

Introduction:

Reading is decoding print. It is a way of deciphering, interpreting, understanding or making sense of a given text. It is one of the most important language skills. Listening, speaking, reading and writing are the four fundamental language skills. Listening and reading enable the language learners to receive information from the text or they are termed as receptive skills. Since speaking and writing involve producing skills.

Reading has a great relevance to the people of all ages, levels and fields. Francis Bacon a great philosopher and writer, has stated "Reading is so powerful that it makes an ignorant person can become a wise one through the power of reading." In this sense, reading has the power to transform a man from ignorant, dull and stupid to a perfectly learned and sane one.

There are different types of reading; loud reading, intensive and extensive reading, slow reading skimming, scanning, intensive and extensive reading. All these are the techniques of reading. We can choose any one depending upon what types of reading texts or the books we are going to read and be tested, "others to be swallowed, and some few to be chewed and digested", the way we read any text is determined by type, nature and the importance of the given text.

Intensive Reading:

Intensive reading refers to reading shorter texts to extract specific information. This is an activity involving reading for detail. Intensive reading means students are expected to understand for detail. Intensive read and be able to answer detailed vocabulary and comprehension questions. In intensive reading, the students read not only for detailed comprehension of meaning but also for mastering the structures and vocabulary. Through intensive reading, a non-native speaker can hope to surpass even the native speaker in the development of writing skill.

a) Comprehension:

Reading comprehension is a test of the reader's ability to read and understand unfamiliar materials and to respond

appropriately to the matters and problems discussed in a text. It involves extracting informations from a text. In the process of reading, the reader meets the mind of the author in the text. It is an exempt ideas of the text and his present experience. Reading comprehension is the understanding of the meaning, feeling tone, intention and historical aspects of the text by an individual reader.

Strategies to use for Reading Comprehension:

A testee who is going to tackle the reading comprehension is advised to adopt the following strategies.

1. Read topic sentences and concluding sentences
2. Try to answer the questions in order.
3. Use context clues to understand the passage
4. Read the passage even if you are familiar with the topic
5. Know what works for you.

Note-taking:

The meaning of the word 'note' is 'brief written record as an aid to meaning. Note making acts as tool for gathering resources from many sources and pooling them towards a common objective.'

1. Read the passage
2. Understand the content
3. Identify and underline key words and sentences
4. Copy them down. You can use your own abbreviations.
5. Group these essential expressions according to the sequence.
6. Give suitable title to the notes and subtitles to the paragraphs.
7. If necessary, you can copy meaning quotations from the passage.
8. You can write down the title of the passage, page no., the author, the publisher and the year of publication.
9. Compare your notes with the passage for content accuracy.

A Sample Note

Title: Buying a pocket calculator

Headings:

1. Things it can do

- a) Arithmetical functions
- b) Memory
- c) Special purpose
- d) Programmable
- e) Print out

2. Ease of use

- a) display
 - i) Clear
 - ii) bright
- b) Keys
 - i) Size
 - ii) Shape
 - iii) Space between keys
 - iv) One function better
 - v) Click

3. Power unit

- a) Mains-operated
- b) Battery- operated
 - i) ordinary battery
 - ii) long life battery
 - iii) rechargeable battery
- c) Summary writing:

'Summary' refers to something in condensed form. A summary is the 'summed up' version of a lengthy text. Summary writing is one of the most important study skills needed by professional students. It also helps in reading as it forces us to focus on what we read. Summarizing also improves our ability to write

concisely be making us aware of the kind of details or expression that can be avoided to achieve precision in writing. Summarizing is an essential study skill required for study purposes. Students need summarizing skills for various purposes. It involves reducing the text to one-third its original version.

Techniques of Summary writing

1) Selection

2) Rejection

3) Substitution

1) Selection

The candidates involved in writing summary select the theme, the main ideas, key phrases that support the main ideas.

2) Rejection

The unimportant details are rejected. The information that is unnecessary or redundant can be omitted. Mostly the following things are rejected.

a) repetitions

b) examples and illustrations

c) redundant expressions

d) minor supporting details

3) Substitution

The technique of substitution includes synthesis or combining sentences, sentence substitution and one word substitution.

4) Contextual questions based on facts and imagination

Context refers to the combination of vocabulary and grammar that surrounds a word. Context can be a sentence or a paragraph or a passage. Context helps the reader make a general prediction about meaning. Having prediction from contexts is very important when the candidate is reading a text in foreign language.

5) Interpreting

The term interpret means to explain the meaning of something. Therefore by interpretation refers to the

particular way in which something is understood or explained. In this way interpreting text involves explaining the meaning of the text. There may be some unusual words and unfamiliar expressions. If the text is technical there can be the technical terms which are used in specific technical field for some special sense.

A. Sample Summary

Passage

Manners are the ornament of action and there is a way of speaking a kind word or of doing a kind thing, which greatly enhances their value. What seems to be done with a grudge, or as an act of condescension, is scarcely accepted as a favour. Yet there are men who pride themselves upon their grubbiness and though they may possess virtue and capacity their manner is often such as to render them almost in supper table. It is difficult to like a man who though he may not pull your nose, habitually wounds your self respect and takes a pride in saying disagreeable things to you. There are others who are dreadfully condensing and can not avoid seizing upon very small opportunity of making their greatness felt. When Abernethy was canvassing for the office of surgeon to st. Bartholomew Hospital, he called upon such a person a rich grocer, one of the governors. The great man behind the counter, seeing the surgeon enter, immediately assumed the grand air towards the supposed supplicant for his vote. "I presume, Sir, your life." Abernethy, who hated humbugs and felt nttled at the tone, replied "No, I don't. I want a penny worth for figs; come, look sharp and wrap them up I want to be off!"

Summary

Manners add to the grace of an action. Anything said or done politely enhances the value of action. Yet some people pride themselves upon their rude behaviour and take delight in habitually wounding the self respect of others. There are others who always assume a superior tone and try to impress their greatness upon others. Abernethy, while canvassing for the post of surgeon to st. Bartholomew Hospital, visited a rich grocer who, thinking he had come for his vote, assumed a grand air, but Abernethy ordered him to wrap up quickly a pennyworth of figs for him.

B. Extensive Reading

This implies supply of long reading passages or books that students can take away to read in their leisure time. It also implies a measure of freedom and non-interference from the teacher so there should be little follow-up. The aim is to get the students reading for enjoyment. In extensive reading students should have a general understanding of the text without necessarily understanding every word. In extensive reading pupils read for information or simply for the pleasure of reading. The primary reading following language activities can be performed.

i) Title/ Topic speculation

ii. Finding theme

iii. Sketching character

i) Title speculation

Title/Topic speculation represents forming an opinion about something. Title/Topic speculation is one of the things that the students may be asked to do after reading the texts given for extensive reading purpose. Students may suggest a suitable title or topic.

ii) Finding theme

Theme means central idea. Every passage may contain a theme. The main idea or the message which the passage is intended to convey can be generalized through a cursory reading over the passage. Generally, the theme is found in the topic sentence which lies either in the beginning, the end or the middle of the passage. The teachers involved in teaching extensive reading should encourage the students to find the theme.

iii) Sketching Character

There can be some people or animals describing or playing some active roles in the literary texts. The people or animals found described in the texts are known as characters. We may find these people or animals playing active or passive good or bad roles. Describing their roles, importance and physical as well as spiritual world is known as sketching character. The students may be asked to sketch the character as a part of language activity when they are given a lengthy text for extensive reading purpose.

of heat and steam generation and removal from the water-tubes. The heat released by the fuel is quickly gathered and transferred to the water. This heat transfer occurs through the walls of the tubes. The heat transfer is achieved by convection, conduction, and radiation. The heat transfer is affected by the type of boiler, the design of the boiler, and the operating conditions. The heat transfer is also affected by the type of fuel used, the fuel characteristics, and the operating conditions.

Section - 1

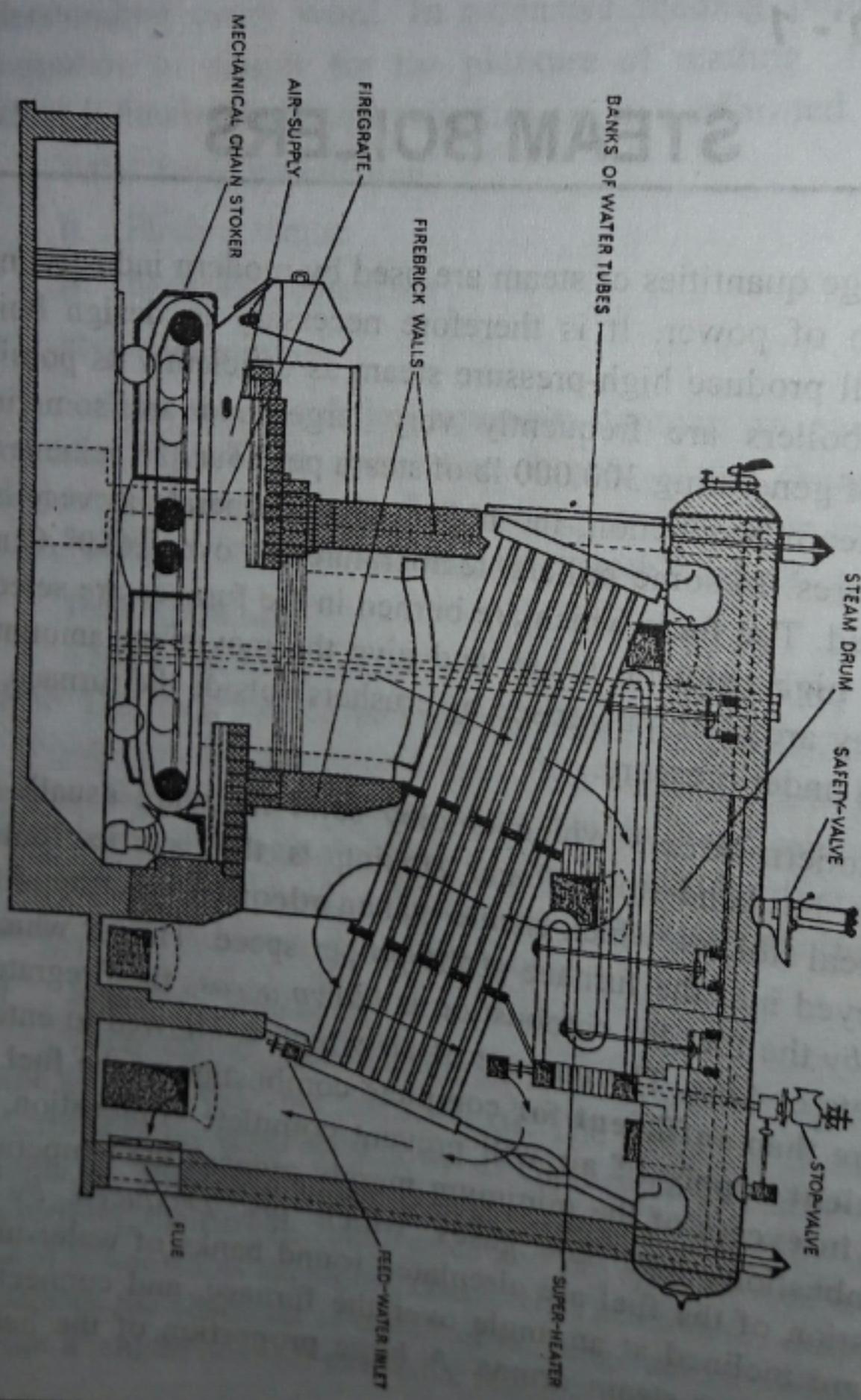
STEAM BOILERS

Large quantities of steam are used by modern industry in the generation of power. It is therefore necessary to design boilers which will produce high-pressure steam as efficiently as possible. Modern boilers are frequently very large, and are sometimes capable of generating 300,000 lb of steam per hour. To achieve this rate of steam production, the boilers should operate at very high temperatures. In some boilers, temperatures of over 1650° C may be attained. The fuels which are burned in the furnace are selected for their high calorific value, and give the maximum amount of heat. They are often pulverised by crushers outside the furnace and forced in under pressure.

Modern boilers which employ solid fuels are usually **too large** to be hand-stoked, and stoking is then carried out by mechanical stokers, which ensure that an **adequate** quantity of fuel is conveyed into the furnace at the proper speed. The air which is *needed* by the fuel for combustion is *blown across* the firegrate by steam jets or fans. The amount of air which is allowed to enter is just more than **sufficient for** complete combustion of the fuel. An **insufficient** supply of air will prevent complete combustion, but any air **in excess** of the minimum merely reduces the temperature of combustion. The hot gases which are produced by the combustion of the fuel are circulated round banks of water-tubes. These are inclined at an angle over the furnace, and connect the upper and lower steam drums. A large proportion of the heat is

absorbed by the water in the boiler. The remainder may be used to heat up the incoming air-supply through an air-heater. The water and steam in the boiler should circulate freely. The water and steam circuits are designed to allow the greatest possible fluid velocity to be attained, and rapid movement of the fluid is achieved by forced circulation. This assists rapid heating and also prevents the formation of steam pockets in the tubes.

Cross-section of boiler with mechanical stoker



Loss of efficiency in the boiler will be caused by the dissipation of heat through the walls of the combustion chamber. This heat loss can be considerably reduced by the use of firebricks round the walls of the chamber. This helps to insulate the chamber and to conserve the heat which is generated. However, at the temperatures which are attainable in modern boilers, the solid walls of the furnace are liable to be damaged by excessive heat. To avoid this, they are often lined with water-tubes, and some of the heat of combustion is absorbed by the water.

The steam from the boiler is passed through a superheater and out past a stop-valve at a high pressure. A fresh supply of water is fed by pumps into the boiler to replace it. The feed-water should be pure, and free from dissolved salts which will cause deposits on the tubes and lead to overheating.

Convection

1. The warm air is conveyed upwards and displaces the cold air.
2. The heat from the engine is carried away by the air-stream.
3. The heat from the engine is transmitted by convection into the air.
4. When the liquid is heated from the bottom, a convection current is set up.

Conduction

1. The heat from the furnace is conducted through the cylinder walls.
2. The heat of the soldering iron is conducted to the metal of the joint.
3. Power from the generator is conducted through cables to every house.
4. The heat from the steam is transmitted through the tubes by conduction.
5. Some substances are better conductors of electric current than others.
6. Copper is a better conductor of heat than iron.

Radiation

1. The heat of the sun is conducted to the earth by radiation.
2. Heat from the fire is transmitted to the walls of the furnace.

Carry or Take

1. Boiler tubes convey the water from the upper drums to the lower drum.
2. Lorries convey the machinery to the docks ready for loading.
3. The exhaust steam is conducted led through a blast pipe.
4. The steam is conducted lead through nozzles onto the blades.

1. Comprehension

- A. What is the topic of the first paragraph?
- B. In your opinion what might be the advantage of mechanical stokers over hand stoking?
- C. Where does heat come from to heat water in the boiler?
- D. What do you mean by 'dissipation of heat' and what is its result?
- E. How is this problem solved?
- F. What does the word 'it' refer to in the last but one sentence of the last paragraph of this text?
- G. What is the tone of this passage?
- H. How are ideas organized in this text?

2. Short questions

- A. How do modern boilers function?
- B. The second paragraph of the text talks about a process.

Rewrite that paragraph using appropriate connectives of preceding actions e.g. before, simultaneous actions eg. when, and following actions.

3. Long Discussion questions

- A. In your opinion what are the advantages and disadvantages of steam?
- B. Justify the suitability of steam boilers as a source of energy in this modern age.

- C. Point out weaknesses of steam boilers and suggest any other better option of source of energy in context of Nepal. Tell why you think that could be the better option.
- D. Identify possible fields of using steam boilers as source of energy by replacing other in context of Nepal and decide whether it is good or bad.
4. Replace the underlined words and expression in the sentences below by choosing appropriate words and expressions from this list (some words and expressions can be used more than once) keep, escape use sparingly, reaching used wastefully, taking in.
- A. The aircraft is capable of attaining a speed of 4000 miles per hour.
 - B. With certain modification the machine will be capable of achieving a greater efficiency
 - C. Dark surfaces are capable of absorbing heat more than the bright surfaces.
 - D. The refractory linings of the furnace conserve the heat in
 - E. The government tries to conserve the natural resources of the country.
 - F. In many countries the natural resources are being dissipated.
 - G. 60% of the heat which the engine produces is dissipated through the cylinder walls.

GRAMMAR

Passive Verb+ by+ agent

Example:

Active: The postman delivered the letters.

Passive: The letters were delivered by the postman.

Change the verb given in the brackets into passive sentences using the present tense, and where possible the past and the future tense.

1. The bridge (.....build.....) the Know-all Construction Company.
2. Heat (.....generate.....) friction.
3. Many engineering scholarships (....give....) the government.
4. Blow holes in castings (....cause.....) bubbles of trapped air.
5. A large proportion of the heat (....absorb...) the water.
6. Three machines can (....control.....) a single operator.
7. The light (....refract...) the surface of the glass.
8. A very strong joint (.....produce....) a vee-shaped weld.
9. Unequal contractions (....produce....) rapid cooling of the metal.
10. Coal (....form....) the decay of vegetable matter.
11. Somebody must have taken it while I was out.
12. They treated us to some ice-cream.
13. The doctor had to operate on him to find out what was wrong.
14. Didn't anybody ever teach you how to behave?
15. I can assure you I will arrange everything in time.
16. A sudden increase in water pressure would break the dam.
17. Men can shell cities from a distance of several miles.
18. One cannot orange if anybody has peeled it.
19. The police are sure to ask you that question.
20. They should not make the celebration an excuse for bad behavior.
21. Let me know if there is anything we should do.
22. Poverty drove him to desperation.
23. They tell me somebody has shot your uncle.
24. They can't put you in prison if they haven't tried you.
25. I should love someone to take me out to dinner.
26. His grandmother brought him up, and he got his education in Paris.

Technical Communication in English

27. Naturally, one expects you to interest yourself in the job they have offered you.
28. It must have disappointed him terribly that people told him they didn't want him.
29. They must have given you the paper they meant for advanced candidates.
30. Someone had already promised me a watch for my birthday when they presented me with one as a prize.
31. It surprised me to hear someone had robbed you.
31. When women had disappointed you as many times as they have him, you can truly say bad luck has dogged you.

Section - 2

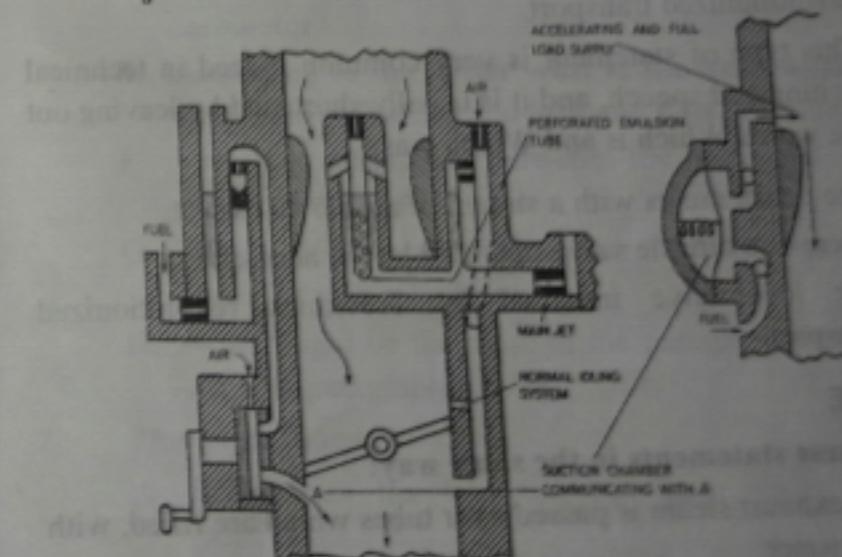
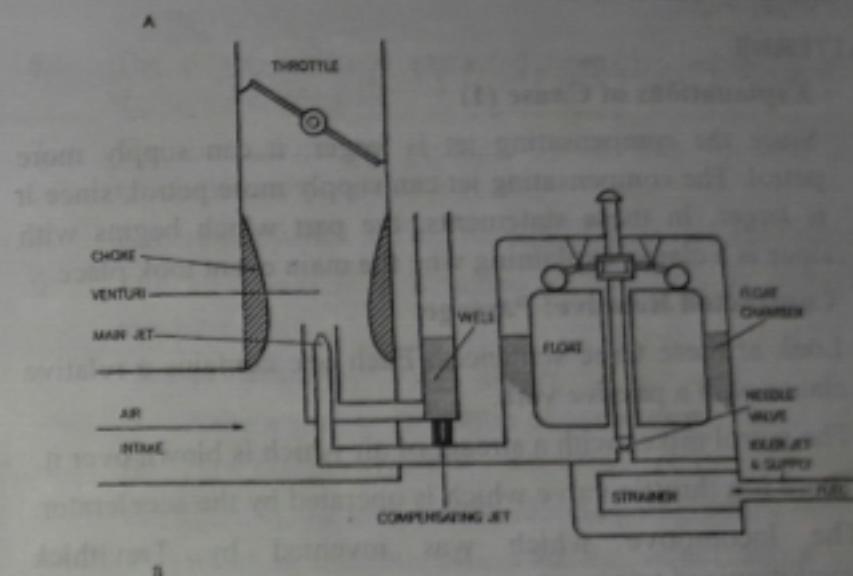
THE CARBURATION SYSTEM

Since it is essential to secure rapid and complete combustion in the cylinder of an internal combustion engine, the fuel and air mixture must be thoroughly mixed; and further, it must be in the correct proportions for all running conditions of the engine. This is accomplished by means of a device called a carburettor. In this carburettor, a stream of air blown over a jet mixes intimately with a spray of petrol drawn out of it. The jet is inserted into a choke or venturi in the intake manifold, and is supplied with petrol at atmospheric pressure.

During the suction stroke of the piston, the pressure in the intake manifold is below atmospheric, and air is induced through the intake and over the jet. As there is a further drop in pressure at the venturi, the pressure difference produced is large enough to draw petrol up out of the jet and atomise it. The level of the petrol in the jet is kept constant by the float and needle valve in the float chamber, which acts as a reservoir for the fuel. Above the venturi there is a throttle valve operated by the accelerator pedal, which controls the amount of mixture admitted to the cylinder.

However, this simple form of single-jet carburettor will not give correct mixture strength for all engine speeds. The chief difficulty encountered is that, at high running speeds, the amount of petrol taken up at the jet will increase faster than the increase in air-flow. Therefore a carburettor set to give correct mixtures at low speed will give a progressively richer mixture as the speed

increases. To compensate for this, a second jet is provided, fed from a well open to the atmosphere and supplied with petrol from the float chamber. Owing to the fact that this compensating jet is larger than the main jet, it can supply petrol at a quicker rate than the main jet until the well is emptied. As the speed is increased, more and more of the petrol required is drawn from the main jet. The compensator jet can now supply only as much petrol as can pass through the small compensator orifice in the float chamber.



(a) Early carburetor with simple compensating jet
(b) Down draught carburetor

Another problem to be solved is that of starting. In order to obtain the rich mixture required for starting, the throttle must be almost closed. As the air velocity is then very low in the venturi, insufficient petrol is drawn out of the jet. This difficulty is overcome by the provision of an idler jet in the wall of the intake manifold near the throttle valve. This jet will only function when the throttle is nearly closed. When it is opened for faster running, the suction round the edge of the throttle decreases, and the idler automatically ceases to act.

PATTERNS

1. Explanations of Cause (1)

Since the compensating jet is larger, it can supply more petrol. The compensating jet can supply more petrol, since it is larger. In these statements, the part which begins with since is a clause explaining why the main event took place.

2. Contracted Relative: Passage

Look at these three sentences. Each one contains a relative clause with a passive verb.

The petrol mixes with a stream of air which is blown over it.
There is a throttle valve which is operated by the accelerator.
The locomotive which was invented by Trevithick revolutionized transport.

This type of statement is very common indeed in technical writing and speech, and it is usually shortened by leaving out the words Which is and Which was:

The petrol mixes with a stream of air blown over it.
There is a throttle valve operated by the accelerator.
The locomotive invented by Trevithick revolutionized transport.

EXERCISE

Change these statements in the same way:

- The exhaust steam is passed over tubes which are filled, with cold water.

- The tube area which is exposed to the incoming steam is relatively large.
- The efficiency of an engine is the ratio of the work which is done to the heat which is received.
- The power which is demanded from modern turbines is continually increasing.
- The research which is being carried out on this subject is extensive.
- The steam which is extracted from the turbine is passed through a condenser.
- The manufacturing process which was adopted was a revolutionary one.
- Generators which are not required for service are stopped.
- The steel which is obtained in this way is suitable for machine tools.

1. Comprehension

- Write a simple definition of carburetor.
- How does it work?
- Identify the topic of the second paragraph.
- What is the impression of the writer about single-jet carburetor?
- According to the writer what is the main weakness of single-jet carburetor and how can it be prevented?
- Tell the difference between the main jet and the compensating jet?
- What type of relationship is there between the speed and the amount of petrol drawn.
- What might be the topic of the paragraph that precedes the first paragraph?

2. Short questions

- Summarize the text in your own words as far as practicable.
- Write a simple verbal description of 'Early carburetor with simple compensating jet' expressed in diagram 'A'.

3. Long Discussion questions

- A. Think about any other mechanical or electrical system that you came across in your life and compare that to the carburetion system.
- B. How careful you should be to follow each and every step in a procedure to make it successful. In case, one step is missed in functioning a carburetor what might be its outcome?
- C. Talk about the use of diagrams in technical passages and tell how did the diagrams help you to understand this passage.

4. Complete the blanks in the following sentences from the list of words and expressions given:

allow for, counteracted by, compensate for, equipped with, inserted in equipped with, installed in, provided with, fitted on

- A. The hospital is.....x-ray facilities.
- B. A central heating system was the house 1st year.
- C. The advertisement was.....the news.....paper yesterday.
- D. A generating station..... electricity to the city
- E. Air for combustion is.....the furnace
- F. The furnace is.....air
- G. Expansion joints of various kinds are steam pipes.
- H. Boilers are safety valves.
- I. The turbine is built in section to expansion.
- J. An idler jet is provided to low air velocity in the venturi.
- K. The disadvantages of the jet engine are its many virtues.

1. Comprehension

- A. What are those which affect the speed at which electrons flow?
- B. Produce two examples each on your own for electrically good conductors and insulators.

- C. Define 'ionisation' as used in the text.
- D. Locate the main idea of the second paragraph.
- E. Suggest a suitable topic for the third paragraph.
- F. What type of relationship is there between the resistivity of insulators and temperature?
- G. With reference to the text, what do you mean by 'dielectric strength'?
- H. Being insulators both cotton and rubber are different. why?

2. Short questions

- A. What lesson do you learn from this text. Support your answer with examples.
- B. In context of this text, justify the suitability of the given diagram.
- C. Prepare a note from this text.

3. Long Discussion questions

- A. Explain with examples the statement knowledge of conduction and conductivity is equally important for a person living in a small house to a person working in a large scale industry.
- B. Imagine in a remote village of Nepal electrification is going to be introduced in near future what kind of awareness programme would you prepare and implement?
4. Use the following words and expressions in sentences of your own to make the meaning clear:
consider as, classified... as, referred to as, as much and used as.

Grammar**Contracted Relative: Passive**

Look at these three sentences. Each one contains a relative clause with a passive verb.

- A. The petrol mixes with a stream of air which is blown over it.

- B. Ans. The petrol mixes with a stream of air blown over it.
- B. There is a throttle valve which is operated by the accelerator.
- Ans. There is throttle valve operated by the accelerator.
- C. The locomotive which was invented by Trevithick revolutionized transport.
- Ans. The locomotive invented by Trevithick revolutionized transport.

Change these statements in the same ways:

1. The exhaust steam is passed over tubes which are filled with cold water.
2. The efficiency of an engine is the ratio of the work which is done to the heat which is received.
3. The power which is demanded from modern turbines is continually increasing.
4. The research which is being carried out on this subject is extensive.
5. The steam which is extracted from the turbine is passed through a condenser.
6. The torque which is exerted is exerted on the crankshaft should be even.
7. The manufacturing process which was a revolutionary one.
8. Generators which are not required for service are stopped.
9. The steel which is obtained in this way is suitable for machine tools.

□ □ □

Section - 3

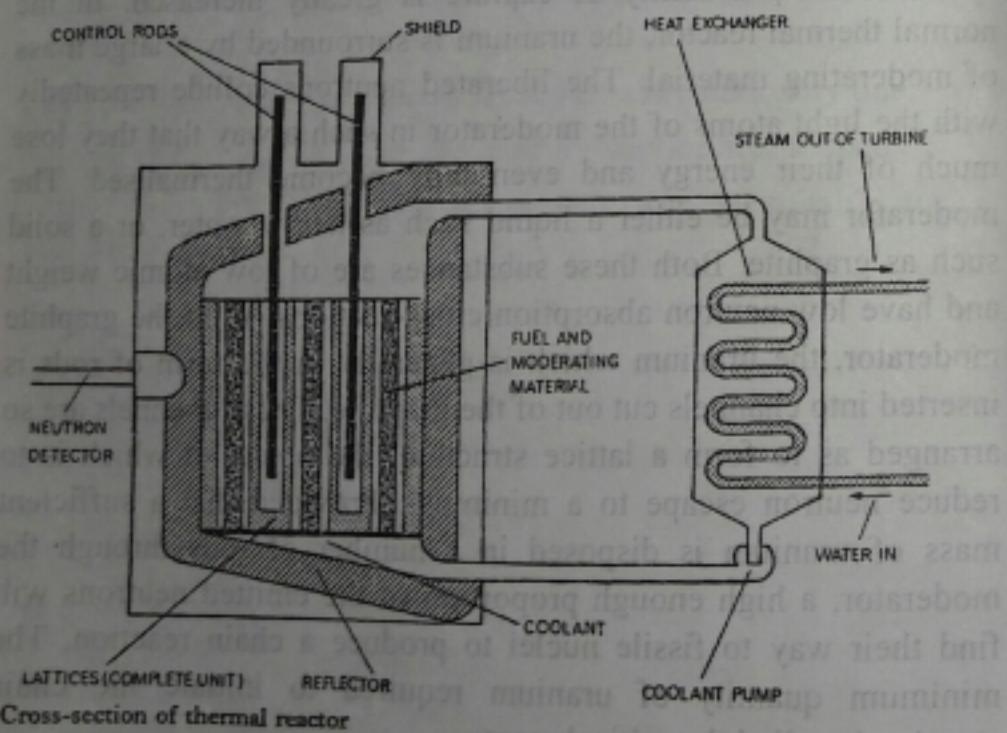
CHAIN REACTION

When fission occurs, an average of 2-5 neutrons are emitted from the nucleus. If the fission process can be so arranged that one of these liberated neutrons is captured by another U-235 nucleus to produce another fission, then the reaction will become self-sustaining.

When emitted, neutrons travel at a high velocity, and it is known that such fast neutrons have little chance of being captured by the fissile Uranium. However, if slowed down to thermal speeds, their probability of capture is greatly increased. In the normal thermal reactor, the uranium is surrounded by a large mass of moderating material. The liberated neutrons collide repeatedly with the light atoms of the moderator in such a way that they lose much of their energy and eventually become thermalised. The moderator may be either a liquid such as heavy water, or a solid such as graphite. Both these substances are of low atomic weight and have low neutron absorption cross-sections. With the graphite moderator, the uranium which is generally in the form of rods is inserted into channels cut out of the graphite. These channels are so arranged as to form a lattice structure, the object of which is to reduce neutron escape to a minimum. Provided that a sufficient mass of uranium is disposed in a number of rods through the moderator, a high enough proportion of the emitted neutrons will find their way to fissile nuclei to produce a chain reaction. The minimum quantity of uranium required to initiate the chain reaction is called the critical mass.

Once irradiated, the uranium fuel elements tend to lose strength and become wrinkled. It is therefore necessary to encase them in a can or cladding of some material such as aluminium or magnesium. These cans are designed so that they not only support the uranium inside, but also contain the highly radioactive fission products, and prevent reaction taking place between the fuel and the coolant.

A chain reaction can be initiated by inserting more and more fuel elements into the reactor core until critical mass is attained. It can be terminated by withdrawing the rods. Once started, the chain reaction must be controlled in such a way that a steady neutron flux rate, and thus a steady production of heat energy, is maintained. The simplest method of control is by inserting control rods of cadmium, or some similar material with a very high neutron absorption cross-section, into the moderator. The purpose of the control rods is to absorb the neutrons emanating from a fissioned nucleus. If therefore there is an increase in the neutron flux rate in the reactor, more control rods can be inserted until the reaction rate is stabilised again; that is, until the multiplication factor is exactly 1.



Comprehension

- A. Define the term 'fission'.
- B. What kind of relationship is there between the velocity of neutrons and their chance of capture?
- C. How do neutrons become thermalised?
- D. According to the context what do you mean by 'moderation'?
- E. What is the topic of the third paragraph?
- F. How can the chain reaction be controlled?
- G. How are ideas organized in this text?
- H. What might be the objective of writing this text?

2. Short questions

- A. Prepare a note on this text.
- B. What makes you feel that this is a technical passage? Talk about its presentation technique also.

3. Long/ Discussion question

What are other field in your surrounding where the term 'chain reaction' is applicable? You can interpret it in different ways.

4. Select the correct option:

- A. The aircraft maintained the same speed for several hours.
 - a. Keep up
 - b. Keep going
 - c. Withstand
 - d. hold
- B. The machinery is simple to maintain.
 - a. Jeep up
 - b. keep in good condition
 - c. use
 - d. holds
- C. The factory sustained heavy damage in the fire.
 - a. withheld
 - b. held
 - c. suffered
 - d. repaired
- D. The metal sustained a lot of hammering and normalising.
 - a. suffered
 - b. supported
 - c. held
 - d. withheld

- E. The left from the wings must sustain the whole weight of the aircraft.
- support
 - keep in
 - keep up
 - hold
- F. In order to sustain the chain reaction, the multiplication factor must be unity.
- keep up
 - keep going
 - inspect
 - withstand

Grammar

Subject - Verb - Agreement

Rules: 1) When the subjects joined by or, nor, either.....or, neither.....nor are of different persons, the verb agrees with the nearer subject.

e.g., Either you or he is laborious.

Neither he nor you are guilty.

- When the indefinite pronouns each, each one, every, everyone, everybody, nobody, either, neither, and no one take singular verb.

e.g., Many a boy is absent today.

- When two nouns are qualified by each or every, although connected by and, they require a singular verb.

e.g., Every boy and every girl was given sweets.

Exercise:

Put the right verbs.

- When emitted, each neutronat a high velocity.
- Either liberated neutronrepeatedly with the light atom of the moderator.
- When fission occurs, many a neutron.....emitted from the nucleus.
- Each and every fast neutron..... little chance of being captured by the fissile uranium.

- Either a liquid such as heavy as water, or a solid such as graphite.....of low atomic weight.
- Neither you nor he.....willing to come.
- Anybody with a will to work.....welcome.
- Each one of the bookssufficient.
- Neither the doctor nor his daughters.....walking in the park.
- Either of the two bookssufficient.
- The man and women.....determined to tell the truth.
- The horse and carriage.....ready.
- Five and fiveten.
- Churchill, statesman, and writer,.....no more.
- The house, with its contents,.....burnt down.
- The father as well as the sonare absent.
- Dick, together with his friends,drowned.
- Neither Ram nor Shyam.....criminal.
- Every coolie.....his nation.
- Neither he nor I.....in the wrong.
- My friends as well as I.....given books.
- Each of the wounded soldiers.....given first aid.
- Either the writer or the cookdishonest.
- Neither of the plans.....approved.
- Physics.....a difficult subject.
- Tales from Tagorea nice collection of stories.
- Twenty miles.....a long distance.
- My means.....limited.
- Great pains.....been taken to obtain permit.
- He has written a



in their field a number of years ago developed a method which could not be easily distinguished from the original. This was a new form of insulation which had been developed by a number of different companies. It was a good idea to make it available to all manufacturers.

Section - 4

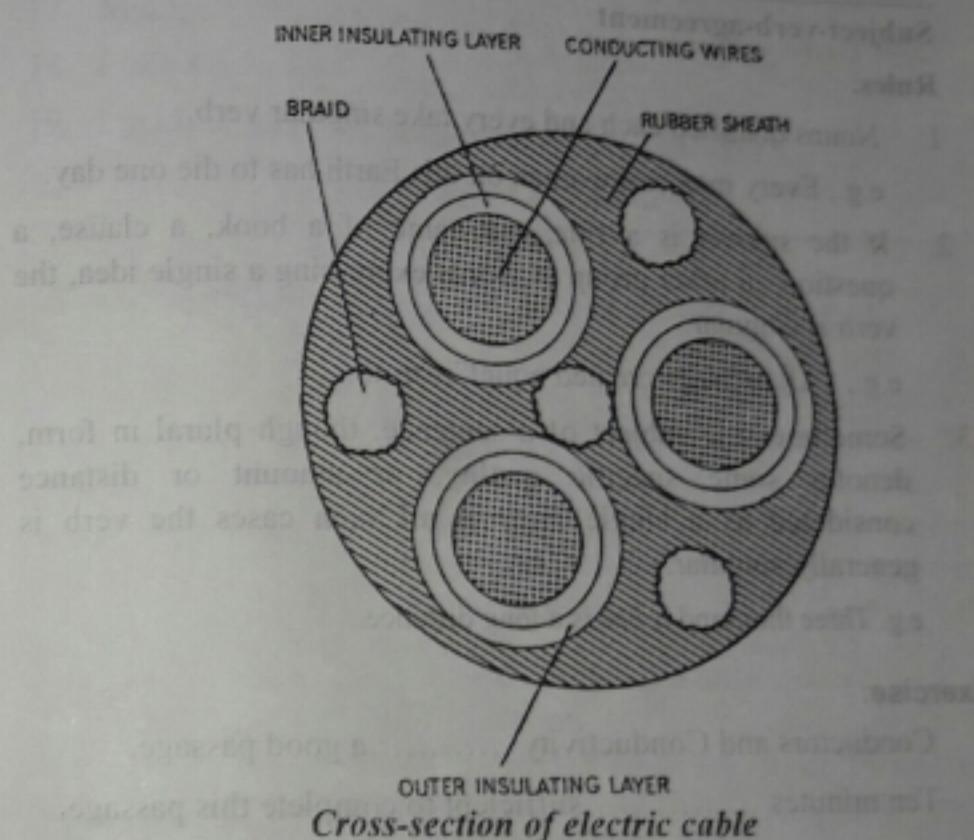
CONDUCTORS AND CONDUCTIVITY

It is usual to consider electric current as a flow of electrons from one point to another through a medium, or even through a vacuum. If the electron flow takes place in a vacuum, as in the case of electronic valves, the electrons will travel at considerable speeds, since little resistance is offered by the medium, and fewer impacts will occur between the electrons. If the medium is a solid - in which case the electrons are more tightly packed - the electron flow will be slower.

All substances may be classified electrically as conductors or insulators, according to the degree of resistance which the medium offers to the flow of current. Most liquids, particularly solutions in liquids, are good conductors. Most gases at normal temperature and pressure are good insulators, but gases maintained at low pressure in a sealed tube allow a flow of current to take place as a result of ionisation of the gas molecules. Solids vary greatly in resistance, some being very good conductors, while others are so resistant that they are referred to as insulators. Electric current is normally transmitted along annealed copper wire.

The resistance of any material to the flow of current is affected by a number of factors, such as the length and cross-section of the conductor, and by its resistivity, which is a specific property of the material at a specific temperature. The temperature

therefore also has some effect on the resistance of a material: in most cases, an increase in temperature causes an increase in resistance. With certain metals, such as copper or iron, the change in resistance which attends on changes in temperature is relatively large - a fact which is utilised in the resistance thermometer, in windings of an electric motor, for instance, by the change in resistance.



Cross-section of electric cable

Some materials have a very high resistance, and as such they can be used as insulators to prevent the leakage of current. Among these materials are asbestos, celluloid, porcelain, cotton and rubber, and recently a number of new materials have been developed, including synthetic textiles such as nylon, and synthetic resins such as vinyl resins. The resistivity of most insulators decreases with an increase in temperature, for which reason the temperatures in insulated conductors must be kept reasonably low. A breakdown of insulation may occur under the application of very high voltages, and it is necessary to know the dielectric strength of any insulating

material. Some materials, such as cotton, which is often used as insulation, are liable to absorb moisture, and this will adversely affect their insulating properties. Rubber, which is a standard insulating material, is liable to deteriorate under sunlight, and it is therefore advisable to protect it with some weather proof material.

Grammar

Subject-verb-agreement

Rules:

1. Nouns qualified each and every take singular verb.
e.g., Every man and women on this Earth has to die one day.
2. If the subject is a title, the name of a book, a clause, a question, or other group of words expressing a single idea, the verb is singular.
e.g., "All men are created equal" is truth.
3. Sometimes the subject of a sentence, though plural in form, denotes some specific quality, or amount or distance considered as a single unit, in all such cases the verb is generally singular.
e.g. Three thousand miles is a long distance.

Exercise:

1. Conductors and Conductivity a good passage.
2. Ten minutes sufficient to complete this passage.
3. Most liquids are good conductors a fact.
4. The horse and cart at his door.
5. Three Musketeers written by Alexander Dumas.
6. One of the books missing.
7. Bread and milk wholesome food.
8. The officer, along with his clerks, in the office.
9. The prime minister as well as his entire cabinet there.
10. The president and member of ex-official in the meeting.

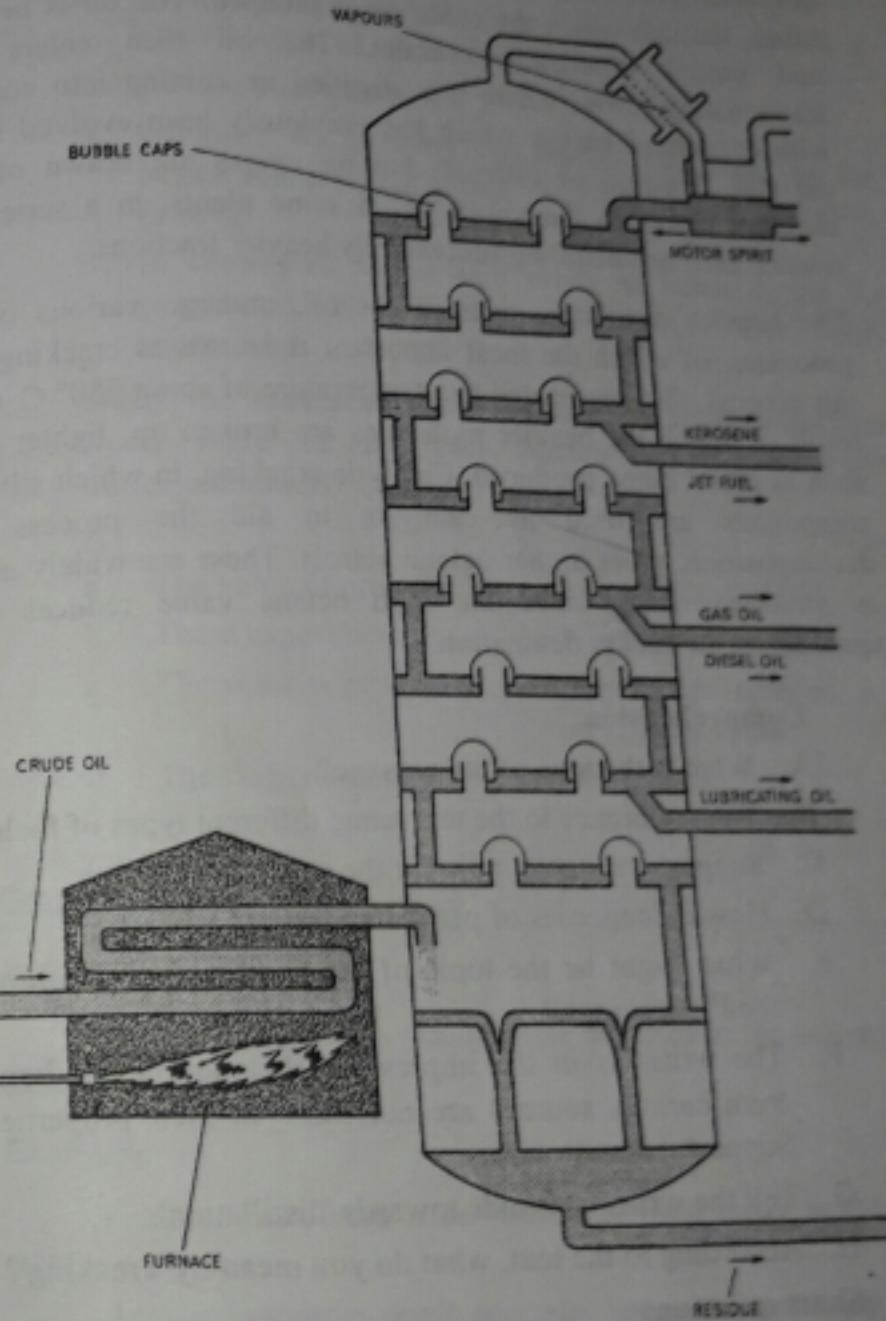
11. The philosopher and the statesman required.
12. My friends as well I joining the army.
13. Neither Ram nor his relatives coming to my place.
14. Either of the two boys willing to work.
15. Nobody helping me.
16. The dollars enough for me.
17. Mumps a dangerous disease.
18. I like a man who laborious.
19. I made a list of the things that needed.

Section - 5**PETROLEUM**

Petroleum is the largest source of liquid fuel, and, in spite of attempts to develop synthetic fuels, and the continued use of solid fuels, world consumption of petroleum products is about four times greater now than in 1940.

Crude petroleum oil from different oilfields is never exactly identical in composition. Although all petroleum is composed essentially of a number of hydrocarbons, they are present in varying proportions in each deposit, and the properties of each deposit have to be evaluated. Samples are subjected to a series of tests in the laboratory, the object of which is largely to determine the correct processing methods to be adopted in each case.

Petroleum is not normally used today in the crude state. The mixture of oils of which it is composed must be separated out into a number of products such as petrol, aviation spirit, kerosene, diesel oils and lubricants, all of which have special purposes. The main method of separation used in refineries is fractional distillation, although further processing is normally required to produce marketable petroleum products. The different hydrocarbons present in petroleum have different boiling temperatures, and the fractions can therefore be isolated according to their boiling temperatures. Petrol, for instance, is a mixture of the lower-boiling hydrocarbons, with boiling temperatures ranging from 100° to 400° C. Diesel oils on the other hand have boiling temperatures of upwards of 400° C.



Cross-section of oil distillery

Distillation was originally carried out in batch-stills and, although this is still done for special purposes, the development of the pipe-still has revolutionised refinery processes, since it allows continuous vaporisation and rectification of the fractions. The pipe-

still consists of a brick-lined furnace, in which is fitted a battery of tubes, through which the crude oil is pumped. The oil is heated, and partial vaporisation occurs. The oil then enters the fractionating tower, where it is distilled by coming into contact with condensed vapour which has previously been evolved from the still. Fractions of different boiling ranges are drawn off at different points in the tower, or, in some plants, in a series of towers, each one distilling successively heavier fractions.

The heavier distillates, such as gas oil, undergo various other processes, of which the most important is known as cracking. In this process, they are heated to a temperature of about 550°C , as a result of which the heavier molecules are broken up, lighter oils such as petrol being produced. Catalytic cracking, in which silicon compounds are used as catalysts to aid the process of decomposition, gives higher octane petroliums. These are widely used as motor-car fuels, since the high octane value reduces the tendency of the fuel to detonation.

1. Comprehension

- A. What is the tone of the passage?
- B. With reference to the text name different types of fuels.
- C. Suggest a suitable topic for the second paragraph.
- D. How is properties of petroleum tested?
- E. What might be the topic of the paragraph that follows the 1st paragraph?
- F. The writer is in the impression that petroleum drawn from carious sources are not same in their properties. Support this with facts.
- G. Tell the writer's attitude towards 'distillation'.
- H. According to the text, what do you mean by 'cracking'?

2. Short questions

- A. Except the first paragraph of the text the writer talks about distillation. Collect those views in a single paragraph in you own words as far as practicable.

- B. Write a simple description of the diagram named a 'cross-section of oil distillery.'
- 3. Long Discussion questions
- A. Comment on 'Nothing can replace petroleum as the largest source of liquid fuel'. You can agree or disagree, or both.
- B. In context of Nepal what might be better option for petroleum? Will it be more cheaper and easily accessible?
- 4. Study the sentences under column 'A' with underlined word 'valve' in each case. Match meaning of 'valve' under column 'B'

A

- a. The value of property is
- b. There experiments have
- c. The velocity of flow is
- d. The ring has great

B

- a. Amount Rs. 100,000/-
- b. Worth been of some valve.
- c. Importance reduced to a negligible valve
- d. Usefulness sentimental valve for me.

Grammar

Rule:

If "by" is not given, you can use the doer in the active voice suitably by yourself.

Example:

Passive: Petroleum is not normally used today in the crude state.

Active: Engineers don't normally use petroleum today in the crude state.

Change passive sentences into active:

- 1. The crude oil is pumped.
- 2. Fractions of different boiling ranges are drawn off at different points in the tower.

3. Silicon compounds are used as a catalyst to aid the process of decomposition.
4. The velocity of flow is reduced to a negligible value.
5. The various losses are evaluated as a percentage of the fuel consumption.
6. The tube is immersed in water and is subjected to rapid heating.
7. These are widely used as motor-car fuels.
8. All petroleum is composed of a number of hydrocarbons.
9. Distillation was originally carried out in batch-stills.
10. This type of word is frequently used to introduce working procedures.
11. English is spoken all over the world.
12. My book was stolen last week.
13. Rice is mainly grown in the Terai.
14. My books have been stolen.
15. The visitors will be shown the new building.
16. The electrician has already been paid for his work.
17. We will be promised higher wages.
18. I was recommended to another doctor.
19. Women are still denied to vote in some countries.
20. Twenty friends are invited in the party.
21. Success must be worked for.
22. That matter must be looked into.
23. The man who was wanted has been found.
24. She was told to go away.
25. The door had been opened.
26. Were you frightened?
27. It is said that Patel is a good teacher.
28. Figs are said to be better for them than bananas.
29. The box has been locked and it cannot be opened.
30. A sound was not heard.

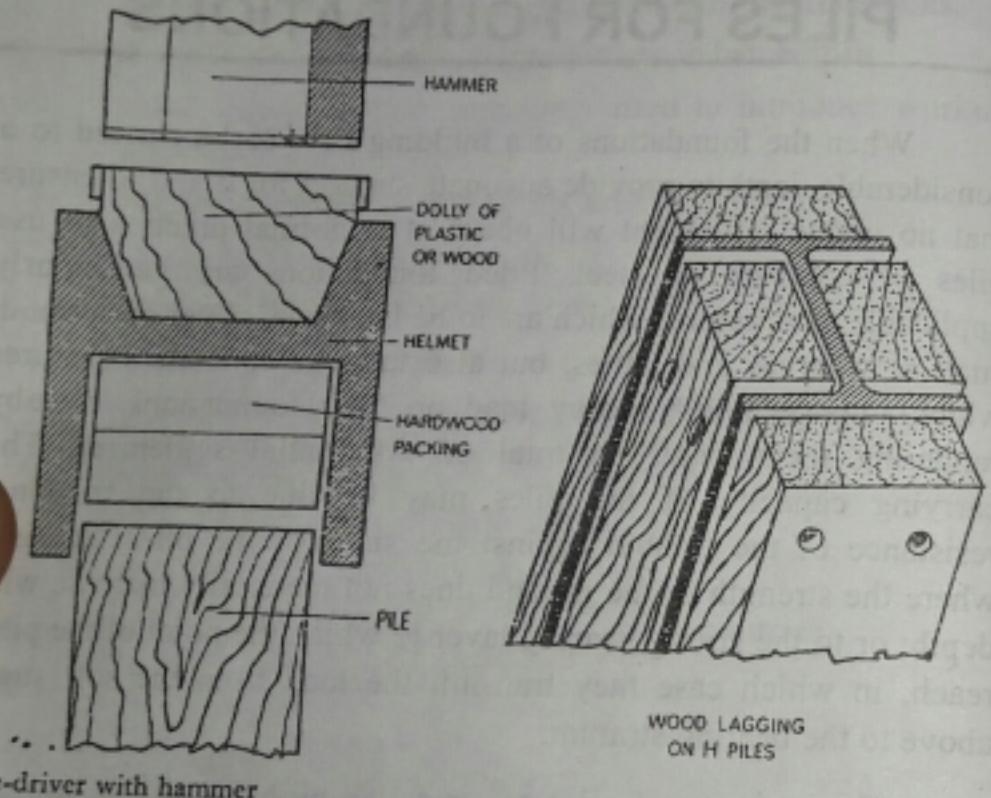
Section - 6**PILES FOR FOUNDATIONS**

When the foundations of a building have to be carried to a considerable depth to provide adequate support for it and to ensure that no undue settlement will occur, it is normal practice to use piles of concrete or steel. Piled foundations are particularly applicable to structures which are to be built over water or on mud, such as wharves and jetties, but also to large concrete structures which impose a very heavy load on their foundations, thereby rendering them liable to total or differential settlement. The carrying capacity of the piles may be due to the frictional resistance of the ground against the sides of the piles, in cases where the strength of the ground does not materially increase with depth; or to the strong bearing layer to which the point of the piles reach, in which case they transmit the load from the soft strata above to the bearing stratum.

The majority of piles are installed by being driven into the ground and displacing the soil through which they pass. Certain soils, however, are difficult to displace by this method, clay being one example, and for this and other reasons an alternative method is adopted, in which the soil is cored out and the hole is then filled with compacted concrete. Such piles are known as *in situ* piles, since they are actually cast in the position in which they are required.

In the case of driven piles, a mechanical pile-driver is required, to hold the pile firmly while it is being driven into the

ground by blows from a hammer moving up and down the frame. The frame in some machines can be adjusted so that the pile is driven either vertically downwards or at the required rake. The amount of penetration with each blow will vary with the force of the impact and the resistance of the ground. The piles are liable to be damaged by the repeated blows of a hammer which may weigh as much as eight tons, and the heads must therefore be protected by a helmet of cast steel, packed with hardwood or some similar material.



Pile-driver with hammer

Steel piles, commonly in the form of H-beams, have a greater strength-weight ratio than concrete piles, and are capable of being driven through hard material with less risk of damage. Extra lengths may be butt-welded on to tile driven sections to increase their length. Where concrete piles are used, they are pre-cast except for those cast *in situ*, and this involves difficult handling and transportation problems, since they are very heavy and may be as much as 100 feet in length. Partly for this reason, driven concrete

piles usually require reinforcement, whereas for the *in situ* piles this is not normally essential, as they are subject to no handling stresses and are not hammered into the ground. When the pile has been driven to the required depth, the reinforcement bars must be exposed at the top by breaking out the concrete, and they are then tied in to the rest of the foundations.

1. Comprehension

- What do you mean by piles?
- Where and why are they used?
- How do driven piles and *situ* piles differ from each other.
- Suggest a suitable topic for the second paragraph.
- Name different piles the writer has mentioned in this passage.
- What topic is dealt under the fourth paragraph?
- What are the advantages of steel piles over concrete piles?
- From which specific this passage might have been extracted?

2. Short questions

- Compare and contrast different types of piles.
- Prepare a note from this passage.

3. Long/ Discussion question

- In recent years, we Nepalese have seen, if not seen, colorful advertisements in Newspapers about multistage apartments from difficult housing companies. In relation to this, talk about suitable of this text.
- Write an essay on importance of different kind of foundation in your life.
- Select any ten technical words from this text and use them in sentences of your own to make their meaning clear.

Grammar**Prepositions of Time and Date**

The prepositions of time and date are **by, at, in, on, during, for, since, from, after, before**. They are used in a variety of situations expressing different shades of meaning.

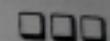
Examples:

- You must be back by four o'clock.
- We met her on the occasion of her marriage.
- Europe was in the throes of war during 1914 to 1990.

Supply the appropriate preposition in the following sentences.

- He travelled in the desert..... six month.
- I arrivedthe concert hall.....good time.
- The rotating shaft bears.....thrusts block.
- The majority of piles are installedbeing driven into the ground.
-they are very heavy and may be as much as 100 feet in length
- It is drivenat a certain angle to the vertical.
-first he opposed the marriage, butthe end he gave his consent.
- Our examination will commence.....15th April 2012.
- He isthis committee.
-miles and miles , there is no greenery to be seen.
- You must be back.....four o'clock.
- I got up six o'clockthe morning.
- He worksthe evening.
- The meeting was heldthe 15th of July, 2011.
- Europe was in the throes of war during 1914 to 1918.
- John has not seen TomMarch.
- John was detainedfive years.
- Tom started his workthe first of August.

- He met Johna long time.
- The sun will risesix o'clock.
- Marry got marriedseventeen.
- Passengers should betime for their train.
- Most people worknine to five.
- He has worked us ever since he left school.
- They met himthe occasion of his marriage.
- Tom wentthe tea party at six o'clock in the evening.
- We were time for train.
- We returnedthe base camp.....during the night.
- He has worked here.....this time last year.
- Back ittwo hours.



Section - 7**SUSPENSION BRIDGES**

Suspension bridges are frequently constructed in preference to other types of bridge, especially where relatively light traffic has to be carried over long spans, since they are more economical in material and are extremely strong. There are in existence suspension bridges with main spans of more than 3000 feet, the entire weight of the deck being supported from above by cables (usually only two or four in number) suspended between two towers at either side of the river.

The cables are composed of thousands of wires, made of high-tensile steel, which are galvanised to resist corrosion. Two or three hundred of these wires, each of about 0.19 inch in diameter, are clamped together *to form* a single strand, and the whole cable may consist of a considerable number of such strands compacted and bound together with wire. In constructing the cable, two distinct methods may be adopted. The wires may either be twisted into strands, the strands then sometimes being twisted round a central strand *to form* the completed cable, or they may be spun parallel to each other, and clamped together at intervals. This latter method obviously involves a much longer spinning operation, since each wire or small group of wires must be spun and adjusted to the correct sag individually, whereas the strands of twisted wire can be erected as units, provided that they are not so heavy as to be unmanageable. However, on bridges with very long spans, there

are certain advantages in the parallel wire method of spinning the cable.

The cables are normally made continuous through the tops of the towers, down through side towers, where these exist, and thence into the anchorage. They bear on specially constructed saddles on the towers, which are shaped to accommodate them, the saddles being either fixed so that the cables may slide over them, or mounted on rollers so that they move with any movement of the cables. In view of the enormous pull exerted by the heavy cables, their ends must be secured in firm anchorages, and unless they can be embedded in sound natural rock, constructions of masonry or concrete must be provided strong enough to withstand the severe pressures put upon them. The cable strands are normally looped round strand-shoes, which are in turn connected by chains to an anchor-plate embedded in the base of the anchorage.

At intervals along the main span, cast-steel cable-bands are attached to the cables, gripping them firmly and excluding moisture from them, and from these bands suspenders of wire-rope or chains hang down. Since these suspenders have to take the weight of the deck to which they are attached, they must have a high tensile strength. One advantage of using the braced-chain suspenders is that they largely dispense with the need for a system of stiffening, being themselves rigid. This stiffening is necessary to resist deformations of the deck of the bridge due to moving traffic loads and also to resist lateral pressures from wind. In the case of wire-rope suspenders, the stiffening must be provided by trusses constructed at the level of the deck, the depth of the truss varying with the length of the span.

1. Comprehension

- What impression is expressed by the writer about suspension bridges?
- Collect expression of measurements scattered over the second paragraph.
- Suggest a suitable topic for the third paragraph.
- Identify an expression of possibility in the second paragraph.

- E. What are two types of cables and what are they made of?
- F. How are ideas organized in this text?
- G. What do you mean by 'stiffening'?
- H. What might be the suitable topic of the paragraph that is to come after the last paragraph of this text?

2. Short questions

- A. How are cables constructed and used in suspension bridges?
- B. Write a summary of this text.

3. Long/ Discussion questions

- A. Considering the topography of Nepal, talk about importance of suspension bridges.
- B. Ropeways are better than suspension bridges in context of Nepal - common on this. You can agree, disagree or both.

4. Fill in the blanks of the sentences by selecting appropriate options from the list given below:

- load, normal load, pay-load a breaking load, an intermittent load, steady load, dead load, live load.
- A. This aircraft carries a very large for its size.
 - B. The bridge cables carry the of the deck and suspenders plus the of the traffic moving over the deck.
 - C. The wire undergoes test to determine its ultimate tensile strength.
 - D. The turbine runs at constant speed under
 - E. The machines should be tested under..... conditions.
 - F. Cranes and hoists carry only an.....
 - G. The is the amount of work which is performed by an engine or motor.

Grammar

Tense: A formal verb

There are of course many hundreds of these Verb+ Adverb constructions in English. But the ones which are illustrated here have a formal verb equivalent, which is commonly used as in technical and scientific writing. They are an essential part of the scientific style, and should be learned.

Example: Take in = absorb

Draw out of = extracted from

Read these statements as they are written. Then substitute a formal verb for the phrase.

1. The heat coming out of a body can be measured by a pyrometer.
2. Large areas of land in Holland have been won back from the sea by dykes.
3. Most synthetic fibres do not easily take in moisture.
4. Multi-stage pumps are made up of several impellers on one shaft.
5. New methods of construction have gradually been brought out through long years of experience and testing.
6. A number of modifications were built into the machine.
7. Tests were carried out on many specimens of soil.
8. The emission of neutrons always goes with nuclear fission.
9. The concrete is stirred up continuously while it is being transported.
10. The spokes of a wheel spread out in all directions from the centre.
11. The lever must be pushed down to start the motor.
12. The turbine blades are liable to be worn down.
13. The two towers were put up in less than a year.

14. At very high speeds, the resistance of the air takes on a much greater importance.
15. The machines can easily be taken to pieces and put together again after they have been looked at.
16. The compaction should be spread out all through the area of the concrete.
17. It should be possible to find out the necessary thickness of the concrete from the formulae.
18. The whole weight of the deck is held up by the four cables.
19. The railway lines seem to go further apart as they come towards the observer.
20. The light is spread out by dust particles in the air.
21. Work on the bridge was started again after the strike was over.
22. The aircraft is driven forward by the thrust from the airscrews.
23. The unprotected pipes are being eaten away by exposure to the air.
24. The cold water goes round and round inside the tubes of the condenser.
25. High speed steel keeps up its hardness well, even at high temperatures.

□□□

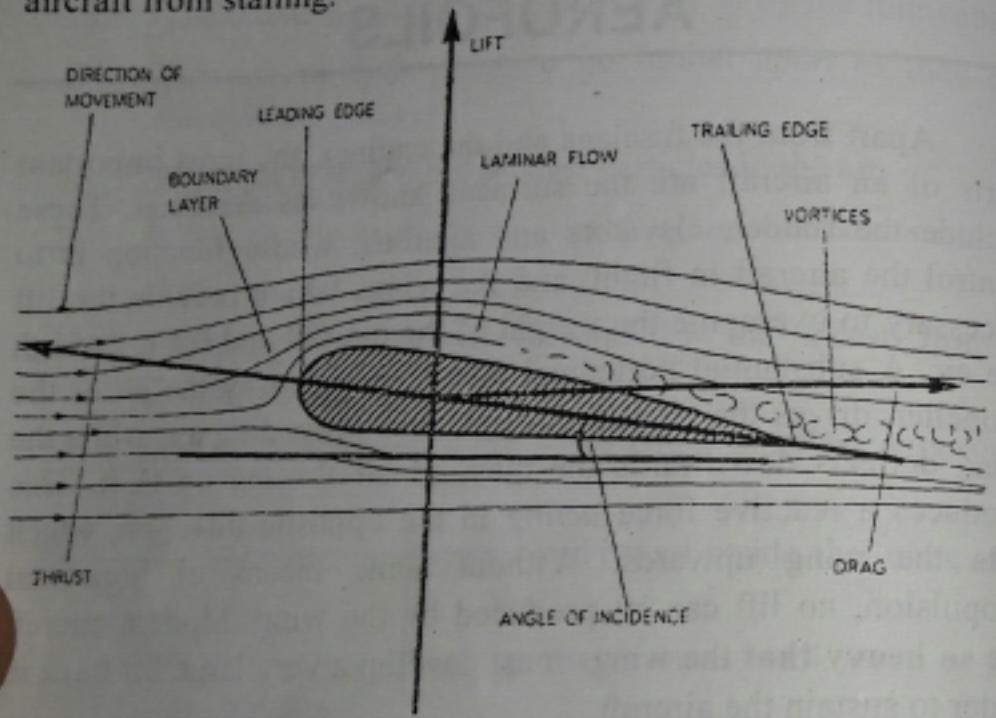
Section - 8

AEROFOILS

Apart from the fuselage and the engines, the most important parts of an aircraft are the surfaces known as aerofoils. These include the rudder, elevators and ailerons, whose function is to control the aircraft in flight; and the wings which provide the lift necessary to overcome the weight of the aircraft and lift it through the air. A substantial horizontal thrust, provided by the jet or the propeller, drives the aircraft through the surrounding air, while the wing deflects downwards the mass of air *flowing* on to it. This produces a reactive force *acting* in the opposite direction, which lifts the wing upwards. Without some means of horizontal propulsion, no lift can be produced by the wing. Modern aircraft are so heavy that the wings must develop a very large lift force in order to sustain the aircraft.

The design of the wings is therefore very important, and various factors have to be considered. Wind-tunnels *reproducing* flight conditions are used to examine the behaviour of air *flowing* over different types of wings at different speeds. The lift produced by a wing will depend on, among other factors, the wing area, its profile, and the angle of incidence - that is, the angle at which the wing is inclined to the direction of motion. Air *flowing* over the top of the aerofoil should flow smoothly and without turbulence. This laminar flow is achieved by streamlining the profile and by making the skin of aerofoil smooth. As a result, the air-flow will follow the contour of the wing, except for a narrow boundary layer of

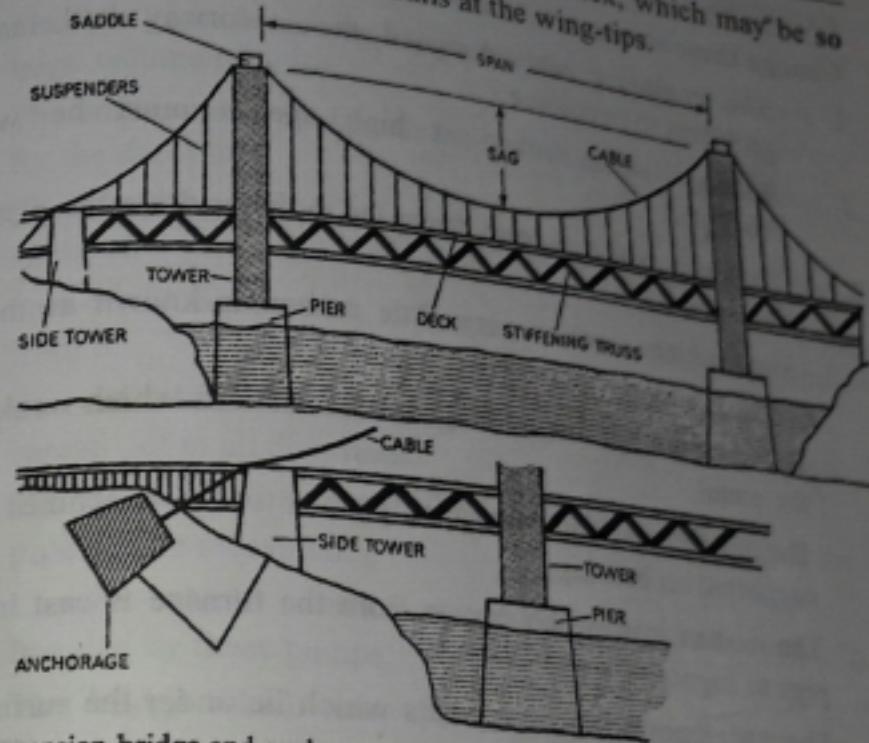
stationary air on its surface. However, above a certain angle of incidence, which varies with the type of wing, the air-flow is liable to break up and become so turbulent as to destroy the low-pressure region above the wing. This causes such a rapid loss of lift that the aircraft may stall. To counteract this, slots are sometimes fitted to the leading edge of the wing, guiding the air-flow more steadily over the aerofoil. Since low speeds are essential for landing, extendable flaps are also fitted to the trailing edge. These extend the effective area of the wing, and thus prevent the aircraft from stalling.



Cross-section of aircraft wing

The force exerted by the deflected column of air beneath the wing has a vertical component called lift, and a horizontal component called drag. Drag in its various forms represents a loss of the energy available to provide lift, but it always accompanies lift. It can never be entirely eliminated, since the wing itself offers resistance to the air through which it moves. A laminar flow over the wing, reducing drag to a minimum, is the optimum condition. But around the wing-tips and on the trailing edge, some turbulence is inevitable. The air, flowing through a region of higher pressure under the wing, swirls up at these edges into a region of low

pressure above the wing and produces a vortex, which may be so violent as to produce vapour trails at the wing-tips.



Suspension bridge and anchorage

Grammar

The Active Relative (-ing)

Look at these sentences:

The man who operates the lathe is a skilled worker.

The spark which passes between the electrodes ignites the fuel.

Wind-tunnels which reproduce flight-conditions are used.

Each of these statements contains a relative clause which is active in form:

When it is in the Present tense (and rarely in the Past tense) a shortened form is used:

The man operating the lathe is a skilled worker.

The spark passing between the electrodes ignites the fuel.

Wind-tunnels reproducing flight-conditions are used.

EXERCISE

Change these statements in the same way:

1. The engineers who designed the motorway had many problems to overcome.
2. Bearings which rotate at high speeds must be well lubricated.
3. The gases which expand down the cylinder drive the piston downwards.
4. Steel which contains very little carbon is known as mild steel.
5. Rapid cooling produces irregular contractions which weaken the metal.
6. The shafting which transmits power to the machines is supported on bearings.
7. The molten iron which comes from the furnace is cast into pigs or ingots.
8. There are enormous oil deposits which lie under the surface of the earth.
9. Some of the heat of combustion is absorbed by water-tubes which line the walls.
10. The steam impinges on moving blades which lie along the periphery of the wheel.
11. Turbine efficiency is reduced by steam which leaks past the packing.
12. Sand which has a high porosity is suitable for moulding operations.
13. Pure iron is a soft metal which has a crystalline structure.
14. The oil-hole which leads to each bearing is fitted with a nipple.
15. A wooden pattern which has a similar shape to the part required is made.
16. The steam encounters droplets of water which fall through it.

17. All aeroplanes are fitted with navigational aids which enable them to fly blind.
18. The hot gases which emanate from the jet-pipe produce a large volume of noise.
19. The contractors who installed the machinery are responsible for the damage.
20. The aircraft which is standing on the runway is bound for Istanbul.
21. Part of the light which strikes the surface will be reflected from it.
22. Current which enters the ground from an electrode will spread out in all directions.
23. The quantity of fluid which passes a given section of the pipe can be measured.
24. Liquids which contain suspended solids can easily be handled by these pumps.
25. The bridge which now spans the river was built nearly a century ago.

Grammar

Voice: Passive of different sentences:

Rules:

- 1) When infinitive is used in the active voice, "to be + past participle is used in the passive. e.g.
I am to write a letter.
A letter is to be written.
- 2) While transforming interrogative sentences, two things must be remembered.
 - A) The question form must be retained.
 - B) The question mark should not be forgotten. e.g.
Does she read novels?
Are novels read by her?

3) Imperatives

- a. Draw the curtain.
Let the curtain be drawn

4) Omission of "by"

- People are destroying jungle.
Jungle is being destroyed.

Choose the correct alternatives:

1. Dacoits stole my money.
 - a. My money has been stolen by dacoits.
 - b. My money had been stolen by dacoits.
 - c. My money stolen by dacoits.
 - d. My money was stolen by dacoits.
2. He eats apples everyday.
 - a. Apples were eaten by him everyday.
 - b. Apples was eaten by him everyday.
 - c. Apples are eaten by someone.
 - d. Apples are eaten by him everyday.
3. Somebody has cheated me.
 - a. I am cheated by someone.
 - b. Me has been cheated.
 - c. I have been cheated.
 - d. I has been cheated.
4. Anita drives a blue car.
 - a. A blue car drives Anita.
 - b. Anita is driven by a blue car.
 - c. A blue car is driven by someone.
 - d. A blue car is driven.
5. They are going to build a complex.
 - a. A complex is being build by them.
 - b. A complex is going to be built.
 - c. They are going to be build by a complex.
 - d. A complex will be build by them.

6. The workers are excavating a buried city.
 - a. A buried city is excavated by the workers.
 - b. A buried city is being excavating the workers.
 - c. A buried city is being excavated by the workers.
 - d. A buried city are being excavated by the workers.
7. Shelley's poems evoke memories of the past.
 - a. Memories of the past are evoked by Shelly's poems.
 - b. Shelley is evoked by the memories of the past.
 - c. Memories is of the past is evoked by Shelley's poems.
 - d. Memories are being evoked by Shelley's poems.
8. My friends don't eat meat.
 - a. Meat is eat by my friends.
 - b. Meat is eaten by my friends.
 - c. Meat are eaten by my friends.
 - d. Meat is not eaten by my friends.
9. Someone will read the chapter next time.
 - a. The chapter will be read by someone.
 - b. The chapter will be readed by someone.
 - c. The chapter will be read next time.
 - d. Next time the chapter will read someone.
10. We must write to her.
 - a. She must be written by us.
 - b. She must be written to.
 - c. She has to be written.
 - d. We must be written by her.
11. I am to teach you.
 - a. You have to be taught.
 - b. You should be taught.
 - c. You are to be taught.
 - d. You are to be teached.
12. He let people beat him.
 - a. He was let to be beaten.

- b. People were let to beat him.
c. People let himself be beaten.
d. He let himself be beaten.
13. People think that she is a teacher.
a. She is thought be a teacher.
b. It is thought that she was a teacher.
c. She is thought by people as a teacher.
d. It is thought she to be a teacher.
14. Prepare yourself for the exam.
A. Let you be prepared for the exam.
B. Let you be prepared for the exam.
C. Let the exam be prepared for by you.
D. Both a. and c
15. Obey your parents.
a. Your parents should be obeyed.
b. Your parents must be obeyed.
c. Let your parents be obeyed.
d. Let your parents to be obeyed.
16. The classroom consisted twenty students.
a. Twenty students were consisted of the classroom.
b. Twenty students were consisted by the classroom.
c. Twenty students were consisted classroom.
d. Twenty students were consisted in the classroom.
17. Let him open the door.
a. Let the door be opened.
b. Let the door be opened by him.
c. You should allow him to open the door.
d. Let him be opened the door.
18. He saw me work at night.
a. I was seen work at night.
b. I was seen to working at night.
c. I was seen at work at night.
d. I was seen to work at night.

19. The milkman brings the milk to my door but the postman leaves the letters in the hall.
a. The milk was brought to my door by the milkman but the postman leaves the letters in the hall.
b. The milk is brought to my door by the milkman but the postman leaves the letters in the hall.
c. The milkman is brought to my door but the postman leaves the letters in the hall.
d. The milk is brought to my door but the letters are left in the hall.
20. In future, perhaps, they won't bring letters to the houses, and we shall have to collect them from the post office.
a. In future, perhaps, letters will not be by them to the houses and they will have to be being collected from the post office.
b. In future, perhaps, the houses will not be brought letters by them and they will have to being collected from the post office.
c. In future, perhaps, letters will not be brought to the houses and they will have to be collect from the office.
d. In future, perhaps, letters will not be brought to the houses and they have to be collected from the post office.
21. The postman clears this box three time a day.
a. This box was cleared three times a day.
b. This box was cleared three time a day by the postman.
c. This box was cleared three time a day by the postman.
d. This box is cleared by the postman three time a day.
22. Someone turned on a light in the hall and opened the door.
a. A light was turned on in the hall and the door was opened the door.
b. A light was turned on in the hall and the door was opened.
c. A light was turned on in the hall and the door was opened.

- d. A light was turned on in the hall and the door opened by someone.
23. We build well over 1,000 new houses a year.
- 1,000 new houses are built well over a year.
 - 1,000 new houses was built a year by us.
 - Well over 1,000 new houses are built a year by us.
 - A new houses are built a year well over.
24. An ambulance took the sick man to hospital.
- The man was taken to hospital.
 - The sick man was taken to hospital.
 - The man was taken to hospital by an ambulance.
 - The sick man was taken to hospital by an ambulance.
25. The dogs guard the warehouse.
- The warehouse was guarded by dogs.
 - The warehouse is guarded by the dogs.
 - The warehouse guarded the dogs.
 - The warehouse is guarded by dogs.
26. They are demolishing the entire block.
- The entire block is being demolished by them.
 - The entire block is being demolished.
 - The entire block demolished them.
 - The entire block was being demolished.
27. He suggested allowing council tenants to buy their houses.
- He suggested that council tenants should be allowed to buy their houses.
 - He was suggested that council tenants should be allowed to buy their houses.
 - Council tenants should be allowed to buy their houses by him.
 - Council tenants should be allowed to buy their houses.
28. They are repairing my piano at the moment.
- My piano was being repaired by them at the moment.
 - My piano is being repaired by them at the moment.
29. They invited Jack but they didn't invite them.
- Jack was invited but they didn't invite Tom.
 - Jack was invited but Tom wasn't by them.
 - Jack was invited but Tom wasn't invited by them.
 - Jack was invited but Tom wasn't.
30. He recommends fitting new tyres.
- New tyres were recommended.
 - Fitting new tyres is recommended by him.
 - Fitting new tyres are being recommended by him.
 - He recommended that new tyres should be fitted.

□□□

Section - 9**IRON AND STEEL**

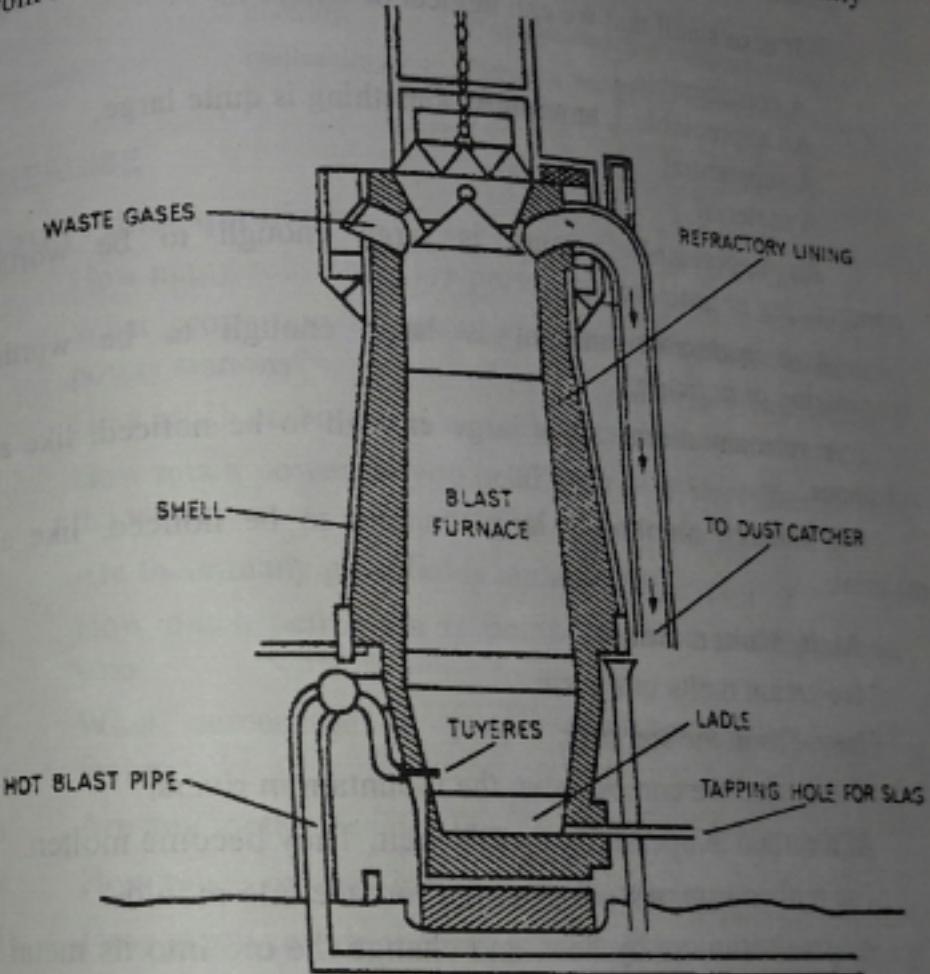
The earth contains a large number of metals which are useful to man. One of the most important of these is iron. Modern industry needs considerable quantities of this metal, either in the form of iron or in the form of steel. A certain number of non-ferrous metals, including aluminium and zinc, are also important, but even today the majority of our engineering products are of iron or steel. Moreover, iron possesses magnetic properties, which have made the development of electrical power possible.

The iron ore which we find in the earth is not pure. It contains some impurities which we must remove by smelting. The process of smelting consists of heating the ore in a blast furnace with coke and limestone, and reducing it to metal. Blasts of hot air enter the furnace from the bottom and provide the oxygen which is necessary for the reduction of the ore. The ore becomes molten, and its oxides combine with carbon from the coke. The non-metallic constituents of the ore combine with the limestone to form a liquid slag.

This floats on top of the molten iron, and passes out of the furnace through a tap. The metal which remains is pig-iron.

We can melt this down again in another furnace - a cupola - with more coke and limestone, and tap it out into a ladle or directly into moulds. This is cast-iron. Cast-iron does not have the strength of steel. It is brittle and may fracture under tension. But it possesses certain properties which make it very useful in the

manufacture of machinery. In the molten state it is very fluid, and therefore it is easy to cast it into intricate shapes. Also it is easy to machine it. Cast-iron contains small proportions of other substances. These non metallic constituents of cast-iron include carbon, silicon and sulphur, and the presence of these substances affects the behaviour of the metal. Iron which contains a negligible quantity of carbon, for example wrought-iron, behaves differently from iron which contains a lot of carbon.



Cross-section of blast furnace

The carbon in cast-iron is present partly as free graphite and partly as a chemical combination of iron and carbon which we call cementite. This is a very hard substance, and it makes the iron hard too. However, iron can only hold about 1.5% of cementite. Any carbon content above that percentage is present in the form of a flaky graphite. Steel contains no free graphite, and its carbon

content ranges from almost nothing to 12%. We make wire and tubing from mild steel with a very low carbon content, and drills and cutting tools from high carbon steel.

WORD STUDY

Negligible, Considerable, Substantial, etc.

A negligible amount of something is very small.

It is so small that we can neglect or ignore it.

A considerable }
An appreciable } amount of something is quite large.
A substantial }
A material }

An appreciable amount is large enough to be worth apprciating or noticing.

A considerable amount is large enough to be worth considering or noticing.

A substantial amount is large enough to be noticed, like a substance.

A material amount is large enough to be noticed, like a material.

Melt, Molten, Smelt

Ice-cream melts in the sun.

Ice melts in the summer.

The melted ice comes down the mountain in rivers.

At a certain temperature, metals melt. They become molten.

The molten iron passes out of the furnace into moulds.

We smelt iron ore by heat, and change the ore into its metal state.

During smelting, the temperature in the furnace is raised and the iron melts.

When the ore is smelted, it becomes pig-iron.

Property

Every metal possesses certain properties, or characteristics or qualities which we can find by experiment; these properties may

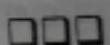
make the metal suitable or unsuitable for any particular purpose. Designers of high-speed aircraft need new materials with special properties such as heat resistance and strength at high temperatures.

Here are some of the properties which metals may have:	
The metal is fluid.	It has fluidity.
plastic.	It flows easily when it melts.
elastic.	It pulls out of shape without breaking.
ductile.	It always returns to its orginal shape.
malleable.	It can be stretched without breaking.
	It can be hammered out of shape without breaking.

EXERCISE

Answer these questions:

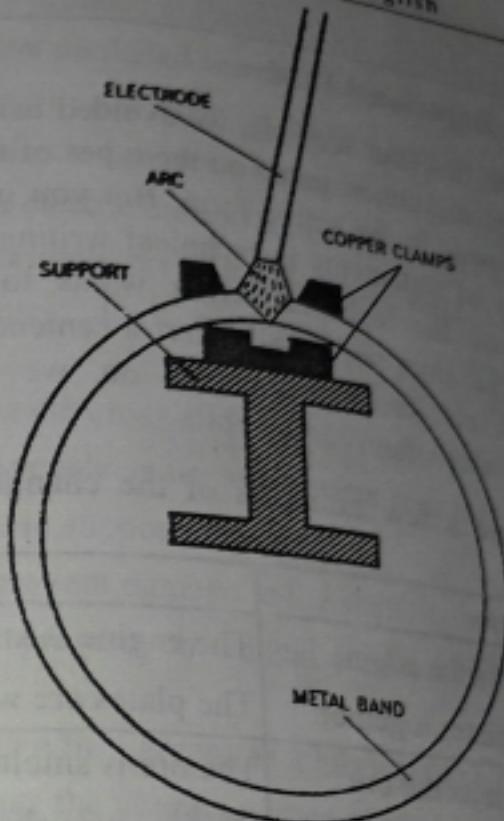
1. How many substances are present in iron ore?
2. What proportion of countries use electricity from nuclear power stations?
3. How much carbon does wrought-iron contain?
4. How much power do you need to drive a large liner through the water?
5. Are there many gold-fields in the world?
6. How much petroleum is pumped out of the ground every year?
7. What percentage of people in your country work in factories?
8. Are any metals besides ferrous metals used in industry?
9. How much oxygen is needed to burn a ton of coal?
10. How much soil do the rivers carry down to the sea in a year?
11. What proportion of passengers flying in aircraft are killed in crashes?
12. How much of your country's electrical supply is derived from water power?



Section -10**WELDING**

There are a number of methods of joining metal articles together, depending on the type of metal and the strength of the joint which is required. Soldering gives a satisfactory joint for light articles of steel, copper or brass, but the strength of a soldered joint is rather less than a joint which is brazed, riveted or welded. These methods of joining metal are normally adopted for strong permanent joints.

The simplest method of welding two pieces of metal together is known as pressure welding. The ends of metal are heated to a white heat - for iron, the welding temperature should be about 1300°C - in a flame. At this temperature the metal becomes plastic. The ends are then pressed or hammered together, and the joint is smoothed off. Care must be taken to ensure that the surfaces are thoroughly clean first, for dirt will weaken the weld. Moreover, the heating of iron or steel to a high temperature causes oxidation, and a film of oxide is formed on the heated surfaces. For this reason, a flux is applied to the heated metal. At welding heat, the flux melts, and the oxide particles are dissolved in it together with any other impurities which may be present. The metal surfaces are pressed together, and the flux is squeezed out from the centre of the weld. A number of different types of weld may be used, but for fairly thick bars of metal, a vee-shaped weld should normally be employed. It is rather stronger than the ordinary butt weld.



Electric arc welding

The heat for fusion welding is generated in several ways, depending on the sort of metal which is being welded and on its shape. An extremely hot flame can be produced from an oxy-acetylene torch. For certain welds an electric arc is used. In this method, an electric current is passed across two electrodes, and the metal surfaces are placed between them. The electrodes are sometimes made of carbon, but more frequently they are metallic. The work itself constitutes one of them and the other is an insulated filler rod. An arc is struck between the two, and the heat which is generated melts the metal at the weld. A different method is usually employed for welding sheets or plates of metal together. This is known as spot welding. Two sheets or plates are placed together with a slight overlap, and a current is passed between the electrodes. At welding temperature, a strong pressure is applied to the metal sheets. The oxide film, and any impurities which are trapped between the sheets, are squeezed out, and the weld is made.

Grammar

1. The Impersonal Passive

In the first four sections, we avoided using the passive type of statement, and concentrated on the types of statement which are frequently made in the active form. But you must remember that the majority of statements in technical writing are in the passive form, because the technical writer wants to be objective and impersonal. He does not usually start a sentence with I or you or the operator, etc. From this section on, we shall be using the passive form very often.

Here are a few examples of the change from active into passive.

Active	Passive
The driver starts the engine.	The engine is started.
He welds the plates together.	The plates are welded together.
The furnace smelts the ore.	The ore is smelted in the furnace.
The man sharpened his tool.	His tool was sharpened.
He welded the plates together.	The plates were welded together.
They will start the work soon.	The work will soon be started.
We must lubricate bearings.	Bearings must be lubricated.
A lathe can cut screws.	Screws can be cut on a lathe.

As you see, Passive constructions require this pattern;

(PRO)NOUN + a form of be + PAST PARTICIPLE

EXERCISE

Change these active statements into impersonal passive statements.

1. We can cast this type of metal into very complicated shapes.
2. We smelt the ore in a blast furnace and reduce it to pig iron.
3. A skilled operator can carry out many operations on a lathe.
4. We clamp the two metal plates together.

5. Coal miners produce millions of tons of coal every week.
6. The company marketed several new products every year.
7. They will start production on the new type of reactor soon.
8. We can generate heat for welding in several ways.
9. We pass an electric current across the electrodes.
10. Welders normally prefer a vee-shaped weld.
11. That country does not produce any heavy industrial machinery.
12. This allows the cross-slide to move across the saddle.
13. The operator selects the appropriate gear for the job.
14. We call these supports bearings.
15. This will prevent damage to the shaft.
16. This will prevent the metal surfaces from coming into contact.
17. We can use a thin grease as a lubricant in rolling bearings.
18. We can alter the characteristics of steel in various ways.
19. We must heat the steel above its critical temperature.
20. You must take care not to damage the machinery.

Grammar II

Decide on the exact meaning of should in these statements, and complete them. Some examples are in the passive. Occasionally more than one meaning is possible.

1. This experiment (..... give) us the answer to the problem.
2. The mould (..... make) slightly larger than the casting we want.
3. Smoking (..... permit) within fifty yards of the store.
4. High tensile steels (..... temper) up to 600° C.
5. The new reactor (..... be) in operation by 1968.
6. A flux (..... apply) to the heated metal to prevent oxidation.
7. The motorway (..... have) three lanes in each direction with a reservation in the middle.

8. The results of the experiment (..... write) up carefully.
9. Wear on the bearings (..... reduce) considerably with good lubrication.
10. The heated metal (..... allow) to cool slowly over a long period.
11. Construction workers (..... wear) safety helmets at all times.
12. The road surface (..... be) capable of withstanding very heavy traffic loads.
13. The material we are looking for (..... be) capable of withstanding very high temperatures.
14. All cutting-tools (..... keep) sharp and in good condition.
15. Delivery of the engines (..... start) by the middle of next year.

□□□

Section - 11

SCIENCE AND THE FUTURE

In preceding (previous) units, we have examined briefly some of the characteristics, methods, effects and problems of present day science. At this stage it may be worth considering a few of the ways in which it may develop in the near future, i.e. the next decade or so.

To begin with, we can expect applied science to produce a vast (huge, enormous) increase in entirely new synthetic products of all kinds. These will range from light-weight; high-strength materials for use in the many specialized branches of engineering, to drugs and chemicals with a greatly-increased selectivity which can be used in medicine and agriculture. However, in this latter case in particular, it may be predicted that the wide-spread application and combination of new and more complex products will give rise to unexpected inter-reactions or side-effects. For this reason, greatly intensified programmes of research will be required in order to discover and eliminate the harmful results of such combinations.

Another point is that the rapid expansion of industrialization throughout the world must inevitably lead to a progressive exhaustion of natural resources. If we wish to counter-balance these losses to some extent, we shall have to follow two main courses of action: (a) much greater efforts will have to be applied (devoted) to conservation, particularly of such items as soil, water,

fuels and minerals; (b) more efficient methods of exploitation and utilization will have to be developed.

In the more developed countries, the automatization of industry (automation) will lead to a high degree of efficiency in the production of manufactured goods, and is likely to have far reaching social effects. For instance, workers will need to be more highly trained and more flexible—they will probably have to be capable of changing (shifting) from one skilled job to another—and they will also have more free time, as they will work fewer hours per day. This in turn will necessitate a considerable expansion and re-orientation of education. Another result of automation should be to accelerate (speed up) the accumulation of surplus capital, which could then be made available for the purpose of assisting the emerging countries to solve some of the problems of underdevelopment. It should, however, be borne in mind that this process itself might involve a chain of difficulties, in this case of a political nature.

In general, the application—or misapplication—of science and technology in all fields is certain to affect the structure of society as a whole. This will remain true whether we are dealing with the application of psychology to advertising and political propaganda, or engineering to the mass media of communication, or of medical science to the problems of overpopulation or old age. This could lead to the development of a special discipline, whose job would be to estimate (evaluate) the social consequences of all major research and development (R and D) projects before they are put into large-scale operation.

This has been examined, at least partially, by W. M. and H. Kassarjian. They used the 'group in a room' and 'lines on cards' situation, and made things much easier for their volunteers. In the first place, the genuine volunteers were in a majority: 20 out of 30. Secondly, the volunteers never had to make their selections aloud, but always enjoyed the anonymity of paper and pencil. The experimenter explained that some people would be asked to declare their choices publicly, and then asked only his 'primed'

collaborators. Thus each volunteer heard the views of only a third of the group he was in. Nevertheless, a substantial distortion was still produced: almost, though not quite, as large as in the conditions we looked at first. So there is only small comfort here.

HAMMERTON, M. broadcast talk reprinted in *The Listener*, 18 October, 1962.

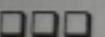
1. **victim:** Here, a humorous way of referring to the subject of the experiment.
2. **to pick:** to choose.
3. **would:** In this context, would (used for all persons) is used to express actions in the past which were repeated regularly and thus constituted a habitual procedure or routine.
Note the different use of would in 1. 55, where it is the past tense of will.
4. **more than a trifle:** very.
5. **primed:** previously prepared by the experimenter.
6. **substantial:** considerable.

Assignments

1. Imagine that you are the experimenter in the experiments outlined in the extract, and that the other members of your class are 'subjects' and 'collaborators' respectively. For each experiment, explain clearly in English.
 - (a) what the 'collaborators' have to do,
 - (b) what the 'subjects' have to do.
 Both 'collaborators' and 'subjects' may ask further questions (in English) to make sure that they understand the instructions given.
2. In this sort of experiment, the degree of conformity (i.e. percentage of conformers) probably varies according to the psychological 'pressure' exerted by the experimenter. Can you design some experiments which could establish this point? If so, explain the procedure clearly in English.

3. Explain some of the dangers to society revealed by the experiments outlined in the extract.
4. It is possible that individuals vary in their susceptibility or resistance to suggestibility. How could you find out whether there are certain factors which
 - (a) predispose people to conform,
 - (b) enable people to resist false conformity.
 and if so, what these factors are?

NOTE: This is a matter of great practical importance in view of Question (3) above.



Section - 12

THE MIRACLE OF GRASS

- Joseph Wood Krutch

Of all the green things which make up what Goethe called "the living garment of god," grass is one of the humblest, the most nearly omnipresent, and the most stupidly taken for granted-a miracle so common that we no longer regard it as miraculous.

To some (poor things) it is merely what you try to keep the dandelions out of, or what you strike a golf ball across. But even such are paying some tribute to it. To those of us a little more aware of the great mystery of which we are a part, its going and its coming, its flourishing and its withering, are a sort of soft ostinato accompaniment in the great symphony of the seasons.

Even in the arid Southwest it springs up bravely for a few short weeks. In California the brown hills turn to emerald almost overnight. And in the gentler, more circumspect East, one hardly knows when the great awakening took place. So imperceptible, but ineluctable, is its progress that those of us who watch for it never quite catch the very moment when the transformation occurs. While our backs are turned it is alive again, and no other phenomenon of spring is at once so quiet and so all-enveloping. If there are astronomers on Mars peering at us as our astronomers are peering at their planet, they must see, much more dramatically, what is usually observed there by earthly astronomers? Martian vegetation is perhaps only dry lichen much like what we see

clinging on the bare rocks near the summits of our highest mountains. But ours is a green carpet, soft to the feet, restful to the eye, and announcing to all living things that spring is here again.

What is this thing called grass? "Why," say the botanist, "that is a question easy to answer. Grass, properly so-called, is any one of the numerous genera and species which compose that family Gramineae. Unfortunately, its early evolutionary history (like that of all the flowering plants) is obscure since the fossil record is scanty. But at least we can say with reasonable certainty that no grass carpeted the earth in that long ago when the first air-breathing animals crawled out of the water. Also that it was not until the cool weather of the Miocene (say a mere forty million or so years ago) that it became a dominant plant and thus made possible the flourishing of the herbivorous mammals over a more peaceful earth where the bellowing of the dinosaurs had given way to the lowing of herds. Then, only yesterday as world history goes, grass conferred upon our own species that tremendous blessing called wheat."

For a less dusty question and answer, we must turn to the poets, many of whom have had their say, though only Walt Whitman put grass at the center of a magnum opus.

A child said, "What is the grass?" fetching it to me with full hands.

I guess it must be the flag of my disposition, out of hopeful green stuff woven

Or I guess it is the handkerchief of the Lord,

A scented gift that Remembrancer designedly dropped, Bearing the owner's name somewhere in the corners, that we may see and remark, and say, "whose?" Few today have time for such meditations or for such quiet pleasures. Most of us are too desperately busy seeking recreation, entertainment, and amusement ever to experience substitutes as essentially ersatz as plastic for china, neon lights for dawn and sunset, or the corner grocer's

cottony horror offered us in place of that other great gift of grass called bread.

"Joy be with you," people used to say when parting from a friend. Now the modish farewell is, "Have fun!" Sometimes those thus sped away actually do have fun; often they do not; and even the most successful in this enterprise are not too much to be envied. Those of us who want something more than fun, whether it be the exaltation of great art or the mystical experience of "belonging" to something greater than one's self, are a little afraid of being called highbrows or "nature lovers" because neither grass nor Wordsworth's meanest flower that blows are what we call "fun things." They can be something much more rewarding, nevertheless.

Henry David Thoreau once explained that he did not drink wine because he was afraid it might "spoil his taste for water." Henry loved to shock by "going too far" in defending what he wanted to defend, and perhaps he was going too far when he said that. If ours were an age tending toward the puritanical and the ascetic, he might be a dangerous influence, persuading us to surrender in the-name of simplicity things much worth having. But since our manners and our morals are not, whatever else they may be, puritanical or ascetic, his voice is more worth hearing than that of those who call for more complexity, for madder music, and for stronger wine. Both of these last pay diminishing returns.

We boast that this is the age of abundance, and the proudest achievement of our best-intentioned men is that, for the first time in history, abundance has been democratized or, to put it somewhat sourly, that now as never before nearly everybody can have rather too much of many things not worth having. Deprivation can kill joy, but so, almost as certainly, can superfluity, for though we always want more, the limiting factor is ultimately what we can take in. More toys than he can play with are a burden, not a blessing, to any child be the five or fifty. It is disastrous to own more of anything than you can possess, and it is one of the most fundamental laws of human nature that our power actually to possess is limited.

In 1989, Louis XIV ordered the following for his garden at Versailles: 87,000 tulips, 800 tuberoses, 400 lilies, and 83,000 narcissus. In this egalitarian age, there are not very many individuals likely to be able to be quite that absurd. But there are many who can and do make the same mistake for the same reason. You just can't take in or possess that many tulips, and if you are foolish enough to try, you will miss the violet by the mossy stone, and even more surely the "thought too deep for tears" which one violet or one tulip might inspire.

"The happiness of the great," wrote Francis Bacon, "consists only in thinking how happy others must suppose them to be:" In Bacon's time the term "status," so beloved of present-day sociologists, had not been invented, but Bacon had grasped the concept behind it. The desire for status is the same desire to be envied which Bacon had in mind, and it was what Louis XIV also was aiming at. "It will be evident to all," so he said to himself, "that no one else in all the world can have as many tulips as I can, and they will envy me—though, God knows, the whole eighty-seven thousand of them look dull enough to me."

When grass becomes merely "a lawn;" it is in danger of becoming what that sour economic Puritan Thorstein Veblen said it always was, namely, a "status symbol," a display of conspicuous expenditure meant to demonstrate that its owner can afford to waste in mere display what might be used to produce wheat or vegetables. Veblen was wrong, because a lawn can also demonstrate a great truth which economists are prone to forget, namely, that beauty may be its own excuse for being. But a lawn can be what he called it, and there is no greater paradox than this transformation of the humblest and most unshowy of green things into a status symbol. Of course, neither your lawn nor mine (when in Connecticut I had one) is that. But just to be sure that it isn't, a salutary experience can be had if we ask ourselves from time to time what our real reason for having it is.

If we have any doubts, an experiment might be worthwhile. Lie down upon your lawn to see what happens. And while I would not advise that all lawns be surrendered to dandelions, I would

suggest that you ask yourself, when one of these gay little miracles raises its flower toward the sun, whether you reach for the weed killer without first remembering Whitman's tribute:

Simple and fresh and fair from winter's clothes emerging

As if no artifice of fashion, business, politics, had ever been

Forth from its sunny nook of sheltered grass innocent,
golden, calm as the dawn;

The spring's first dandelion shows its trustful face.

"All flesh is grass." For once, the apostle and the scientist seem to be in agreement though they were not saying the same thing. To St. Peter all flesh is grass because man, too, "withereth and the flower thereof falleth away." To the biologist all flesh is grass in a more literal sense. No animal, man included, could exist if it were not for the fact that green plants mediate between him and the inanimate materials of the earth. They alone have the power of rising by one step the relative simplicity of the mineral to the complexity of the proteins indispensable to him. Where they leave off his mysterious metabolism takes over. What was mineral but became protein now becomes that even more mysterious thing called protoplasm. And protoplasm is the base of all man's life, thought, imagination, and ideals.

In time, a man passes away, he also withers and the flower thereof falls away, protoplasm descends the scale again to the merely mineral, and grass picks it up once more to repeat the cycle. The process began some billions of years ago and must continue as long as life lasts.

Which of the two truths are the most profound and the most important? The moral truth of the apostle, or the strange, in human truth of the biologist? One is as old as civilization, the other almost as new as yesterday. And perhaps just because it is uniquely ours we tend to value it most highly. But we may be wrong. Many civilizations; some of them glorious, were created and then destroyed by men who were innocent of chemistry. But they could not have been what they were had they not known what Peter and

what Whitman knew. It is just possible that our civilization will fail because we do know one kind of truth and, in our pride, forget the other.

And now it seems to me the beautiful uncut hair of graves.

It may be you transpire from the best of young man,

It may be if I had known them I would have loved them.

It may be you are from old people, or from offspring taken soon out of their mother's laps,

And here you are the mother's laps.

This grass is very dark to be from the white heads of old mothers,

Darker than the colorless beards of old men,

Dark to come from under the faint red roof of mouths. (From *The Leaves of Grass*)

NOTES

The author presents science in an allusive style, mixing the magic of nature with the marvels of scientific investigation, skillfully interweaving the poetry of Walt Whitman with the facts of the theory of evolution.

Goethe (1749-1832): a German writer.

dandelions: yellow-flowered wild plants.

ostinato: (Italian) bass melody.

symphony: an elaborate musical composition for an orchestra.

South West: South West American desert region.

circumspect: careful; slowly-moving.

lichen: flowerless small plants of different shades that grow like a patch of skin on stones and tree trunks.

genera: kinds; classes; plural of genus.

monocotyledonous flowering plants: flowering plants with a single seed-leaf.

Miocene: an epoch of Tertiary (the third geological period) when the high mountains like the Alps and the Himalayas were formed.

dinosaurs: large but now extinct reptiles.

Walt Whitman (1819-1892): a great American poet. His *Magnum Opus* (masterpiece) was *Leaves of Grass*.

Remembrancer: one who reminds; (here) God.

ersatz: (German) imitation.

grocer's cottony horror: mass produced bread of the texture of cotton in contrast to home-baked bread.

William Wordsworth (1770-1850): English Romantic poet and a great lover of nature.

Henry David Thoreau (1817-1862): American writer well-known for his masterpiece *Walden*.

puritanical: of extreme strictness in religion and morals.

diminishing returns: the law of diminishing returns in Economics: (here) fails to produce more pleasure for the additional effort. *Louis XIV* (1638-1715): the extravagant king of France.

Versailles: French town, known for its beautiful gardens.

meanest flowers ...too deep for tears: see Wordsworth's *Immortality Ode*.

violet and tulip: names of flowers.

Comprehension questions:

- Why does the author say that grass is "a miracle so common that we no longer regard it as miraculous"?
- How do the common people view grass?
- What is gram for people who are a little more aware?
- What happens when our backs are turned?
- What is the difference between martian vegetation and the one on the earth?
- How do the botanists define grass?
- What does the American poet whitman guess about gram?
- Why are we being afraid of being called nature loves?"

9. Why did Henry David Thoreau not drink wine?
10. What can kill joy?
11. What is the proudest achievement of men?
12. What was not invented in Francis Bacon's time?
13. What does the happiness of the great consist of according to Bacon?
14. What happens when man becomes mere "a lawn" according to Thorstein Veblen?
15. Why did St. Peter consider "All flesh is man" meaningful?
16. Why do the biologists believe "All flesh is man" to be relevant?
17. What is the source of protein, mineral and protoplasm?
18. How are man and man interrelated?
19. Why were many civilizations destroyed?
20. Why is it possible for our civilization to fail?

Long answer questions:

1. Bring out the different perceptions of gram in science and grass in poetry.
 2. Deprivations can kill joy, but so, almost as certainly can superfluity Elaborate it.
 3. What do the apostle and the scientist mean when they say "All flesh is grass"?

Discussion questions:

1. What are the various uses of gram in our life?
 2. Can you imagine the existence of human beings and other living creatures on the earth in the absence of grass? why?
 3. "To call grass a trivial thing" is a great ignorance" Explain it.

Composition:

1. Attempt a description of two miracles of nature, namely, rain and the rainbow.

2. "Dust thou art and to dust thou shall return" is a well known religious statement. write some paragraphs explaining and highlighting its relevance to our real life.

Grammar

Preposition

Tick on the correct alternative.

1. What is usually observed there earthly astronomers.
a) from b) to
c) by d) off

2. Few today have time such meditations.
a) since b) for
c) within d) off

3. We boast that this is the age abundance.
a) off b) in
c) on d) of

4. Where they leave his mysterious metabolism taken over.
a) off b) of
c) by d) for

5. Which the two truths is the most profound and the most important?
a) on b) onto
c) is d) of

6. Wine is made grapes.
a) at b) of
c) in d) for

7. He always thinks me.
a) about b) by
c) in d) for

8. The land is coveredsnow.
 a) by b) in
 c) over d) with
8. She was bornthe 5th of June.
 a) about b) at
 c) in d) on
9.this evidence, I know he is in the right.
 a) At b) By
 c) From d) In
10. I objectyour proposal.
 a) at b) about
 c) into
11. It is hotthe summer.
 a) at b) at
 c) during d) on
12. Cigarette smoking is injurioushealth.
 a) at b) about
 c) for d) in
13. I am gratefulyou your help.
 a) at, for b) in, in
 c) to, for d) by, for
14. He criticizes memy carelessness.
 a) for b) at
 c) in d) on
15. The diet is deficientvitamins.
 a) for b) at
 c) in d) on
16. The lady takes prideher beauty.
 a) about b) over
 c) in d) on

17. He has confidenceme.
 a) at b) of
 c) in d) about
18. Test beginsSunday.
 a) in b) during
 c) at d) on
19. I have workedthe answer.
 a) about b) over
 c) among d) out
20. I will goKathmandubus.
 a) from, to b) of, by
 c) to, at d) to, by
21. He cut the caketwo.
 a) by b) from
 c) into d) with
22. Our agreement expiresMarch.
 a) about b) in
 c) about d) off
23. I ponderedthe question that was asked to me.
 a) at b) about
 c) on d) over
24. I leanedthe wall.
 a) at b) in
 c) against d) over
25. I don't want to interfereyou know.
 a) from b) with
 c) in d) to
26. She was horrifiedmy results on the exam.
 a) at b) about
 c) in d) on

27. I showed my gratitude his help.
 a) at b) about
 c) for d) in
28. She is associated the company.
 a) for b) with
 c) by d) at
29. He was proved guilty the murder.
 a) of b) at
 c) in d) about
30. The post was allotted him.
 a) for b) to
 c) in d) on
31. She has the capacity doing the work.
 a) about b) over
 c) of d) for
32. I assure you my support.
 a) at b) of
 c) in d) about
33. I look admission college.
 a) in b) during
 c) for d) on
34. I have decided sitting for the exams.
 a) in b) on
 c) for d) out
35. I was angry the noise from outside.
 a) for b) with
 c) over d) at
36. These cloths are sale.
 a) in b) on
 c) for d) both B and C

36. They passed the exam the third attempt.
 a) in b) for
 c) at d) by
37. The weather is quite warm the winter.
 a) about b) from
 c) for d) on
38. There was a quarrel three friends.
 a) in b) at
 c) between d) among
39. She is proficient English.
 a) at b) about
 c) in d) for
40. There is no method doing the problem.
 a) by b) about
 c) of d) from

□□□

Section - 13**KNOWLEDGE AND WISDOM**

- Bertrand Russell, O.M.

FAIRLY ADVANCED. Concise and lucid thought, in subtly-devised sentences)

- A. Most people would agree that, although our age far surpasses all previous ages in knowledge, there has been no correlative increase in wisdom. But agreement ceases as soon as we attempt to define 'wisdom' and consider means of promoting it. I want to ask first what wisdom is, and then what can be done to teach it.
- B. There are several factors that contribute to Wisdom. Of these I should put first a sense of proportion: the capacity to take account of all the important factors in a problem and to attach to each its due weight. This has become more difficult than it used to be owing to the extent and complexity of the specialised knowledge required of various kinds of technicians. Suppose, for example, that you are engaged in research in scientific medicine. The work is difficult and is likely to absorb the whole of your intellectual energy. You have not time to consider the effect which your discoveries or inventions may have outside the field of medicine. You succeed (let us say), as modern medicine has succeeded, in enormously lowering the infant death-rate, not only in Europe and America, but also in Asia and Africa. This has the entirely unintended result of making the food supply inadequate and lowering the standard of life in the most populous parts of the world. To take an even more spectacular example, which is in everybody's mind at the present time: you study the composition of the atom from a disinterested desire for knowledge, and incidentally place in the hands of powerful lunatics the means of destroying the human race. In such ways the pursuit of knowledge may become harmful unless it is combined with wisdom and wisdom in the sense of comprehensive vision is not necessarily present in specialists in the pursuit of knowledge.
- C. The essence of wisdom is emancipation, as far as possible, from the tyranny of the here and the now. We cannot help the egoism of our senses. Sight and sound and touch are bound up with our own bodies and cannot be made impersonal. Our emotions start similarly from ourselves. An infant feels hunger or discomfort, and is unaffected except by his own physical condition. Gradually, with the years, his horizon widens, and, in proportion as his thoughts and feelings become less personal and less concerned with his own physical states, he achieves growing wisdom. This is of course, a matter of degree. No one can view the world with complete impartiality and if anyone could, he would hardly be able to remain alive. But it is possible to make a continual approach towards impartiality on the one hand, by knowing things somewhat remote in time or space; and, on the other hand, by giving to such things their due weight in our feelings. It is this approach towards impartiality that constitutes growth in wisdom,
- D. Can wisdom in this sense be taught? And, if it can, should the teaching of it be one of the aims of education? I should answer both these questions in the affirmative.
- E. I have said that in some degree wisdom can be taught. I think that this teaching should have a larger intellectual element than has been customary in what has been thought of as moral instruction. The disastrous results of hatred and narrow-mindedness to those who feel them can be pointed out incidentally in the course of giving knowledge. I do not

think that knowledge and morals ought to be too much separated. It is true that the kind of specialized knowledge which is required for various kinds of skill has little to do with wisdom. But it should be supplemented in education by wider surveys calculated to put it in its place in the total of human activities. Even the best technicians should also be good citizens and when I say 'citizens', I mean citizens of the world and not of this or that sect or nation. With every increase of knowledge and skill, wisdom becomes more necessary, for every such increase augments our capacity for realizing our purposes and therefore augments our capacity for evil, if our purposes are unwise. The world needs wisdom as it has never needed it before; and if knowledge continues to increase, the world will need wisdom in the future even more than it does now.

Note:

Bertrand Russell—philosopher and mathematician. O.M. (see note on Gilbert Murray, passage 10). Nobel Prize for Literature, 1950. An Earl, of distinguished ancestry, he prefers not to use his title.

Comprehension

1. What do you mean by knowledge?
2. What is wisdom?
3. What do you understand by 'sense of proportion'?
4. When do the pursuit of knowledge become harmful?
5. Why can't we make our sight, sound and touch impersonal?
6. By what is a baby affected?
7. How does a baby grow wiser?
8. What is meant by 'impartiality'?
9. What happens if we view the world with complete impartiality?
10. How can we approach impartiality?
11. What is the relationship between impartiality and wisdom?

12. How can we teach wisdom?
13. What is specialised knowledge?
14. Why should the technicians be good citizens?
15. To whom does Bertrand Russell refer by 'citizens'?
16. Why is wisdom necessary to increase with every increase of knowledge?
17. What do you understand by 'unwise purposes'?
18. Why is the more wisdom needed in the future?
19. What is the difference between knowledge and wisdom?
20. What can be the unexpected effect of modern medicine that lowers the infant death-rate?

Long-answer questions:

1. Describe the various features that contribute to wisdom.
2. As Alfred Lord Tennyson stated, "knowledge comes, but wisdom lingers" find the relevance of this remark to the idea expressed by Bertrand Russel in his essay entitled 'knowledge and wisdom'.

Discussion questions:

1. Do you want to be a knowledgeable man or a wise man? why?
2. "Even the best technicians should also be good citizen." Do you agree? If so, why?
3. Do you think that our present education system has laid equal emphasis on the development of knowledge and wisdom in our students? If not, why?

Composition:

1. Write an essay on "knowledge abd wisdom: two sides of the same coin."
2. Write a letter to the Editor of a newspaper expressing your serious concern over fast deteriorating wisdom all over the world.

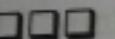
GRAMMAR

Rules: After preposition, we use gerund;

Example: He is fond of swimming in the river.

Complete the following sentences using the words in brackets and supplying prepositions as required:

We must consider means (promote) wisdom. A sense of proportion is the capacity (take account) all the important factors. Suppose you are engaged (do) a piece of research. (two possibilities here, with different meanings.) You have not time (consider) the effect. You succeed (lower) the death rate. This has the result (make) the food supply inadequate. You study the atom (disinterested desire) knowledge. Sight and sound and touch are (bound) our own bodies. It is possible (make) a continual approach (impartiality). The knowledge (required) various kinds of skill has little (do) wisdom.

**Section - 14****THE SCIENTIFIC ATTITUDE**

What is the nature of the scientific attitude, the attitude of the man or woman who studies and applies physics, biology, chemistry, geology, engineering, medicine or any other science?

We all know that science plays an important role in the societies in which we live. Many people believe, however, that our progress depends on two different aspects of science. The first of these is the application of the machines, products and systems of applied knowledge that scientists and technologists develop. Through technology, science improves the structure of society and helps man to gain increasing control over his environment. New fibres and drugs, faster and safer means of transport, new systems of applied knowledge (psychiatry, operational research, etc.) are some examples of this aspect of science.

The second aspect is the application by all members of society, from the government official to the ordinary citizen, of the special methods of thought and action that scientists use in their work.

What are these special methods of thinking and acting? First of all, it seems that a successful scientist is full of curiosity- he wants to find out how and why the universe works. He usually directs his attention towards problems which he notices have no satisfactory explanation, and his curiosity makes him look for underlying relationships even if the data available seem to be unconnected. Moreover, he thinks he can improve the existing

conditions, whether of pure or applied knowledge, and enjoys trying to solve the problems which this involves.

He is a good observer, accurate, patient and objective, and applies persistent and logical thought to the observations he makes. He utilizes the facts he observes to the fullest extent. For example, trained observers obtain a very large amount of information about a star (e.g. distance, mass, velocity, size, etc.) mainly from the accurate analysis of the simple lines that appear in a spectrum.

He is sceptical- he does not accept statements which are not based on the most complete evidence available and therefore rejects authority as the sole basis for truth. Scientists always check statements and make experiments carefully and objectively to verify them.

Furthermore, he is not only critical of the work of others, but also of his own, since he knows that man is the least reliable of scientific instruments and that a number of factors tend to disturb impartial and objective investigation.

Lastly, he is highly imaginative since he often has to look for relationships in data which are not only complex but also frequently incomplete. Furthermore, he needs imagination if he wants to make hypotheses of how processes work and how events take place.

These seem to be some of the ways in which a successful scientist or technologist thinks and acts.

Comprehension

1. Name some sciences.
2. Name two ways in which science can help society to develop.
3. Give some examples of the ways in which science influences everyday life.
4. What elements of science can the ordinary citizen use in order to help his society to develop?
5. How can you describe a person who wants to find out how and why the universe works?

6. What is the role of curiosity in the work of a scientist?
7. Name some of the qualities of a good observer.
8. Give an example of how observed facts are utilized to the fullest.
9. How does a sceptical person act?
10. How does the scientist act towards (a) evidence presented by other people, (b) evidence which he presents in his own work?
11. What do you know about the data which the scientist often has to use? How does this affect his way of thinking?
12. For what other purposes does a scientist need imagination?

Comprehension:

1. What do you mean by scientific attitude?
2. What are the two aspects of science?
3. What does the science do through technology?
4. What are the examples of application of knowledge of science?
5. Who is a successful scientist?
6. To what does a scientist direct his attention?
7. What is the role of curiosity in science?
8. What does the term logical thought represent?
9. How do trained observers get information?
10. What does 'spectrum' mean?
11. Who is sceptical?
12. Why does the scientist reject authority as the basis for truth?
13. Why do the scientists check statements?
14. What do you mean by objective investigation?
15. Name two ways in which science can help society to develop.
16. Give some examples of the ways in which science influences everyday life?

17. What elements of science can the ordinary citizen use in order to help his society to develop?
18. How can you describe a person who wants to find out how and why the universe works?
19. Name some of the qualities of a good observer?
20. Give an example of how observed facts are utilized to the fullest?
21. How does the scientist act towards evidence presented by other people?
22. What do you about the data which the scientist often has to use?
23. How data affect the way of thinking of a scientist?
24. For what other purposes does a scientist need imagination?

Long-answer questions:

1. Describe the characteristics of a successful scientist.
2. Distinguish between the two aspects of science.

Discussion questions:

1. Do you think there are other special ways of thinking and acting, used by scientists? If so, comment and explain.
2. Do you agree that it is important to train the non-scientists to think in a scientific way. Give five pieces of evidence for your point of view.
3. Do you agree that 'man is the least reliable of scientific instruments'? Give example.
4. Give a clear explanation of what you think the word 'authority' means.

Composition:

1. Describe in detail the role of curiosity, imagination and observation in scientific invention.
2. Write an essay on 'science and civilization'.

SUBSTITUTION TABLES

Simple Present Active

A. Affirmatives

A scientist	often	uses employs needs	mathematics complex instruments imagination statistical methods new apparatus	in	his
A technologist					
A researcher	use employ need	They Scientists You Researchers	their	work	their
An investigator					

B. Negatives

A physicist	does not	use employ apply	unreliable instruments inaccurate observation unsuccessful techniques	in	his
A biologist					
He	do not	use employ apply	unreliable instruments inaccurate observation unsuccessful techniques	in	his
An engineer					
Scientific workers	do not	use employ apply	unreliable instruments inaccurate observation unsuccessful techniques	in	his
I					
We	Biochemists	use employ apply	unreliable instruments inaccurate observation unsuccessful techniques	in	his
Biochemists					

C. Questions

Does	a specialist an agronomist he a medical worker	sometimes	need use	new	methods? ideas?
Do	mathematicians geologists they psychologists				

Discussion and Criticism

1. Do you think there are other special ways of thinking and acting, used by scientists? If so, comment and explain.
2. Do you think some of these ways are more important than others? If so, give reasons.
3. Do you know of any famous scientist whose work demonstrates some or all the qualities mentioned in the passage? Give details.
4. Try to say something about the work of some of the scientists mentioned in the Word Study section.
5. In what ways do other sciences affect the particular science you study yourself? Give examples.
6. Do you agree that it is important to train the non-scientist to think in a scientific way (II. 14-17). Give good evidences for your point of view.
7. Do you agree that man is the least reliable of scientific instruments (II. 40-41)? Give examples.
8. Give a clear explanation of what you think the word 'authority' (1, 36) means.

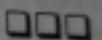
Grammar**Tense: Simple Present Tense**

Remember that this tense is used:

- 1) For action in the present which happen usually, habitually or generally;
e.g., He usually directs his attention towards problems.
- 2) For stating general truths;
e.g., Science plays an important role in the societies in which we live.
- 3) For describing processes in general way;
e.g., A scientist observes carefully, applies logical thought to his observations, tries to find relationships in data.

Put the verbs in brackets into their correct forms:

1. A statistician (apply) mathematics in his work.
2. You (accept) incomplete evidence?
3. The evidence (seem) incomplete.
4. The government official (use) objective methods?
5. Trained observers usually (utilize) data to the fullest.
6. He always (try) to look for underlying relationships in collection of data.
7. A scientist always (think) logically.



Section - 15**STRAIGHT AND CROOKED
THINKING**

If we observe the actions of men, whether as individuals or as groups, and whether scientists or non-scientists, we find that they frequently fall into avoidable errors because of a failure to reason correctly. There are many reasons for this, though only a few can be dealt with here.

The first difficulty is bound up with (related to) the use of words. It frequently happens that what one person means when he uses a certain word is different from what others mean. Consider, for example, the words *intelligence*, *oxygen*, *accurate* and *average*. In *intelligence*, we face the problem that a word may not mean only one thing, but many- in this instance a very complicated set of aptitudes and abilities whose numbers and characteristics are not agreed upon by the specialists who study the phenomenon, and are even less understood by the layman (nonspecialist). In *oxygen*, we have a different problem, for although both; a research chemist and a chemical manufacturer identify the word theoretically with the element O, in practice they have different concepts about it. Thus, if the researcher performed a delicate experiment, using the manufacturer's *oxygen*, it might easily be a failure since the so-called O, whether used as a solid, liquid or gas, would almost certainly contain other substances. Hence another difficulty about words is that they often do not differentiate clearly enough between several varieties of the 'same' thing.

Another common error connected with words consists in confusing a word or a name with a fact. The course of scientific existence of *something* to account for a certain phenomenon, (2) and (3) implying that the phenomenon has been satisfactorily accounted for (explained).

Apart from the misuse of words, mistakes in logic can occur. Thus an example is recorded of a young sociologist, investigating literacy in a certain community, who discovered from the official records that over (more than) 50 percent of the population were females. He subsequently found that approximately 70 percent of the population were literate. When he had obtained this data, he summed it up and drew conclusions as follows:

- Most of the population are females;
- Most of the population are literate;
- ∴ most females are literate.

This was, of course, an unreasonable inference, as the investigator himself realized as soon as he had re-examined his chain of reasoning more carefully.

Another mistake is to confuse cause and effect. This may easily occur at the beginning of an investigation, but if it remains uncorrected it can be considered as primarily a by-product of insufficient experimentation. To illustrate this, the following case can be quoted. The inhabitants of a certain community had noted over the ages that whenever an individual became ill with a fever, the body parasites left him. They therefore made the correlation that the parasites kept them healthy. Later, however, properly controlled scientific investigation showed that the reverse was true: in fact the parasites transmitted several kinds of fever, and then left the sick persons when the latter's bodies became too hot to live on.

Some other factors which may influence reasoning are (a) faulty analogizing, (b) the inhibiting effects on further research of concepts which have been widely accepted as satisfactory, (c) the

role of authority as a bar to the re-consideration of a problem. As regards the first of these, it should be emphasized that the process of tackling one problem by analogizing from another has frequently yielded valuable results, as in the case of air-pressure (see Unit 3). On the other hand, it may lead to the adoption of a totally false hypothesis, as when the idea of the atom as an infinitely small piece of solid matter was obtained by analogizing from the world of visible appearances. This erroneous viewpoint blocked progress in this field for many decades. Similarly, the comparison of the movement of light to a wave -an analogy which had actually provided a satisfactory explanation of the observed phenomena during most of the nineteenth century tended subsequently to interfere with the development of the equally valid concept of light as a stream of particles. This example also illustrates the second factor enumerated above. As far as the third factor is concerned, the history of science shows many instances in which the force of authority has operated in such a manner as to build up an exceedingly powerful resistance to further investigation; in some cases centuries elapsed before this resistance was eventually broken down, as happened in cosmology, for example.

Thus, in addition to the chances of going astray outlined in the previous unit, the scientific investigator shares with the ordinary citizen the possibilities of falling into errors of reasoning in the ways we have just indicated, and many others as well (in addition). The more he knows of this important subject, therefore, the better equipped he will be to attain success in his work; and the straighter he thinks, the more successfully he will be able to perform his functions as a citizen.

Comprehension

1. Why do people make avoidable errors, and what sort of people make them?
2. What is the first difficulty connected with the use of words?
3. Give an illustration of this difficulty.
4. What has often been the result of the process outlined in II.26-31? What error does this process illustrate?

5. What evidence did the young sociologist find to support the assumptions set out in II.39-41?
6. What conclusions (about his inference) did lie come to as soon as he had re-examined his chain of reasoning?
7. In a certain community, when were the body parasites observed to leave a person?
8. What inference did the people draw from this? What was the correct explanation, and what error in reasoning does this illustrate?
9. Name (i) a favourable, (ii) an unfavourable example of the value of analogy in scientific research.
10. Name two other ways, mentioned in the passage, in which the reasoning process can be adversely affected. Give examples of each.
11. What advantages can an awareness of possible errors in thinking bring to the investigator?
12. Give other words or expressions which mean approximately the same as: non-specialist; more than; to be related to; to explain; as well.

Word Study

SYNONYMS EXERCISE (a)

For each of the words appearing in column A below (all of which occur in the reading passage), choose a word from column B which means approximately the same:

A	B	A	B
to reason	complex	instance	later on
way	idea	to obtain	the opposite
frequently	to think	erroneous	case
complicated	to distinguish	the reverse	extremely
concept	in addition to	subsequently	roughly
to differentiate	to find out	to yield	to get
apart from	often	exceedingly	wrong
to discover	manner	approximately	to produce

1. Comprehension

- Make a match between topics and then paragraph number.
- | 'A' | 'B' |
|--|-------------|
| (i) additional causes for affecting reasoning process | paragraph 1 |
| (ii) concluding opinion | paragraph 2 |
| (iii) plan for development of passage | paragraph 3 |
| (iv) Mistakes in way of thinking | paragraph 4 |
| (v) additional problem related | paragraph 5 |
| (vi) adverse affect in reasoning due to inability to distinguish between reason and result | paragraph 6 |
| (vii) exhibition of problem in using words | paragraph 7 |

2. Short questions

- A. What are the difficulties connected with the word 'average'? (To clarify this you may have to find out the meaning of the words mean, median and mode and refer to book on statistics)
- B. Write paragraph on organization pattern of this passage.
- C. Justify the suitability of the title 'straight and worked thinking'.

3. Long/ Discussion questions

- A. Discuss the following, and explain the error:

Education implies teaching, teaching implies knowledge, knowledge is truth, the truth is the same every where. Hence education should be the same every where

- B. Give examples from general science or from your own discipline, how misunderstandings and errors can be caused by words.

- C. How can we prevent ourselves in thinking in crooked way, and think in straight way?

4. For each of the words appearing in column 'A' blow (all of which occur in the reading passage, choose a word from column 'B' which means approximated the same:

'A'	'B'
to reason	complex
way	idea
frequently	to think
complicated	to distinguish
concept	in addition to
to differentiate	to find out
apart from	often
to discover	manner
instance	later on
to obtain	the opposite
erroneous	case
the reverse	extremely
subsequently	roughly
to yield	to get
exceedingly	wrong
approximately	to produce

- B. Some common scientific words having more than one function are; alternate approach, branch change, collapse, count deposit, effect forecast joint lag, net, obtain, trace, value and waste. Look up the different function and meanings of the above words in the 'Basic Dictionary', and incorporate as many as possible in to sentences using each word in the corresponding different functions

Structure Study**PAST PERFECT TENSE**

This tense is formed by *had* plus the Past Participle of the main verb,

E.g. 1.37 'When he *had obtained* the data, he summed it up ...' The main function of this tense is to indicate which of two or more connected actions in the past happened first. Thus in the example given above there are two related actions, i.e. *obtaining* the data and then *summing* it up. The *obtaining* happened before the *summing* up, so the first action goes into the Past Perfect Tense, while the second action is put into the Simple Past Tense.

Thus also II.43-44: 'The investigator himself realized (it was an unreasonable inference) as soon as he had *re-examined* his chain of reasoning.'

First came the re-examination (verb in Past Perfect), then came the realization of the mistake (verb in Simple Past).

Note that the connection between the events is often indicated by an adverb of time such as *when*, *as soon as*, *after*, *before*, etc.

EXERCISE

In the following sentences, put the verbs in brackets into the appropriate tense, i.e. Simple Past or Past Perfect:

1. As soon as the investigator (discover) his error, he (make), the necessary corrections to his data.
2. The authorities (begin) to attack Galileo as soon as he (publish) his new cosmological theories.
3. The accident occurred because the new aircraft (be put) into operation before it (be tested) sufficiently.
4. The medical researcher (refuse) to allow his new drug to be used until he (complete) all the necessary trials.
5. In spite of the fact that the young psychologist realized he (use) an inadequate sample in his investigations, he (allow) his results to be published.
6. During an experiment, a certain piece of metal bent under the strain to which it (be subjected). When the engineer, (re-straighten) it, he (find) that it (lose) some of its original strength.

CONDITIONAL SENTENCES

These are sentences which express what happens if certain conditions are fulfilled. They therefore consist of two parts (which can occur in any order), i.e. a 'Condition' clause - usually introduced by if or unless- and a 'Result' clause. Each of these clauses may have different forms, which are reflected in the tenses used, which indicate the writer's attitude to:

- (i) the chances that the conditions will be fulfilled,
- (ii) the chances that the results will follow.

It is therefore obvious that a fairly large number of different types of conditional sentence are possible, but here we are only concerned with those that are commonly used in scientific English:

1. If (unless) plus the PRESENT tense for the verb expressing the Condition (indicating that the writer thinks that there is no obstacle to the condition being fulfilled, or that it can be or is sure to be fulfilled), connected to another PRESENT tense in the Result clause (indicating that the writer thinks that, given the conditions postulated, the result is normal or usual),

e.g. If we OBSERVE the actions of men, We FIND... (II.1-2), If the supply of heat in a closed system INCREASES, the temperature RISES.

Unless care IS TAKEN, many avoidable mistakes ARE MADE.
2. Sometimes the writer wishes to indicate other attitudes to the Result: in these cases he uses an appropriate anomalous finite, usually WILL (emphasizing the futurity or inevitability of the result), MAY (indicating that the result is only possible) and SHOULD (indicating advisability),

e.g. If the pressure RISES above $\mu\text{lb}/\text{sq.in.}$, structural failure MAY occur; if this limit is reached, therefore, the pressure SHOULD immediately be reduced and the experiment begun again.
3. If (unless) plus the PAST tense for the verb expressing the Condition (indicating that the writer thinks that the condition

is not certain or is unlikely to be fulfilled -it is only a possibility or hypothesis), connected to the anomalous finites WOULD (indicating that the writer thinks that, given the conditions postulated, the result is inevitable) or MIGHT (indicating that he thinks the result is only possible, not certain).

e.g. 'If a researcher **PERFORMED** an experiment (hypothesis), ... it **MIGHT** be a failure (possibility only)' (II.18-20), If all the ice in the world **MELTED** (possibility only), the level of the sea **WOULD** rise (inevitable result) by about 250 ft. (How many metres is this?)

EXERCISE

Complete the following conditional sentences, putting the verbs in italics into the right tense in accordance with the instructions given in brackets in each case:

1. If the body temperature *rise* (can happen) above 106°F, death frequently *occur* (usual result).
2. Unless the scientist *learn* (no obstacle) to think logically, he *commit* (inevitable) many mistakes.
3. If changes in laboratory conditions *occur* (can happen), the results of experiments be *affected* (possibility only).
4. If governments *spend* (possibility only) more money on education and scientific research, more rapid progress *result* (inevitable).
5. If intelligent beings *exist* (hypothesis) in other parts of the universe, they *try* (possibility only) to communicate with the earth.
6. Unless scientists and technologists constantly question and *re-examine* (hypothesis) established concepts and procedures, scientific progress *slow down* (inevitable) or stop.

TWO 'CAUSE AND -RESULT' STRUCTURES

1. Too hot to live on (1.56). This type of construction (TOO plus adjective or adverb plus verb with TO) expresses the

result of an excess of something; in this case it is equivalent to: excessively hot, so that the parasites are not able to live on our body. Other examples are: This piece of metal is TOO hot TO hold (i.e. so hot that it cannot be held); That piece of apparatus is TOO heavy TO move (i.e. so heavy that it cannot be moved); That problem is TOO difficult *for me* TO solve (i.e. so difficult that *I* cannot solve it), etc.

2. *The straighter he thinks, the more successfully he will be able to perform his duties as a citizen* (1.87). This structure (linking two comparatives) expresses the way in which a change in one thing causes a corresponding change in another related thing. Thus in the example quoted, increased power of logical thought leads to a corresponding increase in success as a citizen. Other examples are:

THE HIGHER the temperature, THE FASTER the speed of molecules; THE MORE CAREFULLY we work, THE BETTER the results; THE GREATER the degree of industrialization in a country, THE HIGHER the standard of living, etc.

Note that the construction is often used to state general principles.

SUBSTITUTION TABLES

A. Past Perfect Tense

1	2	3	4	5	6	7	8
The final theory							
A tentative hypothesis	was	developed put forward modified	when after as soon as once		all the data facts evidence information		had been collected obtained analysed plotted
The new model							

B. Conditional Sentences

A

1	2	3	4	5
If the temperature rises, more pressure is applied, environmental conditions are altered, loads increase,	the alloy the metal the sample the material	necessarily inevitably always	undergoes a change of crystal structure loses its original properties develops new properties loses strength	

1	2	3	4	5	6	7	8	9
Unless reliable instruments adequate controls effective procedures suitable techniques	are used applied	in	experiments, field work,	misleading results inaccurate data	will certainly	be obtained		
critical judgement logical thought a careful plan strict objectivity	is put into operation	every type of research.	wrong con- clusions	may possibly				

C.

1	2	3	4	5	6	7
If governments the state	employed used applied	efficient techniques, reliable procedures, effective methods,	skilled manpower crops industrial output	would certainly might, possibly	increase	

D. Could (conditional form, equivalent to *would be able to*)

1	2	3	4	5	6
If larger facilities better equipment more capital	were available,	investigators scientists researchers	could	work more efficiently improve existing conditions develop new sources of power	

NOTE: In conditional sentences of the above type, the correct form of *to be* is *were* for both plural and singular nouns (column 3).

Additional exercise: Repeat the above tables putting the Result clause at the beginning of the sentence and the Condition (*If* or *Unless*) clause at the end, e.g.: The alloy necessarily undergoes a change of crystal structure if the temperature rises. (Table A)

Discussion and Criticism

- What are the difficulties connected with the word *average*? (You may have to find out the meanings of the words *mean*, *median* and *mode* and refer to a book on statistics to clarify this.)
- Give examples from general science or from your own discipline of how misunderstandings and errors can be caused by words.
- Explain the error in logic made by the young sociologist (II.39-41); a simple diagram may help you to do this more clearly.
- Assuming you were the medical researcher concerned in the properly controlled investigation referred to in II.53-56, describe how you carried it out.
- Give additional examples of the 3 obstacles to reasoning outlined in II.57-60.
- Do you know any further types of crooked thinking NOT mentioned in the passage? If so, explain them and give examples.
- Discuss the following, and explain the errors in each case:

- (a) Education implies teaching; teaching implies knowledge; knowledge is truth; the truth is the same everywhere. Hence education should be the same everywhere.
- (b) X is one of the best politicians in the Government. Science is being applied to politics to an increasing degree. Therefore X is the best person to be in charge of the Government's scientific research programme.
- (c) 'I am the Master of this College,
And what I don't know isn't knowledge.'
- (d) Notice put up in an industrial research laboratory: 'Keep your bright ideas to yourself, and do not disturb your superiors: they have enough work of their own. Remember- 99% of bright ideas turn out to be wrong!'
- (e) Physiologists have established that the temperature at which man is able to work best is 62°F. The average temperature of the centre of the Atacama desert is 61.8°F.
- (f) 'Industrialization for underdeveloped countries? A totally wrong solution! Look at the example of Y-land: that country started to industrialize 10 years ago and it has had nothing but political and economic difficulties ever since!'
- (g) 'What is it that separates the living from the non-living? It is, quite simply, Nature's great principle of *vitalism*, recognized by the leaders of scientific thought of all nations under different names, from Bergson's *elan vital* to Shaw's *Life Force*!'
- (h) Either a thing exists or it does not exist, so there cannot really be such things as *unreal numbers* or *anti-matter*.

Grammar

I) Conditional Sentences:

These are sentences which express what happens if certain conditions are fulfilled.

Type-1 Cause and effect

Complete the following sentences, putting the verbs into the right tense.

1. If the body temperature rise (can happen) above 106° F, death frequently occur (usually result).
2. Unless the scientist learn (no obstacle) to think logically, he commit (inevitable) many mistakes.
3. I will look for your notebook and if I find it I
4. If you smoke in a non-smoking compartment,
5. If you (see) Tom tell him I have a message for him.
6. If he (win) he (get) 1,000; if he (come) in second he (get) 500.
7. If you (feel) too hot during the night turn down the central heating.
8. If you (finish) with your dictionary I'd like to borrow it.
9. I shan't wake if the alarm clock (not go) off.
10. I shan't wake unless I (hear) the alarm.
11. If you'd like some ice I (get) some from the fridge.
12. Unless Tom (take) his library book back tomorrow he (have) to pay a fine.
13. You'd better take the day off if you (not feel) well tomorrow.
14. If a driver (brake) suddenly on a wet road he (skid).
15. You can use my phone if yours (not work).
16. If Jack (refuse) to help we'll have to manage without him.
17. You can ask for a continental breakfast if you (not want) a full breakfast.
18. If you (hate) your job why you (not change) it?
19. If you (care) to see some of his drawings I (send) them round to your office.
20. If you (not know) the meaning of a word, you may use a dictionary.



Section - 16

WATER SUPPLIES-A GROWING PROBLEM

Our need for water is constantly increasing. There is an automatic increase due to population growth, while the overall improvement of living standards, the fight against hunger through the irrigation of more land for food growing, and the creation and expansion of new industries, all foretell the need for even greater water supplies throughout the world. Though it is difficult to calculate the exact amount, it is safe to say that in 20 years' time the demand for water will be roughly double. Faced with such a situation it is obvious that we should search as widely as possible and with every available means for sources of fresh water that seem to be the least costly. But where do these sources exist? Only a sustained and co-ordinated programme of scientific observation and research in hydrology will tell us the answer. This is the purpose of the International Hydrological Decade, 1965-1975.

Underground water reserves are much larger than those on the surface, but as they are unseen we tend to underestimate them. It is vitally important that we make use of these underground reserves, but never haphazardly. For example, where does the water come from which we find in one or another of the underground water-bearing layers ('aquifers')? How does it move? How is it renewed? And if this water is used, what effect will it have on the discharge and future level of the water table? What are

the laws of hydrogeology? Despite the immense progress of recent years, all these questions have still not been fully answered.

A similar need for scientific research exists in the branch of hydrology that deals with the quality of water. In nature, there is no water like the pure water defined by chemists, made up of only hydrogen and oxygen. River water, ground-water, and even rainwater always contain other dissolved or suspended elements, and these, even when present in small quantities, play an important role. In the case of irrigation farming, for instance, every drop of water brings with it a little salt: the water evaporates, but the salt remains and gradually poisons the soil and plants. In general, we now know how to remedy the problem of salinity with the help of leaching and drainage. But many questions remain unanswered regarding the effect of irrigation and drainage on the quality of ground water, and the possibility of maintaining the ground water level below the zone of the plant roots while bringing to the surface the water necessary for irrigation.

What happens exactly in this thin layer of soil which preserves the moisture necessary to plant life? What form—liquid or vapour—does the water take in the zone? What forces act on the water, depending on the kind of soil present? How long will this life-giving moisture last?

Evaporation from the soil and transpiration from vegetation are responsible for the direct return to the atmosphere of more than half the water which falls on the land. How exactly do these phenomena, which represent an enormous loss of resources, occur? What part does a forest play in the water balance-sheet of a given area? Does it act merely as a water-consuming mechanism operating through the absorption and transpiration of the trees—thereby reducing the quantity of runoff which reaches the rivers—or, on the contrary, does it result in a slow seepage into the earth which can later be recovered in the form of ground-water, while at the same time preventing erosion?

These are the kinds of problems which still have to be resolved: the answers will only be found through a vast programme of scientific research.

Assignments

1. This extract is an example of a growing type of literature with which scientists all over the world have to deal, i.e. translations from a foreign language (in this case, French) into English. These may be done by individuals—in which case they may be very imperfect and may present actual misinformation for the inattentive reader—or by commercial firms or the specialized Translation Sections of the main international organizations, as in the present extract.

Imagine that a translation, for an international journal, is required of a short summary describing EITHER some of the scientific work being, done at the institution you are studying at, OR a national problem connected with the science you are studying.

Ask one of your specialist teachers to write about 100 words in the vernacular on one of the above alternatives (or do it yourself if you have enough knowledge), and then produce the translation required.

2. You will notice that the passage contains a large number of questions:
 - (a) Imagine that you are attending an international seminar for science students on 'Planning Research Projects': you have been asked to give suggestions on how to plan an investigation into any one of the questions raised in the passage. Give these in English.
 - (b) Formulate similar questions 'still not fully answered' regarding the discipline you are studying yourself.

Comprehension

- A. What question is raised in the first paragraph?
- B. What is put forward to answer this?
- C. Suggest a suitable topic for the second paragraph?

- D. Define 'aquifers'.
 - E. What is opinion of the writer about underground water?
 - F. Summarize the views given in the third paragraph.
 - G. What might be the reason for a series of questions in the fifth paragraph?
 - H. What type of writing do you encounter in this passage?
2. Short questions
 - A. What questions are to be answered in order to solve growing problems of water supplies.
 - B. Link this problem in context of Nepal and write a paragraph.
 3. Long/ Discussion questions
 - A. Imagine that you are asked to plan water supply system in the city of Nepal. How would you plan in storage and make use of its result in distribution?
 - B. Should utilization of ground water in any ways like boring digging well etc. liable to any tax. Relate it to Nepal and discuss.
 - C. Formulate similar questions as in this text still not fully answered 'regarding the discipline you are studying yourself.'
 4. Study this text carefully and make a collection of words with prefix and root (suffer). Use them in sentence of your own to make their meaning clear.
e.g. underestimate = under+ estimate we under estimated the time it would take to get there.

Grammar

Sub-verb-agreement

Rules:

- 1) When clauses are introduced by the relative pronouns who, whom, whose, which, or that, the verb agrees with the antecedent of the relative pronoun in person and number; as-

Example:

- a. Evaporation from the soil and transpiration from vegetation are responsible for the direct return to the atmosphere of more than half the water which falls on the land.
- b. How exactly do these phenomena, which represent an enormous loss of resources, occur?

Exercise:

- 1) He made a list of things that.....required.
 a. was b. were
 c. is d. will
- 2) I like a boy who.....intelligence.
 a. show b. has shown
 c. shows d. have shown
- 3) He is one of the best leaders whoserved the nation perfectly.
 a. serve b. serves
 c. served d. had served
- 4) One of the books which....on the table.....mine.
 a. are, are b. is, is
 c. is, will be d. are, is
- 5) The clergy.....praying for help.
 a. is b. was
 c. has been d. have been
- 6) A pack of cigarettes.....available.
 a. Is b. were
 c. has d. are
- 7) She, as well as her children,.....going for a film.
 a. are b. were
 c. is d. have
- 8) The detailed information.....accurate.
 a. were b. have been
 c. am d. is

- 9) Which of the following takes a singular verb?
 a. furniture b. police
 c. committees d. families
- 10) The memoranda.....approved.
 a. Is b. was
 c. has been d. have been
- 11) All of them.....happy.
 a. are b. is
 c. was d. has been
- 12) Neither he nor he.....going on the picnic.
 a. Is b. was
 c. are d. has
- 13) He, accompanied by the other members of the term,arrived.
 a. has b. have
 c. are d. is
- 14) The committee.....the decision.
 a. are making b. were making
 c. is making d. none of them
- 15) A number of people.....absent today.
 a. Is b. has been
 c. are d. was
- 16) The scenery.....beautiful.
 a. are b. were
 c. is d. have been
- 17) None of the advice.....good.
 a. Is b. are
 c. were d. am
- 18) The syllabi for the subjects.....been approved.
 a. is b. are
 c. has d. have
- 19) Which is incorrect?
 a. scissors b. tweezers
 c. forceps d. pincers

- 20) The gentry.....respected in the United Kingdom.
 a. is b. was
 c. are d. has been
- 21) The number of trees cut down.....multiplied.
 a. have b. is
 c. are d. has
- 22) Neither of the boysto go out.
 a. want b. were wanting
 c. wants d. are wanting
- 23) Nobodythe law to be changed.
 a. want b. were wanting
 c. wants d. are wanting
- 24) A pack of wolves.....howling outside.
 a. are b. is
 c. were d. have been
- 25) The effects of the earthquake.....devastating.
 a. proves b. is proving
 c. was proving d. are proving
- 26) Damber, in addition to his friends,to go to the party.
 a. were wanting b. want
 c. is wanting d. have wanted
- 27) The standard of living in cities as well as in town
 ...deteriorated.
 a. have b. are
 c. has d. is
- 28) The problems of the students.....increased.
 a. has b. is
 c. have d. am
- 29) Theremany solutions to the question.
 a. is b. was
 c. has d. were
- 30) You and I.....been nominated for the award.
 a. is b. are
 c. have d. has

- 31) Some of the equipment.....for sale.
 a. are b. were
 c. is d. have
- 32) Which expression is incorrect?
 a. a pile of books b. a herd of cattle
 c. a pack of wolves d. a herd of sheep
- 33) They, in addition to their loved ones,.....died.
 a. have b. is
 c. are d. has
- 34) The rest of the books.....been sold.
 a. Is b. are
 c. have d. has
- 35) The cattlefor sale.
 a. are b. is
 c. has d. have
- 36) Which is incorrect?
 a. information b. equipment
 c. sceneries d. advice
- 37) Which is singular?
 a. memoranda b. criteria
 c. erratum d. syllabi
- 38) The invention of the telephone.....made life easier.
 a. have b. was
 c. are making d. has
- 39) Two-tenths of the people.....been listed for
 elections.
 a. have b. has
 c. are d. is
- 40) Which is not acceptable?
 a. the deaf b. the poors
 c. the dump d. the handicapped



Section - 17**WHAT EINSTEIN DID**

Albert Einstein discovered one of the most important pieces of new knowledge of the twentieth century. It is a simple formula, perhaps the only formula of advanced physics that most people know: $E=mc^2$. To understand what it means we have to go back a few steps.

Einstein was born in the cathedral city of Ulm, Germany, in 1879. By the age of twelve he had determined to solve the riddle of the "huge world." Unfortunately, his grades were not good, and he left school at fifteen. He managed to begin studying again and eventually graduated from the university with a degree in mathematics in 1900. Unknown to the world, he began work as a patent examiner. Then, in four extraordinary scientific papers published in 1905, he went farther toward solving the riddle of the world than any man before him.

Any one of those papers would have made the reputation of another physicist. The first provided an explanation of Brownian motion, a previously inexplicable phenomenon involving the motion of small particles suspended in a liquid. The second paper resolved the three-centuries-old dispute about the composition of light. Einstein's paper proposed that light is composed of photons that sometimes exhibit wavelike characteristics and at other times act like particles. This cutting of the Gordian knot was not simplistic. Backed by solid mathematical reasoning, it was immediately seen as the solution of this great problem. The proposal also

explained the puzzling photoelectric effect (the liberation of electrons from matter by light).

Paper number three was even more revolutionary, for it proposed what came to be called the Special Theory of Relativity. Einstein said, if we can assume that the speed of light is always the same and that the laws of nature are constant, then both time and motion are relative to the observer.

Einstein provided homely examples of his idea. In an enclosed elevator, a rider is not aware of up or down motion, except, perhaps, in his stomach if the elevator goes too fast. Passengers on two speeding trains are not aware of their overall speed but only of their relative speed, as one, going just a little faster than the other, passes slowly out of sight. Physicists did not need such examples to recognize the elegance and economy of the theory.

The theory explained many things. So did its expansion, in a paper of 1916, into what Einstein called the General Theory of Relativity. In the 1916 paper Einstein posited that gravitation is not a force, as Newton had held, but a curved field in a space-time continuum that is created by the presence of mass. The idea could be tested, he said, by measuring the deflection of starlight as it passed close to the sun during a total eclipse.

Einstein predicted twice the amount of deflection that Newton's laws predicted.

On May 29, 1919, the experiment that Einstein had called for was made by a vessel sent by the British Royal Society to the Gulf of Guinea. The announcement that Einstein had been precisely correct in his prediction came in November and immediately made him world famous. He won the Nobel Prize for Physics in 1921, but he was already the most famous scientist in the world, so much so that he was treated everywhere almost as a kind of circus freak. This displeased him, as it got in the way of his work.

One other paper had been published in 1905. In some ways it was the most important of all. An extension of the previous paper

on relativity, it asked the question whether the inertia of a body depends on its energy content, and answered in the affirmative. However inertia had been held to be dependent on mass alone. Henceforth the world would have to accept the equivalence of mass and energy.

The equivalence is expressed in the famous formula, which says that E , the energy of a quantity of matter with mass m , is equal to the product of the mass and the square of the (constant) velocity of light, c . That velocity, which is also the speed of propagation of electromagnetic waves in free space, is very great: 300,000 kilometers per second. Squared, the number is enormous. In a tiny unit of matter, therefore, is imbedded a gigantic amount of energy, enough, as we learned later, to kill two hundred thousand citizens of Hiroshima with the explosion of a single bomb.

Einstein was a pacifist. He hated war and, after 1918, feared that war would soon erupt again before the world could enjoy a secure and lasting peace. He did what he could to support the Ideas of world government that circulated in the interbellum era. But Einstein the peacemaker was not as influential as Einstein the physicist.

When Adolf Hitler took over Germany in 1933, Einstein renounced German citizenship and fled to the United States. There he continued his work on the General Theory while he sought ways for the angry world to agree to begin to agree. In 1939 when word reached him that two German physicists had split the uranium atom, with a slight loss of total mass that was converted into energy, he realized that war in itself was not the only danger. And, urged by many colleagues, he sat down and wrote a letter to President Franklin D. Roosevelt (1882-1945).

No one else could have written it with such authority. The letter was simple. It described the German experiments and noted that they had been confirmed in the United States. He observed that a European war seemed to be imminent. In the circumstances the possession by Nazi Germany of a weapon based on the fission of the uranium atom could be overwhelmingly dangerous to the rest

of the world. He urged upon the president "watchfulness and if necessary, quick action."

The president wrote polite reply. But the warning had not fallen on deaf ears. No one told Einstein, the pacifist, but a crash program, the greatest and most expensive scientific project up to that time, was begun. Called the Manhattan Project, it was initiated with a six thousand dollar research allocation in February 1940. The total expense would finally grow to more than two billion dollars, the equivalent of many billions of dollars today. When America entered the war, after the Japanese attack on Pearl Harbor at the end of 1941, the pace of the research became feverish. Until 1943, the work was mainly theoretical, but by early 1945 enough progress had been made to begin plans for the test exposing of a bomb. This explosion occurred at Alamogordo Air Base south of Albuquerque, New Mexico, on July 16, 1945. The test proved completely successful, the bomb generating an explosive power equivalent to some twenty thousand tons of TNT. The bomb that would devastate Hiroshima was dropped three weeks later, on August 6.

Einstein was both happy and brokenhearted. The bomb, in the hands of Hitler, would have meant the end of freedom in the world, and the final obliteration of the Jewish people. He struggled to make the newly founded United Nations a better instrument for peace than it was, than it could be, for he feared that the bomb would be used again, and for worse reasons. He continued to work on his unified field theory, which would show how all natural laws could be expressed in a single theoretical construct, perhaps a single equation. But he had left the rest of the scientific community behind, and they increasingly relegated him to isolation. When he died in 1955, he was the only man in the world who believed that he was right about the overall structure of the universe, he who had led mankind to understand more of that structure of the universe, he who had led mankind to understand more of that structure than any scientist since Newton.

Comprehension:

1. What did Albert Einstein discover?
2. What was he determined to do at the age of twelve?
4. Why did he leave school at fifteen?
5. In which subject did he graduate?
6. What outstanding achievement did he have in 1905?
7. What was his first scientific paper about?
8. What did his second paper solve?
9. By what was his theory based?
10. What do you mean by 'photoelectric effect'?
11. Why was his paper number three even more revolutionary?
12. What was the simple example of his idea about theory of Relativity?
13. How did Einstein define gravitation in his 1916 paper?
14. In what way did Einstein's idea about gravitation differ from that of Newton?
15. How could this idea be tested according to Einstein?
16. What was Einstein world famous?
17. When was Einstein awarded Nobel Prize for physics?
18. What displeased Einstein? Why?
19. Why was the paper published in 1905 the most important of all?
20. What is the meaning of $E=mc^2$?
21. Why was Einstein considered to be pacifist?
22. When did Einstein give up his German citizenship? Why?
23. When did Einstein realize that war was not the only danger?
24. What did he write in his letter to president Franklin D. Roosevelt?
25. When did America enter the second world war?

26. When was Hiroshima devastated?
27. Why was Einstein both happy and brokenhearted?
28. Why did Einstein feel fear?
29. What would Einstein's unified field theory show?
30. What did Einstein do?

Long- Answer questions:

1. Describe the contribution of Einstein to the modern scientific world?
2. Describe Einstein's four scientific papers in as much detail as you can.

Discussion question:

1. "Einstein was a pacifist." Do you agree with this? How?
2. "Einstein was the greatest genius of the 20th century." Explain it.

Composition:

1. With the help of reference books and internet, describe in your own words, Einstein's theory of Relativity?
2. Write a letter to your small brother describing the childhood of Einstein his study and achievement.

Grammar**Preposition****Match the column A with column B.****Column A**

- 1) Adolf Hitler took.....Germany in 1933.
- 2) He sat....and wrote a letter to president.
- 3) He urged.....the president.
- 4) He who had led mankind to understand more of that structure than any scientistNewton.
- 5) He was rightthe overall structure of the universe.
- 6) He went farthersolving the riddle of the world than any man before him.

Column B	
down	
since	
over	
up	
within	
after	

- 7) We left our luggage the station. off
8) Shall we take a taxi the station. until
9) The river Rhine flows the North Sea. during
10) I'm supposed to be a diet. for
11) Who is that standing the window? with
12) I managed to put the fire out a extinguisher. by
13) I'm waiting the post to arrive. on
14) I don't think she is capable telling a lie. into
15) Production at the factory was seriously affected....
during the strike. to
16) I think I'll wait ... Thursday before making a decision. at
17) His condition is better these days. toward
18) He needs somebody to look ...him. about
19) The village has three pubs a hundred meters. upon
20) He is walking and down the platform. of

Section - 18

THE MOTHER OF A TRAITOR

— Maxim Gorky

Maxim Gorky (1868-1936) was the pen-name of Alexei Maximovich Peshkov, the great central figure in modern Russian literature. He was born in an artisan family in Nizhny Novgorod, a city now renamed after him. After a miserable childhood in his grandfather's house —his father, had died when he was very young—Gorky wandered about like a tramp for several years, enduring misery and poverty, but mixing with the downtrodden who later peopled his stories and novels.

Gorky began writing in 1892. His first works were mainly romantic stories; he later graduated to Chekovian-type stories of dreary lives and useless intellectuals. With his increasing involvement in Bolshevism and the Revolution, his novels became artistic exposures of the evils of capitalistic society. After the Revolution, Gorky had immense influence on the progress of literature and the arts in Soviet Russia. In the last years of his life he was appointed 'Head of the Soviet Writers' Union, and founded the School of Soviet Realism.

Among the best-known of Gorky's works are: *The Mother*, the first comprehensive portrait of the Russian socialist movement, *Childhood*, *Among the People* and *My Universities*, the autobiographical trilogy, and *The Lower Depths*, a play which was a great success in Russia and was produced all over Europe.

One can talk endlessly about Mothers. For several weeks enemy hosts had surrounded the city in a tight ring of steel; by night fires were lit and the flames peered through the inky blackness at the walls of the city like a myriad red eyes—they blazed malevolently, and their menacing glare evoked gloomy thoughts within the beleaguered city.

From the walls they saw the enemy noose draw tighter; saw the dark shadows hovering about the fires, and heard the neighing of well-fed horses, the clanging of weapons; the loud laughter and singing of man confident of victory—and what can be, more jarring to the ear than the songs and laughter of the enemy?

The enemy had thrown corpses into all the streams that fed water to the city, they had burned down the vineyards around the walls, trampled the fields, cut down the orchards—the city was now exposed on all sides, and nearly every day the cannon and muskets of the enemy showered it with lead and iron.

Detachments of war-weary, half-starved soldiers trooped sullenly through the narrow streets of the city; from the windows of houses issued the groans of the wounded, the cries of the delirious, the prayers of women and the wailing of children. People spoke in whispers, breaking off in the middle of a sentence, tensely alert; was not that the enemy advancing?

Worst of all were the nights; in the nocturnal stillness the groans and cries were more distinctly audible; black shadows crept stealthily from the gorges of the distant mountains towards the half-demolished walls, hiding the enemy camp from view, and over the black ridges of the mountains rose the moon like a lost shield dented by sword blows.

And the people in the city, despairing of succor, worn out by toil and hunger, their hope of salvation waning from day to day, the people in the city stared in horror at that moon, at the sharp-toothed ridges of the mountains, the black mass of the gorges and the noisy camp of the enemy. Everything spoke to them of death, and not a star was there in the sky to give them consolation.

They were afraid to light the lamps in the houses, and a heavy darkness enveloped the streets, and in this darkness, like a fish stirring in the depths of a river, a woman draped from head to foot in a black cloak moved soundlessly.

When they saw her, people whispered to one another:

'Is it she?'

'It is she!'

And they withdrew into the niches under archways, or hurried past her with lowered heads. The patrol chiefs warned her sternly:

'Abroad again, Monna Marianna? Take care, you may be killed and nobody will bother to search for the culprit...'

She drew herself up and stood waiting, but the patrols passed by, either not daring or else scorning to raise their hand against her; the armed men avoided her like a corpse and, left alone in the darkness, she continued her solitary wanderings from street to street, soundless and black like the incarnation of the city's misfortune, while all about her, as though pursuing her, melancholy sounds issued from the night; the groans, cries prayers and the sullen murmur of soldiers who had lost all hope of victory.

A citizen and a mother, she thought of her son and her country: for at the head of the men who were destroying her town was her son, her gay, handsome, heartless son. Yet, not so long ago she had looked upon him with pride regarding him as her precious gift to her, country, a beneficent force she had brought forth to aid the people of the city where she herself had been born and reared. Her heart was bound by hundreds of invisible threads to these ancient stones with which her forefathers had built their homes and raised the walls of the city; to the soil wherein lay buried the bones of her kinsfolk, to the legends, the songs and the hopes of the people. And now this heart had lost a loved one and it wept. She weighed and her heart as on scales her love for her son and her love for her native city, and she could not tell which weighed the more.

And so she wandered thus by night through the streets, and many, failing to recognize her, drew back in fear, mistaking her black figure for the incarnation of Death that was so near to all of them, and when they did recognize her, they turned silently away from the mother of a traitor.

But one day in a remote corner by the city walls she saw another woman, kneeling beside a corpse, so still that she seemed part of the earth. The woman was praying, her grief-stricken face upturned to the stars. And on the wall overhead the sentries spoke in low tones, their weapons grating against the stone.

The traitor's mother asked:

'Your husband?'

'No.'

'Your brother?'

'My son. My husband was killed thirteen days ago, my son today.'

And rising from her knees, the mother of the slain man said humbly:

'The Madonna sees all and knows all, and I am grateful to her!'

'For what?' asked the first, and the other replied:

'Now that he has died honourably fighting for his country, I can say that I feared for him: he was lighthearted, too fond of revelry and I feared that he might betray his city, as did the son of Marianna, the enemy of God and Man, the leader of our foes, may he be so cursed and the womb that bore him!'

Marianna covered her face and went on her way. The next morning she appeared before the city's defenders and said:

'My son has come to be your enemy. Either kill me or open the gates that I may go to him...'

They replied:

'You are a human being, and your country must be precious to you; your son is as much an enemy to you as to each one of us.'

'I am his mother. I love him and feel that I am to blame for what he has become!'

Then they took counsel with one another and decided:

'It would not be honourable to kill you for the sins of your son. We know that you could not have led him to commit this terrible sin, and we can understand your distress. But the city does not need you even as a hostage; your son cares not for you, we believe that he has forgotten you, fiend that he is, and there is your punishment if you think you have deserved it! We believe that is more terrible than death itself!'

'Yes,' she said. 'It is indeed more terrible.'

And so they opened the gates and suffered her to leave the city and watched long from the battlements as she departed from her native soil, now drenched with the blood her son had spilt. She walked slowly, for her feet were reluctant to tear themselves away from this soil and she bowed to the corpses of the city's defenders, kicking aside a broken weapon in disgust, for all weapons are abhorrent to mothers save those that protect life.

She walked as though she carried a precious phial of water beneath her cloak and feared to spill a drop and water as her figure grew smaller and smaller to those who watched from the city wall, it seemed to them that with her went their dejection and hopelessness.

They saw her pause halfway and throwing back the hood of her cloak turn back and gaze long at the city. And over in the enemy's camp they saw her alone in the field and figures dark as her own approached her cautiously. They approached and inquired who she was and whence she had come.

'Your leader is my son,' she said, and not one of the soldiers doubted it. They fell in beside her, singing his praises, saying how clever and brave he was, and she listened to them with head proudly raised, showing no surprise, for her son could not be otherwise.

And now, at last, she stood before him whom she had known nine months before his birth, him whom she had never felt apart from her own heart. In silk and velvet he stood before her, his weapons studded with precious stones. All was as it should be, thus had she seen him so many times in her dreams—rich, famous and admired.

'Mother!' he said, kissing her hands. 'Thou hast come to me, thou art with me, and tomorrow I shall capture that accursed city!'

'The city where thou wert born,' she reminded him.

Intoxicated with his prowess, crazed with the thirst for more glory, he answered her with the arrogant heat for youth:

'I was born into the world and for the world, and I mean to make the world quake with wonder of me! I have spared this city for thy sake, it has been like a thorn in my flesh and has retarded my swift rise to fame. But now tomorrow I shall smash that nest of obstinate, fools!'

'Where every stone knows and remembers them as a child,' she said.

'Stones are dumb unless man makes them speak. Let the mountains speak of me, that is what I wish!'

'And what of men?' she asked.

'Ah yes, I have not forgotten them, Mother. I need them too, for only in men's memory are heroes immortal!'

She said: 'A hero is he who creates life in defiance of death, who conquers death...'

'No!' he objected. 'The destroyer is as glorious as the builder of a city. See, we do not know who it was that built Rome—Aeneas or Romulus—yet we know well the name of Alaric and the other heroes who destroyed the city...'

'Which outlived all names,' the mother reminded him.

Thus they conversed until the sun sank to rest; less and less frequently did she interrupt his wild speech, lower sank her proud head.

A Mother creates, she protects, and to speak to her of destruction means to speak against her; but he did not know this, he did not know that he was negating her reason for existence.

A Mother is always opposed to death; the hand that brings death into the house of men, is hateful and abhorrent to Mothers. But the son did not perceive this, for he was blinded by the cold glitter of glory that deadens the heart.

Nor did he know that a Mother can be as clever and ruthless as she is fearless, when the life she creates and cherishes is in question.

She sat with bowed head, and through the opening in the leader's richly appointed tent she saw the city where first she had felt the sweet tremor of life within her and the anguished convulsions of the birth of this child who now thirsted for destruction.

The crimson rays of the sun dyed the walls and towers of the city blood-red, cast a baleful glare on the windowpanes so that the whole city seemed to be a mass of wounds with the crimson sap of life flowing from each gash. Presently the city turned black as a corpse and the stars shone above it like funeral candles.

She saw the dark houses where people feared to light candles so as not to attract the attention of the enemy, saw the streets steeped in gloom and rank with the stench of corpses, heard the muffled whispers of people awaiting death—she saw it all, all that was near and dear to her stood before her dumbly awaiting her decision, and she felt herself the mother of all those people in her city.

Clouds descended from the black peaks into the valley and swooped down like winged steeds upon the doomed city.

'We may attack tonight,' said her son, 'if the night is dark enough! It is hard to kill when the sun shines in your eyes and the glitter of the weapons blinds you, many a blow goes awry,' he remarked, examining his sword.

The mother said to him: 'Come, my son, lay thy head on my breast and rest, remember how gay and kind thou wert as a child, and how everyone loved thee...'

He obeyed her, laid his head in her lap and closed his eyes, saying:

'I love only glory and I love thee for having made me as I am.'

'And women?' she asked bending over him.

'They are many, one tires of them as of everything that is too sweet.'

'And dost thou not desire children?' She asked finally.

'What for? That they might be killed? Someone like me will kill them; that will give me pain and I shall be too old and feeble to avenge them.'

'Thou art handsome, but as barren as a streak of lightning,' she said with a sigh.

'Yes, like lightning...' he replied, smiling.

And he dozed there on his mother's breast like a child.

Then, covering him with her black cloak, she plunged a knife into his heart, and with a shudder he died, for who knew better than she where her son's heart beat. And, throwing his corpse at the feet of the astonished sentries, she said addressing the city:

'As a Citizen, I have done for my country all I could: as a Mother I remain with my son! It is too late for me to bear another, my life is of no use to anyone.'

And the knife, still warm with his blood, her blood, she plunged with a firm hand into her own breast and again she struck true, for an aching heart is not hard to find.

Comprehension questions:

- How long had the enemy hosts surrounded the city?
- Why was the city exposed on all sides?
- What was the moon like?

- What did everything speak to them?
- How did the woman move?
- Who warned the woman?
- Who was the son of the woman?
- Why did her heart weep?
- What was her black figure mistaken for?
- What was another woman doing?
- What did Marianna say to the defenders of the city?
- Why did monna marianna walk slowly?
- What did the soldiers do?
- What is hateful to mothers?
- What did the mother ask her son to do?
- Why did the mother kill her own son?
- How did she skill her son?
- Why did the mother react when the other soldiers praise her son?
- Why did the mother kill herself at last?

Long answer questions:

- "A hero is he who creates life in defiance of death, who conquers dath." Explain.
- "A mother who is known as a symbol of love may turn into a cruel monster". Explain this statement with reference to the text 'The Mother of a Traitor'.
- Describe how the mother reached her son's camp.
- Write in detail about the scene of the seized city.

Discussion questions:

- How would you react to the betrayal of your own son to your own country?
- Do you think capital punishment is the ultimate solution to the betrayal of the nation?

Composition:

1. Write an essay on the importance of patriotic feeling in the citizens.
2. "Mother and motherland are lovelier than one's own soul." Write a few paragraphs expanding elaborating this remark.

Grammar

Conditional Sentences

Hypothetical but possible

- 1) If + past.....Conditional
If you decide to buy a car, it would cost you a lot of money.
- 2) If + were to.....Conditional
If you were to buy a car, it would cost you a lot of money.

Hypothetical and impossible

- 1) If + past perfect.....perfect conditional
If you had bought a car, you would have cost you much less than now.

Supply the correct tense of the verb:

- 1) It would have been better if they (not come).
- 2) If he hadn't explained it to me, I never (understand).
- 3) If I had worked harder in my youth, I (be) a rich man now.
- 4) He would never have behaved like that if he (have) a good education.
- 5) They would have done it if they (know) how.
- 6) The soldiers (fight) better if they had been given clear orders.
- 7) The dog would have bitten you if it (not be tied) up.
- 8) We (play) tennis yesterday if it (not rain).
- 9) If the students (study) harder, they (pass) their examinations.
- 10) I should never have troubled him, If I (know) he was so busy.

- 11) He (miss) his train if he (not hurry).
- 12) If my watch (not stop), I should have been on time.
- 13) Marry would have been sick if she (eat) all those sweets.
- 14) If he (fall) overboard, he (drown).
- 15) Had he.....he would have met her.
- 16) Had theythey would have built a bigger house.
- 17) Had wewe should have caught the train.
- 18) Had Shakespeare, he would have been very surprised at our actors.
- 19) Had Ihe would never have repaid me.
- 20) Had the jury....., they would never have found the prisoner guilty.
- 21) Had he nothe would never have seen the fight.
- 22) Had we not worked hard last year, we.....
- 23) Had our friends not warned us, we.....
- 24) Had the cinema not been full, we.....
- 25) Had it not been a hot day,.....
- 26) Had they not brought their books with them, the teacher.....
- 27) Had he lived all done what they said they would, we.....
- 28) Unless I am very much mistaken, this.....
- 29) He won't answer unless.....
- 30) Unless it is very fine, we.....
- 31) I can't help you, unless.....
- 32) He could never have achieved that, unless his wife.....
- 33) I would never take a gun with me, unless.....
- 34) The servant would never open the door, unless there.....
- 35) I should never have gone to the cinema, unless you.....
- 36) We should never have gone to the cinema, unless.....
- 37) Unless you do what I say,
- 38) Unless he were to do something silly now, I think he.....
- 39) They could never understand properly, unless you.....

- 40) Your hair will never look nice, unless you.....
 41) Unless you mean to offend your host, you.....
 42) You will never play the piano well, unless.....
 43) Supposing you had five minutes to spare, what.....
 44) Provided that you do what I say, you.....
 45) As long as our children are well, what.....?
 46) If only he would study harder, he.....
 47) Suppose you take 3 from 27, what.....? bH (8)
 48) I shan't mind so long as you.....?
 49) Provided he gets the telegram, he.....?

□ □ □

Section - 19

HOW MUCH LAND DOES A MAN NEED?

— Leo Tolstoy

LEO NIKOLAYEVICH TOLSTOY (1828-1910), Russian novelist, short-story writer, religious philosopher and social reformer was born of a family that was ranked among the most powerful nobles and rich, land owners of Czarist Russia. After a gay youth, he underwent a great spiritual experience and founded a new religion, Tolstoy's. It was based upon his conviction that the whole message of Christ is that 'ye resist not evil'. The main tenets of his religion are renunciation of violence and wealth, improvement of the inner self, compassion for all living things and abolition of governments and churches. Mahatma Gandhi, with his acceptance of the doctrine of nonresistance, became one of his most important followers.

His short stories are full of his religious fervour, and represent the union of great moral conviction and minute psychological analysis.

His best-known work is *War and Peace*; among his other works are: *Anna Karenina*, *The Death of Ivan Ilych* and *Other Stories*, and *Twenty-Three Tales*.

'How Much Land Does a Man Need?' is a story in the moral fable tradition. The theme of human greed and temptation is very

conventional, but it is treated by Tolstoy with artistic restraint, freshness of approach and subtle irony. In spite of carrying an ethical message, the narrative is extremely effective.

Unit 1

An elder sister came to visit her younger sister in the country. The elder was married to a tradesman in town, the younger to a peasant in the village. As the sisters sat over their tea talking, the elder began to boast of the advantages of town life: saying how comfortably they lived there how well they dressed, what fine clothes her children wore, what good things they ate and drank; and how she went to the theatre, promenades and entertainments.

The younger sister was piqued, and in turn disparaged the life of a tradesman, and stood up for that of a peasant.

'I would not change my way of life for yours, said she. 'We may live roughly, but at least we are free from anxiety. You live in better style than we do, but though you often earn more than you need, you are very likely to lose all you have. You know the proverb, "Loss and gain are brothers twain." It often happens that people who are wealthy one day are begging their bread the next. Our way is safer. Though a peasant's life is not a fat one, it is a long one. We shall never grow rich, but we shall always have enough to eat.'

The elder sister said sneeringly:

'Enough? Yes, if you like to share with the pigs and the calves! What do you know of elegance of manners! However much your good man may slave you will die as you are living- on a dung heap- and your children the same.'

'Well, what of that?' replied the younger. 'Of course our work is rough and coarse. But, on the other hand, it is sure, and we need not bow to anyone. But you, in your towns, are surrounded by temptations; today all may be right, but tomorrow the Evil One may tempt your husband with cards, wine, or women, and all will go to ruin. Don't such things happen often enough?'

Pahom, the master of the house, was lying on the top of the stove and he listened to the women's chatter.

'It is perfectly true,' thought he. 'Busy as we are from childhood tilling mother earth, we peasants have no time to let any nonsense settle in our heads. Our only trouble is that we haven't land enough. If I had plenty of land, I shouldn't fear the Devil himself!'

The woman finished their tea, chatted a while about dress, and then cleared away the tea-things and lay down to sleep.

But the Devil had been sitting behind the stove, and had heard all that was said. He was pleased that the peasant's wife had led her husband into boasting, and that he had said that if he had plenty of land he would not fear the Devil himself.

'All right,' thought the Devil. 'We will have a tussle. I'll give you land enough and by means of that land I will get you into my power.'

Unit 2

Close to the village there lived a lady, a small landowner who had an estate of about three hundred acres. She had always lived on good terms with the peasants until she engaged as her steward an old soldier, who took to burdening the people with fines. However careful Pahom tried to be, it happened again and again that now a horse of his got among the lady's oats, now a cow strayed into her garden, now his calves found their way into her meadows and he always had to pay a fine.

Pahom paid up, but grumbled, and going home in a temper, was rough with his family. All through that summer, Pahom had much trouble because of this steward, and he was even glad when winter came and the cattle had to be stabled. Though he grudged the fodder when they could no longer graze on the pastureland, at least he was free from anxiety about them.

In the winter the news got about that the lady was going to sell her land and that the keeper of the inn on the high road was

bargaining for it. When the peasants heard this they were very much alarmed.

'Well,' thought they, if the innkeeper gets the land he will worry us with fines worse than the lady's steward. We all depend on that estate.'

So the peasants went on behalf of their commune, and asked the lady, not to sell the land to the innkeeper, offering her a better price for it themselves. The lady agreed to let them have it. Then the peasants tried to arrange for the Commune to buy the whole estate, so that it might be held by them all in common. They met twice to discuss it but could not settle the matter; the Evil One sowed discord among them and they could not agree. So they decided to buy the land individually, each according to his means and the lady agreed to this plan as she had to the other.

Presently Pahom heard that a neighbour of his was buying fifty acres, and that the lady had consented to accept one half in cash and to wait a year for the other half. Pahom felt envious.

'Look at that,' thought he, 'the land is all being sold, and I shall get none of it.' So he spoke to his wife. 'Other people are buying,' said he, and we must also buy twenty acres or so. Life is becoming impossible. That steward is simply crushing us with his fines.'

So they put their heads together and considered how they could manage to buy it. They had one hundred rubles laid by. They sold a colt and one half of their bees, hired out one of their sons as a labourer and took his wages in advance; borrowed the rest from a brother-in-law, and so scraped together half the purchase money.

Having done this Pahom chose out a farm of forty acres some of it wooded and went to the lady to bargain for it. They came to an agreement, and he shook hands with her upon it and paid her a deposit in advance. Then they went to town and signed the deeds; he paying half the price down, and undertaking to pay the remainder within two years.'

So now Pahom had land of his own. He borrowed seed, and sowed it on the land he had bought. The harvest was a good one, and within a year he had managed to pay off his debts both to the lady and to his brother-in-law. So he became a landowner, ploughing and sowing his own land, making hay on his own land, cutting his own trees, and feeding his cattle on his own pasture; When he went out to plough his fields, or to look at his growing corn, or at his grass-meadows, his heart would fill with joy. The grass that grew and the flowers that bloomed there seemed to him unlike any that grew elsewhere. Formerly, when he had passed by that land, it had appeared the same as any other land, but now it seemed quite different.

Unit 3

So Pahom was well-contented, and everything would have been right if the neighbouring peasants would only not have trespassed on his corn-fields and meadows. He appealed to them most civilly, but they still went on: now the Communal herdsmen would let the village cows stray into his meadows, then horses from the night pasture would get among his corn. Pahom turned them out again and again, and forgave their owners and for long time he forbore to prosecute anyone. But at last he lost patience and complained to the District Court. He knew it was the peasants want of land, and no evil intent on their part, that caused the trouble, but he thought:

'I cannot go on overlooking it or they will destroy all I have. They must be taught a lesson.'

So he had them up, gave them one lesson and then another and two or three of the peasants were fined: "After a time Pahom's neighbours began to bear him a grudge for this, and would now and then let their cattle on to his land on purpose. One peasant even got into Pahom's wood at night and cut down five young lime trees for their bark. Pahom passing through the wood one day noticed something white. He came nearer and saw the stripped trunks lying on the ground, and close by stood the stumps where the trees had been. Pahom was furious.

'If he had only cut one here and there it would have been bad enough,' thought Pahom, 'but the rascal as actually cut down a whole char. If I could only find out who did this, I would pay him out.'

He racked his brains as to who it could be. Finally he decided: 'It must be Simon—no one else could have done it.' So he went to Simon's homestead to have a look round, but he found nothing, and only had an angry scene. However, he now felt more certain than ever that Simon had done it, and he lodged a complaint.

Simon was summoned. The case was tried, and retried, and at the end of it all Simon was acquitted, there being no evidence against him. Pahom felt still more aggrieved, and let his anger loose upon the Elder and the Judges,

'You let thieves grease your palm,' said he. ; If you were honest folk yourselves you would not let a thief go free.'

So, Pahom quarreled with the judges and with his neighbours: Threats to burn his building began to be uttered. So though Pahom had more land, his place in the Commune was much worse than before.

About this time a rumour got about that many people were moving to new parts.

'There's no need for me to leave my land,' thought Pahom. 'But some of the others might leave our village and then there would be more room for us. I would take over land myself and make my estate a bit bigger. I could then live more at ease. As it is, I am still too, cramped to be comfortable.'

One day Pahom was sitting at home when a peasant, passing through the village, happened to call in. He was allowed to stay the night, and supper was given him. Pahom had a talk with this peasant and asked him where he came from. The stranger answered that he came from beyond the Volga, where he had been working. One word led to another and the man went on to say that many people were settling in those parts. He told how some people from

his village had settled there. They had joined the Commune and had had twenty-five acres per man granted them. The land was so good, he said, that the rye sown on it grew as high as a horse, and so thick that five cuts of a sickle made a sheaf. One peasant, he said, had brought nothing with him but his bare hands, and now he had six horses and two cows of his own.

Pahom's heart kindled with desire. He thought:

'Why should I suffer in this narrow hole, if one can live so well elsewhere? I will sell my land and my homestead here, and with the money I will start afresh over there and get everything new. In this crowded place one is always having trouble. But I must first go and find out all about it myself.'

Towards summer he got ready and started. He went down the Volga on a steamer to Samara, then walked another three hundred miles on foot, and at last reached the place. It was just as the stranger had said. The peasants had plenty of land every man had twenty-five acres of Communal land given him for his use, and anyone who had money could buy, besides, at two shillings an acre as much good freehold land as he wanted.

Having found out all he wished to know, Pahom returned home as autumn came on, and began selling off his belongings. He sold his land at a profit, sold his homestead and all his cattle, and withdrew from membership of the Commune. He only waited till the spring, and then started with his family for the new settlement.

Unit 4

As soon as Pahom and his family reached their new abode, he applied for admission into the commune of a large village. He stood treat to the elders and obtained the necessary documents. Five shares of Communal land were given him for his own and his sons' use: that is to say 125 acres (not all together, but in different fields) besides the use of the Communal pasture. Pahom put up the buildings he needed, and bought cattle. Of the Communal land alone he had three times as much as at his former home and the land was good corn-land. He was ten times better off than he had

been. He had plenty of arable land and pasturage and could keep as many head of cattle as he liked.

At first, in the bustle of building and settling down, Pahom was pleased with it all, but when he got used to it he began to think that even here he had not enough land. The first year, he sowed wheat on his share of the Communal land and had a good crop. He wanted to go on sowing wheat, but had not enough Communal land for the purpose, and what he had already used was not available for in those parts what is only sown on virgin soil or on fallow land. It is sown for one or two years and then the land lies fallow till it again over grows with prairie grass. There were many who wanted such land and there was not enough for all so that people quarreled about it. Those who were better off wanted it for growing wheat, and those who were poor wanted it to let to dealers, so that they might raise money to pay their taxes. Pahom wanted to sow more wheat, so he rented land from a dealer for a year. He sowed much wheat and had a fine crop, but the land was too far from the village the wheat had to be carted more than ten miles. After a time Pahom noticed that some peasant dealers were living on separate farms and were growing wealthy and he thought:

'If I were to buy some freehold land and have a homestead en it, it would be a different thing altogether. Then it would all be nice and compact.'

The question of buying freehold land recurred to him again and again.

He went on in the same way for three years, renting land and sowing wheat. The seasons turned out well and the crops were good, so that he began to lay money by. He might have gone on living contentedly, but he grew tired of having to rent other people's land every year, and having to scramble for it. Wherever there was good land to be had, the peasants would rush for it and it was taken up at once, so that unless you were sharp about it you got none. It happened in the third year that he and a dealer together rented a piece of pasture land from some peasants; and they had already ploughed it up, when there was some dispute and

the peasants went to law about it, and things fell out so that the labour was all lost.

'If it were my own land,' thought Pahom, 'I should independent, and there would not be all this unpleasantness.'

So, Pahom began looking out for land which he could buy; and he came across a peasant who had bought thirteen hundred acres, but having got into difficulties was willing to sell again cheap. Pahom bargained and haggled with him, and at last they settled the price at 1,500 rubles, part in cash and part to be paid later. They had all but clinched the matter when a passing dealer happened to stop at Pahom's one day to get a feed for his horses. He drank tea with Pahom and they had a talk. The dealer said that he was just returning from the land of the Bashkirs, far away, where he had bought thirteen thousand acres of land all for 1,000 rubles. Pahom questioned him further and the tradesman said:

All one need do is to make friends with the chiefs. I gave away about one hundred rubles worth of silk robes and carpets, besides a case of tea, and I gave mine to those who would drink it; and I got the land for less than a penny an acre! And he showed Pahom the title deeds saying:

'The land lies near a river, and the whole prairie is virgin soil.'

Pahom plied him with questions, and the tradesman said:

'There is more land there than you could cover if you walked a year, and it all belongs to the Bashkirs. They are as simple as sheep, and land can be got almost for nothing.'

'There now,' thought Pahom, 'with my one thousand rubles, why should I get only thirteen hundred acres, and saddle myself with a debt besides? If I take it out there, I can get more than ten times as much for the money.'

Unit 5

Pahom inquired how to get to the place, and as soon as the tradesman had left him he prepared to go there himself. He left his

wife to look after the homestead, arid started on his journey taking his man with him. They stopped at a town on their way and bought a case of tea, some wine, and other presents, as the tradesman had advised. On and on they went until they had gone more than three hundred miles and on the seventh day they came to a place where the Bashkirs had pitched their tents. It was all just as the tradesman had said. The people lived on the steppes, by a river, in felt-covered tents. They neither tilled the ground, nor ate bread. Their cattle and horses grazed in herds on the steppe. The colts were tethered behind the tents, and the mares were driven to them twice a day. The mares were milked, and from the milk kumis was the women who prepared kumiss and they also made cheese. As far as the men were concerned, drinking kumiss and tea, eating mutton and playing on their pipes, was all they cared about. They were all gout and merry, and all the summer long they never thought of doing any work. They were quite ignorant and knew no Russian, but were good-natured enough.

As soon as they saw Pahom, they came out of their tents and gathered round their visitor. An interpreter was found, and Pahom told them he had come about some land. The Bashkirs seemed very glad; they took Pahom and led him into one of the best tents where they made him sit on some down cushions placed on a carpet, while they sat round him. They gave him some tea and kumiss, and had a sheep killed, and gave him mutton to eat. Pahom took presents out of his cart and distributed them among the Bashkirs, and divided the tea amongst them. The Bashkirs were delighted. They talked a great deal among themselves, and then told the interpreter to translate.

'They wish to tell you,' said the interpreter, 'that they like you, and that it is our custom to do all we can to please a guest and to repay him for his gifts. You have given us presents, now tell us which of the things we possess please you best, that we may present them to you.'

'What pleases me best here,' answered Pahom, 'is your land. Our land is crowded and the soil is exhausted but you have plenty of land and it is good land. I never saw the like of it.'

The interpreter translated. The Bashkirs talked among themselves for a while. Pahom could not understand what they were saying, but saw that they were much amused and that they shouted and laughed. Then they were silent and looked at Pahom while the interpreter said:

'They wish me to tell you that in return for your presents, they will gladly give you as much land as you want. You have only to point it out with your hand and it is yours.'

The Bashkirs talked again for a while and began to dispute. Pahom asked what they were disputing about, and the interpreter told him that some of them thought they ought to ask their Chef about the land and not act in his absence, while others thought there was no need to wait for his return.

Unit 6

While the Bashkirs were disputing, a man in a large fox-fur cap appeared on the scene. They all became silent and rose to their feet. The interpreter said, 'This is our Chief himself.'

Pahom immediately fetched the best dressing gown and five pounds of tea, and offered these to the Chief. The Chief accepted them, and seated himself in the place of honour. The Bashkirs at once began telling him something. The Chief listened for a while, then made a sign with his head for them to be silent, and addressing himself to Pahom, said in Russian:

'Well, let it be so. Choose whatever piece of land you like; we have plenty of it.'

'How can I take as much as I like?' thought Pahom, 'I must get a deed to make secure, or else they may say, "It is yours," and afterwards may take it away again.'

'Thank you for your kind words,' he said aloud. 'You have much land, and I only want a little. But I should like to be sure which bit is mine. Could it not be measured and made over to me? Life and death are in God's hands. You good people give it to me, but your children might wish to take it away again.'

'You are quite right,' said the Chief. 'We will make it over to you.'

I heard that a dealer had been here, continued Pahom, 'and that you gave him a little land, too, and signed title deeds to that effect. I should like to have it done in the same way.'

The Chief understood.

'Yes,' replied he, 'that can be done quite easily. We have a scribe and we will go to town with you and have the deed properly sealed. "And what will be the price I asked PAL."

'Our price is always the same: one thousand rubles a day.'

Pahom did not understand.

'A day? What measure is that? How many acres would that be?'

'We do not know how to reckon it out,' said the Chief. 'We sell it by the day. As much as you can go round on your fact in a day is yours, and the price is one thousand rubles a day.'

Pahom was surprised.

But in a day you can get round a large tract of land, he said.

The Chief laughed.

'It will all be yours!' said he. 'But there is one condition: If you don't return on the same day to the spot whence you started, your money is lost.'

'But how am I to mark the way that I have gone?'

'Why, we shall go to any spot you like, and stay there.'

You must start from that spot and make your round, taking a spade with you. Wherever you think necessary, make a mark. At every turning, dig a hole and pile up the turf; then afterwards we will go round with a plough from hole to hole. You may make as large a circuit as you please, but before the sun sets you must return to the place you started from. All the land you cover will be yours.'

Pahom was delighted. It was decided to start early next morning. They talked a while and after drinking some more kumiss and eating some more mutton, they had tea again, and then the night came on. They gave Pahom a feather-bed to sleep on, and the Bashkirs dispersed for the night, promising to assemble the next morning at daybreak and ride out before sunrise to the appointed spat.

Unit 7

Pahom lay on the feather-bed but could not sleep. He kept thinking about the land.

'What a large tract I will mark off!' thought he. 'I can easily do thirty-five miles in a day. The days are long now, and within a circuit of thirty-five miles what a lot of land there will be! I will sell the poorer land, or jet it to peasants, but I'll pick out the best and farm it. I will buy two ox-teams, and hire two more labourers. About a hundred and fifty acres shall be plough-land, and I will pasture cattle on the rest.'

Pahom lay awake all night, and dozed off only just before dawn. Hardly were his eyes closed when he had a dream. He thought he was lying in that same tent and heard somebody chuckling outside. He wondered who it could be, and rose and went out, and he saw the Bashkir Chief sitting in front of the tent holding his sides and rolling about with laughter. Going nearer to the Chief, Pahom asked: 'What are you laughing at?' But he saw that it was no longer the Chief, but the dealer who had recently stopped at his house and had told him about the land. Just as Pahom was going to ask, 'Have you been here long?' He saw that it was not the dealer, but the peasant who had come up from the Volga, long ago, to Pahom's old home. Then he saw that it was not the peasant either, but the Devil himself with hoofs and horns, sitting there and chuckling, and, before him laid a man barefoot, prostrate on the ground, with only trousers and a shirt on. And Pahom dreamt that he looked more attentively to see what sort of a man it was that was lying there, and he saw that the man was dead, and that it was himself! He awoke horror-struck.

'What things one does dream,' thought he.
Looking round he saw through the open door that the dawn was breaking.

'It's time to wake them up,' thought he. 'We ought to be starting.'

He got up, roused his man (who was sleeping in his cart), bade him hardness and went to call the Bashkirs.

'It's time to go to the steppe to measure the land,' he said.

The Bashkirs rose and assembled, and the Chief came too. Then they began drinking kumiss again, and offered Pahom some tea, but he would not wait.

'If we are to go, let us go. It is high time,' said he.

Unit 8

The Bashkirs got ready and they all started: some mounted on horses, and some in carts. Pahom drove in his own small cart with his servant and took a spade with him. When they reached the steppe, the morning red was beginning to kindle. They ascended a hillock (called by the Bashkirs shikhan) and dismounting from their carts and their horses, gathered in one spot. The Chief came up to Pahom and stretching out his arm towards the plain:

'See,' said he, 'all this, as far as your eye can reach, is ours. You may have any part of it you like.'

Pahom's eyes glistened: it was all virgin soil, as flat as the palm of your hand, as black as the seed of a poppy and in the hollows different kinds of grasses grew breast high.

The Chief took off his fox-fur cap, placed it on the ground and said:

'This will be the mark. Start from here and return here again. All the land you go round shall be yours.'

Pahom took out his money and put it on the cap. Then he took off his outer coat, remaining in his sleeveless under-coat. He unfastened his girdle and tied it tight below, his stomach, put a

little bag of bread into the breast of his coat, and tying a flask of water to his girdle, he drew up the tops of his boots, took the spade from his man, and stood ready to start. He considered for some moments which way he had better go it was tempting, everywhere.

'No matter,' he concluded, 'I will go towards the rising sun.'

He turned His face to the east, stretched himself, and waited for the sun to appear about the rim.

'I must lose no time,' lie thought, and it is easier walking while it is still cool.'

The sun's rays had hardly flashed above the horizon, before Pahom, carrying the spade over his shoulder, went down into the steppe.

Pahom started walking neither slowly nor quickly. After having gone a thousand yards lie stopped, dug a hole and placed pieces of turf one on another to make it more visible. Then he went on and now that he had walked off his stiffness he quickened his pace. After a while he dug another hole.

Pahom looked back. The 11.1'lock could be distinctly seen in the sunlight, with the people on it, and the glittering tyres of the cart-wheels. At a rough guess Pahom concluded that he had three miles. It was growing warmer; he took off his under-coat, flung it across his shoulder, and went on again. It had grown quite warm now; he looked at the sun, it was time to think of breakfast

'The first shift is done, but four in a day, and it is too soon yet to turn. But I will take off nay boots,' said he to himself.

He sat down, took off his boots, stuck them into his girdle and went on. It was easy walking now.

'I will go on for another three miles,' thought he, 'and the turn to the left. This spot is so fine, that it would be a pity to lose it. The further one goes, the better the land seems.'

He went straight, on for a while, and when lie looked round, the hillock was scarcely visible and the people on it looked like

black ants, and he could just see something glistening there in the sun.

'Ah,' thought Pahom, 'I have gone far enough in this direction, it is time to turn. Besides I am in a regular sweat, and very thirsty.'

He stopped, dug a large hole, and heaped up pieces of turf. Next he untied his flask, had a drink, and then turned sharply to the left: He went on and on; the grass was high, and it was very hot.

Pahom began to grow tired: he looked at the sun and, saw that it was noon.

'Well,' he thought, 'I must have a rest.'

He sat down, and ate some bread and drank some water; but he did not lie down, thinking that if he did he might fall asleep. After sitting a little while, he went on again. At first he walked easily the food had strengthened him; but it had become terribly hot and he felt sleepy, still he went on, thinking: 'An hour to suffer, a life-time to live.'

He went a long way in this direction also, and was about to turn to the left again, when he perceived a damp hollow 'It would be a pity to leave that out,' he thought. Flax would do well there. So he went on past the hollow and dug a hole on the other side of it before he turned the corner. Pahom looked towards the hillock. The heat made the air hazy: it seemed to be quivering and through the haze the people on the hillock could scarcely be seen.

'Ah !' thought Pahom, 'I have made the sides- too long; I must make this one shorter.' And he went along the third side stepping faster. He looked at the sun: it was nearly half-way to the horizon, and he had not yet, done two miles of the third side of the square. He was still ten miles from the goal.

'No,' he thought, 'though it will make my land lopsided, I must hurry back in a straight line now. I might go too far, and as it is I have a great deal of land.'

So Pahom hurriedly dug a hole, and turned straight towards the hillock.

Unit 9

Pahom went straight towards the hillock, but he now walked with difficulty. He was done up with the heat, his bare feet were cut and busted, and his legs began to fail. He longed to rest, but it was impossible if he meant to get back before sunset. The sun waits for no man, and it was sinking lower and lower.

'Oh dear,' he thought, 'if only I have not blundered trying for too much! What if I am too late?'

He looked towards the hillock and at the sun. He was still far from his goal, and the sun was already near the rim.

Pahom walked on and on; it was very hard walking but he went quicker and quicker. He pressed on, but was still far from the place. He began running threw away his coat, his boots, his cap and kept only the spade which he used as a support.

'What shall I do, he thought again, I have grasped too much and ruined the whole Mir. I can't get there before the sun sets.'

And this fear made him still more breathless. Pahom went on running, his soaking shirt and trousers stuck to him and his mouth was parched. His breast was working like a blacksmith's bellows, his heart was beating like a hammer, and his legs were giving way as if they did not belong to him. Pahom was seized with terror lest he should die of the strain.

Though afraid of death, he could not stop. 'After having run all that way they will call me a fool if I stop now, thought he. And he ran on and on, and drew near and heard the Bashkirs yelling and shouting to him, and their cries inflamed his heart still more. He gathered his last strength and ran on.

The sun was close to him, and cloaked in mist looked large, and red as blood. Now, yes now, it was about to set! The sun was quite low, but he was also quite near his aim. Pahom could already see the people on the hillock waving their arms to hurry him up. He

could see the fox-fur cap on the ground and the money on it, and the Chief sitting on the ground holding his sides. And Pahom remembered his dream.

'There is plenty of land,' thought he, 'but will God let me live on it? I have lost my life, I have lost my life! I shall never reach that spot!'

Pahom looked at the sun, which had reached the earth: one side of it had already disappeared. With all his remaining strength lie rushed on, bending, his body forward so that his legs could hardly follow fast enough to keep him from falling just as he reached the hillock it suddenly grew dark. He looked up—the sun had already set! He gave a cry: 'All my labour has been in vain though, he, and was about to stop, but lie heard the Bashkirs still shouting, and remembered that though to him from below, the sun seemed to have set, they on the hillock could still see it. He took a long breath and ran up the hillock. It was still light there. He reached the top and saw the cap. Before it sat the Chief laughing and holding his sides. Again Pahom remembered his dream, and he uttered a cry: his legs gave way beneath him, he fell forward and reached the cap with his hands.

'Ah, that's a fine fellow!' exclaimed the Chief. 'He has gained much land!'

Pahom's servant came running up and tried to raise him, but he saw that blood was flowing from his mouth. Pahom was dead!

The Bashkirs clicked their tongues to show their pity.

His servant picked up the spade and dug a grave long enough for Pahom to lie in, and buried him in it. Six feet from his head to his heels was all he needed.

NOTES

the Evil One: Lucifer, Satan, the Devil.

Commune: a co-operative; a plot of land held and managed by a corporation of small farmers.

Volga: river in Russia.

Samara: Kuibyshev, town on the River Volga.

Bashkirs:

a nomadic tribe.

steppes:

dry, treeless, grassy flat lands, kumi.ss: mare's fermented milk.

scribe:

notary public; a person authorized to prepare and certify deeds, contracts and copies of documents.

Comprehension:

1. What are the advantages of town life listed in the story?
2. What are the three things with which the Evil one tempts men?
3. Why did the coming of winter make Pahom Glad?
4. How much land did Pahom decide to buy from the lady?
5. What trouble did the neighbouring peasants create for Pahom?
6. Why did Pahom quarrel with the Elder and the judges?
7. Why was Pahom not satisfied with his riches?
8. How did the dealer please the Bashkirs?
9. How did the Bashkirs please their guests?
10. What pleased Pahom most about the Bashkirs?
11. Why did Pahom want a deed for the land?
12. What was the Bashkirs condition for the sale of land?
13. What happened to Pahom when he reached his goal?
14. What was the 1st thing seen by Pahom in his dream?
15. How much land did Pahom really need in the end?
16. How did the Devil challenge Pahom?
17. Describe the manner in which the Bashkirs lived.
18. What was Pahom's physical condition when he was trying to run back to the starting point?
19. What did Pahom see in his dream?
20. Why did Pahom decide to take his money to the land of the Bashkirs?

Long-answer questions:

1. Describe Pahom's growing greed for land.
2. Describe Pahom's thoughts while he was racing for more land.
3. How does the proverb 'an hour to suffer, a lifetime to live' apply to Pahom's race for land?
4. Describe an imaginary quarrel between two ladies- one from a village and the other from a town-in present day Nepal.

Composition:

1. Write an essay on 'greed leads everyone to disaster'
2. Write a letter to the chairman, Local Housing Authority complaining about the rising rents and the shortage of houses in your city and requesting him to introduce a better housing policy for the city.

Grammar**Tense:****Rules:**

- 1) The past tense in the principal clause is followed by a past tense in the subordinate clause.
- 2) A past tense in the main clause is followed by a present tense verb in the subordinate clause.

Exercise:**Tick the right choice:**

1. She sang well that she.....the competition.
 a. can win b. shall win
 c. might win d. should win
2. He told me the force of gravity.....objects fall.
 a. had made b. is making
 c. make d. makes
3. I told him that mayor.....through the town next week.
 a. can pass b. may pass
 c. would pass d. shall pass

4. If a robberinto my house at night I'd throw something at him.
 a. comes b. had come
 c. came d. was coming
5. She wrote so well that she.....the exam.
 a. shall pass b. may pass
 c. will pass d. could pass
6. He worked hard in order that he.....an engineer.
 a. will be b. may be
 c. might be d. can be
7. She liked him more than she.....her friend.
 a. liked b. likes
 c. like d. had liked
8. It is a known fact they.....present in class today.
 a. were b. had been
 c. are d. could be
9. He.....that the may be changed.
 a. is thinking b. think
 c. thought d. thinks
10. Theyme that they'd be late for the party.
 a. tells b. is telling
 c. says d. told
11. She came when.....
 a. had rained b. it was raining
 c. it rained
12. The rainbefore the lightening flashed.
 a. had already stopped b. already stopped
 c. was stopping
13. I wish.....a bird.
 a. I were b. I was
 c. I have been

14. She looks as if she a ghost.
a. were b. was
c. will be
15. When they come, to visit me.
a. tell them b. you will tell
c. you would tell
16. She always her class.
a. misses b. will miss
c. miss
17. When they I a letter.
a. came, was writing b. was coming, wrote
c. had come, wrote
18. She since last year.
a. has not returned b. will not have returned
c. does not return
19. The boys for a long time.
a. have been working b. have worked
c. had worked
20. My brother from America next week.
a. has come b. will have come
c. is coming
21. The king the parliament next week.
a. addresses b. has addressed
c. addressed
22. After you 12 class, you go through graduate studies.
a. have passed b. had passed
c. will pass
23. He before you have left your office.
a. is coming b. will come
c. has returned

24. Japan the country of island.
a. called b. is called
c. seems to be called
25. Before he left Germany he, a good scholar.
a. has been b. had been
c. was
26. As the train started, many passengers behind.
a. had run b. were running
c. ran
27. Provided that she was good, she attain this position.
a. will attain b. would attain
c. had attained

Section - 20**THE LADY WITH THE PET DOG**

— Anton Chekhov

I

It was said that a new person had appeared on the sea-front; a lady with a little dog. Dmitri Dmitritch Gurov, who had by then been a fortnight at Yalta, and so was fairly at home there, had begun to take an interest in new arrivals. Sitting in Verney's pavilion, he saw, walking on the sea-front, a fair-haired young lady of medium height, wearing a beret; a white Pomeranian dog was running behind her.

And afterwards he met her in the public gardens and in the square several times a day. She was walking alone, always wearing the same beret, always with the same white dog; no one knew who she was, and everyone called her simply "the lady with the dog."

"If she is here alone without a husband or friends, it wouldn't be amiss to make her acquaintance," Gurov reflected.

He was under forty, but he had a daughter already twelve years old, and two sons at school. He married young, when he was a student in his second year, and by now his wife seemed half as old again as he. She was a tall, erect woman with dark eyebrows, stately and dignified, and, as she said of herself, intellectual. She read a great deal, used phonetic spelling, called her husband, not

Dmitri, but Dimitri, and he secretly considered her unintelligent, narrow, inelegant, was afraid of her, and did not like to be at home. He had been unfaithful to her long ago—had been unfaithful to her often, and, probably on that account, almost always spoke ill of women, and when they were talked about in his presence, used to call them "the inferior race."

It seemed to him that he had been so schooled by bitter experience that he might call them what he liked, and yet he could not get on for two days together without "the inferior race." In the society of men he was bored and not himself, with them he was cold and uncommunicative; but when he was in the company of women he felt free, and knew what to say to them and how to behave; and he was at ease with them even when he was silent. In his appearance, in his character, in his whole nature, there was something attractive and elusive which allured women and disposed them in his favour; he knew that, and some force seemed to draw him, too, to them.

Experience often repeated, truly bitter experience, had taught him long ago that with decent people, especially Moscow people—always slow to move and irresolute—every intimacy, which at first so agreeably diversifies life and appears a light and charming adventure, inevitably grows into a regular problem of extreme intricacy, and in the long run the situation becomes unbearable. But at every fresh meeting with an interesting woman this experience seemed to slip out of his memory, and he was eager for life, and everything seemed simple and amusing.

One evening he was dining in the gardens, and the lady in the beret came up slowly to take the next table. Her expression, her gait, her dress, and the way she did her hair told him that she belonged to the upper class, that she was married, that she was in Yalta for the first time and alone, and that she was bored there.... The stories told of the immorality in such places as Yalta are to a great extent untrue; he despised them, and knew that such stories were for the most part made up by persons who would themselves have been glad to sin if they had been able; but when the lady sat down at the next table three paces from him, he remembered these

tales of easy conquests, of trips to the mountains, and the tempting thought of a swift, fleeting love affair, a romance with an unknown woman, whose name he did not know, suddenly took possession of him.

He beckoned coaxingly to the Pomeranian, and when the dog came up to him he shook his finger at it. The Pomeranian growled, Gurov shook his finger at it again.

The lady glanced at him and at once dropped her eyes.

"He doesn't bite," she said, and blushed.

"May I give him a bone?" he asked; and when she nodded he asked courteously, "Have you been long in Yalta?"

"Five days."

"And I have already dragged out a fortnight here."

There was a brief silence.

"Time goes fast, and yet it is so dull here!" she said, not looking at him.

"That's only the fashion to say it is dull here!" A provincial will live in Belyov or Zhidra and not be bored, and when he comes here it's 'Oh, the dullness! Oh, the dust!' One would think he came from Granada."

She laughed. Then both continued eating in silence, like strangers, but after dinner they walked side by side; and there sprang up between them the light jesting conversation of people who are free and satisfied, to whom it does not matter where they go or what they talk about. They walked and talked of the strange light on the sea: the water was of a soft warm lilac hue, and there was a golden streak from the moon upon it. They talked of how sultry it was after a hot day. Gurov told her that he came from Moscow, that he had taken his degree in languages and literature, but had a post in a bank; that he had trained as an opera-singer, but had given it up, that he owned two houses in Moscow.... And from S— since her marriage two years before, that she was staying

another month in Yalta, and that her husband, who needed a holiday too, might perhaps come and fetch her. She was not sure whether her husband had a post in a Crown Department or under the Provincial Council—and was amused by her own ignorance. And Gurov learnt, too, that she was called Anna Sergeyevna.

Afterwards he thought about her in his room at the hotel—though she would certainly meet him the next day; it would be sure to happen. As he got into bed he thought how lately she had been a girl at school, doing lessons like his own daughter; he recalled the diffidence, the angularity, that was still manifest in her laugh and her manner of talking with a stranger. This must have been the first time in her life she had been alone in surroundings in which she was followed, looked at, and spoken to merely from a secret motive which she could hardly fail to guess. He recalled her slender, delicate neck, her lovely grey eyes.

"There's something pathetic about her, anyway," he thought, and fell asleep.

II

A week had passed since they had struck up an acquaintance. It was a holiday. It was sultry indoors, while in the street the wind whirled the dust round and round, and blew people's hats off. One was thirsty all day, and Gurov often went into a restaurant, pressing Anna Sergeyevna to have a soft drink or ice cream. One did not know what to do with oneself.

In the evening when the wind had abated a little, they went out on to the pier to watch the steamer come in. Many people were walking about the dock: they had gathered to welcome someone, bringing bouquets. And two peculiarities of a welldressed Yalta crowd were very conspicuous: the elderly ladies were dressed like young ones, and there were many generals.

Owing to the roughness of the sea, the steamer arrived late, after the sun had set, and it was a long time turning about before it put in at the pier. Anna Sergeyevna looked through her lorgnette at the steamer and the passengers as though looking for acquaintances, and when she turned to Gurov her eyes were

shining. She talked a great deal and asked disconnected questions, forgetting next moment what she had asked; then she dropped her lorgnette in the crush.

The festive crowd began to disperse; it was too dark to see people's faces. The wind had died down, but Gurov and Anna Sergeyevna still stood as though waiting to see someone else come from the steamer. Anna Sergeyevna was silent now, and sniffed the flowers without looking at Gurov.

"The weather is better this evening," he said. "Where shall we go now? Shall we drive somewhere?"

She made no answer.

Then he looked at her intently, and all at once put his arm round her and kissed her on the lips, and breathed in the moisture and the fragrance of the flowers; and he immediately looked round him, anxiously wondering whether anyone had seen them.

"Let us go to your hotel," he said softly. And both walked quickly."

The room was close and smelt of the scent she had bought at the Japanese shop. Gurov looked at her and thought: "What different people one meets in the world!" From the past he carried memories of careless, good-natured women, who loved cheerfully and were grateful to him for the happiness he gave them, however brief it might be; and of women like his wife who loved without any genuine feeling, with superfluous phrases, affectedly, hysterically, with an expression that suggested that it was not love nor passion, but something more significant; and of two or three others, very beautiful, cold women, on whose faces he had caught a glimpse of a rapacious expression—an obstinate desire to snatch from life more than it could give, and these were capricious, unreflecting, domineering, unintelligent women not in their first youth, and when Gurov grew cold to them their beauty aroused his hatred, and the lace on their linen seemed to him like scales.

But in this case there was still the diffidence, the angularity of inexperienced youth, an awkward feeling; and there was a sense

of consternation as though someone had suddenly knocked at the door. The attitude of Anna Sergeyevna—"the lady with the dog"—to what had happened was somehow peculiar, very grave, inappropriate. Her face drooped and faded, and on both sides of it as though it were her fall-so it seemed, and it was strange and her long hair hung down mournfully; she mused in a dejected attitude like "the woman who was a sinner" in an old fashioned picture.

"It's wrong," she said. "You will be the first to despise me now."

There was a watermelon on the table. Gurov cut himself a slice and began eating it without haste. There followed at least half an hour of silence.

Anna Sergeyevna was touching; there was about her the purity of a good, simple woman who had seen little of life. The solitary candle burning on the table threw faint light on her face, yet it was clear that she was very unhappy.

"How could I despise you?" asked Gurov. "You don't know what you are saying."

"God forgive me," she said, and her eyes filled with tears.

"It's awful."

"You seem to feel you need to be forgiven."

"Forgiven? No. I am a bad, low woman; I despise myself and don't attempt to justify myself. It's not my husband but myself I have deceived. And not only just now; I have been deceiving myself for a long time. My husband may be a good, honest man, but he is a flunkey! I don't know what he does there, what his work is, but I know he is a flunkey! I was twenty when I was married to him. I have been tormented by curiosity; I wanted something better. 'There must be a different sort of life,' I said to myself. I wanted to live! To live, to live! . . . I was fired by curiosity . . . you don't understand it, but, I swear to God, I could not control myself; something happened to me: I could not be restrained. I told my husband I was ill, and came here. . . . And here I have been

walking about as though I were dazed, like a mad creature; ... and now I have become a vulgar, contemptible woman whom anyone may despise."

Gurov felt bored already, listening to her. He was irritated by the naive tone, by this remorse, so unexpected and inopportune; but for the tears in her eyes, he might have thought she was jesting or playing a part.

"I don't understand," he said softly. "What is it you want?"

She hid her face on his breast and pressed close to him.

"Believe me, believe me, I beseech you . . ." she said. "I love a pure, honest life, and sin is loathsome to me. I don't know what I am doing. Simple people say: 'The Evil One has beguiled me.' And I may say of myself now that the Evil One has beguiled me."

"Hush, hush! . . ." he muttered.

He looked at her fixed, scared eyes, kissed her, talked softly and affectionately, and by degrees she was comforted, and her gaiety returned; they both began laughing.

Afterwards when they went out, there was not a soul on the sea-front. The town with its cypresses looked dead, but the sea still broke noisily on the shore; a single barge was rocking on the waves, and a lantern was blinking sleepily on it.

They found a cab and drove to Oreanda.

"I found out your surname in the hall just now: it was written on the board—Von Diderits," said Gurov. "Is your husband a German?"

"No; I believe his grandfather was a German, but he is an Orthodox Russian himself."

At Oreanda they sat on a bench not far from the church, looked down at the sea, and were silent. Yalta was hardly visible through the morning mist; white clouds stood motionless on the mountain-tops. The leaves did not stir on the trees, crickets chirped, and the monotonous hollow sound of the sea, rising up

from below, spoke of the peace, of the eternal sleep awaiting us. So it must have sounded when there was no Yalta, no Oreanda here; monotonously when we are all no more. And in this constancy, in lies hid, perhaps, a pledge of our eternal salvation, of the unceasing movement of life upon earth, of unceasing progress towards perfection. Sitting beside a young woman who in the dawn seemed so lovely, soothed and spellbound in these magical surroundings—the sea, mountains, clouds, the wide open sky—Gurov thought how in reality everything is beautiful in this world when one reflects: everything except what we think or do ourselves when we forget our human dignity and the higher aims of our existence.

A man walked up to them—probably a guard—looked at them and walked away. And this detail seemed mysterious and beautiful, too. They saw a steamer come from Theodosia, with its lights out in the glow of dawn.

"There is dew on the grass," said Anna Sergeyevna, after a silence.

"Yes. It's time to go home."

They went back to the town.

Then they met every day at twelve o'clock on the sea-front, lunched and dined together, went for walks, admired the sea. She complained that she slept badly, that her heart throbbed violently; asked the same questions, troubled now by jealousy and now by the fear that he did not respect her sufficiently. And often in the square or gardens, when there was no one near them, he suddenly drew her to him and kissed her passionately. Complete idleness, these kisses in broad daylight while he looked round in dread of someone's seeing them, the heat, the smell of the sea, and the continual passing to and fro before him of idle, well-dressed, well-fed people, made a new man of him; he told Anna Sergeyevna how beautiful she was, how fascinating. He was impatiently passionate, he would not move a step away from her, while she was often

pensive and continually urged him to confess that he did not respect her, did not love her in the least, and thought of her as nothing but a common woman. Rather late almost every evening they drove somewhere out of town, to Oreanda or to the waterfall, and the expedition was always a success, the scenery invariably impressed them as grand and beautiful.

They were expecting her husband to come, but a letter came from him, saying that there was something wrong with his eyes, and he entreated his wife to come home as quickly as possible. Anna Sergeyevna made haste to go.

"It's a good thing I am going away," she said to Gurov. "It's the hand of fate!"

She went by coach and he went with her. They drove the whole day. When she had got into a compartment of the express, and when the second bell had rung, she said:

"Let me look at you once more ... look at you once again. That's right."

She did not shed tears, but was so sad that she seemed ill, and her face was quivering.

"I shall remember you ... think of you," she said. "God be with you; be happy. Don't remember evil against me. We are parting forever—it must be so, for we ought never to have met. Well, God be with you."

The train moved off rapidly, its lights soon vanished from sight, and a minute later there was no sound of it, as though everything had conspired together to end as quickly as possible that sweet delirium, that madness. Left alone on the platform, and gazing into the dark distance, Gurov listened to the chirping of the crickets and the hum of the telegraph wires, feeling as though he had only just waked up. And he thought, musing, that there had been another episode or adventure in his life, and it, too, was at an end, and nothing was left of it but a memory. . . . He was moved, sad, and conscious of a slight remorse. This young woman whom he would never meet again had not been happy with her; he was

genuinely warm and affectionate with her, but yet in his manner, coarse condescension of a happy man who was, besides, almost twice her age. All the time she had called him kind, exceptional, was, so he had unintentionally deceived her.

Here at the station was already a scent of autumn; it was a cold evening.

"It's time for me to go north," thought Gurov as he left the platform. "High time!"

III

At home in Moscow everything was in its winter routine; the furnace was heated, and in the morning it was still dark when the children were having breakfast and getting ready for school, and the nanny would light the lamp for a short time. The frosts had begun already. When the first snow falls, on the first day of sleigh-riding, it is pleasant to see the white earth, the white roofs; one draws soft, delicious breaths, and the season brings back the days of one's youth. The old limes and birches, white with hoar-frost, have a good-natured expression; they are nearer to one's heart than cypresses and palms, and near them one doesn't want to think of the sea and the mountains.

Gurov was Moscow born; he arrived in Moscow on a fine frosty day, and when he put on his fur coat and warm gloves, and walked along Petrovka, and when on Saturday evening he heard the ringing of the bells, his recent trip and the places lie had seen lost all charm for him. Little by little he became absorbed in Moscow life, greedily read three newspapers a day, and declared he did not read the Moscow papers on principle! He already felt a longing to go to restaurants, clubs, dinner-parties, anniversary celebrations, and he felt flattered at entertaining distinguished lawyers and artists, and at playing cards with a professor at the doctors' club. He could already eat a whole plateful of salt fish and cabbage....

In another month, he fancied, the image of Anna Sergeyevna would be shrouded in a mist in his memory, and only from time to time would visit him in his dreams with a touching smile as others did. But more than a month passed, real winter had come, and everything was still clear in his memory as though he had parted with Anna Sergeyevna only the day before. And his memories glowed more and more vividly. When in the evening stillness he heard from his study the voices of his children, preparing their lessons, or when he listened to a song or to an organ playing in a restaurant, or when the storm howled in the chimney, suddenly everything would rise up in his memory: what had happened on the pier, and the early morning with the mist on the mountains, and the steamer coming from Theodosia, and the kisses. He would pace a long time about his room, remembering it all and smiling; then his memories passed into dreams, and in his fancy the past was mingled with what was to come. Anna Sergeyevna did not visit him in dreams, but followed him about everywhere like a shadow and haunted him. When he shut his eyes he saw her as though she were standing before him, and she seemed to him lovelier, younger, tenderer than she had been; and he imagined himself finer than he had been in Yalta. In the evenings she peeped out at him from the bookcase, from the fireplace, from the corner—he heard her breathing, the caressing rustle of her dress. In the streets he watched the women, looking for someone like her.

He was tormented by an intense desire to confide his memories to someone. But in his home it was impossible to talk of his love, and he had no one outside; he could not talk to his tenants nor to anyone at the bank. And what had he to talk about? Had he been in love, then? Had there been anything beautiful, poetical, edifying or simply interesting in his relations with Anna Sergeyevna? And there was nothing for him but to talk vaguely of love, of women, and no one guessed what it meant; only his wife twitched her black eyebrows, and said: "The part of a lady-killer does not suit you at all, Dimitri."

One evening, coming out of the doctors' club with an official with whom he had been playing cards, he could not resist saying:

"If only you knew what a fascinating woman I met in Yalta!"

The official got into his sledge and was driving away, but turned suddenly and shouted:

"Dmitri Dmitritch!"

"What?"

"You were right this evening: the surgeon was a bit too strong!"

These words, so ordinary, for some reason moved Gurov to indignation, and struck him as degrading and unclean. What savage manners, what people! What senseless nights, what dull, uneventful days! The rage for card-playing, the gluttony, the drunkenness, the continual talk about the same things. Useless pursuits and conversations always about the same things absorb the better part of one's time, the better part of one's strength, and in the end there is left a life groveling and curtailed, worthless and trivial, and there is no escaping or getting away from it—just as though one were in a madhouse or a prison.

Gurov did not sleep all night, and was filled with indignation. And he had a headache all next day. And the next night he slept badly; he sat up in bed, thinking, or paced up and down his room. He was sick of his children, sick of the bank; he had no desire to go anywhere or to talk of anything.

In the holidays in December he prepared for a journey, and told his wife he was going to Petersburg to do something in the interests of a young friend—and he set off for S—. What for? He did not very well know himself. He wanted to see Anna Sergeyevna and to talk with her—to arrange a meeting, if possible.

He reached S— in the morning, and took the best room at the hotel, in which the floor was covered with grey army cloth, and on the table was an inkstand, grey with dust and adorned with a figure on horseback, with its hat in its hand and its head broken off. The hotel porter gave him the necessary information; Von Diderits

lived in a house of his own in Old Gontcharny Street—it was not far from the hotel: he was rich and lived in good style, and had his own horses; everyone in the town knew him. The porter pronounced the name "Dridirits."

Gurov went without haste to Old Gontcharny Street and found the house. Just opposite the house stretched a long grey fence studded with nails.

"One would run away from a fence like that," thought Gurov, looking from the fence to the windows of the house and back again.

He considered: today was a holiday, and the husband would probably be at home. And in any case it would be tactless to go into the house and upset her. If he were to send her a note it might fall into her husband's hands, and then it might ruin everything. The best thing was to trust to chance. And he kept walking up and down the street by the fence, waiting for the chance. He saw a beggar go in at the gate and heard the dogs fly at him; then an hour later he heard a piano, and the sounds were faint and indistinct. Probably it was Anna Sergeyevna playing. The front door suddenly opened, and an old woman came out, followed by the familiar white Pomeranian. Gurov was on the point of calling to the dog, but his heart began beating violently, and in his excitement he could not remember the dog's name.

He walked up and down, and loathed the grey fence more and more, and by now he thought irritably that Anna Sergeyevna had forgotten him, and was perhaps already amusing herself with someone else, and that was very natural in a young woman who had nothing to look at from morning till night but that confounded fence. He went back to his hotel room and sat for a long while on the sofa, not knowing what to do, then he had dinner and a long nap.

"How stupid and worrying it is!" he thought when he woke and looked at the dark windows: it was already evening. "Here I've had a good sleep for some reason. What shall I do tonight?"

He sat on the bed, which was covered with a cheap grey blanket of the kind seen in hospitals, and he taunted himself in his vexation:

"So much for the lady with the dog... so much for the adventure.... You're in a nice fix..."

That morning at the station a poster in a large letters had caught his eye. "The Geisha" was to be performed for the first time. He thought of this and went to the theatre.

"It's quite possible she may go to the first performance," he thought.

The theatre was full. As in all provincial theatres, there was a haze above the chandelier, the gallery was noisy and restless; in the front row the local dandies were standing with their hands behind them; in the Governor's box the Governor's daughter, wearing a boa, was sitting in the front seat, while the Governor himself hid modestly behind the curtain with only his hands visible; the orchestra was a long time tuning up; the stage curtain swayed. While people were coming in and taking their seats, Gurov scanned their faces eagerly.

Anna Sergeyevna, too, came in. She sat down in the third row, and when Gurov looked at her his heart contracted, and he understood clearly that for him there was in the whole world no creature so near, so precious, and so important; she, this little woman, in no way remarkable, lost in a provincial crowd, with a vulgar lorgnette in her hand, filled his whole life now, was his sorrow and his joy, the one happiness that he now desired for himself, and to the sounds of the provincial orchestra, of the wretched violins, he thought how lovely she was. He thought and dreamed.

A young man with small side-whiskers, tall and stooping, came in with Anna Sergeyevna and sat down beside her; he bent his head at every step and seemed to be continually bowing. Most likely, this was the husband whom at Yalta, in a rush of bitter feeling, she had called a flunkey. And there really was in his long figure, his side-whiskers, and the small bald patch on his head,

something of the flunkey's obsequiousness; his smile was sugary, and in his buttonhole there was some badge of distinction which looked like the nametag of a waiter.

During the first intermission, the husband went out to smoke; she remained alone in her seat. Gurov, who was sitting in the same section, went up to her and said in a trembling voice, with a forced smile:

"Good evening."

She glanced at him and turned pale, then glanced again with horror, unable to believe her eyes and tightly gripped the fan and the lorgnette in her hands, evidently struggling with herself not to faint. Both were silent. She was sitting; he was standing, frightened by her confusion and not venturing to sit down beside her. The violins and the flute began tuning up. He felt suddenly frightened; it seemed as though all the people in the boxes were looking at them. She got up and went quickly to the door; he followed her, and both walked senselessly along passages, up and down stairs, and figures in legal, scholastic, and civil service uniforms, all wearing badges, flitted before their eyes. They caught glimpses of ladies, of fur coats on hangers; drafts of wind blew on them, bringing a smell of stale tobacco. And Gurov, whose heart was beating violently, thought:

"Oh, heavens! Why are these people and this orchestra here!"

And at that instant, he recalled how when he had seen Anna Sergeyevna off at the station he had thought that everything was over and they would never meet again. But how far they were still from the end!

On the narrow, gloomy staircase—over which was written "To the Amphitheatre," she stopped.

"How you frightened me!" she said, breathing hard, still pale and overwhelmed. "Oh, how you frightened me! I am half-dead. Why have you come? Why?"

"But do understand, Anna, do understand . . ." he said hastily in a low voice. "I entreat you to understand . . ."

She looked at him with dread, with entreaty, with love; she looked at him intently, to keep his features more distinctly in her memory.

"I am so unhappy," she went on, not heeding him. "I have thought of nothing but you all this time; I live only in the thought of you. And I wanted to forget, to forget you; but why, oh why, have you come?"

On the landing above them two schoolboys were smoking and looking down, but that was nothing to Gurov; he drew Anna Sergeyevna to him, and began kissing her face, her cheeks, and her hands.

"What are you doing, what are you doing!" she cried in horror, pushing him away. "We are mad. Go away today; go away at once. . . . I beseech you by all that is sacred, I implore you... There are people coming this way!"

Someone was coming up the stairs.

"You must go away," Anna Sergeyevna went on in a whisper. "Do you hear, Dmitri Dmitritch? I will come and see you in Moscow. I have never been happy; I am miserable now, and I never, never shall be happy, never! Don't make me suffer still more! I swear I'll come to Moscow. But now let us part. My precious, good, dear one, we must part!"

She pressed his hand and walked rapidly downstairs, turned to look at him, and from her eyes he could see that she really was unhappy. Gurov stood for a little while, listened, then, when all sound had died away, he found his coat and left the theatre.

IV

And Anna Sergeyevna began coming to see him in Moscow. Once in two or three months she left S—, telling her husband that she was going to consult a doctor about an internal complaint—and her husband believed her, and did not believe her. In Moscow, she

stayed at the Slavyansk Bazaar hotel, and at once sent a man in a red cap to Gurov. Gurov went to see her, and no one in Moscow knew of it.

Once he was going to see her in this way on a winter morning (the messenger had come the evening before when he was out). With him walked his daughter, whom he wanted to take to school; it was on the way. Snow was falling in big wet flakes.

"It's three degrees above freezing-point, and yet it is snowing," said Gurov to his daughter. "The thaw is only on the surface of the earth; there is quite a different temperature higher in the atmosphere."

"And why are there no thunderstorms in winter, father?"

He explained that, too. He talked, thinking all the while that he was going to see her, and no living soul knew of it, and probably never would know. He had two lives: one, open, seen and known by all who cared to know, full of relative truth and of relative falsehood, exactly like the lives of his friends and acquaintances; and another life running its course in secret. And through some strange, perhaps accidental, conjunction of circumstances, everything that was essential, of interest and of value to him, everything in which he was sincere and did not deceive himself, everything that made the kernel of his life, was hidden from other people; and all that was false in him, the sheath in which he hid himself to conceal the truth—such, for instance, as his work in the bank, his discussions at the club, his "inferior race," his presence with his wife at anniversary festivities—all that was open. Judging others by himself, he did not believe in what he saw, and always fancied that every man had his real, most interesting life under the cover of secrecy and under the cover of night. All personal life rested on secrecy, and possibly it was partly on that account that civilized man was so nervously protective of his personal privacy.

After leaving his daughter at school, Gurov went on to the Slaviansky Bazaar. He took off his fur coat in the lobby, went upstairs, and softly knocked at the door. Anna Sergeyevna, wearing

his favourite grey dress, exhausted by the journey and the suspense, had been expecting him since the evening before. She was pale; she looked at him, and did not smile, and he had hardly come in when she fell on his breast. Their kiss was slow and prolonged, as though they had not met for two years.

"Well, darling, how are you getting on there?" he asked.
"What news?"

"Wait; I'll tell you directly.... I can't talk."

She could not speak; she was crying. She turned away from him, and pressed her handkerchief to her eyes.

"Let her have her cry out. I'll sit down and wait," he thought, and he sat down in an armchair.

Then he rang and ordered tea, and while he drank his tea she remained standing at the window with her back to him.

She was crying from emotion, from the miserable consciousness that their life was so hard for them; they could only meet in secret, hiding themselves from people, like thieves! Was not their life shattered?

"Come, do stop!" he said.

It was evident to him that this love of theirs would not soon be over, that he could not see the end of it. Anna Sergeyevna grew more and more attached to him. She adored him, and it was unthinkable to say to her that it was bound to have an end some day; besides, she would not have believed it!

He went up to her and took her by the shoulders to say something affectionate and cheering, and at that moment he saw himself in the mirror.

His hair was already beginning to turn grey. And it seemed strange to him that lie had grown so much older, so much plainer during the last few years. The shoulders on which his hands rested were warm and quivering. He felt compassion for this life, still so warm and lovely, but probably already not far from beginning to fade and wither like his own. Why did she love him so much? He

always seemed to women different from what he was, and they loved in him not himself, but the man created by their imagination, whom they had been eagerly seeking all their lives; and afterwards, when they noticed their mistake, they loved him all the same. And not one of them had been happy with him. Time passed, he had made their acquaintance, got on with them, parted, but he had never once loved; it was anything you please, but not love.

And only now when his head was grey he had fallen truly, really in love—for the first time in his life.

Anna Sergeyevna and he loved each other like people very close and akin, like husband and wife, like tender friends; it seemed to them that fate itself had meant them for one another, and they could not understand why he had a wife and she a husband; and it was as though they were a pair of birds of passage, caught and forced to live in different cages. They forgave each other for what they were ashamed of in their past, they forgave everything in the present, and felt that this love of theirs had changed them both.

In moments of depression in the past he had comforted himself with any arguments that came into his mind, but now he no longer cared for arguments; he felt profound compassion, he wanted to be sincere and tender....

"Don't cry, my darling," he said. "You've had your cry; that's enough.... Let us talk now, let us think of some plan."

Then they spent a long while taking counsel together, talked of how to avoid the necessity for secrecy, for deception, for living in different towns and not seeing each other for long stretches of time. How could they free themselves from this intolerable bondage?

"How? How?" he asked, clutching his head. "How?"

And it seemed as though in a little while the solution would be found, and then a new and splendid life would begin; and it was clear to both of them that they had still a long, long way to go, and that the most complicated and difficult part of their journey was just beginning.

Comprehension:

1. When did Dimitri Dmitritch Gurov see the lady with a dog?
2. What was she like?
3. How old was Dimitri Dmitritch Gurov then?
4. Why did he not like to be at home?
5. Since when did he begin to be unfaithful to his wife?
6. What did he think about women?
7. How did he feel in the company of men and women?
8. What were the special things that he possessed could attract women?
9. What did he infer from the expression and appearance of the lady?
10. What did Gurov and the lady talk about after their dinner that evening?
11. What was the name of the lady?
12. Where was she brought up?
13. What was the lady's reaction to Mr. Gurov's advances?
14. Why did she think herself to be a bad, low woman?
15. What sort of experience did Mr. Gurov have about the people of Moscow?
16. What did Anna Sergeyevna mean by her remark, "The Evil one has beguiled me"?
17. Describe the view of oreanda that morning.
18. How did they spend their time on the sea-front when they met everyday at twelve o'clock?
19. What made Anna Sergeyevna part with Gurov?
20. Describe the way he passed his time in Moscow; his hometown, in the winter after he parted with Anna Sergeyevna.
21. How did the memory of Anna Sergeyevna follow him?

22. How did his wife react when Gurov talked about love and women?
23. Where did Gurov see Anna sergeyevna for the second time?
24. Why was Anna sergeyevna so much frightened when Gurov met her at the theatre?
25. Why was she unhappy?
26. Compare the two lives of Gurov.
27. Why did Gurov go to slaviansky Bazaar after leaving his daughter at school?
28. What sort of man was Gurov in the true sense?
29. Why did Gurov feel that the most complicated part of their journey was just beginning?

Long-answer questions:

1. Describe the relationship between Gurov and Anna sergeyevna.
2. According to Robert Graves " Love is a universal migraine, a bright stain on the jisiion blotting out reason."
3. Explain the relevance of this quotation to the love between Gurov and Anna Sergeyevna.

Discussion questions:

1. What do you think about extra-marital love? Should it be prohibited?
2. How would you distinguish between love and marriage?
3. Do you think that the married couples are always faithful to each other?
4. Does marriage end the possibility for one being in love with someone?
5. What is the place of love in human life?
6. Is love always limited to husband and wife?

Composition:

1. Write an essay on 'Love and marriage'.
2. Describe the importance of love in anyone's life.
3. Write in detail about the spiritual or true love and the superficial or physical love.

GRAMMAR

Conditional sentences are conveniently classified into three groups:

Cause and effect

Rules:

- A) If + present---present
If one buys a car, it costs money.
- B) If + present---future or imperative
If you buy that car, drive carefully.
- C) Imperative "And" future
Buy a car and it will cost you a lot.
- D) If + 'should' ----future or imperative
If you should decide to buy a car, please tell me.

Put the correct conditional in the following sentences:

1. If she is here alone without her husband or friend, it amiss to make her acquaintance.
2. If waters boils,
3. Thin ice breaks if you.....
4. The flight is generally postponed if
5. If you hit the dog,
6. The cat will scratch you if.....
7. Tell me the answer; I..... give you a prize.
8. People earn a lot if they.....
9. It is possible to reach it only if.....
10. Salt dissolves if you.....

11. They generally play football if the weather.....
12. She visits her family when
13. I wear a black suit if.....
14. If people feel ill, they.....
15. If you (have) a cold, it (be) wise to go to bed.
16. If people (be) tired, they generally (go) to bed.
17. If you (throw) a stone into water, it (sink).
18. If a man (have) children, he (must) look after them.
19. If you (heat) butter, it (melt).
20. If you (go) to the doctor, you (must) pay.
21. Students (learn) fast if the teacher (be) competent.
22. Plants (grow) quickly if you (water) them.
23. I (sing) if I (be) happy.
24. I cannot understand you if you (speak) Chinese.
25. If we try, we may succeed. (Let us.....)
26. If they come, I'll talk to them. (Let them.....)
27. If I have your pen, I'll write the answers. (Let me)
28. If he escapes, he will do it again. (Let him.....)
29. People do not understand if.....
30. If you give me a pencil, I'll explain how to do it.



Section - 21

CIVIL PEACE

— Chinua Achebe

Chinua Achebe (1930), Nigerian novelist, poet, short story writer and essayist, was educated at Umuchia and Abadan. His novels all written in English including *Things Fall Apart* (1958) and *A Man of the People* (1966) describe inter-tribal and inter-racial tensions in pre- and post-colonial Nigerian society as well as traditional African society in confrontation with European customs and values. In 1966 he became involved in the war between Biafra and the rest of Nigeria, and devoted most of his time thereafter to politics and education, producing no more fiction until *Anthills of the Savannah* (1987). Achebe won the Nobel Prize for literature in 1989.

In this story, Chinua Achebe describes how a family, with its hard work and patience, manages to settle itself after it had lost everything in the war.

Jonathan Iwegbu counted himself extra-ordinarily lucky. "Happy survival!" meant so much more to him than just a current fashion of greeting old friends in the first hazy days of peace. It went deep to his heart. He had come out of the war with five inestimable blessings- his head, his wife Maria's head and the heads of three out of their four children. As a bonus he also had his old bicycle — a miracle too but naturally not to be compared to the safety of five human heads.

The bicycle had a little history of its own. One day at the height of the war, it was commandeered "For urgent military action." Hard as its loss would have been to him he would still have let it go without a thought had he not had some doubts about the genuineness of the officer. It wasn't his disreputable rags, nor the toes peeping out of one blue and one brown canvas shoe, nor yet the two stars of his rank done obviously in a hurry in biro, that troubled Jonathan; many good and heroic soldiers looked the same or worse. It was rather a certain lack of grip and firmness in his manner. So Jonathan, suspecting he might be amenable to influence, rummaged in his raffia bag and produced the two pounds with which he had been going to buy firewood, which his wife, Maria, retailed to camp officials for extra stock-fish and corn meal, and got his bicycle back. That night he buried it in the little clearing in the bush where the dead of the camp, including his own, youngest son, were buried. When he dug it up again a year later after the surrender all it needed was a little palm oil greasing. "Nothing puzzles God," he said in wonder.

He put it to immediate use as a taxi and accumulated a small pile of Biafran money ferrying camp officials and their families across the four-mile stretch to the nearest tarred road. His standard charge per trip was six pounds and those who had the money were only glad to be rid of some of it in this way. At the end of a fortnight, he had made a small fortune of one hundred and fifteen pounds.

Then he made the journey to Enugu and found another miracle waiting for him. It was unbelievable. He rubbed his eyes and looked again and it was still standing there before him. But, needless to say, even that monumental blessing must be accounted also totally inferior to the five heads in the family. This newest miracle was his little house in Ogui Over side. Indeed nothing puzzles God! Only two houses away a huge concrete edifice some wealthy contractor had put up just before the war was a mountain of rubble. And here was Jonathan's little zinc house of no regrets built with mud blocks quite intact! Of course, the doors and windows were missing and five sheets off the roof. But what was

that? And anyhow, he had returned to Enugu early enough to pick up bits of old zinc and wood and soggy sheets of cardboard lying around the neighbourhood before thousands more came out of their forest holes looking for the same things. He got a destitute carpenter with one old hammer, a blunt plane and a few bent and rusty nails in his tool bag to turn this assortment of wood, paper and metal into door and window shutters for five Nigerian shillings overjoyed family carrying five heads on their shoulders.

His children picked mangoes near the military cemetery and sold them to soldiers' wives for a few pennies-real pennies this time-and his wife started making breakfast akara balls for neighbours in a hurry to start life again. With his family earnings, he took his bicycle to the villages around and bought fresh palm-wine, which he mixed generously in his rooms with the water, which had recently started running again in the public tap down the road, and opened up a bar for soldiers and other lucky people with good money.

At first, he went daily, then every other day and finally once a week, to the offices of the Coal Corporation where he used to be a miner, to find out what was what. The only thing he did find out in the end was that little house of his was even a greater blessing than he had thought. Some of his fellow ex-miners who had nowhere to return at the end of the day's waiting just slept outside the doors of the offices and cooked what meal they could scrounge together in Bourn vita tins. As the weeks lengthened and still nobody could say what was what Jonathan discontinued his weekly visits altogether and faced his palm-wine bar.

But nothing puzzles God. Came the day of the windfall when after five days of endless scuffles in queues and counter queues in the sun outside the Treasury he had twenty pounds counted into his palms as ex-gratia award for the rebel money he had turned in. It was like Christmas for him and for many others like him when the payments began. They called it (since few could manage its proper official name) egg-rasher.

As soon as the pound notes were placed, in his palm Jonathan simply closed it tight over them and buried fist and money inside his trouser pocket. He had to be extra careful because he had seen a man a couple of days earlier collapse into near-madness in an instant before that oceanic crowd because no sooner had he got his 'twenty pounds than some heartless ruffian picked it off him.' Though it was not right that a man in such an extremity of agony should be blamed yet many in the queues that day were able to remark quietly at the victim's carelessness, especially after he pulled out the innards of his pocket and reveals a hole in it big enough to pass a thief's head. But of course, he had insisted that the money had been in the other pocket, pulling it out too to show its comparative wholeness. So one had to be careful.

Jonathan soon transferred the money to his left hand and pocket so as to leave his right free for shaking hands should the need arise, though by fixing his gaze at such an elevation as to miss all approaching human faces he made sure that the need did not arise, until he got home.

He was normally a heavy sleeper but that night he heard all the neighbourhood noises die down one after another. Even the night watchman who knocked the hour on some metal somewhere in the distance had fallen silent after knocking one o'clock. That must have been the last thought in Jonathan's mind before he was finally carried away himself. He couldn't have gone for long, though, when he was violently awakened again.

"Who is knocking?" whispered his wife lying beside him on the floor.

"I don't know," he whispered back breathlessly. The second time the knocking came it was so loud and imperious that the rickety old door could have fallen down.

"Who is knocking?" he asked them, his voice parched and trembling.

"Na tief-man and him people," came the cool reply. "Make you hopen de door." This was followed by the heaviest knocking of all.

Maria was the first to raise the alarm, then he followed and all their children.

"Police-o! Thieves-o! Neighbours-o! Police-o! We are lost! We are dead! Neighbours, are you asleep? Wake up! Police-o!"

This went on for a long time and then stopped suddenly. Perhaps they had scared the thief away. There was total silence. But only for a short while.

"You done finish?" asked the voice outside. "Make we help you small. Oya, everybody!"

"Police-o! Tief-man-so! Neighbours-o! We done loss-of! Police-o!..."

There were at least five other voices besides the leader's.

Jonathan and his family were now completely paralysed by terror. Maria and the children sobbed inaudibly like lost souls. Jonathan groaned continuously.

The silence that followed the thieves' alarm vibrated horribly. Jonathan all but begged their leader to speak again and be done with it.

"My frien," said he at long last, "we don try our best for call dem but I tink say dem all done sleep-o... So wetin we go do now? Sometaim you wan call soja? Or you wan make we call dem for you? Soja better pass police. No be so?"

"Na so!" replied his men. Jonathan thought he heard even more voices now than before and groaned heavily. His legs were sagging under him and his throat felt like sandpaper.

"My friend, why you no de talk again. I de ask you say wan make we call soja?"

"No."

"Awrighto. Now make we talk business. We no be bad tief. We no like for make trouble. Trouble done finish. War done finish and all the katakata wey de for inside. No Civil War again. This time na Civil Peace. No be so?"

"Na so!" answered the horrible chorus.

"What do you want from me? I am a poor man. Everything I had went with this war. Why do you come to me? You know people who have money. We..."

"Awright! We know say you no get plenty money. But we sef no get even anini. So derefore make you open dis window and give us one hundred pound and we go commot. Orderwise we de come for inside now to show you guitar-boy like dis . . ."

A volley of automatic fire rang through the sky. ; Maria and the children began to weep aloud again.

"Ah, missisi de cry again. No need for dat. We : done talk say we na good tief. We just take our small money and go nwayorly. No molest. Abi we de molest?"

"At all!" sang the chorus.

"My friends," began Jonathan hoarsely. "I hear what you say and I thank you. If I had one hundred pounds . . ."

"Lookia my frien, no be play we come play for your house. If we make mistake and step for inside you no go like am-o. So derefore . . ."

"To God who made me; if you come inside and find one hundred pounds, take it and shoot me and shoot my wife and children. I swear to God. The only money I have in this life is this twenty-pounds egg-rasher they gave me today . . ."

"Ok. Time de go. Make you open dis window and bring the twenty pound. We go manage am like dat." There were now loud murmurs of dissent among the chorus: "Na lie de man de lie; e get plenty money ... Make we go inside and search properly well . . . Wetin be twenty pound? . . ."

"Shurrup!" rang the leader's voice like a lone shot in the sky and silenced the murmuring at once. -Are you dere? Bring the money quick!"

"I am coming," said Jonathan fumbling in the darkness with the key of the small wooden box he kept by his side on the mat.

At the first sign of light as neighbours and others assembled to commiserate with him he was already strapping his five-gallon demijohn to his bicycle carrier and his wife, sweating in the open fire, was turning over akara balls in a wide clay bowl of boiling oil. In the corner, his eldest son was rinsing out dregs of yesterday's palm-wine from old beer bottles.

"I count it as nothing," he told his sympathizers, his eyes on the rope he was tying. "What is egg-rasher? Did I depend on it last week? Or is it greater than other things that went with the war? I say, let egg-rasher perish in the flames! Let it go where everything else has gone. Nothing puzzles God."

Glossary

inestimable	great or precious to be estimated; the value of which cannot be estimated
commandeered	seize for military purposes
biro	a kind of ball-point pen
amenable to	willing to be guided or controlled by some influence
influence	searched by turning things over or disarranging them
rummaged	a bag made from the soft fibre from the leaves of a palm tree
raffia bag	sold
retailed	transporting, carrying
ferrying	sodden, very wet
soggy	borrow; get without paying
scrounge	a piece of unexpected good fortune, especially a sum of money acquired
windfall	a confused struggle; not from legal or other obligation
scuffle	(the stomach and bowels); here, the inside (of his pocket)
innards	express pity for; sympathize
commiserate	

demijohn	a large bottle, often in a wicker case
rinsing out	washing out

Discussion questions

1. Other than being a fashionable greeting, what is meant by "Happy survival"?
2. Mr. Jonathan Iwegbu's bicycle is important to him and to his family and having it is a miracle. Also the intactness of his house is miraculous. What two possessions of yours do you consider very important in your life? Why?
3. Describe the character of the Iwegbu family. What kind of people do you think they are? Why?
4. What is meant by the phrase "Nothing puzzles God"? What would be a similar expression in Nepali?
5. Why do you think the author gave the dialogue with the thieves in quoted, conversational passages rather than in the narrative form as the other parts of the story? What effect does it have on your perception of this part of the story?
6. What is the significance of the term "Civil Peace"? What does it imply?
7. How does the leader of the thieves distinguish good thieves from bad thieves? Why do you think he makes this distinction?
8. In your own words, what is Mr. Jonathan Iwegbu's philosophy of life? How does he approach and deal with good situations and bad situations?

Comprehension:

1. Why did "Happy survival" mean more to Jonathan Iwegbu than a current fashion of greeting?
2. What had he got as a bonus?
3. What was the name of his wife?
4. What sort of history does his bicycle have?
5. How did he use his bicycle?
6. What miracle did he find when he made a journey to Enugu?

7. How did his family make their living after they returned home?
8. What was his job at coal corporation?
9. Why did some of his fellow ex-miners sleep outside the doors of the offices?
10. How long did it take for them to obtain ex-gratia award?
11. How did he feel when he obtained ex-gratia award?
12. Why did Jonathan put the money inside his trouser pocket carefully?
13. What incident had Jonathan seen a couple of days earlier?
14. Why did Jonathan not have sound sleep that night?
15. Who knocked the door from outside that night?
16. How did Jonathan and his family feel when they were awakened by the knocking noise at night?
17. How much money did the thieves demand?
18. How much money did Jonathan possess with him?
19. Why did Jonathan wish for egg-rasher to perish at last?

Long answer questions:

1. Describe the Iwegbu family? What kinds of people do you think they are?
2. Describe the condition of civil peace in the context of Nepal especially after twelve-years' people's war.
3. Innocent common people are victimized by the armed people. Explain.

Discussion Questions:

1. Mr. Jonathan Iwegbu's bicycle is important to him and to his family and having it is a miracle. What possessions of yours do you consider very important in your life? Why?
2. Why do you think the author gave the dialogue with the thieves in quoted, conversational passages rather than in the narrative form as the other parts of the story? What effect does it have on your perception of this part of the story?

3. What is the significance of the term "civil peace"? What does it imply?
4. In your own words, what is Mr. Jonathan Iwegbu's philosophy of life? How does he approach and deal with good situations and bad situations?

Compositions:

1. Write an essay on 'the importance of civil peace'.
2. Write an article for a newspaper describing how badly peace has been threatened in Nepal by armed war-lords.

GRAMMAR

Rules

1) The simple past is used :

- a) To express that something was done or placed in past time; as, I met him yesterday. He failed last year.
 - b) To express a habitual action in the past; as,
- The Hindu widows burnt themselves along with their husbands.

2) The past continuous is used:

- a) To show that the action was incomplete or continuous, as still going on for some time in the past.
She was getting fatter.
- b) The past continuous can express a definite future arrangement in the past.
He was busy packing, for he was learning that night.
- c) It expresses an action which began before that time and probably continued after it.
At seven she was having a bath.

A) Supply the correct form of the verbs given in the brackets:

1. Jonathan Iwegbu himself extraordinarily lucky.
(count)
2. It deep to his heart. (go)

3. The bicycle a little history of its own. (have)
4. Hard as its loss to him, he would still have let it go without a thought. (be)
5. Perhaps they had the thief away. (scare)
6. He (whisper) back breathlessly.
7. The silence that the thieves alarm
8. What you from me? (want)
9. You people who have money. (know)
10. I on it last week? (depend)

B) Put the verb in brackets into the correct tense: simple past or past continuous.

1. Peter and Ann (decide) to redecorate their sitting room themselves.
2. They (choose) cream paint for the woodwork and apricot for the walls.
3. When John (look) in to see how they (get) on, Ann (mix) the paint, and Peter (wash) down the walls.
4. They (be) glad to see John and (ask) if he (do) anything special that day.
5. He hastily (reply) he (go) to the theatre and (go) away at once, because he (know) they (look) for someone to help them.
6. They (begin) painting, but (find) the walls (be) too wet.
7. While they (wait) for the walls to dry, Ann (remember) she (have) a phone call to make.
8. Peter (start) painting while she (telephone), and (do) a whole wall before Ann (come) back.
9. He (grumble) that she always (telephone).
10. Ann (retort) that Peter always (complain).
11. They (work) in silence for some time.
12. Just as they (start) the third wall, the doorbell (ring).
13. It (be) a friend of Peter's who (want) to know if Peter (play) golf the following weekend.

14. He (stay) talking to Peter in the hall while Ann (go) on painting.
15. At last he (leave).
16. Peter (return), expecting Ann to say something about friends who (come) and (waste) valuable time talking about golf.
17. But Ann nobly (say) nothing.
18. Then Peter (think) he would do the ceiling.
19. He just (climb) the step ladder when the doorbell (ring)
- again.
20. Ann (say) she (get) tired of interruptions but (go) and (open) the door.
21. It (be) the postman with a letter from her aunt Mary, saying she (come) to spend the weekend with them and (arrive) that evening at 6.30.
22. I (walk) along Piccadilly when I (realize) that a man with a ginger beard, whom I had seen three times already that afternoon, (follow) me.
23. To make quite sure, I (walk) on quickly, (turn) right, then left and (stop) suddenly at a shop window.
24. In a few minutes the man with the beard (appear) and (stop) at another shop window.
25. I (go) on.
27. Whenever I (stop) he (stop), and whenever I (look) round he (be) still there.
28. He (look) a very respectable type and (wear) very conventional clothes and I (wonder) if he was a policeman or a private detective.

Section - 22

OF STUDIES

- Francis Bacon

Studies serve for delight, for ornament, and for ability. Their chief use for delight is in privateness and retiring, for ornament, is in discourse, and for ability, is in the judgment and disposition of business. For expert men can execute, and perhaps judge of particulars, one by one, but the general counsels, and the plots and marshalling of affairs come best from those that are learned. To spend too much time in studies is sloth; to use them too much for ornament, is affectation; to make judgment wholly by their rules is the humour of a scholar. They perfect nature and are perfected by experience: for natural abilities are like natural plants that need pruning by study; and studies themselves do give forth directions too much at large, except they be bounded in by experience. Crafty men condemn studies; simple men admire them; and wise men use them: for they teach not their own use; but that is a wisdom without them, and above them, won by observation.

Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse; but to weigh and consider. Some books are to be tasted, others to be swallowed and some few to be chewed and digested, that is some books are to be read only in parts; others to be read but not curiously, and some to be read wholly and with diligence and action. Some books also may be read by deputy, and extracts made of them by others, but that would be only in the less important arguments and the meanner

sort of books, else distilled books are like common distilled waters, flashy things.

Reading maketh a full man; conference a ready man; and writing an exact man. And therefore if man write little; he had need have a great memory; if he confer little, he had need have a present wit, and if he read little, he had need have much cunning, to seem to know that he doth not.

Histories make man wise, poets witty; the mathematics subtle; natural philosophy deep; moral grave; logic and rhetoric able to contend. '*Abeunt studia n mores*'. (Studies pass into the character). Nay there is no stand or impediment in the wit, but may be wrought out by fit studies: like as diseases of the body may have appropriate exercise. Bowling is good for the stone and reins, shooting for the lungs and breast, gentle walking for the stomach; riding for the head, and the like. So if a man's wit be wandering, let him study the mathematics, for in demonstration if his wit be called away never so little, he must begin again. If his wit be not apt to distinguish or find differences, let him study the schoolmen; for they are *cymini sectores*. If he be not apt to beat over matters, and to call up one thing to prove and illustrate another, let him study the lawyer's cases. So every defect of the mind may have a special receipt.

Comprehension:

1. For what do studies serve?
2. What's the use of studies in the disposition of business?
3. Why is it sloth to spend too much time in studies?
4. What is the humour of the scholar, according to Francis Bacon?
5. In what way are natural abilities and natural plants similar?
6. How can we distinguish among crafty men, simple men and wise men in terms of studies?
7. What suggestions does Francis Bacon make for the readers about reading?
8. How does he classify books?

9. What does he actually mean by 'some books are to be chewed and digested'?
10. What is the importance of reading in human life?
11. How does the knowledge of history help readers?
12. For what type of person is mathematics suitable in Bacon's view?
13. How does writing make one an exact man?

Long - answer questions:

1. "Studies serve for delight, for ornament, and for ability." Elucidate
2. "Some books are to be tasted, others to be swallowed and some few to be chewed and digested." Elaborate this

Discussion questions:

1. What do you think about the role that books play in the life of a student?
2. John Milton says. "A good book is the precious life-blood of a master spirit, embalmed and treasured up on purpose to a life beyond life." Do you agree with this remark?

Composition:

1. Write an essay on the importance of books.
2. Write a letter to your friend expressing your views on the books that you have read recently.

Grammar

Rules

Some nouns which are plural in form and singular in meaning take a singular verb; as:

This news is not correct.

Economics is a difficult subject.

Ethics deals with the problem of morality.

Measles is a dangerous disease.

Supply the correct verb according to the subject:

1. The mathematics subtle. (make)
2. To spend too much time in studies sloth. (be)
3. Nothing but funny stories him. (delight)
4. A variety of objects the eye. (charm)
5. The ideas of my teachers from mine. (differ)
6. No one except his own supporters with him. (agree)
7. A study of different subjects with different advantages. (carry)
8. Many a man applied for this job. (has/have)
9. Two-third of the work left undone. (was/were)
10. Sixty people a huge party.
11. Politics a dirty game.
12. Every means been tried.
13. All possible means been tried.
14. The headquarters of the police in Naxal.
15. Alm to be given to the poor and the needy.
16. The advice good.
17. The scenery beautiful.
18. The jewelry expensive.
19. The cattle grazing.
20. The police arrived on the scene.
21. All of the money squandered.
22. None of the children turned up.
23. The gentry well respected in England.
24. The money for the car expensive.
25. The baggage been loaded onto the plane.
26. All of us at the meeting.
27. Pairs of paints on display.
28. Most of the answers wrong.
29. Some of it good.

30. Lots of people arrived.
31. A pair of pants for sale.
32. A herd of cattle grazing.
33. A lot of information conveyed.
34. A bouquet of flowers for sale.
35. No one present in class yesterday.
36. Neither of the students arrived.
37. Each of us appealed for better facilities.
38. Neither She nor her friends failed the exam.
39. Either he or his father to appear before the judge.



Section - 23**FREEDOM**

— George Bernard Shaw

GEORGE BERNARD SHAW (1856-1950) was born in Dublin. From his father he learned how to laugh at life's tragedies, and from his mother a sound appreciation of music. In 1884 he became one of the founders of the Fabian society. He remained a lifelong champion of a highly individual economic faith, creative evolution, spelling reforms, and vegetarianism.

In recognition of his contribution to British drama, Shaw was awarded the Nobel Prize in 1926 for 'his work which is marked by both idealism and humanity, its stimulating satire often being infused with a singular poetic beauty.'

As an essayist and pamphleteer, Shaw advocates spiritual freedom, honesty, courage, and idealism.

Among his works are: *Plays Pleasant and Plays Unpleasant; Man and Superman; Saint Joan; The Intelligent Woman's Guide to Socialism, Capitalism, Sovietism and Fascism and Essays in Fabian Socialism*.

Unit 1

In 'Freedom' Shaw pleads for an, original and stimulating attitude towards the concept of Freedom—individual, social and political, and skillfully analyses the difference between the natural

slavery of man to Nature and the unnatural slavery of man to man.

Now remember, ladies and gentlemen, I have no one to talk business. What is a perfectly free person? Evidently a person who can do what he likes, when he likes and where he likes, or do nothing at all if he prefers it. Well, there is no such person; and there never can be any such person. Whether we like it or not, we must all sleep for one-third of our lifetime; wash and dress and undress we must spend a couple of hours eating and drinking; we must spend nearly as much in getting about from place to place. For half the day we are slave to necessities which we cannot shirk, labourers with no servants but their wives. And the wives must undertake the additional heavy slavery of child-bearing if the world is still to be peopled.'

These natural jobs cannot be shirked. But they involve other jobs which can. As we must eat we must first provide food; as we must sleep we must have beds and bedding in houses with fireplaces and coals; as we must walk through the streets, we must have clothes to cover our nakedness. Now, food and houses and clothes can be produced by human labour. But when they are produced they can be stolen. If you like honey you can let bees produce it by their labour, and then steal it from them. If you are too lazy to get about from place to place on your own legs you can make a slave of a horse. And what you do to a horse or a bee you can also do to a man or a woman or a child if you can get the upper hand of them by force or fraud or trickery of any sort, or even by teaching them that it is their religious duty to sacrifice their freedom to yours.

So beware! If you allow any person, or class of persons, to get the upper hand of you, they will shift all that part of their slavery to Nature that can be shifted on to your shoulders and you will find yourself working from eight to fourteen hours a day when, if you had only yourself and your family to provide for you could do it quite comfortably in half the time or less. The object of

all honest Governments should be to prevent your being imposed on in this way. But the object of most actual Governments, I regret to say, is exactly the opposite. They enforce your slavery and call it freedom. But they also regulate your slavery, keeping the greed of your master within certain bounds. When chattel slavery of the Negro sort costs more than wage slavery, they abolish chattel slavery and make you free to choose between one employment, or one master and another, and this they call a glorious triumph for freedom, though for you it is merely the key of the street. When you complain, they promise that in future you shall govern the country for yourself. They redeem this promise by giving you a vote and having a general election every five years or so. At the election, two of their rich friends ask for your vote and you are free to choose which of them you will vote for to spite the other—a choice which leaves you vote freer than you were before, as it does not reduce your hours of labour by a single minute. But the newspapers assure you that your vote has decided the election and that this constitutes you a free citizen in a democratic country. The amazing thing about it is that you are cool enough to believe them.

Unit 2

Now mark another big difference between the natural slavery of man to Nature and the unnatural slavery of man to man. Nature is kind of her slaves. If she forces you to eat and drink, she makes eating and drinking so pleasant that when we can afford it we eat and drink too much. We must sleep or go mad but then sleep is so pleasant that we have great difficulty in getting up in the morning. And firesides and families seem so pleasant to the young that they get married and join building societies to realize their dreams. Thus, instead of resenting our natural wants as slavery, we take the greatest pleasure in their satisfaction. We write sentimental songs in praise of them. A tramp can earn his supper by singing 'Home, Sweet Home.'

The slavery of man to man is the very opposite of this. It is hateful to the body and to the spirit. Our poets do not praise it; they proclaim that no man is, good enough to be another man's master. The latest of the great Jewish prophets, a gentleman named Marx,

spent his life in proving that there is no extremity of selfish cruelty at which the slavery of man to man will stop if it be not stopped by law. You can see for yourself that it produces a state of continual civil war—called the class war—between the slaves and their masters, organized as trade unions on one side and employers' federations on the other. Saint Thomas More, who has just been canonized, held that we shall never have a peaceful and stable society until this struggle is ended by the abolition of slavery altogether and the compulsion of everyone to do his share of the world's work with his own hands and brains, and not to attempt to put it on anyone else.

Naturally the master class, through its Parliaments, schools and newspapers, makes the most desperate efforts to prevent us from realizing our slavery. From our earliest years we are taught that our country is the land of the free, and that our freedom was won for us forever by our forefathers when they made King John sign Magna Carta—when they defeated the Spanish Armada—when they cut off King Charles's head—when they made King William accept the Bill of Rights—when they issued and made good the American Declaration of Independence—when they won the battles of Waterloo and Trafalgar on the playing fields of Eton—and when only the other day, they unintentionally changed the German, Austrian, Russian and Ottoman Empires into republics. When we grumble, we are told that all our miseries are our own doing because we have the vote. When we say: 'What good is the vote?' we are told that we have the Factory Acts and the Wage Board, and free education and the New Deal and the dole: and what more could any reasonable man ask for? We are reminded that the rich are taxed a quarter, a third, or even a half and more, of their incomes; but the poor are never reminded that they have to pay that much of their wages as rent in addition to having to work twice as long every day as they would need if they were free.

Whenever famous writers protest against this imposture—say, Voltaire and Rousseau and Tom Paine in the eighteenth century, or Cobbett and Shelley, Karl Marx and Lassalle

in the nineteenth, or Lenin and Trotsky in the twentieth—you are taught that they are atheists and libertines, murderers and scoundrels; and often it is made a criminal offence to buy or sell their books. If their disciples make a revolution, England immediately makes war on them and lends money to the other Powers to join her in forcing the revolutionists to restore the slave order. When this combination was successful at Waterloo, the victory was advertised as another triumph for British freedom; and the British wage slaves instead of going into mourning like Lord Byron, believed it all and cheered enthusiastically. When the revolution wins, as it did in Russia in 1922, the fighting stops, but the abuse, the calumnies, the lies continue until the revolutionized State grows into a first-rate military Power. Then our diplomatists, after having for years denounced the revolutionary leaders as the most abominable villains and tyrants, have to do a right turn and invite them to dinner.

Unit 3

Now though this prodigious mass of humbug is meant to delude the enslaved class only, it ends in deluding the master class much more completely. A gentleman whose mind has been formed at a preparatory school for the sons of gentlemen, followed by a public school and university course, is much more thoroughly taken in by the falsified history and dishonest political economy and snobbery taught in these places than any workers can possibly be, because the gentleman's education teaches him that he is a very fine fellow, superior to the common run of men whose duty it is to brush his clothes, carry his parcels and earn his income for him; and as he thoroughly agrees with this view of himself, he honestly believes that the system which has placed him in such an agreeable situation and done such justice to his merits in the best of all possible systems, and that he should shed his blood, and yours to the last drop in its defense. But the great mass of our rack-rented, under-paid, treated-as-interiors, cast-off-on-the dole workers cannot feel so sure about it as the gentleman. The facts are too harshly against it. In hard times, such as we are now passing through their disgust and despair sometimes lead them to kick over

the traces, upset everything, and have to be rescued from more gangsterism by some Napoleonic genius who has a fancy for being an emperor, and who has the courage and brains and energy to jump at the chance. But the slaves who give three cheers for the emperor might just as well have made a cross on a British or American ballot paper as far as their freedom is concerned.

So far I have mentioned nothing but plain, natural and historical facts. I draw no conclusions, for that would lead me into controversy; and controversy would not be fair when you cannot answer me back. I am never controversial over the wireless. I do not even ask you to draw your own conclusions, for you might draw some very dangerous ones unless you have the right sort of head for it. Always remember that though nobody likes to be called a slave it does not follow that slavery is a bad thing. Great men, like Aristotle, have held that, law and order and government would be impossible unless the persons the people have to obey are beautifully dressed and decorated, robed and uniformed, speaking with a special accent, travelling in first class carriages or the most expensive cars or on best-groomed and best-bred horses and never cleaning their own boots or doing anything for themselves that can possibly be done by ringing a bell and ordering some common person to do it. And this means, of course, that they must be made very rich without any other obligation than to produce an impression of almost godlike superiority on the minds of common people. In, short, it is contended, you must make men ignorant idolaters before they will become obedient workers and law-abiding citizens.

To prove this, we are reminded that although nine out of ten voters are common workers, it is with the greatest difficulty that a few of them can be persuaded to vote for members of their own class. When women were enfranchised and given the right to sit in Parliament, the first use they made of their votes was to defeat all the women candidates who stood for the freedom of the workers and had given them years of devoted and distinguished service. They elected only one woman—a titled lady of great wealth and exceptionally fascinating personality.

Now this, it is said, is human nature; and you cannot change human nature. On the other hand, it is maintained that human nature is the easiest thing in the world to change if you catch it young enough, and that the idolatry of the slave class and the arrogance of the master class are themselves entirely artificial products of education and of a propaganda that plays upon our infants long before they have left their cradles. An opposite mentality could, it is argued, be produced by a contrary education and propaganda. You can turn the point over in your mind for yourself; do not let me prejudice you one way or the other. The practical question at the bottom of it all is how the income of the whole country can best be distributed from day to day. If the earth is cultivated agriculturally in vast farms with motor ploughs and chemical fertilizers, and industrially in huge electrified factories full of machinery that a girl can handle the product may be so great that an equal distribution of it would provide enough to give the unskilled labourers as much as managers and the men of the scientific staff. But do not forget that when you hear tales of modern machinery enabling one girl to produce as much as a thousand men could produce in the reign of good Queen Anne, that this marvellous increase included things like needles and steel pens, and matches, which we can neither eat nor drink nor wear. Very young children will eat needles and matches eagerly—but the diet is not a nourishing one. And though we can now cultivate the sky as well as the earth, by drawing nitrogen from it to increase and improve the quality of our grass—and consequently of our cattle and milk and butter and eggs—Nature may have tricks up her sleeve to check us if the chemists exploit her too greedily.

Unit 4

And now to sum up, wipe out from your dreams of freedom the hope of being able to do as you please all the time. For at least twelve hours of your day Nature orders you to do certain things, and will kill you if you don't do them. This leaves twelve hours for working; and here again Nature will kill you unless you either earn your living or get somebody else to earn it for you. If you live in a civilized country your freedom is restricted by the laws of the land,

enforced by the police, who oblige you to do this and not to do that, and to pay rates and taxes. If you do not obey these laws the courts will imprison you and if you go too far, kill you. If the laws are reasonable and are impartially administered you have no reason to complain, because they increase your freedom by protecting you against assault, highway robbery, and disorder generally.

But as society is constituted at present, there is another far more intimate compulsion on you; that of your landlord and that of your employers. Your landlord may refuse to let you live on his estate if you go to chapel instead of to church, or if you vote for anybody but his nominee, or if you practise osteopathy, or if you open a shop. Your employer may dictate the cut, colour and condition of your clothes, as well as your hours of work. He can turn you into the street at any moment to join the melancholy band of lost spirits called the unemployed. In short his power over you is far greater than that of any political dictator could possibly be. Your only remedy at present is the trade union weapon of the strike, which is only the old oriental device of starving on your enemy's doorstep until he does you justice. Now, as the police in this country will not allow you to starve on your employer's doorstep you must starve on your own—if you have one. The extreme form of the strike—the general strike of all workers at the same moment—is also the extreme form of human folly, as, if completely carried out, it would extinguish the human race in a week. And the workers would be the first to perish. The general strike is trade unionism gone mad. Same trade unionism would never sanction more than one big strike at a time, with all the other trades working overtime to support it.

Unit 5

Now let us put the case in figures. If you have to work for twelve hours a day, you have no freedom at all. If you work eight hours a day you have four hours a day to do what you like with, subject to the laws of the land and your possession of money enough to buy an interesting book or pay for a seat at the pictures, or, on a half holiday, at a football match, or whatever your fancy may be. But even here Nature will interfere a good deal; for if your

eight hours' work has been of a hard physical kind, and when you get home you want to spend your four hours in reading my books to improve your mind, you will find yourself fast asleep in half a minute, and your mind will remain in its present benighted condition.

I take it, then, that nine out of ten of us desire more freedom, and that this is why we listen to wireless talks about it. As long as we go on as we are—content with a vote and a dole—the only advice we can give one another is that of Shakespeare's Iago: 'Put money in thy purse.' But as we get very little money into our purses on pay day, and all the rest of the week other people are taking money out of it, Iago's advice is not very practical. We must change our politics before we can get what we want; and meanwhile we must stop gassing about freedom because the people of England in the lump don't know what freedom is—never having had any. Always call freedom by its old English name of leisure; and keep clamouring for more leisure and more money to enjoy it in return for an honest share of work. And let us stop singing 'Rule Britannia', until we make it true. Until we do, let us never vote for a parliamentary candidate who talks about our freedom and our love of liberty; for whatever political name he may give himself, he is sure to be at bottom at anarchist who wants to live on our labour without being taken up by the police for it as he deserves.

And now suppose we at last win a lot more leisure and a lot more money than, we are accustomed to. What are we going to do with them? I was taught in my childhood that Satan will find mischief still for idle hands to do. I have seen men come into a fortune and lose their happiness, their health and finally their lives by it as certainly as if they had taken daily doses of rat poison instead of champagne and cigars. It is not at all easy to know what to do with leisure unless we have been brought up to it.

I will therefore leave you with a conundrum to think over. If you had your choice, would you work for eight hours a day and retire with a full pension at forty-five, or would you rather work four hours a day and keep on working until you are seventy? Now, don't send the answer to me, please! Talk it over with your wife.

NOTES

Chattel slavery of the negro: the old, practice of sale and purchase of negroes as movable articles of property.

Tramp: hobo a homeless wanderer.

Marx: Karl Heinrich Marx (1818-83), German philosopher and social economist. He is the author of *Das Capital* on which communism is largely based.

Saint Thomas More: Sir Thomas More (1478-1535) succeeded Wolsey as Lord Chancellor under Henry VIII, but fell into disgrace by refusing to take the oath of Supremacy. He was ultimately executed. *Utopia* is his best known book.

Magna Carta: England's first charter of liberty granted under compulsion by King John (1167-1216).

Spanish Armada: a large fleet sent in 1588 by Philip II of Spain (1527-98) to subdue England. It was severely mauled by the British navy under the command of Lord Howard of Effingham.

King Charles: Charles I (1600-49), King of England, Scotland and Ireland. He was in continual trouble with his ministers and parliament. After the Civil War that ensued, he was beheaded on 30 January 1649.

American Declaration of Independence: drafted mainly by Thomas Jefferson, it was an Act by which the American Congress, on 4 July 1776, declared the American colonies to be independent of Great Britain.

Battle of Waterloo: fought on 18 June 1815. It ended in the rout of Napoleon's troops at the hands of the British and Prussian forces led by the Duke of Wellington.

Trafalgar: in this encounter the English naval commander Horatio Nelson destroyed the French Fleet on 21 October 1805. He lost his own life in the hour of victory.

when a tray shell burst close to his command post on the flagship *Victory*.

Eton: English public school in the town of Eton in South, Buckinghamshire on the River Thames

New Deal: the measures taken in 1933 by President Franklin Roosevelt (1882-1945) to overcome the great economic crisis in the United States. The New Deal comprised large-scale assistance to farmers, social insurance and an ambitious programme to reduce unemployment.

Voltaire: Francois-Marie, Voltaire (1694-1778), eminent French philosopher and writer.

Rousseau: Jean Jacques Rousseau (1712-78), French philosopher, political writer and composer. He laid down the principles of government and conduct which bore fruit in the French Revolution.

Tom Paine: Thomas Paine (1737-1809), English deist and radical. He wrote *The Rights of Man* and *The Age of Reason*.

Cobbett: William Cobbett (1763-1837). In 1802 he started editing *Cobbett's Political Register*, a weekly newspaper which was at first Tory, but he altered its politics in 1804 to propagate Radicalism.

Lassalle: Ferdinand Lassalle (1825-64), founder of the German socialist movement.

Lenin: Vladimir Ilyich Lenin (1876-1924), Russian revolutionary and statesman. His faction of Russian Marxists came to be known as the Bolsheviks. After the fall of the Czar in February 1917 his followers dominated the workers, 'peasants' and soldiers' councils (soviets). Lenin seized power at the end of October 1917, but for the three years Russia was torn by a civil war of immense brutality which left the Bolsheviks victorious but the country devastated.

Trotsky: Leo Trotsky (1879-1940) was the only Russian Marxist who could approach Lenin in intellectual grasp and leadership. As commissar of War he created the Red Army. He was the chief architect of Soviet victory in the Civil War. Expelled from the Party in 1927 and from the U.S.S.R. in 1929, he tried unsuccessfully to build an international socialist revolutionary movement opposed to Stalinist Communism (the Fourth International).

Byron: George Gordon, Lord Byron (1788-1824), English Romantic poet. Some of his poems are marked by an intense republican sentiment. He died at Missolonghi, where he had gone with a view to aiding the Greeks in their battle for national independence.

Enfranchised: admitted to the privileges of a citizen, particularly voting rights.

Queen Anne: Anne (1665-1714), Queen of England.

Iago: the villain in Shakespeare's Othello.

Britannia: the figure of a seated woman with trident and helmet, used as a symbolic representation of Great Britain and the British Empire.

Conundrum: a riddle.

Vocabulary practice :

1. He was jailed for two years for fraud which means that he was jailed for beating/ cheating/ teasing other people.
2. If you get upper hand of them you will have your hand on your head/ more power than others. Put your hand higher than others.
3. They redeem this promise means they repeat/ revise/ fulfil it.
4. They abolish chattel slavery. The underlined phrase in this sentence means the practice of selling and purchasing/ beating/ exploiting slaves.
5. The expression cast-off-on-the dole workers refers to those workers who are very rich/poor/well-behaved.

6. They elected only one woman-a titled lady means they elected a woman with a title/beauty/fame.
7. You must make men ignorant idolators to make them obedient means you must make them worshippers of idols/smugglers of idols.
8. Nature may have tricks up her sleeve means nature will have mercy/cruelty/secret/trick.
9. He is sure to be an anarchist. The underlined word means a person who favours peace/disorder/freedom.
10. Your mind will remain in its present benighted condition. The underlined word means being a knight/a leader/without the light of knowledge.

Comprehensions:

1. Who, according to Shah, is a perfectly free man?
2. What should be the object of all honest governments?
3. What is natural slavery according to Shaw?
4. How is nature kind to her nature?
5. What is unnatural slavery?
6. What facilities were provided under the Factory Acts?
7. What steps does the working class take against its exploitation?
8. Why did they cut off King Charles head?
9. How do laws of the land protect the citizens?
10. What power does a landlord have over his tenant?
11. How do workers tend to lose in a general strike?
12. What is meant by 'Put money in the purse'?
13. What should the workers do to have this kind of freedom?
14. Why does Shaw advise Englishmen against voting in the elections?
15. How is man's slavery to Nature pleasant?
16. How can slavery be ended?

18. Why do most workers or women vote for their social superiors?
19. How does a civilized society protect its citizens?
20. What are Shaw's views on working hours and retirement?

Discussion questions:

1. What is the importance of freedom in human life? What will be the effect of the lack of freedom in our personality development?
2. If you were a slave, what sort of freedom would you expect to enjoy from your owners?
3. What do you think about the conditions of the misuse of freedom in the universities in Nepal?
4. As a son or a daughter, what type of freedom do you want to enjoy at home and in your personal life from your parents?

Composition:

1. Write a letter to the editor of a local newspaper stating how your freedom is being curbed in present-day society.
2. Suppose you are now twenty-one. You are going to cast your vote in the elections to the Indian parliament. What would be your reasons for voting in favour of a particular candidate or a party?

Grammar

Combine the following pairs of sentences into sentences beginning with "if....."

Example: Do as I tell you. You will succeed.

Solution: If you do as I tell you, you will succeed.

1. You have only yourself and your family to provide for. You can do it quite comfortably.
2. He always gets the upper hand of you. You will be his slave someday.
3. You like honey. You can let the bees produce it for you.

4. Catch human nature enough. It will be the easiest thing to change.
5. Hit hard with the bat. The bowlers will forget their length.
6. You take away his toys. He will cry.
7. You drive too fast. He will get killed.
8. You say that again. I will beat you.
9. You listen to me carefully. I will explain.
10. You turn over the page. You will see what I mean.
11. You leave them alone. They will come home.
12. You think of the difficulties. You will realize why progress is slow.
13. You invest in that business. You will be ruined.
14. You touch that wire. You will get a nasty shock.
15. You go to the doctor. He will give you some medicine.
16. You look out of the window now. You will see him walking down the street.
17. You knock at the door. They will get you in.
18. You tell me the answer. I will give you prize.
19. You move. I will shoot you.
20. You give them an inch. They will take a mile.
21. You follow my instructions. You won't get lost.
22. You send in this form. We will do the rest.
23. You give me a pencil. I will explain how to do it.
24. He escapes. He will do it again.
25. I have your pen. I will write the answers.
26. They come. I will talk to them.
27. We try. We may succeed.
28. He comes to me. I help him.
29. He completes that work. I will give him money.
30. John teaches us well. We will answer all the questions.

□□□

Section - 24**THE PRESENT IS THE KEY TO THE PAST**

Today's geomorphology, or Landscape science, builds very clearly on the work of past scholars; from a wide variety of backgrounds. It is hard to identify who the first geomorphologists were, as that 'job title' didn't exist until the late 19th century, whilst interest is the scientific study of landscape stretches back many centuries. People such as Leonardo da Vinci carried out early geographical studies, through their attempts to understand phenomena such as river. Da Vinci's sketchbooks reveal his interest in river flows and turbulence. Like Da Vinci, most of early scholars who investigated geomorphological phenomena did so as part, of a much wider interest that they had in life and the Earth. Even in the 19th century, when there was a great flowering of landscape study, the scholars involved were interested in a much wider range of phenomena. Perhaps the best example of this is Alexander von Humboldt (1769-1859), who investigated a huge array of topics within the natural environment, culminating in the publication of his multi-volume work entitled *The Cosmos* which covered subjects ranging from astronomy to human societies. Others, such as Charles Darwin, gained long-term fame and recognition for their research on other parts of what we now call the Earth's system, but nevertheless also carried out important geomorphological research.

How did these early scholars come to recognize that the Earth's surface changes over long timescales? How did they come to understand the relationship between landform and process? In essence, they were early landscape detectives utilizing the existing range of techniques (and helping, develop some new ones) in order to do four things: describe landscapes, interpret unfamiliar ones in the light of what they already knew about the way the world works, develop theories and then, when possible, test them by dating. It is these landscape-detection methods which have come to form the basis of modern day geomorphological science, and it is worth examining them in a bit more detail. We are going to explore them in relation to three major 18th and 19th century geomorphological problems: that is, how do the different types of coral reefs develop? are rivers powerful agents of denudation?; and what created the extraordinary landscapes of the Alps?

The first stage of being a landscape detective involves describing the features of an unfamiliar landscape. Imagine visiting for the first time somewhere like Iceland and being faced with an almost unimaginable array of odd landforms, which don't look anything like any landforms you have ever seen before. How would you go about describing them? Today we would undoubtedly take photographs, but in the past field sketches formed a key part of the landscape detective's toolkit, and even today these are an important part of most geomorphologists' fieldwork. Geomorphologists of the past were often experts of field sketches and adept at turning them into explanatory cross-sectional diagrams. Looking at coral reefs, river valleys and Alpine landscapes provided early landscape detectives with a key question what could have formed these features?

Visual observation and recording from a viewpoint, however, do not permit detailed insights into the sediments and rocks which make up the landscape, and it is here that the great landscape detectives of the past made use of developing industrial technology. During, the 18th and 19th centuries, in Britain and other countries, vast alterations and extensions were made to the transport routes, as canal and rail networks were opened up.

Digging canals necessitated cutting into the landscape - dissecting it, in a sense. This allowed the landscape detectives greater access to its internal workings, providing them with the beginnings of a three-dimensional description of the landscape. Quarrying and other forms of mineral extraction gave similar glimpses under the Earth's surface, allowing new questions to be asked about familiar landscapes. In many cases, the view obtained by cutting into a landscape illustrated a complex palimpsest, cutting through many into valley side slopes may reveal ancient river sediments and landscape over time. As well as using these developments to advance their knowledge of landscape, people with geomorphological skills were often at the forefront of prospecting and evaluating new terrain. In the USA, during the late 19th-century expansion westwards, for example, there was a huge need for an understanding of landscape in order to assess what resources might be present, as well as what obstacles there might be to river navigation and the spread of railroads. Some of the earliest professional geomorphologists, including John Wesley Powell and W. J. McGee, were employed by the United States Geological Survey (USGS) during this period. There is at least some evidence to suggest they were the first to coin the term 'geomorphology'.

Geomorphologists also used, and continue to use, another method of visualizing how landscapes have evolved, that is, trying to observe a developmental sequence in time portrayed as an array of landforms in space. Imagine, for example, standing near the snout of a glacier that has been observed to be retreating over the past few decades. In front of most glaciers, you see deposits of sediment which have eroded and pushed down the valley as the glacier advances. Once a glacier starts to retreat, it loses the energy to carry this debris and deposits it as what geomorphologists call a 'terminal moraine'. In front of many large glaciers suffering from net retreat, we can see arrays of such terminal moraines reflecting different positions of the snout of the glacier over time. The great genius of some early landscape detectives was to realize that these spatial arrays could reflect a temporal sequence. In this case, the

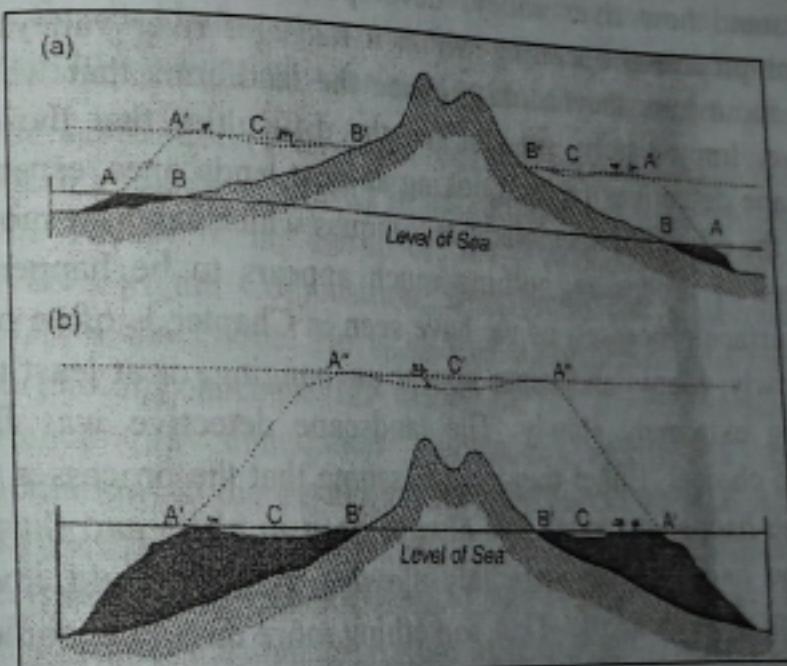
terminal moraine furthest from the current snout position would be the oldest, and so on until the newest, which would be nearest the snout.

The usefulness of substitution of space for time relies on two key facts which the early geomorphologists had to establish. First, whilst the net state of the glacier in this case must be retreating, it must also have experienced short periods of advance in order to create new moraines. Second, the sequence may only be a partial record of the recent history of the glacier. If advance dominates over a long enough period then older moraines will become bulldozed by the glacier, thus erasing part of its history. Observing moraines of different ages in some detail allows geomorphologists to build up a picture of how individual moraines evolve and develop over time. What we are noticing here is that however we look at the history of a landscape, directly or using space for time substitution, it is almost impossible for geomorphologists to separate out pure description from explanation - as soon as we start to describe, we are forced to interpret, and vice versa. This tells us something about the scientific method in geomorphology, and the links between theory and observations, to which we will return later.

A lovely example of substituting space for time in describing and interpreting an unfamiliar landscape is the work of Charles Darwin (1809-82) on coral reefs (Figure 4). During his time on the Beagle, he became the world's most well-travelled naturalist, and probably saw a wider array of landscapes than any other person. In the Pacific Ocean, which Darwin visited on the voyage of Beagle in the 1830s, there are a number of different types of coral reef. Darwin identified three main types. A fringing reef is one that lies close to the shore of some continent or island. It consists of an uneven, generally flat, narrow platform about the level of low water. Between it and the mainland there may be a narrow channel or lagoon. A barrier reef occurs where there is a wider, deeper lagoon, and the reef lies at some distance from the shore, rising from deep water. An atoll is a reef in the form of a ring or horseshoe with a lagoon in the centre. Darwin's theory to explain

these three types was based on the idea that subsidence had occurred. He argued that a succession from one coral type to another could be achieved by the upward growth of coral from a sinking platform, and that there would be a progression through the disappearance through subsidence of the barrier reef stage, until, with Darwin put forward this simple but ingenious hypothesis, deep boreholes were drilled through some of the Pacific atolls, passing through more than 1,000 metres of coral sediment before reaching the basalt substratum of the ocean floor. This indicated that the crust subsided, thereby proving that Darwin's idea was basically correct.

Interestingly, Darwin developed his theory of coral reefs before he had seen one in the field, but he was able to apply his own observations from other settings and the descriptions of reefs made by others to try and solve the problem of their origin. As he puts it:



Charles Darwin's diagram of the evolution of coral reefs

No other work of mine was begun in so deductive a spirit as this, for the whole theory was thought out on the west coast of South America, before I had seen a true coral-reef. I had therefore

only to verify and extend my views by a careful examination of living reefs. But it should be observed that I had during the two previous years been incessantly attending to the effects on the shores of South America of the intermittent elevation of the land, together with the denudation and deposition of sediment. This necessarily led me to reflect much on the effects of subsidence, and it was easy to replace in imagination the continued deposition of sediment by the upward growth of corals. To do this was to form my theory of the formation of barrier-reefs and atolls.

Making such observations of the surface and subsurface characteristics of a landscape permitted the early landscape detectives to start explaining how it had developed or, as William Morris Davis put it in 1904, how 'the geography of today is nothing more nor less than a thin section at the top of geology, cut across the grain of time. The most obvious starting point to explain the past is to look around us at the present and see if we can find evidence of processes and changes occurring that we could then extrapolate back into the past. For example, if we want to understand how river valleys developed, we could look at the present processes operating within a range of river valleys and think about how they could produce the landforms that we also observe. Immediately, we can see the difficulties that the early landscape detectives faced. Looking at most landscapes, especially before the advent of specialized techniques which can now monitor the rates of processes, nothing much appears to be happening! Earth surface processes, as we have seen in Chapter 1, often occur very slowly. Many landscapes appear unchanging, or at least to be changing extremely slowly. The landscape detective was faced with two choices. Either they could assume that the processes they could see happening today had always been in place and thus the landscape had evolved incredibly slowly, or they could invoke something more dramatic. That 'something more dramatic' could be fast-operating processes known to occur in other places in the world today, but for some reason not happening in the landscape under study, or they could be something without an analogue in today's world - like a giant flood or a meteorite impact.

Up until the latter part of the 19th century, in Britain and other countries dominated by Christian religious beliefs, this led to a series of problems. According to contemporary Christian doctrine, the Earth had been formed a few thousand years ago by God and shaped by Noah's flood and other major events. Many landscape detectives at the time realized that this narrow interpretation of the biblical record was incompatible with the landscapes that they were trying to understand.

One of the key doctrines to emerge in the 19th century as 'uniformitarianism'. Simply put, this states that the present is the key to the past' or, to put it another way, is based on the assumption that the processes that we can see around us operating on the Earth today are those that were responsible for past changes. We don't need to invoke any exceptional processes that we cannot see somewhere in the world today. During the 19th century, this doctrine was used in opposition to that of 'catastrophism', which asserted that several key parts of the global landscape had been created by supernatural forces or God-driven processes (such as Noah's flood). Uniformitarianism does allow rates of operation of processes to have varied in the past, but not their essential nature.

James Hutton (1726-97) is regarded by many as the founder of modern geology as a result of his ideas on the first published in 1788 as *Theory of the Earth: or, An Investigation of the Laws Observable in the Composition, Dissolution and Restoration of Land Upon the Globe*. He is also often regarded as a father of geomorphology because his theory of the Earth illustrated the importance of denudation (alongside uplift and oceanic sedimentation) in the development of the Earth's surface. Applying his knowledge of the slow present-day workings of fluvial systems to interpreting the development of large valley systems, he was forced to conclude that they were of immense antiquity, far older than permitted in the strict interpretation of biblical chronology accepted at the time. There was also, in his mind, no evidence for Noah's flood or diluvial events having shaped the fluvial landscape, just these slow fluvial processes. In his words of 1788,

'there was no vestige of a beginning, no prospect of an end', just slow, inexorable fluvial processes carving their way imperceptibly through the landscape. However ground-breaking Hutton's ideas were, he faced much uncertainty, as he had no real way of knowing the processes operating today had indeed operated at much the same rate in the past. Exogenic processes, as we explained in Chapter 1, are largely controlled in nature and rate by climate, and thus much explanation of landscape history requires an understanding of past climates.

Hutton's observations of slow but important denudation by rivers provided a key element of developing geomorphological theory. Towards the end of the 19th century, the role of rivers as agents of landscape development was more firmly established, thanks to the impressive (but now largely abandoned) ideas of William Morris Davis (see the box). Davis used many of the classical methods of landscape detection, focusing especially on visual observations and comparisons.

William Morris Davis

William Morris Davis (1850-1934) has been described as an Everest among geomorphologists. He was the leading American geomorphologist of the late 19th and early 20th centuries. He spent most of his career at Harvard University, where he was an exacting but skilful teacher. Above all, he was a very prolific author, writing more than 500 articles and books.

His great contribution was to produce a deductive model of landscape evolution, called the 'cycle of erosion', or the 'geographical cycle'. This was developed during the 1880s and 1890s. Cross-sectional diagrams and field sketches were important methods that Davis used to help visualize his cycle. Davis believed that landscapes were the products of three factors: structure (geological setting, rock character, and so on); process (weathering, erosion, and so on); and stage in an evolutionary sequence. Stage was what most interested him. He suggested that the starting point of the cycle was the uplift of a broadly flat, low-lying surface. This was followed by a phase he termed 'youth',

when streams became established and started to cut down and to develop networks. Much of the original flat surface remained. In the phase he termed 'maturity', the stream valleys had widened so that the original flat surface was largely eroded away and streams drained the entire landscape. The streams began to meander across wide floodplains and the hillslopes gradually became less steep. In 'old age', the landscape became so denuded that a low relief surface close to sea level developed, with only low hills rising above it. This surface was called a 'peneplain'. Rejuvenation of a landscape and continuation of the cycle could occur as a result of tectonic uplift or other processes that lower the base level.

One of the major advances of 19th-century geomorphology and Earth history involved a very different hypothesis about the landscape-forming importance of fluvial erosion in Alpine and other mountainous environments. Here descriptions of landforms and sediments had revealed many enigmatic features - strange fossils which appeared to come from the sea but were found within high mountain environments, weirdly shaped valleys which looked as though they must have been carved by unfeasibly large rivers, boulders which had clearly been moved long distances by huge forces, and so on (Figure 5).

Invoking the slow, long-term operation of present processes clearly could not explain the landscape. Two major theories were developed. First, Noah's flood was proposed as the agent that had carved the valleys and deposited the marine fossils (which became known as the 'diluvial theory'). Second, it was proposed that in the past, glaciers had expanded hugely and that it was the power of ice, not water, which had carved the dramatic valleys and other unusual topographies. Louis Agassiz (see the box) has become identified as the major proponent of this theory, and ultimately of the discovery that past ice ages were major transformers of the landscape. The glacial theory could not explain the marine fossils, and here again geologists were forced to accept that the biblical dating of the Earth could not be right, and that these fossils dated back to much earlier in the landscape's history when rocks were laid down before they were contorted into mountains. Thus, during the 19th century,

we start to see a clear separation of geology and geomorphology as questions about the landscape become detached from questions about the underlying building-blocks.



Erratic boulder forming part of a lateral moraine overlooking the Mer de Glace, near Chamonix, France

So how did these early landscape detectives start to identify which processes could have operated in the past in order to test some of these ideas about landscape histories? One of the most obvious methods, still utilized greatly today, is analogy with other contemporary environments. For example, when trying to determine whether ice really could have carved the great glaciated valleys, aretes, and pyramidal peaks observed in the Alps and the English Lake District, Agassiz and others looked at the recently exposed glacial erosion features surrounding valley glaciers within the Alps. Another method, also used commonly today, is that of experimentation. Some of the greatest geomorphological problems have been solved by carrying out experiments - such as Grove Karl Gilbert's work to simulate the production of meteorite craters, and Charles Darwin's experimentation with earthworms to calculate rates of soil turnover and erosion carried out by these humble creatures. G. K. Gilbert, a key figure in the history of geomorphology (as discussed in the box), produced craters in clay and sand targets by dropping clay bullets and shooting bullets into

them and used the results to infer how craters on the surface of Earth and other planets developed. Ultimately, both approaches assisted the landscape detectives in building up plausible links between processes and resultant landforms. If these processes could then be related to specific climatic conditions, and if their rates of operation could be roughly quantified, then it became

Louis Agassiz

Louis Agassiz (1807-73) was born in Switzerland and died in America. He trained initially as a medic in Switzerland and Germany, but then went to Paris, where he fell under the tutelage of Alexander von Humboldt and Georges Cuvier who converted him to a twin career in zoology and geology. In the late 1830s, building upon the ideas of such figures as Ignatz Venetz and Jean de Charpentier, he developed the idea that the Earth had undergone an 'ice age' and that a huge ice sheet had developed over the Alps. He recognized the criteria for the glacial modification of landscapes, including moraines, erratic blocks, and the grooving and striation of rock. In 1840, he visited the British Isles and found that here too there was abundant evidence of former glacial activity. In 1846, he moved to America, and as soon as he landed in Halifax, Nova Scotia, he sprang onshore and was immediately met by 'the familiar signs, the polished surfaces, the furrows and scratches, the line-engraving of the glacier so well known in the Old World'. Such was his enthusiasm for the ice age that when he visited Brazil in the 1860s, he claimed to find glacial drift there as well! Not only did Agassiz identify many of the criteria for glaciation, he also explained many phenomena that had previously been attributed to Noah's flood, and made a fundamental contribution by recognizing that severe climate change had a major role to play in creating the landscapes we see today.

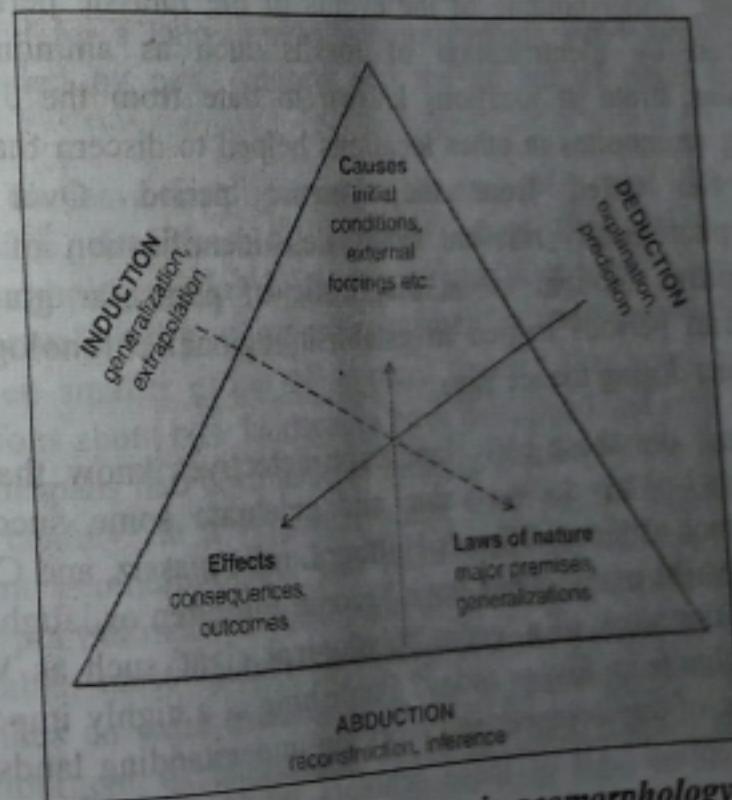
possible to develop some ideas of how, and how quickly, a landscape had developed and over what timespan.

In many cases, explanations of how landscapes developed were based on an intimate and quite complex relationship between observations and the development of a theory. There are three main things that help us explain in landscapes: knowledge of the laws of nature, the potential causes of change, and the effects of those

Grove Karl Gilbert

Grove Karl Gilbert (1843-1918) was a remarkable American geomorphologist who, in many respects, was ahead of his time. Although he died over 90 years ago, his career exemplifies par excellence many of the concerns of modern geomorphology. Spending much of his career in the American West, he made diverse and impressive contributions to the discipline. He helped to explain and name the structure and topography of the Basin and Range province, with its many alternations of mountains and playas; he explained and classified the igneous intrusions that had created the Henry Mountains of the Colorado Plateau; he studied the greatest pluvial lake of the American West - Lake Bonneville -and recorded the evidence of its fluctuating levels; he established that large lakes could depress the Earth's crust and so contributed to the growth of ideas about crustal mobility; he helped to demonstrate that the craters on the Moon were the result of meteorite impact; he used laboratory flumes to carry out experiments on fluvial processes, and studied the environmental effects (siltation and so on) of hydraulic mining for gold. A great exponent of the use of hypothesis testing as scientific method, he was, as his biographer Stephen J. Pyne remarked, 'A great engine of research'.

changes as seen in the landscape. Different approaches in geomorphology use knowledge about two of those to derive information about the third (as shown in Figure 6). For example, the inductive approach uses observations of both causes and effects to try and develop theories and laws. Deduction, in comparison, involves knowledge of causes and the laws of nature to try and work out what the effects or outcomes are. Charles Darwin's work on coral reefs can be seen to come under this deductive category, as does W. M. Davis's cycle of erosion. Scientists are often taught that deductive and inductive approaches are the only two ways to approach science. However, many geomorphologists (both the early landscape detectives and geomorphologists today) use a third approach to scientific explanation, called 'abduction'. The basic approach here is to look at the end results, or 'effects' (a landform or landscape), and to use one's knowledge of how the world works (laws of nature) to work out what the causes have been. Whilst it is impossible to know how the great early landscape detectives actually did their science, the abductive method certainly provides a good basic explanation of how they interwoven observations and ideas to produce important insights into landscape histories.



Modes of explanation in geomorphology

A final part of the landscape detectives' toolkit in the 18th and 19th centuries was the ability to date events in the past. This dating has two important aspects: first, to say when a particular event occurred at one location; and second, to correlate this with other events in different places. A major part of attempts to understand the ice ages was to date when ice advances occurred within the Alps and whether similar changes occurred in other places at around the same time. If large swathes of upland terrain within the northern hemisphere experienced glaciations at the same time, then one might search for very different causes of that glacial expansion than if only small areas were affected at any one time. Dating of landscape features was extremely difficult until the advent of radiometric techniques, which we will discuss in more detail in Chapter 3. However, stratigraphic position (that is, where a deposit occurs within a vertical sequence) was used as a relative dating technique from quite early on in the history of the geosciences, based on the Law of Superposition (which states that newer deposits will be laid down on older ones). Similarly, identification of fossils within certain strata also helped to identify individual deposits and correlate them across large areas. For example, understanding of the events of the Jurassic period was enhanced by identification of fossils such as ammonites in particular strata at locations known to date from the Jurassic. Finding ammonites in other locations helped to discern that these rocks too dated from the Jurassic period. Over more geomorphologically relevant timescales, identification of fossils and deposits thought to be diagnostic of particular glacial or interglacial periods helped to establish regional chronologies of glaciations during the ice ages.

How did these early landscape detectives know that they were right? Why do we value and celebrate some successful theories such as those of James Hutton, Louis Agassiz, and Charles Darwin, whilst many others have become forgotten or laughed at? Why has the work of a 'geomorphological giant' such as W. M. Davis 'fallen from favour today? Publishing is a highly important component of any science, and work on understanding landscapes is no exception. All of these scholars wrote copious amounts.

However, scientific ideas need to be successful over the long term, as well as published at the time. A successful theory provides a good explanation of the particular phenomenon under examination, but it usually goes much further than that. It usually also provides a better explanation than other theories, or fits in with other theories and ideas, and also often gives insights into other phenomena. Darwin's theory of coral reef development, for example, fitted the observed facts better than any others. It has also stood the test of time, even when new ideas (such as the great idea of plate tectonics many other theories. Similarly, Louis Agassiz's ideas on the ice age, whilst having been refined and complicated by observations from other places and more detailed chronologies, proved capable of explaining landscapes in many different places, and in turn were validated by Milutin Milankovitch's identification of the major orbit of the Earth around the Sun. James Hutton's ideas on the slow geological cycle in which land was created and denuded over vast timescales as a result of natural forces, not supernatural ones, paved the way for the evolution of modern geomorphological thinking, even though many of his ideas have proved in detail to be wrong or inadequate. W. M. Davis's theory was extremely powerful for a long time in geomorphology, but was ultimately superseded by new datasets and the advent of plate tectonics theory.

We leave this discussion of the early 18th- and 19th-century landscape detectives by thinking about how they link to geomorphology today in the early part of the 21st century. The intellectual bravery of a relatively small group of men (afforded by an even smaller group of women) ensured that some really big questions about how landscapes have developed and over what sort of timespans had been at least initially tackled by the dawn of the 20th century. In a very real sense, they set the agenda for our current geomorphology. But there were several key ideas that underpin our modern conception of landscapes which were not yet available, most notably the theory of plate tectonics, which now provides an extra dimension to our explanation of the long-term development of landscapes and the whole global system. The growth of geomorphological science went hand in hand with the

expansion of capitalism within northern Europe and as imperialism spread more widely. The timing is not accidental, and we can see similar correlations between economic development and advances in landscape science during the 20th century, as industrial and mercantile expansion led to demands for increased scientific knowledge about the natural world. Finally, the fact that individual landscape detectives ranged widely between geological, biological, and geomorphological pursuits illustrates the many linkages between these different fields within the 18th and 19th centuries. Such linkages are paralleled today, but in a rather different way, by the advent of 'Earth system science'.

Short Questions

1. Is it hard to identify who the first geomorphologists were?
2. How did these early scholars come to recognize that the Earth's surface changes over long timescales?
3. How did they come to understand the relationship between landform and process?
4. How do the different types of coral reefs develop?
5. What are the two key facts which the early geomorphologists had to establish?
6. What are the types of coral reef according to Darwin? Explain them in brief.
7. Define landscape according to contemporary Christian doctrine.
8. Write a note on uniformitarianism.
9. William Morris Davis believed that landscapes were the products of three factors. What are they?
10. What are three main things that help us explain landscapes?
11. Define deductive and inductive methods with examples.
12. Why has the work of a geomorphological giant such as M. Davis fallen from factor today?
13. What do you mean by a success theory? Define it.
14. How can you claim that present is the key to the past?
15. What is the basic difference between Darwin's theory and W.M. Davis's theory related to landscape.

Long Questions

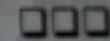
1. Describe and interpret the contribution of Charles Darwin concerning Coral reefs and about unfamiliar landscape. Make the diagram of the evolution of coral reefs.
2. How did these early landscape detectives start to identify which processes could have operated in the past in order to test some of these ideas about landscape history?
3. James Hutton is often regarded as a father of geomorphology and also he is regarded by many as the founder of modern geology. Explain.

Discussion Questions

1. William Morris Davis put it in 1904 "The geography of today is nothing more or less than a thin section at the top of geology, cut across the grain of time" How?
2. How did these early landscape detectives know that they were right? Why do we value and celebrate some successful theories such as those of James Hutton, Louis Agassiz and Charles Darwin whilst many others have become forgotten or laughed at?

Composition

1. Write in 250 words about "Landscapes and Geomorphology".
2. Write the contribution of scientists concerning Earth System Science.



destructive activities. Often, what is most visible about a landscape are the upper layers of vegetation and human society, but the underlying surfaces are not blank, smooth canvases - rather, they are rough, diverse, and dynamic surfaces which play an active role in creating the look and function of a landscape. So, landscape is what is termed a 'palimpsest' - a series of complex and overlying layers. In the landscape, these layers also interact, unlike those in the original meaning of a palimpsest, which is overprinting of writing on an ancient manuscript or parchment.

There are many dramatic and spectacular examples of landscape palimpsests which illustrate the overlying layers and their complex evolution. New Zealand, a mecca for geomorphologists, possesses a whole range of spectacular landforms which include alpine mountains, enormous fault lines, and coastal fjords. The fundamental reason for the development of such grand scenery is the presence of colliding lithospheric plates. New Zealand is, in fact, a fragment of the old supercontinent of Gondwana which formed around 650 million years ago, and started to break up around 130 million years ago. New Zealand probably detached from Gondwana around 80 million years ago, and during the last 65 million years or so has become the site of the boundary between the Pacific and Indian/Australian plates. Today, a great fault line -the Alpine Fault - runs south-westwards through South Island and marks this boundary. There is much compression across this fault, and this creates the Southern Alps, which at Mount Cook reach an altitude of 3,764 metres. These mountains have been rising very rapidly, possibly by as much as 20 millimetres per year, and have formed over the last 5 million years. The Southern Alps are also shaped by the processes of glaciation, weathering, and erosion that are manifestations of the climate. Their crests trap moist air that comes from the Tasman Sea, so that in exposed areas there are massive annual precipitation amounts, up to 12,000 millimetres. This means that exceptionally large glaciers have formed. In the

Pleistocene (the period from about 2 million to 12,000 years ago), these glaciers greatly expanded in volume during glacial

Section - 25

THE CHANGING LANDSCAPE

The landscapes that we see around us are complex and multilayered, and have often developed over almost unimaginably long timescales. Understanding how these landscapes evolve and change, and why they are important both globally and locally, is what this book is all about. We are going to take you on a journey through time and space to find out more about the landscape and it is also (known as geomorphologists) who investigate it. But, before we start on this journey, we need to think more carefully about what landscapes really are. For many of us, the best view we get of a landscape is as we break through the clouds coming in to land after a flight. On the approach to Heathrow Airport near London, for example, we see rivers, fields, roads, villages, and towns draped over a topography of low, rolling hills. Underneath these features are the rocks that underpin this landscape - which have been formed, altered, and contorted over millions of years of geological history. On exposure at the Earth's surface, these rocks have become shaped by water, wind, and ice, producing the topography (or relief) we see today, as well as the soils which blanket the landscape. Both relief and soils are slowly changing - adapting to new conditions as climatic and other environmental factors change. Vegetation and animal life have spread across these surfaces, leaving their own, continuing, impact on soils, relief, and climate. Finally, humans have left, and continue to leave, their sometimes indelible imprint on the landscape - through buildings, transport routes, field systems, quarries, and other constructive and

periods and carved the troughs in which the great fjords, which serrate the southern coast of New Zealand's west side, developed. The geographical isolation of New Zealand since it split from Gondwana has had great impacts on the fauna and flora, as did the arrival of European colonists in the early 19th century. Today, the New Zealand landscape reflects this complex history, spanning hundreds of millions of years and linking the forces of tectonism and climate, and the physical and the living components of the landscape (see Figure 1).



Landscape around Arthur's Pass, South Island, New Zealand

Because landscapes consist of rocks, soils, vegetation, animals, and human constructions, many different groups of scientists and academics are involved in their study and management. In many countries, geographers have claimed landscape as their key area of study - as geography has, over its long history, commonly focused on human/environment relations, or what we might see as the upper layer of the landscape palimpsest. Ecologists, geologists, archaeologists, and historians have also laid claim to landscape as one of their major subjects of interest, as they focus on different layers or timescales of landscape change. However, our purpose with this book is to introduce you to how

and why geomorphologists, as the main 'landscape scientists', study landscape.

Geomorphology may be defined as the study of the Earth's surface and the processes that shape it. Thus, by definition, it deals with the fundamental 'canvas' of landscape - that is, the topography, or relief, and the processes that create and shape it. Geomorphology is what holds landscape together. As befits such a central area of study, geomorphology is carried out by scientists trained in a range of disciplines, notably geology and geography. Geomorphology is also today a highly inter-disciplinary field, with linkages to hydrology, ecology, climatology, and human geography, for example. What geomorphologists do, and how they do it, will be a central theme of this book.

Geomorphology is a complex science, very different from the experimental sciences of physics and chemistry. Like geology and biology, geomorphology is often described as an 'historical science', as it deals with change over time. The argument goes that in experimental sciences, such as chemistry, an experiment (as long as it is run properly) will always produce the same outcome wherever or whenever it is run, in observance of basic laws. However, in historical sciences, such as geomorphology, an event may have a very different outcome depending on the conditions at that particular time and location. For example, an earthquake of the same magnitude and location will not necessarily produce the same landslide event within the same area of mountainous terrain at two different dates, because all other things are not equal - landscape has a history and that history makes each even unique. This makes geomorphology both fascinating and frustrating, as it is very hard to find general laws within landscapes and thus very difficult to explain and manage them.

The quest for general explanations of how landscapes behave is one key motivation for geomorphologists, as we shall see later on.

Whilst geomorphology is clearly complex and difficult, at heart it focuses on three fairly simple elements: that is, landforms, processes, and the development of landscapes over time. As a

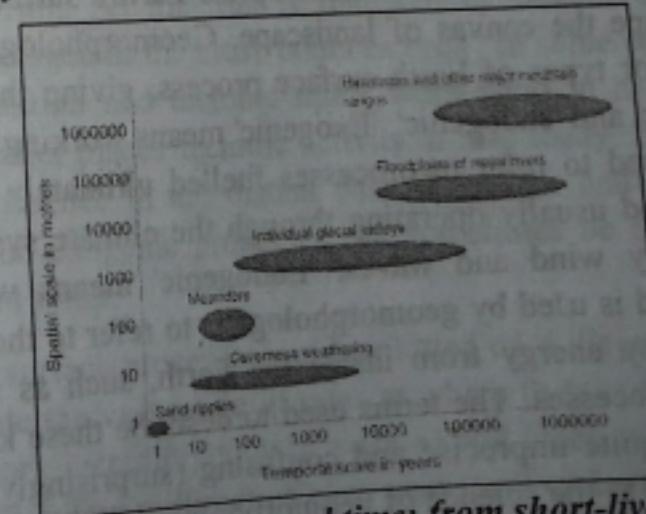
subject, geomorphology has sometimes prioritized one of these three over the others, but we now know that they are all crucial to explaining landscape. These are the building-blocks of geomorphological science which together create what is often seen as the 'geomorphological system', or 'Earth surface system'. In these phrases, 'system' implies an interconnected, functioning association of different elements. Systems, as a concept, are often used in the historical sciences to try and make sense of dynamic and complex subject material. They both organize and simplify the essential components of geomorphology, helping geomorphologists to see what is significant and what is not. But before we look at geomorphic systems in any more detail, let us explain what the three building-blocks of geomorphology are all about.

Some landforms, such as river valleys, mountain ranges, and beaches, are familiar. Others are more obscure features that may be given locally coined names, such as dolines, playas, tafoni, and yardangs. In essence, landforms are clearly defined topographical features. Occupying part of the Earth's surface, they have a three-dimensional shape and are usually made up of sediments and rocks, water, and organic life. If we fly over any part of the Earth's land surface (in a plane or, virtually, on Google Earth), we will see that the topography is organized into recognizable landforms. Geomorphologists, especially during the 19th and early 20th centuries, have spent much time identifying, measuring, naming, and explaining these landforms. Often, local words have been used to name landforms in the different countries in which they occur (like 'doline', which is a term for a closed depression found in limestone landscapes originating in a Serbo-Croat name for 'valley') and much effort has been exerted trying to create internationally standardized terminologies. Philosophically aware geomorphologists (and there aren't a large number of these!) have also devoted time to considering whether landforms are true entities or 'natural kinds'. Similar discussions have also been held in biology over the concept of 'species' and whether a species is a natural kind. Landforms are, in many ways, the species of the geomorphological world. Even non-philosophically aware geomorphologists, however, realize that landforms are rather more elusive and slippery to identify and categorize than biological

species. Individual landforms do not have a unique signature - there is no geomorphological equivalent of DNA.

Landforms can be big or small. Indeed, they range hugely in scale from small pits in rock surfaces less than a centimetre in diameter to whole mountain ranges of thousands of kilometres in extent.

Big landforms may be made up of many small ones. A large river basin, such as the Amazon, is a landform and one which has superimposed on it many smaller landforms (such as river meanders, sand bars, hillslopes). Geomorphologists have investigated in many different ways whether the small landforms contribute to the development of the larger ones on which they are superimposed and, in turn, whether the large landforms constrain the development of the smaller ones. As well as varying in spatial scale, landforms also vary in terms of how long they take to develop. As with spatial scale, the range of timescales over which landforms evolve varies hugely - from a few seconds to millions of years. In general, smaller landforms develop more quickly than bigger ones, but there is large variability within this general rule. One useful way of visualizing the vast variability in size and timespan of formation of landforms is to plot them on a log:log plot. Such graphs have logarithmic axes and are commonly used to graph datasets which cover very large-scale ranges and would not fit on standard axes. These diagrams are used frequently in geomorphology and other Earth and environmental sciences.



Landforms over space and time: from short-lived and tiny to immense and persistent

A diagram of this type with a number of landforms plotted on it is shown as Figure 2. The vast range of scales of landforms illustrated by this diagram hints at the many questions facing geomorphologists.

What sorts of questions do geomorphologists pose about landforms? Often, geomorphologists want to know what produces particular types of landform, how quickly they develop, and how persistent they are within a landscape. We also often want to know where specific landforms are found - for example, whether they develop only under specific climatic conditions and, if so, whether they can be used diagnostically as evidence to help us interpret newly discovered landscapes. We are also interested in links between landforms and life - whether particular landforms harbour specific vegetation types and, in turn, whether vegetation communities help produce some landforms. Geomorphologists are also increasingly interested in the linkages between landforms and global change - such as how sensitive some landforms may be to future climate change. Finally, geomorphologists also ask questions about the contribution of landforms to the overall topography of the Earth. We will look at many of these questions in later sections of this book.

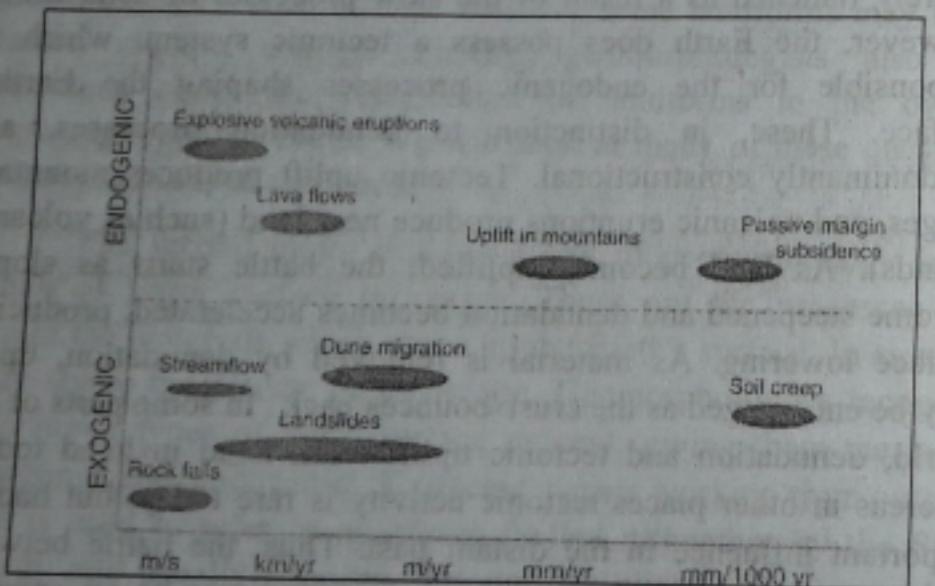
The second major building-block of geomorphology is the study of Earth surface processes. These are the processes that sculpt the materials which make up the Earth's surface. In essence, they shape the canvas of landscape. Geomorphologists recognize two major types of Earth surface process, giving them the labels 'exogenic' and 'endogenic'. 'Exogenic' means working from outside, and is used to refer to processes fuelled ultimately by the Sun's energy and usually operating through the climate system, such as erosion by wind and waves. 'Endogenic' means working from inside, and is used by geomorphologists to refer to those processes powered by energy from inside the Earth, such as volcanic and tectonic processes. The terms used to describe these key processes are often quite imprecise and confusing (surprisingly, given their importance to the science of geomorphology), but all the processes identified contribute to change in the land surface. Many

geomorphologists have regarded the development of landscape as a battle over time between the two sets of processes, exogenic and endogenic. Or, to put it another way, the essence of geomorphology can be interpreted to be the long-term interplay between climate and tectonics. Let's look at this in a bit more detail.

Exogenic processes largely involve what geomorphologists call 'denudation', or the lowering of the land surface through the linked processes of weathering and erosion. For example, wind, rain, snow, ice, and gravity all contribute to eroding mountain landscapes. Gradually, and sometimes abruptly, steep mountainsides become eroded into more gentle slopes as sediment is detached, removed, and washed away through the river system, ultimately ending up in the oceans. If the Earth had no tectonic system, geomorphology would be dominated by denudation and, over millions and millions of years, the Earth's surface would be entirely flattened as a result of the slow processes of denudation. However, the Earth does possess a tectonic system, which is responsible for the endogenic processes shaping the Earth's surface. These, in distinction to denudation processes, are predominantly constructional. Tectonic uplift produces mountain ranges, and volcanic eruptions produce new land (such as volcanic islands). As land becomes uplifted, the battle starts as slopes become steepened and denudation becomes accelerated, producing surface lowering. As material is removed by denudation, uplift may be encouraged as the crust 'bounces back'. In some parts of the world, denudation and tectonic uplift work hand in hand today, whereas in other places tectonic activity is rare today, but had an important influence in the distant past. Thus, the battle between endogenic and exogenic processes can sometimes be an episodic and one-sided affair.

Earth surface processes can be plotted on a diagram (Figure 3) to illustrate the vast range of rates at which they operate. Some processes work incredibly slowly, such as soil creep which moves sediment only a few millimetres each year. Soil creep involves the movement of individual grains of soil down a slope as a response

to minor changes in microclimatic conditions. Under frosty conditions, for example, grains of soil become detached on small ice crystals developing from water in surface pores. When the frost thaws, the ice supporting the soil grain melts and the grain moves under gravity a small distance down the slope. Such conditions may only occur a few times a year, and thus the progress of an individual soil grain can be extremely slow. The area affected may also be very small, in this case just a few grains of soil. In distinction, some Earth surface processes operate remarkably quickly. The movement of material down slope under gravity (mass movement) can be very rapid, such as rockfall which can move debris many hundreds of metres within a few seconds. Such a rockfall can also cover a very large area, with several millions of tonnes of material moved in one event. Looking at Figure 3, we can see that both endogenic and exogenic processes can occur slowly or quickly. They can also affect areas from centimetres to hundreds of kilometres in diameter.



Earth surface processes over time: how quickly do they operate?

What questions do geomorphologists ask about Earth surface processes? Quantifying their rate is a crucial area of research, as is identifying where and when they occur. Geomorphologists are also interested, as we have seen above, in linking processes to the development of landforms in order to understand the role they play

in the landscape. We are also engaged in attempts to show how geomorphological processes interlink with ecological processes - such as for example the mutual operation of weathering and nutrient cycling. Furthermore, geomorphologists are increasingly interested in linking Earth surface processes to other processes affecting the whole Earth system, such as biogeochemical cycling and human activity. We will return to some of these key questions in later chapters.

The third building-block of geomorphology is the study of the development of landscapes over time. It is fair to say that this preoccupied geomorphologists for much of the 19th and early 20th centuries, and became neglected during the second half of the 20th century when geomorphologists (at least in the English-speaking community) became obsessed with quantifying processes over the short term and at the local scale rather than investigating the longer term. With the advent of new and improved techniques, such as radiometric dating, the study of long-term change has now been reinvigorated. So what do we mean by 'long term' in geomorphology? How long does it take for landscapes to develop? If we picture landscapes as being large-scale assemblages of landforms, then most landscapes have been produced over the Cenozoic era - the last 65 million years or so of geological time. However, change over the Cenozoic has often been influenced by events during much earlier geological periods, in which rocks have been laid down, large plate tectonic movements have occurred, and sea levels have changed dramatically. Some landscapes are extremely old, such as large parts of Australia which still bear the signs of processes and events in much earlier geological periods. Within the Cenozoic, the past 2.4 million years or so (often called the Quaternary period) have been the dominant period of change for many landscapes. More recently, human impacts on the landscape have become an important geomorphological force over the last 12 thousand or so years (often called the Holocene), with an acceleration of human activity during the past 300 years. Also over the Holocene, there has been a major period of global sea level rise associated with the melting of the ice at the end of the last glacial period. This has been a major control on the

development of coastal landscapes throughout the world. The world's major deltas, like the Nile and the Mississippi, began to develop their present forms around 6,000 years ago.

Why do geomorphologists expend so much effort trying to explain histories of landscape development? One important reason is that to understand how landscapes function today, it is necessary to evaluate their history. Trying to understand the pattern and timing of catastrophic mass movements within the Himalayas, for example, requires an understanding of the forces that have shaped the landscape in the past. Glacial periods left clear imprints in the Himalayas and other mountainous areas, in the form of over-steepened valley side slopes where glaciers had eroded. These over-steepened slopes became unstable and likely to fail once the glaciers melted. Reconstructing glacial histories in time and space can help determine the likely threat of geomorphic hazards today.

The geomorphic past is also a major testing ground for our theories and ideas of how the world works which have been derived from studying the present. If, for example, geomorphologists develop a theory to explain the link between weathering and the development of cavernous weathering features (also known as tafoni), then they can test this by looking at a dated sequence of tafoni to see how they developed under different past climatic and environmental conditions. A further reason to study the broad changes in landscape in the past relates to the need to predict the future. If we can reconstruct how landscapes, climate, and tectonics have mutually adjusted over hundreds, thousands, and millions of years, we can start to understand their behaviour better and look ahead to future changes (perhaps linked to climate change). However, in order to do this, geomorphologists need to utilize all three of their basic building-blocks, and bring together a concern for landforms, processes, and landscape development over time. How can they achieve this?

In order to link these elements, it would be helpful if geomorphologists had some over-arching theory or view of how the world works. As we shall see in Chapter 2, there have been several attempts to create such a theory, and the jury is still out

over whether we will ever have a satisfactory over-arching theory which suits everyone and accommodates all questions and research areas. Certainly, at the very least we need some shared goals and a long way in developing a suite of widely applicable techniques and methodologies in recent years. Putting these together has enabled geomorphologists to make much progress in interpreting past, present, and future landscapes. In Chapter 4, we discuss in more detail the impact of tectonics and climate change on landscapes, whilst Chapter 5 introduces some of the interesting work done on how the living and non-living parts of the landscape interact. As we shall see in Chapters 6 and 7, we now have a lot of information and ideas with which we can respond to environmental managers' requests for explanations of the human impacts on the landscape (both today and as a result of ongoing and future climate change). Geomorphology also has other dimensions, such as a long-term engagement with landscape and culture (introduced in Chapter 8) and its application to other landscapes, such as those on other planets and the ocean floor, as we discuss in Chapter 9.

Short Questions

1. What is this book all about?
2. What is landscape?
3. What does New Zealand possess?
4. What are the Southern Alps shaped by?
5. What do landscapes consist of?
6. What is Geomorphology?
7. Who are called the main 'landscape scientists'?
8. What is Geomorphology linked to?
9. Why is Geomorphology described as a 'historical science'?
10. On which three simple elements does geomorphology focus?
11. To what do landforms range from?
12. What is the second major building block of geomorphology?

13. What two major types of Earth surface process do Geomorphologists recognize?
14. What does 'Exogenic' mean?
15. What does 'Endogenic' mean?
16. What contributes to eroding mountain landscapes?
17. What is the third building block of Geomorphology?
18. Which reinvigorated the study of long-term change?
19. Which period has been the dominant period of change for many landscapes?
20. Around how many years ago did the world's major deltas begin to develop their present forms?

Long Questions

1. How do the landscapes evolve and change?
2. Why are the landscapes important both globally and locally?
3. Write in brief about the role of geomorphology in the study of landscapes.
4. What questions do geomorphologists ask about Earth surface processes?
5. Why do geomprphologists expend so much effort trying to explain histories of landscape development?
6. What sorts of questions do geomorohologists pose about landforms?

Discussion

1. "The geomorphic past is also a major testing ground for our theories and ideas of how the world works today." Discuss it.

Composition

1. Write an account of the geomorphological study of the landscape of Kathmandu valley.

□□□

Section - 26**EXCERPTS FROM COMPLEXITY AND CONTRADICTION IN ARCHITECTURE (1966)**

— Robert Venturi,

I like complexity and contradiction in architecture. I do not like the incoherence or arbitrariness of incompetent architecture nor the precious intricacies of picturesqueness or expressionism. Instead, I speak of a complex and contradictory architecture based on the richness and ambiguity of modern experience, including that experience which is inherent in art. Everywhere, except in architecture, complexity and contradiction have been acknowledged, from Godel's proof of ultimate inconsistency in mathematics to T. S. Eliot's analysis of "difficult" poetry and Joseph Albers' definition of the paradoxical quality of painting.

But architecture is necessarily complex and contradictory in its very inclusion of the traditional Vitruvian elements of commodity, firmness, and delight. And today the wants of program, structure, mechanical equipment, and expression, even in single buildings in simple contexts, are diverse and conflicting in ways previously unimaginable. The increasing dimension and scale of architecture in urban and regional planning add to the difficulties. I welcome the problems and exploit the uncertainties. By embracing contradiction as well as complexity, I aim for vitality as well as validity.

Architects can no longer afford to be intimidated by the puritanically moral language of orthodox Modern architecture. I

like elements which are hybrid rather than pure," compromising rather than "clean," distorted rather than "straightforward," ambiguous rather than "articulated," perverse as well as impersonal, boring as well as "interesting," conventional rather than excluding," accommodating rather than excluding, redundant rather than simple, vestigial as well as innovating, inconsistent and equivocal rather than direct and clear. I am for messy vitality over obvious unity. I include the non sequitur and proclaim the duality.

I am for richness of meaning rather than clarity of meaning; for the implicit function as well as the explicit function. I prefer "both-and" to "either-or," black and white, and sometimes gray, to black or white. A valid architecture evokes many levels of meaning and combinations of focus: its space and its elements become readable and workable in several ways at once.

But an architecture of complexity and contradiction has a special obligation toward the whole: its truth must be in its totality or its implications of totality. It must embody the difficult unity of inclusion rather than the easy unity of exclusion. More is not less.

[...] Orthodox Modern architects have tended to recognize complexity insufficiently or inconsistently. In their attempt to break with tradition and start all over again, they idealized the primitive and elementary at the expense of the diverse and the sophisticated. As participants in a revolutionary movement, they acclaimed the newness of modern functions, ignoring their complications. In their role as reformers, they puritanically advocated the separation and exclusion of elements rather than the inclusion of various requirements and their juxtapositions. As a forerunner of the Modern movement, Frank Lloyd Wright, who grew up with the motto "Truth against the World," wrote: "Visions of simplicity so broad and far-reaching would open to me and such building harmonies appear that ... would change and deepen the thinking and culture of the modern world. So I believed." And Le Corbusier, co-founder of Purism, spoke of the "great primary forms" which, he proclaimed, were "distinct ... and without ambiguity." Modern architects with few exceptions eschewed ambiguity. But now our position is different: "At the same that the

problems increase in quantity, complexity, and difficulty they also change faster than before," and require an attitude more like that described by [author and philanthropist] August Heckscher: "The view of life as complex and ironic is what every individual passes through in becoming mature. But certain epochs encourage this development in them the paradoxical or dramatic outlook colors the whole intellectual scene.. Amid simplicity and order rationalism is born, but rationalism proves inadequate in any period of upheaval. Then equilibrium must be created out of opposites. Such inner peace as men gain must represent a tension among contradictions and uncertainties.... A feeling for paradox allows seemingly dissimilar things to exist side by side, their very incongruity suggesting a kind of truth."

Rationalizations for simplification are still current, however, though subtler than the early arguments. They are expansions of Mies van der Rohe's magnificent paradox, "less is more." Paul Rudolph has clearly stated the implications of Mies' point of view: "All problems can never be solved. ... Indeed it is a characteristic of the twentieth century that architects are highly selective in determining which problems they want to solve. Mies, for instance, makes wonderful buildings only because he ignores many aspects of a building. If he solved more problems, his buildings would be far less potent".

The doctrine "less is more" bemoans complexity and justifies exclusion for expressive purposes. It does, indeed, permit the architect to be "highly selective in determining which problems [he wants] to solve." But if the architect must be "committed to his particular way of seeing the universe," such a commitment surely means that the architect determines how problems should be solved, not that he can determine which of the problems he will solve. He can exclude important considerations only at the risk of separating architecture from the experience of life and the needs of society. If some problems prove insoluble, he can express this: in an inclusive rather than an exclusive kind of architecture there is room for the fragment, for contradiction, for improvisation, and for

the tensions these produce. Mies' exquisite pavilions have had valuable implications for architecture, but their selectiveness of content and language is their limitation as well as their strength.

I question the relevance of analogies between pavilions and houses, especially analogies between Japanese pavilions and recent domestic architecture. They ignore the real complexity and contradiction inherent in the domestic program—the spatial and technological possibilities as well as the need for variety in visual experience. Forced simplicity results in oversimplification. In the Wiley House, for instance, in contrast to his glass house, Philip Johnson attempted to go beyond the simplicities of the elegant pavilion. He explicitly separated and articulated the enclosed "private functions" of living on a ground floor pedestal, thus separating them from the open social functions in the modular pavilion above. But even here the building becomes a diagram of an oversimplified program for living—an abstract theory of either-or. Where simplicity cannot work, simpleness results. Blatant simplification means bland architecture. Less is a bore.

The recognition of complexity in architecture does not negate what Louis Kahn has called "the desire for simplicity." But aesthetic simplicity which is a satisfaction to the mind derives, when valid and profound, from inner complexity. The Doric temple's simplicity to the eye is achieved through the famous subtleties and precision of its distorted geometry and the contradictions and tensions inherent in its order. The Doric temple could achieve apparent simplicity through real complexity. When complexity disappeared, as in the late temples, blandness replaced simplicity.

Nor does complexity deny the valid simplification which is part of the process of analysis, and even a method of achieving complex architecture itself. "We oversimplify a given event when we characterize it the standpoint of a given interest." But this kind of simplification is a method in the analytical process of achieving a complex art. It should not be mistaken for a goal.

An architecture of complexity and contradiction, however, does not mean picturesqueness or subjective expressionism. A

false complexity has recently countered the false simplicity of an earlier Modern architecture. It promotes an architecture of [architect] Minoru Yamasaki calls "serene" but it represents a new simplicity. Its intricate forms do not reflect genuinely complex industrial techniques for execution, though dependent on oily created by handicraft techniques. Gothic tracery and Rococo rocaille were not only expressively valid in relation to the whole, but came from a valid showing-off of hand skills and expressed a vitality derived from the immediacy and individuality of the method. This kind of complexity through exuberance, perhaps impossible today, is the antithesis of "serene" architecture, despite the superficial resemblance between them. But if exuberance is not characteristic of our art, it is tension, rather than "serenity" that would appear to be so.

The best twentieth-century architects have usually rejected simplification—that is, simplicity through reduction—in order to promote complexity within the whole. The works of Alvar Aalto and Le Corbusier (who often disregards his polemical writings) are examples. But the characteristics of complexity and contradiction in their work are often ignored or misunderstood. Critics of Aalto, for instance, have liked him mostly for his sensitivity to natural materials and his fine detailing, and have considered his whole composition willful picturesqueness. [...] Aalto's complexity is part of the program and structure of the whole rather than a device justified only by the desire for expression. Though we no longer argue over the primacy of form or function (which follows which?), we cannot ignore their interdependence.

The desire for a complex architecture, with its attendant contradictions, is not only a reaction to the banality or prettiness of current architecture. It is an attitude common in the Mannerist periods: the sixteenth century in Italy or the Hellenistic period in Classical art, and is also a continuous strain seen in such diverse architects as Michelangelo, Palladio, Borromini, Vanbrugh,

Hawksmoor, Soane, Ledoux, Butterfield, some architects of the Shingle Style, Furness, Sullivan, Lutyens, and recently, Le Corbusier, Aalto, Kahn, and others.

Today this attitude is again relevant to both the medium of architecture and the program in architecture.

First, the medium of architecture must be re-examined if the increased scope of our architecture as well as the complexity of its goals is to be expressed. Simplified or superficially complex forms will not work. Instead, the variety inherent in the ambiguity of visual perception must once more be acknowledged and exploited.

Second, the growing complexities of our functional problems must be acknowledged. I refer, of course, to those programs, unique in our time, which are complex because of their scope, such as research laboratories, hospitals, and particularly the enormous projects at the scale of city and regional planning. But even the house, simple in scope, is complex in purpose if the ambiguities of contemporary experience are expressed. This contrast between the means and the goals of a program is significant. Although the means involved in the program of a rocket to get to the moon, for instance, are almost infinitely complex, the goal is simple and contains few contradictions; although the means involved in the program and structure of buildings are far simpler and less sophisticated technologically than almost any engineering project, the purpose is more complex and often inherently ambiguous.

[...]

A play of order and compromise also supports the idea of renovation in building, and of evolution in city planning. Indeed, change in the program of existing buildings is a valid phenomenon and a major source of the contradiction I am endorsing. [...] Much of the richness of the Italian urban scene at eye level results from the tradition of modifying or modernizing every several generations the commercial ground floor interiors, for example, the frankly stylish contemporary bars, located in the frames of old palazzi. But the building's original order must be strong. A good

deal of clutter has not managed to destroy the space of Grand Central Station but the introduction of one foreign element casts into doubt the entire effect of some modern buildings. Our buildings must survive the cigarette machine.

I have been referring to one level of order in architecture—that individual order that is related to the specific building it is part of. But there is convention in architecture, and convention can be another manifestation of an exaggeratedly strong order more general in scope. An architect should use convention and make it vivid. I mean he should use convention unconventionally. By convention I mean both the elements and methods of building. Conventional elements are those which are common in their manufacture, form, and use. I do not refer to the sophisticated products of industrial design, which are usually beautiful, but to the vast accumulation of standard, anonymously designed products connected with architecture and construction, and also to commercial display elements which are positively banal or vulgar in themselves and are seldom associated with architecture.

The main justification for honky-tonk elements in architectural order is their very existence. They are what we have. Architects can bemoan or try to ignore them or even try to abolish them, but they will not go away. Or they will not go away for a long time, because architects do not have the power to replace them (nor do they know what to replace them with), and because these commonplace elements accommodate existing needs for variety and communication. The old clichés involving both banality and mess will still be the context of our new architecture, and our new architecture significantly will be the context for them. I am taking the limited view, I admit, but the limited view, which architects have tended to belittle, is as important as the visionary view, which they have tended to glorify but have not brought about. The short-term plan, which expeditiously combines the old and the new, must accompany the long-term plan. Architecture is evolutionary as well as revolutionary. As an art it will acknowledge what is and what ought to be, the immediate and the speculative. [...] Are we today proclaiming advanced technology,

while excluding the immediate, vital if vulgar elements which are common to our architecture and landscape? The architect should accept the methods and the elements he already has. [...] Present-day architects, in their visionary compulsion to invent new techniques, have neglected their obligation to be experts in existing conventions. The architect, of course, is responsible for the how as well as the what in his building, but his innovating role is primarily in the what; his experimentation is limited more to his organization of the whole than to technique in the parts. The architect selects as much as creates.

These are pragmatic reasons for using convention in architecture but there are expressive justifications as well. The architect's main work is the organization of a unique whole through conventional parts and the judicious introduction of new parts when the old won't do. Gestalt psychology maintains that context contributes meaning to a part and change in context causes change in meaning. The architect thereby, through the organization of parts, creates meaningful contexts for them within the whole. Through unconventional organization of conventional parts he is able to create new meanings within the whole. If he uses convention unconventionally, if he organizes familiar things in an unfamiliar way, he is changing their contexts, and he can use even the cliché to gain a fresh effect. Familiar things seen in an unfamiliar context become perceptually new as well as old.

Modern architects have exploited the conventional element only in limited ways. If they have not totally rejected it as obsolete or banal, they have embraced it as symbolic of progressive industrial order. But they have seldom used the common element with a unique context in an uncommon way. Wright, for instance, almost always employed unique elements and unique forms, which represented his personal and innovating approach to architecture. Minor elements, like hardware by Schlage or plumbing fixtures by Kohler of Kohler, which even Wright was unable to avoid using, read as unfortunate compromises within the particular order of his buildings, which is otherwise consistent.

Gropius in his early work, however, employed forms and elements based on a consistent industrial vocabulary. He thus recognized standardization and promoted his *ma chine* aesthetic. The inspiration for windows and stairways, for instance, came from current factory architecture, and these buildings look like factories. Latter-day Mies employs the structural elements of Albert Kahn with unconscious irony: the elegant frame members are derived from standard steel manufacturers' catalogues; they are expressed as exposed structure but they are ornament on a fire-resistant frame; and they make up complex, closed spaces rather than the simple industrial spaces they were originally designed for. It was Le Corbusier who juxtaposed objects trouvés and commonplace elements, such as the Thonet chair, the officer's chair, cast iron radiators, and other industrial objects, and the sophisticated forms of his architecture with any sense of irony.

[...] Poets, according to Eliot, employ "that perpetual slight alteration of language, words perpetually juxtaposed in new and sudden combinations." Wordsworth writes in his preface to the Lyrical Ballads of choosing "incidents and situations from common life [so that] ordinary things should be presented to the mind in an unusual aspect." And Kenneth Burke has referred to "perspective by incongruity." This technique, which seems basic to the medium of poetry, has been used today in another medium. The Pop painter gives uncommon meaning to common elements by changing their context or increasing their scale. Through "involvement in the relativity of perception and the relativity of meaning," old clichés in new settings achieve rich meanings which are ambiguously both old and new, banal and vivid. [...] Pop Art has demonstrated that these commonplace elements are often the main source of the occasional variety and vitality of our cities, and that it is not their banality or vulgarity as elements which make for the banality or vulgarity of the whole scene, but rather their contextual relationships of space and scale.

Another significant implication from Pop Art involves method in city planning. Architects and planners who peevishly

denounce the conventional townscape for its vulgarity or banality promote elaborate methods for abolishing or disguising honky-tonk elements in the existing landscape, or, for excluding them from the vocabulary of their new townscapes. But they largely fail either to enhance or to provide a substitute for the existing scene because they attempt the impossible. By attempting too much they flaunt their impotence and risk their continuing influence as supposed experts. Cannot the architect and planner, by slight adjustments to the conventional elements of the townscape, existing or proposed, promote significant effects? By modifying or adding conventional elements to still other conventional elements they can, by a twist of context, gain a maximum of effect through a minimum of means. They can make us see the same things in a different way.

[...]

In [the 1964 book] God's Own Junkyard [architect/critic] Peter Blake has compared the chaos of commercial Main Street with the orderliness of the University of Virginia. Besides the irrelevancy of the comparison, is not Main Street almost all right? Indeed, is not the commercial strip of a Route 66 almost all right? As I have said, our question is: what slight twist of context will make them all right? Perhaps more signs more contained. Illustrations in God's Own Junkyard of Times Square and Road Town are compared with illustrations of New England villages and arcadian countrysides. But the pictures in this book that are supposed to be bad are often good. The seemingly chaotic juxtapositions of honky-tonk elements express an intriguing kind of vitality and validity, and they produce an unexpected approach to unify as well.

It is true that an ironic interpretation such as this results partly from the change in scale of the subject matter in photographic form and the change in context within the frames of the photographs. But in some of these compositions there is an inherent sense of unity not far from the surface. It is not the obvious or easy unity derived from the dominant binder or the motival order of simpler, less contradictory compositions, but that derived from a complex and illusive order of the difficult whole. It

is the taut composition which contains contrapuntal relationships, equal combinations, inflected fragments, and acknowledged qualities. It is the unity which "maintains, but only just maintains, a control over the clashing elements which compose it. Chaos is very near; its nearness, but its avoidance, gives ... force." In the validly complex building or cityscape, the eye does not want to be too easily or too quickly satisfied in its search for unity within a whole.

Some of the vivid lessons of Pop Art, involving contradictions of scale and context, should have awakened architects from prim dreams of pure order, which, unfortunately, are imposed in the easy Gestalt unities of the urban renewal projects of establishment Modern architecture and yet, fortunately are really impossible to achieve at any great scope. And it is perhaps from the everyday landscape, vulgar and disdained, that we can draw the complex and contradictory order that is valid and vital for our architecture as an urbanistic whole.

Short Questions

1. What does the author like in architecture?
2. What did Orthodox Modern architects idealize?
3. As reformers, what did modern architects do?
4. Who was Frank Lloyd Wright?
5. With which motto did Frank Lloyd Wright grow up?
6. Who was August Heckscher?
7. What is Miles van der Rohe's paradox?
8. Which doctrine becomes complexity?
9. What does forced simplicity result in?
10. What does blatant simplification mean?
11. What replaced simplicity?
12. Why have the best twentieth century architects rejected simplification?
13. What should an architect use?
14. What does the author mean by convention?

15. What is the architect responsible for?
16. According to Eliot, what do poets employ?
17. How does the pop painter give uncommon meaning to common elements?
18. What has pop art demonstrated?
19. What has Peter Blake compared?
20. What do architects and planners denounce?

Long Questions

1. Explain the paradox 'less is more'.
2. "An architecture of complexity and contradiction does not mean picturesqueness or subjective expressionism.: Explain this statement.
3. What does the author mean by convention in architecture?
4. How is architecture evolutionary as well as revolutionary?
5. How is pop art important in architecture?

Composition

1. With reference to the text, describe complexity and contradiction in architecture of the library building of your college.

Discussion

1. Wordsworth says " incidents and situations from common life ordinary things should be presented to the mind in an unusual aspect." Discuss it.



Section - 27

THE LAMP OF SACRIFICE

I. Architecture is the art which so disposes and adorns the edifices raised by man for whatsoever uses, that the sight of them contributes to his mental health, power and pleasure. It is very necessary, in the outset of all inquiry, to distinguish carefully between Architecture and Building.

To build, literally to confirm, is by common understanding to put together and adjust the several pieces of any edifice or receptacle of a considerable size. Thus we have church building, house building, ship building, and coach building. That one edifice stands, another floats, and another is suspended on iron springs, makes no difference in the nature of the art, if so it may be called, of building or edification. The persons who profess that art, are severally builders, ecclesiastical, naval, or of whatever other name their work may justify; but building does not become architecture merely by the stability of what it erects; and it is no more architecture which raises a church, or which fits it to receive and contain with comfort a required number of persons occupied in certain religious offices, than it is architecture which makes a carriage commodious or a ship swift. I do not, of course, mean that the word is not often, or even may not be legitimately, applied in such a sense (as we speak of naval architecture); but in that sense architecture ceases to be one of the fine arts, and it is therefore better not to run the risk, by loose nomenclature, of the confusion which would

arise, and has often arisen, from extending principles which belong altogether to building, into the sphere of architecture proper.

Let us, therefore, at once confine the name to that art which, taking up -and admitting, as conditions of its working, the necessities and common uses of the building, impresses on its form certain characters venerable or beautiful, but otherwise unnecessary. Thus, I suppose, no one would call the laws architectural which determine the height of a breastwork or the position of a bastion. But if to the stone facing of that bastion be added an unnecessary feature, as a cable moulding, that is Architecture. It would be similarly unreasonable to call battlements or machicolations architectural features, so long as they consist only of an advanced gallery supported on projecting masses, with open intervals beneath for offence. But if these projecting masses be carved beneath into rounded courses, which are useless, and if the headings of the intervals be arched and trefoiled, which is useless, that is Architecture. It may not be always easy to draw the line so sharply and simply, because there are few buildings which have not some pretence or color of being architectural; neither can there be any architecture which is not based on building, nor any good architecture which is not based on good building; but it is perfectly easy and very necessary to keep the ideas distinct, and to understand fully that Architecture concerns itself only with those characters of an edifice which are above and beyond its common use. I say common; because a building raised to the honor of God, or in memory of men, has surely a use to which its architectural adornment fits it; but not a use which limits, by any inevitable necessities, its plan or details.

II. Architecture proper, then, naturally arranges itself under five heads:-

Devotional; including all buildings raised for God's service or honor.

Memorial; including both monuments and tombs.

Civil; including every edifice raised by nations or societies, for purposes of common business or pleasure.

Military; including all private and public architecture of defence.

Domestic; including every rank and kind of dwelling-place.

Now, of the principles which I would endeavor to develop, while all must be, as I have said, applicable to every stage and style of the art, some, and especially those which are exciting rather than directing, have necessarily fuller reference to one kind of building than another; and among these I would place first that spirit which, having influence in all, has nevertheless such especial reference to devotional and memorial architecture the spirit which offers for such work precious things simply because they are precious; not as being necessary to the building, but as an offering, surrendering, and sacrifice of what is to ourselves desirable. It seems to me, not only that this feeling is in most cases wholly wanting in those who forward the devotional buildings of the present day; but that it would even be regarded as an ignorant, dangerous, or perhaps criminal principle by many among us. I have not space to enter into dispute of all the various objections which may be urged against it they are many and spacious; but I may, perhaps, ask the reader's patience while I set down those simple reasons which cause me to believe in a good and just feeling, and as well-pleasing to God and honorable in men, as it is beyond all dispute necessary to the production of any great work in the kind with which we are at present concerned.

III. Now, first, to define this Lamp, or Spirit of Sacrifice, clearly. I have said that it prompts us to the offering of precious things merely because they are precious, not because they are useful or necessary. It is a spirit, for instance, which of two marbles, equally beautiful, applicable and durable, would choose the more costly because it was so, and of two kinds of decoration, equally effective, would choose the more elaborate because it was so, in order that it

might in the same compass present more cost and more thought. It is therefore most unreasoning and enthusiastic, and perhaps best negatively defined, as the opposite of the prevalent feeling of modern times, which desires to produce the largest results at the least cost.

Of this feeling, then, there are two distinct forms: the first, the wish to exercise self-denial for the sake of self-discipline merely, a wish acted upon in the abandonment of things loved or desired, there being no direct call or purpose to be answered by so doing; and the second, the desire to honor or please someone else by the costliness of the sacrifice. The practice is, in the first case, either private or public; but most frequently, and perhaps most properly, private; while, in the latter case, the act is commonly, and with greatest advantage, public. Now, it cannot but at first appear futile to assert the expediency of self-denial for its own sake, when, for so many sakes, it is every day necessary to a far greater degree than any of us practise it. But I believe it is just because we do not enough acknowledge or contemplate it as a good in itself, that we are apt to fail in its duties when they become imperative, and to calculate, with some partiality, whether the good proposed to others measures or warrants the amount of grievance to ourselves, instead of accepting with gladness the opportunity of sacrifice as a personal advantage. Be this as it may, it is not necessary to insist upon the matter here; since there are always higher and more useful channels of self-sacrifice, for those who choose to practise it, than any connected with the arts.

While in its second branch, that which is especially concerned with the arts, the justice of the feeling is still more doubtful; it depends on our answer to the broad question, Can the Deity be indeed honored by the presentation to Him of any material objects of value, or by any direction of zeal or wisdom which is not immediately beneficial to men?

For, observe, it is not now the question whether the fairness and majesty of a building may or may not answer any moral

purpose; it is not the result of labor in any sort of which we are speaking, but the bare and mere costliness the substance and labor and time themselves: are these, we ask, independently of their result, acceptable offerings to God, and considered by Him as doing Him honor? So long as we refer this question to the decision of feeling, or of conscience, or of reason merely, it will be contradictorily or imperfectly answered; it admits of entire answer only when we have met another and a far different question, whether the Bible be indeed one book or two, and whether the character of God revealed in the Old Testament be other than His character revealed in the New.

Now, it is a most secure truth, that, although the particular ordinances divinely appointed for special purposes at any given period of man's history, may be by the same divine authority abrogated at another, it is impossible that any character of God, appealed to or described in any ordinance past or present, can ever be changed, or understood as unchanged, by the abrogation of that ordinance. God is one and the same, and is pleased or displeased by the same things forever, although one part of His pleasure may be expressed at one time rather than another, and although the mode in which His pleasure is to be consulted may be by Him graciously modified to the circumstances of men. Thus, for instance, it was necessary that, in order to the understanding by man of the scheme of Redemption, that scheme should be foreshown from the beginning by the type of bloody sacrifice. But God had no more pleasure in such sacrifice in the time of Moses than He has now; He never accepted as a propitiation for sin any sacrifice but the single one in prospective; and that we may not entertain any shadow of doubt on this subject, the worthlessness of all other sacrifice than this is proclaimed at the very time when typical sacrifice was most imperatively demanded. God was a spirit, and could be worshipped only in spirit and in truth, as singly and exclusively when every day brought its claim of typical

and material service or offering, as now when He asks for none but that of the heart.

So, therefore, it is a most safe and sure principle that, if in the manner of performing any rite at any time, circumstances can be traced which we are either told, or may legitimately conclude, pleased God at that time, those same circumstances will please Him at all times, in the performance of all rites or offices to which they may be attached in like manner; unless it has been afterwards revealed that, for some special purpose, it is now His will that such circumstances should be withdrawn. And this argument will have all the more force if it can be shown that such conditions were not essential to the completeness of the rite in its human uses and bearings, and only were added to it as being in themselves pleasing to God.

IV. Now, was it necessary to the completeness, as a type, of the Levitical sacrifice, or to its utility as an explanation of divine purposes, that it should cost anything to the person in whose behalf it was offered? On the contrary, the sacrifice which it foreshowed was to be God's free gift; and the cost of, or difficulty of obtaining, the sacrificial type, could only render that type in a measure obscure, and less expressive of the offering which God would in the end provide for all men. Yet this costliness was generally a condition of the acceptableness of the sacrifice. "Neither will I offer unto the Lord my God of that which doth cost me nothing." [B] That costliness, therefore, must be an acceptable condition in all human offerings at all times; for if it was pleasing to God once, it must please Him always, unless directly forbidden by Him afterwards, which it has never been.

Again, was it necessary to the typical perfection of the Levitical offering, that it should be the best of the flock? Doubtless the spotlessness of the sacrifice renders it more expressive to the Christian mind; but was it because so expressive that it was actually, and in so many words, demanded by God? Not at all. It was demanded by Him

expressly on the same grounds on which an earthly governor would demand it, as a testimony of respect. "Offer it now unto thy governor." [C] And the less valuable offering was rejected, not because it did not image Christ, nor fulfil the purposes of sacrifice, but because it indicated a feeling that would grudge the best of its possessions to Him who gave them; and because it was a bold dishonoring of God in the sight of man. Whence it may be infallibly concluded, that in whatever offerings we may now see reason to present unto God (I say not what these may be), a condition of their acceptableness will be now, as it was then, that they should be the best of their kind.

VI. But farther, was it necessary to the carrying out of the Mosaical system, that there should be either art or splendor in the form or services of the tabernacle or temple? Was it necessary to the perfection of any one of their typical offices, that there should be that hanging of blue, and purple, and scarlet? those taches of brass and sockets of silver? that working in cedar and overlaying with gold? One thing at least is evident: there was a deep and awful danger in it; a danger that the God whom they so worshipped, might be associated in the minds of the serfs of Egypt with the gods to whom they had seen similar gifts offered and similar honors paid. The probability, in our times, of fellowship with the feelings of the idolatrous Romanist is absolutely as nothing compared with the danger to the Israelite of a sympathy with the idolatrous Egyptian; [1] no speculative, no unproved danger; but proved fatally by their fall during a month's abandonment to their own will; a fall into the most servile idolatry; yet marked by such offerings to their idol as their leader was, in the close sequel, instructed to bid them offer to God. This danger was imminent, perpetual, and of the most awful kind: it was the one against which God made provision, not only by commandments, by threatenings, by promises, the most urgent, repeated, and impressive; but by temporary ordinances of a severity so terrible as almost to dim for a time, in the eyes of His people, His attribute of

mercy. The principal object of every instituted law of that Theocracy, of every judgment sent forth in its vindication, was to mark to the people His hatred of idolatry; a hatred written under their advancing steps, in the blood of the Canaanite, and more sternly still in the darkness of their own desolation, when the children and the sucklings swooned in the streets of Jerusalem, and the lion tracked his prey in the dust of Samaria. [D] Yet against this mortal danger provision was not made in one way (to man's thoughts the simplest, the most natural, the most effective), by withdrawing from the worship of the Divine Being whatever could delight the sense, or shape the imagination, or limit the idea of Deity to place. This one way God refused, demanding for Himself such honors, and accepting for Himself such local dwelling, as had been paid and dedicated to idol gods by heathen worshippers; and for what reason? Was the glory of the tabernacle necessary to set forth or image His divine glory to the minds of His people? What! purple or scarlet necessary to the people who had seen the great river of Egypt run scarlet to the sea, under His condemnation? What! golden lamp and cherub necessary for those who had seen the fires of heaven falling like a mantle on Mount Sinai, and its golden courts opened to receive their mortal lawgiver? What! silver clasp and fillet necessary when they had seen the silver waves of the Red Sea clasp in their arched hollows the corpses of the horse and his rider? Nay--not so. There was but one reason, and that an eternal one; that as the covenant that He made with men was accompanied with some external sign of its continuance, and of His remembrance of it, so the acceptance of that covenant might be marked and signified by use, in some external sign of their love and obedience, and surrender of themselves and theirs to His will; and that their gratitude to Him, and continual remembrance of Him, might have at once their expression and their enduring testimony in the presentation to Him, not only of the firstlings of the herd and fold, not only of the fruits of the earth and the tithe of time, but of all

treasures of wisdom and beauty; of the thought that invents, and the hand that labors; of wealth of wood, and weight of stone; of the strength of iron, and of the light of gold.

Short Questions

1. What is "to build"?
2. What makes no difference in the nature of the art?
3. What makes a ship swift?
4. What sort of art is Architecture?
5. What are the categories of architecture?
6. What is Military Architecture?
7. What does the Lamp of Sacrifice refer to?
8. In which sacrifice did God have no pleasure in the time of Moses?
9. To what does the lamp of sacrifice prompt us?
10. Why should one exercise self-denial?
11. What is a most secure truth?
12. Who is one and the same?
13. By what is God pleased or displeased?
14. How should the scheme of Redemption be foreshown?
15. Who was a spirit?
16. What does the sight of edifices contribute to?
17. Who are builders?
18. What do the architectural laws determine?
19. What is Devotional Architecture?
20. With what characters of an edifice does Architecture concern?

Long Questions

1. Distinguish between Architecture and Building.
2. Describe all the categories of Architecture.

3. Define spirit of sacrifice.
4. Discuss the central theme of this passage.
5. What are two distinct forms of the spirit of Sacrifice? Explain them.

Composition

1. Suppose you are an Architecture engineer. Describe the Devotional Architecture of a temple going to be built in your locality.
2. Give your reactions to the architecture of any historical building of Bhaktapur municipality.

Discussion

1. "God had no more pleasure in bloody sacrifice in the life of Moses than He has now". Discuss it.



Section - 28

VITRUVIUS ARCHITECTURE

Introduction

While your divine intelligence and will, Imperator Caesar, were engaged in acquiring the right to command the world, and while your fellow citizens, when all their enemies had been laid low by your invincible valour, were glorying in your triumph and victory, while all foreign nations were in subjection awaiting your beck and call, and the Roman people and senate, released from their alarm, were beginning to be guided by your most noble conceptions and policies, I hardly dared, in view of your serious employments, to publish my writings and long considered ideas on architecture, for fear of subjecting myself to your displeasure by an unseasonable interruption.

But when I saw that you were giving your attention not only to the welfare of society in general and to the establishment of public order, but also to the providing of public buildings intended for utilitarian purposes, so that not only should the State have been enriched with provinces by your means, but that the greatness of its power might likewise be attended with distinguished authority in its public buildings, I thought that I ought to take the first opportunity to lay before you my writings on this theme. For in the first place it was this subject which made me known to your father, to whom I was devoted on account of his great qualities. After the council of heaven gave him a place in the dwellings of immortal

life and transferred your father's power to your hands, my devotion continuing unchanged as I remembered him inclined me to support you. And so with Marcus Aurelius, Publius Minidius, and Gnaeus Cornelius, I was ready to supply and repair ballistae, scorpions, and other artillery, and I have received rewards for good service with them. After your first bestowal of these upon me, you continued to renew them on the recommendation of your sister.

Owing to this favour I need have no fear of want to the end of my life, and being thus laid under obligation I began to write this work for you, because I saw that you have built and are now building extensively, and that in future also you will take care that our public and private buildings shall be worthy to go down to posterity by the side of your other splendid achievements. I have drawn up definite rules to enable you, by observing them, to have personal knowledge of the quality both of existing buildings and of those which are yet to be constructed. For in the following books I have disclosed all the principles of the art.

Chapter One

The Education of the Architect

The architect should be equipped with knowledge of many branches of study and varied kinds of learning, for it is by his judgment that all work done by the other arts is put to test. This knowledge is the child of practice and theory. Practice is the continuous and regular exercise of employment where manual work is done with any necessary material according to the design of a drawing. Theory, on the other hand, is the ability to demonstrate and explain the productions of dexterity on the principles of proportion.

It follows, therefore; that architects who have aimed at acquiring manual skill without scholarship have never been able to reach position of authority to correspond to their pains, while those who relied only upon theories and scholarship were obviously hunting the shadow, not the substance. But those who have a

thorough knowledge of both, like men armed at all points, have the sooner attained their object and carried authority with them.

In all matters, but particularly in architecture, there are these two points:— the thing signified, and that which gives it its significance. That which is signified is the subject of which we may be speaking; and that which gives significance is a demonstration on scientific principles. It appears, then, that one who professes himself an architect should be well versed in both directions. He ought, therefore, to be both naturally gifted and amenable to instruction. Neither natural ability without instruction nor instruction without natural ability can make the perfect artist. Let him be educated, skilful with the pencil, instructed in geometry, know much history, have followed the philosophers with attention, understand music, have some knowledge of medicine, know the opinions of the jurists, and be acquainted with astronomy and the theory of the heavens.

The reasons for all this are as follows. An architect ought to be an educated man so as to leave a more lasting remembrance in his treatises. Secondly, he must have a knowledge of drawing so that he can readily make sketches to show the appearance of the work which he proposes. Geometry, also, is of much assistance in architecture, and in particular it teaches us the use of the rule and compasses, by which especially we acquire readiness in making plans for buildings in their grounds, and rightly apply the square, the level, and the plummet. By means of optics, again, the light in buildings can be drawn from fixed quarters of the sky. It is true that it is by arithmetic that the total cost of buildings is calculated and measurements are computed, but difficult questions involving symmetry are solved by means of geometrical theories and methods.

A wide knowledge of history is requisite because, among the ornamental parts of an architect's design for a work, there are many the underlying idea of whose employment he should be able to explain to inquirers. For instance, suppose him to set up the marble statues of women in long robes, called Caryatides, to take the place

of columns, with the mutules and coronas placed directly above their heads, he will give the following explanation to his questioners. Caryae, a state in Peloponnesus, sided with the Persian enemies against Greece; later the Greeks, having gloriously won their freedom by victory in the war, made common cause and declared war against the people of Caryae. They took the town, killed the men, abandoned the State to desolation, and carried off their wives into slavery, without permitting them, however, to lay aside the long robes and other marks of their rank as married women, so that they might be obliged not only to march in the triumph but to appear forever after as a type of slavery, burdened with the weight of their shame and so making atonement for their State. Hence, the architects of the time designed for public buildings statues of these women, placed so as to carry a load, in order that the sin and the punishment of the people of Caryae might be known and handed down even to posterity.

Likewise the Lacedaemonians under the leadership of Pausanias, son of Agesipolis, after conquering the Persian armies, infinite in number, with a small force at the battle of Plataea, celebrated a glorious triumph with the spoils and booty, and with the money obtained from the sale thereof built the Persian Porch, to be a monument to the renown and valour of the people and a trophy of victory for posterity. And there they set effigies of the prisoners arrayed in barbarian costume and holding up the roof, their pride punished by this deserved affront, that enemies might tremble for fear of the effects of their courage, and that their own people, looking upon this ensample of their valour and encouraged by the glory of it, might be ready to defend their independence. So from that time on, many have put up statues of Persians supporting entablatures and their ornaments, and thus from that motive have greatly enriched the diversity of their works. There are other stories of the same kind which architects ought to know.

As for philosophy, it makes an architect high-minded and not self-assuming, but rather renders him courteous, just, and honest without avariciousness. This is very important, for no work can be rightly done without honesty and incorruptibility. Let him

not be grasping nor have his mind preoccupied with the idea of receiving perquisites, but let him with dignity keep up his position by cherishing a good reputation. These are among the precepts of philosophy. Furthermore, philosophy treats of physics (in Greek TualoAoyia) where a more careful knowledge is required because the problems which come under this head are numerous and of very different kinds; as, for example, in the case of the conducting of water. For at points of intake and at curves, and at places where it is raised to a level, currents of air naturally form in one way or another; and nobody who has not learned the fundamental principles of physics from philosophy will be able to provide against the damage which they do. So the reader of Ctesibius or Archimedes and the other writers of treatises of the same class will not be able to appreciate them unless he has been trained in these subjects by the philosophers.

Music, also, the architect ought to understand so that he may have knowledge of the canonical and mathematical theory, and besides be able to tune ballistae, catapultae, and scorpiones to the proper key. For to the right and left in the beams are the holes in the frames through which the strings of twisted sinew are stretched by means of windlasses and bars, and these strings must be clamped and made fast until they give the same correct note to the ear of the skilled workman. For the arms thrust through the stretched strings must, on being let go, strike their blow together at the same moment; but if they are not in unison, they will prevent the course of projectiles from being straight.

In theatres, likewise, there are the bronze vessels which are placed in niches under the seats in accordance with the musical intervals on mathematical principles. These vessels are arranged with a view to musical concords or harmony, and apportioned in the compass of the fourth, the fifth, and the octave, and so on up to the double octave, in such a way that when the voice of an actor falls in unison with any of them its power is increased, and it reaches the ears of the audience with greater clearness and sweetness. Water organs, too, and the other instruments which

resemble them cannot be made by one who is without the principles of music.

The architect should also have a knowledge of the study of medicine on account of the questions of climates (in Greek air, the healthiness and unhealthiness of sites, and the use of different waters. For without these considerations, the healthiness of a dwelling cannot be assured. And as for principles of law, he should know those which are necessary in the case of buildings having party walls, with regard to water dripping from the eaves, and also the laws about drains, windows, and water supply. And other things of this sort should be known to architects, so that, before they begin upon buildings, they may be careful not to leave disputed points for the householders to settle after the works are finished, and so that in drawing up contracts the interests of both employer and contractor may be wisely safe-guarded. For if a contract is skilfully drawn, each may obtain a release from the other without disadvantage. From astronomy we find the east, west, south, and north, as well as the theory of the heavens, the equinox, solstice, and courses of the stars. If one has no knowledge of these matters, he will not be able to have any comprehension of the theory of sundials.

Consequently, since this study is so vast in extent, embellished and enriched as it is with many different kinds of learning, I think that men have no right to profess themselves architects hastily, without having climbed from boyhood the steps of these studies and thus, nursed by the knowledge of many arts and sciences, having reached the heights of the holy ground of architecture.

But perhaps to the inexperienced it will seem a marvel that human nature can comprehend such a great number of studies and keep them in the memory. Still, the observation that all studies have a common bond of union and intercourse with one another, will lead to the belief that this can easily be realised. For a liberal education forms, as it were, a single body made up of these members. Those, therefore, who from tender years receive

instruction in the various forms of learning, recognize the same stamp on all the arts, and an intercourse between all studies, and so they more readily comprehend them all. This is what led one of the ancient architects, Pytheos, the celebrated builder of the temple of Minea at Priene, to say in his Commentaries that an architect ought to be able to accomplish much more in all the arts and sciences than the men who, by their own particular kinds of work and the practice of it, have brought each a single subject to the highest perfection. But this is in point of fact not realized,

For an architect ought not to be and cannot be such a philologist as was Aristarchus, although not illiterate; nor a musician like Aristoxenus, though not absolutely ignorant of music; nor a painter like Apelles, though not unskilful in drawing; nor a sculptor such as was Myron or Polyclitus, though not unacquainted with the plastic art; nor again a physician like Hippocrates, though not ignorer of medicine; nor in the other sciences need he excel in each, though he should not be unskilful in them. For, in the midst of all this great variety of subjects, an individual cannot attain to perfection in each, because it is scarcely in his power to take in and comprehend the general theories of them.

Still, it is not architects alone that cannot in all matters reach perfection, but even men who individually practise specialties in the arts do not all attain to the highest point of merit. Therefore, if among artists working each in a single field not all, but only a few in an entire generation acquire fame, and that with difficulty, how can an architect, who has to be skilful in many arts, accomplish not merely the feat in itself a great marvel of being deficient in none of them, but also that of surpassing all those artists who have devoted themselves with unremitting industry to single fields?

It appears, then, that Pytheos made a mistake by not observing that the arts are each composed of two things, the actual work and the theory of it. One of these, the doing of the work, is proper to men trained in the individual subject, while the other, the theory, non to all scholars; for example, to physicians and

musicians the rhythmical beat of the pulse and its metrical movement. But if there is a wound to be healed or a sick man to be saved from danger, the musician will not call, for the business will be appropriate to the physician. So in the case of a musical instrument, not the physician but the musician will be the man to tune it so that the ears may find their due pleasure in its strains.

Astronomers likewise have a common ground for discussion with musicians in the harmony of the stars and musical concords in tetrads and triads of the fourth and the fifth, and with geometers in the subject of vision (in Greek Agyoc Orrnk6c); and in all other sciences many points, perhaps all, are common so far as the discussion of them is concerned. But the actual undertaking of works which are brought to perfection by the hand and its manipulation is the function of those who have been specially trained to deal with a single art. It appears, therefore, that he has done enough and to spare who in each subject possesses a fairly good knowledge of those parts, with their principles, which are indispensable for architecture, so that if he is required to pass judgement and to express approval in the case of those things or arts, he may not be found wanting. As for men upon whom nature has bestowed so much ingenuity, acuteness, and memory that they are able to have a thorough knowledge of geometry, astronomy, music, and the other arts, they go beyond the functions of architects and become pure mathematicians. Hence they can readily take up positions against those arts because many are the artistic weapons with which they are armed. Such men, however, are rarely found, but there have been such at times; for example, Aristarchus of Samos, Philolaus and Archytas of Tarentum, Apollonius of Perga, Eratosthenes of Cyrene, and among Syracusans Archimedes and Scopinas, who through mathematics and natural philosophy discovered, expounded, and left to posterity many things in connection with mechanics and with sundials.

Since, therefore, the possession of such talents due to natural capacity is not vouchsafed at random to entire nations, but only to a few great men; since, moreover, the function of the architect requires a training in all the departments of learning; and finally,

since reason, on account of the wide extent of the subject, concedes that he may possess not the highest but not even necessarily a moderate knowledge of the subjects of study, I request, Caesar, both of you and of those who may read the said books, that if anything is set forth with too little regard for grammatical rule, it may be pardoned. For it is not as a very great philosopher, nor as an eloquent rhetorician, nor as a grammarian trained in the highest principles of his art, that I have striven to write this work, but as an architect who has had only a dip into those studies. Still, as regards the efficacy of the art and the theories of it, I promise and expect that in these volumes I shall undoubtedly show myself of very considerable importance not only to builders but also to all scholars.

Chapter Two

The Fundamental Principles of Architecture

Architecture depends on Order, Arrangement, Eurythmy, Symmetry, Propriety, and Economy.

Order gives due measure to the members of a work considered separately, and symmetrical agreement to the proportions of the whole. It is an adjustment according to quantity. By this I mean the selection of modules from the members of the work itself and, starting from these individual parts of members, constructing the whole work to correspond. Arrangement includes the putting of things in their proper places and the elegance of effect which is due to adjustments appropriate to the character of the work. Its forms of expression (Greek Mai) are these: ground plan, elevation, and perspective. A ground plan is made by the proper successive use of compasses and rule, through which we get outlines for the plane surfaces of buildings. An elevation is a picture of the front of a building, set upright and properly drawn in the proportions of the contemplated work. Perspective is the method of sketching a front with the sides withdrawing into the background, the lines all meeting in the centre of a circle. All three come of reflexion and invention. Reflexion is careful and laborious thought, and watchful attention directed to the agreeable effect of

one's plan. Invention, on the other hand, is the solving of intricate problems and the discovery of new principles by means of brilliancy and versatility. These are the departments belonging under Arrangement.

Eurythmy is beauty and fitness in the adjustment of the members. This is found when the members of a work are of a height suited to their breadth, of a breadth suited to their length, and, in a word, when they all correspond symmetrically.

Symmetry is a proper agreement between the members of the work itself, and relation between the different parts and the whole general scheme, in accordance with a certain part selected as standard. Thus in the human body there is a kind of symmetrical harmony between forearm foot, palm, finger and other small parts and so it is with perfect buildings. In the case of temples, symmetry may be calculated from the thickness of a column, from a or even from a module; in the ballista, from the hole or from what the Greeks call the in a ship, from the space between the tholepins, ; and in other things, from various members.

Propriety is that perfection of style which comes when a work is authoritatively constructed on approved principles. It arises from prescription (Greek:), from usage, or from nature. From prescription, in the case of hypaethral edifices, open to the sky in honour of Jupiter Lightning, the Heaven, the Sun, or the Moon: for these are gods whose semblances and manifestations we behold before our very eyes in the sky when it is cloudless and bright. The temples of Minerva, Mars, and Hercules, will be Doric, since the virile strength of these gods makes daintiness entirely inappropriate to their houses. In temples to Venus, Flora, Proserpine, Spring-Water, and the Nymphs, the Corinthian order will be found to have peculiar significance, because these are delicate divinities and so its rather slender outlines, its flowers, leaves, and ornamental volutes will lend propriety where it is due. The construction of temples of the Ionic order to Juno, Diana, Father Bacchus, and the other gods of that kind, will be in keeping with the middle position which they hold; for the building of such

will be an appropriate combination of the severity of the Doric and the delicacy of the Corinthian.

Propriety arises from usage when buildings having magnificent interiors are provided with elegant entrance-courts to correspond for there will be no propriety in the spectacle of an elegant interior approached by a low, mean entrance. Or, if dentils be carved in the cornice of the Doric entablature or triglyphs represented in the Ionic entablature over the cushion-shaped capitals of the columns, the effect will be spoilt by the transfer of the peculiarities of the one order of building to the other, the usage in each class having been fixed long ago.

Finally, propriety will be due to natural causes if, for example, in the case of all sacred precincts we select very healthy neighbourhoods with suitable springs of water in the places where the fanes are to be built, particularly in the case of those to Aesculapius and to Health, gods by whose healing powers great numbers of the sick are apparently cured. For when their disease bodies are transferred from an unhealthy to a healthy spot, and treated with waters from health-giving springs, they will the more speedily grow well. The result will be that the divinity will stand in higher esteem and find his dignity increased, all owing to the nature of his site. There will also be natural propriety in using an eastern light for bedrooms and libraries, a western light in winter for baths and winter apartments, and a northern light for picture galleries and other places in which a steady light is needed; for that quarter of the sky grows neither light nor dark with the course of the sun, but remains steady and unshifting all day long.

Economy denotes the proper hit management of materials and of site, as well as a thrifty balancing of cost and common sense in the construction of works. This will be observed if, in the first place, the architect does not demand things which cannot be found or made ready without great expense. For example: it is not everywhere that there is plenty of pits and, rubble, fir, clear fir, and marble since they are produced in different places and to assemble them is difficult and costly. Where there is no pits and, we must

use the kinds washed up by rivers or by the sea; the lack of fir and clear fir may be evaded by using cypress, poplar, elm, or pine; and other problems we must solve in similar ways.

A second stage in Economy is reached when we have to plan the different kinds of dwellings suitable for ordinary householders, for great wealth, or for the high position of the statesman. A house in town obviously calls for one form of construction; that into which stream the products of country estates requires another; this will not be the same in the case of money-lenders and still different for the opulent and luxurious; for the powers under whose deliberations the commonwealth is guided dwellings are to be provided according to their special needs: and, in a word, the proper form of economy must be observed in building houses for each and every class.

Chapter Three

The Departments of Architecture

There are three departments of architecture: the art of building, the making of timepieces, and the construction of machinery. Building is, in its turn, divided into two as, of which the first is the construction of fortified towns and of works for general use in public places and the second is the putting up of structures for private individuals. There are three classes of public buildings: the first for defensive, the second for religious, and the third for utilitarian purposes. Under defence comes the planning of walls, towers and gates, permanent devices for resistance against hostile attacks; under religion, the erection of fanes and temples to the immortal gods; under utility, the provision of meeting places for public use, such as harbours, markets, colonnades, baths, theatres promenades, and all other similar arrangements in public places.

All these must be built with due reference to durability, convenience, and beauty. Durability will be assured when foundations are carried down to the solid ground and materials wisely and liberally selected; convenience, when the arrangement

of the apartment; is faultless and presents no hindrance to use, and when each class of building is assigned to its suitable and appropriate exposure and beauty, when the appearance of the work is pleasing and in good taste, and when its members are in due proportion according to correct principles of symmetry.

Chapter Four

The Site of a City

For fortified towns the following general principles are to be observed. First comes the choice of a very healthy site. Such a site will be high neither misty nor frosty, and in a climate neither hot nor cold, but temperate; further, without marshes in the neighbourhood. For when the morning breezes blow toward the town at sunrise, if they bring with them mists from marshes and, mingled with the mist, the poisonous breath of the creatures of the marshes toy be wafted into the bodies of the inhabitants, they will make the site unhealthy. Again, if the town is on the coast with a southern or western exposure, it will not be healthy, because in summer the southern sky grows hot at sunrise and is fiery at noon, while a western exposure grows warm after sunrise, is hot at noon, and at evening all aglow.

These variations in heat and the subsequent cooling off are harmful to the people living on such sites. The same conclusion may be reached in the case of inanimate things. For instance, nobody draws the light for covered wine rooms from the south or west, but rather from the north, since that quarter is never subject to change but is always constant and unshifting. So it is with granaries: grain exposed to the sun's course soon loses its good quality, and provisions and fruit, unless stored in a place unexposed to the sun's course, do not keep long.

For heat is a universal solvent, melting out of things their power of resistance, and sucking away and removing their natural strength with its fiery exhalations so that they grow soft, and hence weak, under its glow. We see this in the case of iron which, however hard it may naturally be, yet when heated thoroughly in a

furnace fire can be easily worked into any kind of hope; and still, if cooled while it is soft and white hot, it hardens again with a mere dip into cold water and takes on its former quality.

We may also recognize the truth of this from the fact that in summer the heat makes everybody weak, not only in unhealthy but even in healthy places, and that in winter even the most unhealthy districts are much healthier because they are given a solidity by the cooling off. Similarly, persons removed from cold countries to hot cannot endure it but waste away; whereas those who pass from hot places to the cold regions of the north, not only do not suffer in health from the change of residence but even gain by it.

It appears, then, that in founding towns we must beware of districts from which hot winds can spread abroad over the inhabitant; For while all bodies are composed of the four elements (in Greek), that is, of heat, moisture, the earthy, and air, yet there are mixtures according to natural temperament which make up the natures of all the different animals of the world, each after its kind.

Therefore, if one of these elements, heat, becomes predominant in any body whatsoever, it destroys and dissolves all the others with its violence. This defect may be due to violent heat from certain quarters of the sky, pouring into the open pores in too great proportion to admit of a mixture suited to the natural temperament of the body in question. Again, if too much moisture enters the channels of a body, and thus introduces disproportion, the other elements, adulterated by the liquid, are impaired, and the virtues of the mixture dissolved. This defect, in turn, may arise from the cooling properties of moist winds and breezes blowing upon the body. In the same way, increase or diminution of the proportion of air or of the earthy which is natural to the body may enfeeble the other elements; the predominance of the earthy being due to overmuch food, that of air to a heavy atmosphere.

If one wishes a more accurate understanding of all this, he need only consider and observe the natures of birds, fishes, and land animals, and he will thus come to reflect upon distinctions of

temperament. One form of mixture is proper to birds, another to fishes and a far different form to land animals. Winged creatures have less of the earthy, less moisture, heat in moderation, air in large amount. Being made up, therefore, of the lighter elements, they can more readily soar away into the air. Fish, with their aquatic nature, being moderately supplied with heat and made up in great part of air and the earthy, with as little of moisture as possible, can more easily exist in moisture for the very reason that they have less of it than of the other elements in their bodies; and so, when they are drawn to land, they leave life and water at the same moment. Similarly, the land animals, being moderately supplied with the elements of air and heat, and having less of the earthy and a great deal of moisture, cannot long continue alive in the water, because their portion of moisture is already abundant.

Therefore, if all this is as we have explained, our reason showing us that the bodies of animals are made up of the elements, and these bodies, as we believe, giving way and breaking up as a result of excess or deficiency in this or that element, we cannot but believe that we must take great care to select a very temperate climate for the site of our city, since healthfulness is, as we have said, the first requisite.

I cannot too strongly insist upon the need of a return to the method of old times. Our ancestors, when about to build a town or an army post, sacrificed some of the cattle that were wont to feed on the site proposed and examined their livers. If the livers of the first victims were dark-coloured or abnormal, they sacrificed others, to see whether the fault was due to disease or their food. They never began to build defensive works in a place until after they had made many such trials and satisfied themselves that good water and food had made the liver sound and firm. If they continued to find it abnormal, they argued from this that the food and water supply found in such a place would be just as unhealthy for man, and so they moved away and changed to another neighbourhood healthfulness being their chief object.

That pasturage and food may indicate the healthful qualities of a site is a fact which can be observed and investigated in the case of certain pastures in Crete, on each side of the river Pothereus, which separates the two Cretan states of Gnosus and Gortyna. There are cattle at pasture on the right and left banks of that river, but while the cattle that feed near Gnosus have the usual spleen, those on the other side near Gortyna have no perceptible spleen. On investigating the subject, physicians discovered on this side a kind of herb which the cattle chew and thus make their spleen small. The herb is therefore gathered and used as a medicine for the cure of splenetic people. The Cretans call it From food and water, then, we may learn whether sites are naturally unhealthy or healthy.

If the walled town is built among the marshes themselves, provided they are by the sea, with a northern or north-eastern exposure, and are above the level of the seashore, the site will be reasonable enough. For ditches can be dug to let out the water the shore, and also in times of storms the sea swells and comes backing up into the marshes, where its bitter blend prevents the reproductions of the usual marsh creatures, while any that swim down from the higher levels to the shore are killed at once by the saltiness to which they are unused. An instance of this may be found in the Gallic marshes surrounding Altino, Ravenna, Aquileia, and other towns in places of the kind, close by marshes. They are marvellously healthy, for the reasons which I have given.

But marshes that are stagnant and have no outlets either by rivers or ditches, like the Pomptine marshes, merely putrefy as the stand, emitting heavy, unhealthy vapours. A case of a town built in such a spot was Old Salapia in Apulia, founded by Diomede on his way back from Troy, or, according to some writers, by Elpias of Rhodes. Year after year there was sickness, until finally the suffering inhabitants came with a public petition to Marcus Hostilius and got him to agree to seek and find them a proper place to which to remove their city. Without delay he made the most skilful investigations, and at once purchased an estate near the sea in, healthy place, and asked the Senate and Roman people for

permission to remove the town. He constructed the walls and laid out the house lots, granting one to each citizen for a mere trifle. This done, he cut an opening from a lake into the sea, and thus made of the lake a harbour for the town. The result is that now the people of Salapia live on a healthy site and at a distance of only four miles from the old town.

Chapter Five

The City Walls

After ensuring on these principles, the healthfulness of the future city, and selecting a neighbourhood that can supply plenty of food stuffs to maintain the community, with good roads or else convenient rivers or seaports affording easy means of transport to the city, the next thing to do is to lay the foundations for the towers and walls. Dig down to solid bottom, if it can be found, and lay them therein, going as deep as the magnitude of the proposed work seems to require. They should be much thicker than the part the walls that will appear above ground, and their structure should be as solid as it can possibly be laid.

The towers must be projected beyond the line of wall, so that an enemy wishing to approach the wall to carry it be assault may exposed to the fire of missiles on his open flank from the towers on his right and left. Special pains should be taken that there be no easy avenue by which to storm the wall. The roads should be encompassed at steep points, and planned so as to approach the gates, not in a straight line, but from the right to the left; for as a result of this, the right hand side of the assailants, unprotected by their shields, will be next the wall. Towns should be laid out not as an exact square nor with salient angles, but in circular form, to give a view of the enemy from many points. Defence is difficult where there are salient angles, because the angle protects the enemy rather than the inhabitants.

The thickness of the wall should, in my opinion, be such that armed men meeting on top of it may pass one another without interference. In the thickness there should be set a very close

succession of ties made of charred olive wood, binding the two faces of the wall together like pins, to give it lasting endurance. For that is a material which neither decay, nor the weather, nor time can harm, but even though buried in the earth or set in the water it keeps sound and useful forever. And so not only city walls but substructures in general and all walls that require a thickness like that of a city wall, will be long in falling to decay if tied in this manner.

The towers should be set at intervals of not more than a bowshot apart, so that in case of an assault upon any one of them, the enemy may be repulsed with scorpions and other means of hurling missiles from the towers to the right and left. Opposite the inner side of every tower the wall should be interrupted for a space the width of the tower, and have only a wooden flooring across, leading to the interior of the tower but not firmly nailed. This is to be cut away by the defenders in case the enemy gets possession of any portion of the wall; and if the work is quickly done, the enemy will not be able to make his way to the other towers and the rest of the wall unless he is ready to face a fall.

The towers themselves must be either round or polygonal. Square towers are sooner shattered by military engines, for the battering rams pound their angles to pieces; but in the case of round towers they can do no harm, being engaged, as it were in driving wedges to their centre. The system of fortification by wall and towers may be made safest by the addition of earthen ramparts, for neither rams, nor mining, nor other engineering devices can do them any harm.

The rampart form of defence, however, is not required in all places, but only where outside the wall there is high ground from [24] which an assault on the fortifications may be made over a level space lying between. In places of this kind we must first make very wide, deep ditches; next sink foundations for a wall in the bed of the ditch and build them thick enough to support an earth-work with ease.

Then within this substructure lay a second foundation, far enough inside the first to leave ample room for cohorts in line of battle to take position on the broad top of the rampart for its defence. Having laid these two foundations at this distance from one another build cross walls between them, uniting the outer and inner foundation, in a comb-like arrangement, set like the teeth of a saw. With this form of construction, the enormous burden of earth will be distributed into small bodies, and will not lie with all its weight in one crushing mass so as to thrust out the substructures.

With regard to the material of which the actual wall should be constructed or finished, there can be no definite prescription, because we cannot obtain in all places the supplies that we desire. Dimension stone, flint, rubble, burnt or unburnt brick, use them as you find them. For it is not every neighbourhood or particular locality that can have a wall built of burnt brick like that at Babylon, where there was plenty of asphalt to take the place of lime and sand, and yet possibly each may be provided with materials of equally usefulness so that out of them a faultless wall may be built to last forever.

Chapter Six

The Directions of the Streets; with Remarks on the Winds

The town being fortified, the next step is the apportionment of house lots within the wall and the laying out of streets and alleys with regard to climatic conditions. They will be properly laid out if foresight is employed to exclude the winds from the alleys. Cold winds are disagreeable, hot winds enervating, moist winds unhealthy. We must, therefore, avoid mistakes in this matter and beware of the common experience of many communities. For example, Mytilene in the island of Lesbos is a town built with magnificence and good taste, but its position shows a lack of foresight. In that community when the wind is south, the people fall ill; when it is northwest, it sets them coughing; with a north wind they do indeed recover but cannot stand about in the alleys and streets, owing to the severe cold.

Wind is a flowing wave of air, moving hither and thither indefinitely. It is produced when heat meets moisture, the rush of heat generating a mighty current of air. That this is the fact we may learn from bronze eolipiles, and thus by means of a scientific invention discover a divine truth lurking in the laws of the heavens. Eolipiles are hollow bronze balls, with a very small opening through which water is poured into them. Set before a fire, not a breath issues from them before they get warm; but as soon as they begin to boil, out comes a strong blast due to the fire. Thus from this slight and very short experiment we may understand and judge of the mighty and wonderful laws of the heavens and the nature of winds.

By shutting out the winds from our dwellings, therefore, we shall not only make the place healthful for people who are well, but also in the case of diseases due perhaps to unfavourable situations elsewhere, the patients, who in other healthy places might be cured by a different form of treatment, will here be more quickly cured by the mildness that comes from the shutting out of the winds. The diseases which are hard to cure in neighbourhoods such as those to which I have referred above are catarrh, hoarseness, coughs, pleurisy, consumption, spitting of blood, and all others that are cured not by lowering the system but by building it up. They are hard to cure, first, because they are originally due to chills; secondly, because the patient's system being already exhausted by disease, the air there, which is in constant agitation owing to winds and therefore deteriorated, takes all the sap of life out of their diseased bodies and leaves them more meager every day. On the other hand, a mild, thick air, without draughts and not constantly blowing back and forth, builds up their frames by its unwavering steadiness, and so strengthens and restores people who are afflicted with these diseases.

Some have held that there are only four winds: Solanus from due east; Auster from the south; Favonius from due west; Septentrio from the north. But more careful investigators tell us that there are eight. Chief among such was Andronicus of Cyrrhus who in proof built the marble octagonal tower in Athens. On the

several sides of the octagon he executed reliefs representing the several winds, each facing the point from which it blows; and on top of the tower he set a conical shaped piece of marble and on this a bronze Triton with a rod outstretched in its right hand. It was so contrived as to go round with the wind, always stopping to face the breeze and holding its rod as a pointer directly over the representation of the wind that was blowing.

Thus Eurus is placed to the southeast between Solanus and Auster: Africus to the southwest between Auster and Favonius; Caurus, or, as many call it, Corus, between Favonius and Septentrio; and Aquilo between Septentrio and Solanus. Such, then, appears to have been his device, including the numbers and names of the wind and indicating the directions from which particular winds blow. These facts being thus determined, to find the directions and quarters of the winds your method of procedure should be as follows.

In the middle of the city place a marble amussium, laying it true by the level, or else let the spot be made so true by means of rule and level that no amussium is necessary. In the very centre of that spot set up a bronze gnomon or "shadow tracker" (in Greek *oxia8eipac*). At about the fifth hour in the morning, take the end of the shadow cast by this gnomon, and mark it with a point. Then, opening your compasses to this point which marks the length of the gnomon's shadow, describe a circle from the centre. In the afternoon watch the shadow of your gnomon as it lengthens, and when it once more touches the circumference of this circle and the shadow in the afternoon is equal in length to that of the morning, mark it with a point.

From these two points describe with your compasses intersecting arcs, and through their intersection and the centre let a line be drawn to the circumference of the circle to give us the quarters of south and north. Then, using a sixteenth part of the entire circumference of the circle as a diameter, describe a circle. The Tower of the Winds at Athens with its centre on the line to the south, at the point where it crosses the circumference, and put

points to the right and left on the circumference on the south side, repeating the process on the north side. From the four points thus obtained draw lines intersecting the centre from one side of the circumference to the other. Thus we shall have an eighth part of the circumference set out for Auster and another for Septentrio. The rest of the entire circumference is then to be divided into three equal parts on each side, and thus we have designed a figure equally apportioned among the eight winds. Then let the directions of your streets and alleys be laid down on the lines of division between the quarters of two winds.

On this principle of arrangement the disagreeable force of the winds will be shut out from dwellings and lines of houses. For if that streets run full in the face of the winds, their constant blasts rushing in from the open country, and then confined by narrow alleys, will sweep through them with great violence. The lines of houses must therefore be directed away from the quarters from which the winds blow, so that as they come in they may strike against the angles of the blocks and their force thus be broken and dispersed.

Those who know names for very many winds will perhaps be surprised at our setting forth that there are only eight. Remembering, however, that Eratosthenes of Cyrene, employing mathematical theories and geometrical methods, discovered from the course of the sun, the shadows cast by an equinoctial gnomon, and the inclination of the heaven that the circumference of the earth is two hundred and fifty-two thousand stadia, that is, thirty-one million five hundred thousand paces, and observing that an eighth part of this, occupied by a wind, is three million nine hundred and thirty-seven thousand five hundred paces, they should not be surprised to find that a single wind, ranging over so wide a field, is subject to shifts this way and that, leading to a variety of breezes.

So we often have Leuconotus and Altanus blowing respectively to the right and left of Auster; Libonotus and Subvesperus to the right and left of Africus; Argestes, and at

certain periods the Etesiae, on either side of Favonius; Circias and Corus on the sides of Caurus; Thracias and Gallicus on either side of Septentrio; Supernas and Caecias to the right and left of Aquilus; Carbas, and at a certain period the Ornithiae, on either side of Solanus; while Eurocircias and Voltumnus blow on the flanks of Eurus which is between them. There are also many other names for winds derived from localities or from the squalls which sweep from rivers or down mountains.

Then, too, there are the breezes of early morning; for the sun on emerging from beneath the earth strikes humid air as he returns, and as he goes climbing up the sky he spreads it out before him, extracting breezes from the vapour that was there before the dawn. Those that still blow on after sunrise are classed with Eurus, and hence appears to come the Greek name Eupos as the child of the breezes, and the word for "to-morrow," Aupiov, named from the early morning breezes. Some people do indeed say that Eratosthenes could not have inferred the true measure of the earth. Whether true or untrue, it cannot affect the truth of what I have written on the fixing of the quarters from which the different winds blow.

If he was wrong, the only result will be that the individual winds may blow, not with the scope expected from his measurement, but with powers either more or less widely extended. For the readier understanding of these topics, since I have treated them with brevity, it has seemed best to me to give two figures, or, as the Greeks say OxniJaTa at the end of this book: one designed to show the precise quarters from which the winds arise; the other, how by turning the directions of the rows of houses and the streets away from their full force, we may avoid unhealthy blasts. Let A be the centre of a plane surface, and B the point to which the shadow of the gnomon reaches in the morning. Taking A as the centre, open the compasses to the point B, which marks the shadow, and describe a circle. Put the gnomon back where it was before and wait for the shadow to lessen and grow again until in the afternoon it is equal to its length in the morning, touching the circumference at the point C. Then from the points B and C

describe with the compasses two arcs intersecting at D. Next draw a line from the point of intersection D through the centre of the circle to the circumference and call it E F. This line will show where the south and north lie.

Then find with the compasses a sixteenth part of the entire circumference; then centre the compasses on the point E where the line to the south touches the circumference, and set off the points G and H to the right and left of E. Likewise on the north side, centre the compasses on the circumference at the point F on the line to the north, and set off the points I and K to the right and left; then draw lines through the centre from G to K and from H to I. Thus the space from G to H will belong to Auster and the south, and the space from I to K will be that of Septentrio. The rest of the circumference is to be divided equally into three parts on the right and three on the left, those to the east at the points L and M, those to the west at the points N and O. Finally, intersecting lines are to be drawn from M to O and from L to N. Thus we shall have the circumference divided into eight equal spaces for the winds. The figure being finished, we shall have at the eight different divisions, beginning at the south, the letter G between Eurus and Auster, H between Auster and Africus, N between Africus and Favonius, O between Favonius and Caurus, K between Caurus and Septentrio, I between Septentrio and Aquilo, L between Aquilo and Solanus, and M between Solanus and Eurus. This done, apply a gnomon to these eight divisions and thus fix the directions of the different alleys.

Chapter Seven

The Sites for Public Buildings

Having laid out the alleys and determined the streets, we have next to treat of the choice of building sites for temples, the forum, and all other public places, with a view to general convenience and utility. If the city is on the sea, we should choose ground close to the harbour as the place where the forum is to be built; but if inland, in the middle of the town. For the temples, the sites for those of the gods under whose particular protection the

state is thought to rest and for Jupiter, Juno, and Minerva, should be on the very highest point commanding a view of the greater part of the city. Mercury should be in the forum, or, like Isis and Serapis, in the emporium; Apollo and Father Bacchus near the theatre; Hercules at the circus in communities which have no gymnasium nor amphitheatres; Mars outside the city but at the training ground, and so Venus, but at the harbour. It is moreover shown by the Etruscan diviners in treatises on their science that the fanes of Venus, Vulcan, and Mars should be situated outside the walls, in order that the young men and married women may not become habituated in the city to the temptations incident to the worship of Venus, and that buildings may be free from the terror of fires through the religious rites and sacrifices which call the power of Vulcan beyond the walls. As for Mars, when that divinity is enshrined outside the walls, the citizens will never take up arms against each other, and he will defend the city from its enemies and save it from danger in war.

Ceres also should be outside the city in a place to which people need never go except for the purpose of sacrifice. That place should be under the protection of religion, purity, and good morals. Proper sites should be set apart for the precincts of the other gods according to the nature of the sacrifices offered to them.

The principle governing the actual construction of temples and their symmetry I shall explain in my third and fourth books. In the second I have thought it best to give an account of the materials used in buildings with their good qualities and advantages, and then in the succeeding books to describe and explain the proportions of buildings, their arrangements, and the different forms of symmetry.

Here ends Book I of Vitruvius; he continues the discussion in Book II.

Short Questions

1. Why were Casesar engaged in acquiring the right to command the world?

2. How did the writer know about Caesar's father?
3. Why did he begin to write? Explain
4. Define the term practice and theory based on text.
5. Do you think manual skill is sufficient? If not why?
6. What are the abilities that make an architect perfect? Give an example.
7. Why does an architect need knowledges of history? Explain with a suitable example.
8. Write in brief about the importance of stories for an architect.
9. What makes an architect high-minded?
10. Do you agree that an architect should be trained by philosophers?
11. The writer says that the knowledge of music is necessary. Why? Why not?
12. If one has no knowledge of medicine, he will not be able to have any comprehension of the theory of sundials. Explain.
13. What is the view of Pytheos regarding an architect?
14. Is it possible for an architect to study all the related subjects in short time?
15. What are the orders that depend on architecture?
16. What do you mean by Eurythmy? Describe its elements.
17. Explain the symmetry with examples.
18. Describe Propriety. How is it originated? Explain.
19. What are the characteristics of Propriety?
20. Write the meaning of Economy with its stage in architecture.
21. Describe the public and private buildings with examples.
22. What is the effect of heat on human body?
23. Why does heat become predominant in anybody?
24. How can we investigate whether sites are naturally healthy or unhealthy?
25. What is the view of the writer about the thickness of wall?

26. Give the description of tower according to the writer.
27. What is the importance of second foundation?

Long Questions

1. Write in detail about different fields of knowledge that an architect requires.
or,
Write in 180 words about the basic knowledge that an architect requires.
2. What are the fundamental principles of architecture? Write the name of fundamental principles and explain any four of them?
3. Write major ideas about the sites for Public Building.

Composition

1. Neither natural ability without instructions nor instructions without natural ability can make the perfect artist. Explain it. If possible, give the reference from the text (200 words).
2. Make the diagram of winds with commentary.



Section - 29

INTERVIEWS

From 'half modern half something else' Martin Beek
published 2003

Introduction

You just republished "The Language of Post-Modern Architecture" for the seventh time. What prompted this latest new edition, 11 years after the last, and 25 years-after the first?

Since the publication of the sixth edition in 1991 the most important development has been the way the sciences of complexity have moved from a peripheral position to a central one. Whereas in the 1960s these things were all on the edge complexity and contradiction, complexity and the city: and complexity and the life sciences they now are at the center of how people think the universe works. This shift is mostly external to architecture but it has to do with the underlying ideas of The Language of Post-Modern Architecture that is multivalence and complexity. The notion of interrelationships between things being as important as the things themselves, which makes for complexity.

So much of Modernism has privileged the reductivism inherent in its own paradigm. Post-Modernism is based on a different view according to which things emerge out of other things and this process is generally formulated under the terms of complexity theory.

My argument has always criticized the univalence of Modernism, and its recurrent tendencies to reduce the city as Abbe Laugier said in the 18th Century to a primitive hut. The reason to re-edit the book is that now the computer is used by architects to deal with complex systems in a way that didn't exist when Venturi and Stirling were practicing. Now smooth complexity the ability of the computer to blend and blur complex requirements, has come to the foreground. In crude terms that's the reason for the 7th edition. I am surprised at how fast architecture changes all the time and incorporates external ideas and transforms itself. There is a way in which architecture is always undergoing continual revolution something my blob diagrams in the book reveal. So one should have a new edition every ten years-maybe?

Context

In the early 1970s you published three books [Architecture 2000 (1971), Adhocism: The Case for Improvisation with Nathan Silver, 1972] and Modern Movements in Architecture (1973)] the themes of which shift from engaging with a Modernist paradigm to engaging with the environmental movement to re-addressing the history of Modern architecture from a pluralist perspective given that you wrote your thesis with (the Modernist) Reyner Banham I wonder if this sequence of topics reflects an intellectual transition from modernism to setting the ground for what you then defined as postmodernism?

You are missing here the first book I edited with George Baird called Meaning in Architecture-this came out in 1969 it was a hypertext with ten contributors who commented on each other's work, and counter-comments were published in the margins of the articles. We had Ken Frampton stating one position, George Baird another. Banham a third, Aldo van Eyck a fourth, and so on. In a way it was a postmodern dialogue with a lot of modernists.

I think you're right to stress the pluralism in Modern Movements. I put the "s" in movements, a conscious move I felt that the interpretation of modernism as put forward by Siegfried Giedion (who was my teacher at Harvard). Nikolaus Pevsner (who I tried to work with but who rejected my entreaties) and Banham

(who accepted me quickly) excluded too many people. Even though they didn't agree among themselves. The view of modernism that they collectively defined was too limited. I was sensitive to the fact that the Expressionists were repressed as well as the Constructivists. My essay "History as Myth" in Meaning and Architecture deals with the question of how historical suppression works mythically in different periods, and how it is inevitable that all history is based on interpretation and relevance. My argument tried to get history writing into a different space so one could become aware of that systematic, mythical bias.

Within Adhocism there is a rough way of treating pluralism as a bottom-up reality I was aware of the ecology movement, but would say not enough aware. Had I thought about it more coherently as a paradigm I would have seen that Rachel Carson's book from 1960 Silent Spring was like Jane Jacobs' *Trio Death and Life of Great American Cities* from 1961, a key text that opened up postmodernism. They both questioned the progressivist myth and the unforeseen consequences of progress. On the other hand, so much of postmodernism of the Lyotard-kind, is anti-enlightenment and I have strenuously denied that this variant is an acceptable kind. For me, postmodernism has always been both modern and critical of modernism. But it's true a lot of people don't understand it that way, which is one of the reasons I've dropped the phrase postmodern from the main title of the seventh edition. The book is now called it *The New Paradigm in Architecture* because the word postmodern has become so contested and confused that it almost means nothing - or everything.

You mention in the introductions to *The Language of Post-Modern Architecture* that the project started in essay format, indicating that the arguments were developed over time in the first half of the 1970s. Could you elaborate on the discursive contexts, such as structuralism and semiology, the emergence of the "post-modern" in other disciplines etc. that were formative for developing the arguments you put forward.

My chapter in *Meaning and Architecture* was based on Levi-Strauss. There was definite interest in Saussure and in French

Structuralism I have never been a great fan of Roland Barthes. But, of course, the French approach was a definite formative influence, no question. In a way we were trying to put meaning back into architecture because signification was the great taboo or the great undiscussable element-and for so many other reasons Partly because as a profession, architects only see trouble when thinking about architecture on the level of public content. We thought, well, if you can't address meaning then you can't really address expression - the World Trade Center projects bring up this problem in an extreme form American foreign policy in the Middle East, its relationship to Muslim cultures; Jewish cultures and terrorism in general. Thus there are the political and social reasons for addressing meaning. Until architects can bring meaning into their architecture, it is impoverished. And, you know minimalism is the most reduced of all the impoverished. As far as I'm concerned Meaning in Architecture was trying to say there is no blank slate, the slate can't be voided. It all goes back to the fluid conditions of the 1960s. The counter-culture is, of course, the key idea that started so much of postmodernism.

Articulation

The first 1977 edition of *The Language of Post-Modern Architecture* is structured into three parts. In the first one you tract crisis of modernist functionalism and what you call "the death of modernism. the middle part introduces a linguistic communication model for architecture and the third shorter one describes contemporary as well as historical examples for what you frame under the term "post-modern architecture" The driving distinction is articulated in terms such as "univalent" and "polyvalent" Can you elaborate on these two markers and how this distinction notes a difference to modernist thinking?

Polyvalence has to do with multiple links between things and how meaning is created in these relationships. Within the modern paradigm there is a complexity paradigm, and yet in architecture, as opposed to literary theory, it had been repressed or not articulated. Modern literature dealt explicitly with complexity and you can see it in the work of T.S.Eliot, William Empson and

James Joyce. You could say architecture tends to be overwhelmed by the reductivist paradigm. In *The Language of Post-Modern Architecture* I was interested in finding, in its earliest modern state, an architecture of complexity based on meaning. That is why I ended with Gaudi's Casa Batllo because I could see that his architecture was socially and politically motivated. The building is built to assert the small-scale independence of Catalonia against the large scale "dragons of Spain and Castile". It was a Secessionist building in both senses of the word - it seceded from Spain and it related to the art movement of that name. It created a relation to the street, the context and the history of Barcelona. For instance St. George is the patron saint of Barcelona and on the facade of Casa Batllo he kills the dragon. Characteristically, Ken Frampton and modernist critics would dismiss Gaudi as kitsch; a "freak and a fantast" were the very words that Nikolaus Pevsner used. This is typical of a protestant, northern repressive character calling someone he doesn't like a "freak." "Constable Frampton", another protestant policeman would deny; as Pevsner had fifty years earlier, that Gaudi was a fountainhead and a worthwhile, seminal architect: I heard him call Gaudi kitsch in an Alt Net Lecture in London, 1978. I thought Casa Batllo was clearly a standard in 1977 because I couldn't think of any better building to illustrate the thesis of complexity. That included of course the work of Robert Venturi, buildings that were putting forward similar ideas. But the built architecture did not yet articulate them. That's one of the curious things - you have ideas, the ideas are around and they're shared, but there may not be a building, or set of buildings, that fully illustrates them. So in the first edition I was forced into the ridiculous position of claiming a pre-modern building of Gaudi's was a postmodern harbinger of change - because I had nothing else. Venturi's buildings had not been as interesting as his theory of complexity and contradiction. Seven years later, by 1984, the New Staatsgalerie in Stuttgart by James Stirling and Michael Wilford was, I think, the best example of Robert Venturi's complexity and contradiction.

Reception

The reactions, specifically by American architectures such as Robert Stern, Michael Graves, and Charles Moore were very favorable. What was the reception like in other contexts?

The book was translated into eleven languages, went into multiple editions, and was embarrassingly popular. All over the world in fact, but particularly behind the Iron Curtain it had a following. I was in Prague in the early 1980's and they had copies of the book which had been churned out by hand, on mimeograph paper. And it was the same in China and in Russia and other satellite countries, partly because modernism had taken root there and was really conformist, in a way much more virulently repressive than it was in the West. So the reception was different in different cultures. It also fit into the growing American counter-culture and mainstream practice in other ways. These multiple readings illustrate the idea of reception theory, as indeed postmodernism itself, that different cultural codes extract differing messages from the same text.

How did "the modernists," specifically someone like Reyner Banham to whom you had a personal relationship perceive your arguments?

My former tutor and professor, Peter Reyner Banham, hated it. There is a recent book on Banham in which this is analyzed quite amusingly by another of his students, Nigel Whitely, and it shows how Banham would attack the book and attack me, his student.* He and I had a curious relationship. Although he disliked postmodernism which he did dismiss as rubbish, at the same time he acknowledged it-contradictorily-as extremely important rubbish. Banham really thought out of two sides of his head. On the one side he was very hip and fashion-led, and on the other he was a good critical character who would do his homework. In a sense postmodernism caught him between these two views: the populism and scholarship, the pop and the traditional architectural cultures. So the reaction was extremely negative in reviews and yet begrudgingly positive in unfathomable ways. You could say that there was a conflict between his theory of popular culture - which

would justify postmodernism - and his visceral dislike of its styles and literary conceits.

Differentiation and Terms

The Language of Post-Modern Architecture was re-editioned a few months after its initial publication with a substantially elaborated third chapter that introduces a series of new terms, such as "Revivalism", "Neo-Vernacular," "Radical Eclecticism". What was the urgency for this immediate extension and differentiation?

In England, for instance, where revivalism was the only coherent alternative to modernism those terms articulated the pluralism. Postmodernism was clearly many things rather than one thing, a rainbow coalition of difference which was opportunistically (letting together under the same umbrella) And I had to acknowledge that variety. The modernists discussed it as one thing, so I wanted to elaborate that it was many things. Especially in America where anything with funny facades and formal sculptural shapes was considered postmodern. There the issue of meaning was not thought of as especially important so I thought to distinguish issues of meaning from issues of pure form. Sculptural architecture was not necessarily postmodern as was often thought, but rather Late Modern. As postmodernism turns into a conscious tradition and elaborates itself, it starts multiplying its own "isms" just as modernism did. In fact from one viewpoint it almost became part of modernism. That made the situation very confusing. Therefore you have to use terms that are a little bit more precise and differentiating. On the one hand, there was postmodern classicism which suddenly became a huge world movement, but of many types. There was a minimalist classicism done by, say, Mario Botta in Switzerland; then an eclectic version followed by Stirling in this country, Britain; then a more representational type, followed by Venturi, Moore, and a thousand others in America; then a heavy concrete classicism of Ricardo Boffin in France and Spain; or an ironic type by Arata Isozaki in Japan, and, of course a fundamentalist version that of Aldo Rossi in Italy. He's the European exemplar. Postmodern classicism all of a sudden synthesized the different strands and became almost monolithic in

itself. It was soon done without any thought, just as the International Style was replicated in the twenties. I obviously didn't agree with that slackening.

History

The exhibition "The Presence of the Past" at the Venice Biennale 1980 marked an international breakthrough for postmodern architecture. The Language of Post-Modern Architecture was reedited and further elaborated upon in 1981. How did the historicist orientation of the "The Presence of the Past" impact the third edition and how did that reflect a cultural condition at the beginning of the 1980s?

It was the particular position of Paolo Portoghesi and Robert Stern that turned the exhibition in that direction. I was somewhat critical of that, but not entirely. You are right to see that as another shift like the one I just mentioned-postmodern classicism. There was a postmodern historicism and for architects like Philip Johnson, Stern and Portoghesi "The Presence of the Past" was extremely important because they, in different ways, were trying to legitimize some continuities that the modernist rupture with history had created. Gropius and others had said, "we can't teach history", that "modernism is a unique", period, and that "it forms a discontinuity with the past". But, again, if you go to literature you see that language continues on in spite of ruptures and that it has to do with the bricolage and transformation of the past. At best Portoghesi et al were trying to do what T.S. Eliot was doing that is weaving together out of the fragments of the past, a new present. One can agree with part of the impetus, and historicism certainly had a great effect on American architecture, which became, as a result of it, full of historical references. A lot of people understand that type simply as the postmodernism; and this approach originates with the 1980 exhibition, with Stern and Graves and Johnson. I regretted it and argued no, postmodernism has more to do with communication and the pluralist culture than with historicism". Historical references are just one of the aspects of that pluralism, but I never saw it as the fundamental orientation. By the mid-1980s when I started writing about the architects following

this lead I became critical of the turn. It's a turn that leads very quickly to "porno", a degraded form of postmodernism, which ultimately killed it. You see that in the sixth and seventh editions of *The Language of Post-Modern Architecture* where the "porno" becomes explicit, and kitsch. In the seventh edition as a sign of that, I illustrated Michael Graves building in Portland blowing up, like Pruitt-Igoe.

Within the framework of postmodern architecture how would you distinguish between historicism and historicity as two conflicting frameworks for establishing a relationship to history?

Well, historicism already has two quite different meanings. It means, on the one hand, what Karl Popper termed the 'poverty of historicism,' signifying the belief in some deterministic trend of history, the appeal to history as having an inevitable direction. Then there's the historicism in the nineteenth century sense, which is the appeal to different historical periods, a kind of revivalism of difference. In other words, a revivalism that isn't straight but rather evocative. In say the Brighton Pavilion of John Nash, you would have historical quotes as a form of communication, a reference to India and the Gothic. The postmodern historicism of the 1980s was this type, a referencing of historical architecture in a conscious and ironic way. However, if one understands historicity as a deeper interpretive project you would find this fluid type with Aldo Rossi and his interest in the historical city. But also the European fundamentalists; such as Matthias Ungers, were looking for historical archetypes and forms. So there are basically three types of historicism.

Format/Design/Photography

The first five editions of *The Language of Post-Modern Architecture* follow a book format and that is articulated in the first edition in 1977. The specific design features (typography and page layouts) reflect what one could call a pragmatic book aesthetics common for architectural books at the time. Did the change of format and design in the sixth edition from 1991, when it became a coffee table book, reflect a changing aesthetic climate? Or

different function, circulation, and position of the book within culture at large?

You're partly right. But at that time it was not common in the architectural world to have an argument with so many photographs -like a slide show. One of the reasons for the book's success was the tact that it had a lot of photographs and new important buildings were illustrated in it. And that was partly because I was lucky enough to travel and lecture at all these different places and I could take photographs that weren't all that expensive to reproduce. They were also different from the standard fare, less glossy and plasticized: The book had a strong photographic backbone and was, in a sense, a lecture turned into a book, with all the faults and immediacy of that medium. The positive aspect was the freshness. However, the problem was that it became an argument by image, or at least an image-led discussion. Later in 1991 it was turned into a coffee-table book, not by me but by my publisher, and against my better judgment and desire. That transformation more or less killed its polemical spirit, and its low price. Now the seventh edition brings it back to the kind of book I wanted, which is of course based on image and text but rather more tightly connected than in a coffee table book. Yet, it's a hybrid book, I hope a 'critical-readable-coffee-table'. The seventh edition is partly problematic because there is so much material in it. But this is responding to a certain kind of complexity, to the plurality of what is happening. It has all the mess of history in it. History is messy--it doesn't always have a clear path, even if it has a certain coherence. I think there's both coherence and mess in the book.

One of the features of the book that has noticeably evolved over the various editions is the way buildings are photographed as well as how these photographs are structured into the book. Since you also took lots of photographs for the books I am wondering what constitutes the transformation of architectural photography over the course of the seven editions; and, related to that, if you think that there is a reciprocal influence between photography and postmodern architecture?

The different feel is partly a result of going to full color in the sixth edition and using the slides that I happened to have, but, of course, Postmodern architecture is colour while modern architecture is black and white. One of the things I learned when quite young is that it is better to use your own photographs than those of other people because a) you know them b) you prove you were at the building c) they don't cost anything, and d) they're fresh. Most buildings are represented again and again by the same shot by a professional photographer. These pictures are technically of higher quality than my 35mm slide, but that medium allows me more flexibility. I am not under the onus of the architect, and can take my own view of the building from my angles, or my understanding. The seventh edition has more color still and a better layout. We have been able to get the text and image to work closer than ever. It's still not as good as I would like, but for me it's definite progress. For image, text, design and thought to be completely consonant with each other is, of course, an ideal.

From the first to the latest edition of *The Language of Post-Modern Architecture* the book grew considerably. As you said, arguments had to be refined and new developments taken into account. Looking at the editions as a collection they reflect, in an abstract as well as concrete way the development of a discourse. In some interesting way, they also double your basic marker about polyvalence, discursively and on the level of the book format. You used the term evolvotome to describe this process. Evolvotome was a phrase I used in the fourth edition of *What is Post-Modernism?* 1995. The computer had allowed me to rewrite and reconsider a changing situation and to better clarify my thoughts: to reduce mistakes and show change in the ideas, and in design itself. An evolvotome-hideous word though it may be-is a new kind of book that is written while history is being created. In a sense, it is a series of snapshots that show what the feeling and ideas were like at that particular point, when the tome went to bed as it were, and had to be printed. It has all the immediacy of the "I was there: this is what happened" situation which Benham correctly identified as necessary for historical writing. What follows is that you never get a coherent picture of history and a

coherent book because both are evolving all the time. Although it has certain directions; real history is chaotic and fluctuates. It is truly multiform; and yet there are chreodes, there are broad developments, or highways of movement that you can talk about coherently. So it's that curious mixture of the two aspects of history which an evolvotome seeks to capture; but, maybe, never quite does. To think of the seven editions as a single collection must be maddening because, for instance, if you bought the third edition you would find that there's a lot of repetition with the sixth edition. But I see it more as if the first edition is being rewritten, and reminded like a coin. And you're saying, well, it may not be "what really happened in history". That takes me back to the first thing I wrote on "History as Myth": that to capture what "really happened" is impossible. But what you're getting in an evolvotome is the layering of narratives, a palimpsest which has a certain truth to it.

Nigel Whiteley, Reyner Benham: Historian of the immediate Future, Cambridge, MA: MIT Press 2002.

Short Questions

1. What is the nature of the language of post-modern Architecture?
2. What is the problem with architects?
3. Why does the writer feel surprised regarding architecture changes?
4. What are the parts of post-modern Architecture?
5. Define the term "Paradigm".
6. What are the reactions by American architectures?
7. What was the urgency for this immediate extension and differentiation?
8. How did the historicist orientation of the 'The presence of the past' impact the third edition?
9. How would you distinguish between historicism and historicity within the frameworks for establishing a relationship to history?

Technical Communication in English

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10. Did the change of format and design in the sixth edition from 1991 reflect a changing aesthetic climate?

Long Questions

1. Discuss in detail the view of Charles Jencks about Articulation, Reception and History.
2. What is the comment of interviewer regarding format, design and photocopy?
3. Sum up the major ideas given by the interviewer in his interview.

Composition

1. Write in 200 words about modernism and postmodernism in the field of architecture.
2. Write in brief about paradigm shift in Architecture.

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