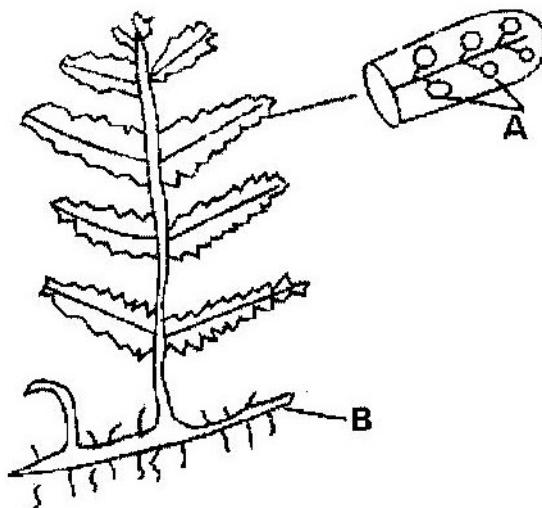


**BIOLOGY FORM THREE ANSWERS  
TO TOPICAL QUESTIONS.**

**CLASSIFICATION II**

**PAST KCSE QUESTIONS ON THE TOPIC**

- State two ways in which some fungi are harmful to man ( 2 marks)
- The diagram below represents a fern



Name \_\_\_\_\_

- (a) Parts labeled A and B ( 2 marks)
- (b) The division which the plant belongs ( 1 mark)
- An organism with an exoskeleton, segmented body, two pairs of legs per segment, a pair of eyes and a pair of antennae and a pair of short antennae belongs to the phylum ( 1 mark)
- When are two organisms considered to belong to the same species? ( 2 marks)
- A student caught an animal which had the following characteristics;
  - o Body divided into two parts
  - o Simple eyes
  - o Eight legs

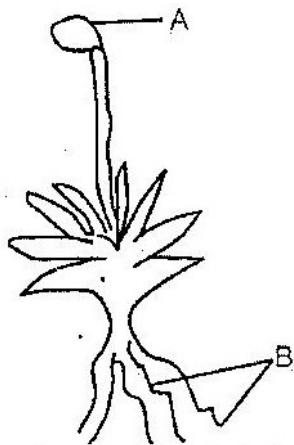
The animal belongs to the class ( 1 mark)

- Below is a list of organisms, which belong to classes insecta, myriapoda and arachnida. Tick, centipede, praying mantis, tsetse fly. Millipede and spider. Place the organisms in their respective classes in the table below. Give reasons in each case.

Class	Organisms	Reasons
Insecta		
Myriapoda		
Arachnida		

- State two characteristics features of members of division bryophyte  
( 2 marks)
- State two ways in which some fungi are beneficial to humans ( 2 marks)
- Other than having many features in common state the other characteristics of species  
( 1 mark)
- Beside the abdomen, name the other body part of members of arachnida  
( 1 mark)
- Name the phylum whose members possess notochord. ( 1 mark)
- Name the class in the phylum arthropoda which has the largest number of individuals  
( 1 mark)
- To which class does an animal with two body parts and four pairs of legs belong?  
( 1 mark)
- (a) Name two organisms that cause food spoilage ( 2 marks)
- (b) Name two methods of food preservation and for each state the biological principal behind it. ( 2 marks)
- (a) List two characteristics that mammals share with birds ( 2 marks)
- (b) State two major characteristics that are unique to mammals ( 2 marks)
- What two characteristics distinguish animals in phylum chordata? ( 2 marks)

- The diagram below shows a plant

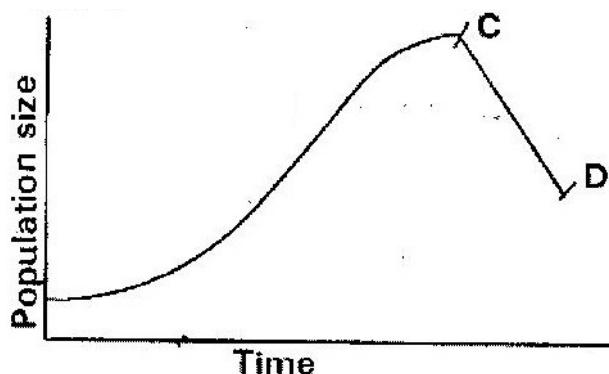


- (a) Name the parts labeled A and B (2 marks)
- (b) Name the division to which the plant belongs (1 mark)
- (c) Which is the dominant generation of the plant in the diagram? (1 mark)
- (d) State three characteristics of the organisms in the division named (b) above? (3 marks)
- What three characteristics are used to divide the arthropods into classes? (2 marks)
  - (a) Write two differences between algae and fungi (2 marks)
  - (b) Give the economic importance of algae (1 mark)
  - (a) What is alteration of generations? (3 marks)
  - (b) Name two divisions in plant kingdom that shows alternation of generation (2 marks)
  - (a) A millipede, grasshopper and crayfish all belong to phylum arthropoda. Mention three major characteristics that they have in common. (3 marks)
  - (b) The specific name of Irish potato is solanum Tuberrsum
    - (i) Identify two errors that have been made when writing the name

- (ii) What is the species name of Irish potato?
- (c) An ecologist came across a plant with the following characteristics, green in colour, non-flowering, compound leaves and sori on the underside of the leaflets. State the probable division of the plant. ( 1 mark)
- An organism with an exoskeleton, segmented body, two pairs of legs per segment, a pair of eyes and a pair of short antennae belongs to the class ( 1 mark)
  - List the main characteristics that are used to sub-divide arthropods into classes ( 2 marks)
  - Name the main method of reproduction among bacteria. ( 1 mark)

## ECOLOGY

- State how excessive use of pesticides may affect soil fertility
- The graph below represents a population growth of a certain herbivore in a grassland ecosystem over a period of time.



Suggest three factors that could have caused the population change between C and D

( 3 marks)

- A biologist carried out a study to investigate the growth of a certain species of herbivorous bony fish and the factors influencing plant and animal life in four lakes A, B, C and D. The lakes were located in the same geographical area.

Two of the lakes A and B were found to contain hard water due to presence of high content of calcium salts. The mean body length of 2 year old fish, amount of plant life and invertebrates biomass in each lake were determined. The data was as shown in

Lakes	Mean body length (cm)	Type of water	Amount of plant life	Invertebrate biomass (g/cm <sup>3</sup> )			
				Insects	Snails	Crabs	Worms
A	31.2	Hard	1050	11	300	10	180
B	28.6	Hard	950	72	100	9	90
C	18.4	Soft	1.2	97	0	2	20
D	16.3	Soft	0.5	99	0	1	10

- o Describe the procedure that may have been used to determine the mean body length of the fish ( 6 marks)
- o What are the likely reasons for the difference in the mean body length of the fish living in lakes A and D? ( 4 marks)
- o Suggest one reason for the absence of snails in lakes C and D? ( 1 mark)
- o (i) Name any six abiotic (physical) factors that are likely to influence the plant and animal life in lake A. ( 3 marks)
- o (ii) Explain how each of the factors named in (i) may influence the plant and animals life in Lake A. ( 6 marks)
- During an ecological study of a lake a group of students recorded the following observations.
  - o Planktonic crustaceans feed on planktonic algae
  - o Small fish feed on planktonic crustaceans worms and insect larvae
  - o Worms feed on insect larvae

- o Bird species feeds on small fish planktonic crustaceans and worms
- o Insect larvae feed on small fish

- (a) From this record of observations construct a feed web (5 marks)
- (b) From the food web you have constructed in (a) above isolate and write down a food chain that ends with
- (i) Bird species as a secondary consumer (1 mark)
  - (ii) Large fish as tertiary consumer (1 mark)
- (c) The biomass of the producers in the lake was found to be greater than that of primary consumers. Give an explanation for this observation? (1 mark)
- (d) Using either the observations recorded by the students or the food web you have constructed name (1 mark)
- (i) Two organisms that compete for food in the lake. (2 marks)
- (ii) The source of food the organisms in d (i) above compete for ( 1 mark)
- (e) (i) State three ways by which many may interfere with this lake ecosystem ( 3 marks)
- (ii) Explain how each of the ways you have stated may affect life in the lake? ( 6 marks)

- In an investigation, a student collected two plants A and B. Plant A had hairy leaves and epidermis. Leaves of plant B

- (i) Plant A ( 1 mark)
- (ii) Plant B ( 1 mark)

- An investigation was carried out between 1964 and 1973 to study the changes of fish population in a certain small lake. Four species of fish A, B, C and D were found to live in this lake. In 1965 a factory was built near the lake and was found to discharge hot water into the lake raising the average temperature from  $25^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . In 1967 sewage and industrial waste from a nearby town was diverted into the lake was stopped. The fish population during the period of investigation is shown in the table below.

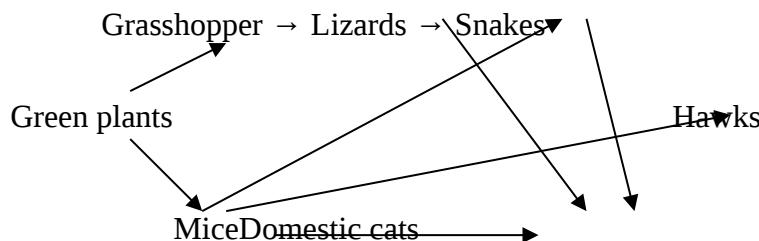
Fish species	Fish populations during the period						
	1964	1966	1969	1970	1971	1972	1973
A	6102	223	26	106	660	4071	7512
B	208	30	11	22	63	311	405
C	36	100	0	0	0	0	0
D	4521	272	23	27	79	400	617

- (i) (i) In which year were the fish populations lowest?
- (ii) State the factors that might have caused the lowest fish populations during the year you have stated in (a) (i) above ( 3 marks)
- (iii) Explain how each factor you have stated in (a) (ii) above could have brought about the changes in fish populations (11 marks)

- (ii) (i) What is the difference in the rate of population recovery of species A and D? (1 mark)
- (ii) Suggest two biological factors that could have led to this difference

(2 marks)

- (iii) (i) State a method that might have been used to estimate the fish population in the lake ( 1 mark)
- (ii) State one disadvantage of the method you have stated in (c) (i) above ( 1 mark)
- Industrial wastes may contain metallic pollutants. State how such pollutants may indirectly reach and accumulate in the human body if the wastes were dumped into rivers.
  - State three measures that can be taken to control infection of man by protozoan parasites ( 3 marks)
  - The chart below shows a feeding relationship in a certain ecosystem



- (a) Construct two food chains ending with a tertiary consumer in each case (2 marks)
- (b) Which organisms has the largest variety of predators in the food web? (1 mark)
- (c) Name secondary consumers in the food web ( 2 marks)

(d) Suggest three ways in which the ecosystem would be affected if there was prolonged drought  
( 3 marks)

- To estimate the population size of crabs in a certain lagoon, traps were laid at random. 400 crabs were caught, marked and released back into the lagoon. Four days later, traps were laid again and 374 crabs were caught. Out of the 374 crabs, 80 were found to have been marked.

(a) Calculate the population size of the crabs in the lagoon using the formula below

$$N = \frac{n \times M}{M}$$

M

Where

N= Total population of crabs in the lagoon

n= Total number of crabs in the second catch

M= Number marked crabs during the first catch

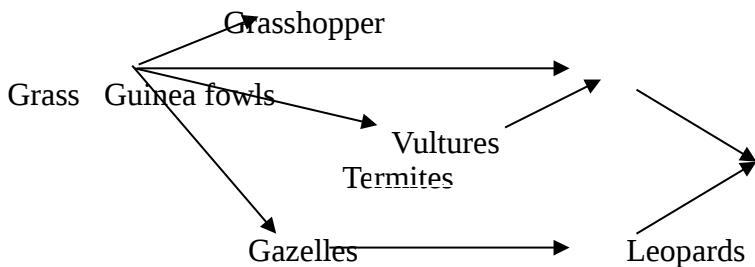
M= Number of marked crabs in the second catch. ( 2 marks)

(b) State two assumptions that were made during the investigation ( 2 marks)

(b) What is the name given to this method of estimating the population size?

( 1 mark)

- The figure below represents a feeding relationship in an ecosystem



(a) Write down the food chains in which the guinea fowls are secondary consumers

( 1 mark)

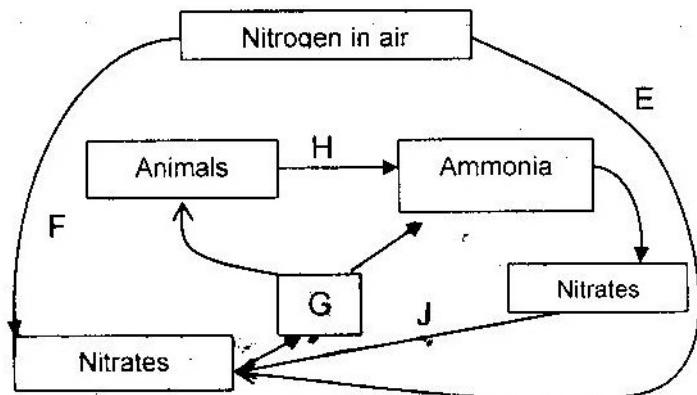
(b) What would be the short term effects on the eco- system if lions invaded the area?

( 3 marks)

(c) Name the organisms through which energy from the sun enters the food web.

( 1 mark)

- The diagram below represents a simplified nitrogen cycle



(a) Name the organisms that causes processes E and J ( 2 marks)

(b) Name the processes represented by F and H (2 marks)

(c) Name the group of organisms represented by c (i)

- (a) Distinguish between a community and a population (2 marks)

(b) Describe how a population of grasshopper in a given area can be estimated

(5 marks)

- Explain how the various activities of man have caused pollution of air ( 20 marks)
- Explain how birds of prey are adapted to obtaining their food ( 2 marks)
- (a) Name the crop infested by phytophthora infestants and the disease it causes

Crop -

Disease -

(b) State four control measures against the diseases ( 4 marks)

- Explain why the carrying capacity for wild animals is higher than for cattle in a given piece of land ( 2 marks)
- (a) What is meant by

(i) Autecology ( 1 mark)

(ii) Synecology ( 1 mark)

(b) The number and distribution of stomata on three different leaves are shown in the table below

Leaf	Number of stomata	
	Upper epidermis	Lower Epidermis
A	300	0
B	150	200
C	02	13

Suggest the possible habitat of the plants from which the leaves were obtained.

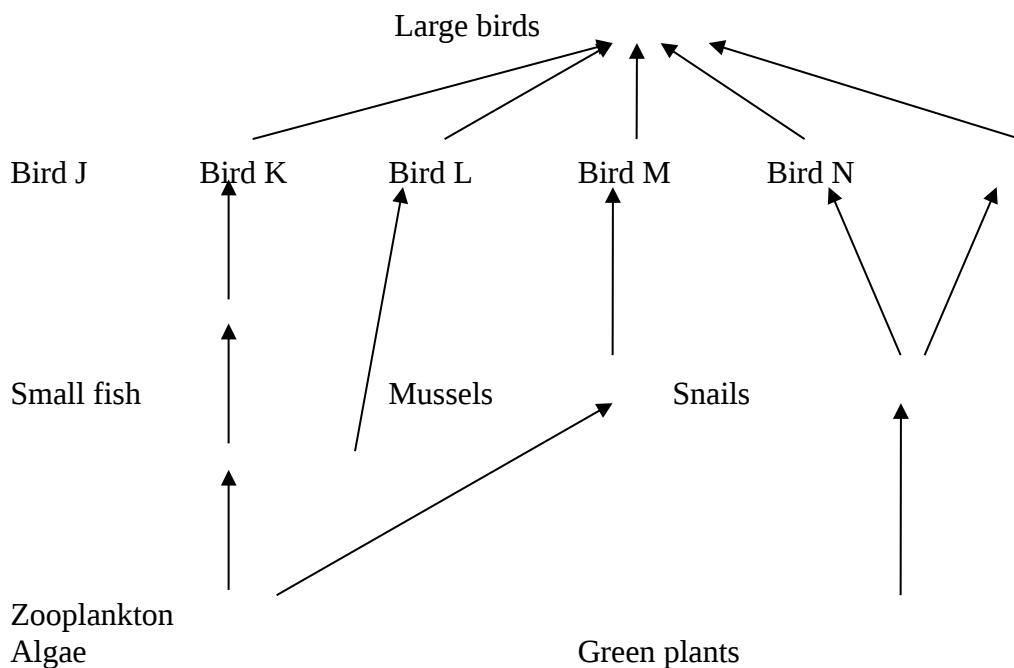
( 3 marks)

Leaf Habitat

A \_\_\_\_\_  
B \_\_\_\_\_  
C \_\_\_\_\_

(c) State the modification found in the stomata of leaf C

- After an ecological study of feeding relationships students constructed the food web below



(a) Name the process through which energy from the sun is incorporated into the food web

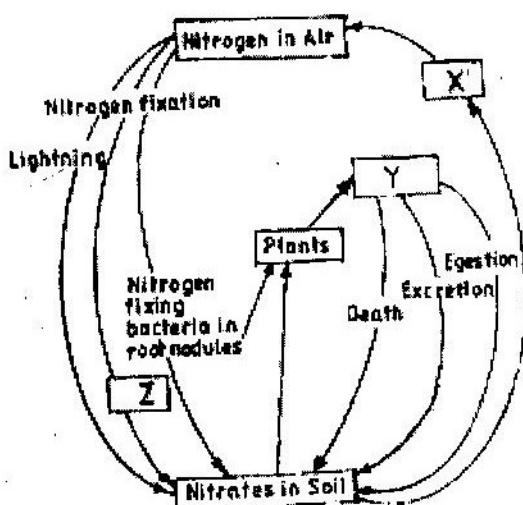
( 1 mark)

(b) State the mode of feeding of the birds in the food web (1 mark)

(c) Name two ecosystem in which the organisms in the food web live( 2 marks)

(d) From the information in the food web construct a food chain with the large bird as a quarter –  
nary consumer ( 1 mark)

- (e) What would happen to the organisms in the food web if bird N migrated?
- (f) Not all energy from one trophic level is available to the next level. Explain ( 3 marks)
- (g) (i) Two organisms, which display a role in the ecosystems, are not included in the food web. Name them. ( 1 mark)
- (ii) State the role played by the organisms named g (i) above. (1 mark)
- (h) (i) State three human activities that would affect the ecosystems ( 3 marks)
- (ii) How would the activities stated in h (i) above affect the ecosystems? ( 3 marks)
- How is aerenchyma tissue adapted to its functions? ( 2 marks)
  - Explain how abiotic factors affect plants ( 20 marks)
  - What is the importance of the following in an ecosystem? ( 3 marks)
    - Decomposers
    - Predation
  - Chart below represents a simplified nitrogen cycle



What is represented by X, Y and Z? ( 3 marks)

- (a) Distinguish between pyramid of numbers and pyramid of Biomass ( 2 marks)
- (b) Give three reasons for loss of energy from one trophic level to another in a food chain. ( 3 marks)
- (c) Describe how the belt transect can be used in estimating the population of a shrub in a grassland ( 2 marks)
- (a) Distinguish between population and community ( 2 marks)
- (b) Name a method that could be used to estimate the population size of the following organisms
- (i) Fish in a pond ( 1 mark)
- (ii) Black jack in a garden ( 1 mark)

State two ways in which schistosoma species is adapted to parasitic mode of life

Describe causes and methods of controlling water pollution ( 20 marks)

- (a) What is biological control of population growth? ( 2 marks)
- (b) Describe one example where biological control has been used successfully ( 2 marks)
- (c) Explain why the number of predators in nay ecosystem is less than the number of their prey ( 1 mark)

Suggest reasons to account for the following observations.

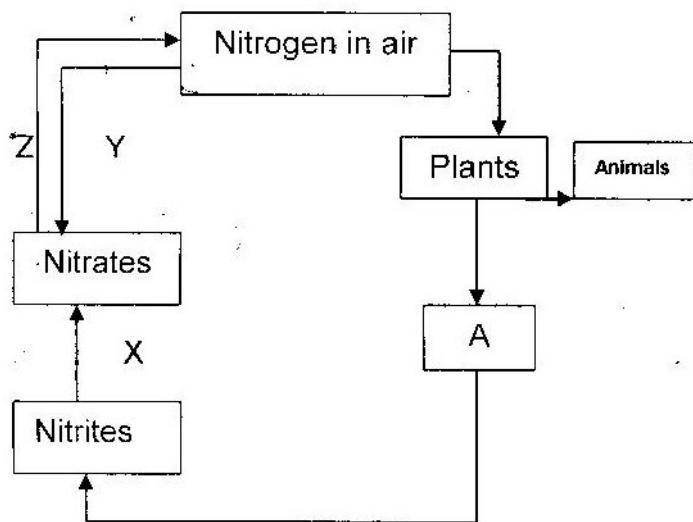
- (b) Antelopes are more commonly found in open grassland while giraffe while giraffes are commonly found in wooded areas. ( 2 marks)
- (b) In the savannah there is a wider variety of herbivores in wooded areas than in open grassland ( 1 mark)

- (c) Removal of predators for an herbivore may in the long run lead to a decrease in its population

- Explain why primary productivity decreases with depth in aquatic environments.

( 2 marks)

- The following is a simplified drawing of nitrogen cycle.



- (a) Identify the compound named A ( 1 mark)

- (b) Name the processes

X \_\_\_\_\_

Y \_\_\_\_\_

Z \_\_\_\_\_

(c) In what form is nitrogen found in plants and animals?

- An investigation was carried out to study the type of food eaten by birds found in forest and savannah in a certain area. The table below compares the feeding habitats of the birds found in a closed forest area and an open dry savannah of the area.

Diet	Percentage of birds	
	Forest	Savannah
Insects only	60	50
Vertebrates	10	10
Seeds	5	20
Fruits	25	10
Other plant materials	5	5
Number	120	60

(a) Work out the difference in the number of bird species the feed on:

(i) Fruits found in forest and savannah ( 2 marks)

(ii) Seed found in forest and savannah ( 2 marks)

(b) State two factors that may cause this difference in (a) above ( 2 marks)

(c) In another investigation two vertebrate species from the savannah were counted and recorded on monthly basis as shown below.

Year	Month	Species A	Species B
1998	July	96	240
1998	August	79	590
1998	September	75	900
1998	October	87	750
1998	November	-	230
1998	December	99	80
1998	January	129	200
1998	February	96	330
1998	March	99	300
1998	April	79	320
1998	May	135	90
1998	June	104	450

- (i) Which species show more fluctuation in numbers? ( 1 mark)
- (ii) Suggest an explanation of this ( 3 marks)
- (d) Suggest two ways by which the savannah environment can be destroyed and how it can be conserved ( 4 marks)

## REPRODUCTION IN PLANTS AND ANIMALS

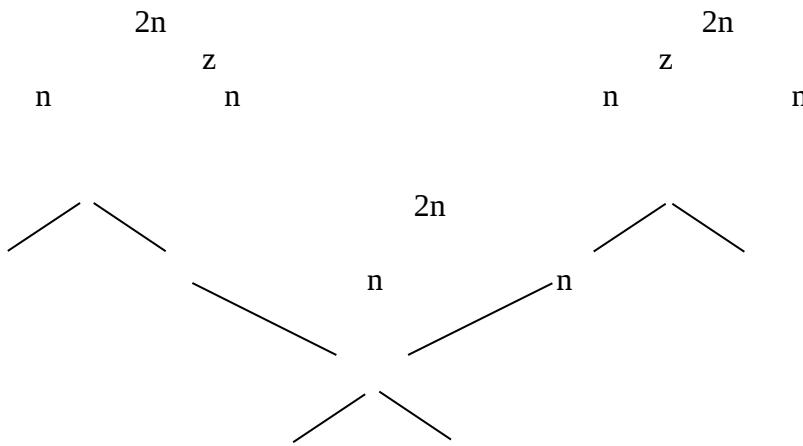
- At what stage of mitosis do chromosomes replicate to form daughter chromatid?

( 1 mark)

- Fill in the blank spaces in the statement below

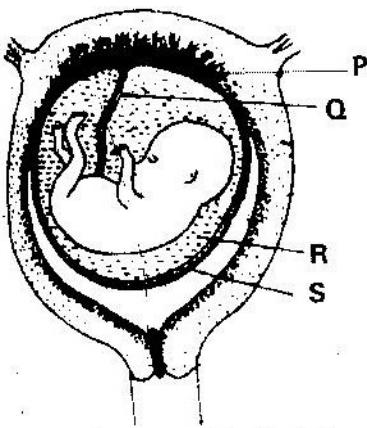
After fertilization of an ovule \_\_\_\_\_ develops into a testa and \_\_\_\_\_ develops into a testa and \_\_\_\_\_ develops into endosperm. ( 2 marks)

- State the difference between the composition of maternal blood entering the placenta and material blood leaving the placenta ( 3 marks)
- After four months of pregnancy the ovaries of a woman can be removed without terminating pregnancy. However during the first four months of pregnancy the ovaries must remain intact if pregnancy is to be maintained. Explain these observations ( 3 marks)
- Name two mechanisms that prevent self pollination in flowers that have both male and female parts ( 2 marks)
- State three characteristics that ensure cross pollination takes place in flowering plants ( 3 marks)
- Give a reason why it is necessary for frogs to lay many eggs ( 1 mark)
- A flower was found to have the following characteristics
  - Inconspicuous petals
  - Long feathery stigma
  - Small light pollen grains
    - What is the likely agent of pollination of the flower? ( 1 mark)
    - What is the significance of the long feathery stigma in the flower ( 1 mark)
- State two ways by which the human Immuno Deficiency virus (HIV) is transmitted other than sexual intercourse? ( 2 marks)
- Explain why sexual reproduction is important in organisms ( 3 marks)
- State two disadvantages of self- pollination ( 2 marks)
- The chart below shows the number of chromosomes before and after cell division and fertilization in a mammal.



- (a) What type of cell division takes place at Z? ( 1 mark)
- (b) Where in the body of a female does process Z occur? ( 1 mark)
- (c) On the chart indicate the position of parent and gametes ( 2 marks)
- (a) What is meant by the terms
    - (i) Epigynous flower ( 1 mark)
    - (ii) Staminate flower (1 mark)
  - (b) How are the male parts of wind- pollinated flowers adapted to their function? ( 4 marks)
  - Name the part of a flower that developed into:
    - (a) Seed ( 1 mark)
    - (b) Fruit ( 1 mark)
  - (a) State two processes which occur during anaphase of mitosis ( 2 marks)
  - (b) What is the significance of meiosis? (2 marks)
  - (a) Explain how the following prevents self- pollination:
    - (i) Protoandry ( 1 mark)
    - (ii) Self- sterility ( 1 mark)
  - (b) Give three advantages of cross- pollination ( 3 marks)

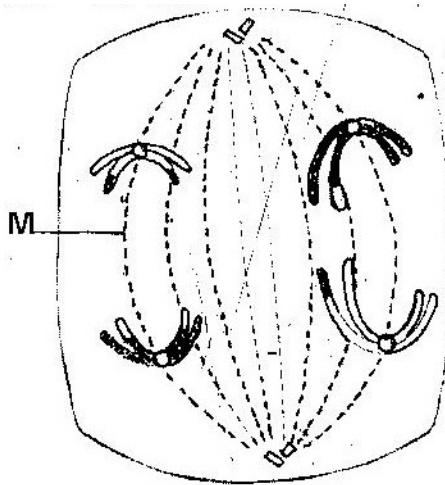
- The diagram below represents a human foetus in a uterus



- (a) Name the part labeled S ( 1 mark)
- (b) (i) Name the types of blood vessels found in the structure labeled Q ( 2 marks)
- (ii) State the difference in composition of blood in the vessels named (b) (i) above ( 2 marks)

- Name two features that enable the structure labeled P carry out its function ( 2 mark)
- State the role of the part labeled R ( 1 mark)

- The diagram below represents a stage during cell division



- (a) (i) Identify the stage of cell division ( 1 mark)  
(ii) Give three reasons for your answer (a) (i) above ( 2 marks)

(b) Name the structure labeled M ( 1 mark)

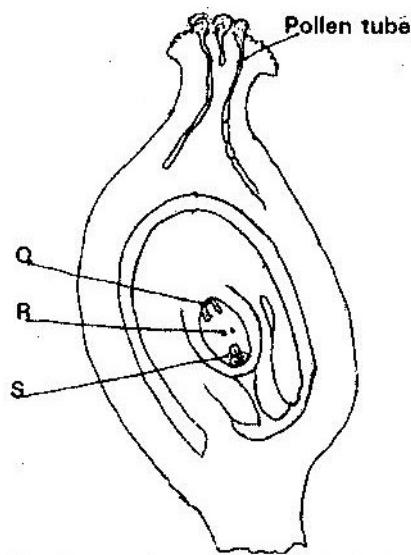
- State two disadvantages of sexual reproduction in animals ( 2 marks)
- 

(iv) What is meant by the following terms?

(i) Protandry ( 1 mark)

(ii) Self- sterility ( 1 mark)

(v) The diagram below shows a stage during fertilization in plant



- (i) Name the parts labeled Q, R, and S ( 3 marks)
- (ii) State two functions of the pollen tube ( 2 marks)
- (vi) On the diagram, label the micropyle ( 1 mark)

- (a) Describe how insect pollinated flowers are adapted to pollination ( 6 marks)

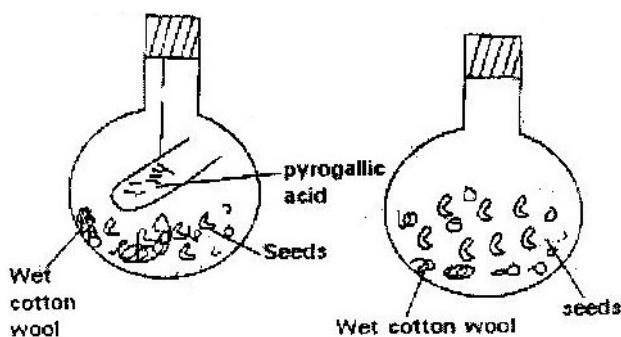
(b) Describe the role of each of the following hormones in the human menstrual cycle.

- (i) Oestrogen
- (ii) Progesterone
- (iii) Luteinizing hormone ( 3 marks)

- Describe the role of hormones in the human menstrual cycle (20 marks)
- What part does the placenta play in the
  - (i) Nutrition of the embryo
  - (ii) Protection of the embryo ( 4 marks)

## GROWTH AND DEVELOPMENT

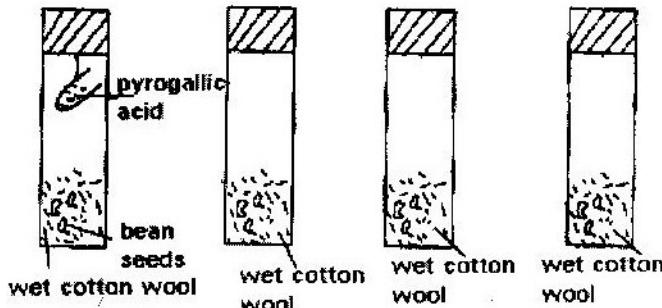
- (d) Explain why several auxiliary buds sprout when a terminal bud in a young tree is removed.
- (e) Account for loss in dry weight of cotyledons in a germinating bean seed.
- (f) What is the effect of gibberellins on shoots of plants?
- (g) A student set up an experiment as shown in the diagram below



The set up was left at room temperature for a week

- What was the aim of the experiment?
- What would be the expected results at the end of the experiment?

- (h) State two advantages of metamorphosis to the life of insects
- (i) During germination and early growth, the dry weight of endosperm decreases while that of the embryo increases. Explain
- (j) In an experiment, a group of student set up four glass jars as shown in the diagram below jar A, B and C were maintained at  $25^{\circ}\text{C}$  for 7 days. While Jar D was maintained at  $0^{\circ}\text{C}$  for the same period of time.



- What was this set up supposed to investigate?
- Why was pyrogallic acid included in glass jar A?
- Explain why glass jar C and D were included in the experiment
- What result would you expect in glass jar A and B at the end of the experiment?
- State two artificial ways of breaking seed dormancy

- (k) Removal of the apical bud from the shrub is a practice that results in the development of the lateral buds which later from the branches.

- (vii) Give reasons for the development of the lateral braches after the removal of the apical bud
- (viii) Suggest one application of this practice
- (ix) What is the importance of this practice?

- (l) In an experiment some germination seeds were placed in large airtight flask and left for four days
- (e) Suggest the expected changes in the composition of gases in the flask on the fifth day
- (f) Give four reasons for your answer in (a) above
- (g) Name two factors that cause dormancy in seeds
- (m) (a) Distinguish between epigeal and hypogeal germination ( 1 mark)
- (b) Why is oxygen necessary in the germination of seeds? ( 2 marks)
- (n) An experiment was carried out to investigate the effect of hormones on growth of lateral buds of three pea plants

The shoots were treated as follows:

Shoot A- Apical bud was removed

Shoot B – Apical bud was removed and gibberellic acid placed on the cut shoot

Shoot C- Apical bud was left intact.

The length of the branches developing from the lateral buds were determined at regular intervals

The results obtained are as shown in the table below

Time (days)	Length of branches in mm		
	Shoot A	Shoot B	Shoot C
0	3	3	3
2	10	12	3
4	28	48	8
6	50	90	14
8	80	120	20
10	118	152	26

- (d) Using the same axes, draw graphs to show the length of branches against time ( 8 marks)
- (e) (i) What was the length of the branch in shoot B on the 7<sup>th</sup> day? ( 1 mark)
- (ii) What would be the expected length of the branch developing from shoot A on the 11<sup>th</sup> day? ( 1 mark)

- (f) Account for the results obtained in the experiment ( 6 marks)
- (g) Why was shoot C included in the experiment? ( 1 mark)
- (h) What is the importance of gibberallic acid in agriculture? ( 1 mark)
- (i) State two physiological processes that are brought about by the application of gibberellic acid on plants. ( 2 marks)

12. (a) State tow environmental conditions that can cause seed dormancy
- (b) Name the part of a bean seed that elongates to bring about epigeal germination ( 1 mark)
13. (a) “True growth is not simply an increase in size” State four different ways in which true may be defined.
- (b) State two external factors, which influence growth in plants and describe one effect of each.
- (c) Fill in the spaces in the following table, which refers to hormones involved in growth processes.

Name hormone	Site of hormone production	Effect
	Thyroid gland	
		Maturation of Graafin follicles
Auxins		
Gibberellins		

14. Seedling from 100g of maize seed was grown in the dark for 10 days. The seedlings were then analyzed and compared with 100g of ingeminated maize. The following results were obtained.

	Dry mass of ingeminated seeds	Dry mass of seedling after 10 days
Cellulose	2g	5g
Starch	63g	9g

Other organic	13g	27g
Material Ash	2g	4g
Total dry mass	80g	45g

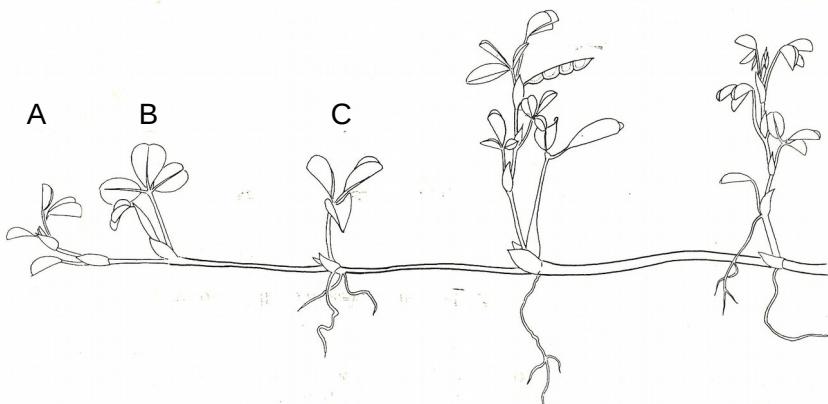
- (i) Why is dry mass used for comparison?
- (j) How would one ensure that the drying process had been completed
- (k) Account for the decrease in the total dry mass of the seedlings
- (l) Why did the seedling contain more cellulose than the undervarinated seeds?
- (m) What is the most likely source of the carbon used to form this new cellulose?

### Asexual reproduction and cloning in plants

1 In natural vegetative propagation, which of the following structures are most likely to give rise to new individuals: (a) stems, (b) roots, (c) buds, (d) leaves, (e) flowers?

2 The drawing shows a plant which reproduces vegetatively.

- (a) What will need to happen before shoots A - C become independent plants?
- (b) How might a gardener assist this process?
- (c) What name is given to the horizontal stem in this kind of propagation?
- (d) Name a commercially grown fruit whose plants are propagated in this way



3 Before stem cuttings are planted, the cut end of the stem is often dipped in a hormone powder. What is the point of this?

4 The following are thought to be some of the advantages of either vegetative reproduction or sexual reproduction:

produces greater variety in the offspring, good at colonising new areas, reduces competition from other species, maintains desirable qualities in the offspring, good at colonising favourable areas

Make a table with these qualities under the headings of 'Sexual reproduction' and 'Vegetative reproduction'.

**5** If a gardener wanted to propagate a useful variety of apple tree in a way which maintained all its desirable qualities, which of the following techniques would be used:

- (a) planting stem cuttings in potting compost
- (b) grafting stem cuttings onto a rootstock
- (c) grafting buds on to a root stock
- (d) growing the seeds produced from the useful variety
- (e) cross-pollinating the variety with another good variety and growing the seeds resulting from the cross?

**6** What name is given to the population of genetically identical offspring which result from a process of asexual (vegetative) reproduction?

**7** Which structures of a flowering plant give rise to (a) potatoes, (b) the fleshy scales of an onion?

**8** In the process of tissue culture in plants, what is needed to induce the formation of a complete plant, in addition to a growth medium with nutrients?

## Human Reproduction

**1** Fertilisation occurs when the .....(A)..... of the sperm cell fuses with the.....(B) ..... of the ..... (C) .....

**2** State the differences between the male gametes and the female gametes with regard to  
(a) their size; (b) their structure, (c) their relative numbers.

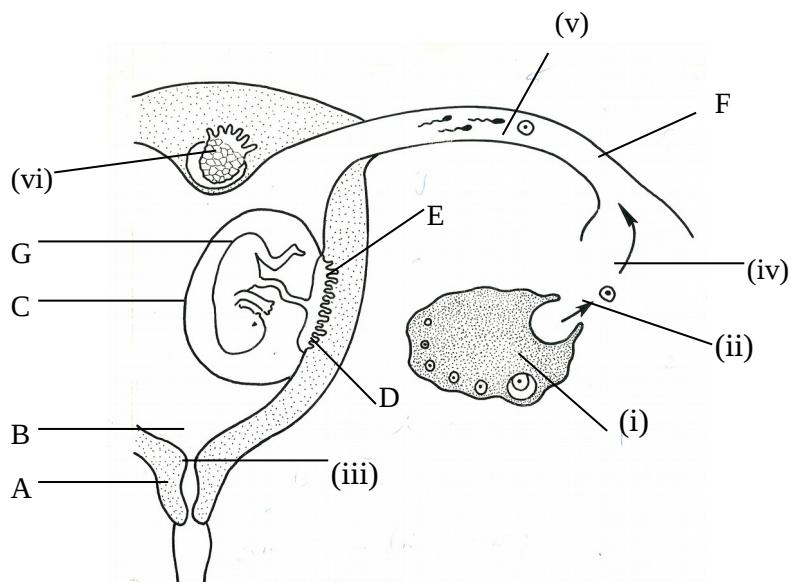
**3** Before fertilisation can occur, the sperms have to travel from the testes to meet an ovum in the female organs. Using the list below, name the organs, in the correct order, through which the sperms will have to pass.

*uterus, sperm duct, oviduct, urethra, cervix, vagina*

**4** (a) Explain what is meant by ovulation.  
(b) How often does it occur in humans?

**5** Explain why the chance of fertilisation in humans is restricted to only a few days each month.

**6** The diagram below represents the events leading up to fertilisation (v), implantation (vi) and development. In each case name the structures involved and, at the numbers, state briefly what is happening or what has happened previously.



**7** Blood from the fetus circulates through the placenta.

- (a) What substances pass (i) from the maternal to the fetal blood, (ii) from the fetal to the maternal blood?
- (b) By what means is the fetal blood circulated through the placenta?

**8** What is the function of the umbilical cord?

**9** What are the possible effects on the fetus if, during pregnancy, the mother (a) smokes, (b) catches rubella?

**10** Describe the events which lead to the formation of (a) identical twins, (b) fraternal twins.

**11** At an ante-natal clinic what can (a) blood tests, (b) urine tests reveal?

**12** Place the following events in the correct order for natural childbirth.

*amniotic fluid expelled, placenta expelled from uterus, baby's feet emerge from vagina, abdominal contractions begin, baby's head emerges from vagina, amnion breaks, cervix dilates, contractions of the uterus begin .*

**13** (a) What are the advantages of human milk over cows' milk for feeding babies?

- (b) Apart from the composition of the milk, what are the other advantages of breast-feeding?

**14** Name (a) the male sex hormone and (b) the female sex hormone which help bring about the changes at puberty .

**15** After ovulation (a) what structure replaces the Graafian follicle, (b) what hormone does it produce?

## **Personal health**

- 1** Which of the following are not considered to be necessary components of a healthy diet?  
sugar, salt, protein, butter, vitamins, alcohol, green vegetables
- 2** For which one of the following is there not strong evidence for the beneficial effects of exercise?  
more efficient muscular contraction, improved stamina, prevention of heart attack,  
stronger muscles, avoidance of obesity, feeling of well-being
- 3** Which of the following diseases are not associated with smoking?  
emphysema, hay fever, diabetes, lung cancer, bronchitis, stomach ulcers, bladder cancer,  
arterial disease, tuberculosis, coronary thrombosis
- 4** (a) Match the following descriptions to the terms (i) 'drug tolerance', (ii) 'drug dependence':  
A - If the drug is not taken, there are physical withdrawal symptoms.  
B - A steadily increasing dose of the drug is needed to achieve an acceptable effect.  
(b) Which of these conditions is also known as 'addiction'?
- 5** Name two stimulant drugs and state the undesirable side-effects of each.
- 6** (a) What effect does alcohol have on reaction time?  
(b) What other short-term effects does alcohol have?  
(c) What long-term effects can result from an excessive alcohol intake?
- 7** If a woman thinks she is pregnant she should  
(a) take no more than three standard alcoholic drinks per day  
(b) take no more than one standard alcoholic drink per day  
(c) take no more than five standard alcoholic drinks per week  
(d) take no alcoholic drinks at all.
- 8** Put the following in order of their total alcohol content, starting with the strongest.  
double whisky, 2 pints of cider, 3 glasses of wine, a glass of sherry, pint of beer
- 9** Which of the following is considered to be a relatively safe level of alcohol intake for  
(a) men, (b) women, (c) pregnant women, (d) people about to drive?  
0, 10, 20, 30, 40, 50 units of alcohol (standard drinks) per week
- 10** Drugs which relieve pain are called ..... A..... Readily available (i.e. non-prescription)  
examples of these drugs are ..... B ..... and ..... C ..... Morphine and codeine, drugs which relieve  
severe pain, are called ..... D ..... These drugs are prescribed with care because their use can lead to  
..... E ..... and ..... F .....
- 11** List four possible after-effects of solvent abuse (glue-sniffing).
- 12** Classify the following under the headings 'Mental illness' and 'Mental handicap'.  
clinical depression, Down's syndrome, acute anxiety, claustrophobia, phenylketonuria

**13** Which component of the diet is thought to be largely responsible for causing tooth decay?

**14** What is the connection between this substance, mouth bacteria and tooth decay?

**15** Which one of the following is likely to be most effective in reducing dental decay?

- (a) Eating crisp food, e.g. apples, after meals.
- (b) Cutting down on sweets, biscuits etc. between meals.
- (c) Cleaning the teeth after meals and at night.
- (d) Using an antiseptic mouth wash.

**16** What is plaque?

**17** From which part of the teeth is it particularly important to remove plaque?

**18** What gum conditions may result from a failure to remove plaque?

## Reproduction in flowering plants

**1** Which is the most accurate statement?

The principal role of a flower in the life cycle of a plant is:

- (a) attracting insects
- (b) producing seeds
- (c) producing pollen
- (d) producing nectar

**2** Name the parts A-J shown on this drawing of a half-flower of a Stitchwort.

**3** What is (a) the male gamete, and (b) the female gamete in a flowering plant?

**4** Complete the following paragraph selecting words from the list below. Pollination is the transfer of ..... from the ..... to the ..... in a flower. In cross-pollination, the ..... from a flower on one ..... is transferred to the ..... of another ..... of the same species.

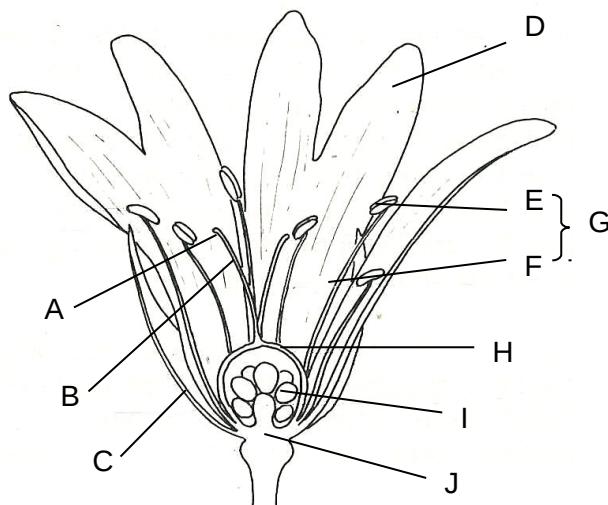
*anthers, ovule, stigma, plant, flower, pollen, ovary, petal, style, receptacle, stamens*

**5** Complete the following sentences:

In a flowering plant fertilisation occurs when the ..... of the ..... fuses with the ..... of the ..... . After fertilisation , the ..... becomes the ..... and the ..... becomes the .....

**6** Which of the following statements is correct? In flowering plants:

- (a) pollination can take place without fertilisation
- (b) fertilisation can take place without pollination

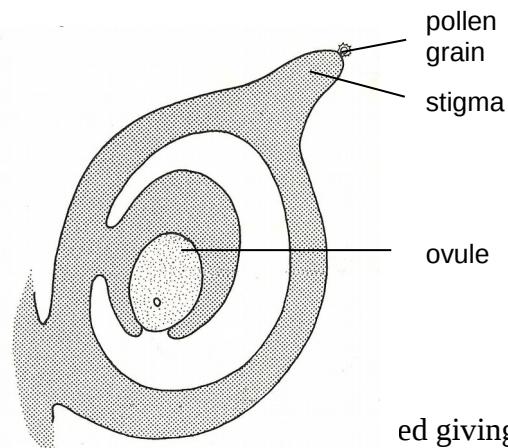


- (c) pollination and fertilisation are the same
  - (d) pollination and fertilisation must occur at the same time

7 Some species of plant are strongly adapted to pollination by certain insects. Which of the following characteristics would you regard as adaptations to pollination by bees:

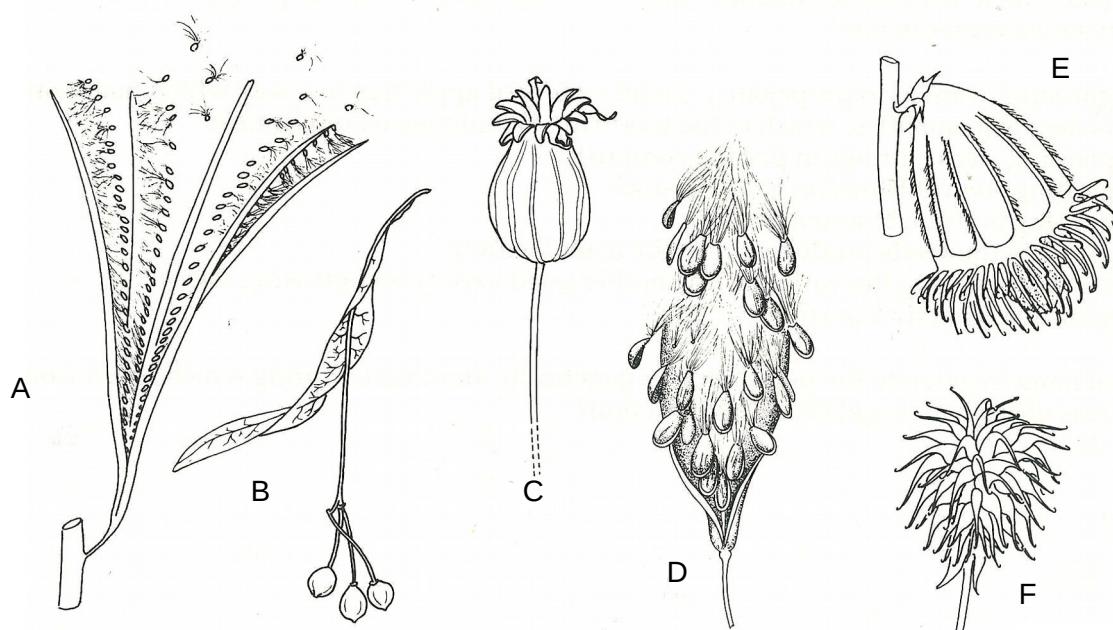
- (a) white or coloured petals
  - (b) light, smooth pollen grains
  - (c) spiky or sticky pollen grains
  - (d) anthers and stigma inside the flower
  - (e) anthers and stigma protruding from the flower
  - (f) small green petals
  - (g) production of nectar
  - (h) production of pollen
  - (i) production of scent?

**8** A bee visits several flowers in succession on a single willow herb plant. In doing so, the bee transfers pollen from the younger flowers, near the top of the inflorescence (group of flowers) to the older flowers near the base of the inflorescence. Is this an example of self-pollination or cross-pollination?



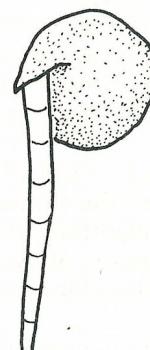
**10** The drawings show seeds or fruits of different plants.  
(a) From the appearance of the structures, make reasons for your answers.

(b) What are the advantages to a plant of an effective method of seed dispersal?



**11** The root of the pea seedling is marked with equally spaced lines as shown here. Draw what you would expect to see in two days' time if the root

- (a) grew only from the tip                    (c) grew only at the top  
(b) grew uniformly along its length      (d) did not grow.



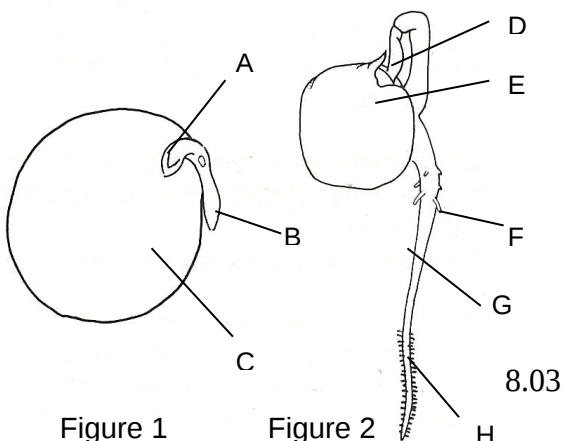
- 12** (a) What conditions do most seeds need in order to begin germination?  
 (b) What other condition do the seedlings need to continue growth to mature plants?

**13** How would you design, in principle, an experiment to test the hypothesis that a certain variety of lettuce seed needed daylight in order to germinate?

**14** Figure 1 represents a pea seed split open to show its structure. Name the parts A-C and state the function of each.

Figure 2 represents a pea seedling -5 days after germination. Name the parts D-H.

**15** The early stages of germination take place in the soil where there is little or no light for photosynthesis. How does the seedling obtain materials for its growth and energy during Self-assessment questions needs during this time?



### Reproduction in flowering plants (continued)

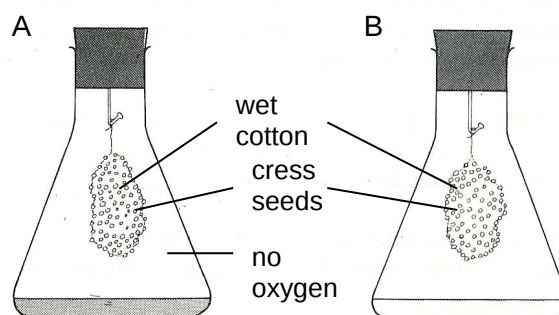
**16** You are asked to set up an experiment to investigate the effect of temperature on the rate of germination. You place ten soaked peas in each of three flower pots containing moist sand. One pot is placed in a refrigerator at 4°C, one is placed in a cupboard at room temperature (about 18°C) and the third is placed in an incubator at 25°C. You leave them for a week, checking each day that the sand is kept moist.

- (a) How would you judge the results?
- (b) Why was the pot, at room temperature, kept in a cupboard rather than on the laboratory bench?

**17** Starch is one of the most common storage product in seeds. What happens to the starch before it can be used by the germinating seed?

**18** The diagram represent an experiment to test the hypothesis that seeds need oxygen in order to germinate.

- (a) What is the liquid in A and what does it do?
- (b) What is the liquid in B and what does it do?
- (c) Which of the two flasks represents the control and what is its purpose?
- (d) What results would you expect
  - (i) if oxygen is necessary for germination
  - (ii) if oxygen is not necessary for germination?



**19** What differences would you expect to see between pea seedlings grown for 10 days in total darkness and pea seedlings grown in the light for the same period of time?