

**NEW BIOLOGY EXTRA
BIOLOGY LANGUAGE.**

Command words in
Biology by **MUGWE
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COMMON COMMAND WORDS

1. DEFINE- means give the precise meaning of a word, phrase, or physical quantity.

- Example Define the term Tissue
- Answer. A tissue is a group of cells and their intercellular substance which are linked together and perform a particular function.



2. What do you understand by/What is meant by-similar to define but more relevant information required.

- *Example. What do you understand by the term eutrophication?*
- *Answer. Eutrophication is the process in which nutrients are washed into ponds, lakes and rivers, allowing algae to multiply. This reduces light available for other plants, and sets off a cycle which results in bacteria using up all of the oxygen in the water*



3. State ... means give a specific name, value, or other brief answer without explanation or calculation

- Example- State the effects of lack of ATP in the skeletal muscles

ANSWER

- -No pumping of calcium ions into SR ✓ -No detachment of myosin heads ✓ no hydrolysis of ATP ✓ no cross-bridge formation- ✓ no power stroke/pulling of actin-no recovery stroke / myosin head does not return to original position



4. List ... means give a sequence of names or other brief answers with no explanation

- List the functions of RED BLOOD CELLS
- Answer – Transport of carbon dioxide, oxygen and buffering



5. Explain ... means that you should use your biological knowledge to give a detailed account of causes, reasons, or mechanisms. Phrase 'because' is used!

- **Example-** Explain why cell surface membranes are impermeable to most biological molecules
- **ANSWER-** cell surface membrane has a phospholipid bilayer✓ whose hydrocarbon tails forms a hydrophobic core;✓ so polar molecules/electrically charged✓ are unable to dissolve in the bilayer of phospho-lipids✓ for their transport across. some molecules are too big to penetrate the lipid bilayer through pores/channels✓ polar molecules with same charge with protein channels are repelled; ✓✓

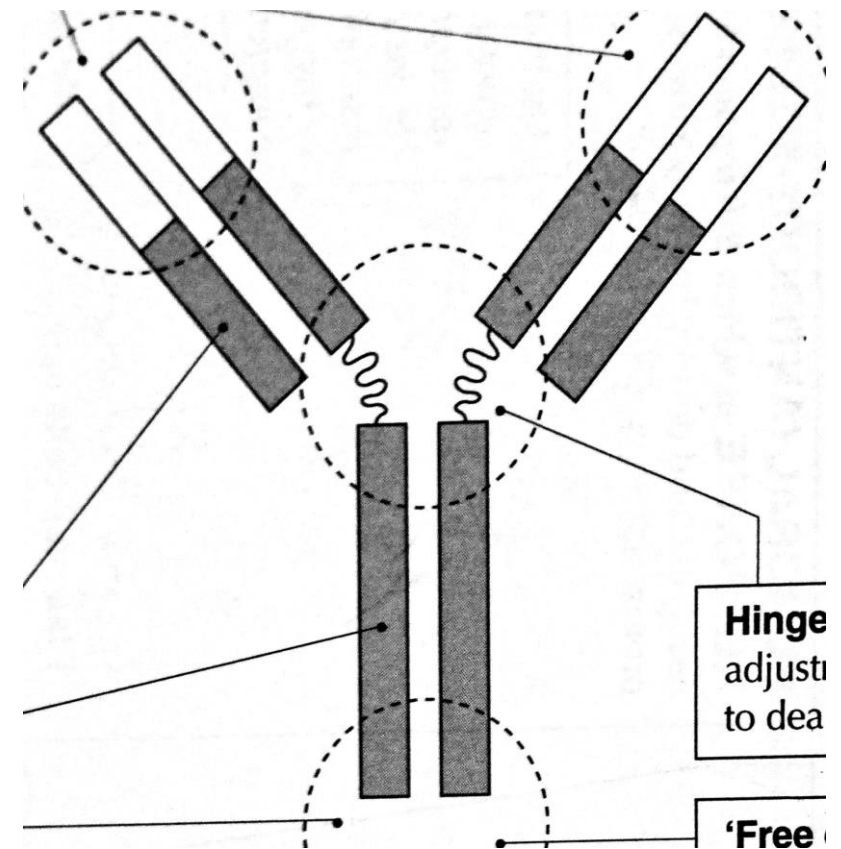


6. Describe ... means give a detailed account OF.

Include diagrams where necessary.

Example - Describe the antibody structure.

Answer **Y**-shaped molecule; ✓ Quaternary structure ✓
four polypeptide chains; ✓ two heavy chains ✓; which
are long ✓; two short; ✓ light chains; ✓ all held by
disulphide bonds or bridges; ✓ constant regions; ✓
and variable regions; ✓ with folded sequences of
amino-acids forming paratope/antigen binding sites;
✓ hinge formed by disulphide bonds; and the tail/free
end with binding sites; Accept sites complementary to
phagocyte receptor. ✓ ✓



7. Describe and explain ... means give a detailed account, including causes, reasons, or mechanism.

- Example – Describe the structure and function of haemoglobin.

Answer- Compact molecule/closely united/packed ✓ made up of four, interlocked ✓ polypeptide chains ✓ two alpha; and two beta chains; ✓ ✓ consisting of globular/globin; ✓ attached to a haem units; ✓ which consists of porphyrin ring; ✓ containing iron at the centre ✓ with binding sites ✓ which are pocket-like; ✓ Accept bonds

- AND interactions such as ionic/disulphide/hydrogen and hydrophobic interaction; ✓ ✓
- Transports Oxygen and Carbon dioxide; Buffering effects;



8. Suggest/Predict ... means propose an answer, based on your knowledge of biological topics.

Example – Predict what would happen if light intensity exceeds 100%

- Answer -Rate of photosynthesis would remain constant; other factors other than light would limit the rate of photosynthesis;
- Example mineral concentration/temperature/inhibitors;
- Further more bleaching of chlorophyll will occur.
- Photorespiration and closure of stomata occurs.



9. Calculate

... means find a numerical answer, showing the relevant stages in your working (unless you are instructed not to do so). The question will provide the data you need to complete the calculation. Example: (A table gives tally data on records made of starlings visiting 5 gardens at different times during the year.) Calculate the mean value for the number of starlings visiting gardens in July. Answer: 80 $(110 + 70 + 65 + 78 + 77) \div 5 = 80$

A common type of calculation in biology exam papers involves 'magnification'. Remember that magnification of an object = $\frac{\text{Measured (observed) length of object or structure}}{\text{Actual length of object or structure}}$

The question will always provide two of these quantities, e.g. you might be given the magnification and be able to measure the length of the structure, so can calculate the actual length by rearranging the above equation. $\text{Actual length} = \frac{\text{Measured length}}{\text{Magnification}}$

N.B. If you are asked to calculate the magnification, make sure that the measured length and the actual length are in the same units



10. Adaptations

- this is made up of three aspects i.e structure, nature and how nature results efficiency.

Question - Describe the adaptations of the antibody to its function.

- variable region; with amino-acid sequences folded into 3-D shape forming the paratope/antigen binding sites for antigens; ✓ ✓
- -Hinge with disulphide bond which provide flexibility during binding with antigen ✓ ✓
- -Disulphide bonds which are strong for stability of molecules; ✓ ✓
- -Free end/tail with receptors complementary to phagocyte receptor; ✓ ✓
- -Hydrophilic side chains/amino-acids allows its solubility to function in aqueous environment; ✓ ✓
- -Heavy chains are long and strong for stability; ✓
- Small molecules so that can diffuse across blood capillaries into intercellular spaces ✓



IN THE EXAMINATION TAKE NOTE OF THE FOLLOWING

- - Check that you have correct question paper! So, make sure you have the question paper you're expecting.
- - Read through the whole of the question paper before beginning. Select questions you're more comfortable with. There is no rule that says you must answer questions in the order they are printed!
- - Read the questions carefully and understand key words. (Why not underline them?)
- - Don't give up if you cannot answer part of the question. The next part may be easier and may provide a clue on

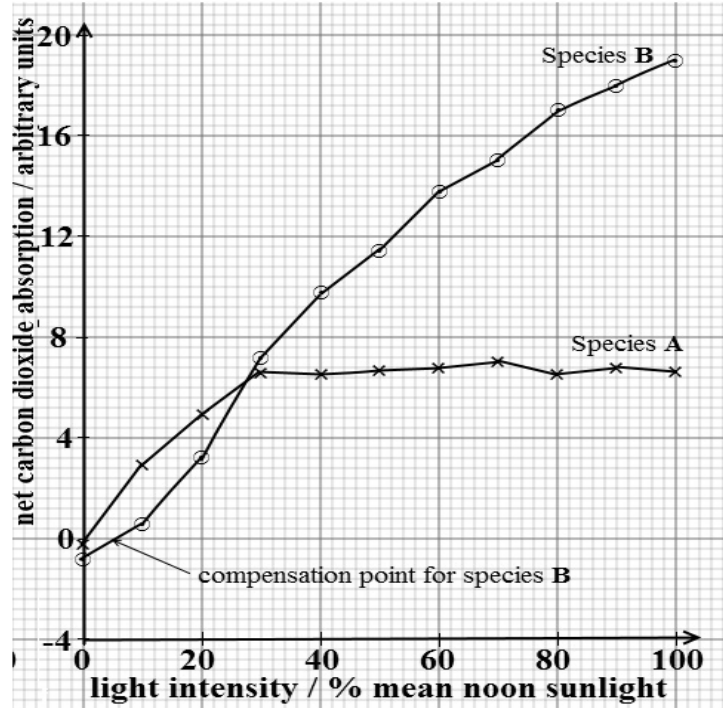


- what you should do in the part you find difficult.
- -Check the number of marks allocated to each section of the question
- -Read data from graphs and tables carefully. Take note of the column heading, labels on axes, scales and units used.
- -Keep an eye on the clock-perhaps check your time after finishing 50% of the paper
- -use any left-over time carefully. Don't just sit there and gaze around the room.
- -Check that you haven't missed out anything in any section.
Repeat the calculations to make sure that you haven't made any arithmetical error.



RAW DATA, MANIPULATION AND PRESENTATION

- Data analysis is key in biology and takes 40 marks of the paper. Failure to harness reasonable marks from this section may result into poor score at the end and so this section must be handled carefully.
- **EXAMPLE** - Figure 1 shows the amount of carbon dioxide absorbed in photosynthesis (+) or released in respiration (-) by plant species A and B, growing at relatively constant temperature and varying light intensities from darkness to the equivalent of mean noon sunlight. Study Fig. 1 and answer the questions that follow.



1. COMPARE- Differences and similarities.

-start with both for similarities

-use while/whereas/than for differences

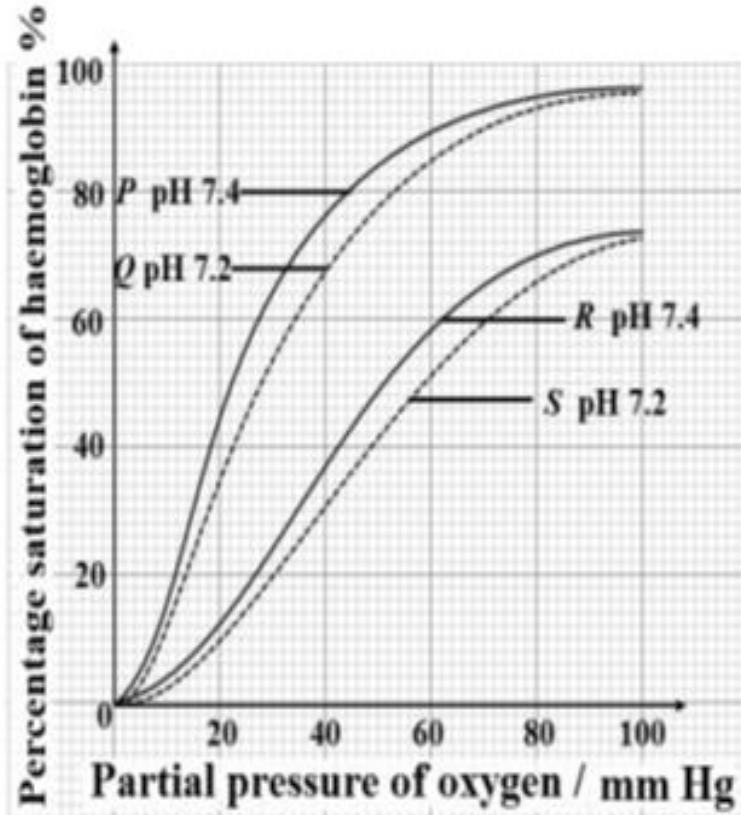
Eg- a) Compare the effect of light intensity on carbon dioxide absorption in species A and B.

- ANSWER- In both increase in light intensity caused increased net carbon dioxide absorption
- In both the net rate of carbon dioxide absorption attained a compensation point;
- In both increase in light intensity caused attainment of maximum net absorption of carbon dioxide
- In both 29.0% mean noon sunlight caused equal net carbon dioxide absorption
- In both 0% mean moon sunlight caused carbon dioxide release;

Differences

Species A	Species B
Compensation point reached at lower light intensity	Compensation point reached at higher light intensity; ✓
Maximum net carbon dioxide uptake is lower	Maximum net carbon dioxide uptake is higher; ✓
Net carbon dioxide absorption remained constant beyond 29% mean moon sunlight	Net carbon dioxide absorption continued to increase; ✓
Net carbon dioxide uptake is higher at lower light intensity	Net carbon dioxide absorption is lower at lower intensities; ✓
Generally, a gradual increase in the net carbon dioxide absorption	Generally, rapid increase in the overall net carbon dioxide absorption; ✓
At 0%, carbon dioxide released is lower	At 0%, carbon dioxide released is higher; ✓

- 2. Explain/account for- Requires the description plus the reasons behind. For description start with 'From' and reasons use 'Because'
- Fig. 1 shows the oxygen dissociation curves for foetal haemoglobin (P and Q) and for maternal haemoglobin (R and S) at different pH values.



Describe the effect of

(i) Increasing partial pressure of oxygen on saturation of haemoglobin, using both fig. 1 and 2 (6 marks)

(Very) low partial pressure of oxygen; ✓ resulted into gradual increase in percentage saturation of haemoglobin with oxygen; ✓ increasing partial pressure of oxygen steeply ✓ resulted into rapid/sharp/dramatic/steep increase in percentage saturation of haemoglobin with oxygen; ✓

(Very) high partial pressure of oxygen ✓ resulted into percentage saturation of haemoglobin remaining constant; ✓ OR has no effect on the percentage saturation of HB with oxygen. Accept words: causes/leads.

- Example-From 0 hour to 2 hours, the amount of carbohydrates formed during photosynthesis was zero/no carbohydrates formed;
- For RELATIONSHIPS - use words such as while/as/both etc.
- EXAMPLE- AS time increases, in both respiration rapidly increases.
- For rate start with initial point and further spread.
- WORDS USED WHEN HANDLING TRENDS.
- -Rapid/fast/drastring/sharp/steep
- -slow/gradual/gently
- AVOID WORDS
 - Linear
 - Accelerating
 - Generally
- Uniformly. Less, more (these are comparative words) and should not be used when describing trend



- b) Explain the variation

- (i) Increasing partial pressure of oxygen on saturation of haemoglobin.

Low partial pressure of oxygen, HB saturation increased gradually because few haem groups are bound to oxygen; ✓ polypeptide chains (alpha and beta) tightly bound together/closely united; ✓ making it difficult for oxygen to access haem groups/iron atoms; ✓

Increasing partial pressure resulted into rapid uptake of oxygen, because more haem groups are bound to oxygen; ✓ haemoglobin opened up polypeptide chain/quaternary structure changes shape; exposing other haem groups hence picking up oxygen more rapidly; ✓

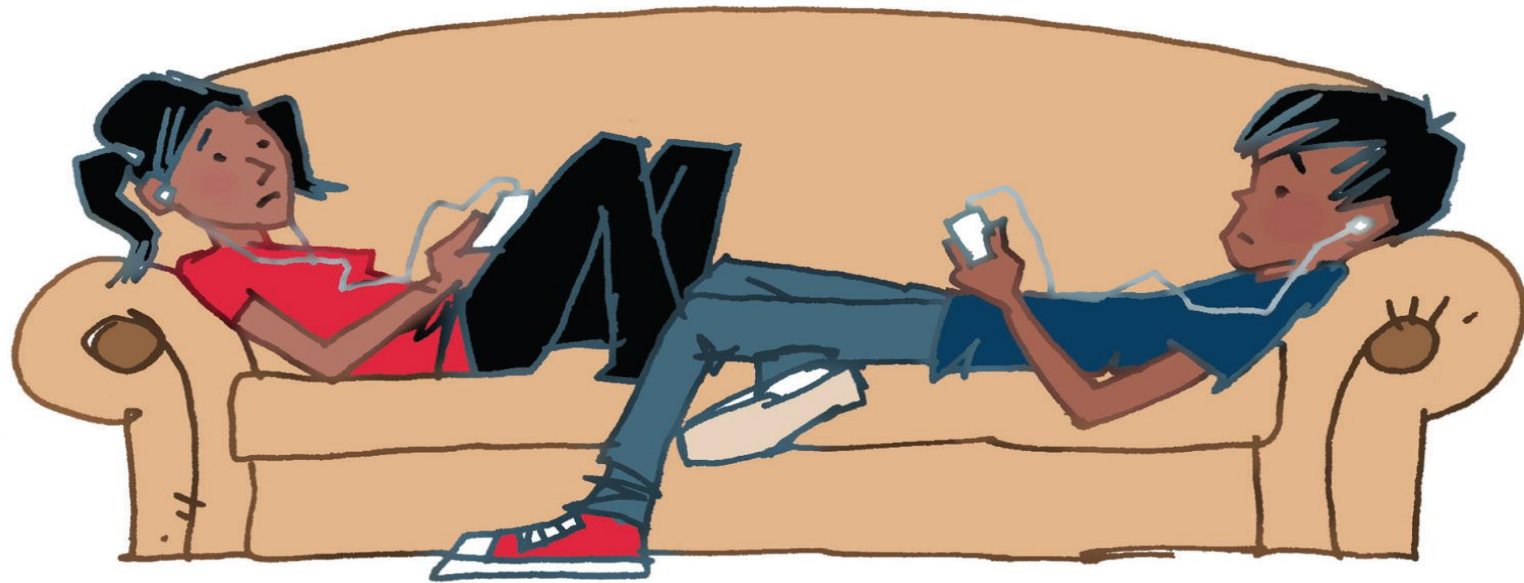
Very high partial pressure, saturation of HB remained almost constant because all haem groups are bound with oxygen/all binding sites of oxygen on haemoglobin are filled/occupied/saturated; ✓ Reagent relatively constant.



REVISION TIPS

- Start revising very early.

Start revising about 2 months prior to the exams to avoid last minute panic!



2. BEGIN WITH A PLAN!

Plan how to manage your time well.

Design a suitable time table to follow when revising.

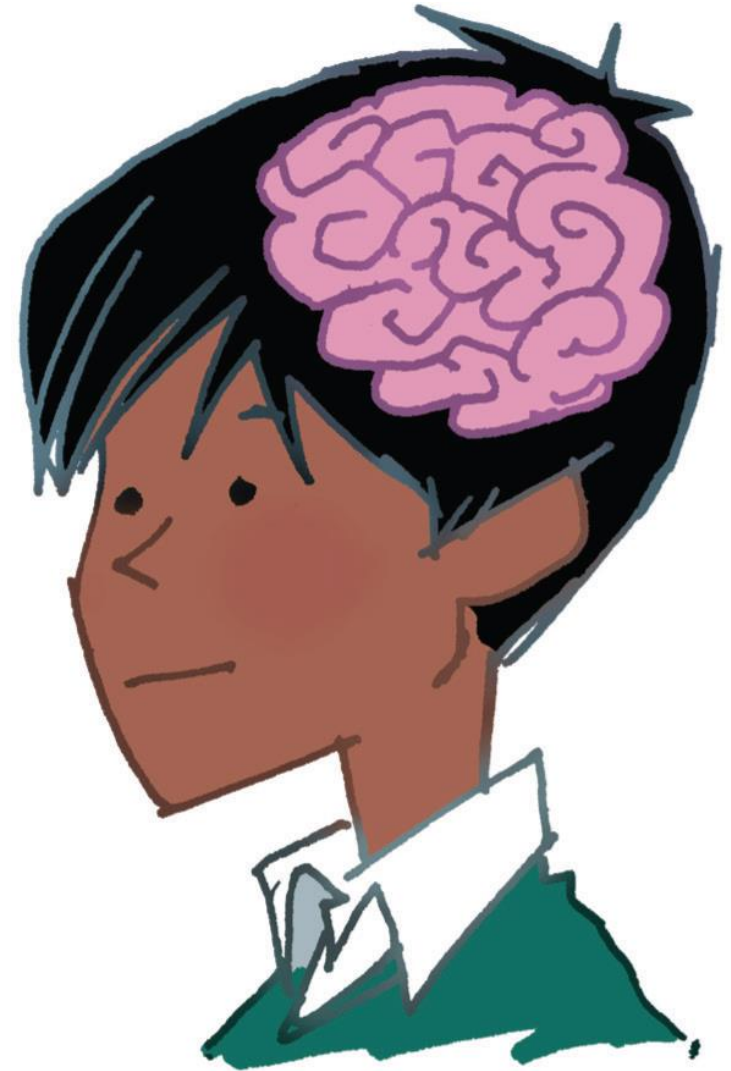
Hint on your friends so that you can engage them in a discussion

Be committed to your revision schedule.

Time for dissection practice must be created.



3. Don't just sit and read!
Your textbook covers your
biology syllabus. Reading
it is part of revision ... but
only part! There are many
other ways to get material
into your head



3 DON'T JUST SIT AND READ!

FOR EXAMPLE, TRY SOME OR ALL OF THESE ...

MAKE BRIEF NOTES OF THE KEY POINTS

USE **COLOURS AND HIGHLIGHTING** FOR THE KEY POINTS.

SAY WHAT YOU HAVE LEARNED OUT LOUD.

USE THE **REVISION CHECKLIST** FOR EACH CHAPTER.

YOU CAN PRINT IT FROM THE CD, AND TICK THE ITEMS ON IT.

DO **QUESTIONS** FROM THE BACK OF THE CHAPTERS IN THE TEXTBOOK.

DO THE **INTERACTIVE TEST** FOR EACH CHAPTER.



4.Try questions from past exams

- Get practice in answering past exam questions.
- This is very important. It will help to give you confidence.
- - the past exam questions from the back of the textbook
- - a set of past exam questions, with model answers,
- to work through
- - a set of sample exam papers, based on other past
- questions, for you to try against the clock.
- Your teacher can check your answers.



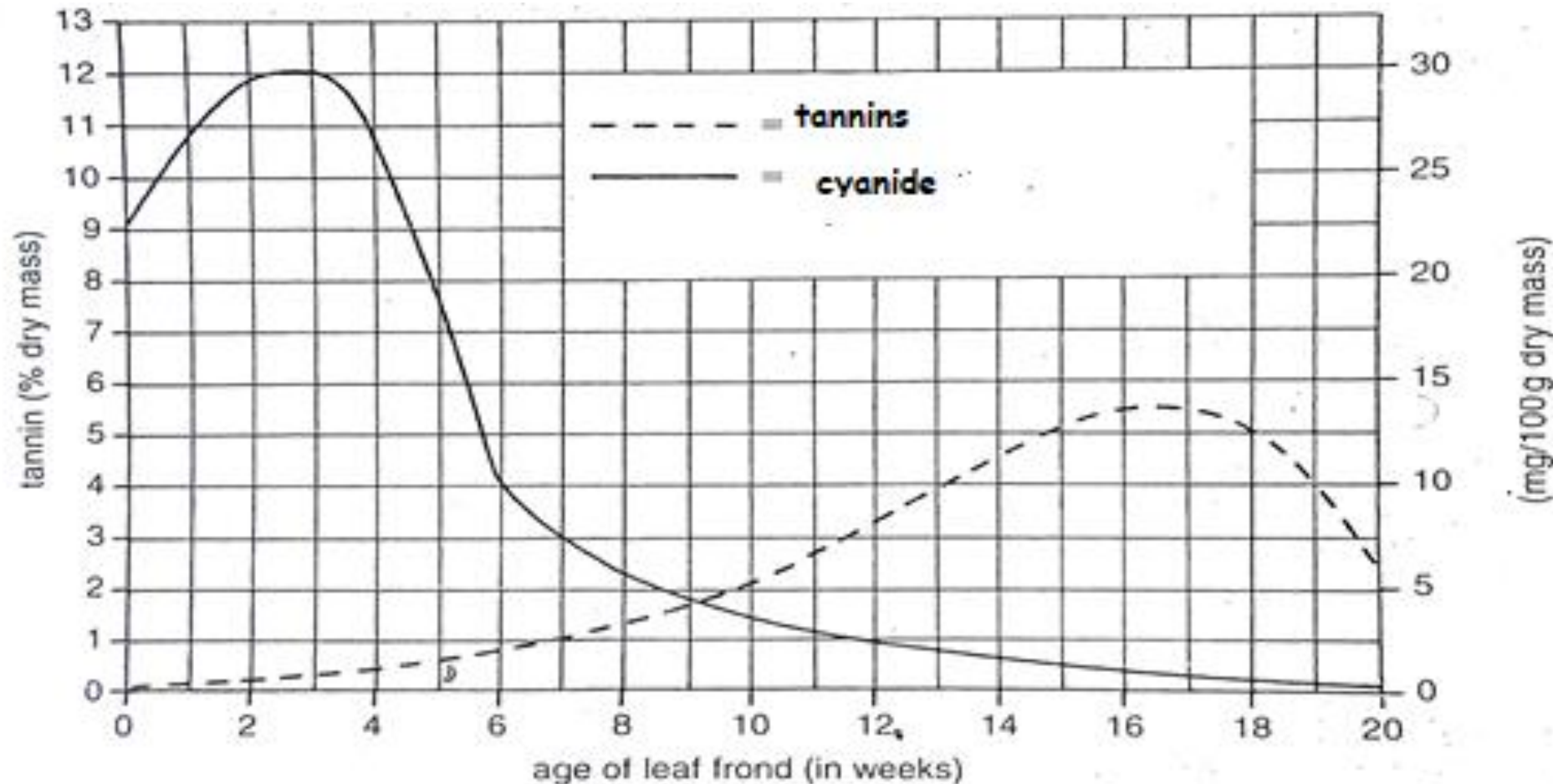
5 But don't work too hard!

- Brains get tired after a while. We also learn better
- at the start and end of a session.
- So it is better to keep each revision session quite
- short, rather than going on for hours.
- If you lose concentration, take a break.
- Take a walk. Dance around. Sing.
- Then back to work, refreshed.
- Revising late the night before an exam is *not* idea



SAMPLE QUESTIONS FOR YOU

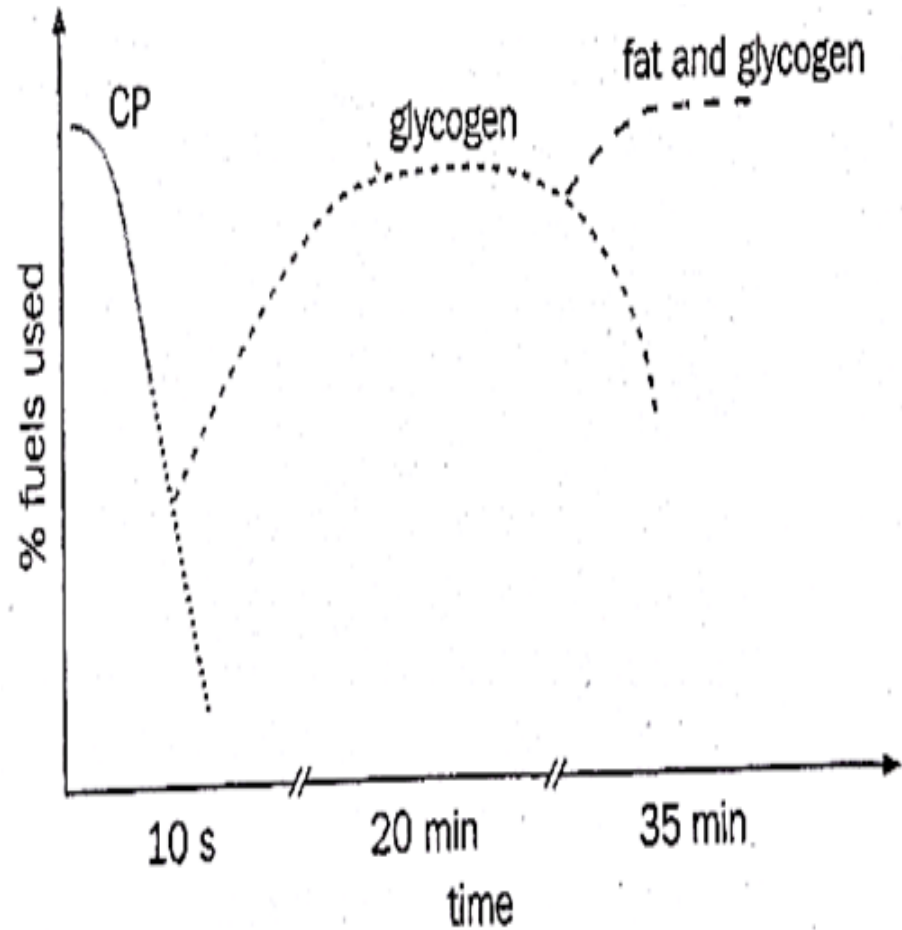
- The graph below shows changes in the concentration of cyanides and tannins of a plant. Study it carefully and answer questions that follow.



- From 0 week to 3 weeks the concentration of the cyanide increased rapidly; to a peak; because they are made by the leaves ✓ in order to provide protection against herbivory ✓ (Feeding on buds/young leaves)
- from 3 weeks to 20 weeks the concentration of cyanide decreased rapidly later gradually to a minimum ✓ because cyanide was broken down by plant enzymes; to stop inhibition of the respiratory enzymes; adequate ATP required for rapid growth during this age. ✓ ✓
- From 0 week to 17 weeks, the concentration of tannins increases gradually to a peak ✓ due to increased secondary metabolism; ✓ forming tannins; for protection of the plant against herbivory/entry of pathogen ✓ and tannins take up role of cyanides due to their lack of inhibitory effects on respiratory enzymes ✓
- From 17 weeks to 20 weeks, the concentration of tannins decreased gradually, due to fall in secondary metabolism; with increasing age. ✓ ✓



The graph below shows the relationship between the duration of an exercise and the type of fuel used. Study it carefully and answer questions that follow



For the first 10 seconds, the % of CP decreases rapidly; and stops;

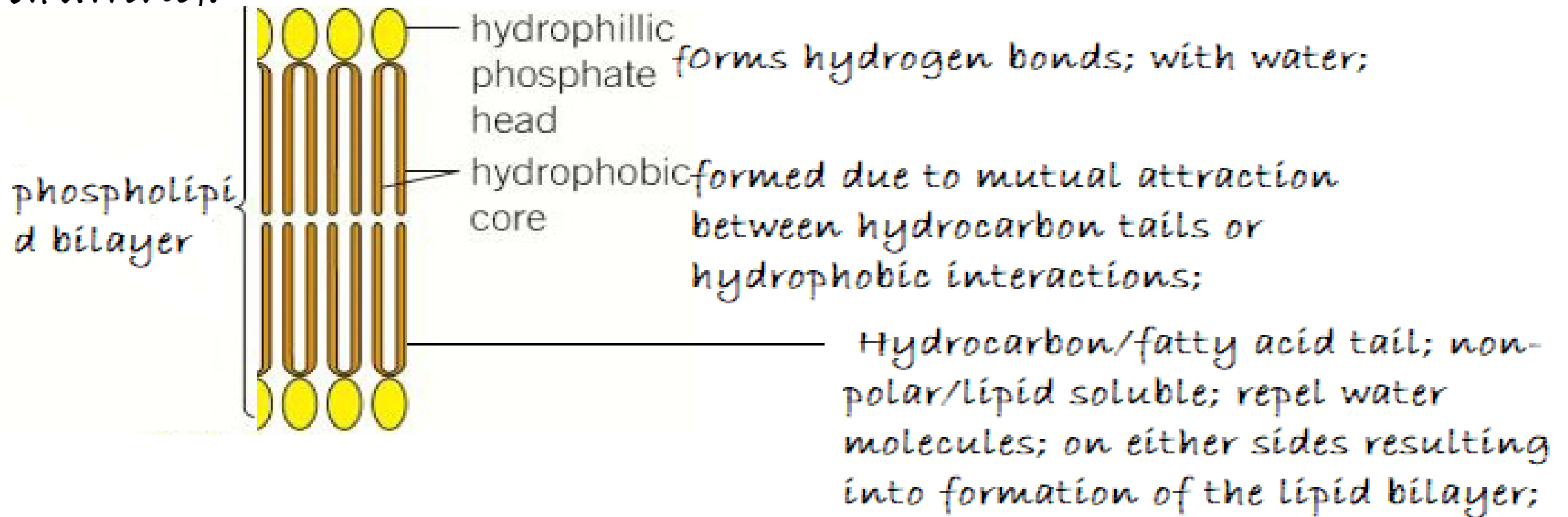
CP provides an almost instant replenishment of ATP ✓ creatine phosphate is broken down to form inorganic phosphate/phosphate ion and energy ✓ and the energy released is used to add a phosphate to ADP to reform ATP; ✓ very vital during the initial stages of the activity; ✓ later the pathway stops because creatine phosphate supplies are limited in muscles so the re-synthesis of ATP by this pathway fails; ✓



ANNOTATE.-

using a drawing with brief notes giving extra information.

Example - Describe how the lipid bilayer is formed using annotated drawing.



DISCUSS-

- Debate, giving the various view points and arguments
- Question- Discuss the energy flow through the food web.
- Energy flow in the ecosystem is linear/non-cyclic; ✓ sun is the principal source of energy; ✓ primary producers/autotrophs/photosynthetic organisms; ✓ green plants/algae/blue green bacteria; ✓ transform solar energy/light energy; ✓ to chemical energy which is contained in the organic molecules that make up their tissues; ✓ primary consumers/herbivores ✓ feed directly on primary producers; ✓ secondary consumers feed on primary consumers; ✓ tertiary consumers feed on secondary consumers; ✓ and quaternary consumers ✓ feed on tertiary consumers; ✓ and when plants and animals die ✓ are decomposed by fungi and bacteria to obtain their energy; ✓ little energy is passed from one trophic level to another ✓ is lost as heat; ✓ through respiration; ✓ excretion and indigestible materials; ✓



ACCEPT THE LOSES

- Solar energy is reflected back by clouds/dust into space ✓✓
- -Absorbed by the atmosphere and re-radiated ✓✓
- -light may not fall on a chlorophyll molecule eg rocks ✓✓
- -Energy lost by transmission through the leaf hence not used ✓✓
- -Energy lost since its not a correct wavelength for absorption by photosynthetic pigments ✓✓
- -Solar energy absorbed turned into heat energy in the atmosphere, particularly by Ozone layer. ✓✓
- -Solar energy used in the evaporation of water off the leaves due to heating ✓✓
- -limiting factors of photosynthesis eg carbon dioxide affect amount of light used ✓✓



■ ACCEPT COMPARISONS OF EFFICIENCY

- lower from plants to herbívores ✓ because -much of the plant NNP is indigestible to herbívores; ✓ much of the plant materials are not consumed by herbívores eg roots/bark; ✓ and also high respiration rate and photorespiration ✓. Transfer from herbívores to the carnívores is much more efficient ✓ because animal tissues are more digestible than plant tissues; ✓ animal tissues have higher calorific values ✓ carnívores being specialized for prey consumption.



■ OUTLINE- give the main points

Question – Outline the main stages of oxidative phosphorylation

NAD accepts two hydrogen atoms; ✓ hydrogen atoms passed to FAD/FMN; ✓ addition of the hydrogen atoms to carriers causes reduction; ✓ each time hydrogen atoms flow from NAD to FAD energy is released and used to form ATP ✓. Hydrogen atoms passed on to co-enzyme Q which splits hydrogen atoms into protons and electrons ✓ FADH₂ from Krebs cycle passes on its hydrogen atoms to Co-Q ✓ electrons pass through a system of electron carriers/cytochromes through series of redox reactions ✓ forming ATP from ADP and P_i ✓ Final electron carrier is cytochrome oxidase; catalyzes combination of hydrogen atoms with oxygen forming water ✓ Energy associated with the flow of electrons and hydrogen atoms is used to pump hydrogen ions from the matrix into inter-membranal space; ✓ resulting into establishment of the proton electrochemical gradient between matrix and inter-membranal space ✓ Protons pass back into the matrix through stalked granules along electrochemical gradient ✓ and electrical potential energy is used to form ATP catalyzed by ATP synthetase. ✓



DISTINGUISH OR CONTRAST

- Make distinction between, point out differences,
- Question. Distinguish between humoral and cell mediated responses

Humoral	Cell mediated
Mediated by B-cells;	Mediated by T-cells; ✓
Plasma B-cells secrete antibodies;	No antibodies produced; ✓
Second stage of immune response after cell mediated;	First stage of immune response ✓
No cytokines produced	Cytokines are produced; ✓
Effective through body fluids	Effective through cells ✓
May or may not involve APCs	Involves APCs for antigen presentation; ✓
Rapid response;	Slow response; ✓



CRITICIZE

- Point out faults and shortcomings
- QUESTION- Critic the lipid-sandwich model of cell membrane structure.
- Solution- looks at the cell membrane as a very rigid/stiff structure ✓
- Proteins and lipids as the major chemical components but cholesterol and glyco proteins and lipids are not mentioned ✓
- Cell membrane as Trilaminar structure/3-distinct layers ✓
- Proteins don't permeate the membrane ✓
- Proteins sandwiching the lipid bilayer ✓
- Points out a single continuous protein layer ✓
- Proteins and lipids don't float/move ✓



COMPARE

- point out differences and similarities.
- Question – Compare T cells and B-cells.

Solution

Similarities - Both the originate from stem cells in the bone marrows/haemopoietic stem cells ✓

- Both are part of the adaptive/acquired immunity ✓

- Both undergo proliferation by mitosis ✓

- Both are effector cells/Fight infections ✓

- Both are nucleated ✓

- Both are motile ✓

- Both form Memory cells ✓



■ Differences between B and T cells

B-cells	T-cells
Mature in the bone marrow;	Mature in the thymus gland; ✓
Quicker in action;	Slower in action; ✓
Fewer in number;	Larger in number; ✓
Responds later after T-cells	Attack the pathogen first; ✓
Produce/secrete antibodies;	Don't secrete antibodies ✓
Don't secrete cytokines	Secrete cytokines/lymphokines/interleukins ✓

