



Cambridge O Level

BIOLOGY

5090/11

Paper 1 Multiple Choice

October/November 2022

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

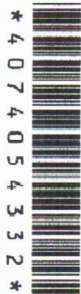
INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

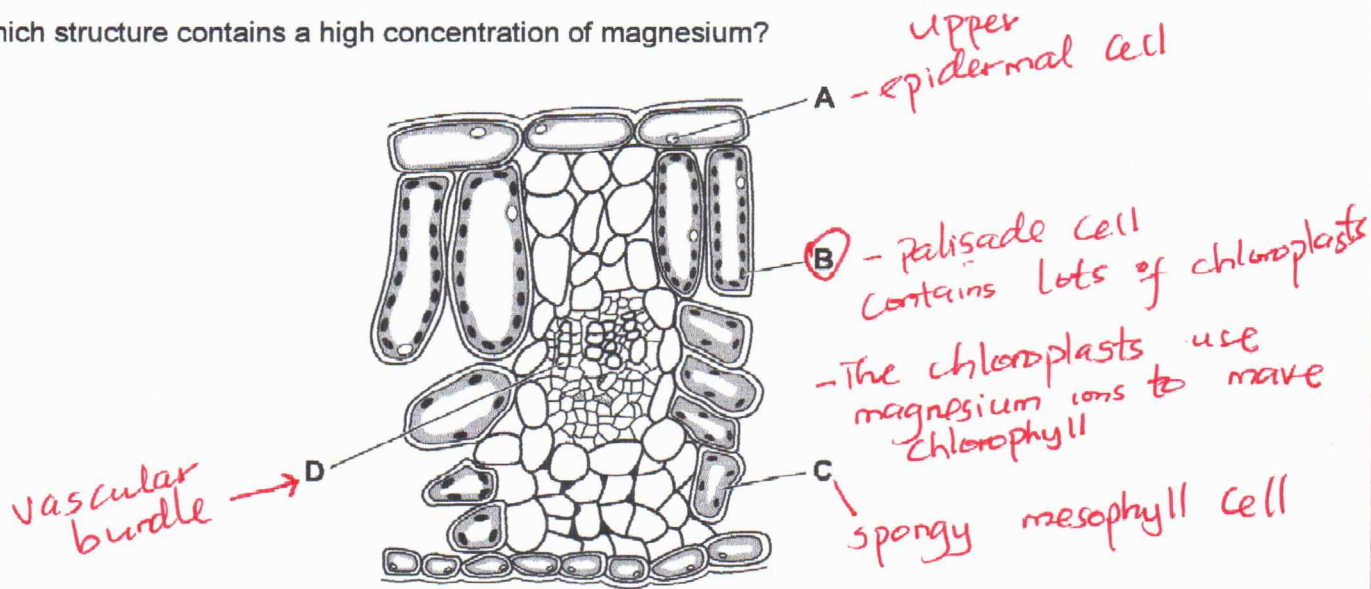
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **20** pages. Any blank pages are indicated.



1 The diagram shows cells from a plant leaf.

Which structure contains a high concentration of magnesium?



2 What are the functions of xylem vessels?

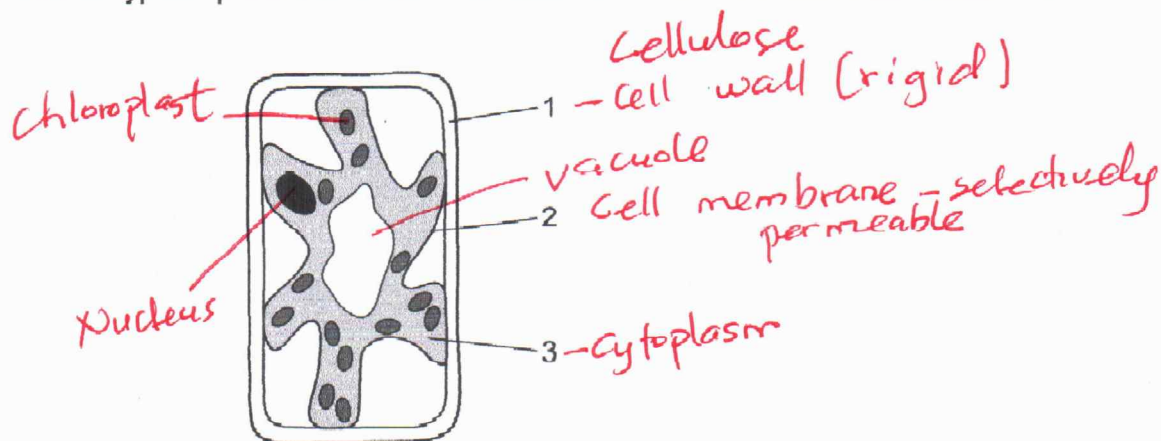
Xylem vessels are reinforced by lignin for support in roots and stems

	strengthening roots and stems	supporting leaf shape	transporting sugars
A	✓	X	X
B	✓	✓	X
C	X	✓	✓
D	X	X	✓

key
 ✓ = yes
 X = no

Sugars are transported by phloem

3 The diagram shows a typical plant cell which has been in a concentrated salt solution for 10 minutes.



Which numbered structures are partially permeable?

A 1 and 2

B 1 and 3

C 1 only

D 2 only

4 Which row applies to active transport?

Movement of materials from region of low to high concentration

	movement occurs from region of higher concentration to region of lower concentration	movement occurs from region of lower concentration to region of higher concentration	an example is ion uptake by root hairs	an example is water uptake by root hairs
A	✓	x	✓	x
B	✓	x	x	✓
C	x	✓	✓	x
D	x	✓	x	✓

key \Rightarrow Molecules are moved up their concentration gradient
 ✓ = yes This process use energy from respiration
 x = no \Rightarrow Root hair cells absorb nitrate ions by active transport

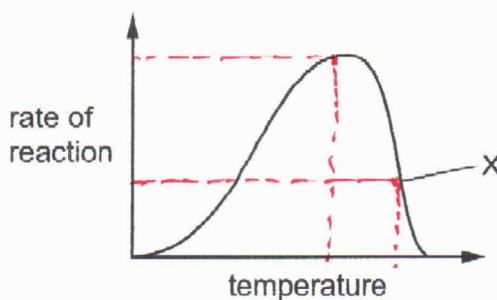
5 Which statements are correct?

- ✓ 1 Enzymes are proteins and function as catalysts. *- enzymes are biological catalysts that are proteins in nature*
- 2 Enzymes are changed by the reaction they catalyse.
- ✓ 3 The 'lock and key' hypothesis explains the way that enzymes function.

A 1, 2 and 3 B 1 and 2 only **C** 1 and 3 only D 2 and 3 only

enzymes are specific in their activity due to lock and key hypothesis

6 The diagram shows the effect of temperature on the rate of an enzyme-controlled reaction.



- decreasing enzyme activity caused by enzyme becoming denatured.

What is the explanation for the part of the graph labelled X?

- A The temperature is dropping. *- false*
- B The substrate is starting to run out. *- false*
- C** The enzyme is becoming denatured. ✓
- D The enzyme is starting to run out. *- false*

- 7 A small mountain lake has aquatic plants growing under water on the lake bed. Shortly after heavy rainfall, the mud on the lake bed becomes stirred up and the water level rises.

Mud decrease light penetration to lower depth of the pond

Why does this cause the rate of photosynthesis of these plants to fall?

- A extra carbon dioxide *-false*
 B extra dissolved nitrates *-increase growth*
 C lower light intensity *- mud reduce light intensity*
 D lower oxygen concentration *-false*
- 8 Some plants have large leaves and are growing well but the leaves are turning yellow.

Which factor is likely to be causing this problem?

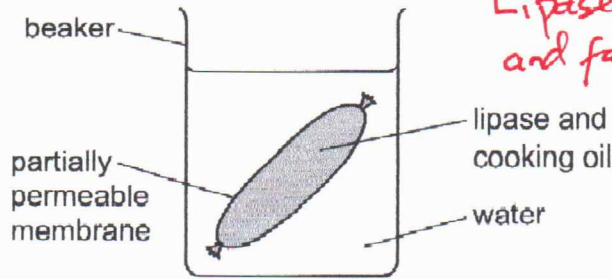
- A a lack of magnesium in the soil *- magnesium is used in making of chlorophyll. Lack of chlorophyll (chlorosis) make leaves to appear yellow*
 B a lack of water in the soil *-false*
 C not enough sunlight *-false*
 D too much nitrate in the soil *-false*

- 9 Which row shows the average daily energy requirement for the people in the table?

	7500 kJ	9000 kJ	10 500 kJ	15 000 kJ
A	6-year-old child	pregnant woman	male manual labourer	teenage girl
B	6-year-old child	teenage girl	pregnant woman	male manual labourer
C	teenage girl	6-year-old child	male manual labourer	pregnant woman
D	teenage girl	pregnant woman	6-year-old child	male manual labourer

- Teenage girl require more energy because her body is developing faster*
- Manual labourer use more energy for work.
- pregnant woman has high energy needs for herself and for the baby.

10 The diagram shows an experiment.



After 30 minutes, tests were carried out on the contents of the membrane bag and on the water in the beaker.

Which row shows the results of the tests?

The fatty acids make the pH 5.5 (acidic).

	biuret test on water in the beaker	biuret test on the contents of the bag	pH of water in the beaker
A	blue	blue	6.0
B	<u>blue</u>	<u>purple</u>	<u>5.5</u>
C	red	purple	7.0
D	purple	blue	8.0

Biuret test confirms contents of the bag has protein

11 Which function is **not** carried out by the liver?

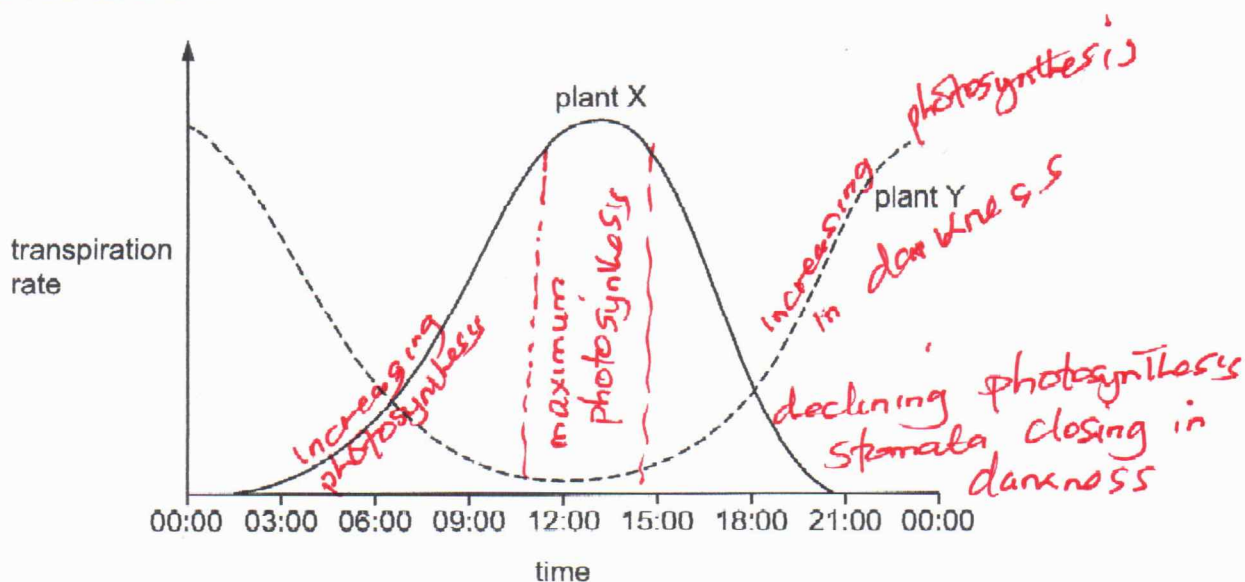
- A breakdown of alcohol - detoxification
- B conversion of glycogen to glucose - increases blood sugar level
- C formation of urea - deamination
- D** secretion of digestive enzymes - Liver does not secrete any enzyme

12 Which statements about root hairs are correct?

- ✓ 1 The cell membrane can allow movement of water and ions into the cell. - partially permeable
- ✓ 2 The cell vacuole extends into the root hair. - storage bag of solutes
- ✓ 3 They are formed as an extension of the outer layer of root cells. - absorb H₂O from soil

- A** 1, 2 and 3 B 1 and 2 only C 1 and 3 only D 2 and 3 only

- 13 The graph shows the transpiration rates of two plants during one day. Both plants were grown under identical conditions.



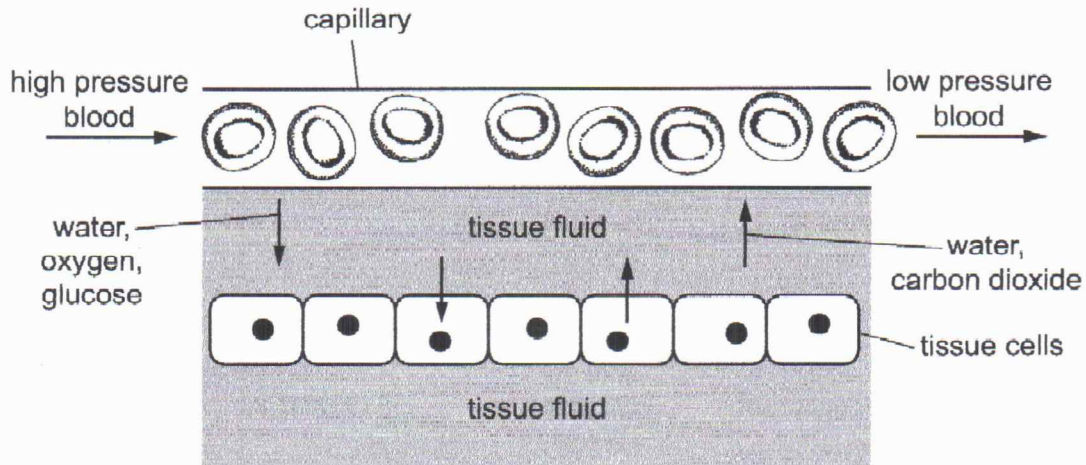
Which statement explains what the graph shows?

- A Plant X closes its stomata during the brightest part of the day. *- false (no evidence)*
 - B Plant Y closes its stomata during the brightest part of the day. *✓*
 - C Plants X and Y close their stomata during the brightest part of the day. *- false (no evidence)*
 - D Plant Y has no stomata. *- false (no evidence)*
- 14 Some people have a rare heart condition in which the lower left chamber of the heart has not developed properly and is much smaller than normal.
Left ventricle pumps blood to aorta
 The immediate result of this condition is to cause lower than normal blood flow into which blood vessel?
- A aorta *- pumps blood to all body organs*
 - B pulmonary artery *- pumps blood to lungs for oxygenation.*
 - C pulmonary vein *- receives blood from lungs*
 - D vena cava *- receives blood from the body organs*
- 15 Tissue transplants are normally rejected by the body unless the transplant tissue and the patient are very carefully matched.

Which component of the blood is responsible for the rejection of transplanted tissue?

- A plasma *- Liquid part of blood*
- B platelets *- clotting*
- C red blood cells *- transport oxygen*
- D white blood cells *(lymphocytes and phagocytes)*

16 The diagram shows movement of substances between blood in a capillary and tissue fluid.

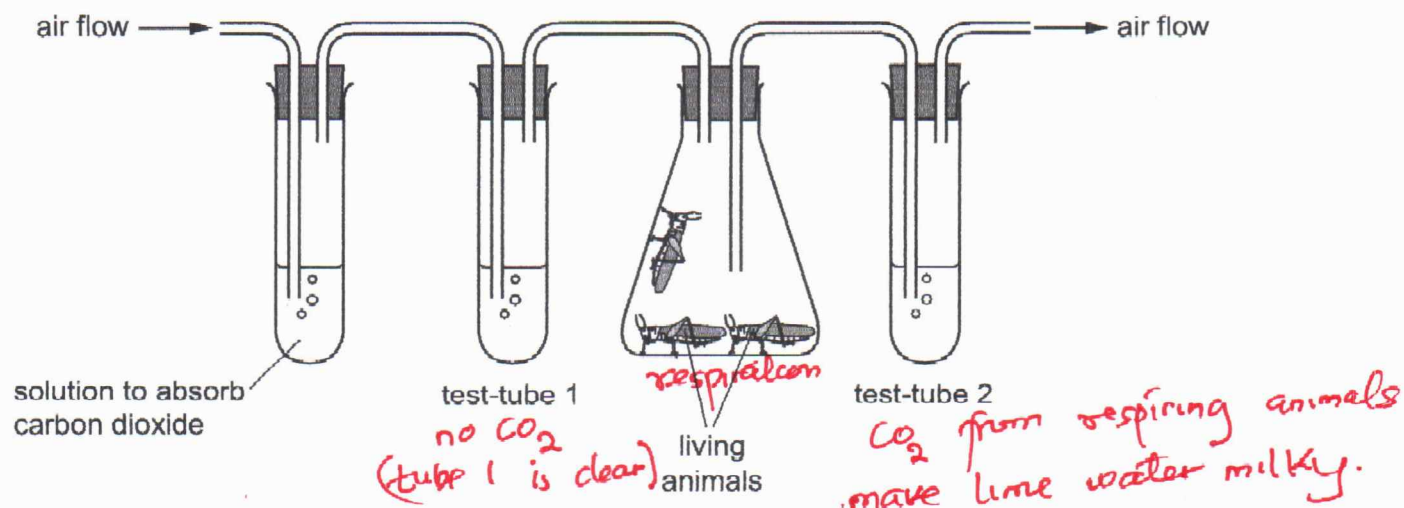


By which process does water move from tissue fluid to capillary?

- A active transport - movement of materials against their concentration gradient;
- B water pressure - false (not evidence)
- C osmosis - movement of water across partially permeable membrane
- D assimilation - movement of soluble end products of digestion into cells

17 An experiment is set up, as shown.

Test-tubes 1 and 2 contain limewater. Limewater is a clear solution that turns cloudy in the presence of carbon dioxide. Air is pumped through the apparatus.



What is the appearance of the limewater in test-tubes 1 and 2 after a period of 10 minutes?

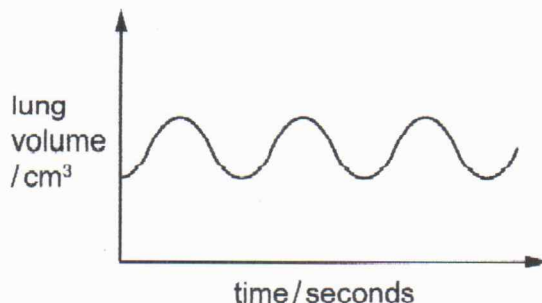
	test-tube 1	test-tube 2
A	clear	clear
B	clear	cloudy
C	cloudy	clear
D	cloudy	cloudy

18 Which equation represents anaerobic respiration in yeast?

- A glucose → ethanol - false
- B glucose → ethanol + lactic acid - false
- C glucose → lactic acid + carbon dioxide - Lactic acid is formed in animal cells
- D** glucose → ethanol + carbon dioxide - anaerobic respiration in yeast

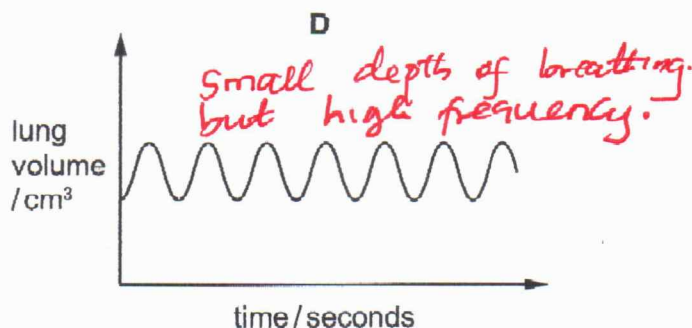
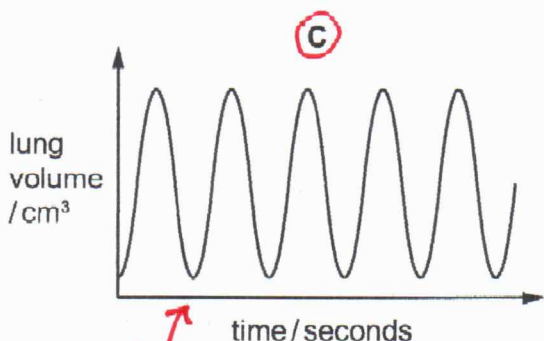
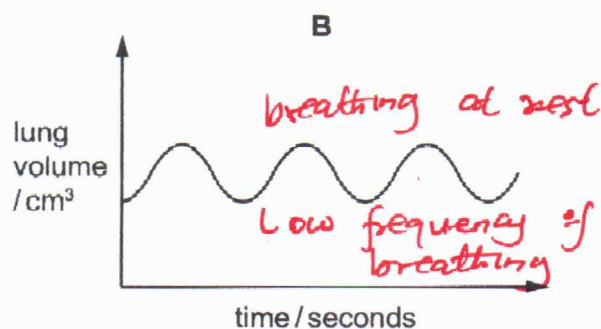
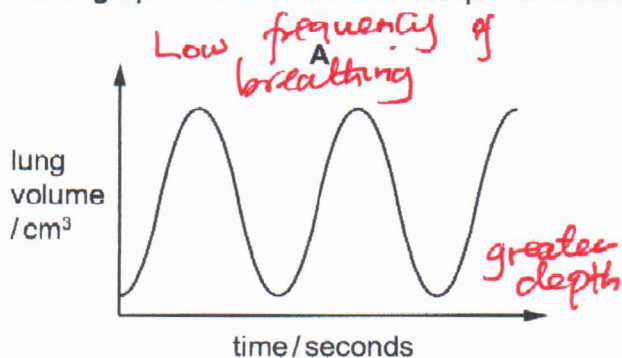
Anaerobic respiration in yeast cells produce ethanol and carbon dioxide.

19 The graph shows the rate and depth of breathing at rest.



uniform frequency of breath at rest

Which graph shows the rate and depth of breathing during exercise?



20 How do the concentrations of oxygen and urea in the renal artery compare to their concentrations in the renal vein?

Renal artery transfer oxygenated blood to the kidney. Oxygenated blood has less urea

	oxygen in renal artery	urea in renal artery
A	higher	higher
B	<u>higher</u>	<u>lower</u>
C	lower	higher
D	lower	lower

Renal vein ^{filtered} removes blood out of kidney to ^{vein aorta} Blood leaving the kidney is rich in urea

21 Which changes occur when a person walks from a very cold room into a hot room?

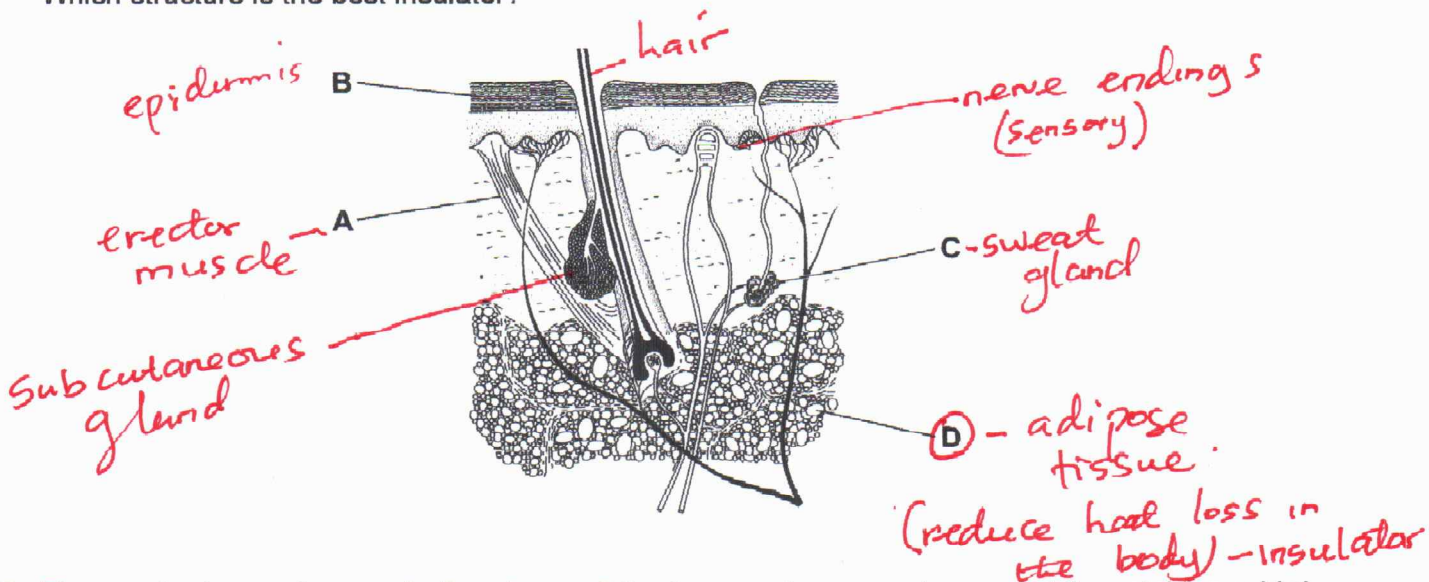
Sweating increase in warm environment. The latent heat of vaporization of sweat cools the body

	sweating	skin blood vessels
A	decreases	constrict
B	decreases	dilate
C	increases	dilate
D	increases	constrict

Blood vessels dilate to increase heat

22 The diagram shows a section through part of the skin.

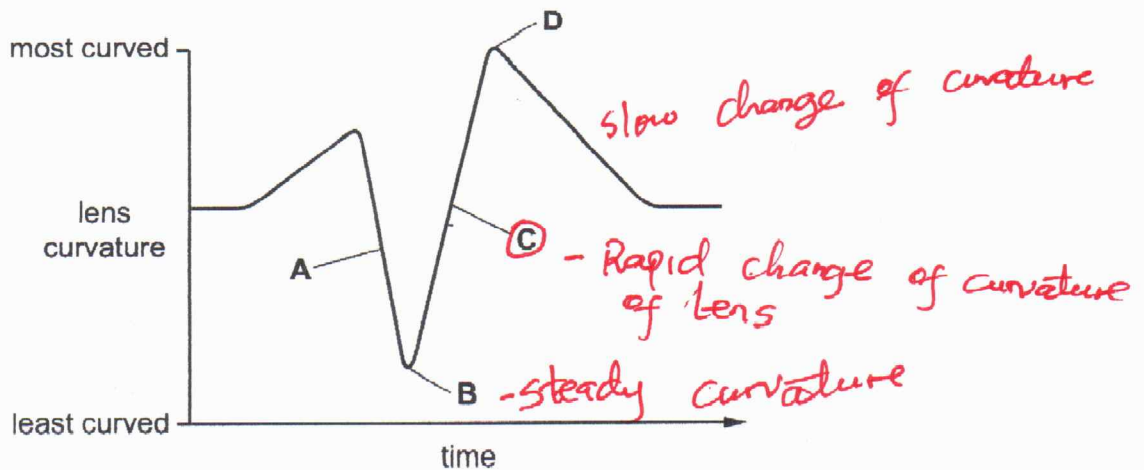
Which structure is the best insulator?



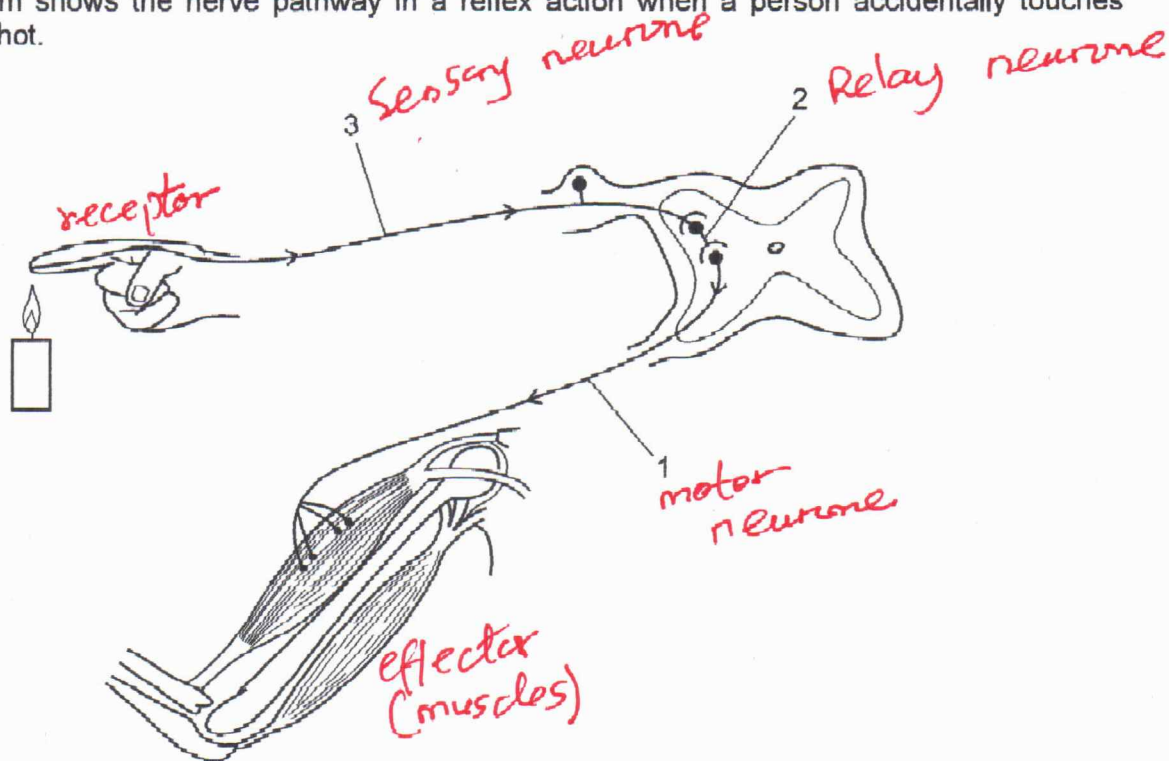
23 The graph shows changes in the shape of the lenses of a person's eyes while watching a bird flying.

lens become fat when objects are near

At which point is the bird flying most rapidly towards the person?



- 24 The diagram shows the nerve pathway in a reflex action when a person accidentally touches something hot.



Which row correctly identifies a sensory neurone, a relay neurone and a motor neurone?

	1	2	3
<input checked="" type="radio"/> A	motor neurone	relay neurone	sensory neurone
<input type="radio"/> B	sensory neurone	relay neurone	motor neurone
<input type="radio"/> C	relay neurone	motor neurone	sensory neurone
<input type="radio"/> D	motor neurone	sensory neurone	relay neurone

- 25 A patient shows symptoms of unexplained weight loss, severe thirst and frequent need of urination.

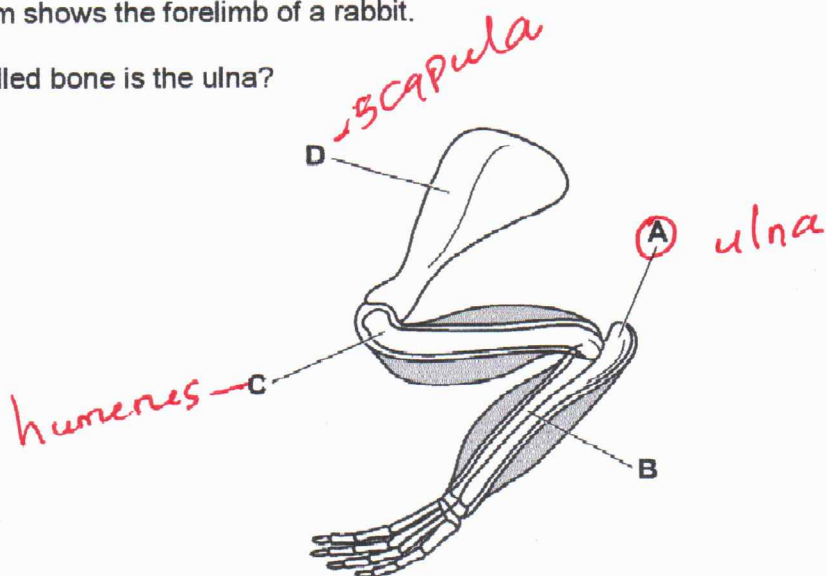
A test shows high levels of glucose in the urine.

Which condition is diagnosed?

- A cardiovascular disease - not related to sugar in urine
- B diabetes - hypoglycaemia
- C anaemia - iron deficiency
- D obesity - overnutrition

26 The diagram shows the forelimb of a rabbit.

Which labelled bone is the ulna?



27 Which activity is most likely to cause lung disease?

- A excessive use of antibiotics - MRSA
- B excessive consumption of alcohol - addiction
- C injection of heroin - false
- D smoking cigarettes - cause lung disease

28 The table shows some features of three types of microorganism.

Bacterium is made of cell but has no nucleus.

type of microorganism	cell wall	cell membrane	nucleus	cytoplasm
1	x	x	x	x
2	✓	✓	x	✓
3	✓	✓	✓	✓

key
 ✓ = present
 x = absent

Which row identifies each type of microorganism?

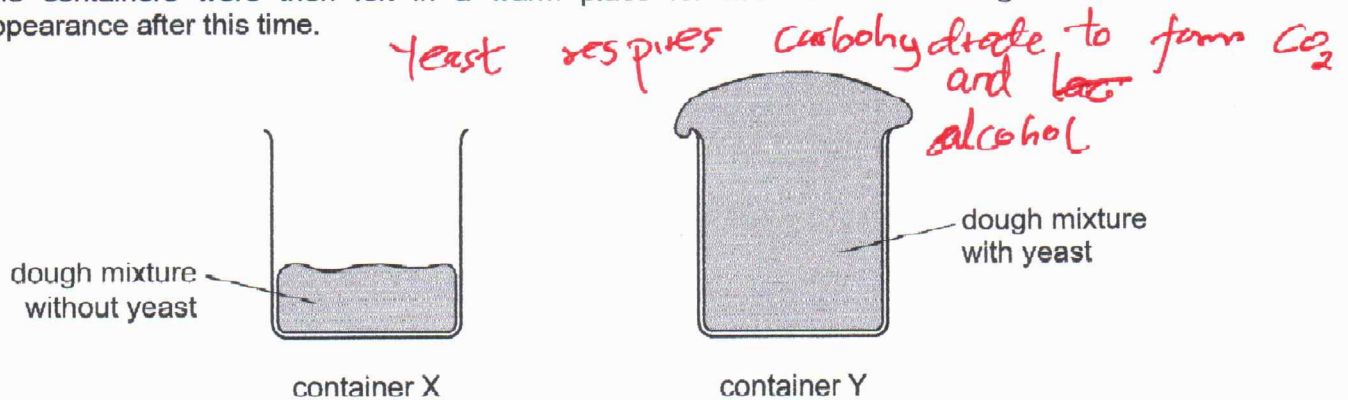
Virus is not a living organism - not made of cell

	microorganism 1	microorganism 2	microorganism 3
A	bacterium	virus	fungus
B	fungus	bacterium	virus
<input checked="" type="radio"/> C	virus	bacterium	fungus
D	virus	fungus	bacterium

Fungus is a living organism made of many hyphae, nucleus, cytoplasm

29 Two containers, X and Y, were filled with equal amounts of dough mixture for making bread. The mixture in Y had yeast in it.

The containers were then left in a warm place for two hours. The diagram shows their appearance after this time.



Which substance produced by the yeast causes the difference between the dough in X and Y?

- A alcohol *- evaporates during baking*
- B carbon dioxide *- Cause dough to rise*
- C lactic acid *- found in animal cells only*
- D oxygen *- used in aerobic respiration*

30 Which types of microorganism carry out decomposition in the nitrogen cycle?

- A bacteria and fungi only *- decomposers*
- B bacteria and viruses only *- Virus not a decomposer*
- C fungi and viruses only *- Virus not decomposer*
- D bacteria, fungi and viruses *- Viruses not decomposers*

31 Which actions can be used to control the malarial pathogen?

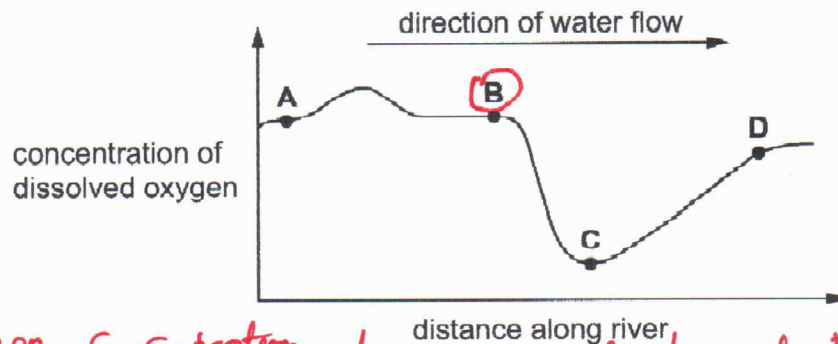
Biological control - Carnivorous fish eating larvae of mosquito

	releasing carnivorous fish in ponds and lakes	applying antibiotic creams to the skin	spraying insecticides on buildings	vaccination with the malarial vector
A	yes	yes	no	no
<input checked="" type="radio"/> B	yes	no	yes	no
C	no	yes	no	yes
D	no	no	yes	yes

*Malaria cannot be treated by anti-biotics
Spraying of insecticides kill mosquito vectors*

32 The graph shows the concentration of dissolved oxygen at different points along a river.

At which point is sewage emptied into the river?

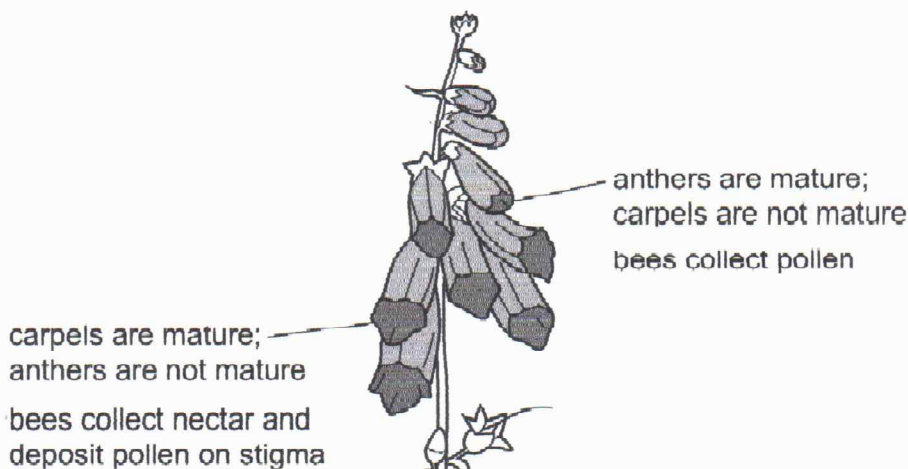


Dissolved Oxygen concentration decreases sharply at the point where sewage is introduced into the river.

33 The diagram shows how bees visit a species of flowering plant that has tall spikes of flowers.

In the flowers at the base of the spike, the carpels are mature but the anthers are not yet mature.

In the flowers at the top of the spike, the anthers are mature but the carpels are not yet mature.



Pollination - transfer of pollen grains from anthers to stigma of flowers of same species.

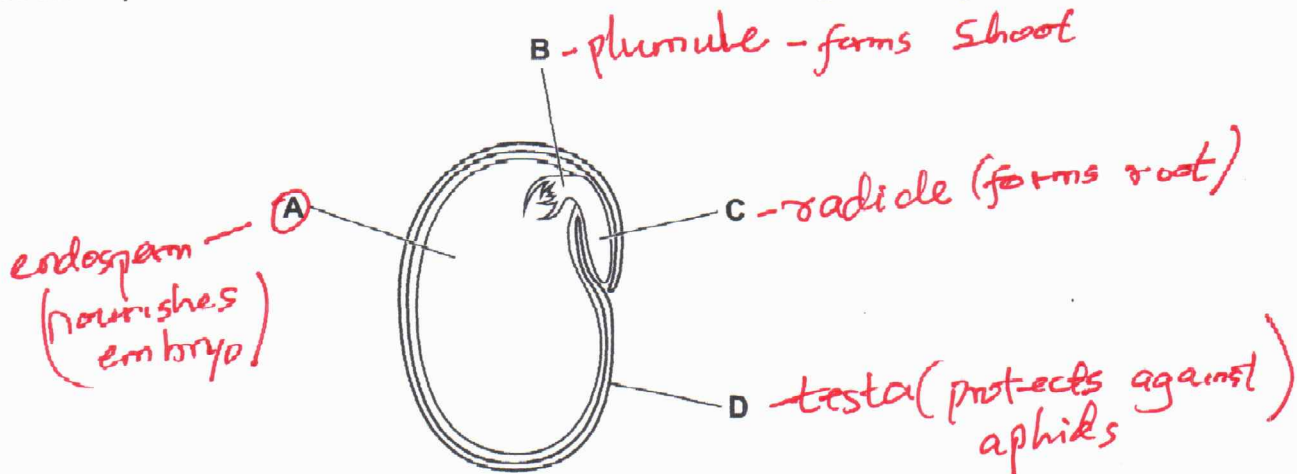
Which statements are correct?

- ✓ 1 Bees visit two flowers for successful pollination.
- ✓ 2 The difference in maturing times for anthers and carpels ensures pollination between flowers. *male and female parts of flower mature at different times.*
- 3 Seeds will develop first in the flowers at the top of the plant. *false*

A 1, 2 and 3 **B** 1 and 2 only C 1 and 3 only D 2 and 3 only

34 The diagram shows a section through a dicotyledonous seed.

Which structure provides most of the nutrients needed for the seed to grow after germination?



35 Human gametes are different from each other.

Which information about male gametes is correct?

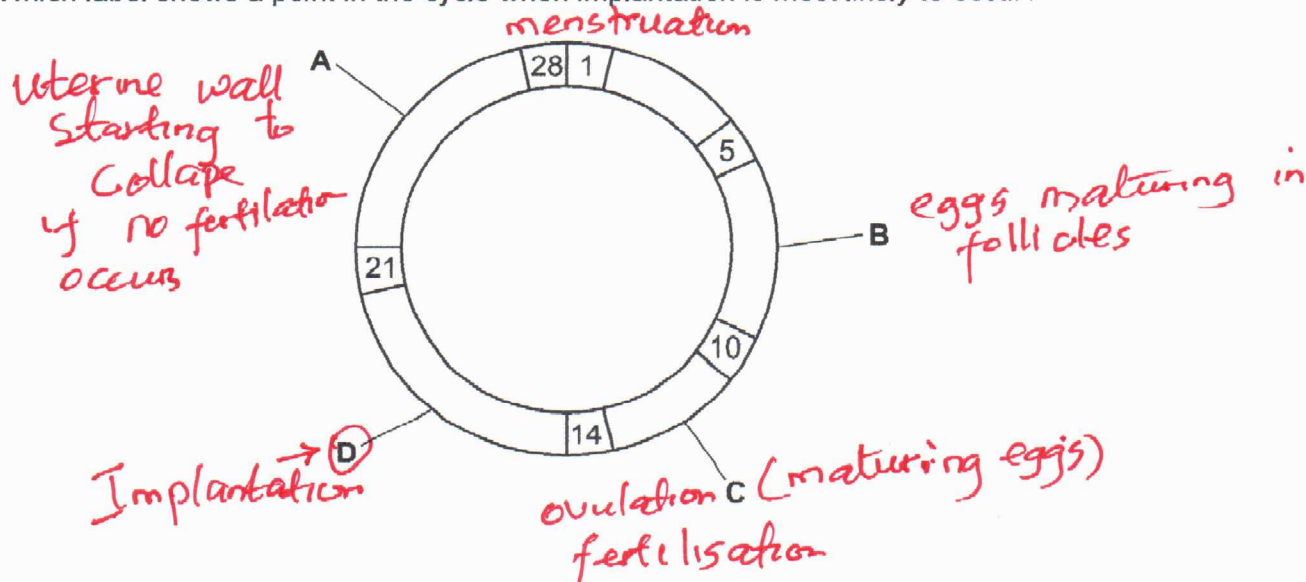
Sperm cells are smaller compared to egg cell, they have a tail for locomotion

	size	numbers released at one time	movement
A	large	normally one	cannot move on their own
B	large	millions	cannot move on their own
C	small	normally one	can swim
D	small	millions	can swim

Sperm cells are produced in large numbers to increase chance of fertilisation

36 The diagram shows the menstrual cycle. The numbers refer to the number of days after the beginning of menstruation.

Which label shows a point in the cycle when implantation is most likely to occur?



37 A variety of snail has an inherited condition that affects the thickness of the shell.

$S^t S^t$ have thick shells.

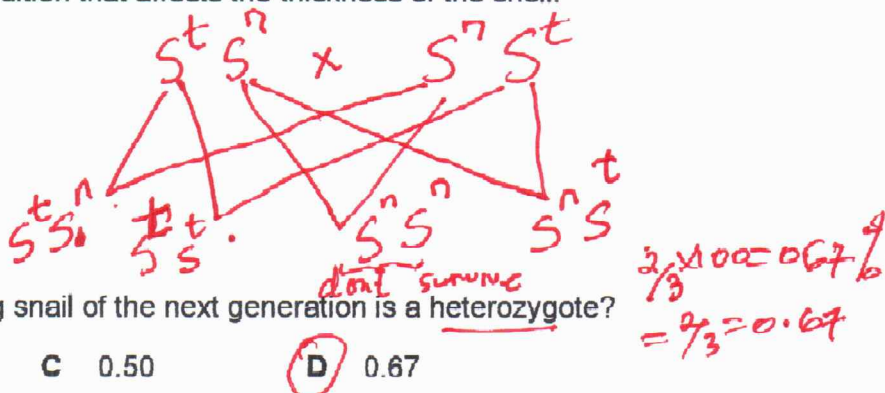
$S^t S^n$ have thin shells.

$S^n S^n$ do not survive.

Two heterozygous snails are mated.

What is the probability that a surviving snail of the next generation is a heterozygote?

- A 0.00 B 0.25 C 0.50 **D 0.67**



38 A man of blood group A and his wife of blood group O had two children, both of blood group A. The man concluded that he must be homozygous for the allele I^A , since he thought half his children would be of group O if he were heterozygous.

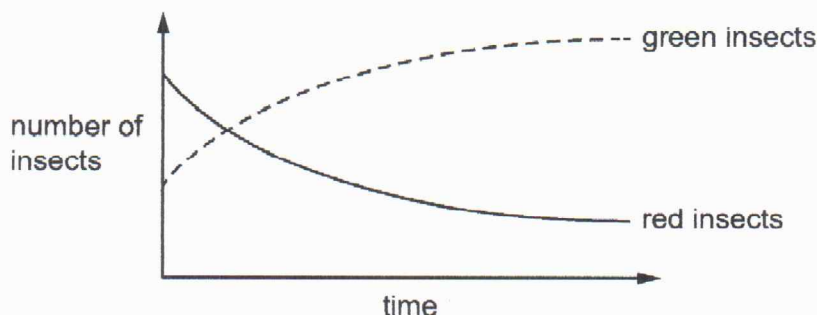
Why was his conclusion unsound?

- A Blood group mutations are common. - false
B Genetic ratios are unreliable for small numbers. - only 2 children
 C His wife might have been heterozygous. - no evidence
 D The expected ratio for a heterozygous father and group O mother is 3 group A : 1 group O. - for large sample

39 In a garden there is a species of insect which can be either red or green in colour. The green insects are well camouflaged.

Birds that eat insects start to live in the garden.

The graph shows how the populations of red and green insects then change.



What is this an example of?

- A artificial selection - no human interference
 B continuous variation - false
 C incomplete dominance - false
D natural selection - camouflage increase chances of survival

40 What can be the benefits of genetic engineering of crops?

- ✓ 1 crops that can be stored for longer — increases shelf-life
- ✓ 2 crops with a better flavour — improved quality
- ✓ 3 less use of fertilisers — compete better with weeds in the field
- ✓ 4 less use of pesticides — resistant to pests and diseases

- A 1, 2, 3 and 4
- B 1, 2 and 3 only
- C 1 and 2 only
- D 3 and 4 only