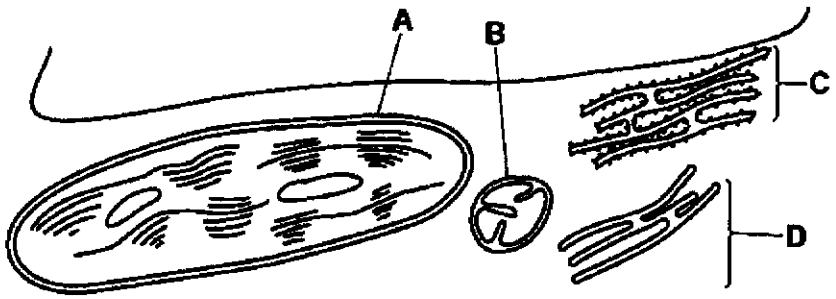
Multiple Choice Questions [40m]

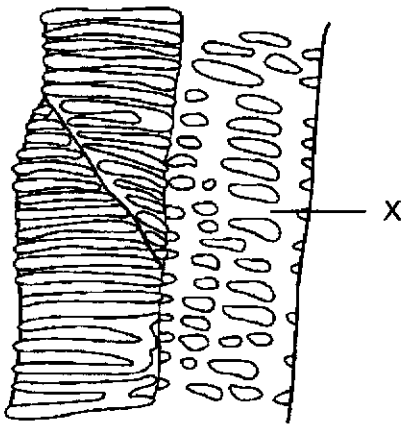
Shade your answers in the OTAS answer sheet provided

1 The diagram shows a drawing made from an electron micrograph of a leaf cell.

Which organelle carries out detoxification?



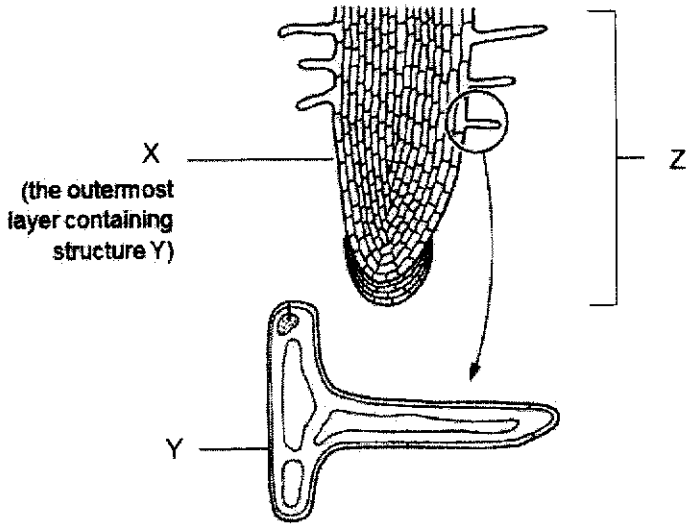
2 The diagram shows part of a xylem vessel.



What is the function of structure X?

A absorption
B photosynthesis
C support
D transport

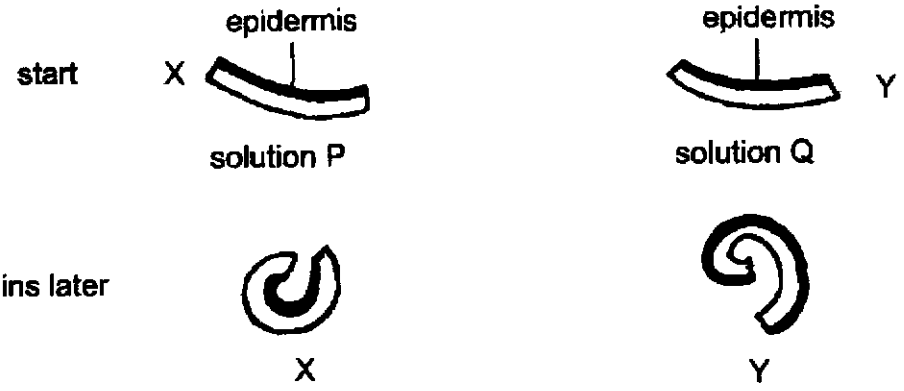
3 The diagram shows the structure of the root of a plant.



Which row is correct?

	X	Y	Z
A	cell	tissue	organ
B	epidermis	root hair cell	root
C	root hair	root cell	root tip
D	tissue	cell	system

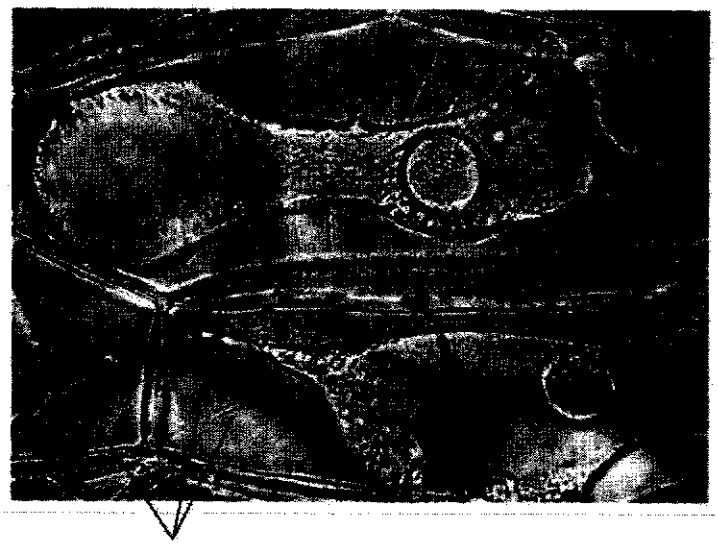
4 A 3 cm long balsam stem was cut into four longitudinal strips. Two of the strips, X and Y, were placed in solutions P and Q respectively. The diagram shows the appearance of X and Y at the start of the experiment and 15 minutes later.



Which of the following could be possible identities of solution P and Q?

	P	Q
A	10% sucrose solution	25% sucrose solution
B	25% sucrose solution	water
C	25% sucrose solution	10% sucrose solution
D	water	25% sucrose solution

5 A fleshy section of an onion bulb was taken and placed in a liquid.
The diagram below shows the cells from the onion bulb after half an hour.



P

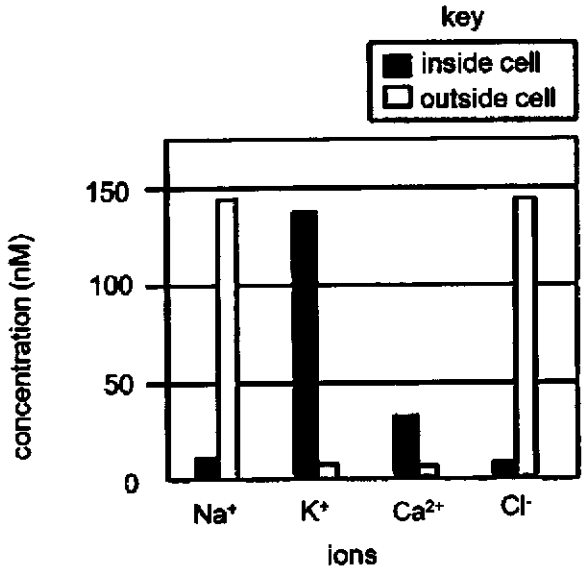
Which of the following is most likely to be in the regions labelled P?

A concentrated sugar solution
B dilute sugar solution
C distilled water
D oil

6 Which of the following statements is the reason why most organisms cannot live in salt solutions more concentrated than sea water?

A The high salt concentration increases the density of the water so the organisms float on the surface.
B The high salt concentration increases the rate by which they enter the cell through active transport.
C Water molecules from tissues of organisms are removed too rapidly.
D Water molecules will enter the tissues and the organisms will burst.

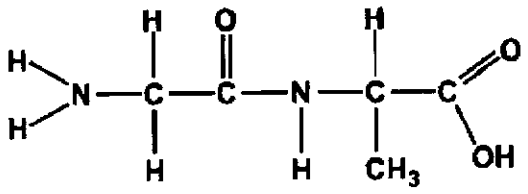
7 The bar graph shows the concentration of various ions on the inside and outside of an animal cell.



Which of the following ions would be taken up by the following methods into the cell?

	diffusion	active transport
A	Cl^-, Ca^{2+}	Na^+, K^+
B	K^+, Ca^{2+}	Na^+, Cl^-
C	Na^+, Cl^-	K^+, Ca^{2+}
D	Na^+, K^+	Cl^-, Ca^{2+}

8 The diagram shows the structure of a molecule.



Which one of the following tests would give a positive result?

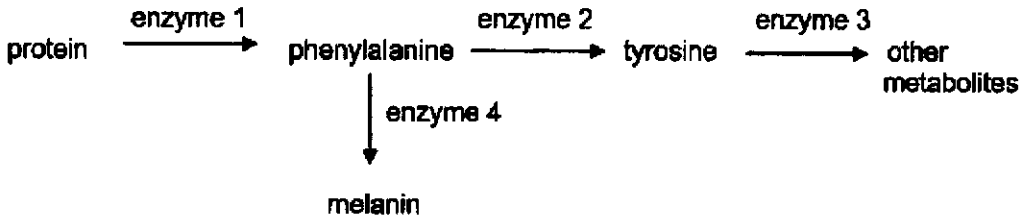
A adding biuret solution
B adding iodine in potassium iodide solution
C heating with Benedict's solution
D shaking with ethanol then pouring into water

9 Which of the following is not a function of water in our body?

A A medium for chemical reactions to take place.
B Helps to control body temperature.
C Helps to transport hormones.
D To provide energy for cell activities.

10 Phenylketonuria is an inherited disease. Individuals with the disease have high levels of the amino acid phenylalanine in the blood. They also have pale skin due to lack of melanin.

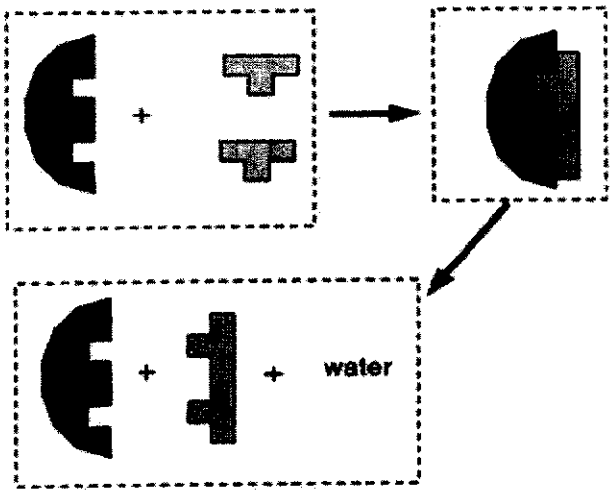
The diagram shows a series of reactions that occurs in individuals who are not affected phenylketonuria.



Which enzyme(s) is/are lacking in individuals affected by phenylketonuria?

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

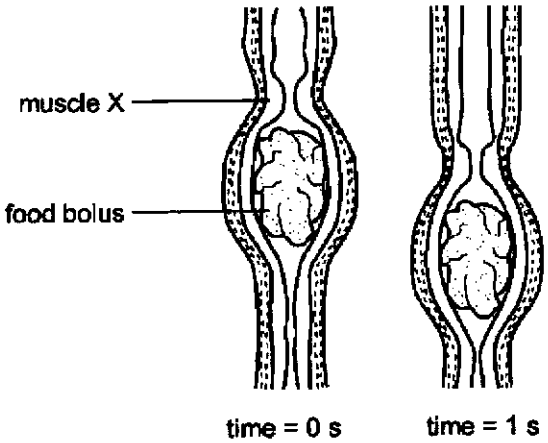
11 The following diagram represents an enzymatic reaction.



Which of the following reactions can be represented by the above diagram?

A synthesis of fat from fatty acids and glycerol
B synthesis of maltose from glucose
C synthesis of polypeptide from different amino acids
D synthesis of starch from glucose

12 The diagram shows some food moving along the alimentary canal.



Which row identifies muscle X and its action, and the component in the food bolus that will most likely stimulate the movement shown?

	muscle X	muscle action	component in food bolus that stimulates movement
A	circular muscle	contracting	fibre (roughage)
B	circular muscle	relaxing	fibre (roughage)
C	longitudinal muscle	contracting	protein
D	longitudinal muscle	relaxing	protein

13 A sample of blood was taken from a patient. Two drops of blood were placed on a white tile and tested with serum containing 'antibodies a' and 'antibodies b' respectively.

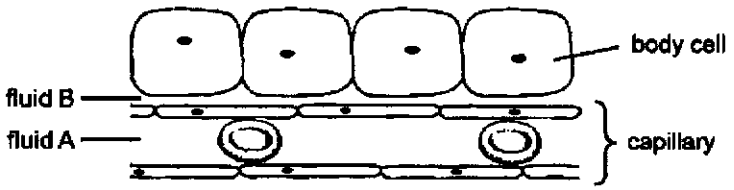
The results of the test are shown.

	serum with antibodies a	serum with antibodies b
blood samples	 clumping	 no clumping

What conclusion can be made regarding the characteristics of the patient's blood type?

A The patient can donate blood to another person with blood type B
B The patient's blood type is AB.
C The patient's red blood cells contain antigen A.
D The patient's red blood cells do not contain any antigens.

14 The diagram shows some body cells and a nearby capillary.

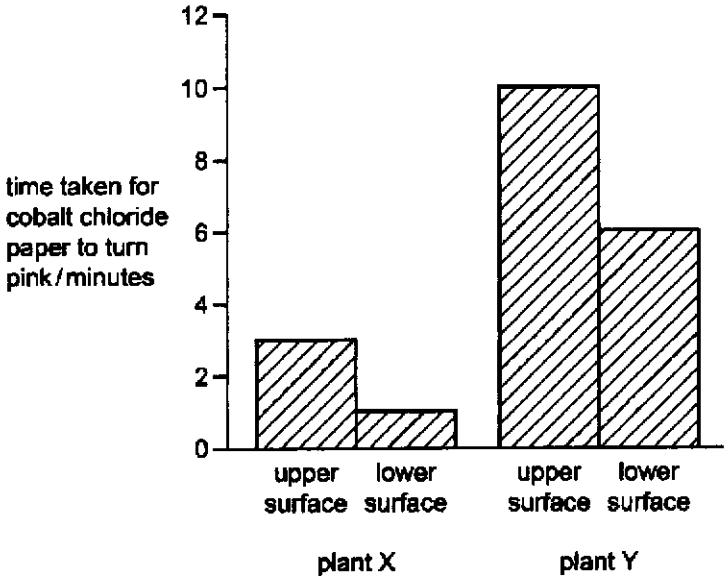


Which row is not a possible difference between fluid A and fluid B?

	fluid A	fluid B
A	less dissolved glucose	more dissolved glucose
B	more red blood cells	fewer red blood cells
C	more white blood cells	fewer white blood cells
D	some dissolved glucose	no dissolved glucose

15 Cobalt chloride paper is blue when dry but turns pink when wet. Some blue cobalt chloride paper was fastened to the upper and lower surfaces of a leaf on a plant X and a leaf on plant Y.

The diagram shows the results of the experiment.

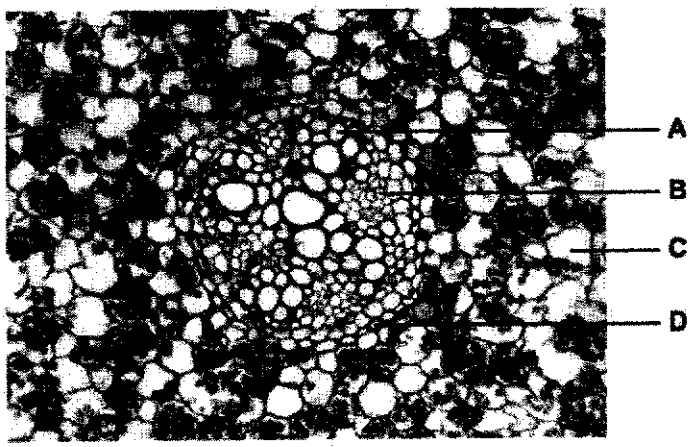


Which conclusion is correct?

A It was an unreliable experiment as it was difficult to ascertain the colour change in cobalt chloride paper.
B There are more stomata on the upper side than underside of the leaf.
C There is an error in the experiment as the cobalt chloride paper on the underside of the leaf should turn pink faster.
D Translocation occurred on both sides of the leaf.

16 The photomicrograph shows part of a section of a plant.

In which tissue are nitrates transported?



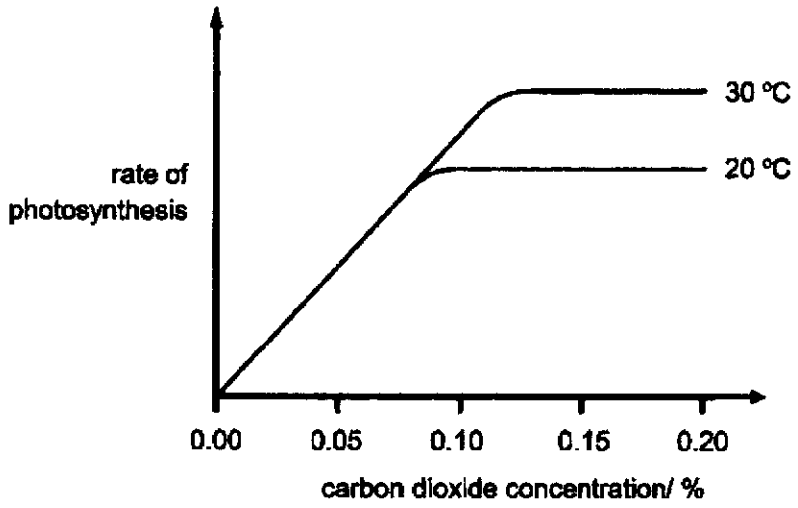
17 The table shows the rate of water flow through a tree over a 12-hour period.

time of day	rate of flow / cm per hour
7:00	100
9:00	120
11:00	140
13:00	250
15:00	300
17:00	260
19:00	180

What conclusion can be drawn from the table?

A Between 7:00 and 17:00 hours, the rate of flow continuously increases.
B The greatest increase in rate of flow is between 11:00 and 13:00 hours.
C Water does not flow up through a tree in the evening.
D Water flow is affected by humidity between 15:00 and 17:00 hours.

18 The graph shows the rate of photosynthesis in a plant in full sunlight at two different temperatures and different concentrations of carbon dioxide.



Which conclusion can be drawn from the graph?

A At atmospheric carbon dioxide concentration, carbon dioxide concentration has no effect on photosynthesis.
B At high carbon dioxide concentration, temperature limits the rate of photosynthesis.
C Carbon dioxide concentration limits the rate of photosynthesis.
D When temperature is low, the plant cannot photosynthesise.

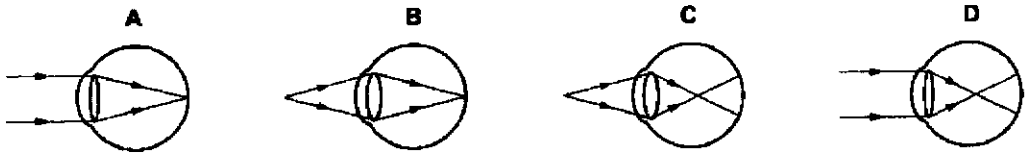
19 Which substance has the same concentration in dialysis fluid as in blood?

A creatinine
B glucose
C protein
D urea

20 What happens when the core temperature of the body increases?

	diameter of blood vessels in the skin	sweat production
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

21 Which diagram shows how light from a near object is focused on the retina to form a clear image?



22 The table shows the results of a blood and urine test of four different individuals.

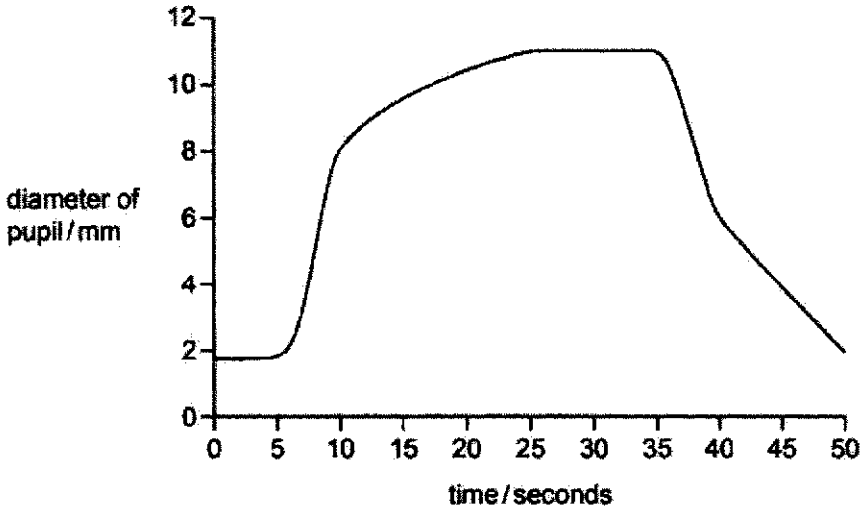
individual	concentration of glucose	
	blood	urine
1	+	+
2	+	-
3	-	+
4	-	-

key
+ = increased
- = decreased

Which individual(s) may have diabetes?

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

23 The graph shows the changes in the diameter of the pupil of the eye as the light intensity of the surroundings is changed.

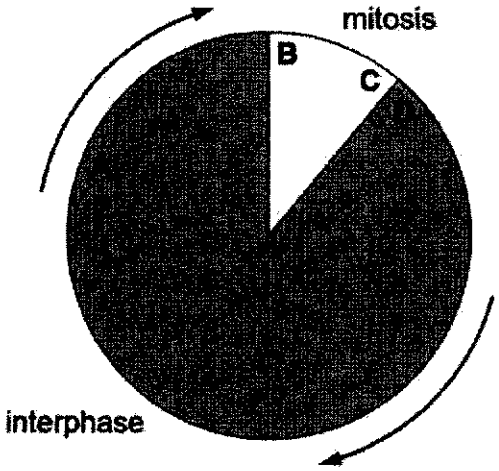


Between which times is the light intensity decreasing?

A 5 to 10 seconds
B 25 to 35 seconds
C 35 to 40 seconds
D 40 to 50 seconds

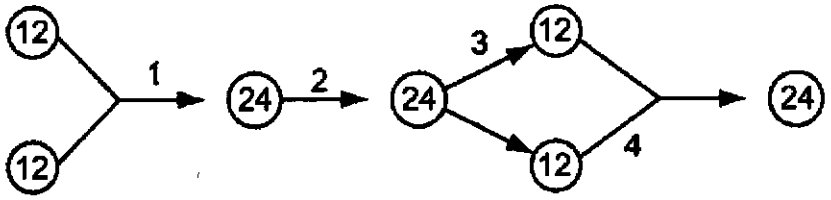
24 The diagram shows the mitotic cell cycle.

When radioactive nucleotides are supplied to dividing cells, at which point will they be incorporated into the chromosomes?



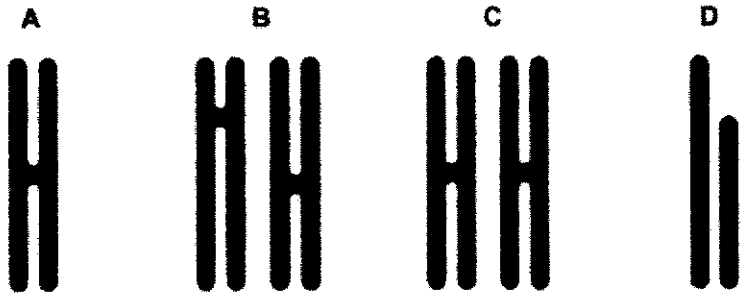
25 The diagram represents the life cycle of an animal. There are 24 chromosomes in the body cell of this animal.

At which stage in the life cycle does fertilisation, meiosis and mitosis occur?



	fertilisation	meiosis	mitosis
A	1	3	2
B	2	4	1
C	3	1	4
D	4	2	3

26 Which diagram represents a pair of homologous chromosomes after replication?

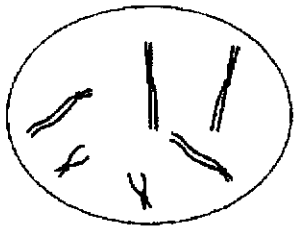


27 Colchicine is a well-known mitotic poison that inhibits the formation of spindle fibres.

What might be observed in cells that are exposed to colchicine?

A Centrioles of the cell will fail to replicate.
B Chromosomes are randomly distributed throughout the cell during metaphase.
C Chromosomes remain as loose chromatin threads.
D Sister chromatids are separated rather than held together at the centromere.

28 The diagram shows chromosomes during mitosis.

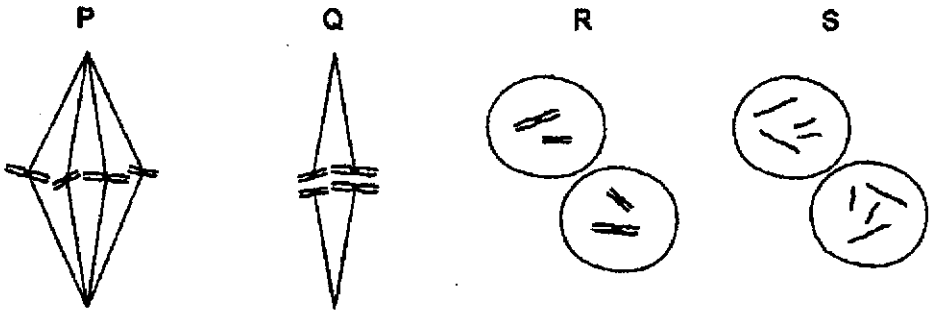


How many pairs of chromatids and homologous chromosomes are shown and which stage of mitosis is shown?

	pairs of chromatids	pairs of homologous chromosomes	stage of mitosis
A	3	6	prophase
B	3	6	telophase
C	6	3	prophase
D	6	3	telophase

29 The diagram below represents the nucleus of a body cell of an organism.

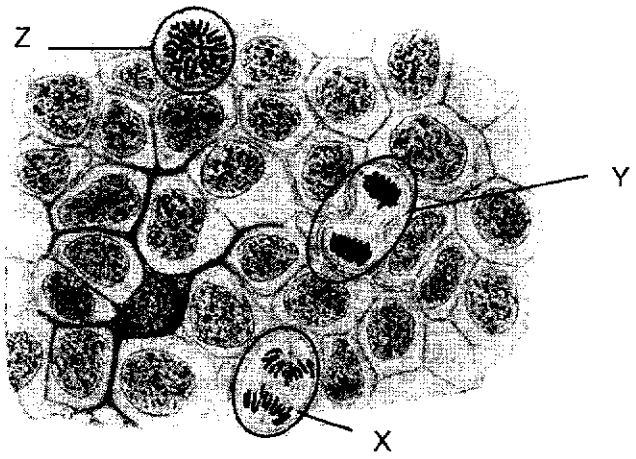
The diagrams below show the appearance of the same cell during different stages of cell division.



Which diagrams show stages of meiosis?

A P and R
B P and S
C Q and R
D Q and S

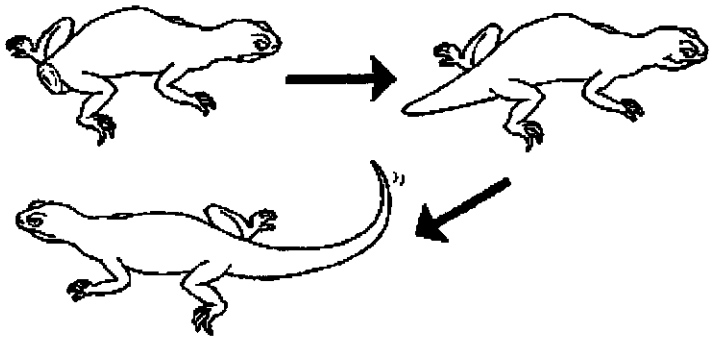
30 The diagram below shows animal cells undergoing various stages of mitosis.



Identify the stages of mitosis occurring in the cells labelled X, Y and Z.

	X	Y	Z
A	anaphase	prophase	interphase
B	anaphase	telophase	prophase
C	prophase	anaphase	telophase
D	prophase	telophase	metaphase

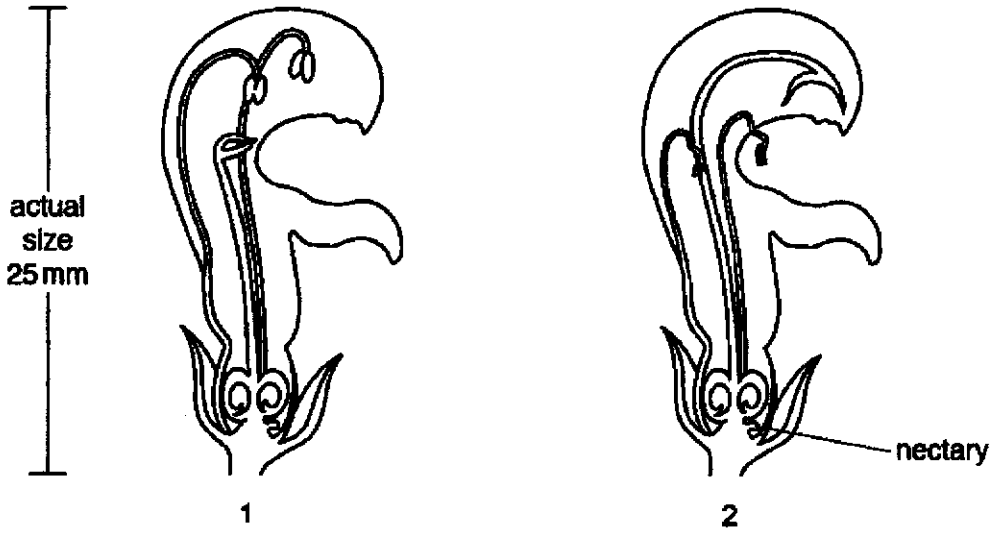
31 The diagrams show a lizard in various stages of regeneration of its tail.



Which cellular process is directly responsible for this regeneration?

A meiosis
B mitosis
C nutrition
D respiration

32 The diagram shows two separate flowers from the same species of plant at different stages in their development.



Which row gives the method by which these flowers can be pollinated?

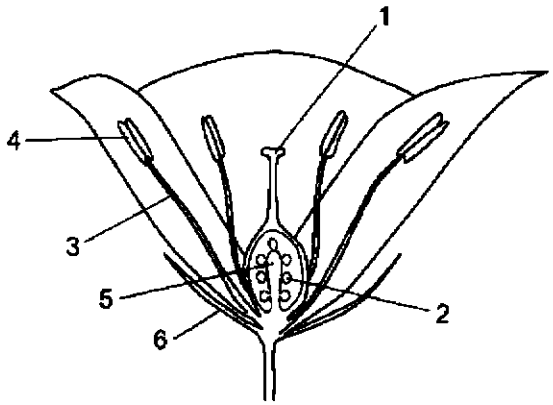
	type of pollination possible in flower 1	type of pollination possible in flower 2
A	insect	wind
B	self	insect
C	wind	insect
D	wind	wind

33 A number of new plants are growing from pieces of a plant that have become detached and have rooted in soil.

Which statement is correct about these new plants when they mature?

A The new plants are formed after self-pollination.
B They will all grow to the same size.
C They will all have the same colour flowers.
D They will all produce the same number of fruit.

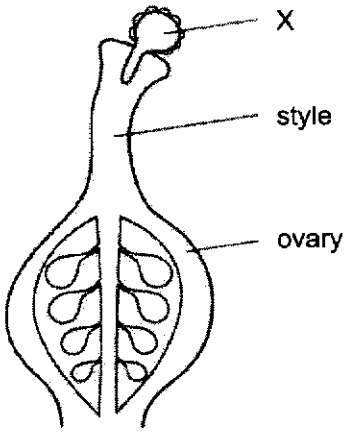
34 The diagram shows a flower cut in half.



Which parts of the flower produce haploid gametes?

A 1 and 2
B 2 and 4
C 3 and 6
D 4 and 5

35 The diagram shows part of a flower at one stage during reproduction.



What is structure X?

A a pollen grain after fertilisation, but before pollination
B a pollen grain after pollination, but before fertilisation
C an ovule after fertilisation, but before pollination
D an ovule after pollination, but before fertilisation

36 Flowering plants use different methods to ensure that their flowers are pollinated successfully.

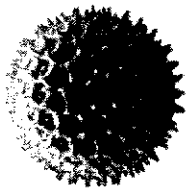
Some of these methods are listed.

1 Plant 1 has flowers in which the female parts ripen before the male parts.
2 Plant 2 has separate male and female flowers.
3 Plant 3 has separate male and female plants.
4 Plant 4 has flowers in which the male parts ripen before the female parts.
5 Plant 5 has flowers in which the male and female parts ripen at the same time.

Which method(s) make it more likely that self-pollination will take place?

A 1, 2, 3 and 4 only
B 1 and 4 only
C 2 and 3 only
D 5 only

37 The diagram shows a structure taken from the flower of Morning Glory.

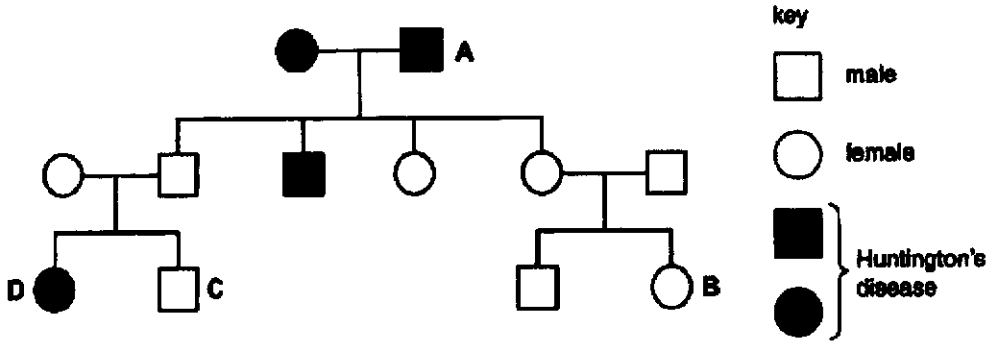


Which statement is correct?

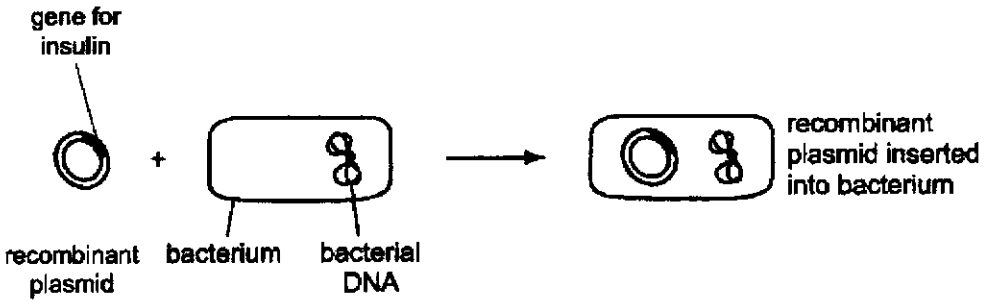
A An embryo is formed when the structure fuses with the female gamete.
B The structure can only germinate if it lands on the stigma of another flower.
C The structure is the male gamete of a plant.
D The sugary fluid of a stigma stimulates the structure to germinate.

38 Huntington's disease is an inherited disorder of the central nervous system. It is caused by a dominant allele. The family tree shows the inheritance of Huntington's disease.

Which individual's symbol is not correct?



39 The diagram shows one stage of the process to produce recombinant DNA that will synthesise human insulin for the treatment of diabetes.

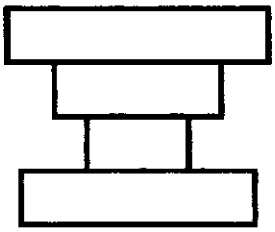


What is the next stage of this process?

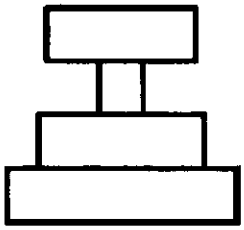
A Add the altered bacterium to human food.
B Inject the altered bacterium into the blood of a person with diabetes.
C Put the bacterium into a fermenter to multiply rapidly.
D Use the altered bacterium in a nasal spray.

40 Which pyramid of numbers has more primary consumers than producers?

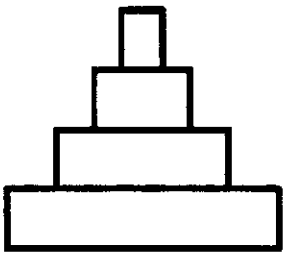
A



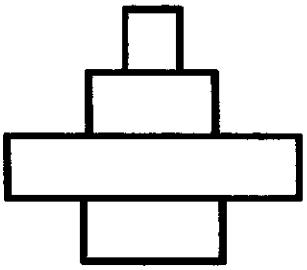
C



B



D



End of Paper 1

Section A: Structured Questions [50m]

Answer all questions in the spaces provided on the Question Paper.

1 Fig. 1 shows a diagram of a section through the heart.

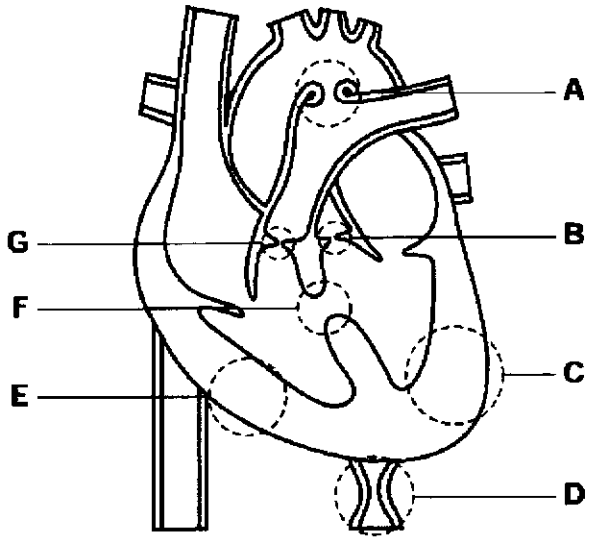


Fig. 1

(a) One of the dotted circles shows that the area affected involves a hole in the septum between the ventricles.

Write down the label of the dotted circle that shows

(i) a hole in the septum between the ventricles and [1]

_____

(ii) a narrowing of the semilunar valve of the pulmonary artery. [1]

_____

(b) Describe the structural defect shown by the dotted circle labelled **D**. [1]

_____

_____

(c) The dotted circle labelled **A** shows the area affected in a person with the congenital heart disease called *patent ductus arteriosus.*

Suggest and explain how the flow of blood in a person with *patent ductus arteriosus* differs from that of a person with a healthy heart. [3]

[Total: 6]

2 Fig. 2 is a graph of the volume of air flowing into and out of the lungs of a human while breathing at rest.

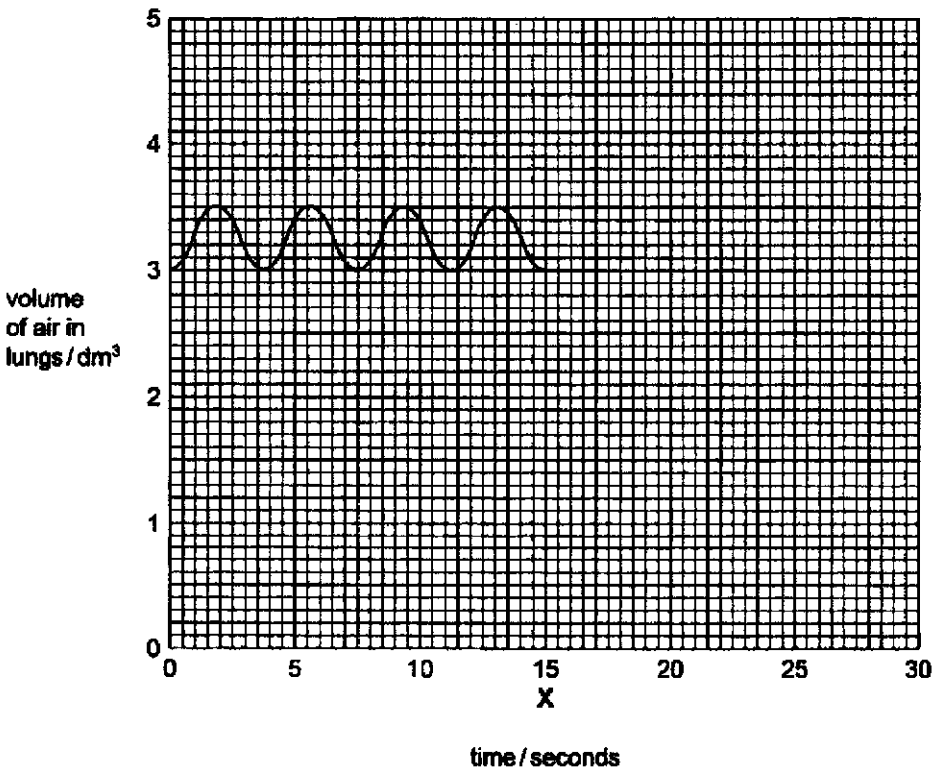


Fig. 2

(a) (i) State how many breaths are inhaled in 15 seconds. [1]

(ii) State the volume of air breathed in during each breath. [1]

_____

(iii) Calculate the volume of air breathed in during one minute.
Show your working. [2]

_____ cm^3

(b) (i) At time **X** the person began to exercise. Sketch on the graph five more breaths for this person during this exercise. [2]

(ii) Explain the difference in the graph before and after time **X**. [4]

_____

_____

_____

_____

_____

[Total: 10]

3 Amniocentesis is a test that may be offered during pregnancy to find the sex of the fetus and to detect mutations.

During the test, a long, hollow needle may be used to withdraw some of the fluid into a syringe, as shown in Fig. 3.

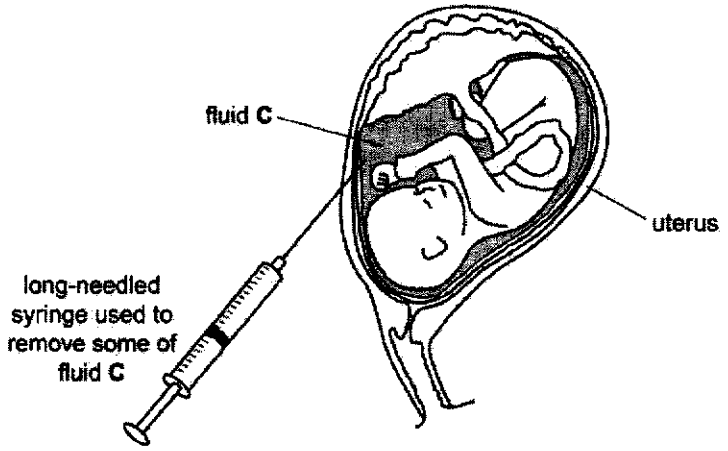


Fig. 3

(a) Name fluid **C** and state its function. [2]

name of fluid _____

function _____

_____

(b) Suggest how fluid **C** is used to find the sex of the fetus and to detect mutations. [2]

_____

_____

(c) On Fig. 3, label

(i) the placenta using a line and the letter **P**; [1]

(ii) the umbilical cord using a line and the letter **U**. [1]

(d) Describe the functional relationship between the placenta and the umbilical cord. [3]

[Total: 9]

4 Fig. 4 shows some parts of the human alimentary canal and associated organs.

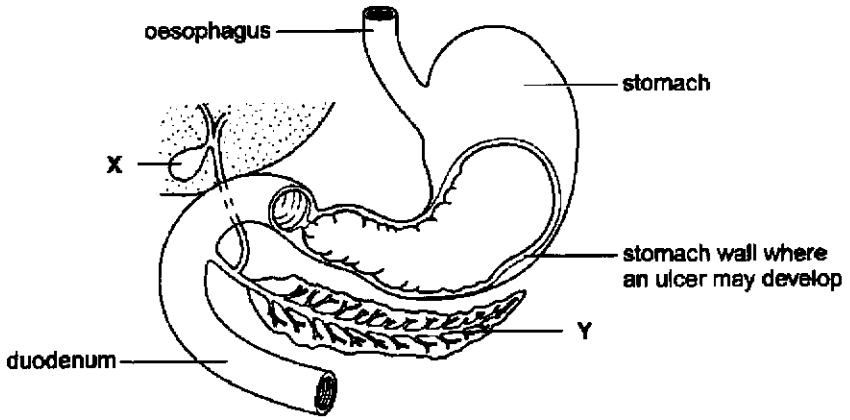


Fig. 4

(a) An ulcer can develop on the wall of the stomach, which can cause a person pain. The pain may be relieved by taking a drug that reduces the amount of acid produced by the cells in the stomach wall.

Suggest and explain how the processes taking place in the stomach may be affected in a person taking this drug. [4]

(b) Describe how **X** and **Y** work together in fat digestion. [4]

[Total: 8]

5 Fig. 5 shows details of DNA replication. One strand acts as a template for the synthesis of a new strand.

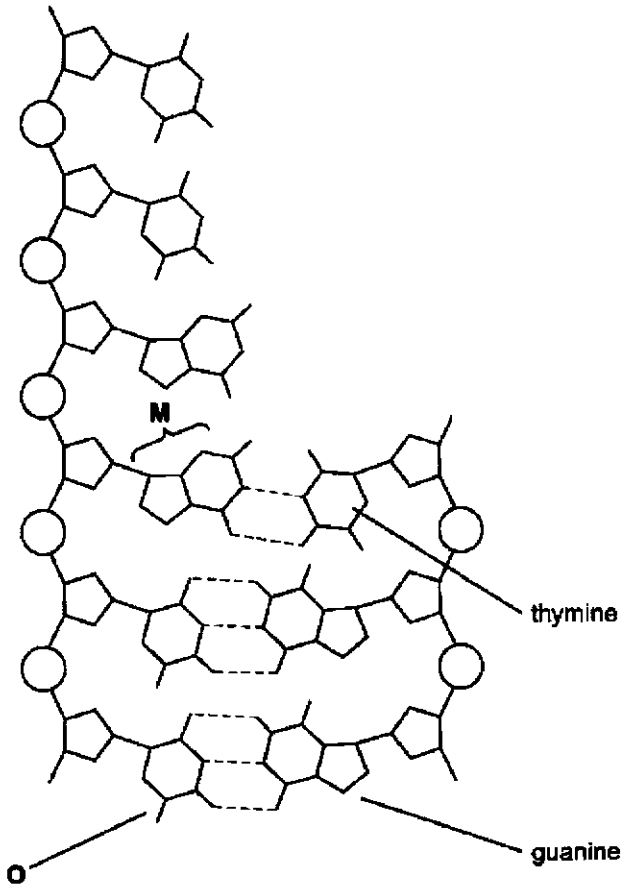


Fig. 5

(a) On Fig. 5, circle one nucleotide. [1]

(b) Name the nitrogenous bases, **M** and **O**. [1]

M _____ **O** _____

(c) Describe **two** features of a polypeptide molecule that are different from those found in a DNA molecule. [2]

_____

_____

_____

[Total: 4]

6 An investigation was carried out into the effect of diet on the rate of production of urine. Three students each took 1.5 dm^3 of a different drink **A**, **B** or **C**.

Fig. 6 shows the volume of urine released by each student over the next two and a half hours.

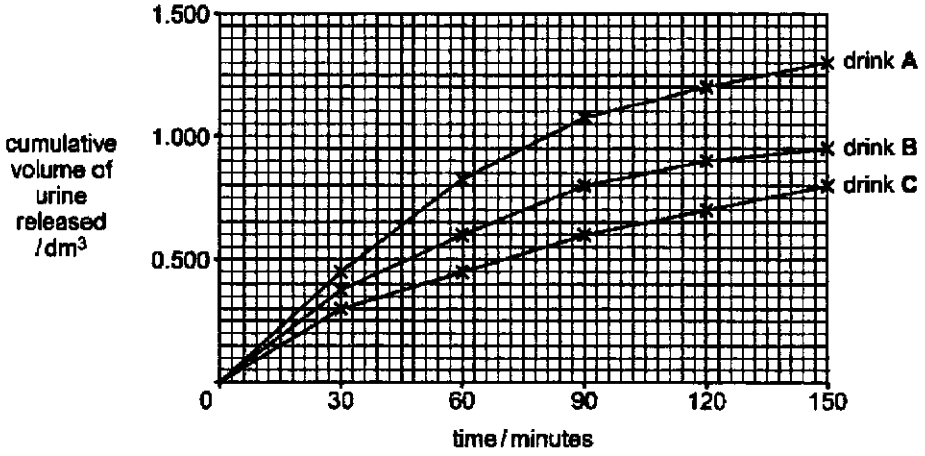


Fig. 6

(a) Suggest which of the three drinks contained the highest amount of mineral salts.
Give an explanation for your answer. [4]

drink with highest amount of mineral salts _____

explanation _____

_____

_____

_____

(b) Urine released by the student who took drink **B** was found to contain high levels of urea. [3]

Suggest a possible reason for this result.

_____

_____

_____

_____

[Total: 7]

7 Fig. 7 shows a section through the skin.

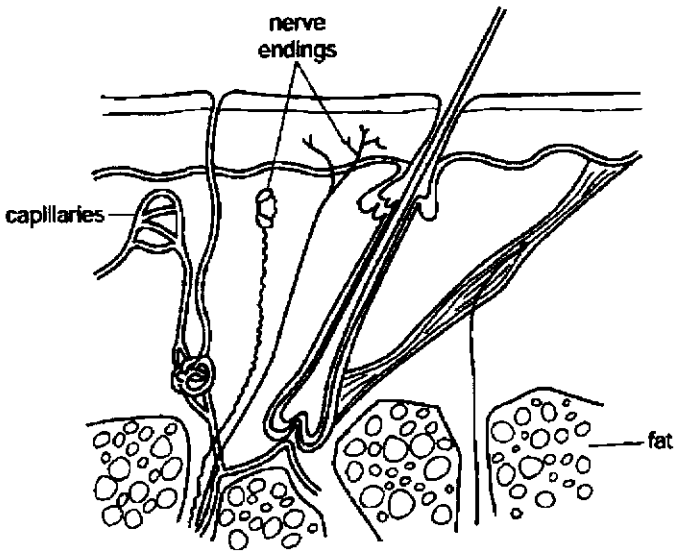


Fig. 7

(a) Suggest two possible functions of the nerve endings shown in Fig. 7. [2]

1. _____

2. _____

(b) Explain how the capillaries shown in Fig. 7 are involved in the loss of heat from the body during exercise. [3]

_____

_____

_____

_____

(c) A layer of fat is shown in Fig. 7.

Suggest a function for this structure in mammals living in an extremely cold climate. [1]

_____

_____

[Total: 6]

Section B: Free Response Questions [30m]

Answer **three** questions.
Question **10** is in the form of an **Either/Or** question.
Only one part should be answered.
Write your answers in the space provided.

8 **(a)** A man blames his wife for the sex of their child.

Use your knowledge of how sex is inherited to explain which parent determines the sex of a child. [6]

(b) Researchers at Harvard Medical School recently designed a model to show how bacteria overcome drugs meant to stop and destroy them.

Fig. 8 shows bacteria growing on the surface of a dish containing nutrient jelly (which appear black). At the start of the experiment, the bacteria (which appear white) only grew on the part of the jelly that did not contain antibiotic. After some time, a small group of bacteria is seen in the part of the jelly that contained the antibiotic.

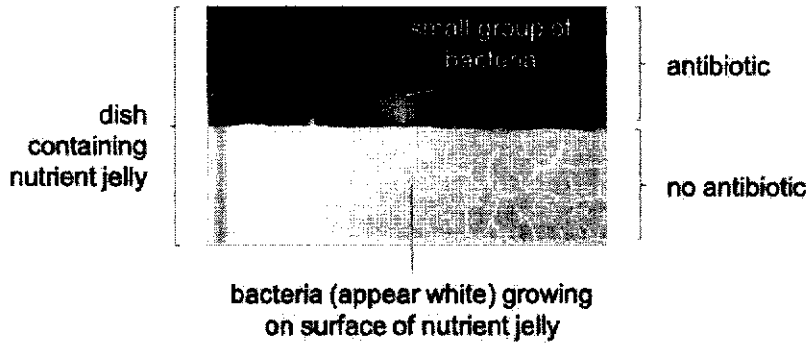


Fig. 8

Use the information above, and your knowledge of the process of natural selection, to describe and explain the observation described above. [4]

[Total: 10]

9 The following experiment was carried out to investigate the effect of light intensity on the rate of photosynthesis of a water plant, *Elodea*.

- *Elodea* was cut into three pieces, each 10 cm long.
- Each piece of *Elodea* was placed in a glass tube, containing 0.5% sodium hydrogen carbonate solution, which was then sealed with a bung.
- Tube **A** was placed 10 cm away from a lamp.
- Tube **B** was placed 5 cm away from a lamp.
- Tube **C** was placed in a dark room.
- An oxygen sensor was used to measure the percentage of oxygen in the solutions at the start of the experiment and again at 5, 10 and 20 minutes.

The results are shown in Fig. 9.

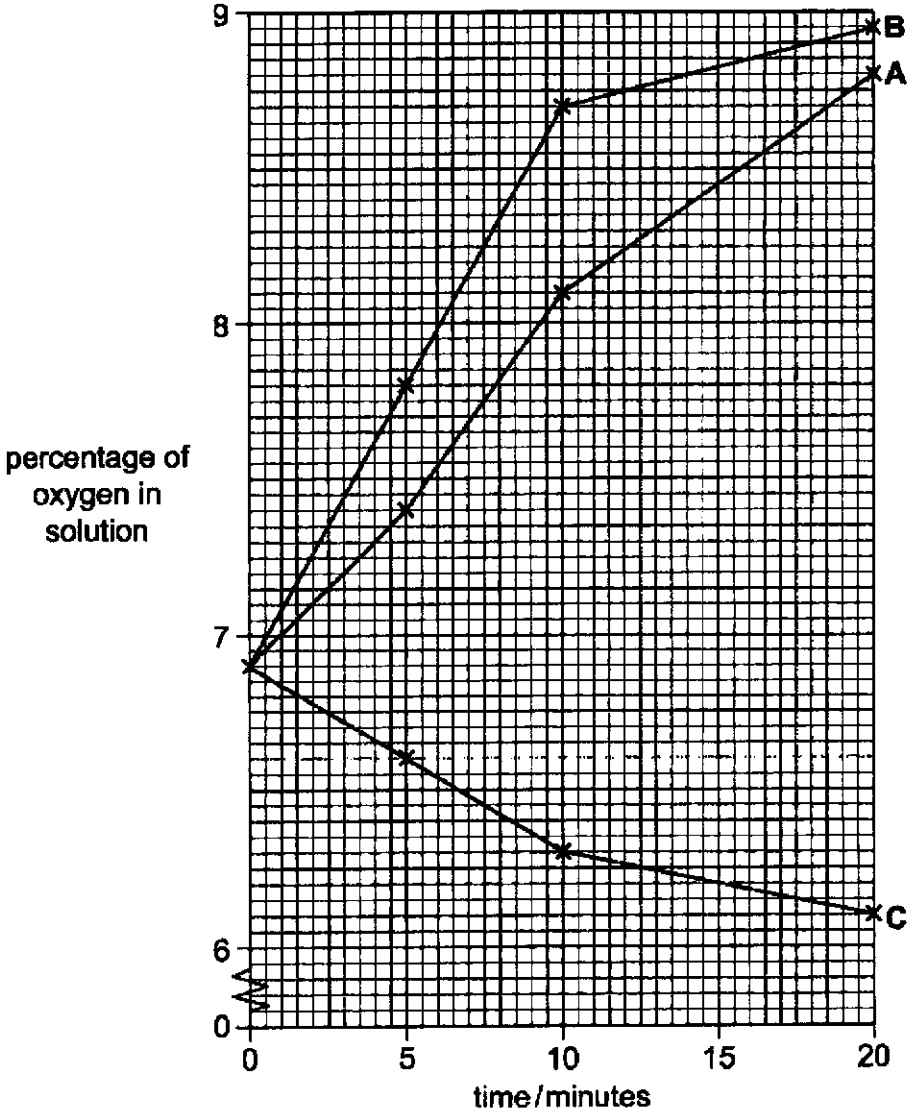


Fig. 9

(a) Calculate the mean rate of oxygen production for tube **A** for the 20 minutes of the experiment.

Give your answer to two decimal places.
Show your working. [1]

answer _____

(b) Describe how more results can be obtained to plot a new graph that shows the effect of light intensity on the rate of photosynthesis. [4]

_____

_____

_____

_____

_____

_____

_____

_____

(c) Explain the results for tube **C**. [2]

_____

_____

(d) The fruit of *Elodea* contain seeds that ripen underwater.

Describe how photosynthesis in *Elodea* can lead to an increase in the level of starch in its seeds. [3]

[Total: 10]

Either

10 A child is frightened by a sudden loud noise and turns to run away from the noise.

(a) Explain why the child's heart beats faster immediately after hearing the sudden loud noise. [5]

(b) Describe the pathway of nerve impulses in the child's act of running away. [5]

[Total: 10]

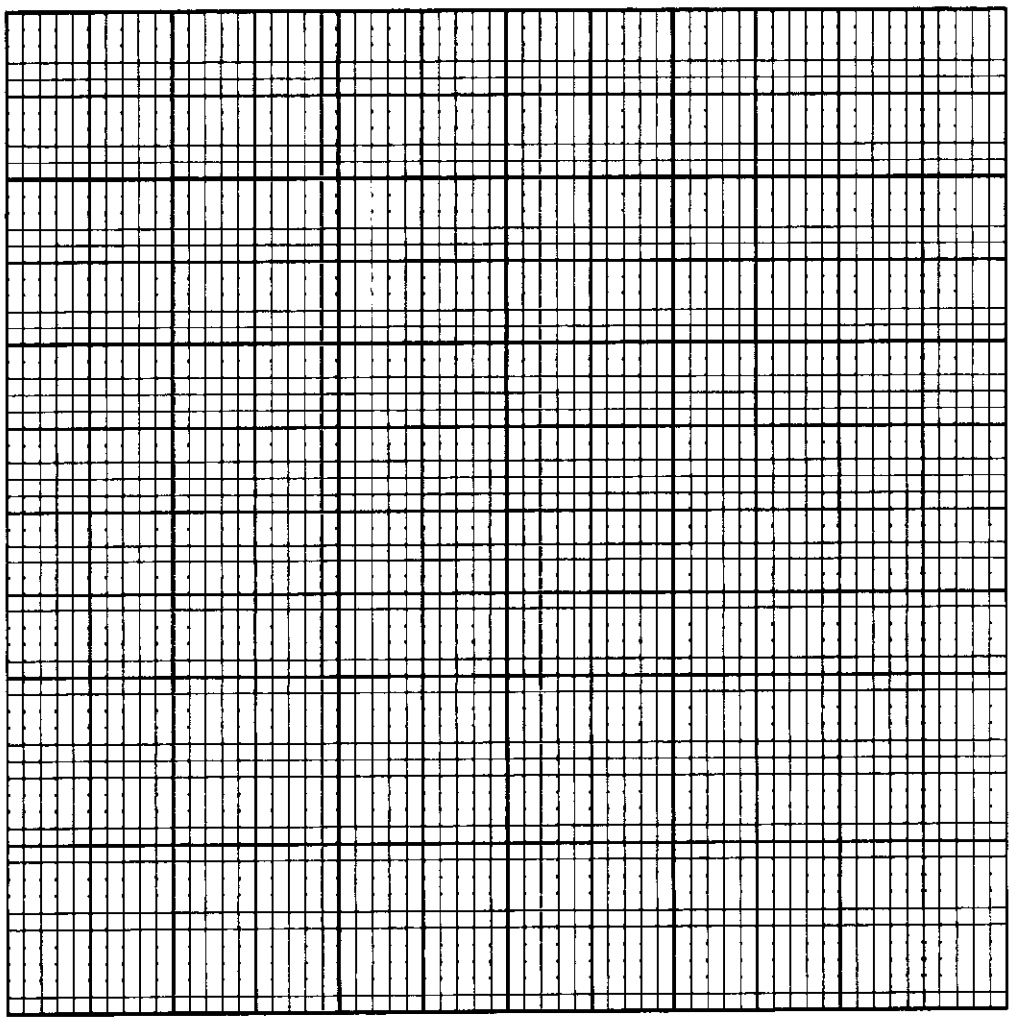
Or

10 Table 10 shows the quantities of pesticides, in parts per million (ppm) that accumulate in four populations, each at different trophic levels in a food chain.

Table 10

population	A	B	C	D
quantity of pesticide accumulated/ ppm	40	400	120	2000

(a) Draw a bar chart of the data in Table 10. [3]



(b) State what is meant by the term *trophic level*. [1]

(c) **(i)** Draw the food chain shown in Table 10. [1]

(ii) Explain your answer in **(c)(i)**. [5]

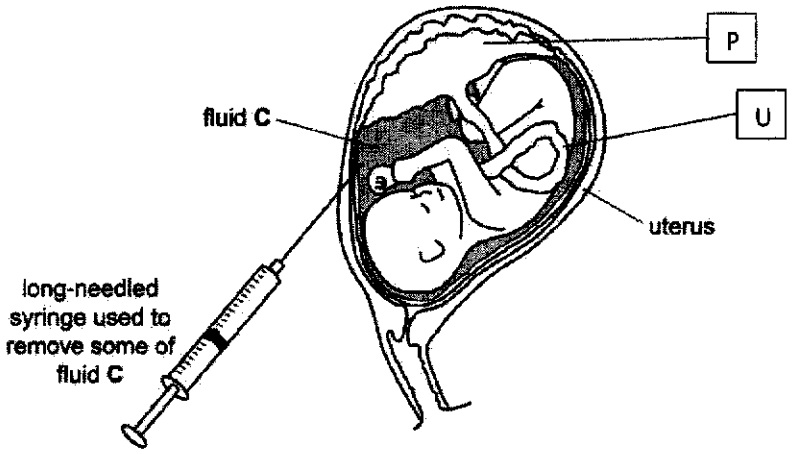
[Total: 10]

End of Paper 2

1	2	3	4	5	6	7	8	9	10
D	C	B	D	A	C	C	A	D	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	A	C	B	C	A	B	B	B	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	B	A	A	A	C	B	C	C	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	B	C	B	B	D	D	D	C	D

Section A: Structured Questions [50m]

1	ai	F ;		
	aii	G ;		
	b	narrowing of the aorta / OWTTE ;		
	c	accept ora where relevant *suggest* 1 blood flows <u>from</u> aorta <u>to</u> pulmonary artery ; 2 increased volume of / more, blood to lungs ; **A** blood to lungs at higher pressure 3 oxygenated and deoxygenated mix / oxygenated blood / blood from aorta, to lungs ; *explain (why blood flows from aorta to pulmonary artery)* 4 left ventricle thicker wall (than right ventricle) ; 5 (so) contraction generates greater force (than right ventricle)/AW ; 6 higher pressure in aorta (than pulmonary artery) ; [3 max] *max 2 for omission of suggestion or explanation* adapted from: 9700_s10_qp_22		
			[Total: 6]	
2	a	i	4;	
		ii	0.5 dm^3/500 cm^3;	
		iii	4 (breaths) x 500 (cm^3) x 4 (quarter minutes); 8000 cm^3; **R** 8 dm^3	
	b	i	single breaths occupy a shorter time; breaths have greater amplitude;	
		ii	more oxygen uptake ; <u>more</u> energy (**R** produced, made, manufactured, etc.) ; from aerobic respiration ; more muscular contraction;	
			[Total: 10]	
3	**a**	amniotic fluid ; prevents physical harm / damage to fetus ;		
	b	DNA / chromosomes ; from fetal cells / nuclei ; (of fluid C is used for the analysis)		

	c	i, ii		
	d		umbilical cord carries fetal blood to and from placenta ; which then ; transfers nutrients / oxygen from mother to fetus ; removes CO2 / waste from fetus to mother ; *max 2m if no ref to causal / sequential relation between umbilical cord and placenta* *penalize once for unclear direction of transfer / transport*	
			[Total: 9]	
4	a		less digestion of protein ; protease / pepsin, no / reduced activity ; (stomach) decrease in pH / acidity / less acid ; **R** change ref. fewer microorganisms / bacteria / pathogens killed ; **A** work best in acid conditions **R** drug neutralises the acid adapted from: 5090_s14_ms_21	
	b		(X) gall bladder, stores / releases bile ; **R** secretes / produces (which) emulsifies fats ; (Y) pancreas, secretes pancreatic juice ; (which contains) lipase ; breaks down fat into fatty acid and glycerol ;	
			[Total: 8]	
5	a		Circle contains one phosphate group, one nitrogenous base, one ribose, all covalently boded to each other ;	
	b		M = adenine and O = cytosine ;	

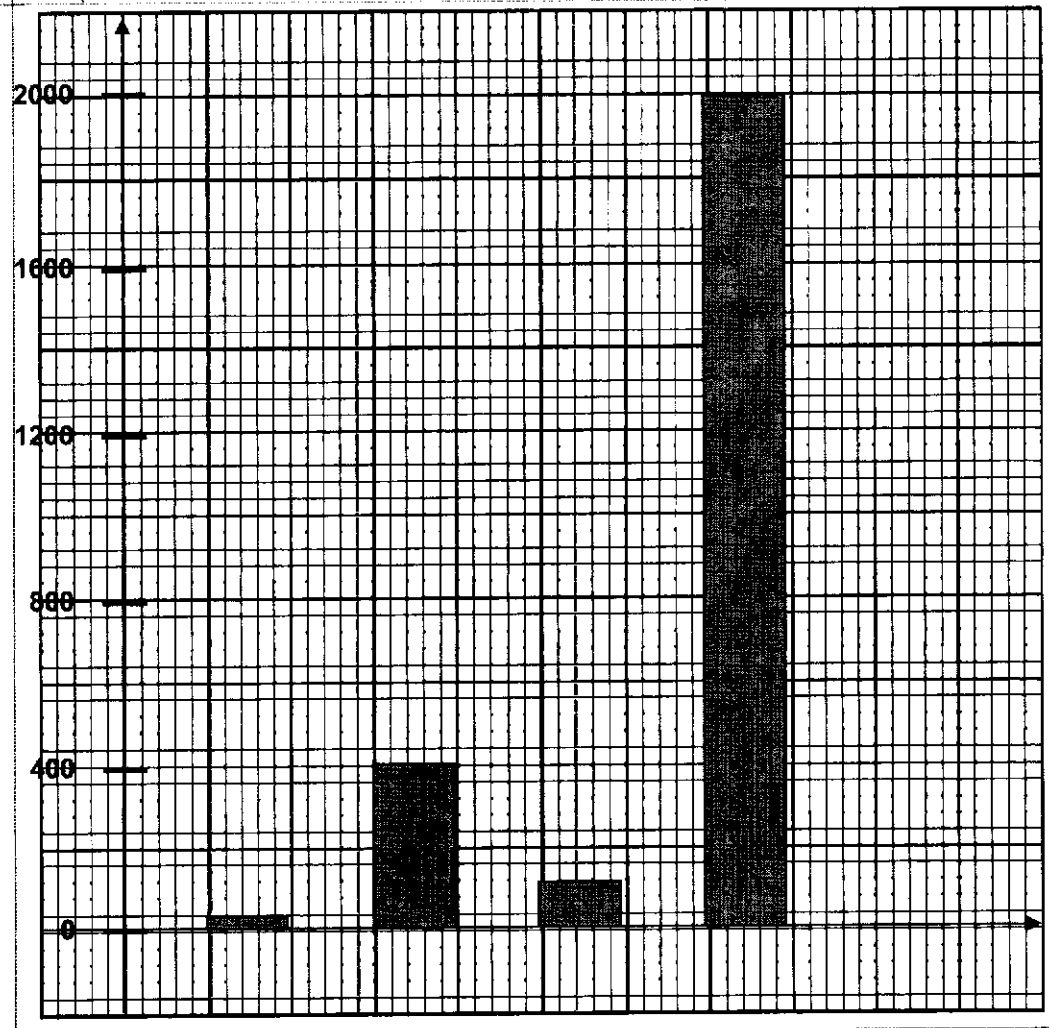
	c	Assume answer is about polypeptide unless indicated otherwise. A comparison is not required. Information given below is for either polypeptide or DNA features. **A** ideas from either column. Do not penalise if points are not corresponding on one line / sentence. Mark all points on line. Only **R** if biologically incorrect. *polypeptide* / *DNA* amino acids / nucleotides ; one / single strand / chain / two / double strand / chains ; peptide bonds / phosphodiester ; **R** between peptides / polypeptides 20 types of amino acids / only 4 types of bases **A** > 4 no phosphate / PO_4 / has phosphate / PO_4 ; 2^o / 3^o structure / double helix ; 3 max adapted from: 9700_s04_ms	
		[Total: 4]	
6	a	drink C (increased salt intake led to) decreased water potential in blood plasma ; pituitary gland released more ADH into bloodstream ; cells in walls of collecting ducts more permeable to water / more water reabsorbed from collecting duct into capillaries ; lowest increase in volume of / more water in + urine / produces least / little / less urine ;	
	b	more protein ; **Ig** ref. to specific foods correct ref. excess amino acids ; broken down in / converted by liver / deamination ; adapted from: 5090_s14_ms_22	
		[Total: 7]	
7	a	one per line, mark the first, any 2 from: detection of pressure, temperature, pain, touch;; (**A** for ONE mark max. a reference to the detection of stimuli)	
	b	dilation of arterioles; **R** capillaries more blood, carries heat;	

		heat lost from + body surface/skin/named heat transfer method; capillaries supply sweat glands; [max 3]	
	c	stores energy; supplies energy/heat; insulates (against heat loss); *ref. low external temperature [max 1] adapted from: N15/1/22	
		[Total: 6]	

Section B: Free Response Questions [30m]

8	**a**	father is XY / contains Y chromosomes ; **A** marks in Punnett Square mother is XX / does not contain Y chromosomes ; father produces sperm with either X or Y (chromosomes) ; mother produces eggs only with X (chromosomes) ; sex depends on which sperm fertilises the egg ; 1:1 male : female in offspring / AW ;	[6]
	b	*explain (why bacteria only grew on jelly without antibiotic)* reference to (bacteria) killed in region with antibiotic / ORA ; *explain (why some bacteria grew on jelly with antibiotic after some time)* gene, mutation ; causes some bacteria to be resistant to antibiotic ; (resistant bacteria) survive, reproduce ; pass on resistance / gene mutation to next generation / offspring ; information from https://news.harvard.edu/gazette/story/2016/09/a-cinematic-approach-to-drug-resistance/	
		[Total: 10]	
9	**a**	8.8 – 6.9 / 20 ; 0.10 ; % per minute ; **R** *plural*	
	b	three more tubes, placed 15 cm, 20 cm, 25 cm away from the lamp ; measure percentage of oxygen in the solutions at 0 , 5, 10, 20 minutes ; calculate mean rate of oxygen production for all tubes for the 20 minutes of the experiment ; plot a graph of mean rate against light intensity / distance from lamp, draw a trend line ; rate will increase with light intensity then level off ; [max 4]	[4]
	c	no, photosynthesis / light dependent reaction ; oxygen used up in respiration ;	[2]
	d	glucose is converted to sucrose ; translocation (of) sucrose ; from the leaf to the seeds ; through phloem ; converted to starch ;	[3]

		[Total: 10]	
Either			
10	a	sound + stimulus, detected by ears AW; nerve impulse generated ; transmitted to brain, sensory neurone ; adrenal gland, secretes adrenaline ; into blood, transported to heart muscles ; ref. fight/flight/fright etc. response – or described;	
	b	nerve impulse generated, (fore)brain ; transmitted, relay neurone (from forebrain) ; to (white matter of) spinal cord ; transmitted, motor neurone (in grey matter) ; ref. named effector / muscles in the leg, contraction ;	
		[Total: 10]	

10	a	(OR)		
				
	b	the position of an organism / feeding level AW; in a food chain / food web / pyramid of biomass / pyramid of numbers / pyramid of energy;		
	c	i	A → C → B → D	
		ii	small plants/animals absorb/contain pesticide ; eaten by small fish (Only mark available if no ref to pesticide in the answer) ; (pesticide) passes from small fish to large fish ; each time <u>many</u> organisms eaten/higher organism gets large dose/intensifies, increases; is not excreted; cannot be broken down ; stored in body AW; adapted from: 5090_s11_ms_21	
			End of Paper	