CEDAR GIRLS' SECONDARY SCHOOL
Preliminary Examination Two 2014
Secondary Four

BIOLOGY 5158/01

Paper 1 Multiple Choice 25 August 2014

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and index number on the Answer Sheet in the spaces provided unless this has been done for you.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

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1 Which of the following is not a function of a cell nucleus?

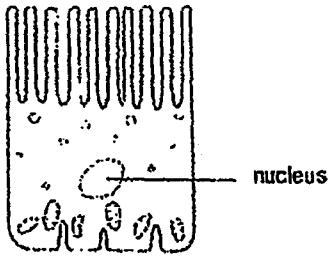
A protection of genetic material

B regulation of protein synthesis

C replication of genetic material

D synthesis of enzymes

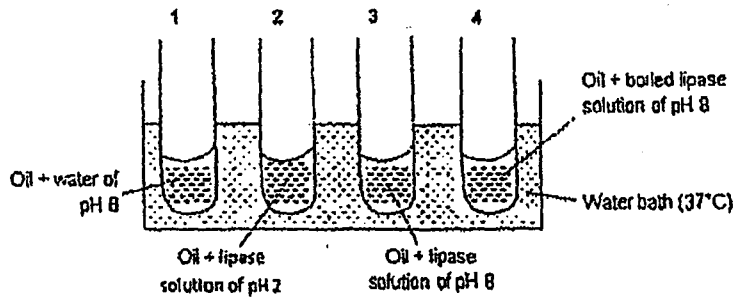
2 The diagram shows a cell found in an organism.



Identify the type of cell and the function it is mostly likely adapted to perform.

	type of cell	function
A	animal	absorption of substances
B	animal	storage of substances
C	plant	absorption of water
D	plant	photosynthesis

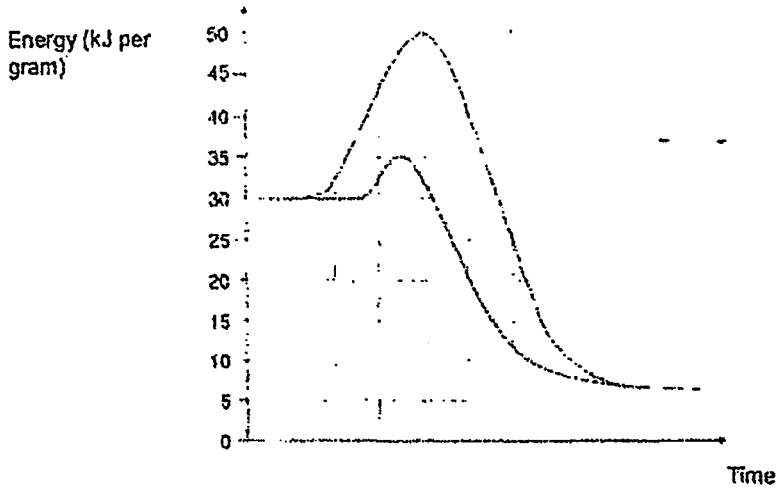
3 Four test tubes, labelled 1, 2, 3 and 4, were set up in an experiment. 1 cm^3 of oil and 1 cm^3 of solution are added to each test tube. The test tubes were incubated for one hour.



Which of the following shows the expected results when the test tubes are subjected to the ethanol emulsion test?

	1	2	3	4
A	Cloudy	Cloudy	Clear	Cloudy
B	Cloudy	Cloudy	Cloudy	Clear
C	Clear	Clear	Clear	Cloudy
D	Clear	Clear	Cloudy	Clear

4 The graph shows the energy levels of an enzyme-catalysed reaction and a reaction without the enzyme.



How much has the activation energy been lowered due to enzyme action?

A 15 kJ per gram

B 20 kJ per gram

C 35 kJ per gram

D 50 kJ per gram

5 A Benedict's test and a Biuret test were carried out on a sample of saliva from the salivary glands of a human. Which of these accurately shows the expected observations of the two tests?

	Benedict's test	Biuret test
A	blue solution	blue solution
B	blue solution	violet colouration
C	red precipitate	blue solution
D	red precipitate	violet colouration

6 Which blood vessel contains the highest concentration of glucose after a period of fasting?

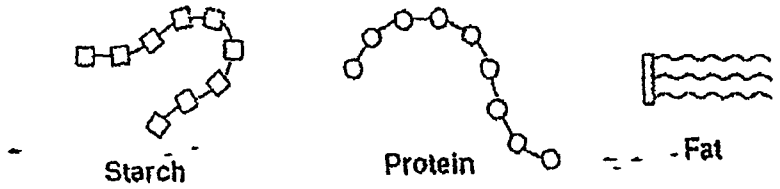
A hepatic artery

B hepatic portal vein

C hepatic vein

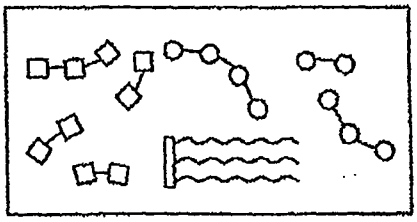
D renal artery

7 The diagrams represent molecules of starch, protein and fat at the beginning of the human alimentary canal.



A sample of food that has been in a person's stomach for 3 hours was removed and mixed with bile. The mixture was left to stand for an hour. Which diagram correctly represents the final products of this procedure?

A



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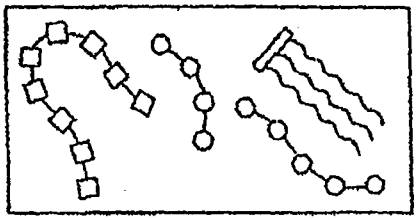

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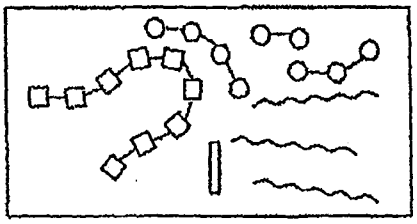

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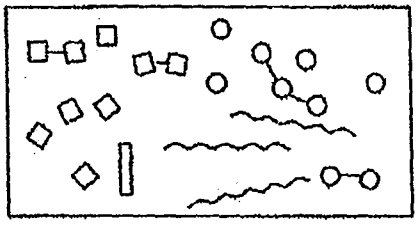
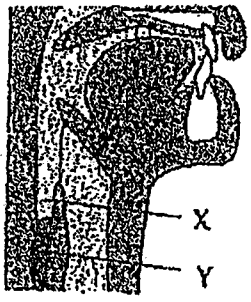


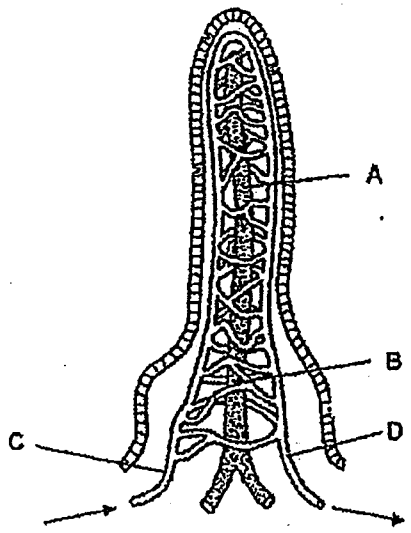
8 The diagram shows food after it has been swallowed into the human alimentary canal.



Which of the following is true about the muscles in the oesophagus at points X and Y?

	circular muscles at X	longitudinal muscles at Y
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

9 The diagram shows a section through a villus in a small intestine. The arrows indicate the direction of flow in the vessels. Which labelled part contains the highest concentration of glucose?



10 Which substance/s is not able to pass from a capillary into muscle tissue via tissue fluid?

1 adrenaline
2 carbon dioxide
3 glycogen
4 red blood cells

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

11 The following table shows the results of blood transfusions between four individuals, P, Q, R and S.

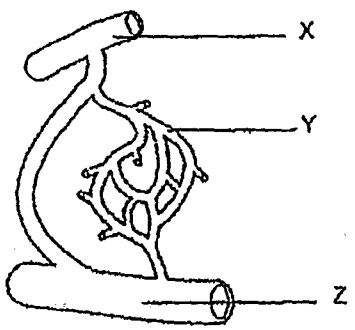
		Recipients			
		P	Q	R	S
Donors	P		✓	✓	✓
	Q	X		✓	✓
	R	X	X		X
	S	X	✓	✓	

✓	Successful transfusion
X	Unsuccessful transfusion

What are the possible blood groups of the four individuals?

	P	Q	R	S
A	AB	A or B	O	A or B
B	AB	A	O	B
C	O	A or B	AB	A or B
D	O	B	AB	A

12 The diagram shows some blood vessels found within a human being.



Which of the following accurately identifies the vessels in which blood flows at the highest and lowest pressure?

	highest pressure	lowest pressure
A	X	Y
B	X	Z
C	Z	Y
D	Z	X

13 Which of the following statements about the clotting of blood is not true?

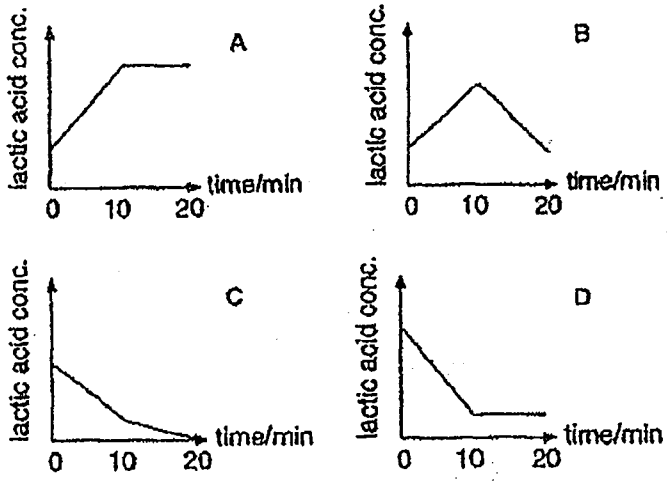
A a blood clot helps to prevent the entry of foreign particles

B an enzyme is required for the process of blood clotting

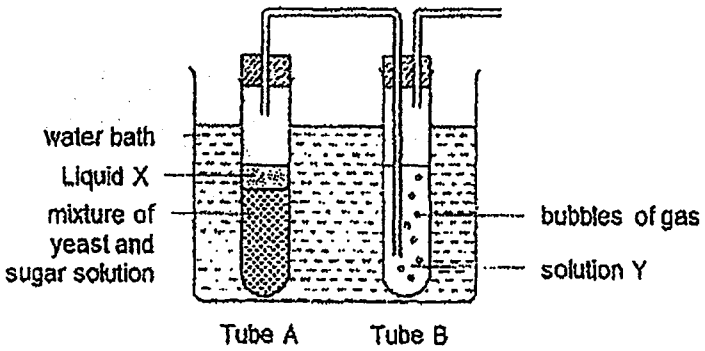
C blood clots can only form at the surface of the skin

D the clotting of blood prevents excessive loss of blood

14 Which of the graphs shows the change in lactic acid concentration in the muscles of a man if he runs for 10 minutes and then rests for another 10 minutes?



15 A student conducted an investigation on the products of anaerobic respiration in yeast cells as seen in the diagram.



What are the identities of Liquid X and Solution Y?

	liquid X	solution Y
A	ethanol	calcium hydroxide solution
B	oil	calcium hydroxide solution
C	lactic acid	ethanol
D	water	ethanol

16 Which of the following substances is/are not found in the glomerular filtrate which enters the Bowman's capsule of a kidney tubule?

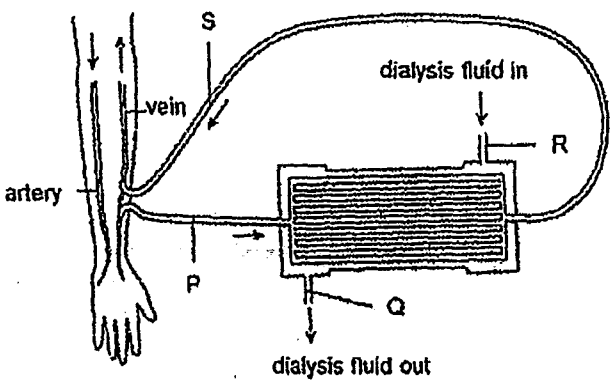
1 urea
2 proteins
3 glucose
4 red blood cells

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

17 A healthy person has decided to modify his diet by increasing his intake of proteins and lowering his intake of carbohydrates. What is a possible consequence of this change?

A Less glucose will be present in his urine
B More amino acids will be present in his urine
C More proteins will be present in his urine
D More urea will be present in his urine

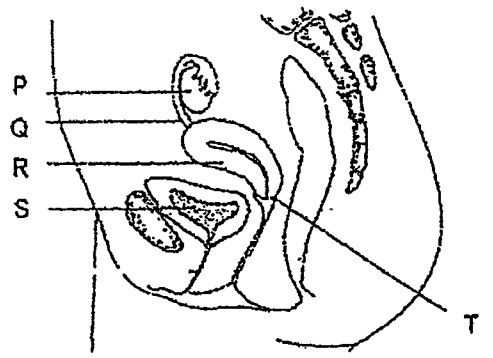
18 The diagram shows the flow of blood and dialysis fluid through a kidney machine.



Arrange P, Q, R and S in the increasing order of concentrations of urea present in the fluids at the different points.

	concentration of urea (in increasing order)
A	R → S → Q → P
B	R → S → P → Q
C	S → R → Q → P
D	S → Q → R → P

19 The diagram below shows a female reproductive system.



Which correctly shows the regions where the following events are likely to occur?

	implantation	fertilisation	meiosis
A	R	Q	P
B	R	P	Q
C	S	Q	R
D	T	R	P

20 Which of the following statements is true about a woman's fertile period?

A Her fertile period starts only after ovulation has taken place as an ovum has to be present for fertilisation to take place.

B Her fertile period starts a few days before ovulation as sperms are able to survive for a few days.

C Her fertile period starts immediately after menstruation has taken place as a new ovum will start to develop.

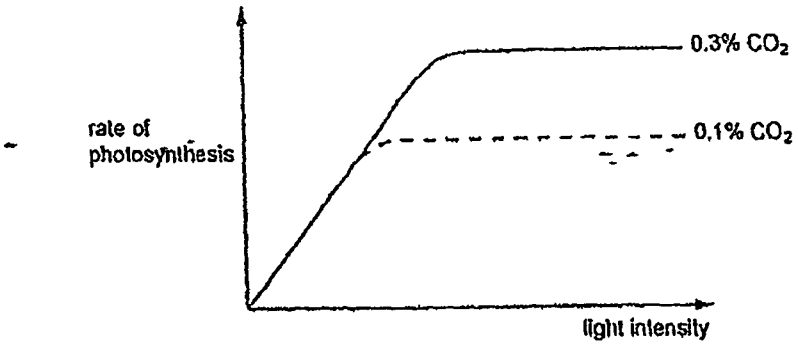
D Her fertile period starts few days before ovulation as the ovum released from the previous cycle will still be intact.

21 Which of the following substances are able to cross the placenta?

1 amino acids
2 urea
3 red blood cells

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

22 The graph shows the effect of changing light intensity on the rate of photosynthesis in a plant at two different carbon dioxide concentrations.



Which statement can be best concluded from the graph?

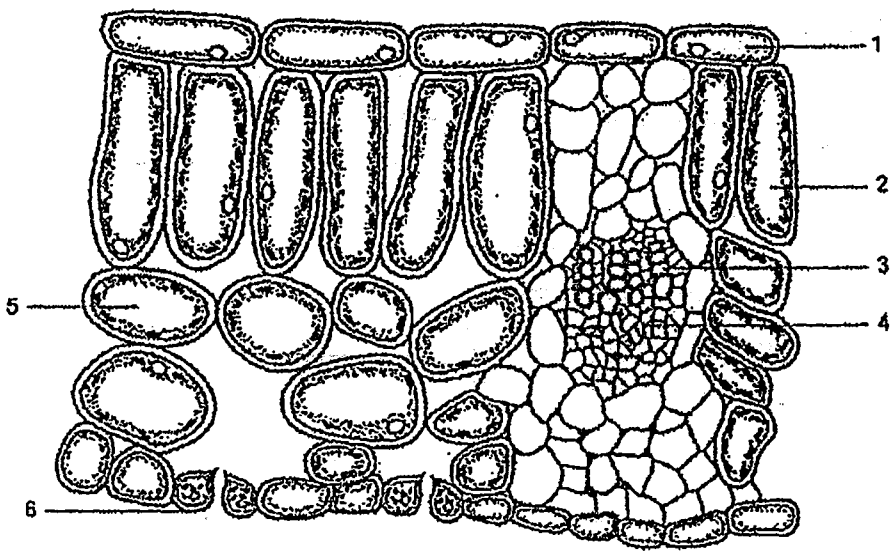
A Light intensity does not limit the rate of photosynthesis.

B Light intensity limits the rate of photosynthesis.

C Carbon dioxide limits the rate of photosynthesis at high light intensity.

D Carbon dioxide limits the rate of photosynthesis at low light intensity.

The diagram shows part of a leaf. Use the diagram to answer questions 23 and 24.



23 Which cells are involved in photosynthesis?

A 1, 2 and 5

B 2, 4 and 5

C 2, 5 and 6

D 4, 5 and 6

24 Which cell uses the least amount of sugar?

A 1

B 3

C 4

D 6

25 Which of the following is an advantage of wilting?

A leaves fold downwards to decrease surface area exposed to sunlight

B leaves fold downwards to protect the plant from physical harm

C stomata close to prevent carbon dioxide from diffusing into the leaves

D stomata close to prevent diffusion of water vapour out of the leaves

26 Which of the following is correct with regards to translocation in the phloem?

	cell with pores in its cross walls	cell releasing energy	translocated substance
A	companion cell	sieve tube element	sucrose
B	sieve plate	companion cell	sucrose
C	sieve plate	sieve tube element	amino acid
D	sieve tube element	companion cell	amino acid

27 A boy accidentally cuts his finger with a kitchen knife. He grabbed his injured finger, cried out in pain and ran to look for his mother.

Which row correctly identifies the parts of the nervous system involved in this reflex action?

	transmission of signal from cutting his finger	transmission of signal towards muscles and larynx	response coordinator
A	motor neurone	relay neurone	spinal cord
B	motor neurone	relay neurone	brain
C	sensory neurone	motor neurone	spinal cord
D	sensory neurone	motor neurone	brain

Use the information to answer questions 28 and 29.

A group of research scientists conducted an experiment to test the reaction timing in 10 volunteers. Each volunteer was blindfolded and touched on the left foot by an object. They were instructed to press a button as soon as they felt the touch. Each person did the test 30 times, and an average reaction time was calculated. The results are shown in the table.

individual	average reaction time / s
1	0.8
2	0.5
3	0.3
4	0.4
5	0.5
6	0.6
7	0.8
8	0.7
9	0.7
10	0.5

28 What was the stimulus in this experiment?

A pressing the button

B reacting immediately

C the skin on the toe

D the touch on the toe

29 Is the response a reflex action, and why?

	reflex action?	why?
A	no	touch was not painful
B	no	response was voluntary
C	yes	presence of stimulus
D	yes	quick and immediate

30 Which of the following parts of the eye matches the correct description?

	part of the eye	description
A	choroid	contains rods and cones
B	ciliary body	connects the suspensory ligaments to the lens
C	fovea	found on retina
D	iris	highest refraction index

31 What happens to the eye when accommodation takes place?

A change in refraction of the cornea and lens to focus light rays on retina

B focal length changes to focus light rays on retina

C pupil dilates to allow more light to enter

D rectus muscles contract and relax to move the eyeball for a focussed image

32 Which of the following is not a consequence of an increase in adrenaline?

A increase glucose uptake through villi

B increase heart rate

C increase metabolism

D increase ventilation

33 Jack has diabetes mellitus. After collecting a few pieces of information from him, a biology student concluded that he is down with Type 1 and not Type 2 diabetes mellitus. The information is as follows:

1 He is overweight.

2 He suffers from a hereditary condition that affects his pancreas

3 He contracted diabetes mellitus when he was six years old.

4 He carries a supply of insulin injections all the time.

Which of the following pieces of information are evidences that Jack has Type 1 diabetes mellitus?

A 1 and 2 only

B 3 and 4 only

C 2, 3 and 4 only

D 1, 2, 3 and 4

34 Which one of the following is a disadvantage of cross-pollination compared with self-pollination in flowering plants?

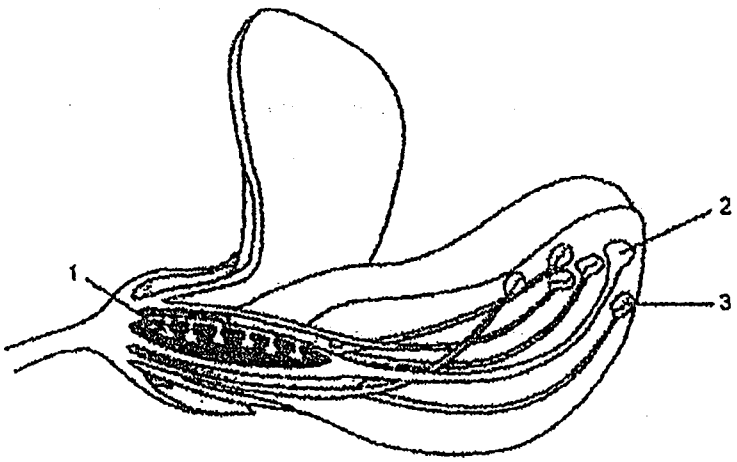
A adaptation of offspring to new surroundings is low

B fertility of offspring is low

C genetic variation is low

D probability of occurrence is low

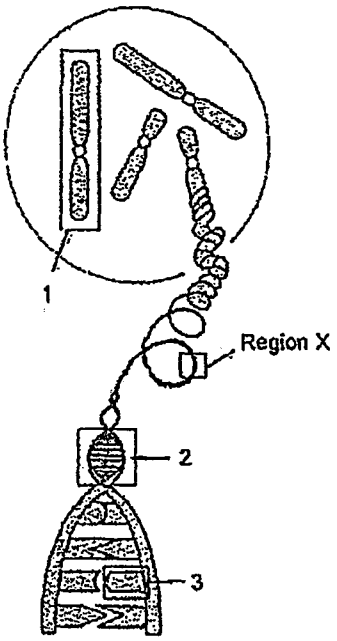
35 The diagram shows a flower.



Where do fusion and production of gametes take place?

	Fusion of gametes	Production of gametes
A	1	1 and 2
B	1	1 and 3
C	2	2 and 3
D	3	1, 2 and 3

Use the diagram to answer questions 36 and 37.



36 Which of the options identify 1, 2 and 3 correctly?

	1	2	3
A	chromatin	DNA	sugar
B	chromatin	gene	base
C	chromosome	DNA	base
D	chromosome	gene	phosphate

37 What will not be found at X?

A centromere

B codon

C hydrogen bond

D nucleotide

38 Bacterial transformation is a technique used to produce insulin to treat patients suffering from diabetes mellitus.

Which of the following is not required for insulin production through bacterial transformation?

A bacteria
B DNA ligase
C plant host
D plasmid

39 What is an advantage of producing transgenic plants?

A allow plants to occupy only one niche in their ecosystem
B create less variation in the same plant species
C increase the nutrient content in the plants
D lower the plants' resistance to pesticides

40 Which of the following characteristics shows the correct type of variation?

	continuous variation	discontinuous variation
A	gender	ability to roll tongue
B	presence of lobed ears	hair colour
C	intelligence quotient	blood groups
D	eye colour	skin colour

End of Paper 1

For Examiner's Use

Section A

Answer all the questions.

Write your answers in the spaces provided.

1 Fig. 1.1 shows an animal cell during cell division.

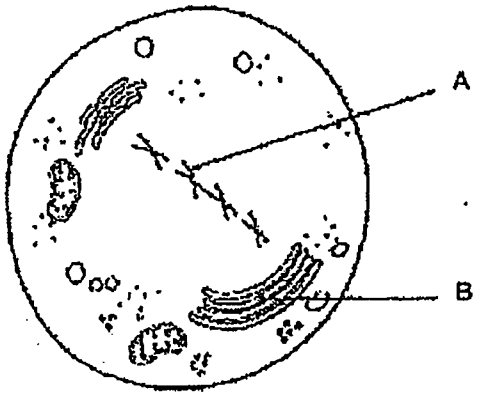


Fig. 1.1

(a) Name the structures labelled A and B. [2]

A _____

B _____

(b) (i) Identify the stage of cell division that the cell will undergo after the stage it is currently at. [1]

_____

_____

(ii) Describe the events that happen in the stage of cell division named in (b)(i). [2]

_____

_____

_____

_____

I The mass of DNA in the cell in Fig. 1.1 was found to be *n* units.

(i) State the mass of DNA in a non-dividing cell from the same animal. [1]

_____

For Examiner's Use

(ii) Name the process that leads to the change in DNA mass between that of a non-dividing cell and that of the cell in Fig. 1.1. [1]

[Total: 7marks]

2 In an experiment, a student suspended several rat liver cells in water and left the suspension in a test tube for 5 hours. It was found after the experiment that the test tube no longer contained intact cells. Explain what has happened to the cells during the course of the experiment [3]

[Total: 3marks]

3 Fig. 3.1 shows the cross-section of a stem from atypical flowering plant.

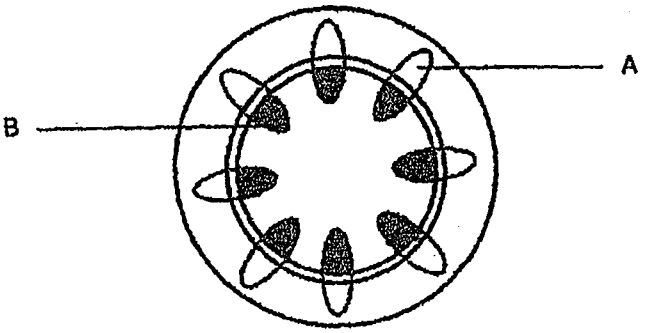


Fig. 3.1

(a) Identify structure B and explain how it is adapted for its function. [3]

For Examiner's Use

Fig. 3.2 shows a set-up that measures the rate of water uptake from a twig.

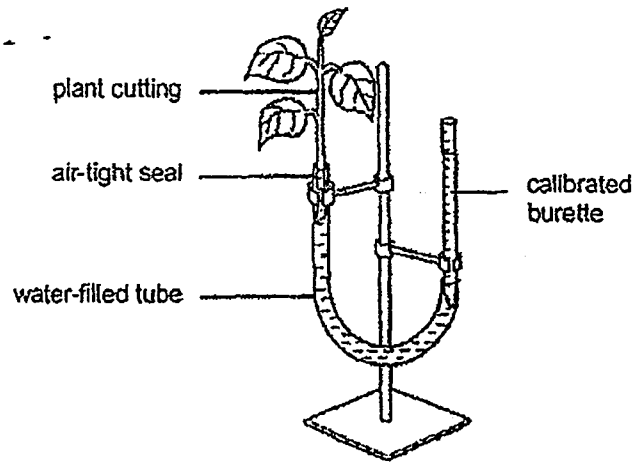


Fig. 3.2

(b) Explain how the leaves in the twig obtain water from the set-up and how the rate of water uptake is measured. [3]

An experiment was conducted to investigate the effect of sunlight on the rate of water uptake by the twig and the results are shown in Table 3.3.

In sunlight	In darkness
$2cm^3/hr$	$0.1cm^3/hr$

(c) State and explain the effect of sunlight on water uptake by the twig. [2]

[Total: 8marks]

For Examiner's Use

4 The fig 4.1 shows the thoracic section of the human body.

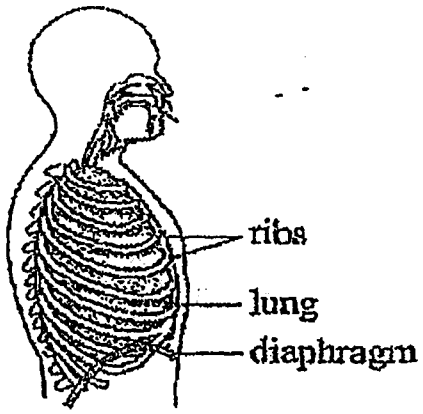


Fig. 4.1

(a) Draw and label two arrows on Fig. 4.1 to indicate the direction of movement during inhalation for the ribs and diaphragm respectively. [2]

(b) Table 4.2 shows the volume of air inhaled per breath and the breathing rate of a normal person during resting conditions.

Volume of air inhaled/cm^3	Breathing rate/min^{-1}
515	13

Table 4.2

Calculate the volume of oxygen entering the lungs per minute, given that atmosphere air contains 20% oxygen. Show your working. [2]

(c) During strenuous exercise, the volume of oxygen obtained by breathing is often insufficient to meet the energy demands of the body. State how the body copes during strenuous exercise and the consequence of oxygen insufficiency on the body. [3]

[Total: 7marks]

For Examiner's Use

5 In Drosophila flies, the wing shape is controlled by a gene found on chromosome 2 and has 2 alleles. Curly wings were found to be dominant over normal wings. Fig. 5.1 and Fig. 5.2 show the normal wing and curly wing phenotype respectively.

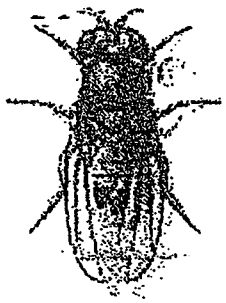


Fig 5.1 Normal Wing

Fig. 5.2 Curly Wing

(a) Distinguish between an allele and gene [2]

The gene controlling eye colour is found on the X chromosome and has two alleles. It was observed that red eye trait is dominant over white eye trait.

(b) Explain what is meant by the term 'dominant'. [1]

For Examiner's Use

(c) A curly winged male was crossed with normal winged female. They produced 20 curly winged and 22 normal winged offspring. Determine the genotype of the male parent using a genetic diagram. [5]

[Total: 8marks]

For Examiner's Use

6 The takahē, *Porphyrio hochstetteri*, is a flightless bird that is restricted to a small area of the South Island of New Zealand. It is one of only two remaining species of large, flightless, herbivorous birds from New Zealand. Their flighted ancestor came over from Australia millions of years ago.
The takahē as shown in Fig. 6.1 was thought to be extinct but a small population with low genetic variation was discovered in 1948 among the grassland mountains of the South Island.

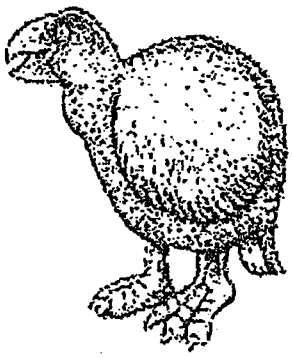


Fig. 6.1

(a) Explain why it has been possible for flightless birds, such as the takahē, to evolve. [4]

(b) Suggest why low genetic variation in the population of takahē is undesirable. [1]

For Examiner's Use

(c) To increase genetic variation in the population, conservationists selected some birds with more variation in their alleles and allowed them to interbreed. This is an example of artificial selection.

(i) Suggest one difference between artificial selection and natural selection. [2]

(ii) State two processes that led to increased genetic variation in the population. [2]

[Total : 9marks]

7 Fig. 7.1 shows a town and surrounding countryside.

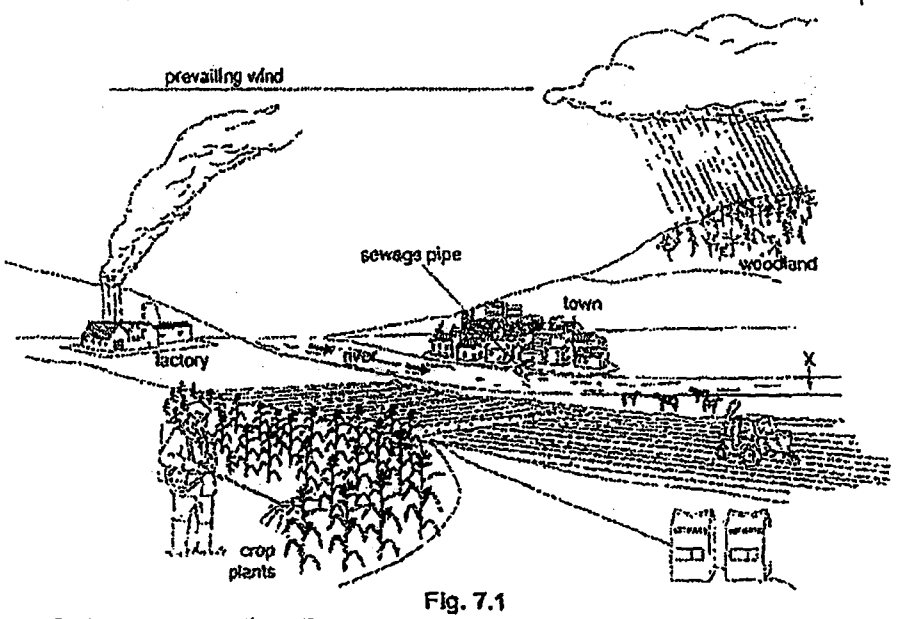


Fig. 7.1

(a) State the term for the effects on the environment of the activities shown in Fig. 7.1. [1]

For Examiner's Use

(b) (i) Name a harmful gas released into the air by the factory. [1]

(ii) Describe a harmful effect of this gas. [1]

(c) (i) Downstream from point X in Fig. 7.1, plants in the river grow rapidly and in large numbers. State two possible reasons for this. [2]

1

2

(ii) Explain why, between the town and point X, there are large numbers of bacteria but very few plants and animals in the water. [4]

[Total: 9marks]

End of Section A

For Examiner's Use

CANDIDATE NAME

INDEX NUMBER

CLASS 4

For Examiner's Use	
Section B	
8	
9	
10	
Total	

Section B

Answer all the questions.

Answer Q 8(bi) on the graph paper inserted behind this cover page.

Question 10 is in the form of an Either/Or question.
Only one part should be answered.
Write your answers on the lines provided.

8 The rate of a drug exiting the body via the kidneys was measured by injecting a radioactively labelled drug into a vein in the arm of a volunteer and measuring the radioactivity of urine samples collected in 1-hr intervals.

(a) Outline the shortest path a molecule can take from a vein in a person's arm to his kidneys, listing the major blood vessels and organs that the molecule will pass through. [3]

(b) The results are shown in table 8.1.

Time/h	0	1	2	3	4	5	6
Radioactivity/ arbitrary unit	0	0	10	5	2.5	1.2	0.6

(i) Plot the data on the graph paper provided. [4]

(ii) Calculate the time for the radiation intensity to drop from its peak to half of the peak value.

[1]

(iii) The analysis of the radioactive molecules in the urine samples showed that the radioactive molecule is a fragment of the original drug molecule, and none of the original drug molecules are present. Explain what could have occurred to lead to this observation and name the organ in the body that could have been involved in this process. [2]

9 (a) Describe the events that occur after the body temperature falls that will return the body temperature to its normal level. [7]

(b) Explain what is meant by control by 'negative feedback'. [3]

10 Either

(a) Describe the path taken by a molecule of oxygen as it passes from air in the lungs to a muscle cell in the body. [6]

(b) Explain how the difference in the pressure of the blood in the pulmonary artery and in the aorta is related to

(i) the structure of the ventricles and

(ii) where the blood is going. [4]

10 OR

(a) Describe how the action of enzymes can be explained by the 'lock and key' hypothesis. [5]

(b) Describe and explain the effect of a gradual increase in temperature on an enzyme-controlled reaction. You should refer to the 'lock and key' hypothesis. [5]

CEDAR GIRLS' SECONDARY SCHOOL
Preliminary Examination Two 2014
Secondary Four

Paper 1: MCQ

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

Paper 2

Section A

	Marking Scheme/Answers	Marker's Comment
1	(a) A: Chromosome [1] B: Golgi body [1] (b) (i) Anaphase [1] (ii) • The sister chromatids [$^1/_2$] • separate [$^1/_2$]. • Spindle fibre will shorten [$^1/_2$] • Chromosomes pulled towards the poles [$^1/_2$]. (c) (i) ½ n [1] (ii) DNA replication [1] [Total : 7 marks]	
2	Water molecules + osmosis [1]. Water potential inside the cells is lower than that of pure water which is outside the cells. [1] an increase in the volume + cells lyse.[1] [Total : 3 marks]	

3	(a) • The xylem vessels - long + hollow tube [½]. • able conduct water and mineral salts +direction [½] • no cross walls or cytoplasm [½] • continuous hollow columns + efficient water transport. [½] • lignin deposition [½] • prevents the collapse of the structures. [½] • When bundled together[½], • provide mechanical support to the plant. [½] [max 3 marks] (b) • mesophyll cells surrounded by a thin film of water [½]. • water evaporates [½] • lost as water vapour when the stomata of the leaves are open [½] • This lowers [½] the water potential of the mesophyll cells. • Water moves from the neighbouring cells + osmosis [½] • a suction force [½] was created • results in water uptake [½] of the twig from the photometer. • water level at the calibrated pipette will decrease, indicating the amount of water that is absorbed. [½] (c) • presence of sunlight increases [½] the rate of water uptake by the twig. • In darkness guard cells at the leaves are flaccid + stomata are closed [½], • little transpiration + little water uptake [½] • stomata open + increase the rate of transpiration. [½] [Total : 8 marks]	
4	(a) (b) 515 x 13 x 0.2 = 139 cm^3 (c) • anaerobic respiration [½] • additional energy[½]. • lactic acid [1] produced • muscle fatigue [½]. • breathing rate continues to be fast [½] [Total : 7 marks]	

5 (a)

- Gene - a segment of a chromosome [$^1/_2$] +
- a sequence of nucleotides and it codes for a single protein [$^1/_2$].
- An allele is one of the alternate forms of a gene [1]

(b)

- Dominant refers to the gene that is able to express itself [$^1/_2$]
- same phenotype in both homozygous and heterozygous dominant. [$^1/_2$]

(c) Let N represent the allele for the Normal wing
n represent the allele for the curly wing

For the female parent to have normal wing, it has to be Nn or NN.

Cross one : if the female parent is NN

Parents: Phenotype Curly winged X Normal Winged
Genotype nn NN

Alleles n, n N, N

Fertisation

F1 Generation: Genotype Nn
Phenotype normal
Ratio All Normal Winged

Cross two : if the female parent is Nn

Parents: Phenotype Curly winged X Normal Winged
Genotype nn Nn

Alleles n, n N, n

Fertisation

F1 Generation: Genotype Nn, Nn , nn, nn
Phenotype Normal Curly Winged
Ratio 1 Normal Winged : 1 Curly Winged

As shown in this cross 2, the female parent has to be heterozygous (Nn) if she was to contribute a recessive allele (n) to produce a curly winged offspring which has genotype of nn.

6	(a) Explain why it has been possible for flightless birds, such as the takahē, to evolve in New Zealand. • Variations + (e.g. flightless birds) + mutation. [1] • Adapted to the environment + e.g. by being a specialist in grassland [1] • Nature selection occurs [1] • Survival of fittest (or explain this term e.g able to compete and survive and reproduced their own kind.) [1] (b) Suggest why low genetic variation in the population of takahē is undesirable. May result in extinction [1/2] because population may not have resistance to diseases [1/2] (c) (i) Suggest one difference between artificial selection and natural selection. Artificial Selection is when the selection of a trait (in plants for animals) is carried out by Man while Natural Selection occurs when environmental Conditions determine which combination of alleles (genotypes) will survive and reproduce. [2] (ii) State two processes that led to increased genetic variation in the population. 1. Environmental Conditions 2. Meiosis (independent assortment and crossing over) 3. Mutation 4. Fertilisation (any two) Total : 9 marks]	

7	(a) pollution ; [1] (b) (i) carbon dioxide/carbon monoxide/sulphur dioxide/various oxides of nitrogen (R symbols) ; [1] (ii) global warming /carboxyhaemoglobin/acid rain (effect must be related to named gas) ; [1] (c) (i) Any two from: drainage from land, ion/salt/nutrients or named, sewage, dung, warmer water;; [2] (ii) bacteria in sewage/cow dung ; decomposition ; oxygen used up ; bacteria + respiration ; animals/plants + unable to respire [max 3] [Total : 8 marks]	

Section B

8	(a) The shortest pathway for the molecule to take is to travel from the vein in the arm to the right atrium and ventricle of the heart, [$^1/_2$] enter the lungs via the pulmonary artery [$^1/_2$] and return to the left atrium [$^1/_2$] and ventricle of the heart via the pulmonary vein. [$^1/_2$] The molecule then exits the heart via the aorta [$^1/_2$] and travels to the kidneys via the renal artery. [$^1/_2$] [max 3]	
	(b) (i) Graph Labels [1] Plotting [1] Shape [1] Appropriate axes/more than ½ of graph paper [1] [max 4]	
	(ii) 1 hour (iii) The drug molecule travelled to the liver [1] where it is metabolised [$^1/_2$] into smaller molecules [$^1/_2$]. [max 3]	

9	(a) ref. hypothalamus nervous control/impulses/brain less active sweat glands/sweating stops (A inactive) less evaporation (of sweat) (R no evaporation) vasoconstriction of arteries/-erioles/blood vessels (R capillaries/veins) less blood to capillaries (A ref. heat loss from) less heat lost shivering generates heat/hair erection decreases heat loss (or insulates)/adrenaline release/higher metabolic rate one behavioural reference (e.g. moving/putting clothes on) [max 7] (b) • a change (e.g. in level); • is responsible for/ triggering/causing/ • with ref to receptors; • a response/reaction occurs; • (which leads to) restoration of original level; [max 3]	

10	Either (a) Describe the path taken by a molecule of oxygen as it passes from air in the lungs to a muscle cell in the body. • Enters the nostrils + [air is warmed and moistened]; • Pharynx + larynx; • Trachea; • Bronchus (must be singular); • Bronchiole (must be singular); • Alveolus (must be singular); • Dissolve in thin film of moisture; • Passes through the single celled alveolar wall; • Diffuses into the capillaries; • Diffuses into RBC + binds with haemoglobin; • RBC will be carried to left ventricle of heart + by the pulmonary vein; • Left ventricle contracts + RBC will be sent to all parts of the body including muscles. [max 6] (b) right (ventricle) wall thinner/left (ventricle) wall thicker OR reference less/ more muscle OR weaker/stronger contractions ; (A smaller—Larger) (pulmonary) shorter distance to travel (A only to the lungs); little work (or effort) to do against gravity; avoidance of damage to lung capillaries/low pressure required in lungs ; (body) high pressure for kidney filtration ; oxygen/glucose to brain ; [max. 3]	
10	OR (a) active site ; of specific shape; substrate ; fit/are complementary ; any ref. enzyme/substrate complex being like lock and key ; stress on substrate molecule ; product formed ; also works in reverse ; [max 5] (b) reaction rate increases ; similar to key turning more often ; more energy/faster movement of molecules ; active site changes shape ; proteins are denatured by heat; permanently ; reaction stops ; substrate no longer fits active site ; key no longer fits lock ; [max 5]	