PASIR RIS CREST SECONDARY SCHOOL
Preliminary Examination
Secondary Four Express/Five Normal Academic

CANDIDATE NAME

CLASS / INDEX NUMBER

SCIENCE (CHEMISTRY, BIOLOGY)

5078/01

Paper 1 Multiple Choice

4 September 2019

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and register number on the answer sheet in the spaces provided.

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 instruction 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.
A copy of the Data Sheet is printed on page 20.
A copy of the Periodic Table is printed on page 21.
The use of an approved scientific calculator is expected, where appropriate.

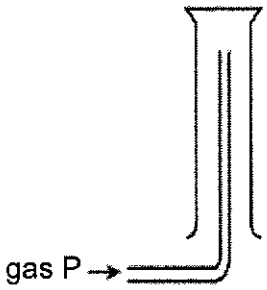
For Examiner's Use
40
Parent's Signature

This document consists of **21** printed pages.

[Turn over

Answer **all** questions.
Shade your answers in the Multiple Choice Answer Sheet provided.

1 Gas P can be collected using the apparatus shown below.



Based on the diagram only, what can you infer about gas P?

A It is denser than air.

B It is insoluble in water.

C It is less dense than air.

D It is soluble in water.

2 Which property should be used to determine the purity of citric acid crystals?

A colour of crystals

B density

C melting point

D solubility in water

3 Which substance has particles that are close together but still able to move freely at room temperature?

	melting point/ °C	boiling point/ °C
A	-169	-100
B	-114	78
C	113	184
D	97	800

[Turn over

4 An aqueous solution of X reacts with aqueous sodium hydroxide to produce a reddish brown precipitate. Dilute nitric acid and aqueous silver nitrate is added to aqueous solution of X to produce a white precipitate.

What is solution X?

A iron(II) chloride

B iron(III) chloride

C iron(II) sulfate

D iron(III) sulfate

5 Which row consists of an element, a compound and a mixture?

A air, oxygen, nitrogen

B barium, carbon dioxide, water

C calcium nitrate, steel, zinc

D magnesium, iron, iron oxide

6 The table shows the number of particles present in four elements.

	number of protons	number of neutrons	electron structure
1	18	22	2,8,8
2	19	20	2,8,8
3	19	21	2,8,8,1
4	20	20	2,8,8,2

Which two particles belong to the same element?

A 1 and 2

B 1 and 4

C 2 and 3

D 2 and 4

7 Which statement is true about a carbon dioxide molecule?

A A carbon atom gains four electrons from two oxygen atoms.

B A carbon atom shares two electrons with two oxygen atoms.

C There are weak forces of attraction between the carbon dioxide molecules.

D There is strong bonding between carbon dioxide molecules.

8 An atom of element X reacts with an atom of element Y to form an ionic compound X_2Y.

What is the electronic structure of element X and element Y?

	element X	element Y
A	2,5	2,1
B	2,6	2,7
C	2,8,1	2,6
D	2,8,2	2,7

9 30 cm^3 of 1.0 mol/dm^3 of aqueous sodium hydroxide neutralises 25 cm^3 of dilute hydrochloric acid.

What is the concentration of dilute hydrochloric acid?

A 0.80 mol/dm^3

B 1.00 mol/dm^3

C 1.20 mol/dm^3

D 1.25 mol/dm^3

10 Which salt is prepared by titration?

A ammonium chloride

B calcium carbonate

C copper(II) sulfate

D potassium hydroxide

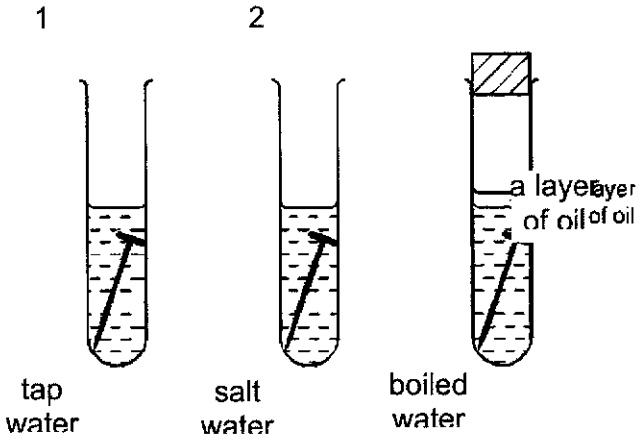
11 Which row describes an amphoteric oxide?

	reaction with acid	reaction with alkali
A	form salt and water	form salt and water
B	form salt and water	no reaction
C	no reaction	form salt and water
D	no reaction	no reaction

12 Which set of properties belongs to sodium?

	density	malleable	melting point
A	low	yes	low
B	low	no	high
C	high	yes	low
D	high	no	high

13 The diagram shows three experiments to investigate rusting.



In which test tube(s) will the iron nail rust?

A 1 only

B 1 and 2 only

C 1 and 3 only

D 1, 2 and 3

14 Why is limestone needed in the extraction of iron?

A To increase the temperature in the furnace.

B To reduce iron(III) oxide to iron.

C To remove acidic impurities.

D To produce oxygen for coke to burn.

15 Which statement describes the properties of bromine?

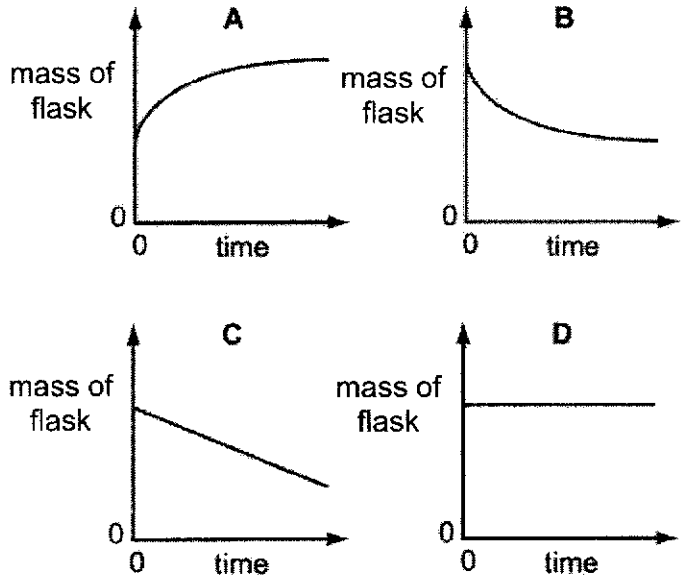
A It has high density.

B It has higher boiling point than iodine.

C It is a liquid at room temperature.

D It reacts with aqueous potassium chloride.

16 Which graph represents the change in mass of flask against time when a conical flask containing aqueous sodium carbonate reacts with dilute nitric acid?



17 2 g of calcium carbonate granules reacts with excess 2.0 mol/dm^3 of dilute hydrochloric acid.

Which condition decreases the rate of the reaction?

A Increasing the volume of dilute hydrochloric acid.

B Using 1.0 mol/dm^3 of dilute hydrochloric acid.

C Using 5 g mass of calcium carbonate.

D Using powdered calcium carbonate.

18 Why is argon used instead of air in a light bulb?

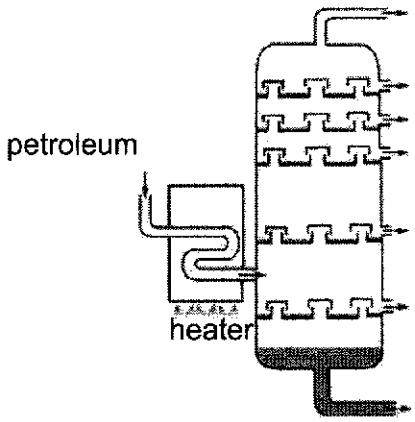
A Argon is a good conductor of electricity.

B Argon is a colourless gas.

C Argon is an inert gas.

D Argon is insoluble in water.

19 The diagram shows the setup for the fractional distillation of petroleum.



Which statement is true about the fractional distillation of petroleum?

A A pure compound is collected at each level in the column.

B The molecules collected at the bottom of the column have the lowest relative molecular mass.

C The molecules collected at the top of the column is the most flammable.

D The temperature increases as the height of the column increases.

20 Which statements are true about alkenes?

1. They are unsaturated hydrocarbons.
2. They react with sodium carbonate.
3. They react with aqueous bromine.

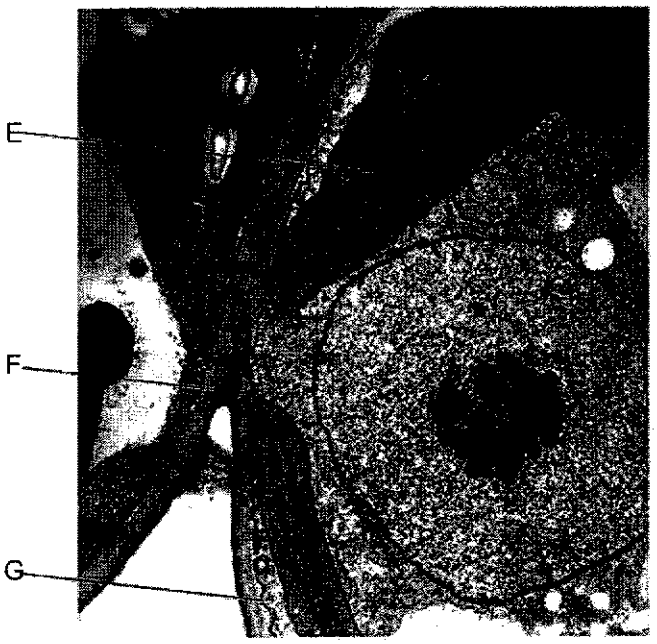
A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

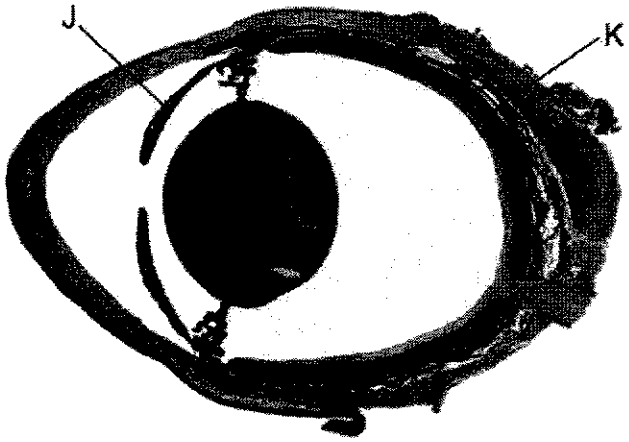
21 The electron micrograph shows part of two cells.



Which labelled structure(s) is/are found in plant cells but **not** in animal cells?

A E only **B** E and F **C** E and G **D** F and G

22 The diagram shows a section through the eye of a small mammal as viewed with a microscope.



What are structures J and K?

A organs in an organ system
B organs in a tissue
C organ systems in an organism
D tissues in an organ

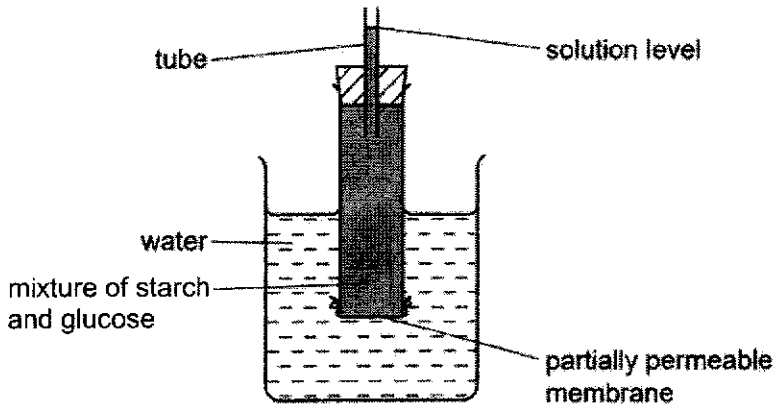
23 In a section through a plant, a student found a group of long, microscopic structures. The structures lack cross walls, cytoplasm and nuclei.

Which identification and reason best match the student's observations?

	identification	reason
A	root hair cell	they do not contain a nucleus when mature
B	root hair cell	they do not contain cytoplasm to absorb water
C	xylem	they can support the plant better without cytoplasm
D	xylem	they need to be hollow to transport water efficiently

[Turn over

24 The diagram represents the apparatus used to investigate diffusion and osmosis.



After one hour, samples of water in the beaker were tested with Benedict's solution and with iodine solution.
What are the results obtained from the food tests and how would the solution level in the tube change?

	results obtained after heating with Benedict's solution	results obtained after adding iodine solution	change in solution level
A	blue solution	blue-black	fall
B	blue solution	yellow-brown	rise
C	orange precipitate	blue-black	fall
D	orange precipitate	yellow-brown	rise

25 The diagram shows two food molecules before and after they have been digested by enzymes.

before digestion

after digestion

Which identifies the products of fat digestion?

A L and M **B** L and N **C** M and N **D** N and P

[Turn over

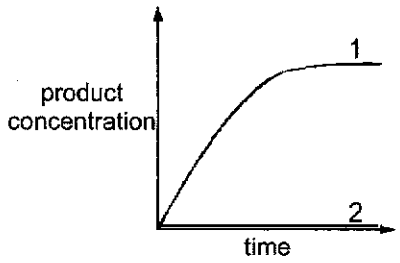
26 According to the 'lock and key' hypothesis, where is the active site and which is the lock and key?

	active site	lock	key
A	on the enzyme	enzyme	substrate
B	on the enzyme	substrate	enzyme
C	on the substrate	enzyme	substrate
D	on the substrate	substrate	enzyme

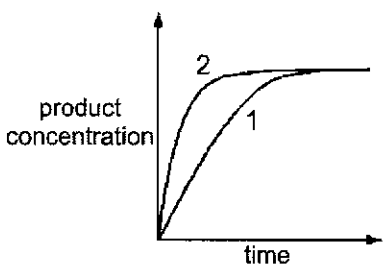
27 Two experiments were conducted to investigate the activity of an enzyme isolated from gastric juice. The first experiment was carried out at pH 2 while the second experiment was carried out at pH 8.

Which graph shows the results?

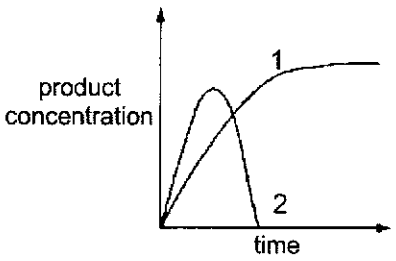
A



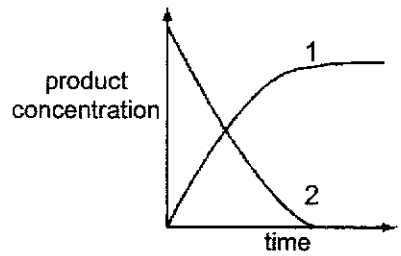
B



C



D



[Turn over

28 The table shows changes in the concentrations of solutes in the blood plasma as the blood flows through an organ.

solute	change in concentration
carbon dioxide	increased
glucose	increased
oxygen	decreased
urea	increased

Which organ has the blood passed through?

A brain

B liver

C lungs

D stomach

29 Where in the alimentary canal is most water absorbed?

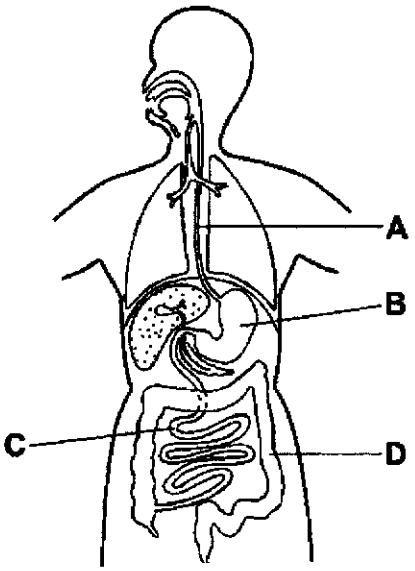
A anus

B colon

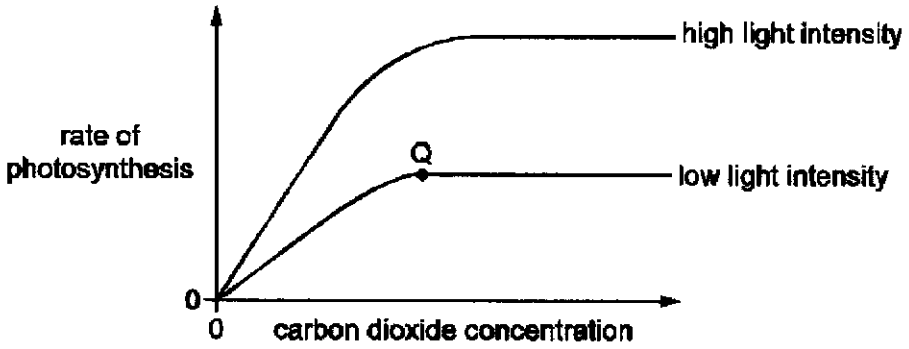
C ileum

D stomach

30 Which part of the alimentary canal receives enzymes from a gland to digest fats and proteins, and contains muscles that carry out peristalsis?



31 The graph shows how the rate of photosynthesis of a plant varies with carbon dioxide concentration at two different light intensities. The temperature is kept constant at 25 °C.



Which factor is limiting the rate of photosynthesis at point Q?

A availability of chlorophyll

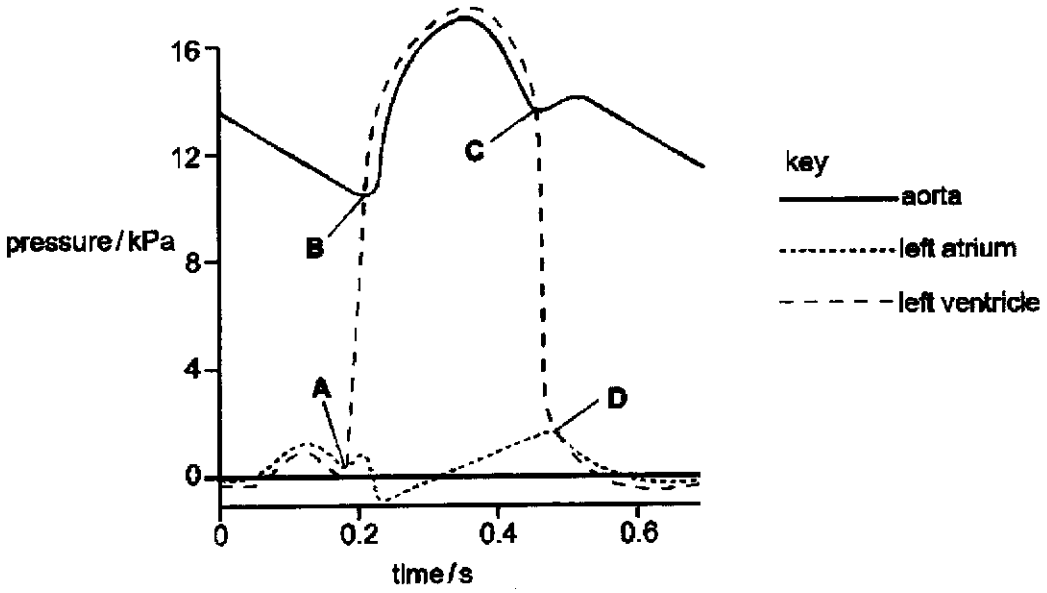
B carbon dioxide concentration

C light intensity

D water availability

[Turn over

32 The diagram shows the blood pressure in various parts of the circulatory system during the cardiac cycle.
At which point will the semilunar valve of the aorta close?



33 Which feature of alveoli decreases the distance over which oxygen and carbon dioxide molecules diffuse?

A Each alveolus has a large blood supply.

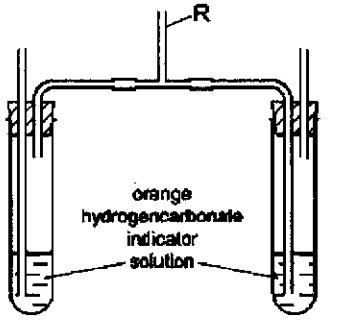
B Each alveolus is only 0.1 mm – 0.2 mm in diameter.

C There are approximately 150 million alveoli in each lung.

D Walls of alveoli are only one cell thick.

[Turn over

34 The diagram shows apparatus used to investigate breathing.



At the start, both test tubes contain orange hydrogencarbonate indicator solution.

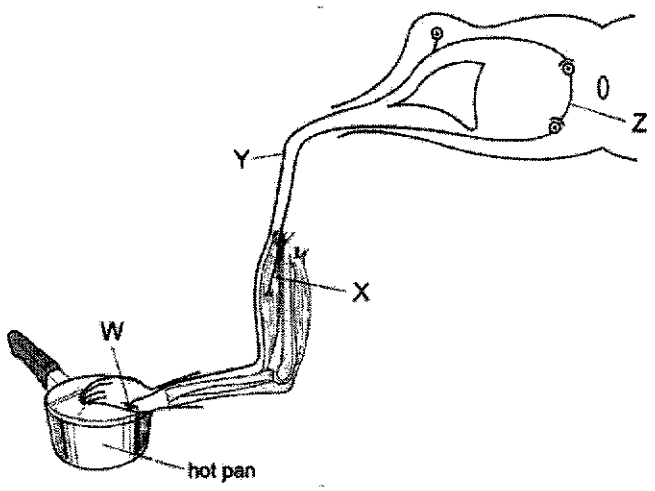
The hydrogencarbonate indicator solution is orange when atmospheric air passes through it.
When air with less carbon dioxide passes through the hydrogencarbonate indicator solution, it changes to red.
When air with more carbon dioxide passes through the hydrogencarbonate indicator solution, it changes to yellow.

Which changes occur to the hydrogencarbonate indicator solution in test tubes S and T when a person breathes in and out through the tube R?

	solution in test tube S	solution in test tube T
A	becomes red	becomes yellow
B	becomes yellow	becomes red
C	remains orange	becomes red
D	remains orange	becomes yellow

[Turn over

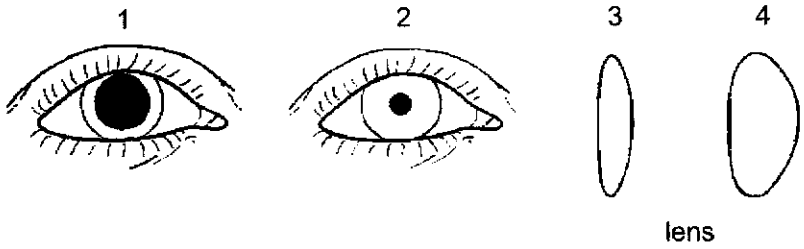
35 The diagram shows the structures involved in a reflex action.



What is the sequence in which nerve impulses pass through the labelled structures?

A X → Z → Y → W
B W → Y → Z → X
C W → X → Y → Z
D Z → X → W → Y

36 The diagram show the eye viewed from the front and the lens in cross-section.

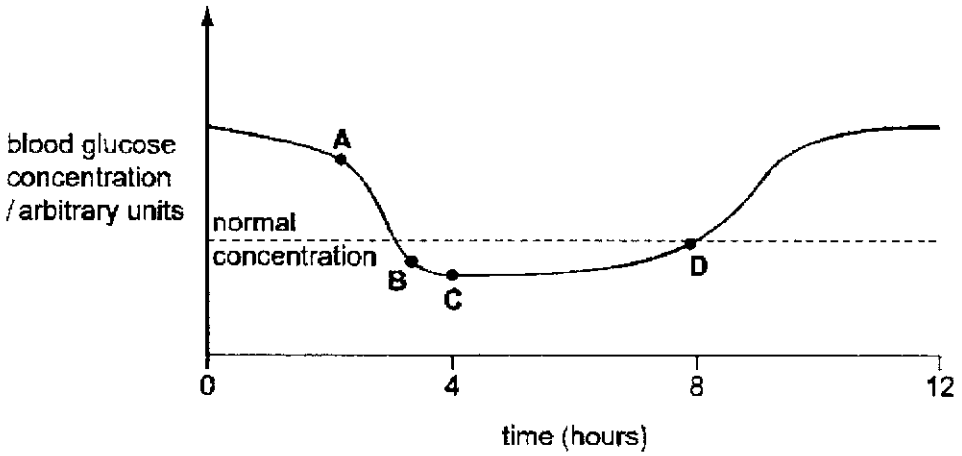


Which diagrams show the appearance of the pupil and the shape of the lens when reading a book at the unsheltered area at the basketball court on a sunny day?

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

[Turn over

37 A patient who suffers from diabetes mellitus receives treatment with insulin injections. The graph shows how the patient's blood glucose concentration changed during part of one day. At which point was an insulin injection administered?



38 What is the result of cutting both sperm ducts in a man?

A He will not be able to pass urine.

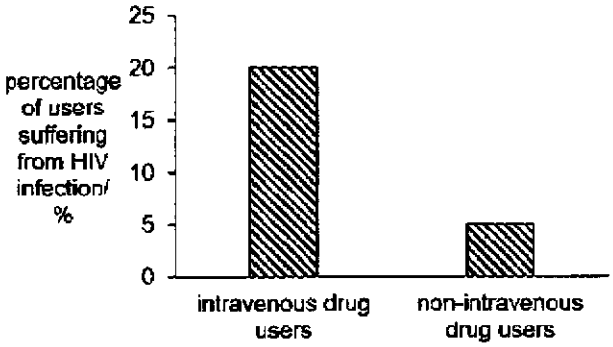
B He will not be able to produce sperms.

C He will not be able to release sperms.

D His blood will not contain testosterone.

[Turn over

39 Intravenous drug use involves injecting the drug into a vein using a syringe.
The diagram shows the percentage of intravenous drug users and non-intravenous drug users who suffer from HIV infection in a particular part of the world.



Which of the following explains the difference between the two groups of drug users?

A Intravenous drug use is more common in some parts of the world.

B Intravenous drug users use condoms more frequently than non-intravenous drug users.

C Many intravenous drug users used the same unsterilized needle to administer the drug.

D There are more intravenous drug users than non-intravenous drug users.

40 A couple has four children. The table shows some of the children's characteristics.

child	gender	blood group	left-handedness/ right-handedness
1	male	A	right-handed
2	male	B	right-handed
3	male	AB	left-handed
4	female	O	left-handed

What type of variation do the characteristics show?

A continuous variation

B discontinuous variation

C both continuous and discontinuous variation

D neither continuous nor discontinuous variation

[Turn over

Data Sheet

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
lead(II) hydroxide	white
zinc hydroxide	white

PASIR RIS CREST SECONDARY SCHOOL
Preliminary Examination
Secondary Four Express/Five Normal Academic

CANDIDATE NAME

CLASS / INDEX NUMBER

SCIENCE (CHEMISTRY, BIOLOGY) 5078/04

Paper 4 Biology

2 September 2019

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your candidate name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A (45 marks)
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B (20 marks)
Answer any **two** questions.
Write your answers in the spaces provided on the question paper.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at end of each question or part question.

For Examiner's Use
65
Parent's Signature

This document consists of **14** printed pages.

[Turn over

Section A

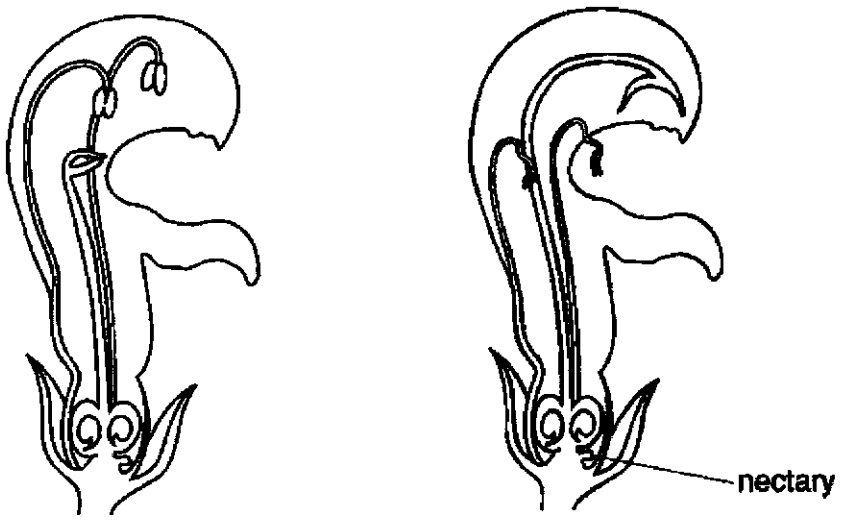
Answer **all** questions in the spaces provided.

1 **(a)** Define the term *pollination*.

.....

..... [2]

(b) Fig. 1.1 shows flowers of a plant at different stages, **P** and **Q**, in their development.



stage **P** stage **Q**

Fig. 1.1

(i) On Fig. 1.1, draw lines labelled **F** and **S** to label a filament (**F**) and a sepal (**S**). [1]

(ii) With reference to Fig. 1.1, suggest how the plant may prevent self-pollination.

..... [1]

(iii) State two features shown in Fig. 1.1 that suggest that the flower is pollinated by insects.

.....

..... [2]

[Total: 6]

[Turn over

2 The following is an example of a simple food chain:

tree → insect → bird → fox

(a) Name the secondary consumer from this food chain.

..... [1]

(b) State two ways in which energy may be lost between trophic levels.

.....

.....

..... [2]

(c) The foxes are infested with fleas (small, blood-sucking insects).

(i) In the space below, draw and label a pyramid of numbers and a pyramid of biomass for the complete food chain **including** the fleas.

pyramid of **numbers**

pyramid of **biomass**

[4]

(ii) The energy flow in this food chain is non-cyclical.
Use the pyramid of biomass constructed in **2(c)(i)** to explain the term non-cyclical.
Include information about the source of energy for the food chain in your answer.

.....

.....

..... [3]

[Total: 10]

[Turn over

3 **(a)** Fig. 3.1 shows the changes in blood pressure as it flows from the right atrium to the pulmonary vein.

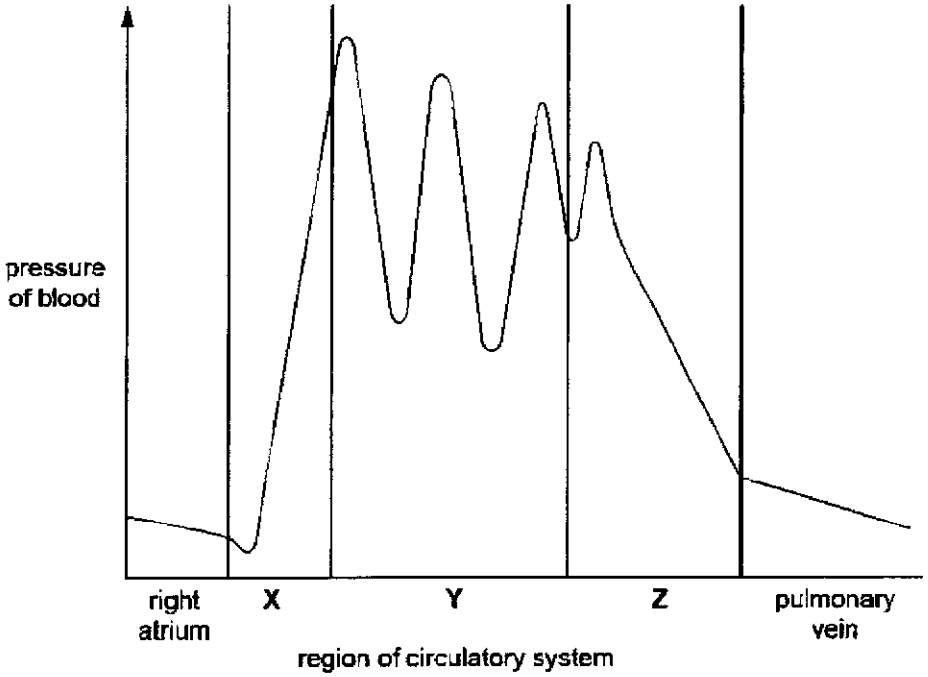


Fig. 3.1

(i) State the name of blood vessels represented by **Y** and **Z**.

..... [2]

(ii) Explain the fluctuations in the pressure of blood in region **Y**.

.....

.....

..... [2]

(iii) State which chamber of the heart is represented by **X**. Explain your answer.

chamber **X** .....

explanation .....

..... [2]

[Turn over

(b) A student measured his pulse rate during the day. He took a reading while sitting, and also as he did different activities. Some of his readings are shown in Table 3.1.

Table 3.1

activity	pulse rate/ beats per min
sitting	65
running	162
S	83

(i) Suggest an activity for **S**. Explain your answer.

.....

..... [1]

(ii) Explain in detail why the muscles of the student's legs need a greater supply of blood while running.

.....

.....

.....

.....

..... [2]

[Total: 9]

[Turn over

4 **(a)** Fig. 4.1 shows a drawing of the alveoli in healthy lungs and Fig. 4.2 shows a drawing of alveoli of a person with bronchitis.

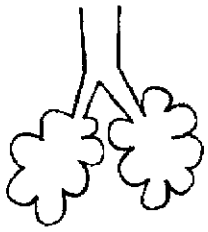


Fig. 4.1

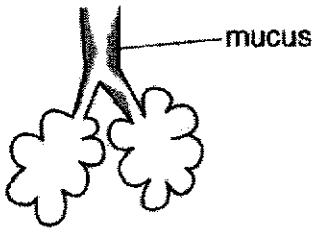


Fig. 4.2

With reference to Fig. 4.1 and Fig. 4.2, describe how cigarette smoke encourages bronchitis.

.....

.....

.....

..... [3]

(b) Fig. 4.3 shows a drawing of the alveoli of a person with emphysema.

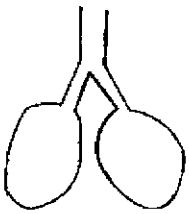


Fig. 4.3

With reference to Fig. 4.1 and Fig. 4.3, suggest how emphysema can be harmful during pregnancy.

.....

.....

.....

..... [3]

[Turn over

(c) Fig. 4.4 shows the percentage of smokers in a particular country and the number of deaths from lung cancer in that country during the years 1925 to 2015.

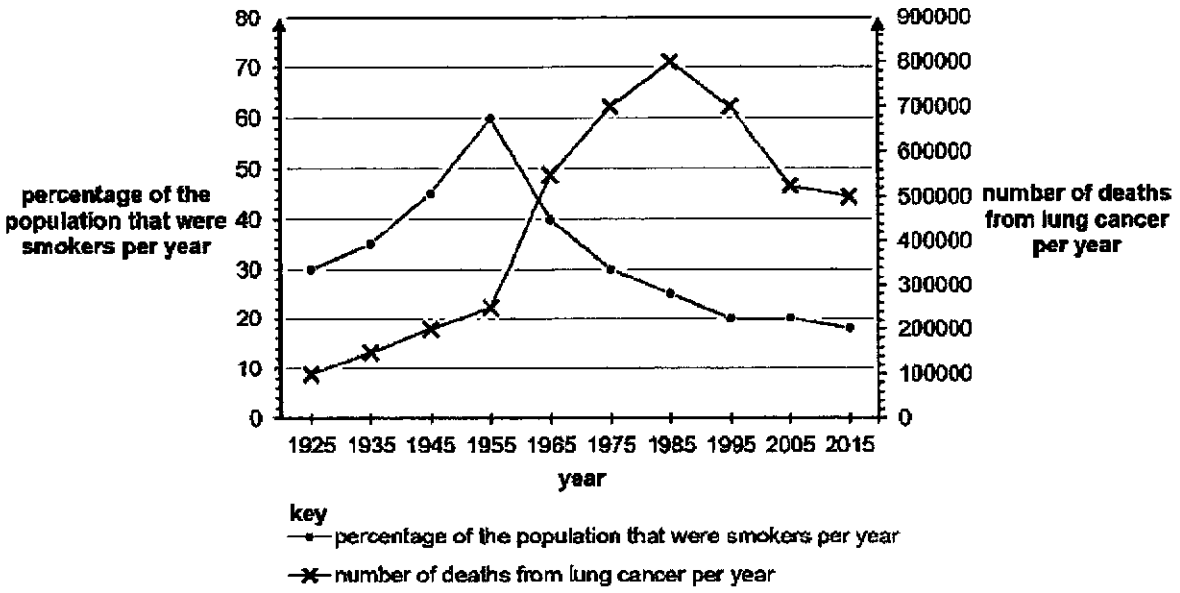


Fig. 4.4

Describe and explain the trends shown in Fig. 4.4.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 10]

[Turn over

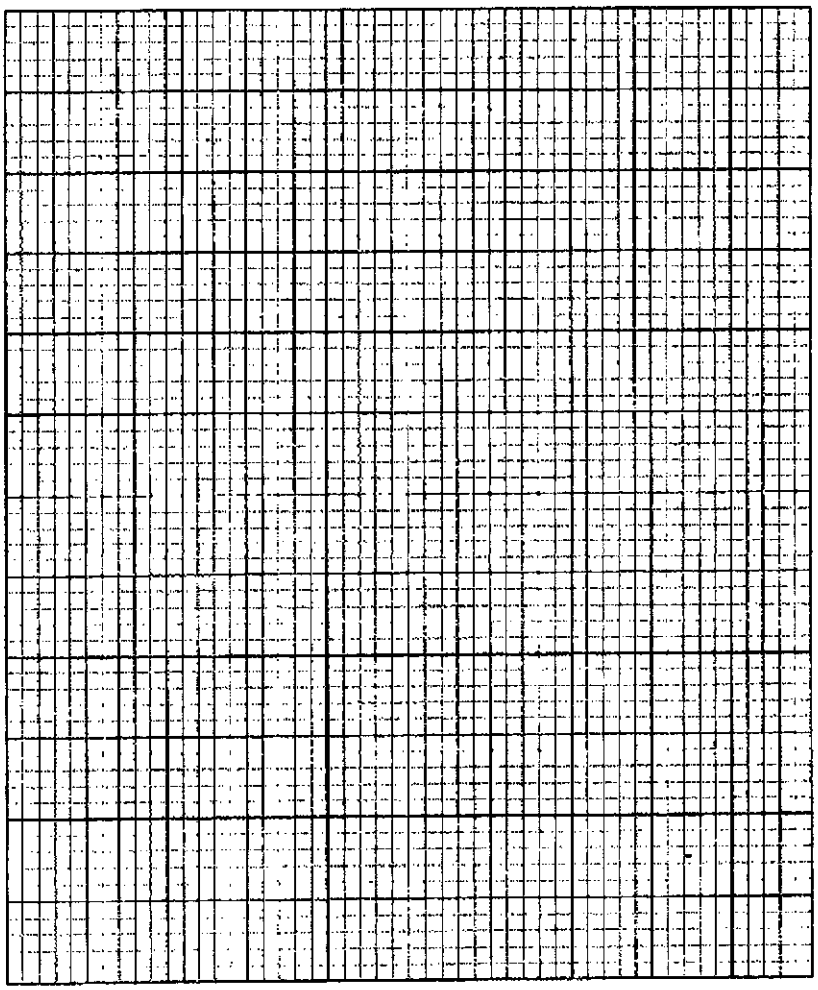
5 Hemicellulase is an enzyme which breaks down hemicellulose, a polysaccharide found in plant cell walls. It is used to extract juice from fruits such as apples.

(a) A student investigated the effect of adding a known volume of hemicellulase to some crushed apples. The mixture was stirred to mix the hemicellulase thoroughly with the apple and filtered. He recorded the volume of apple juice collected every 30 seconds for 4 minutes. His results are shown in Table 5.1.

Table 5.1

time/ s	30	60	90	120	150	180	210	240
volume of apple juice collected/ cm^3	22	27	33	39	43	48	50	50

(i) On the grid provided, plot the data shown in Table 5.1.



[4]

[Turn over

(ii) Use your graph in **5(a)(i)** to predict the volume of apple juice collected at 200 seconds. Show on your graph how you arrived at your answer.

volume = ... [1]

(iii) Use your graph to describe how the volume of apple juice collected changes during the 4 minutes.

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..... [2]

(b) Hemicellulase is made up of many polypeptide chains joined together.
Describe how the DNA that makes up the chromosomes controls the production of hemicellulase.

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..... [3]

[Total: 10]

[Turn over

Section B

Answer any **two** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Use knowledge about photosynthesis and transpiration to suggest and explain how an increase in light intensity affects the gaseous exchange occurring between a leaf and the atmosphere during the day.

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..... [5]

(b) Explain how the starch stored in the roots of a plant during the day can be used for growth for growing regions of the plant during the night.

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..... [5]

[Total: 10]

[Turn over

7 (a) Acromatase deficiency is an inherited disorder that results in reduced levels of oestrogen. It is inherited as a recessive allele.

Fig. 7.1 shows how acromatase deficiency was inherited in one family.

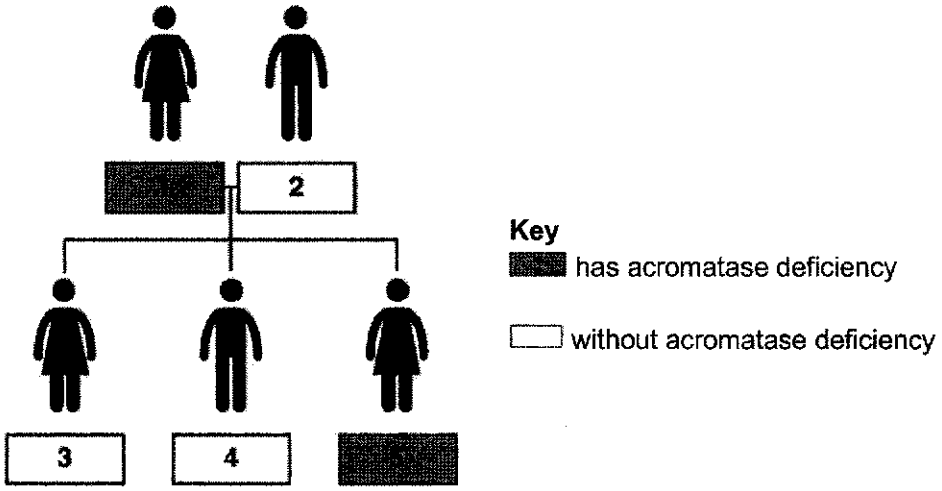

Fig. 7.1

Explain why individual 5 suffers from acromatase deficiency while her siblings do not. Individual 5 marries a carrier. Use a genetic diagram to determine the chance of their child having acromatase deficiency. Use **A** to represent the dominant allele and **a** to represent the recessive allele.

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..... [8]

[Turn over

(b) Explain how individual **5**'s menstrual cycle and fertility may be affected by acromatase deficiency if she does not seek medical treatment

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..... [2]

[Total: 10]

[Turn over

8 Freshwater shrimps are small organisms that live in rivers. They require a high level of dissolved oxygen in the water to survive. Raw sewage was discharged into a river in 2018. Scientists took samples at 1 km intervals along the river and measured the number of freshwater shrimps in the water samples. Fig. 8.1 shows their results.

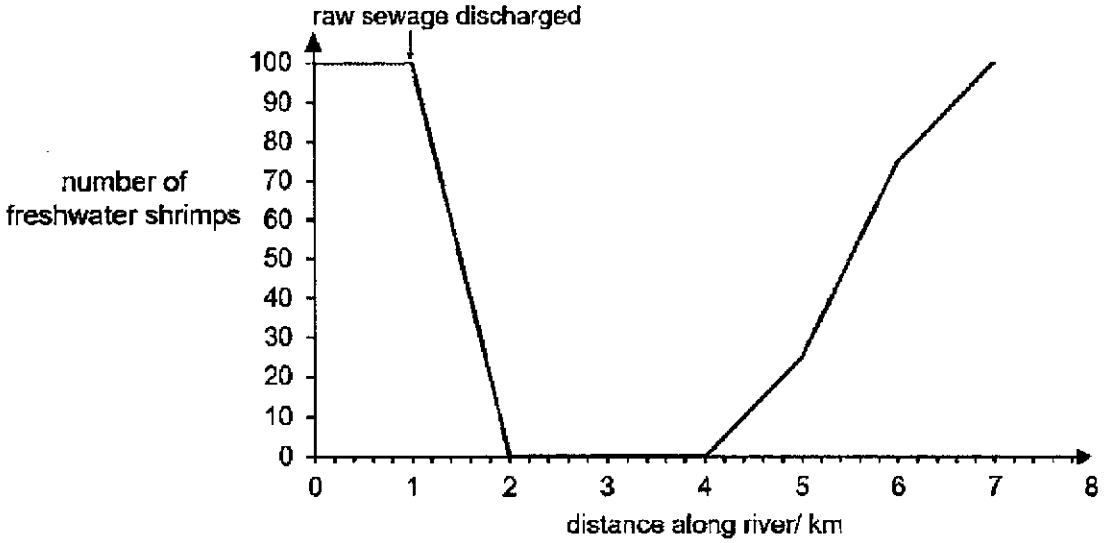

Fig. 8.1

(a) Describe and explain the changes in the number of freshwater shrimps along the river as shown in Fig. 8.1.

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..... [6]

[Turn over

(b) A new sewage treatment plant is built so that raw sewage will not be discharged into the river directly.
Explain how biotechnology is applied in sewage treatment to improve water quality.
Suggest and explain how this would affect the number of freshwater shrimps in the river.

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..... [4]

[Total: 10]

End of Paper 4

Sec 4E5N Science (Biology) Prelim Exam 2019

Paper 1

Questions 1 to 20 are Chemistry MCQ.

21	22	23	24	25	26	27	28	29	30
B	D	D	D	A	A	A	B	C	C
31	32	33	34	35	36	37	38	39	40
C	C	D	D	B	D	A	C	C	B

Paper 4

no.			mark scheme	marks
1	(a)		transfer of pollen; from anther to stigma;	2
	(b)	(i)	correctly labelled a filament + correctly labelled a sepal;	1
		(ii)	anthers and stigma mature at different times;	1
		(iii)	1. large petals; 2. has nectary to produce nectar; 3. stigma and anther enclosed by petals; [max 2]	2
				[Total: 6]
2	(a)		bird;	1
	(b)		Any 2 1. energy lost as heat during respiration; 2. energy lost as it is trapped in excretory waste and faeces; 3. energy lost as it is trapped in uneaten parts of the organism;	2
	(c)	(i)	1. both pyramids with 5 levels + 'flea' level at the top; 2. each level correctly labelled; 3. standard pyramid shape for pyramid of biomass; 4. for pyramid of numbers - 'flea' level larger than + immediately above 'fox' level - 'fox' level smaller than + immediately above 'bird' level - 'bird' level smaller than + immediately above 'insect' level - 'tree' level at bottom + of smallest width; - ignore if 'flea' level is larger than 'insect' level	4
		(ii)	1. as energy is transferred from one trophic level to the next, energy is lost to the surroundings 2. energy lost does not return to the organisms in the food chain; 3. require continuous input of energy from the sun to allow trees to photosynthesize;	3
				[Total: 10]

3	(a)	(i)	Y: pulmonary artery; Z: capillary (in the lungs);	2
		(ii)	1. blood pressure increases when wall of right ventricle contracts; 2. elastic tissue / fibres in the wall of Y stretch and recoil due to increased pressure;	2
		(iii)	X is right ventricle; blood flows from right atrium to right ventricle/ higher blood pressure in right ventricle due to thicker, more muscular walls;	2
	(b)	(i)	any suitable activity, e.g. walking **and** activity is more energy-demanding / uses more oxygen than sitting but is less energy-demanding / uses less oxygen than running;	1
		(ii)	1. to supply more oxygen and glucose to the muscles for faster rate aerobic respiration; 2. to release more energy for vigorous / more muscle contractions;	2
				[Total: 9]
4	(a)		1. increase mucus production; 2. cilia in the trachea become paralysed + cannot remove mucus from airway / away from lungs; 3. accumulation of mucus containing trapped dust and bacteria lead to bronchitis;	3
	(b)		1. reduced surface area for gas exchange in alveoli + reduced rate of diffusion of oxygen from alveolar air into red blood cell; 2. less oxygen in fetal blood + reduced rate of respiration; 3. less energy released for growth and development + 1 possible effect: stillbirth/ premature delivery / low birth weight / neonatal death / possible developmental problems / AW;	3
	(c)		D1 (trend without numerical data) + E1; D1: From 1925 to 1955, number of deaths from lung cancer per year increased from approximately 100,000 to 220,000 as the percentage of population that were smokers per year increased from 30 % to 60 %. E1: people are not educated about / unaware of the link between smoking and lung cancer / cigarettes contain tar which is carcinogenic / AW D2 (trend without numerical data) + E2; D2: From 1955 to 1985, number of deaths from lung cancer increased from 220,000 to 800,000 even though the percentage of population that were smokers per year decreased from 60 % to 25 %. E2: cancer can take a long time to develop OR people suffer from lung cancer due to passive smoking / cancer caused by other factors / AW	4

			D3 (trend without numerical data) + E3; D3: From 1985 to 2015, number of deaths from lung cancer decreased from 800,000 to 500,000 as percentage of population that were smokers per year decreased from 25 % to 18 %. E3: risk of developing lung cancer reduced as there are lesser smokers / development of better diagnosis / treatment for lung cancer OR development of low tar cigarettes / better filters / e-cigarettes citing numerical data for each description (D);	
				[Total: 10]
5	**(a)**	**(i)**	1. time on x-axis, volume of apple juice collected on y-axis, both axes fully labelled with units; 2. suitable scales: linear + minimum size specified; 3. all points plotted correctly; 4. best-fit curve drawn;	4
		(ii)	50 cm^3 ± half small square; *award mark if students read from their graphs accurately even though they did not construct a best-fit curve in 5(a)(i)*	1
		(iii)	1. from 30 s to 200 s, volume of apple juice collected increased from 22 cm^3 to 50 cm^3 ; 2. from 200 s to 240 s, volume of apple juice remained constant at 50 cm^3 ;	2
	(b)		1. each DNA molecule consists of many genes along its length; 2. each gene is made up of a sequence of nucleotides which contains information for the synthesis of one polypeptide; 3. different genes code for the production of different polypeptides;	3
				[Total: 10]
6	**(a)**		1. photosynthesis occurs faster than respiration; 2. higher concentration of oxygen in the intercellular air space than atmospheric air/ AW; 3. oxygen diffuses out of leaf / released; 4. higher concentration of carbon dioxide in the atmospheric air than the intercellular air space; 5. carbon dioxide diffuses into leaf / absorbed; 6. through stomata; 7. guard cells carry out photosynthesis + more turgid guard cells 8. increase in size of stomata + faster diffusion of water vapour out of leaf; [max 5]	5

	(b)	1. enzymes break down starch to form glucose; 2. glucose converted to sucrose; 3. sucrose is soluble (in water of plant sap); 4. sucrose diffuses from storage cells to phloem; 5. sucrose transported to growing regions of the plant through the phloem / by translocation; 6. sucrose converted to glucose in the cells in the growing regions; 7. energy released from the breakdown of glucose during respiration is used for growth; [max 5]	5
			[Total: 10]
7	**(a)**	Explain why individual 5 suffers from acromatase deficiency while her siblings do not. 1. correct parental genotypes – individual 1 is homozygous recessive and individual 2 is heterozygous; 2. individual 5 inherited a recessive allele from each parent; 3. individuals 3 and 4 inherited recessive allele from individual 1 and dominant allele from individual 2; Chance of 5 and carrier having a child with acromatase deficiency: 4. correct parental genotype in genetic diagram: aa X Aa; 5. correct offspring genotype in genetic diagram; 6. correct gametes in genetic diagram; 7. offspring phenotype must link to genotypes correctly in genetic diagram; 8. chance of child suffering from acromatase deficiency = 50 % or 0.5 note: penalise once if other symbols are used but only if genetic cross works	8
	(b)	1. irregular menstrual cycle; 2. low oestrogen levels prevent ovulation + reduced fertility;	2
			[Total: 10]
8	**(a)**	1. 1 km from the point of release of sewage, number of freshwater shrimps decreased from 100 to 0; 2. from 2 km to 4 km, number of freshwater shrimps remained at 0 3. from 4 km to 7 km along the river, number of freshwater shrimps increases from 0 to 100 4. raw sewage contains bacteria which respire aerobically + concentration of dissolved oxygen decreased drastically; 5. as the distance increases, sewage diluted by water contains lesser bacteria 6. concentration of dissolved oxygen increases gradually + more oxygen available for freshwater shrimps to respire aerobically and survive / AW	6

	(b)	1. aerobic bacteria and fungi carry out aerobic respiration to break down the organic matter in sewage 2. anaerobic bacteria and some fungi carry out anaerobic respiration to break down remaining organic pollutants in sludge 3. treated sewage cannot support / does not increase the population of the microorganisms present in the river 4. treated sewage does not reduce concentration of dissolved oxygen in the river + number of freshwater shrimps remain high / unaffected / unchanged	4
			[Total: 10]