NORTH VISTA SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018

40

NAME: _____( ) **CLASS:** _____

SUBJECT: SCIENCE(CHEMISTRY/BIOLOGY) (PAPER 1) **DATE: 12 SEPTEMBER 2018**

LEVEL / STREAM: SECONDARY 4 EXPRESS **TIME: 1 HOUR**

CODE : 5078/01

INSTRUCTIONS TO CANDIDATES

Write in soft pencil.
Do not use staples, paper clips, glue or correction tape/fluid.
Write your full name, register number and class on the cover page of the question paper and OTAS sheet provided.

There are **forty** questions in 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 OTAS sheet.

Read the instructions on the OTAS sheet very carefully.

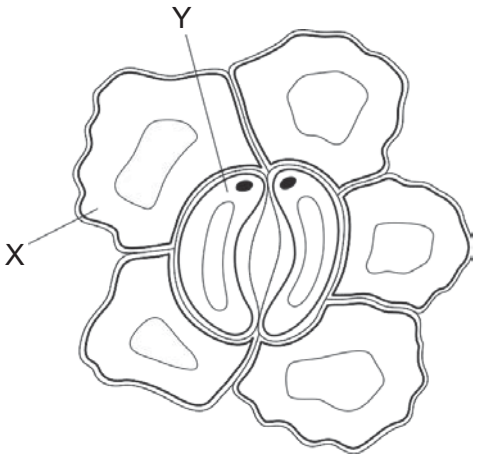
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this question paper.
Any rough working should be done in this booklet.
The use of an approved scientific calculator is expected, where appropriate.

A copy of the Data Sheet is printed on page 19.
A copy of the Periodic Table is printed on page 20.

This question paper consists of 20 printed pages.

[Turn over

21 The diagram shows cells in the epidermis of a leaf.

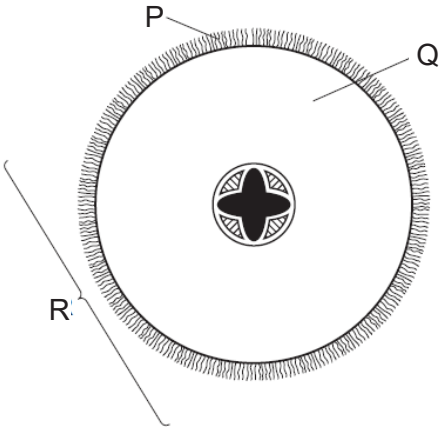


Which structural features should also be added to cells in X and Y to complete the diagram?

	cell X		cell Y	
	chloroplasts	nucleus	chloroplasts	nucleus
A	✓	✓	✗	✗
B	✓	✗	✓	✓
C	✗	✓	✓	✗
D	✗	✗	✗	✓

key
✓ = yes
✗ = no

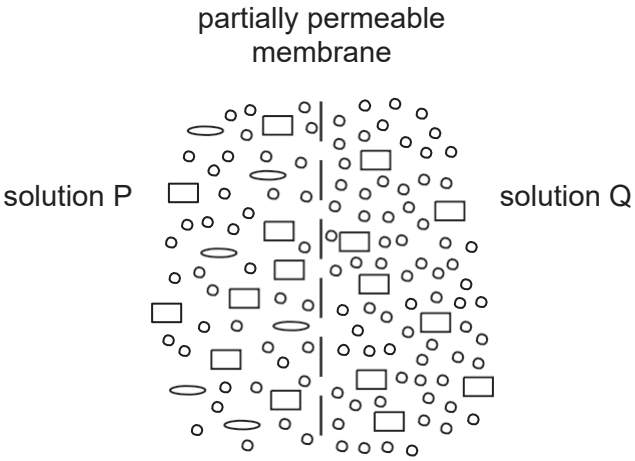
22 The diagram shows a section through a root.



What are the levels of organisation of the labelled structures?

	cell	organ	tissue
A	P	Q	R
B	P	R	Q
C	Q	R	P
D	R	Q	P

23 The diagram represents an experiment where two solutions, P and Q, are separated by a partially permeable membrane.



What is the initial movement of the three different molecules between the two solutions, P and Q?

	net movement from Q to P	net movement from P to Q	no net movement
A	○	□	⬭
B	○	⬭	□
C	□	⬭	○
D	⬭	○	□

24 The table shows the results of some food tests.

Which row shows a food containing both protein and starch?

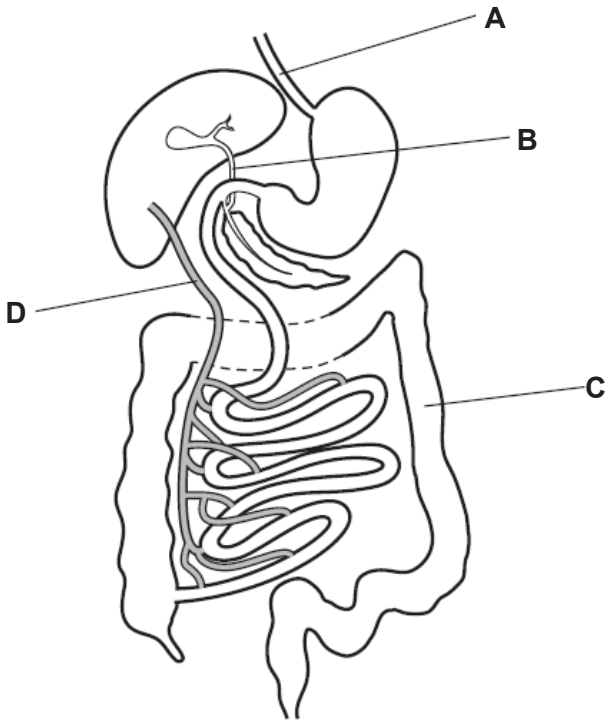
	Benedict's solution	biuret test	ethanol	iodine solution
A	blue	blue	clear	blue-black
B	blue	purple	clear	blue-black
C	red	blue	cloudy	brown
D	red	purple	cloudy	brown

25 According to the lock and key hypothesis, what represents the lock and key for the enzyme lipase?

	lock	key
A	glycerol	lipase
B	lipase	lipids
C	lipids	fatty acids
D	lipids	lipase

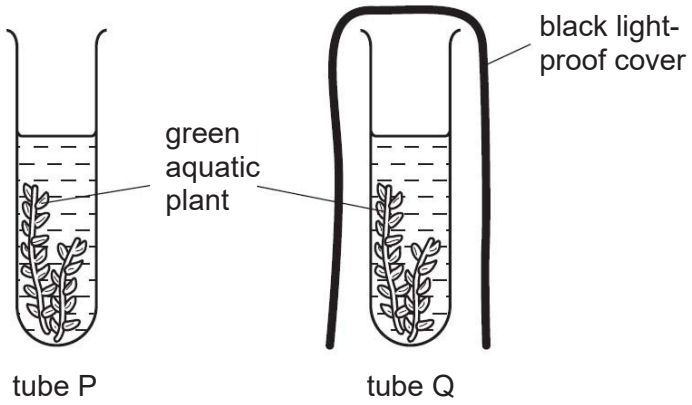
26 The diagram shows part of the alimentary canal and associated organs.

Which part would contain high concentrations of glucose and amino acids, four hours after eating a meal?



27 Two test-tubes, P and Q, were set up, each containing a solution of red hydrogencarbonate indicator. Hydrogencarbonate indicator turns yellow when the carbon dioxide concentration increases and turns purple when the carbon dioxide concentration decreases.

Similar pieces of the same aquatic plant were placed into tubes P and Q. Tube P was uncovered and tube Q had a black light-proof cover. The tubes were left in a warm room in sunlight for four hours.

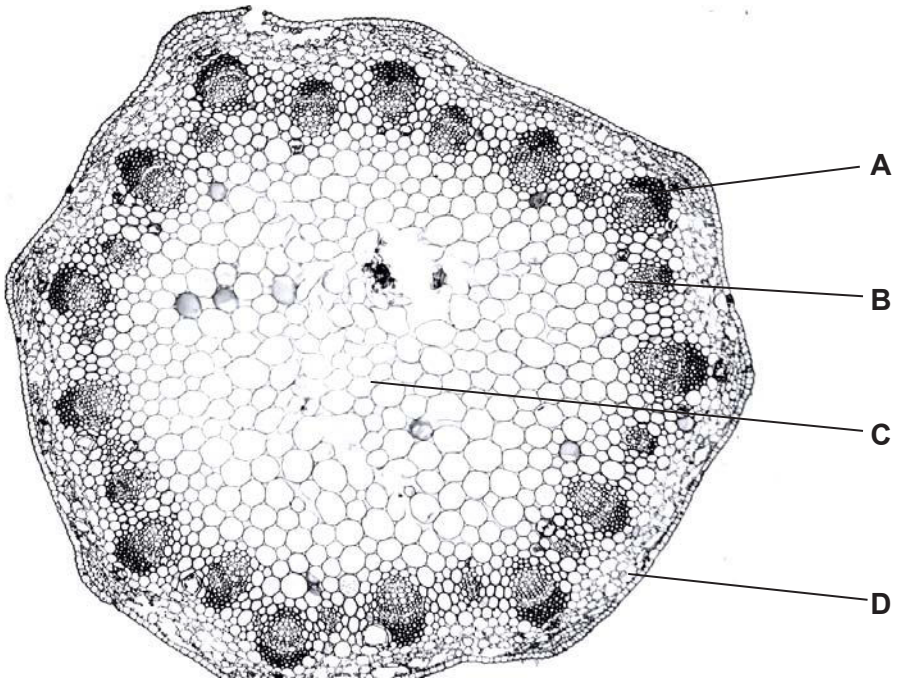


What would be the colour of the hydrogencarbonate indicator in the two tubes after four hours?

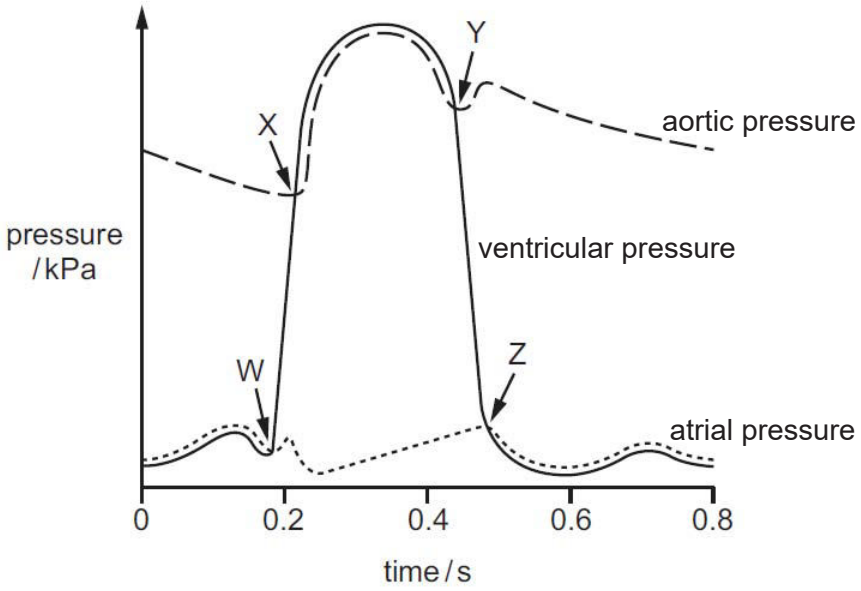
	tube P	tube Q
A	purple	red
B	purple	yellow
C	red	yellow
D	yellow	red

28 The photomicrograph is a section through a plant organ.

Which label identifies the xylem vessels?



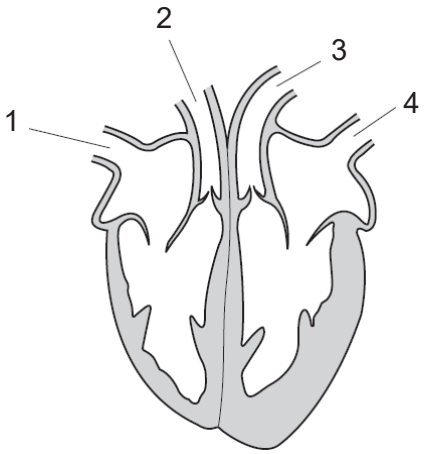
29 The graph shows pressure changes on the left side of the heart during a cardiac cycle.



Which row correctly identifies W, X, Y and Z?

	W	X	Y	Z
A	atrioventricular valves close	semi-lunar valves close	semi-lunar valves open	atrioventricular valves open
B	atrioventricular valves close	semi-lunar valves open	semi-lunar valves close	atrioventricular valves open
C	semi-lunar valves close	atrioventricular valves open	atrioventricular valves close	semi-lunar valves open
D	semi-lunar valves open	atrioventricular valves close	atrioventricular valves open	semi-lunar valves close

30 The diagram shows a section through the mammalian heart.



Which labelled structures carry oxygenated blood?

A 1 and 2

B 1 and 4

C 2 and 3

D 3 and 4

31 What is the minimum number of cell membranes a molecule of oxygen passes through during gaseous exchange between the alveoli and the blood plasma in the capillaries?

A 2

B 3

C 4

D 5

32 When the nervous system responds to a stimulus, there are several stages to the response.

1 The central nervous system processes the information.

2 The receptors detect the stimulus.

3 A nerve impulse is sent to the central nervous system.

4 A response is produced.

5 A nerve impulse is sent to the muscles.

What is the correct order of the stages?

A 2, 3, 1, 5, 4

B 2, 3, 5, 1, 4

C 3, 2, 1, 5, 4

D 3, 2, 5, 1, 4

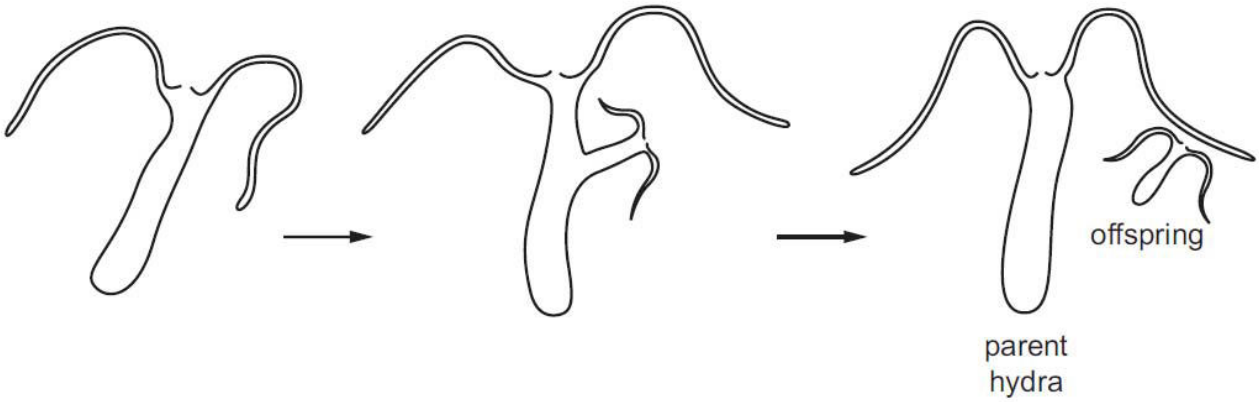
33 A person looks at some hills far away.

Which row shows the state of the lenses, ciliary muscles and suspensory ligaments in her eyes?

	lenses	ciliary muscles	suspensory ligaments
A	thick	contracted	slacken
B	thick	relaxed	taut
C	thin	contracted	slacken
D	thin	relaxed	taut

34 A hydra was kept in an aquarium and its growth was observed.

The diagram shows the hydra growing and releasing an offspring from the side of its body.



Which row describes the reproduction of hydra?

	parent and offspring are genetically identical	uses sexual reproduction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

35 Which plants are most likely to adapt successfully to a climate change in their environment?

A plants that are cross-pollinated

B plants that do not rely on wind-pollination

C plants that grow rapidly

D plants that reproduce asexually

36 What does a gene control production of?

A a chromosome

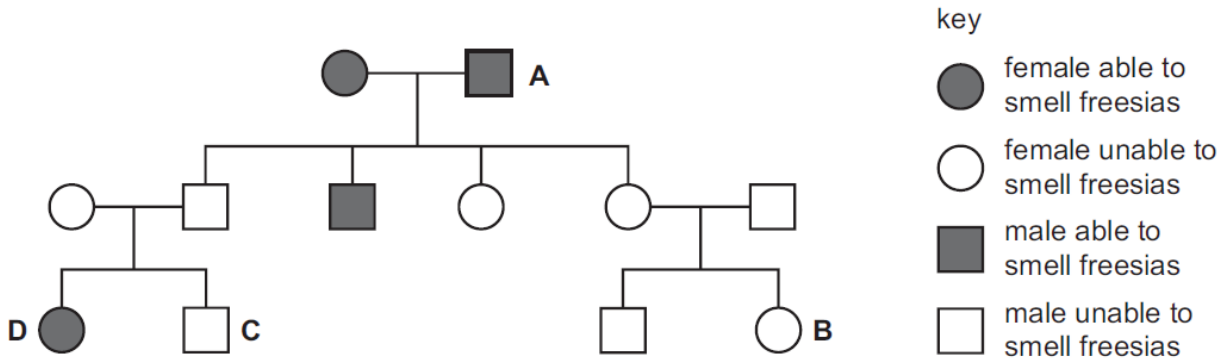
B an allele

C protein

D DNA

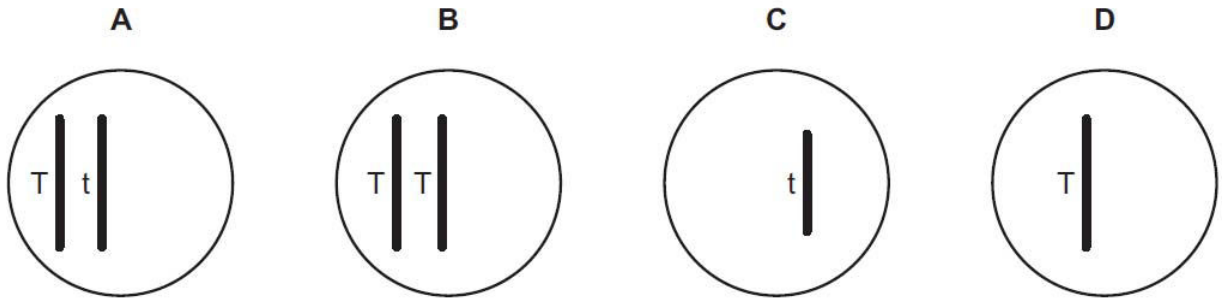
37 The family tree shows the inheritance of the ability to smell flowers called freesias. The allele for the ability to smell freesias is dominant.

Which individual's symbol is not correct?

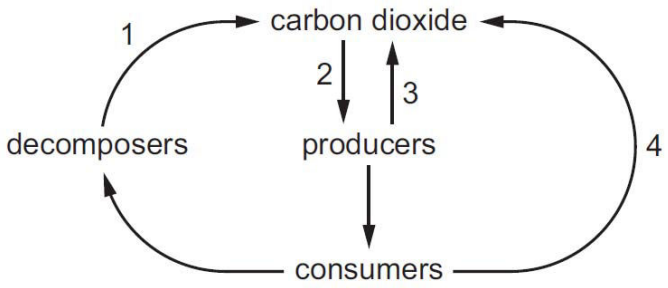


38 An organism is homozygous dominant for a gene which has two possible alleles, T and t.

Which diagram represents a gamete from this organism?



39 The diagram shows part of the carbon cycle.



In which labelled stage(s) is respiration occurring?

	1	2	3	4
A	✓	✓	✓	✗
B	✓	✗	✓	✓
C	✗	✓	✓	✓
D	✗	✗	✗	✓

40 The table shows the ability of three species of fish and their eggs to survive in water at different pH levels.

fish species	pH					
	4.0	4.5	5.0	5.5	6.0	6.5
trout	✗	✓	✓	✓	✓	✓
sea bass	✗	✗	✗	✓	✓	✓
perch	✗	✗	✓	✓	✓	✓
fish eggs	✗	✗	✗	✓	✓	✓

key

✓ = survive

✗ = do not survive

A lake at pH 6.0 contains breeding populations of all three fish.

If acid rain causes the pH to fall to 5.0, which outcome would likely occur?

A Trout and perch will survive and produce offspring.

B Trout and perch will survive but only perch will produce offspring.

C Trout and perch will survive but produce no offspring.

D Trout, sea bass and perch will survive but produce no offspring.

NORTH VISTA SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018

65

NAME: _____( ) **CLASS:** _____

SUBJECT: SCIENCE (BIOLOGY) (PAPER 4) **DATE: 28 AUGUST 2018**

LEVEL / STREAM: SECONDARY 4 EXPRESS **TIME: 1 HOUR 15 MINUTES**

CODE : 5078/04

INSTRUCTIONS TO CANDIDATES

Write your full name, register number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction tape/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
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer any **two** questions.
Write your answers in the spaces provided on the Question Paper.

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

This question paper consists of 14 printed pages.

Section A

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

1 Fig. 1.1 shows an organ, **X**, and its associated blood vessels, **P**, **Q** and **R**.

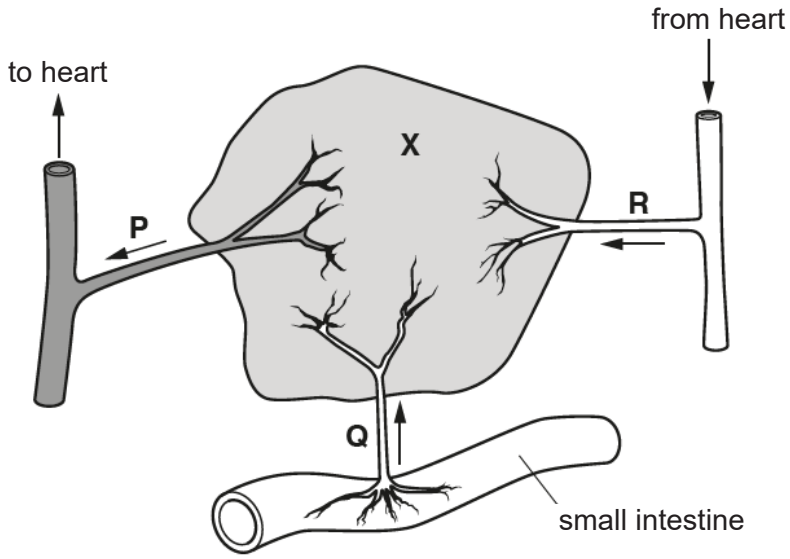


Fig. 1.1

Organ X is involved in deamination of excess amino acids and the breakdown of chemical substances, including alcohol.

(a) Name organ **X** and each of its associated blood vessels.

organ **X** ……

blood vessel **P** ……

blood vessel **Q** ……

blood vessel **R** ……[4]

(b) Compare the structure of the blood vessels **P** and **R** in Fig. 1.1.

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……

……

……[2]

(c) State **two** other functions of organ **X**.

……

……

……[2]

2 (a) (i) State the word equation for photosynthesis.

……[2]

(ii) Name the part of the plant cell that contains chlorophyll.

……[1]

(iii) State two types of specialised cell that contain chlorophyll.

……[1]

(b) In an investigation, some students placed a plant in bright light.

They measured the rate of photosynthesis at different temperatures.

The results are shown in Fig. 2.1.

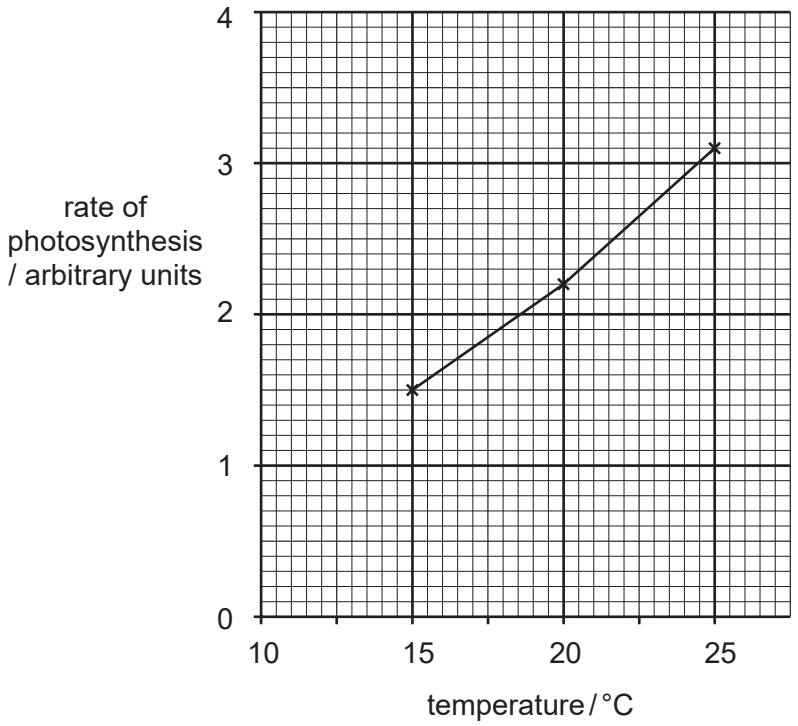

Fig. 2.1

(i) Describe the results shown in Fig. 2.1.

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……[2]

(ii) Suggest an explanation for these results.

……..……..……

……..……..……

……..…...……[2]

(iii) Predict the effects on the rate of photosynthesis if the investigation is carried out at 60°C. Explain your reason.

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……..……..……

……..…...……[2]

3 Fig. 3.1 shows flowers from the same species of plant at different stages, **D** and **E**, in their development.

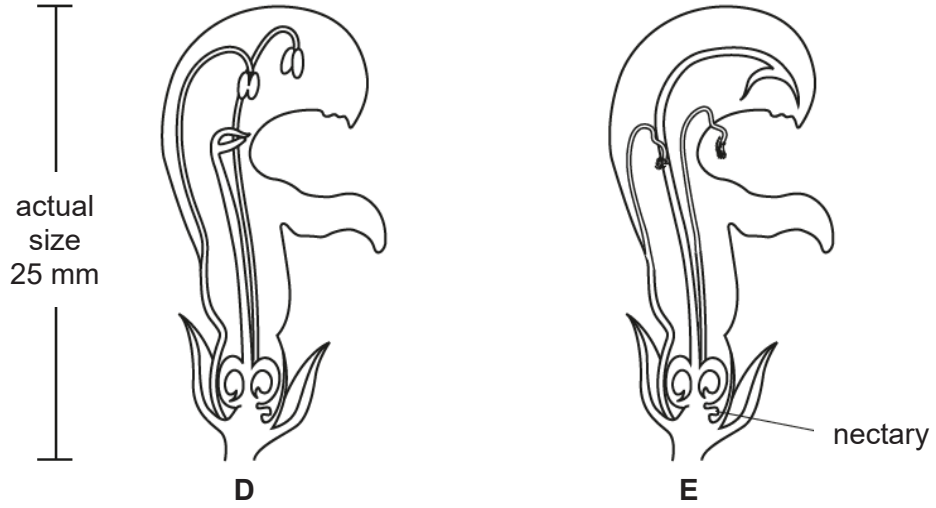


Fig. 3.1

(a) On Fig. 3.1, use labelled lines to indicate the position of a sepal, anther and stigma. [3]

(b) The flowers are cross-pollinated by an insect.

(i) Define cross-pollination.

……

……

……[2]

(ii) Explain why the insect must visit flower **D** before visiting flower **E**.

……

……

……

……

……[3]

(c) From Fig. 3.1, suggest how flowers of this species are adapted to be pollinated by an insect such as a bee.

……

……

……[2]

4 Fig. 4.1 shows a section of a bronchiole from the lungs of a non-smoker and a section of a bronchiole from a smoker of several years.

The two sections were taken from the same relative position in the lungs and are drawn to the same scale.

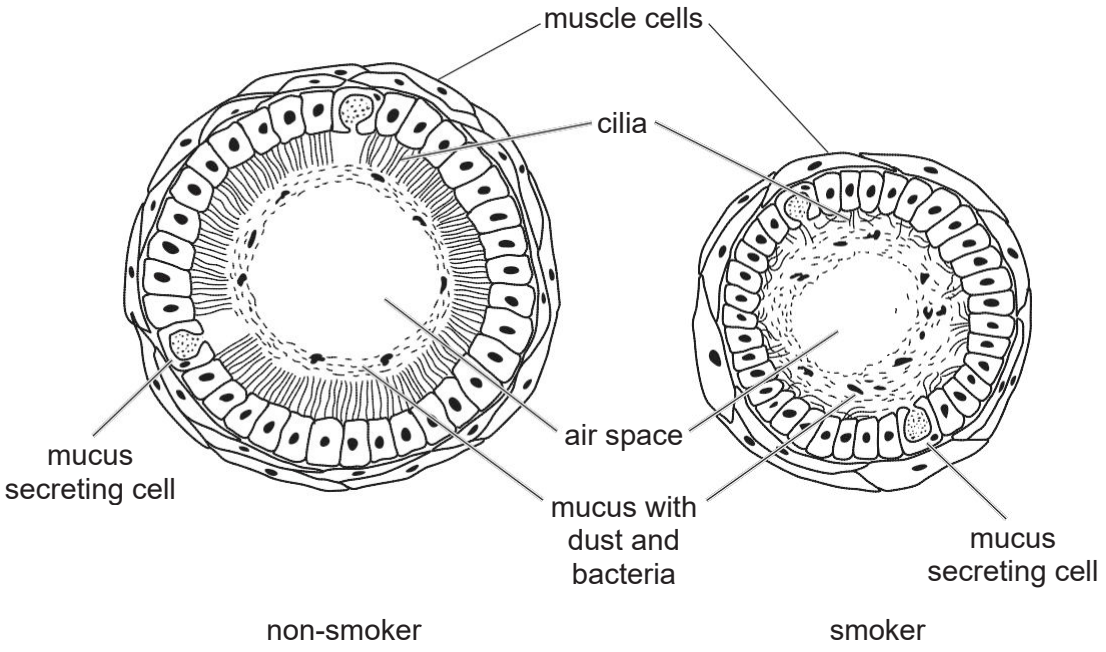


Fig. 4.1

(a) (i) Table 4.2 gives a comparison between the bronchiole of a non-smoker and a smoker.

Use Fig. 4.1 to complete Table 4.2. An example is given in the table.

Table 4.2

feature	bronchiole of non-smoker	bronchiole of smoker
size of mucus layer	thin	thick
length of cilia		
size of air space		

[2]

(ii) From Fig. 4.1, identify **two** other ways in which the bronchiole in a non-smoker is different from the bronchiole in a smoker.

1 ……

……

2 ……

……[2]

(b) A person who smokes has a higher risk of lung infections than a person who does not smoke.

Use evidence from Fig. 4.1 to explain why the smoker has a higher risk of lung infections than a non-smoker.

……..…..…….

……..…..…….

……..…..…….

……...……[2]

(c) Name two substances in tobacco smoke that are harmful.

……...……[2]

5 A student carried out an investigation into the relationship between the concentration of sucrose solution and the number of plant cells which were plasmolysed.

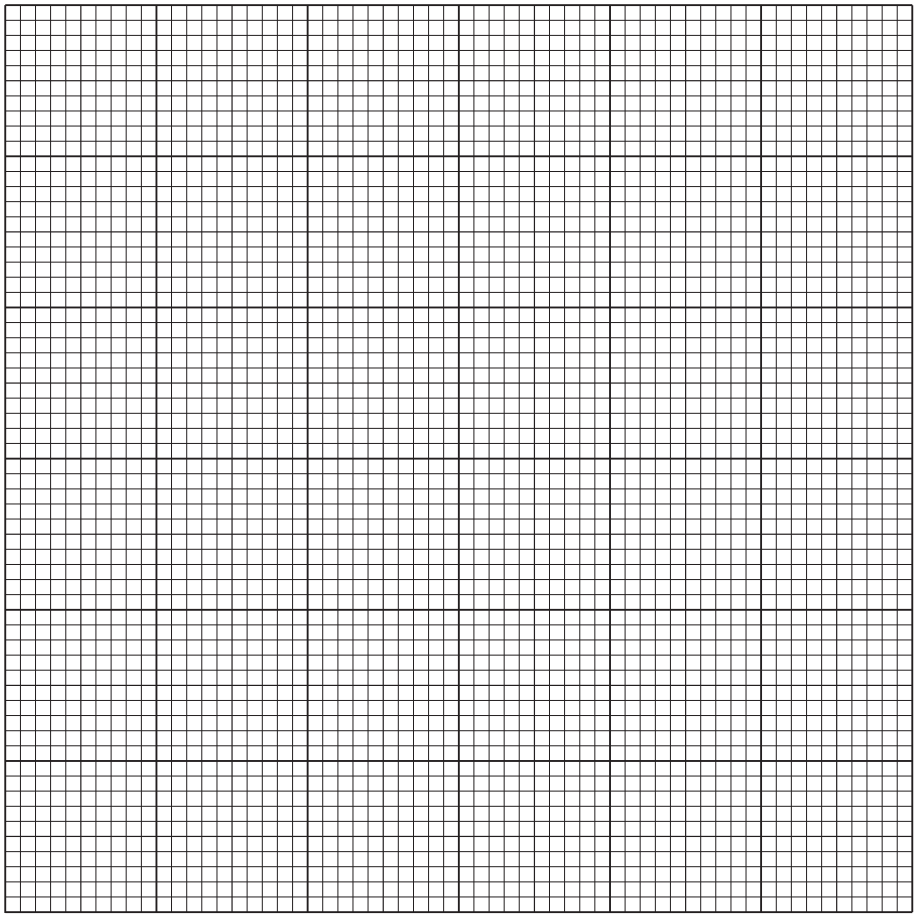
She placed small pieces of plant tissue in sucrose solutions and counted the number of cells that were plasmolysed. She then calculated the percentage of cells that were plasmolysed in each solution.

Her results are shown in Table 5.1.

Table 5.1

concentration of sucrose solution / mol per dm^3	percentage of cells that were plasmolysed
0.0	0
0.2	5
0.4	18
0.6	75
0.8	100

(a) (i) Plot a graph of the results in Table 5.1.



[3]

(ii) Use your graph to find the concentration of sucrose solution in which 50% of the cells would be plasmolysed. On your graph, show how this value is obtained.

……[2]

(b) Explain why the cells plasmolysed.

……

……

……

……[3]

(c) Suggest why the cells plasmolysed over a range of concentration of sucrose solution.

……[1]

Section B

Answer any **two** questions in this section

Write your answers in the spaces provided.

6 Fig. 6.1 shows the flow of energy within a biological system.

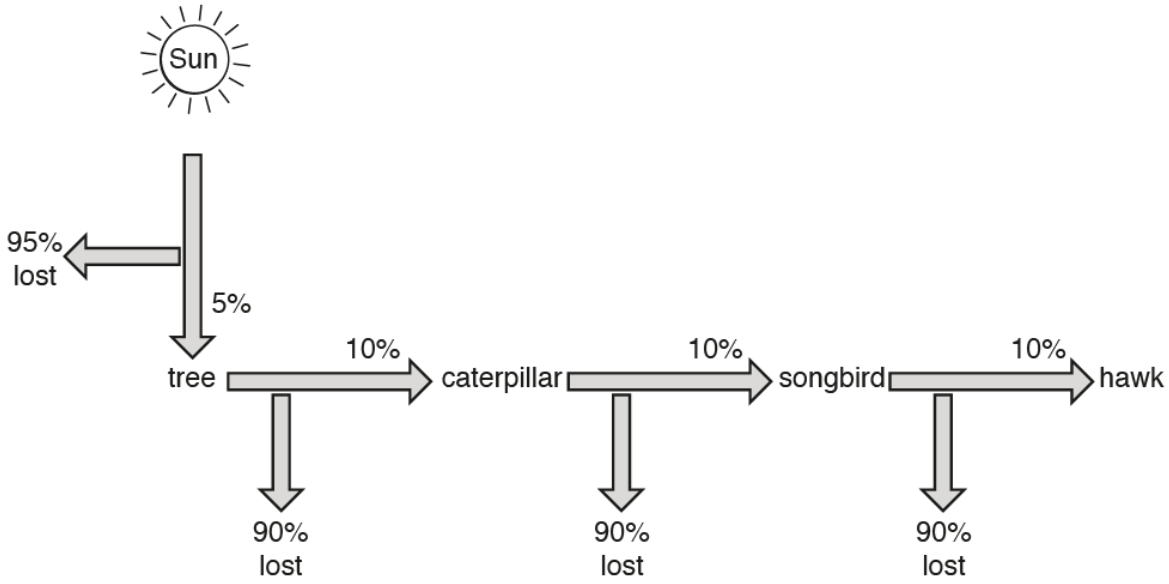


Fig. 6.1

(a) Name **one** example, shown in Fig. 6.1, of each of the following types of organism.

producer ……...

carnivore ……[2]

(b) **(i)** Suggest why only 5% of the energy from the Sun passes to the tree.

……

……

……

……[2]

(ii) Describe how energy is lost between the songbird and the hawk.

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……[2]

(c) Fig. 6.2 shows two possible uses of the same area of land to produce food.

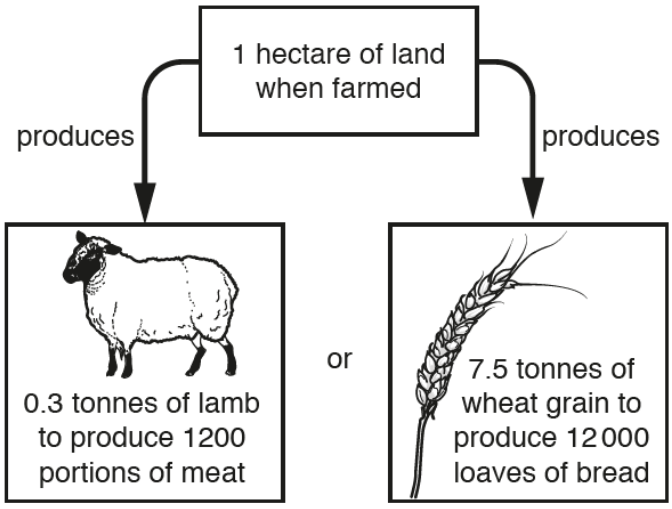

Fig. 6.2

Use the information in Fig. 6.1 and Fig. 6.2, and your own knowledge, to explain why it is possible to feed a greater number of people if the area of land is used to farm crops rather than to farm animals.

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……

……[4]

7 Table 7.1 shows the loss of water vapour by two similarly-sized potted plants, **X** and **Y**, grown in the same environment over a period of 14 hours.

Table 7.1

	water vapour loss / arbitrary units	
time of day / hours	plant **X**	plant **Y**
06.00 – 08.00	0.8	5.0
08.00 – 10.00	1.8	13.6
10.00 – 12.00	5.6	14.6
12.00 – 14.00	4.6	9.0
14.00 – 16.00	3.4	6.6
16.00 – 18.00	2.8	4.2
18.00 – 20.00	1.8	0.8

(a) State the time of day at which the combined loss of water vapour from the two plants is at its greatest.

……..……[1]

(b) Described the trends observed and suggest reasons for each of the following:

(i) the difference between the total amount of water vapour lost by plants **X** and **Y** during the 14-hour period,

……

……

……

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……[5]

(ii) the change in rate of water vapour loss by plant **Y** from 06.00 hours to 12.00 hours.

……

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……

……

……

……[4]

8 **(a)** Describe the structure of a DNA molecule.

……

……

……

……

……[3]

(b) Genes can mutate.

State the causes of mutation and state one effect that this may have in humans.

……

……

……

……

……[3]

(c) Apple scab is a disease that infects apple trees.

A gene that determines whether or not apple trees are resistant to apple scab disease has two alleles:

- disease-resistant, **R**
- not disease-resistant, **r**

A farmer crosses two of his apple trees. Out of the 100 offspring produced, 53 are not resistant to apple scab disease.

Use a genetic diagram to show the genotypes of the two apple trees that were crosses and the genotypes and phenotypes of the offspring.

[4]

P1 answers

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

21 At the epidermis of a leaf, only the guard cell (Y) has chloroplast. The nucleus is already present in the drawing for cell Y. Cell X does not have chloroplast and only the nucleus is missing from this cell.

22 P shows a root hair cell, Q shows tissue and R represents the root which is an organ.

23 The rectangular molecule concentration is the same on both sides of the membrane, hence there will be no net movement. There is a higher concentration of the oval molecule at P and a higher concentration of the circular molecule at Q, hence both will move to the side with lower concentration.

24 The positive test for biuret test is purple which shows that protein is present while the positive test for iodine solution is blue-black which shows that starch is present.

25 The enzyme represents the lock while the substrate represents the key.

26 Glucose and amino acids will be absorbed into the hepatic portal vein represented by D hence the concentration is the highest at D. A is the oesophagus, B is the bile duct and C is the large intestine.

27 In tube P, photosynthesis occurs which uses carbon dioxide. Carbon dioxide in tube P thus decreases and indicator turns purple. In Q, due to absence of light, the plant only respires and gives off carbon dioxide causing the carbon dioxide concentration in tube Q to increase. Hence the indicator turns yellow.

28 B is the xylem as it points to the inner part of the vascular bundle.

29 Atrioventricular valve is found between the atrium and ventricle while semilunar valve is found between the aorta and ventricle.
At W, the ventricular pressure is increasing above the atrial pressure, hence the atrioventricular valve closes.
At X, the ventricular pressure is increasing above the aortic pressure, hence the semilunar valves opens.
At Y, the ventricular pressure is decreasing below the aortic pressure, hence the semilunar valve closes.
At Z the ventricular pressure is decreasing below the atrial pressure, hence the atrioventricular valve opens.

30 1 is the vena cava which carries deoxygenated blood from all parts of the body into the right side of the heart. 2 is the pulmonary artery which carries deoxygenated blood from the right ventricle. 3 is the aorta which carries oxygenated blood from the left side of the heart. 4 is the pulmonary vein which carries oxygenated blood from the lungs into the left side of the heart.

31 The 4 membranes are: into alveolar cell membrane, out of alveolar cell membrane, into blood capillary membrane, out of blood capillary membrane to plasma

32 Nerve impulses travel from receptor to sensory neurone to relay neurone (central nervous system) to motor neurone and finally effector (muscles) to produce a response.

33 To view far objects, the lens must be thin due to suspensory ligaments pulling on it. For the suspensory ligament to be taut, the ciliary muscles have to relax.

34 The hydra in the aquarium reproduces on its own (1 parent). There is no fusion of gametes hence this is asexual reproduction and the parent and offspring are genetically identical.

35 Plants that are cross-pollinated (different parents) have greater genetic variation hence are more likely to adapt successfully to environmental changes.

36 This is a knowledge type question on function of a gene.

37 Parents of offspring D only has recessive allele, hence D cannot inherit a dominant allele.

38 Gametes only have half the number of chromosomes compared to other cells as they will undergo fusion to produce zygote. Hence a gamete can only contain 1 allele of each gene. Since the organism is homozygous dominant, it can only produce gametes with dominant alleles.

39 Decomposes, consumers and producers all respire to return carbon dioxide to the atmosphere. Arrow 2 shows producers taking in carbon dioxide due to photosynthesis.

40 At pH 5 only trout and perch survives, sea bass dies. Fish eggs are unable to survive at pH5, hence no offspring can be produced.

P4 Answers

1(a) organ X: liver ;
P: hepatic vein ;
Q: hepatic portal vein ;
R: hepatic artery ;

1(b) any 2 of
P has thinner wall / less muscular wall than R ;
P has valves while R does not ;
P has wider lumen than R;

1(c) any 2 of
converts glucose to glycogen / stores glycogen ;
converts glycogen to glucose ;
produces bile ;
iron storage ;

2(a)(i) carbon dioxide + water ;
glucose + oxygen ;

2(a)(ii) chloroplasts ;

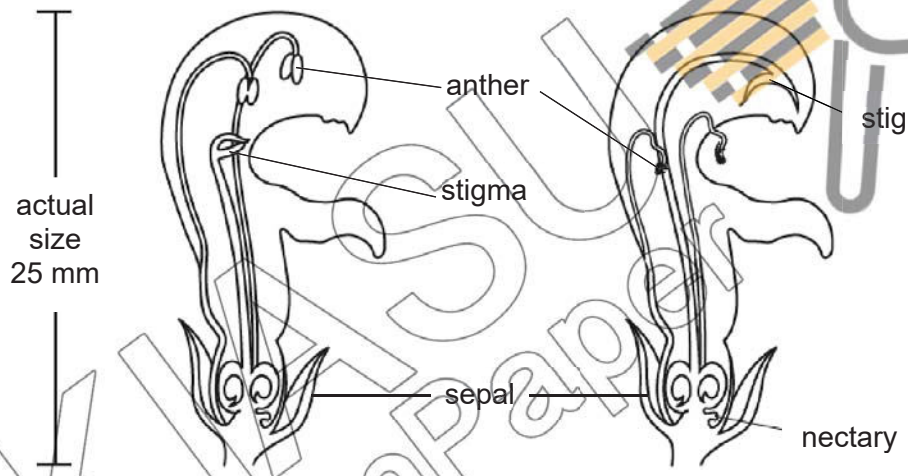
2(a)(iii) palisade mesophyll cell / spongy mesophyll cell / guard cell ;

2(b)(i) any 2 of
rate of photosynthesis increases as temperature rises ;
data quote ;
rate doubles with 10 °C rise in temperature ;

2(b)(ii) any 2 of
photosynthesis involves enzymes;
particles / enzymes have more energy (at higher temperatures) so move more quickly ;
more frequent collisions between enzyme and substrate ;

2(b)(iii) rate of photosynthesis decrease / stop ;
enzymes denatured / destroyed ;

3(a) line ending either on or in sepal + labelled sepal ;
line ending either on or in anther + labelled anther ;
line ending either on or in stigma + labelled stigma ;



3(b)(i) transfer of pollen grains from anther to stigma ;
between flowers of the same species on different plants ;

3(b)(ii) any 3 of
1 flower D, anther mature / pollen grain produced / present ;
2 flower D, stigma closed / immature ;
3 flower E, stigma open / mature ;
4 flower E, anther withered / no pollen present ;

3(c) bee land on large petals ;
bee makes contact with anther/stigma + while collecting nectar;

4(a)(i)

feature	non-smoker	smoker
length of cilia	long	shorter ;
size of air space	Wide	narrow ;

accept alternative wording ;

4(a)(ii) any two of

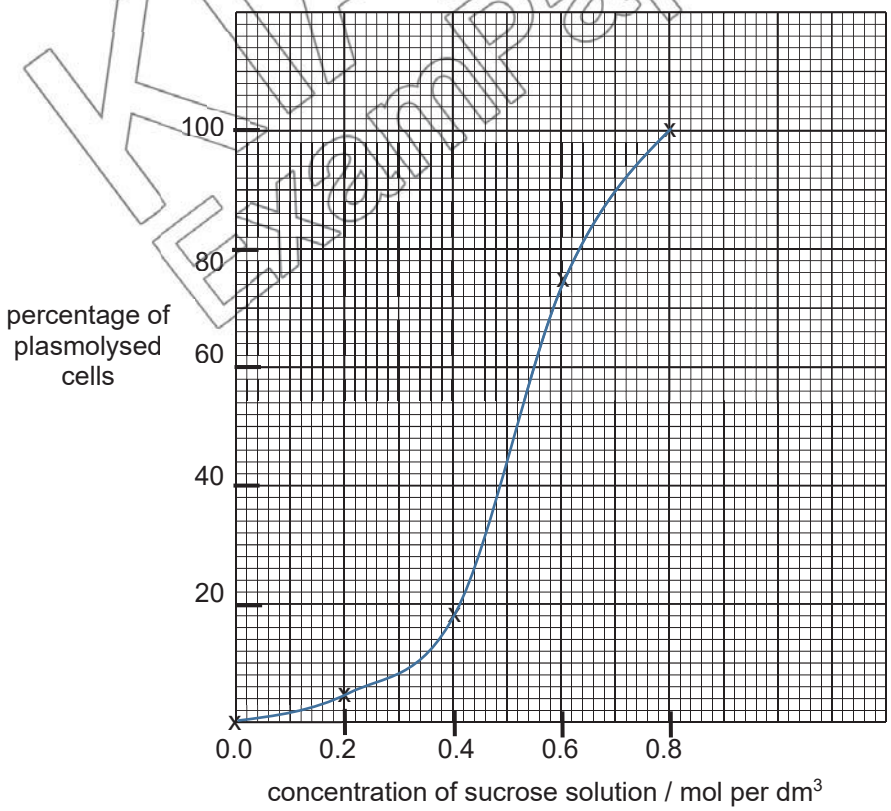
Feature	non-smoker	smoker
size of mucus layer	thin / narrow / even distribution	thick / wide / uneven distribution
bacteria present in mucus	few	many / more ;
diameter / bronchiole size	wide / larger / longer	narrow / smaller ;
shape of lumen	circular	oval ;
number of muscle cells	many / more	few / less ;
size of muscle cells	small	large ;
number of cilia	many / more / large	few / little / less ;

accept alternative wording ;
accept other possible comparisons ;

4(b) insufficient / damaged cilia to sweep mucus ;
bacteria trapped in mucus not removed / stay in / build up in, (lung / bronchiole)
or
mucus / bacteria, will enter alveoli ;

4(c) any two of
carbon monoxide / tar / nicotine / irritants ;;

5a(i) 1 both axes fully labelled -
'concentration of sucrose solution / mol per dm^3 on x-axis and 'percentage of plasmolysed cells' on y axis;
2 all 5 points visibly plotted correctly ;
3 plotted points joined with smooth lines + not extrapolated beyond first and last plots + graph occupies at least 50% of grid ;



5(a)(ii) working shown on graph ;
value read correctly from working + mol per dm^3 (allow ecf);

5(b) 1 sucrose solution at lower water potential than cell sap ;
2 net movement of water molecules / water molecules move by osmosis from cell sap solution into sucrose solution / out of cell ;
3 too much water loss from cell, cell membrane pulls away from cell wall ;

5(c) cells saps at different concentrations / water potential ;

6(a) tree ;
songbird / hawk ;

6(b)(i) any 2 of
doesn't reach the leaves / tree / intercepted by other objects ;
reflected off leaves ;
not used in photosynthesis ;

6(b)(ii) any 2 of
movement / flight ;
excretion ;
egestion / faeces ;
respiration which releases heat / maintaining body temp / warm blooded ;
hawk doesn't eat / digest all of songbird (s);

6(c) any 4 of
1 more food produced ;
2 quote from Fig. 6.2 (e.g. 12 000 loaves vs. 1200 portions of meat) ;
3 25 X more mass / 10 X more food products (for wheat);
4 fewer levels in food chain ;
5 correct reference to herbivore / carnivore + human OR correct reference to primary / secondary + consumer ;
6 less energy lost / more efficient ;
7 example of energy not lost (e.g. through movement);

7(a) 10.00 – 12.00 ;

7(b)(i) any 5 of

state at least 1 trend:
1 plant X lost less water vapour than plant Y from 06.00 to 18.00 ;
2 plant X lost more water vapour than plant Y from 18.00 to 20.00 ;
Accept plant Y lost more water vapour than plant X over the 14-hour period

reasons:
3 plants may be of different species ;
4 plant Y + more / faster transpiration ;
5 plant Y + more / bigger leaves ;
6 plant Y + more stomata / pores / guard cells OR stomata bigger / wider AW ;
7 plant Y + better / bigger root system / absorbs more water ;
8 plant Y + thinner (waxy) cuticle ;

7(b)(ii) any 4 of

state at least 1 trend:
1 more rapid loss of water vapour from 06.00 to 10.00;
2 rate of water loss slows from 10.00 to 12.00;
Accept water loss increase from 06.00 to 12.00

reasons:
from 06.00 – 10.00,
3 increased + light (intensity) ;
4 increased rate of photosynthesis ;
5 stomata / pores / guard cells + open /wider ;
6 increased + temperature / heat ;
7 reference to wind OR increased + air movement ;
8 decreased + humidity ;

8(a) any 3 of
double helix ;
made of nucleotides ;
A joins with T and C joins with G ;
strands / bases, join / pair up, by crosslinks / hydrogen bonds ;

8(b) mutation caused by radiation;
or chemicals;
can cause change in gene structure e.g. sickle cell anaemia
or change in chromosome number e.g. Down's syndrome

8(c)

parental phenotype	Resistant		x	non-resistant		
parental genotype	Rr		x	rr		
gametes	R	r		r		r
F1 genotype	Rr	Rr		rr		rr
F1 phenotype	resistant			non-resistant		
F1 phenotype ratio	1		:	1		

parental phenotype and genotype ;
gametes ;
F1 genotype ;
F1 phenotype ;

P5 answers

2(a)(i)

piece	dimensions / mm	Time taken / s
A	20 x 10 x 10	
B	10 x 10 x 10	
C	5 x 10 x 10	

correct dimensions ;
time taken in seconds and decreasing trend ;

2(a)(ii) the bigger/larger the piece of agar, the longer the time taken for the agar to change colour ;
accept reverse argument

2(a)(iii) diffusion ;

2(a)(iv) for faster removal of ;
waste products / carbon dioxide ;

OR
for faster absorption of;
nutrients / oxygen ;

A for named substances oxygen, CO_2 , waste products, ions, vitamins, hormones (anything small enough to diffuse)
A faster diffusion into and out of cell ;

2(b) 1 cut agar of the same dimensions ;
2 place them in different concentrations of liquid X ;
3 record time taken for each agar to completely change colour ;

2(c)(i) outline clear and continuous + no shading ;
larger than actual slice, fills at least half the available space + correct proportions ;

2(c)(ii)

food test	unripe banana	ripe banana
starch test	large areas of blue black colouration	smaller areas of blue black coloration / remains yellow
reducing sugar test	remains blue / green / yellow precipitate forms	orange / brick-red precipitate forms

correct observations for unripe banana ;
correct observations for ripe banana ;

OR any 2 correct observations 1 mark

2(c)(iii) less starch in S2 than S1 ;
more reducing sugar in S2 than S1 ;