

PRELIMINARY EXAMINATION 2016
SECONDARY 4 EXPRESS

BIOLOGY

5158/1

PAPER 1 Multiple Choice

20 September 2016

Additional Materials: OTAS sheet

1 hour

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, index number on the OTAS 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 OTAS sheet.

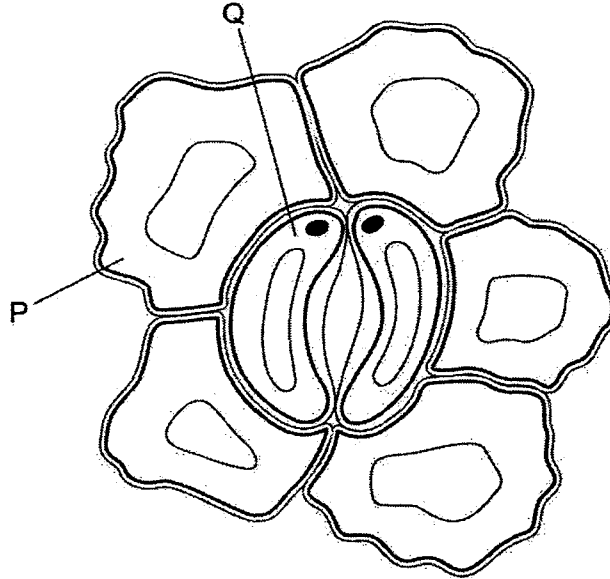
Read the instructions on the OTAS sheet very carefully.

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 booklet.

This question paper consists of **16** printed pages.

- 1 The diagram shows cells in the epidermis of a leaf.



To complete the diagram, which structural features should be added to the cells P and Q?

	P		Q	
	chloroplast	nucleus	chloroplast	nucleus
A	✓	✓	X	X
B	✓	X	✓	✓
C	X	✓	✓	X
D	X	X	X	✓

- 2 Which features of a red blood cell would make it an efficient transporter of oxygen to all cells of the body?

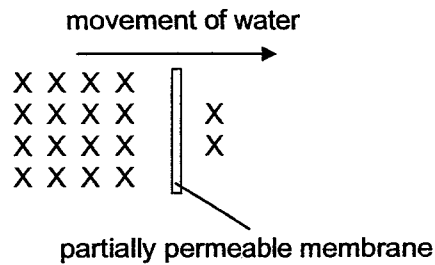
	biconcave disc	lack of nucleus	lack of mitochondria
A	✓	✓	✓
B	X	✓	X
C	✓	X	✓
D	X	X	X

- 3 Scientists believe that absorption of mineral ions in plants requires energy from respiration.

Which observation best supports this idea?

- A Carbohydrate is stored in the roots.
- B Living roots give off carbon dioxide.
- C The root hairs have a large surface area.
- D Uptake of nitrate is reduced at lower oxygen concentrations.

- 4 The diagram shows a model of the movement of water (represented by X) across a partially permeable membrane.



What is the type of process modeled in the diagram?

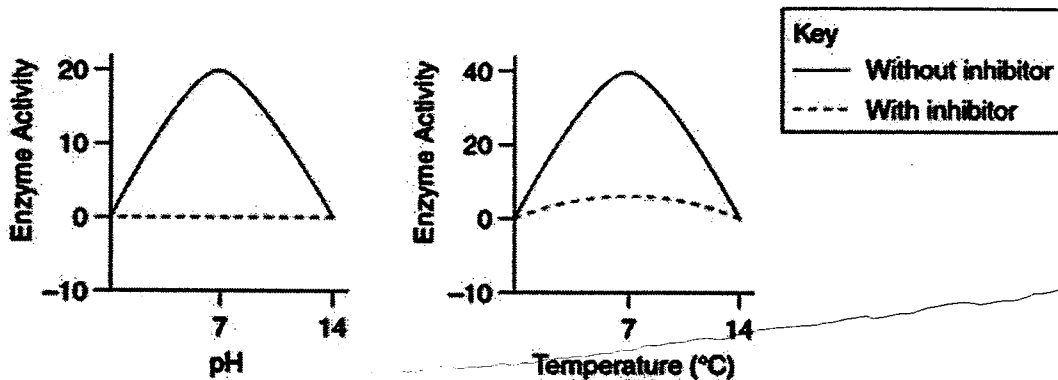
- A osmosis
 B filtration
 C diffusion
 D active transport
- 5 In an animal cell, which is dependent upon cell surface area?
- A oxygen used
 B hormones detected
 C carbon dioxide produced
 D glucose absorbed
- 6 Three statements about water are listed.
- 1 Water is involved in metabolic reactions.
 - 2 Water is used as a solvent for many chemicals.
 - 3 Water cools a surface from which it evaporates.

Which statement(s) make water suitable to use in a blood transport system?

- A 1 and 2
 B 1 and 3
 C 2 only
 D 3 only
- 7 Which statement best describes the relationship between proteins and polypeptides?
- A Proteins are composed of polypeptides.
 B Polypeptides are composed of proteins.
 C Proteins, unlike polypeptides, are composed of amino acids.

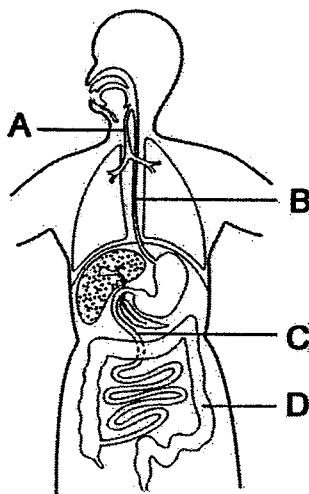
D Polypeptides, unlike proteins, are composed of amino acids.

- 8 Experiments were carried out to show the effects of pH and temperature on enzyme activity. The experiments also tested the effects of a chemical known as an inhibitor. The results are shown in the graphs below.



The best conclusion that can be drawn from these results is that the inhibitor affects

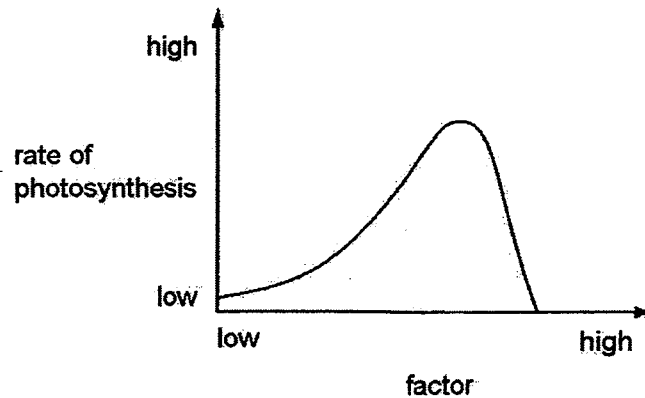
- A pH.
 - B temperature.
 - C enzyme activity.
 - D enzyme concentration.
- 9 Where does emulsification of fat begin?



10 Which function of the liver is correctly paired with the chemical involved?

	function	chemical
A	storage	amino acid
B	excretion	urea
C	deamination	glycogen
D	detoxification	alcohol

11 The graph shows the rate of photosynthesis of a plant plotted against an unknown factor.



Which factor is limiting the rate of photosynthesis as shown in the graph?

- A temperature
- B light intensity
- C number of chloroplasts
- D carbon dioxide concentration

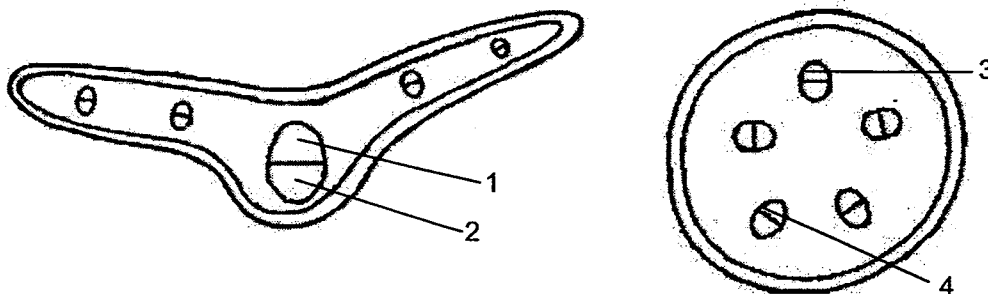
12 Samples of leaf tissue were tested with

- Iodine solution
- Benedict's solution and boiled

Which correctly shows the results obtained?

	Iodine solution	Benedict's solution and boiled
A	black	red precipitate
B	black	blue solution
C	yellow	red precipitate
D	yellow	blue solution

- 13 The diagrams below show sections of a leaf and of the stem of a plant.



Which regions represent the xylem tissue?

- A 1 and 3
 B 1 and 4
 C 2 and 3
 D 3 and 4
- 14 Where does the most transpiration in a plant take place?
- A stomata
 B cuticle
 C mesophyll cells
 D xylem vessels

- 15 Both equations, Y and Z, show reactions that take place in red blood cells.



What are the factors that determine the speed and direction of the reactions?

	reaction Y		reaction Z	
	concentration of reactants	correct enzyme present	concentration of reactants	correct enzyme present
A	yes	yes	yes	no
B	yes	no	yes	no
C	yes	no	yes	yes
D	no	yes	no	yes

16 Some functions of blood are listed.

- 1 antibody formation
- 2 clotting
- 3 distribution of hormones
- 4 phagocytosis

Which two functions are responsible for tissue rejection following a transplant operation?

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

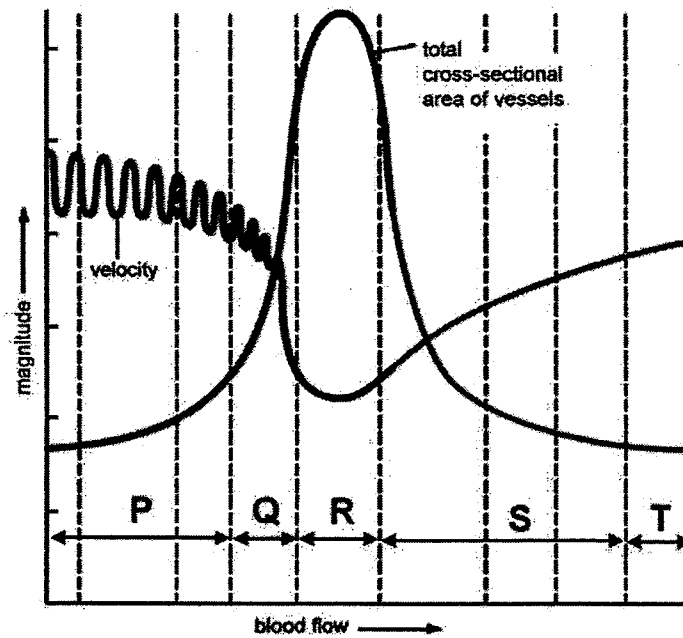
17 A man with blood group A has two sons. The plasma of one of the boys agglutinates the red blood cells of his father, but the plasma of the other son does not.

- 1 The father must be heterozygous for blood group A.
- 2 The boy with blood plasma that agglutinates his father's red blood cells could be of blood group A.
- 3 The man's wife must be homozygous for blood type A.
- 4 The boy with blood plasma that does not agglutinate his father's red blood cells could be of blood group AB.

Which statements are correct?

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

18 The diagram below shows properties of different parts of the human circulatory system.

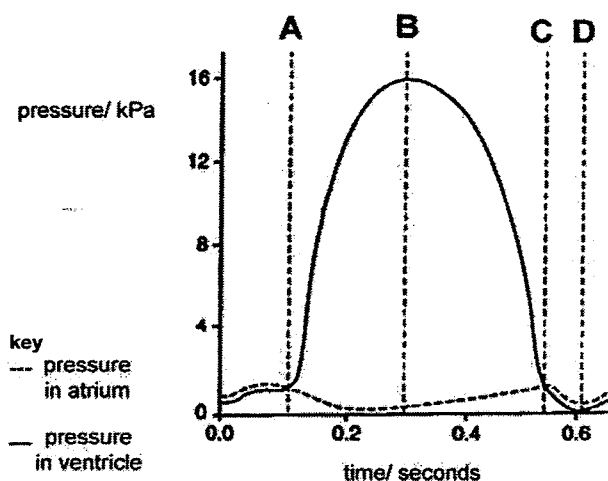


Which of the following is correct?

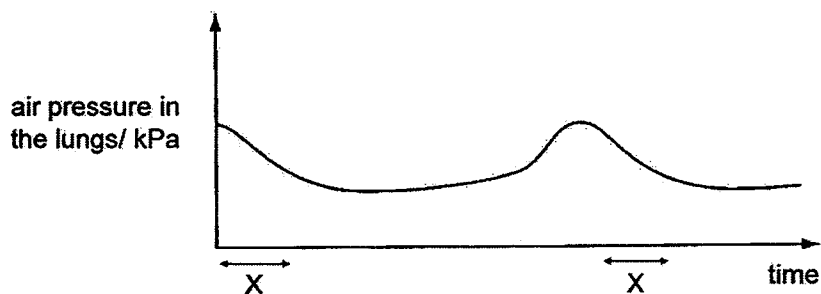
	exchange of soluble material occurs	valves most likely to be present	connects artery and capillary	pulse can be felt most strongly in
A	Q	P	R	S
B	R	P	Q	S
C	R	S	Q	P
D	S	Q	R	T

19 The graph shows pressure changes in the left side of the heart, during a single heart beat.

At which point does the bicuspid (mitral) valve open, allowing blood to flow from the atrium to the ventricle?



20 The graph shows changes in air pressure in the lungs during breathing,



What causes the change in air pressure during period X?

- A movement of ribs downwards
- B decrease in the volume of lungs
- C contraction of the diaphragm muscles
- D relaxation of the external intercostal muscles

21 The table shows results from a study into the effects of smoking during pregnancy.

number of cigarettes smoked per day by mother while pregnant	average birth weight of baby/ kg	average height of child at 15 years/ cm
0	3.7	166.1
1 - 9	3.5	165.0
10 and over	3.1	162.8

Which of these effects of smoking during pregnancy is supported by the information in the table?

- A reduced growth rate and reduced birth weight
- B reduced growth rate and increased birth weight
- C increased growth rate and reduced birth weight
- D increased growth rate and increased birth weight

22 The most accurate description of excretion is that the body is eliminating

- A water and urea from the kidneys.
- B the waste products of metabolism.
- C the unwanted products of respiration.
- D undigested food materials from the intestines.

23 Which is the most likely function of the kidney in fish that live in freshwater rather than seawater?

- A To remove water from the fish
- B To absorb salt from the environment
- C To excrete concentrated urine from the fish
- D To decrease nitrogenous waste lost to the environment

24 Which statement regarding the anti-diuretic hormone is true?

- A The hormone is produced by the hypothalamus.
- B Deficiency of the hormone in the body causes the condition of diabetes mellitus.
- C Less hormone is secreted when the concentration of sodium chloride in the blood increases.
- D The concentration of the hormone in the blood is high when the blood water potential is low.

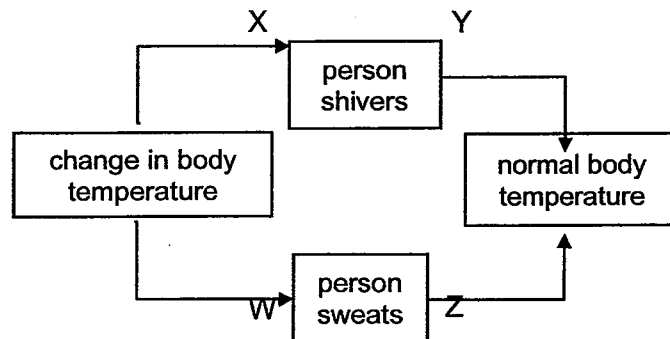
25 How is a working kidney dialysis machine similar to the healthy kidney?

- A It deaminates amino acids to urea.
- B It regulates the concentration of the blood.
- C It removes large molecules from the blood.
- D It takes sugar molecules out of the blood.

26 In organisms, the maintenance of a constant internal environment is

- A necessary because organisms must have a constant body temperature.
- B necessary because enzyme activity is highest at specific temperatures.
- C unnecessary because organisms are found in environments with a broad range of temperatures.
- D unnecessary because the nervous system detects and responds to changes in ambient temperature.

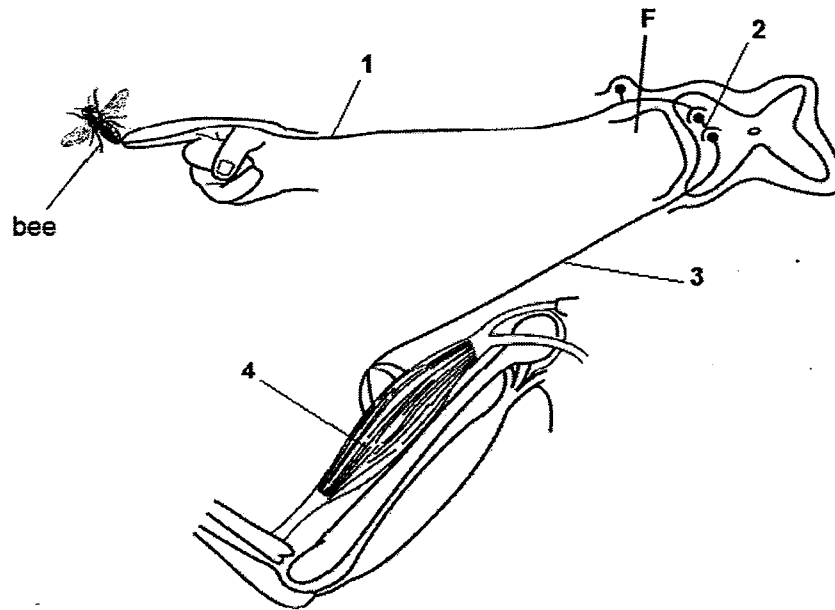
27 The diagram shows an example of homeostasis in a person.



Which letters represent negative feedback?

- A W and X
- B W and Y
- C X and Z
- D Y and Z

Refer to the following diagram when answering questions 28 and 29.



28 Which correctly identifies the motor neurone, effector and type of reflex shown above?

	motor neurone	effector	type of reflex
A	1	4	spinal
B	1	2	cranial
C	3	4	spinal
D	3	2	cranial

29 The person's nervous pathway that has been cut at F. A bee stings the person's finger as shown in the diagram.

What are the effects of this sting on the person?

	pain felt	arm moves
A	no	no
B	no	yes
C	yes	no
D	yes	yes

30 Which shows the correct order of events when a person focuses on a far object?

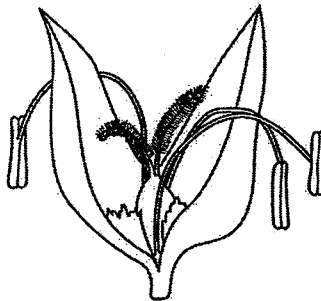
- 1 ciliary muscles relax
- 2 suspensory ligaments become taut
- 3 edge of lens pulled for it to be less convex

- A 1 → 2 → 3
 B 2 → 1 → 3
 C 2 → 3 → 1
 D 3 → 2 → 1

31 What effects would an increase in the secretion of adrenaline have on the body?

	concentration of glycogen in the liver	concentration of glucose in the blood
A	decrease	increase
B	increase	increase
C	increase	no effect
D	no effect	decrease

32 The diagram below shows a wind-pollinated flower.



Which of the following statements indicate that it is pollinated by the wind?

- 1 The anthers hang outside the flower.
- 2 The stigma is large.
- 3 The stigma is feathery.
- 4 The ovary is within the flower.
- 5 The stigma is within the flower.

- A 1 and 2
 B 2 and 3
 C 1,2 and 3
 D 1,3 and 5

- 33 A person with AIDS is susceptible to all kinds of infectious diseases.

Which statement accounts for this?

- A HIV weakens the immune system.
- B HIV destroys disease-causing organisms.
- C HIV causes an increase in antigens.
- D HIV causes antibody production to increase.

- 34 A diploid organism has 3 pairs of homologous chromosomes.

Which correctly describes the number of chromosomes present at each stage of cell division in each nucleus?

	stage of cell division	number of chromosomes
A	prophase I	12
B	prophase I	3
C	prophase II	6
D	prophase II	3

- 35 What process results in organisms containing DNA from different species?

- A transcription
- B transgenics
- C translation
- D translocation

- 36 The following events occur after DNA is subjected to radiation. The events are listed in no specific order.

- P: Change in protein structure
- Q: Change in polypeptide sequence
- R: Change in cell activity
- S: Mutation

What is the correct sequence of steps?

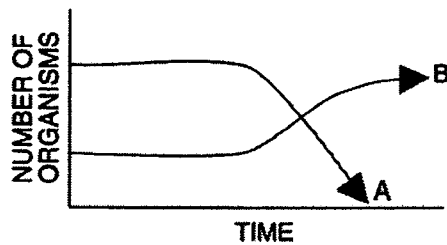
- A S, P, Q, R
- B S, Q, P, R
- C R, Q, S, P
- D R, S, Q, P

- 37 For many generations, farmers cross two breeds of cattle, the Angus and the Hereford, to obtain beef of optimum quality.

Which statement describes this practice?

- A evolution
- B artificial selection
- C natural selection
- D discontinuous variation

- 38 The graph below shows changes in two populations of herbivores in a grassy field.



A possible reason for these changes is that

- A all of the plant populations in this habitat decreased.
 - B population B competed more successfully for food than population A did.
 - C population A produced more offspring than population B did.
 - D population B consumed the members of population A.
- 39 Why does an ecosystem need to be exposed regularly to sunlight?
- A Energy is converted to biomass.
 - B Energy is lost as heat.
 - C Energy is lost to decomposers.
 - D Energy is reflected by plants.
- 40 Which is the most direct way that carbon in starch stored in cereal grain can return to the atmosphere as carbon dioxide?
- A Grain is eaten by birds.
 - B Grain is made into bread and eaten by humans.
 - C Grain is destroyed by fire during storage.
 - D Grain stored in damp conditions turns mouldy and decays.

End of Paper

PRELIMINARY EXAMINATION 2016
SECONDARY 4 EXPRESS

CANDIDATE NAME

CLASS

INDEX NUMBER

BIOLOGY

5158/2

PAPER 2

15 September 2016

1 hour 45 minutes

READ THESE INSTRUCTIONS FIRST

Write in dark blue or black ink.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the answer sheet in the spaces provided unless this has been done for you.

Section A (50 marks)

Answer all questions.

Write your answers in the spaces provided on the Question Paper.

Section B (30 marks)

Answer all questions.

Write your answers in the space provided on the Question Paper.

Write an E (for Either) or an O (for Or) next to the number 9 in the grid below to indicate which question you have answered.

You are advised to spend no longer than an hour on Section A and no longer than 45 minutes on Section B.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use		
9		
Total	80	

This question paper consists of **14** printed pages.

SECTION A (50 marks)

Answer all questions in this section.

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows parts of the alimentary canal that lie in the upper part of the human body.

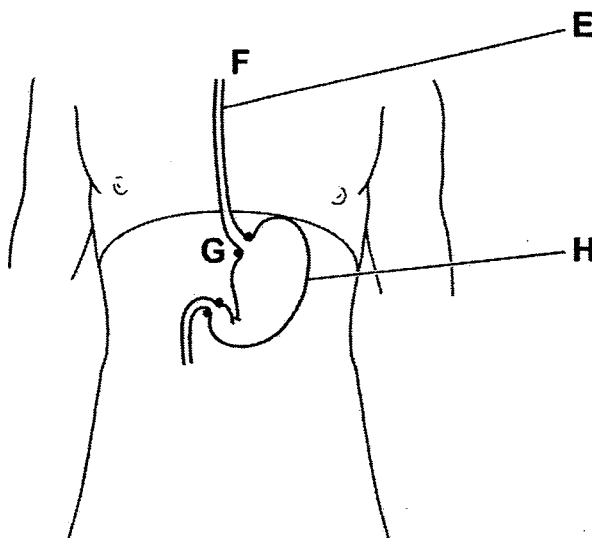


Fig. 1.1

- (a) (i) Name the part labelled E. [1]
- (ii) Name the process that carries food from F to G. [1]
- (b) The walls of part H are normally coated with mucus. Suggest reasons for this.

.....

.....

.....

..... [3]

(c) Sometimes, particularly when a person is lying flat, partly digested food returns into structure E through the valve at G. This can cause discomfort known as heartburn.

(i) Explain why heartburn is not a biologically accurate name for this condition.

.....
..... [1]

(ii) Explain why medications for this condition are often alkaline in nature.

.....
.....
..... [1]

[Total: 7]

2 (a) Write the chemical equation for photosynthesis.

..... [2]

(b) A young, green, leafy stem was placed in a clear glass beaker of water in bright light. Fig. 2.1 shows the stem 12 hours later.

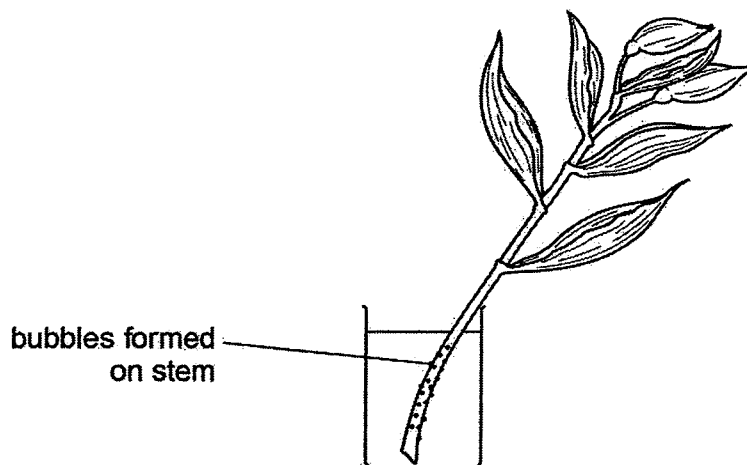


Fig. 2.1

Tests proved that the bubbles contained oxygen. Explain how they appeared on the side of this green stem.

.....
.....
.....
..... [3]

[Turn over

(c) Explain the benefits to other organisms of having submerged water plants in a pond ecosystem.

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.....

[3]

[Total: 8]

3 Fig. 3.1 shows a kidney and its associated structures. The arrows show the direction of flow of fluids in these structures.

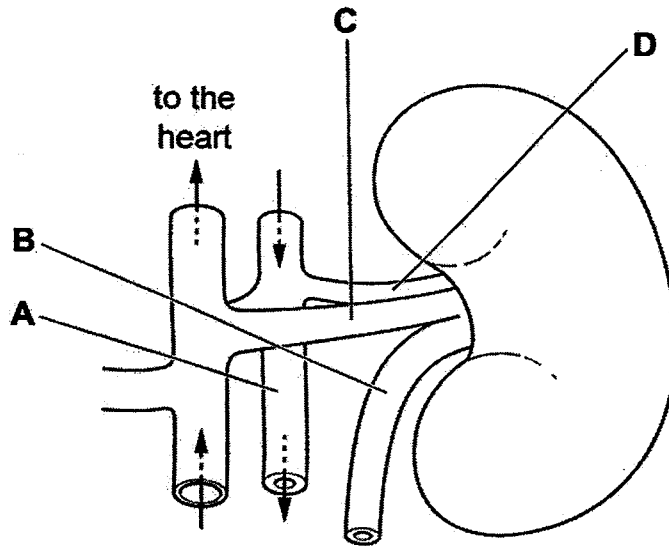


Fig. 3.1

(a) (i) Name the part labelled A. [1]

(ii) Name the chamber of the heart through which blood in structure A last passed.
 [1]

- (b) Table 3.1 shows the relative concentrations of various substances in structures B and C. Complete the table to show the possible concentrations of these substances in structure D.

Table 3.1

substance	relative concentration in structure		
	B	C	D
amino acids	0.00	0.05	
glucose	0.00	0.10	
mineral ions	1.50	0.72	2.25
proteins	0.00	8.00	
urea	2.00	0.03	2.03

[3]

- (c) Explain how the relative concentrations of glucose might change in structures B, C and D in a person with diabetes.

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[5]

[Total: 10]

- 4 Fig. 4.1 shows the effect of exercise on the concentration of oxygen in the blood and the concentration of lactic acid in the muscles of a healthy person over a 5-minute period.

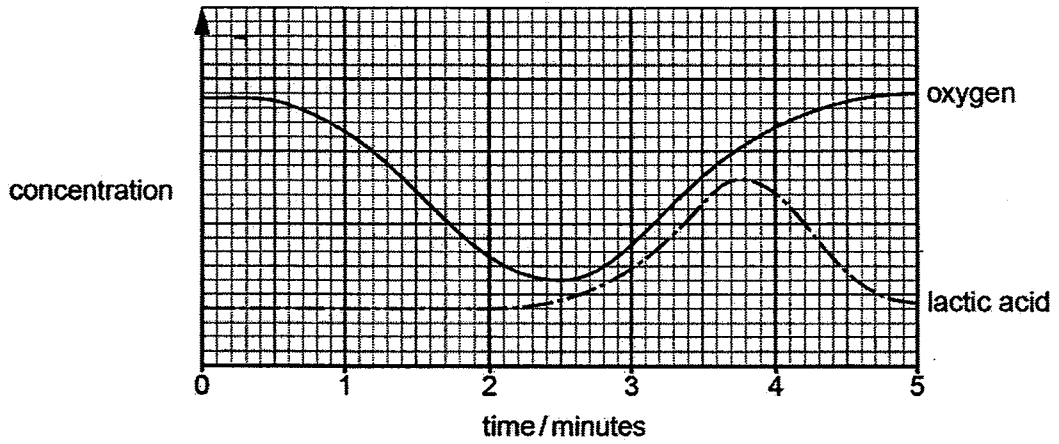


Fig. 4.1

- (a) Use Fig. 4.1 to find the time at which the person started to exercise.

[1]

- (b) Name the process that causes the change in oxygen concentration during the first 2 minutes on Fig. 4.1.

[1]

- (c) State and explain how each of the two curves on Fig. 4.1 might be different if the person suffered from emphysema.

[4]

[Total: 6]

- 5 In an experiment, a person looked at the same light source from various distances. The diameter of the pupil was measured at each distance. Fig. 5.1 shows how the diameter varied.

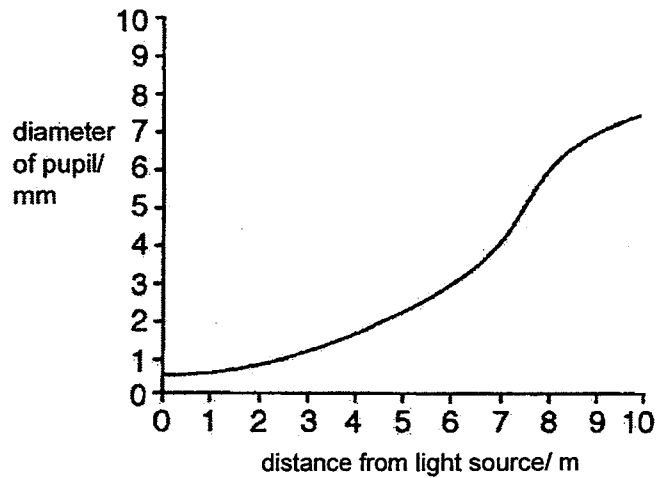


Fig. 5.1

- (a) Describe the relationship between the distance from the light source and pupil diameter shown in Fig. 5.1.

.....
 [1]

- (b) What type of response accounts for this change in pupil diameter?

.....
 [1]

- (c) Explain in detail how the response is brought about as the distance from the light source is increased from 6 to 8 metres.

.....

 [5]

(d) Albino people lack pigment in their bodies. Suggest why they should avoid looking at bright lights.

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[3]

[Total: 10]

6 Fig. 6.1 and 6.2 show the use of some scientific techniques in the process of reproduction. The animal used in this particular procedure was a sheep.

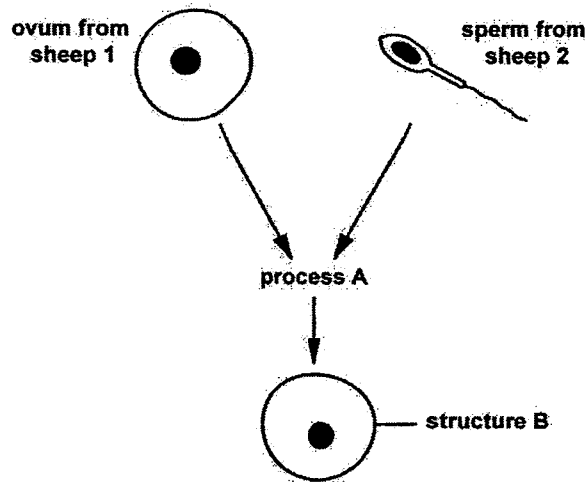


Fig. 6.1

(a) Identify the process A and structure B on Fig. 6.1.

A

B

[2]

(b) The diploid number of chromosomes for sheep is 54. State the number of chromosomes in

(i) the ovum of sheep 1,

[1]

(ii) liver cell of sheep 2,

[1]

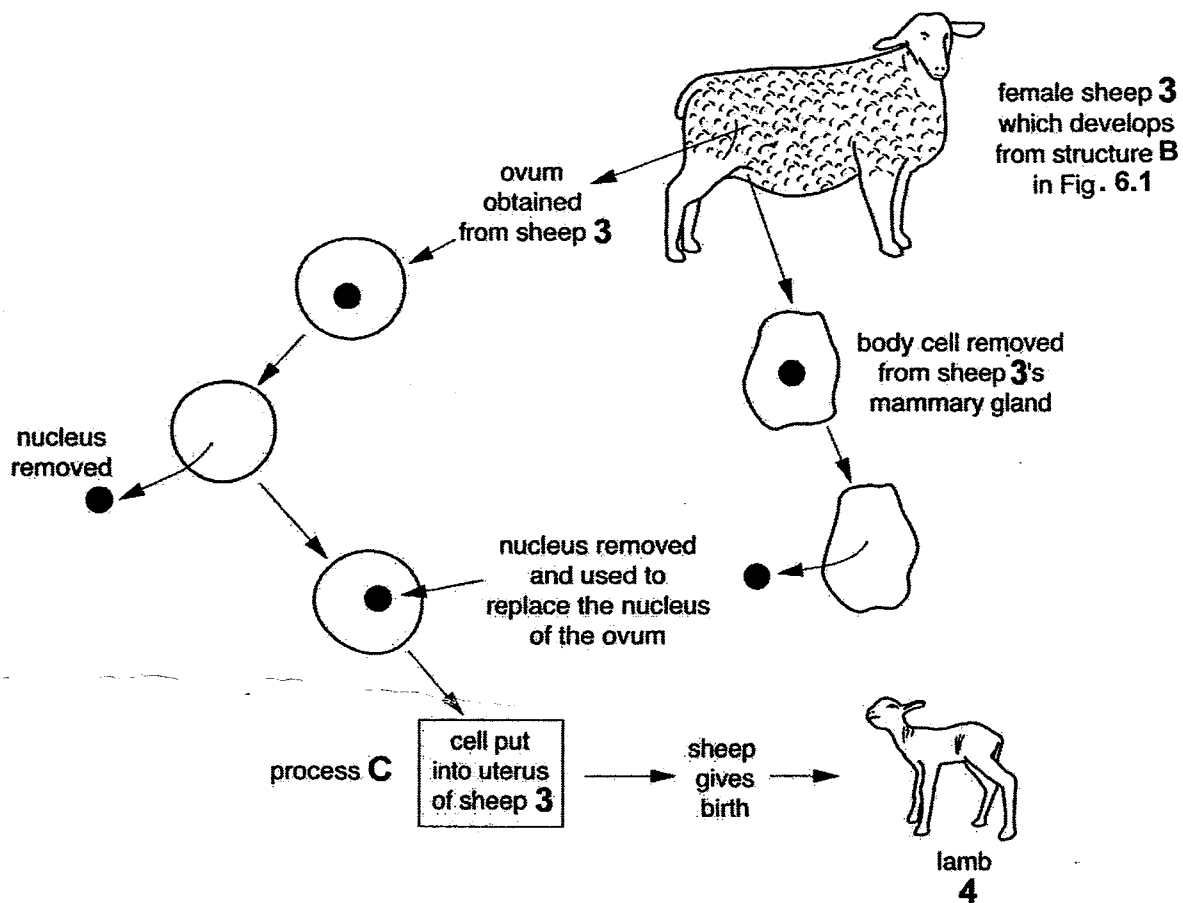


Fig. 6.2

(c) Explain how the production of lamb 4 in Fig. 6.2 can be described as asexual reproduction.

.....

.....

..... [2]

(d) This process of reproduction in Fig. 6.2 does not always result in a successful birth of lamb 4.

Suggest improvements that can be made to the procedure and/or precautions that can be taken to ensure the successful birth of lamb 4. Give reasons to support your answer.

.....

.....

.....

..... [3]

[Total: 9]

[Turn over

SECTION B (30 marks)

Answer all questions in the spaces provided.

Question 9 is in the form of an Either/Or question. Only one part should be answered...

- 7 Some students carried out an investigation to find the effect of the shape of an animal's body on heat loss from the body. Heat loss was measured as a decrease in temperature in $^{\circ}\text{C}$.

They used two plastic containers, **A** and **B**, to represent two differently shaped bodies of an equal volume.

The containers used are shown in Fig. 7.1.

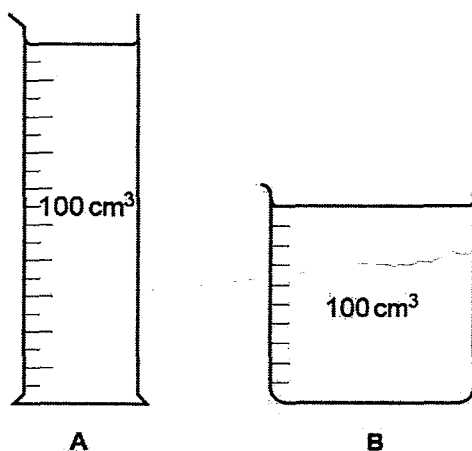


Fig. 7.1

The two containers, **A** and **B**, were each filled with 100 cm^3 of hot water. A thermometer was used to measure the temperature of the hot water in each container immediately. These temperatures were recorded at 0 minutes.

Table 7.1 shows the temperatures that were then recorded for each container every two minutes, for a total of eight minutes.

Table 7.1

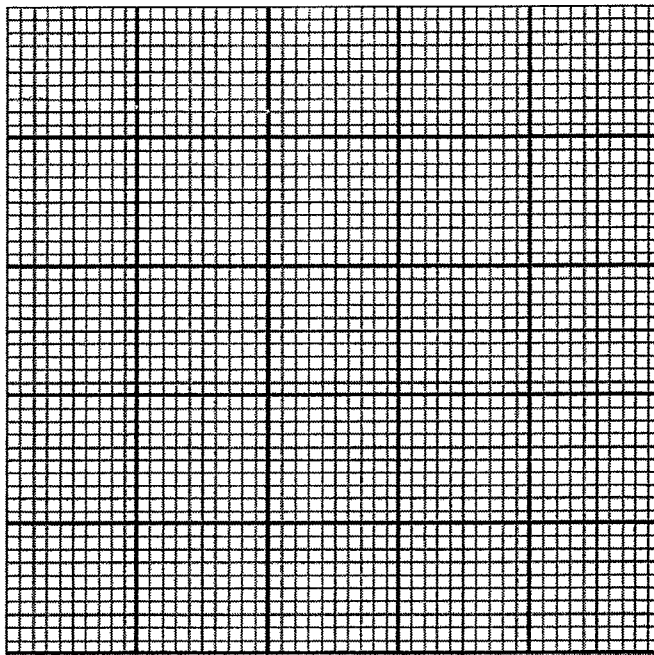
time/ min	temperature/ $^{\circ}\text{C}$	
	A	B
0	65	65
2	55	58
4	50	54
6	46	50
8	40	47

- (a) Calculate and record the overall decrease in temperature of the water for each container and record these two values below.

Show your working.

A B [2]

- (b) (i) Construct a graph to show the decrease in temperature of the water with time, in containers A and B, using the results in Table 7.1. Use the same axes for both sets of data.



[4]

- (ii) Describe these results.

.....
.....
..... [2]

(iii) The shape of a container does affect the heat loss from the container. Suggest an explanation for this.

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.....
.....
..... [2]

[Total: 10]

8 Describe the similarities and differences in structure and function of root hair cells and villi.

(a) similarities

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.....
..... [4]

(b) differences

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..... [6]

[Total: 10]

[Turn over

9 Either

(a) (i) Explain how meiosis is involved in the formation of gametes.

.....
.....
.....
..... [2]

(ii) Explain, in words, how two plants, one with red flowers and one with white flowers, can produce seeds that will grow into plants with either red or white flowers in the ratio of 1:1.

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..... [6]

(b) Explain the difference between a genetically modified and a selectively bred animal.

.....
.....
..... [2]

[Total: 10]

9 Or

(a) (i) Give an example of a food chain involving **four** named organisms.

(ii) Draw and label a pyramid of numbers for your food chain.

[4]

(b) Explain how energy is lost along a food chain.

[6]

[Total: 10]

2016 Prelim 4 Express BIOLOGY Mark Scheme

P1

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

; = 1m unless otherwise stated | R: reject | Comments in *italics* | sp: spelling penalty | I= ignore |
 AW: alternative wording

1 a) i) esophagus; sp. R: gullet
 ii) peristalsis; sp.

b) ref. protection from/ prevent; corrosive nature of HCl;
 (gastric juices) contains pepsin/ protease; digest cells of the (gastric) wall;
 serves as a lubricant + movement/ churning of stomach contents max: 3

c) i) ref. heart not connected to alimentary canal/ heart is part of the circulatory system but not the
 esophagus;

ii) **neutralise**;
 HCl (in gastric juice); max 1

2 a) $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$ correct equation; both factors;

b) chlorophyll present on stem; R: chlorophyll in leaves
 photosynthesis; hence oxygen produced;

c) oxygen (from photosynthesis is used for) respiration; to release energy; R: produce energy

for one use of energy e.g. cell division, active transport, muscular contraction, protein synthesis, nervous
 transmission; R: photosynthesis/ respiration

food/shelter for animals; max: 1

3 a) i) aorta/ renal artery; sp.
 ii) left + ventricle; sp.

b)

substance	relative concentration in structure		
	B	C	D
amino acids	0.00	0.05	0.05 > 0.05;
glucose	0.00	0.10	0.10; > 0.10;
mineral ions	1.50	0.72	2.25
proteins	0.00	8.00	8.00 only;
urea	2.00	0.03	2.03

This OR this set of answers

This set of answers takes into
 account that the kidney cells
 themselves used the glucose
 and amino acids for their own
 respiration and growth/ repair/
 protein synthesis

c) B,C and D increase;

ref. insufficient/inability insulin production;
excess glucose not converted to glycogen + by liver;
 ref. kidney + not able to reabsorb; all + glucose;

*Many answers implied that the kidney was involved in blood glucose concentration (bgc) regulation by excreting the excess glucose. This is a flawed understanding because the glucose is not a metabolic product and glucose being a source of energy is a substance that the body will try its best to retain. Hence, converting any excess into fat for storage. In the case of diabetics, even though their bgc is elevated, the kidneys will still attempt to reabsorb all the glucose including the excess. However, when the bgc is so high, the kidney is **unable to** rather than will not reabsorb that excess. This leads to diabetics possibly having kidney complications due to this strain on the selective reabsorption process. Of course there are many other reasons that can cause kidney failure and not just complications from diabetes. A diabetic will not have glucose present in the urine if the kidneys are well-functioning but the strain on the kidneys will eventually occur resulting kidney failure.*

4 a) single value between 0.3 to 0.5 + min;

b) aerobic + respiration;

c)

oxygen concentration starts at a lower value;	reduced SA in lungs; for oxygen diffusion ;
oxygen curve decreases faster;	oxygen in blood is already low and will be depleted faster;
lactic acid will take longer to return to normal;	reduced SA in lungs; for oxygen diffusion ; anaerobic occurring earlier/ for longer; more oxygen to repay oxygen debt;
lactic acid produced faster;	reduced SA in lungs; for oxygen diffusion ; anaerobic occurring earlier/ for longer;
concentration of lactic acid decreases/ reaches lowest faster;	reduced SA in lungs; for oxygen diffusion ; anaerobic occurring earlier;

at least one for lactic acid and oxygen curve each

no double crediting for same point

5 a) nearer the light + smaller the pupil;

b) (pupil/cranial) **reflex**/ involuntary;

c) decrease in light intensity;
 retina- receptor to;
 produce nerve impulse;
 ref. role of sensory + relay + motor neurone;
 role of brain as a the CNS;
 effector as radial muscles of the iris;
 contraction of radial muscles;
 to dilate pupil; max 5

d) iris (lacking pigment)
 ineffective in blocking light; AW: light passes through iris (even when pupil constricts)
 damage to retina;

OR

choroid (lacking pigment);
 internal reflection of light occurs;
 blurred vision/ damage to retina;

6 a) A: fertilisation; B: zygote; sp.

b) i) 27; ii) 54;

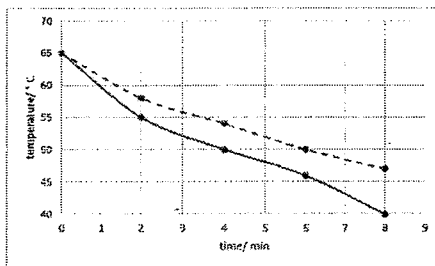
c) single parent;
no fertilisation; AW: no sex cells
inheritance of full set of DNA/ genetically identical offspring; max: 2

d) use another sheep for implantations; as sheep 3 is stressed from other procedures;
ensure sheep 3 is in estrous cycle; ensures implantation;
implant more than one 'zygote'; increase chances of implantation;
sterile environment; ref. cells involved remain undamaged/ viable;

Accept other reasonable answers and appropriate reasons for them. max 3

7 a) 25 + 18; °C;

b) i)



-1 mark per/ error
plots| scaling| axes title and units| label graphs
A and B| line (best fit or point to point)

ii) B loses less heat than A; B loses heat slower than A; final temperature for B higher than A;

iii) cylinder A has larger; surface area + to volume ratio;

8 a) RHCs and villi have protrusions/long/ elongated; large SA (:vol); diffusion;

"Root hair cell (singular) and villi have protrusions" is an incorrect statement because only when there is more than one RHC, would there be more than one protrusion.

absorption; active transport;
named ions/minerals; water;
partially permeable;
active transport; max: 4

Many students wrote that RHC and villi have transporting (one place to another WITHIN organism) functions. This is incorrect. They are absorptive (from source INTO organism) structures.

b) presence of cell wall;
presence of microvilli on surface epithelial cells of villi vs single protrusion of root hair cell itself;
single (RHC) vs multicellular structure (villus);

from intestinal cavity vs from soil;
water and minerals; vs. glucose, a.a., fats, water and minerals; max: 6

Many students forgot that the small intestines also absorb water and minerals. An 'invalid' point is annotated when a comparison of different criteria is used. Example: The root hair cell has a cell wall but the villus has a lacteal and blood capillaries. Here, even though the criteria of structure is used, the cell wall is a structure at a unicellular level whereas the lacteal and blood capillaries are structures in a multicellular structure hence there is no basis of comparison.

9Ea) i) in testes / anthers / ovaries ;
cell division ;
halving of chromosome numbers / haploid ;

so that diploid number is restored on fertilisation ;

Max: 2

- ii) one (either) colour is controlled by a dominant allele;
one by a recessive allele ;
one parent heterozygous – (or described, e.g. Rr) ;
one is homozygous recessive (or described) ;
correct ref. to gametes ;
gametes correctly identified for both parents ;
how gametes pair to produce offspring in 1:1 ratio ;

- b) transfer of DNA from one organism into genome of another;
two organisms are chosen/selected for their traits/characteristics and crossed/bred;

90a) i) and ii)

starting with a named producer|
plausible food chain with 3 named consumers + arrows in correct direction|
labelled pyramid with organisms named in food chain|
in correct order with named producer labelled at bottom|
pyramid of correct proportions for given food chain|

-1/ error

b) explain why not all energy gets transferred to the consumer by clearly differentiating that

energy is still trapped in :

in faeces of the organism being eaten;
urine / excretory products of the organism being eaten;
parts remain uneaten/ undigested parts ;

for the organism was being eaten:

it carried out respiration;
during this respiration some energy lost as heat ;

the rest of the energy released was used by the organism (the one being eaten) for:
movement / muscular contraction (or any e.g. of same) ;
nervous impulses ;
active transport ;
protein synthesis;
cell division;

LAST WARNING:

YOU WILL BE PENALISED FOR WRITING 'ENERGY IS PRODUCED' FOR YOUR 'O' LEVELS. YOU SHOULD ONLY WRITE 'ENERGY RELEASE'.

