DULWICH COLLEGE | SINGAPORE |

Year 10 Examination
IGCSE Biology
May 2018

Name:.....

Time allowed: 2 hours

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

Total Marks available	/ 120	Teacher comment:
	%	
Grade		

Student reflection

1 A meal contains different food components.

(a) The table lists some of the components in the meal.

Complete the table by giving the function of each component.

One has been done for you.

(3)

Component	Function of component
vitamin A	
vitamin C	
vitamin D	bone growth
iron	

(b) Describe a test to show that the meal contains glucose.

(3)

(c) The meal also contains lipids and proteins.

(i) Give the three chemical elements found in lipids and also found in proteins.

(1)

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(ii) The table lists two substances involved in the digestion of lipids.

Complete the table by naming an organ that produces each substance.

(2)

Substance	Organ
bile	
lipase	

(Total for Question 1 = 9 marks)

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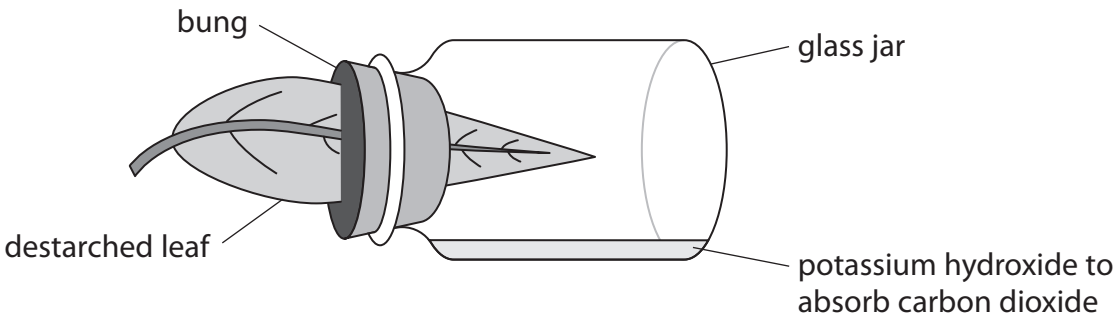
2 A student investigates the effect of carbon dioxide on photosynthesis.

The student places a plant in the dark to remove starch from its leaves.

(a) Explain why a leaf becomes destarched if it is placed in the dark.

(2)

(b) The student puts one of the destarched leaves through the bung of a glass jar containing potassium hydroxide, as shown in the diagram.



She places the apparatus in the light for 24 hours, and then tests the leaf for starch.

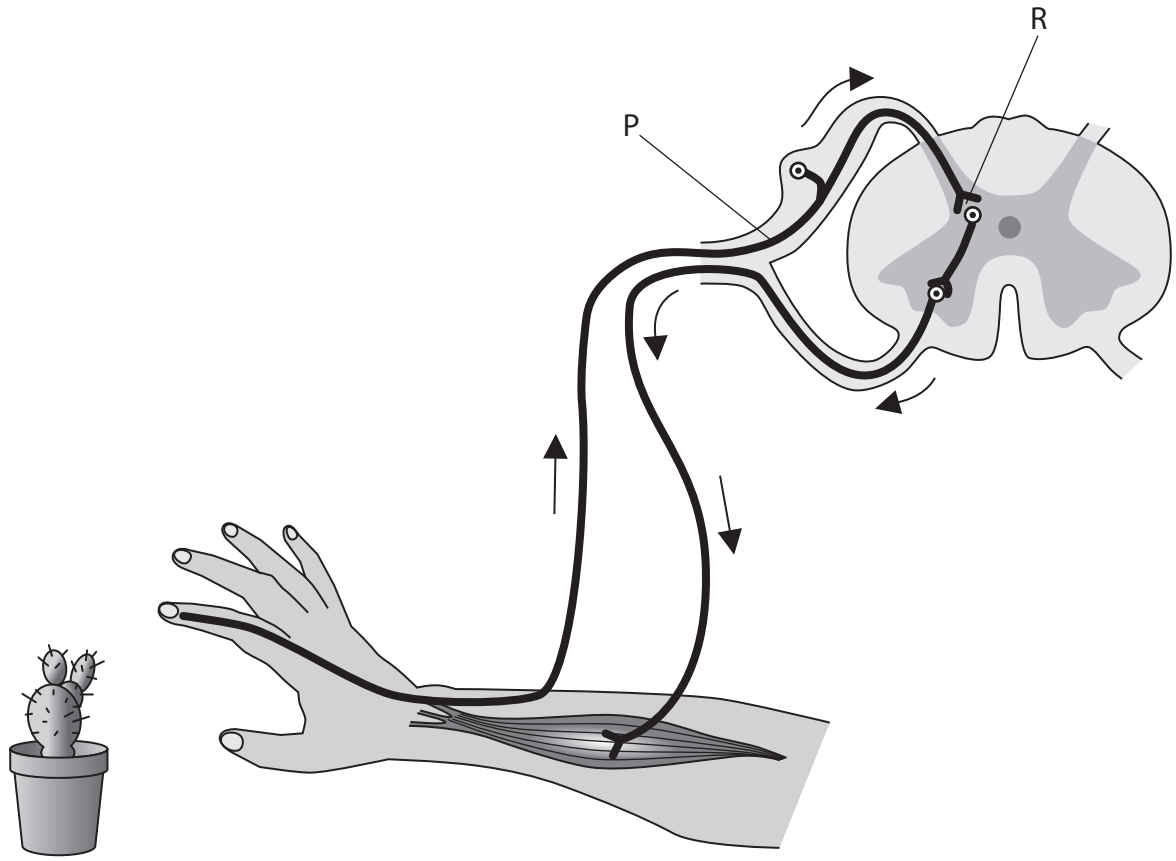
(i) Describe a safe method of testing this leaf for starch.

(4)

(Total for Question 2 = 6 marks)

3 (a) When a person touches the spine of a cactus plant, they quickly withdraw their hand.

The diagram shows the reflex arc involved in this response.



(i) Give the name of neurone P.

(1)

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(ii) Describe what happens at R.

(2)

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(iii) Draw a labelled diagram of the motor neurone involved in this response.

(3)

(iv) Explain the role of the motor neurone in this response.

(2)

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(Total for Question 3 = 8 marks)

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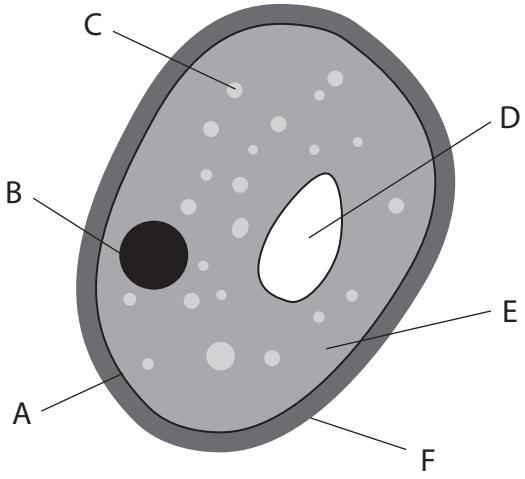
4 The diagram shows a yeast cell.



(a) (i) Give the letter of the part made of chitin.

(1)

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(ii) Give the letter of the part made of glycogen.

(1)

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(b) Anaerobic respiration in yeast cells produces a gas.

Write the word equation for anaerobic respiration in yeast cells.

(2)

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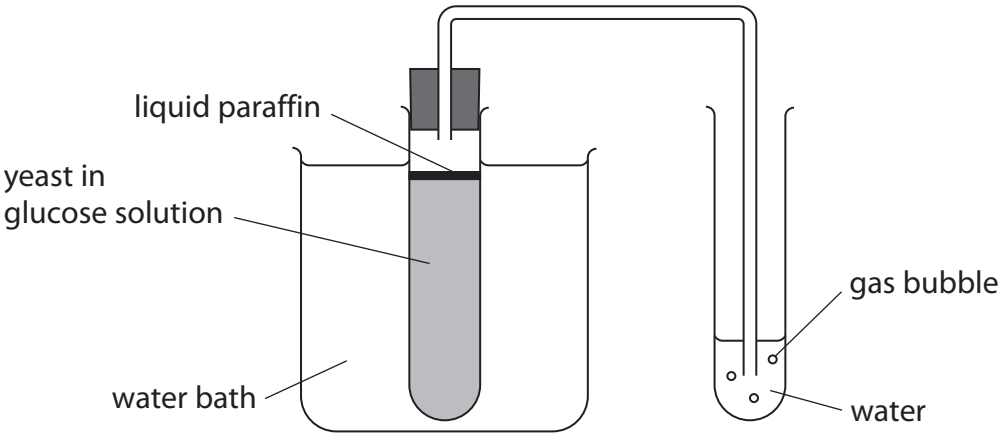
(c) A student uses this apparatus to investigate the effect of temperature on anaerobic respiration in yeast.



The student uses the water bath to control the temperature of the yeast in glucose solution.

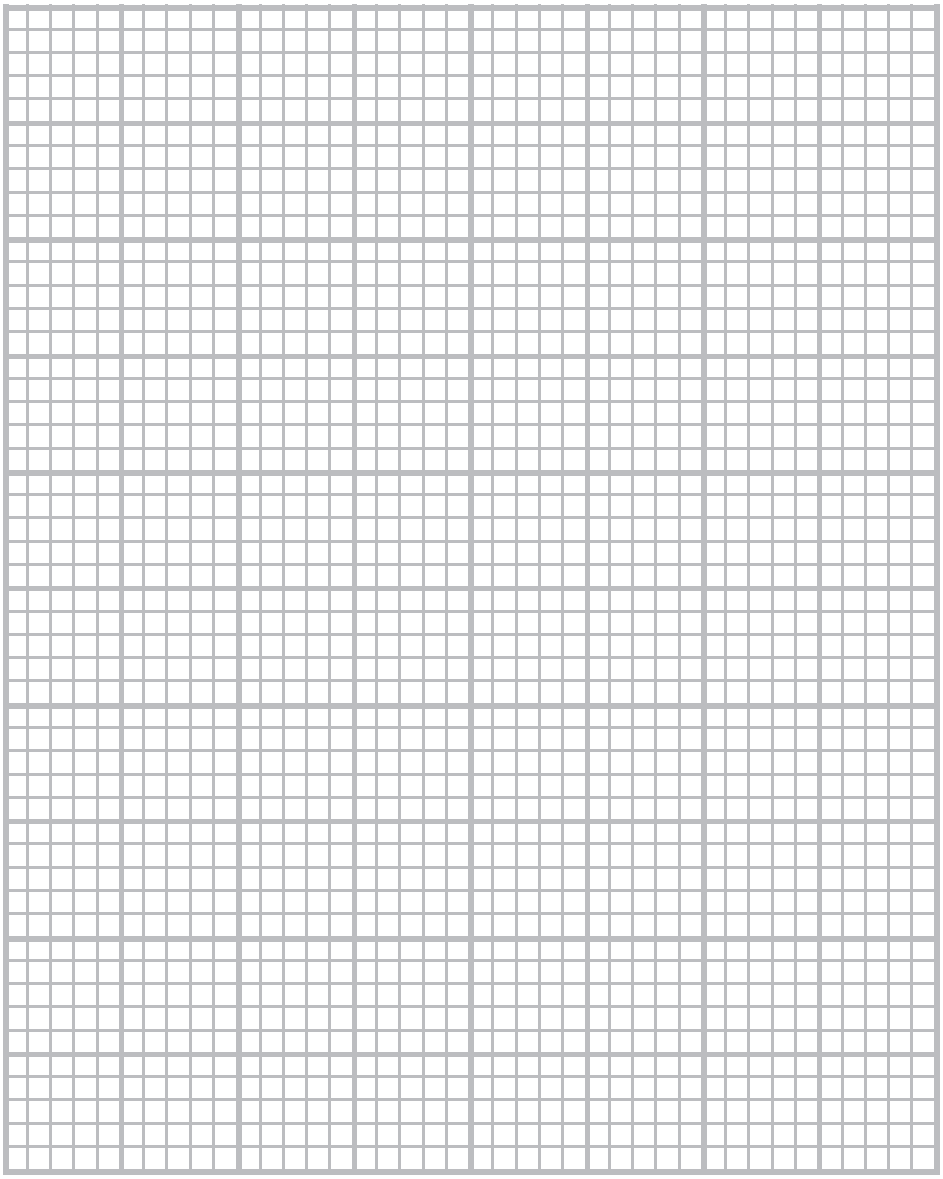
He measures the rate of anaerobic respiration by counting the number of gas bubbles produced in one minute.

The table shows the student's results.

Temperature of water bath in °C	Rate of anaerobic respiration in bubbles per minute
20	3
25	5
30	7
36	10
40	14
45	20
52	3

(i) Plot a graph to show the effect of temperature on the rate of anaerobic respiration.

Use a ruler to join the points with straight lines. **(5)**



(ii) Explain how the student could modify his method to improve his results.

(2)

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(iii) Explain the results obtained at 20 °C and at 52 °C.

(4)

20 °C.....

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52 °C.....

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(Total for Question 4 = 15 marks)

5 If a person drinks a lot of water, the water content of their blood will increase.

(a) Describe how the water content of their blood is regulated.

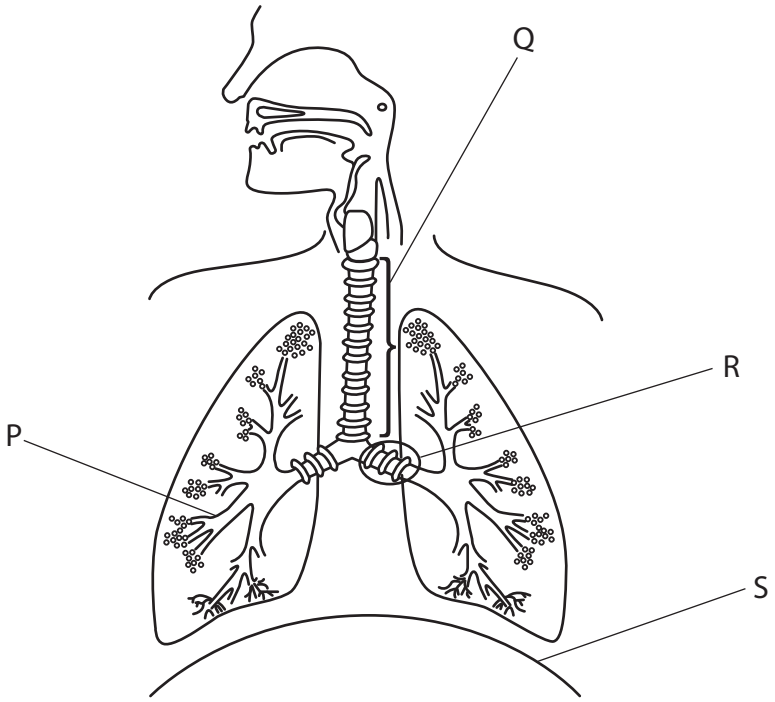
(5)

(b) Explain why red blood cells would be damaged if the water content of the blood increased.

(3)

(Total for Question 5 = 8 marks)

6 (a) The diagram shows part of the human thorax.



(i) Give the names of structures P, Q and R.

(3)

P .....

Q .....

R .....

(ii) Explain the role of structure S when a person breathes out.

(3)

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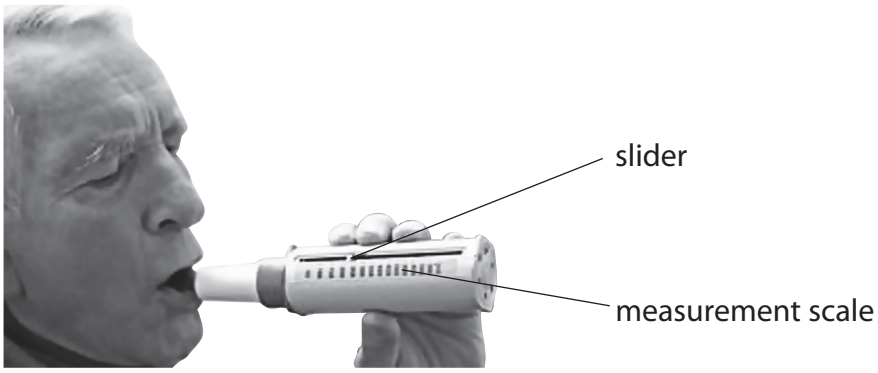
(b) Asthma is a disease that narrows the airways in the lungs.

A peak flow test is used to diagnose and monitor asthma.

The test measures how fast you can blow air out of your lungs.

The test involves blowing as hard as you can into a small device called a peak flow meter.

Blowing into the peak flow meter moves a slider along the measurement scale.



These instructions are provided to help measure peak flow.

Step 1 Sit or stand still

Step 2 Set the meter to zero, make sure your fingers are not touching the slider and that the meter is horizontal

Step 3 Breathe in as deeply as you can, then breathe out as quickly and as hard as you can into the peak flow meter

Step 4 Record the measurement when you have finished breathing out

Step 5 Repeat the procedure three times

(i) Suggest the unit that is used to measure peak flow.

(1)

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(ii) Explain why the instructions in step 5 are necessary.

(2)

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(Total for Question 6 = 9 marks)

7 The passage describes hormones and coordination.

Complete the passage by writing a suitable word in each blank space.

(9)

Hormones are chemicals that are produced by endocrine .....

and are secreted into the ..... . The hormones are then

transported to target cells in another part of the body.

Males have testes that produce the sex hormone ..... that causes

body hair to grow. Females have ..... that produce the

sex hormones ..... and progesterone.

The pancreas produces hormones that regulate blood glucose. One of these hormones,

called ..... , stimulates the conversion of blood glucose

to ..... in the ..... .

Another hormone causes the heart rate to increase in response to danger.

This hormone is called ..... .

(Total for Question 7 = 9 marks)

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8 Substances move in and out of cells using different processes.

(a) Complete the table by giving the process used for each example of substance movement.

(3)

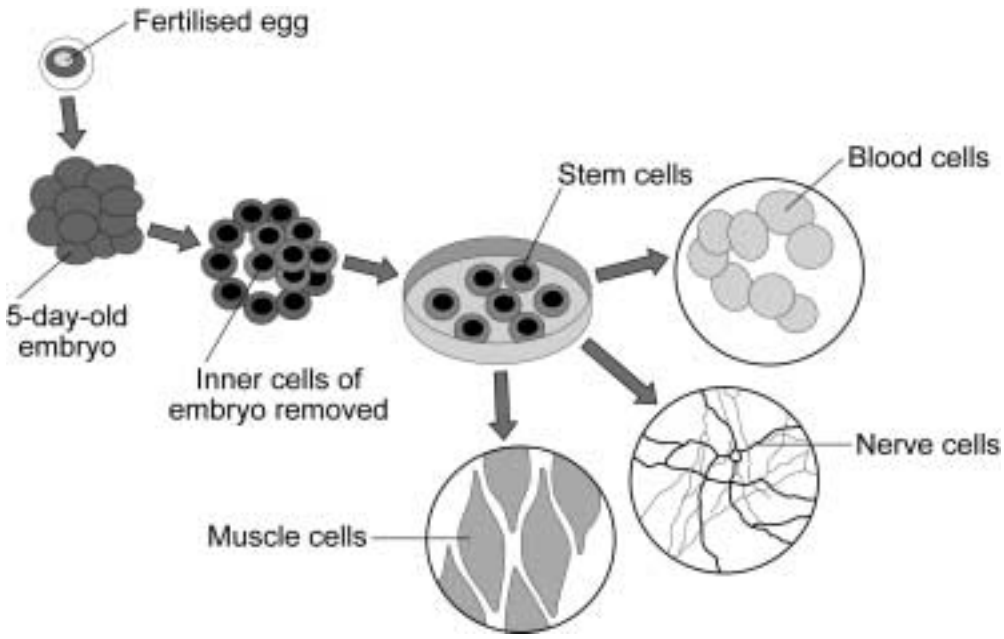
Example of substance movement	Process
carbon dioxide moving through stomata into a leaf	
nitrate ions moving into a plant root hair cell against a concentration gradient	
water moving from a collecting duct of the kidney into blood plasma	

(b) Explain how the structure of the small intestine is adapted for efficient absorption of substances.

(4)

(Total for Question 8 = 7 marks)

9. The diagram shows one way that stem cells can be produced from human embryos.



(a) Stem cells can be used to treat a condition such as paralysis.

Explain why.

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(2)

(b) During pregnancy, an umbilical cord and a placenta join the embryo to the mother. At birth the umbilical cord is cut.

Stem cells can be obtained from the umbilical cord.

Many people think that the stem cells for treating human conditions should be obtained from umbilical cords rather than human embryos.

Suggest **one** reason why.

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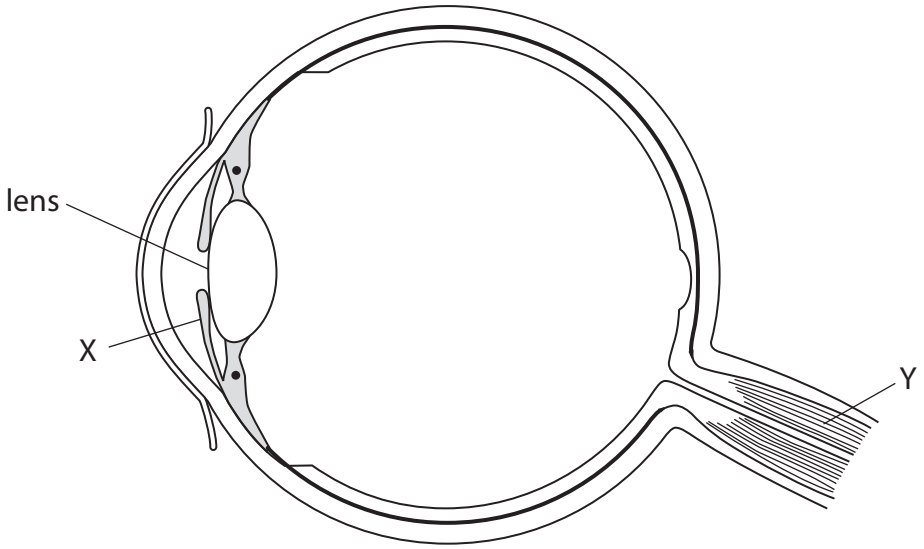
(1)

(Total for Question 9 = 3 marks)

10 The diagram shows a section of a human eye.



(a) (i) Explain how part X prevents damage to the retina in very bright light.

(2)

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(ii) Explain why damage to part Y would affect the ability to see.

(2)

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(b) In some people the lens in the eye becomes cloudy.

A cloudy lens is called a cataract.

(i) Explain how a cataract would affect the ability to see.

(2)

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(ii) The population of the USA is 322 million, of which 47.0% are over 40 years of age.

17.2% of the people over the age of 40 develop a cataract.

Calculate the number of people in the USA over the age of 40 who develop a cataract.

(2)

number of people = ...

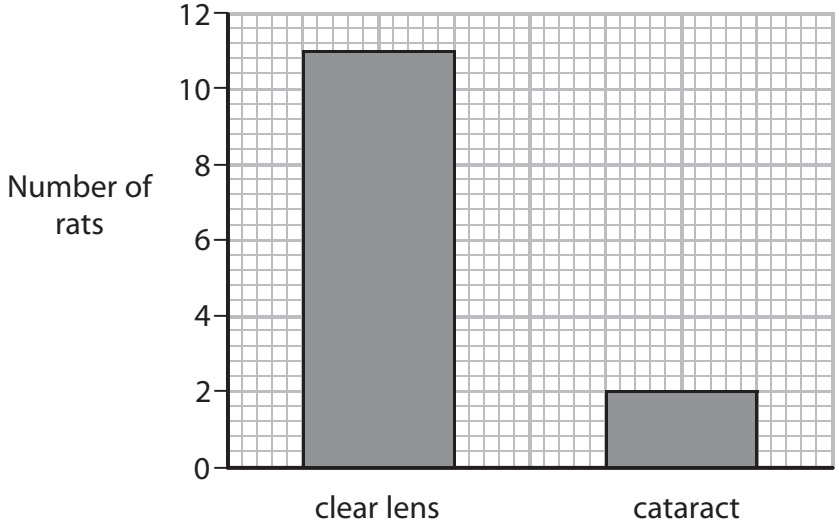
(c) Cataracts develop when proteins in the lens clump together.

Lanosterol is a chemical that helps to break up these clumps of protein.

In 2015, scientists investigated the ability of lanosterol to cure cataracts. They put drops of lanosterol solution into the eyes of rats with cataracts.

After six days of treatment they counted the number of rats with a clear lens and the number of rats that still had cataracts.

The graph shows the results.



One conclusion from this investigation is that lanosterol cures cataracts in humans.

(i) Explain why some people might agree with this conclusion.

(2)

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(ii) Give two reasons why some people do not agree with this conclusion.

(2)

1 .....

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2 .....

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(Total for Question 10 = 12 marks)

11 Plants produce seeds by sexual reproduction.

(a) (i) Fertilisation takes place before seeds are formed.

Name the structure that contains the male sex cells involved in this fertilisation.

(1)

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(ii) Explain how young plants that grow from seeds are able to survive until photosynthesis can start.

(3)

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(b) A student investigates the conditions needed for broad bean seeds to germinate.

He divides broad bean seeds into four groups, A, B, C and D.

He places each group of seeds in different conditions as shown in the table.

Group	Conditions
A	access to water, oxygen and at a temperature of 5 °C
B	access to water, oxygen and at a temperature of 15 °C
C	access to oxygen, no access to water and at a temperature of 15 °C
D	access to water, no access to oxygen and at a temperature of 15 °C

(i) Suggest how the student could identify when a seed has germinated.

(1)

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(ii) Explain which group of seeds is likely to germinate first.

(4)

(Total for Question 11 = 9 marks)

12 Components of blood have different functions.

(a) Complete the table by giving the missing information.

(4)

Component	Function
red blood cells	
	engulf bacteria
platelets	
	transport vitamins and minerals

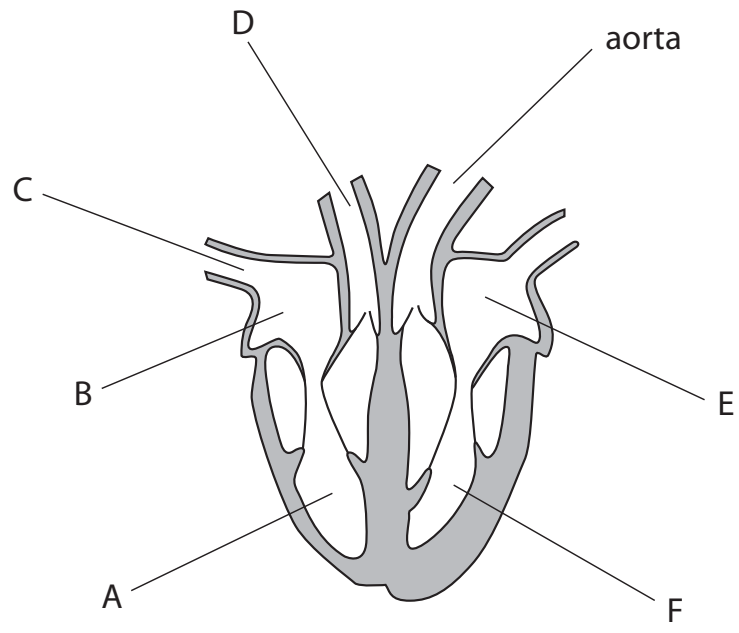
(b) When a person is vaccinated, their immune system produces memory cells.

Describe the role of memory cells.

(3)

(Total for Question 12 = 7 marks)

13 The diagram shows a section through the human heart.



(a) (i) Give the letter of the part known as the vena cava.

(1)

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(ii) Give the letters of the chambers where oxygenated blood is found.

(1)

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(b) Describe how the structure of the aorta is adapted for its role.

(2)

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(c) The table shows the speed of blood flow in three blood vessels.

Blood vessel	Speed of blood flow in cm per second
aorta	40.00
lung capillary	0.03
vena cava	15.00

(i) Blood has to travel 20 cm from a person's heart to their renal artery.

Calculate the time taken for blood to flow from this person's heart to their renal artery.

Show your working.

(2)

time = ... s

(ii) Explain how the speed of blood flow in the lung capillary affects gas exchange.

(2)

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(Total for Question 13 = 8 marks)

14 Translocation is the transport of the products of photosynthesis in a plant.

A scientist investigates the effect of sulfur dioxide gas, a common air pollutant, on the rate of translocation in young bean plants.

She uses this method.

- select young bean plants that each have one mature leaf and one young leaf that is still growing
- expose some of the plants to sulfur dioxide gas, a common air pollutant
- measure the rate of translocation in the plants exposed to sulfur dioxide gas
- measure the rate of translocation in the plants not exposed to sulfur dioxide gas

(a) (i) Identify the independent variable in this investigation.

(1)

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(ii) Identify the dependent variable in this investigation.

(1)

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(iii) Suggest a control variable for this investigation.

(1)

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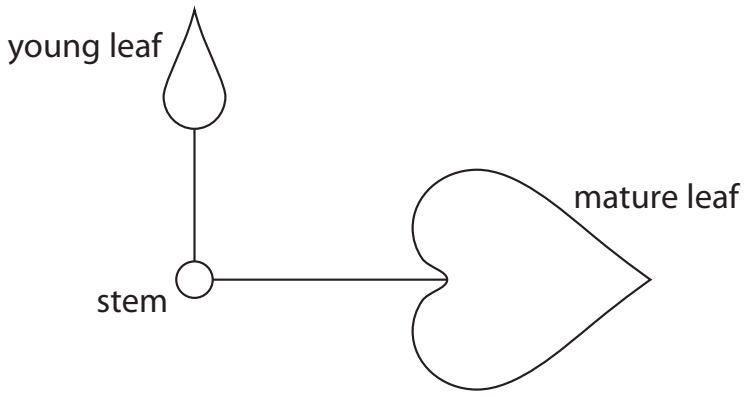
(b) The diagram shows one of the young bean plants viewed from above.



(i) Draw an arrow on the diagram to show the main direction of translocation.

(1)

(ii) Name the tissue that is the main site of translocation.

(1)

.....

(iii) Name one substance that is moved by translocation.

(1)

.....

(Total for Question 14 = 6 marks)

15 Yoghurt is a healthy food that is high in protein, calcium and vitamins.

(a) (i) Give a benefit of having calcium in the diet.

(1)

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(ii) Fat-free yoghurt, which has had the fat removed from the milk, is also available.

Give a benefit of eating fat-free yoghurt rather than full-fat yoghurt.

(1)

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(b) Suggest the health benefits of adding fruit to sweeten yoghurt.

(2)

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(Total for Question 15 = 4 marks)

TOTAL FOR PAPER = 120 MARKS