Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number	Candidate Number

Biology

Paper 2

Foundation Tier

Sample Assessment Materials for first teaching September 2016	Paper Reference
Time: 1 hour 45 minutes	**1BI0/2F**

You must have:	Total Marks
Calculator, ruler	

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an asterisk (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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S 5 0 0 4 3 A 0 1 3 2

PEARSON

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Plants need light for photosynthesis.

Part of the photosynthesis equation is shown below.

..... + carbon dioxide → glucose + ...

(a) Which of the following would complete the photosynthesis equation?

(1)

		reactant	product
☒	**A**	water	chlorophyll
☒	**B**	chlorophyll	oxygen
☒	**C**	water	oxygen
☒	**D**	oxygen	water

A scientist investigates the effect of light intensity on photosynthesis.

He sets up the equipment shown in Figure 1.

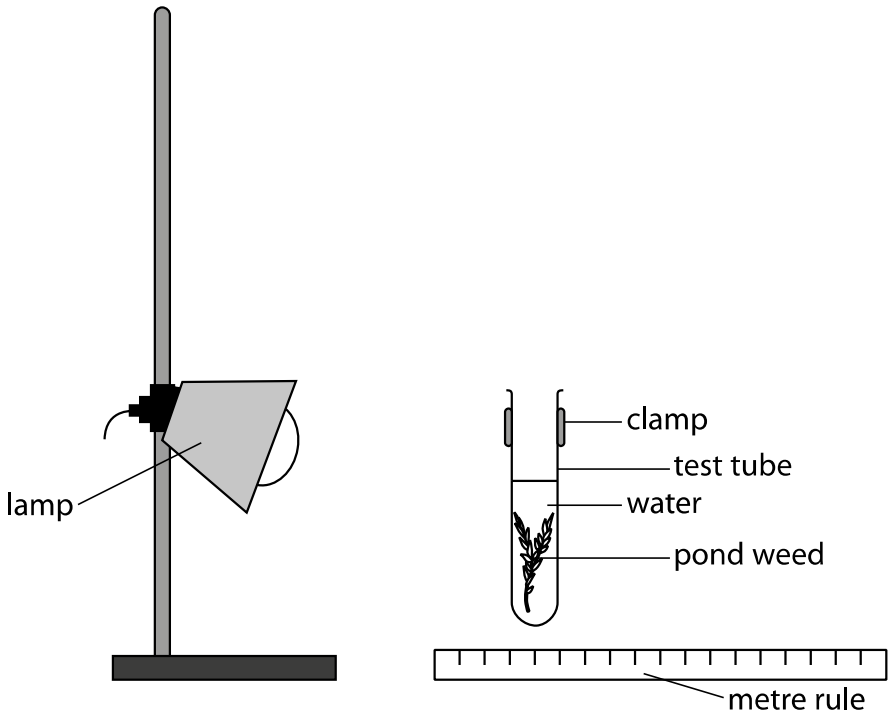

Figure 1

He places the lamp 10 cm from the test tube and records the number of bubbles produced in five minutes.

He repeats the procedure with the lamp at a distance of 20 cm and 30 cm away from the test tube.

The scientist wants to repeat his investigation at each distance.

(b) (i) State **three** variables that should be kept constant to improve the results.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

The scientist noticed that the temperature of water near the light increased.

(ii) Give **one** improvement the scientist could make to reduce the effect of this increase in temperature.

(1)

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.....

(c) Figure 2 shows the results of the investigation.

distance (cm)	number of bubbles counted			
	test 1	test 2	test 3	mean
10	42	37	44	41
20	23	24	22	
30	10	11	12	11

Figure 2

(i) Calculate the mean result for a distance of 20 cm.

(1)

.....

The number of bubbles counted for test 2 at 10 cm was anomalous.

(ii) State how the scientist could deal with this anomaly.

(1)

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(iii) Give a conclusion about the effect of light intensity on photosynthesis.

(1)

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(Total for Question 1 = 8 marks)

2 Figure 3 shows a pair of human lungs.

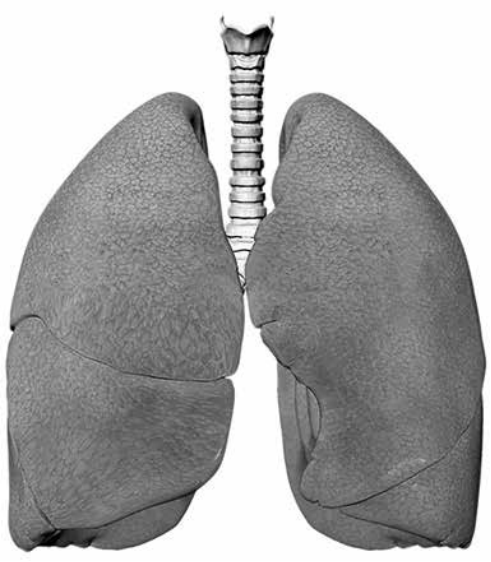

Figure 3

(a) (i) Where does gas exchange take place in the lungs?

(1)

- ☒ **A** alveolus
- ☒ **B** bronchus
- ☒ **C** bronchiole
- ☒ **D** trachea

A person had emphysema. This reduces the number of alveoli in the lungs.

(ii) Explain how emphysema would affect the amount of oxygen carried in the bloodstream.

(2)

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(b) Figure 4 is a table that shows the surface area (SA) to volume (V) ratio in three different sized cubes.

cube size (cm)	surface area / SA (cm^2)	volume / V (cm^3)	SA:V ratio
2	24	8	
4	96	64	1.5:1
6	216	216	1:1

Figure 4

(i) Calculate the SA:V ratio for the 2 cm cube.

(2)

.....

(ii) Give **one** reason why it is important that human lungs have a high surface area to volume ratio.

(1)

.....

.....

Oxygen is involved with aerobic respiration in cells.

(iii) Which is the correct equation for aerobic respiration?

(1)

☐ **A** oxygen + carbon dioxide → glucose + lactic acid

☐ **B** carbon dioxide + water → oxygen + lactic acid

☐ **C** glucose + oxygen → carbon dioxide + water

☐ **D** glucose + water → carbon dioxide + oxygen

(Total for Question 2 = 7 marks)

3 (a) Plankton, krill and cod are found in the Arctic ocean.

Figure 5 shows the mass of organisms in an area of the Arctic ocean.

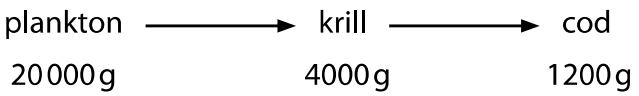

Figure 5

(i) Draw an accurate pyramid of biomass for this food chain.

(2)

(ii) Give **two** reasons why all the biomass from the krill is not transferred to the cod.

(2)

1 .....

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2 .....

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(b) Large amounts of krill are now being caught to produce krill oil as a dietary supplement for humans.

(i) Explain how this will affect the cod.

(2)

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(ii) Give **one** other factor that could affect the number of krill in the Arctic ocean.

(1)

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(Total for Question 3 = 7 marks)

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4 Thermoregulation is an important process of the human body.

Figure 6 shows a model of human skin.

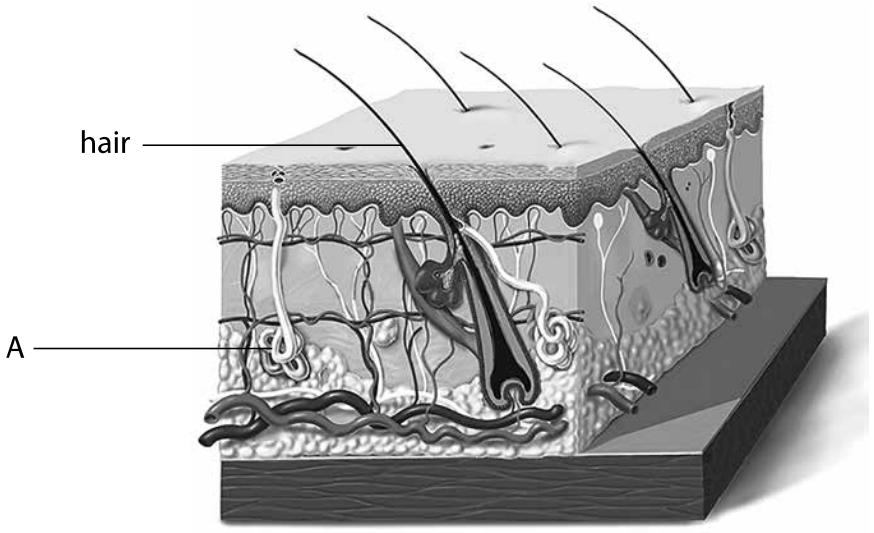

Figure 6

(a) Explain how part A is involved in thermoregulation.

(2)

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.....

(b) Which part of the brain contains the thermoregulatory centre?

(1)

☒ **A** cerebellum

☒ **B** cerebral cortex

☒ **C** hypothalamus

☒ **D** medulla

(c) Figure 7 shows how the internal temperature of a fish and an otter changes when the external temperature changes.

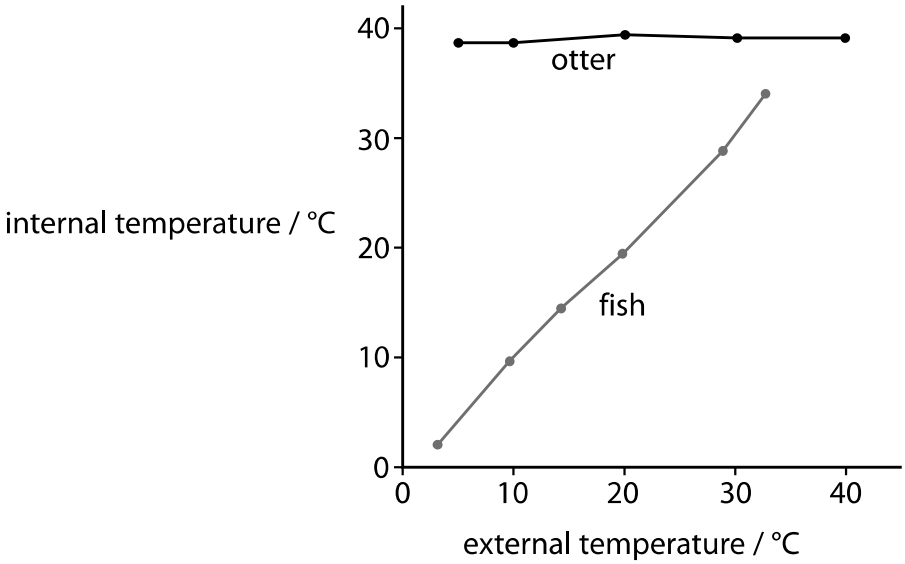

Figure 7

(i) Describe how the internal temperature of the fish changes in response to the external temperature.

(2)

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(ii) Explain why it is important that the temperature of the otter is maintained at about 37 °C.

(2)

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(d) Shivering is one way in which humans can regulate their body temperature.

Explain how shivering helps to regulate body temperature.

(3)

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(Total for Question 4 = 10 marks)

5 Scientists can measure how much water is lost by the leaves of a plant.

(a) (i) What is the movement of water molecules from an area with a low solute concentration to an area with a high solute concentration called?

(1)

- ☒ **A** active transport
- ☒ **B** diffusion
- ☒ **C** osmosis
- ☒ **D** transpiration

(ii) What structure transports water through the stem of the plant?

(1)

- ☒ **A** guard cell
- ☒ **B** phloem
- ☒ **C** stomata
- ☒ **D** xylem

(b) A scientist measured the rate of water loss from a plant shoot using a potometer.

Figure 8 shows the equipment used in the experiment.

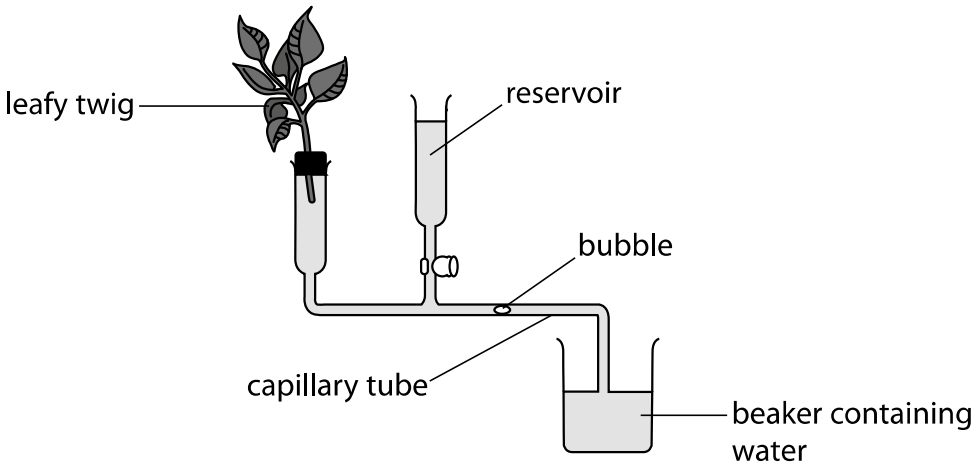

Figure 8

The volume of water lost from the plant can be calculated by measuring the distance a bubble moves along the capillary tubing.

(i) Calculate the rate of water loss from the plant in mm^3/s if the volume of water lost was 12 mm^3 in 10 minutes.

(3)

rate of water loss = ... mm^3/s

(ii) Explain how the water loss would change if the plant only had one leaf.

(2)

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The scientist wants to extend the investigation by considering other factors that affect transpiration rate.

(iii) State **two** variables, other than temperature, that she could investigate.

(2)

1 .....

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2 .....

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(c) Explain the effect of increasing air temperature on the rate of transpiration in a plant.

(2)

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(Total for Question 5 = 11 marks)

6 (a) A scientist wanted to estimate the number of earthworms in a field using a quadrat.

The scientist placed the quadrats at random on the surface of the area being sampled and then watered the area with a very dilute solution of mustard.

This causes the earthworms to come to the surface to be counted.

(i) Give a reason why the quadrats were placed at random.

(1)

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The skin of the earthworm acts as a gas exchange surface.

(ii) Describe the gases that are exchanged across the skin of the earthworm as a result of the earthworm respiring.

(2)

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.....

(iii) What is the method in which gases are exchanged across the skin of the earthworm?

(1)

☒ **A** active transport

☒ **B** diffusion

☒ **C** osmosis

☒ **D** transpiration

(b) A student wants to estimate the number of daisy plants in a 500 m^2 field.

She uses a 1 m^2 quadrat to sample the field.

Figure 9 shows the results for the number of daisy plants counted in six areas sampled with the quadrat.

sample number	number of daisy plants	mean diameter of daisy plants / cm
1	5	7
2	2	2
3	6	9
4	3	3
5	4	5
6	4	6

Figure 9

(i) Calculate the mean number of daisy plants for the six samples.

(1)

mean number of daisy plants = ...

(ii) Describe how the student could use this calculated mean to estimate the total number of daisy plants in this field.

(2)

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Sample 2 was taken in an area where there were many overhanging trees.

(iii) Explain how these trees may have affected the distribution of daisy plants growing in this area.

(2)

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(iv) Give **two** abiotic factors that could affect the distribution and size of daisies growing in this field.

(2)

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(Total for Question 6 = 11 marks)

7 Figure 10 shows a diagram of the heart.

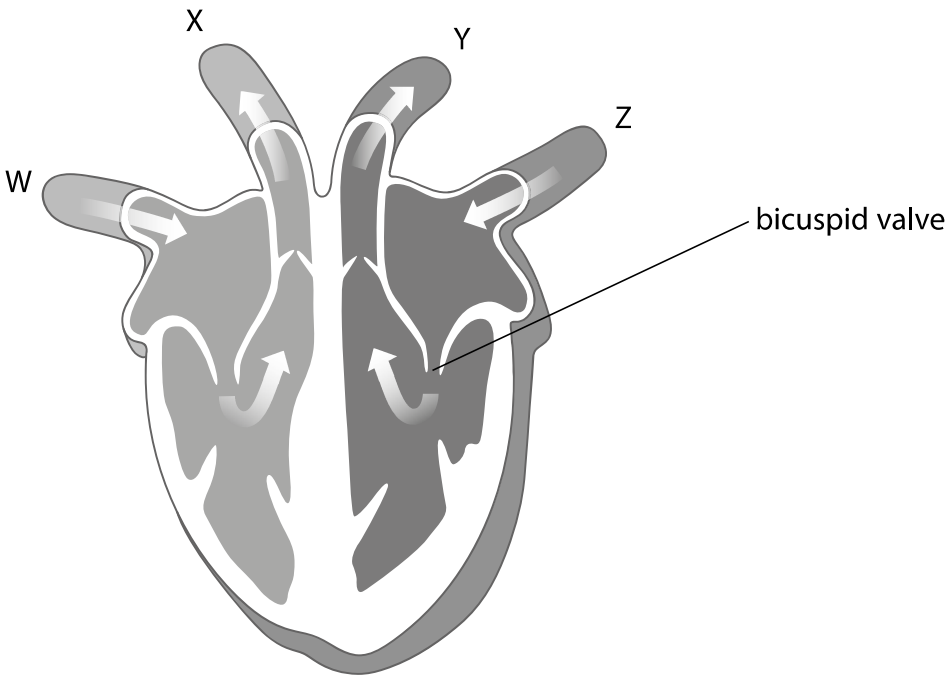

Figure 10

(a) (i) Vessel X takes

(1)

- ☒ **A** deoxygenated blood to the body
- ☒ **B** deoxygenated blood to the lungs
- ☒ **C** oxygenated blood to the body
- ☒ **D** oxygenated blood to the lungs

(ii) Give **one** reason why the wall of the left ventricle is thicker than the right.

(1)

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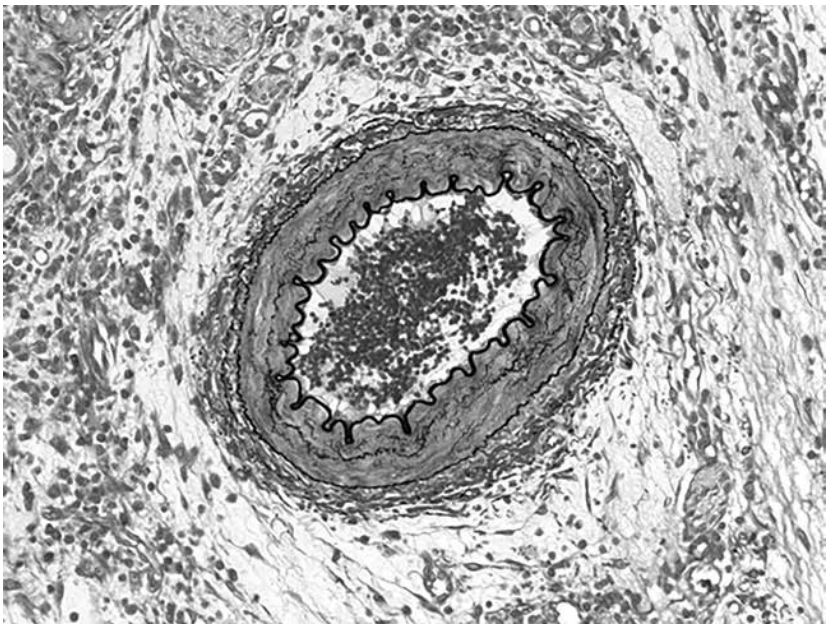
.....

Valves in the human heart may become damaged and no longer function.

(iii) Describe what would happen to the flow of blood in the left side of the heart if the bicuspid valve did not function effectively.

(2)

Figure 11 shows a photomicrograph of a blood vessel.



(Source: Microscape/Science Photo Library)

Figure 11

(b) Explain how the structure of this blood vessel is related to its function.

(2)

Figure 12 shows a diagram of the circulatory system of a fish.

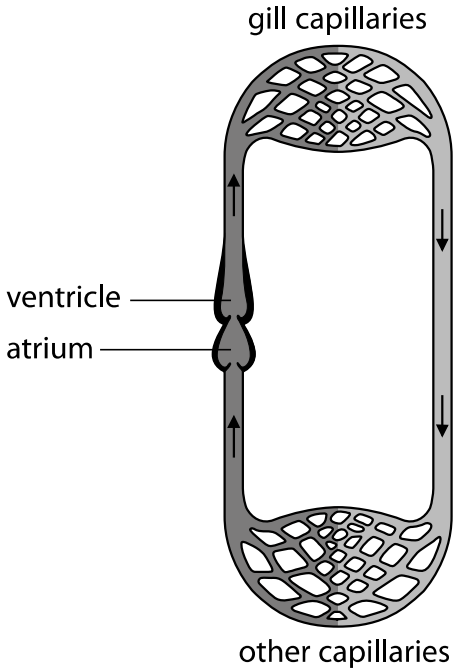


Figure 12

(c) Describe the differences between the structure of the circulatory system of a fish and the human circulatory system.

(4)

(Total for Question 7 = 10 marks)

8 (a) Blood tests can be used to check a person's blood glucose and hormone levels.

Figure 13 shows the results of two blood tests done on three people to check their blood glucose levels. Person 1 is healthy.

	blood glucose level (mmols/l)	
	after fasting for 12 hours	**two hours after drinking 75 g glucose**
person 1	5.4	6.4
person 2	5.6	9.0
person 3	7.8	12.1

Figure 13

(i) Compare the glucose levels of person 1 with the glucose levels of person 2 after fasting for 12 hours.

(1)

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.....

(ii) Compare the glucose levels of person 2 with the glucose levels of person 1, two hours after drinking 75 g glucose.

(1)

.....

.....

Person 3 cannot produce the hormone that controls blood glucose levels.

(iii) State the hormone that person 3 cannot produce.

(1)

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(b) Figure 14 shows the level of progesterone for a female during five different stages of the menstrual cycle.

days in the menstrual cycle	progesterone level (nmol/l)
1–9	1.85
10–14	1.48
15–17	14.28
18–23	35.27
24–28	17.11

Figure 14

(i) Describe the changes in progesterone levels during the 28-day cycle.

(2)

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(ii) Explain why progesterone levels changed following day 14.

(2)

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Figure 15 shows the effectiveness of different methods of contraception in the prevention of pregnancy during their first year of use.

It shows percentages for typical use (some mistakes when used) and perfect use (no mistakes when used).

		percentage of women with unintended pregnancies within the first year of use (%)	
contraceptive method	**type of contraceptive**	**typical use**	**perfect use**
diaphragm	barrier	16	6
female condom	barrier	21	5
male condom	barrier	15	2
intra uterine device	hormonal	8	0.3
combined pill	hormonal	8	0.2
mini pill	hormonal	8	0.3
combined patch	hormonal	8	0.2

Figure 15

*(c) Compare and contrast the data for different contraceptive methods and types, to advise a young adult as to the best method of contraception to avoid pregnancy.

(6)

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(Total for Question 8 = 13 marks)

9 A gardener investigated the ability of four types of compost to hold water.

50 cm^3 of water was added to each type of compost.

(a) Figure 16 shows the volume of water retained by four different types of compost.

type of compost	A	B	C	D
mass of compost /g	500	500	1000	1000
volume of water retained / cm^3	15	29	45	34
total mass of compost after water was added /g cm^{-3}	515	529	1045	1034

Figure 16

(i) Calculate the percentage change in mass for compost B.

(2)

..... %

(ii) Explain which compost would be best to use in a pot containing strawberry plants to be grown during a hot summer.

(2)

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(iii) State **one** way to improve this investigation in order to compare the results without having to calculate the percentage change in mass.

(1)

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(b) (i) Strawberries can be preserved by freezing them.

State how freezing helps to preserve strawberries.

(1)

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When the strawberries are frozen they become soft.

(ii) Describe the features of a plant cell that help to maintain its structure.

(2)

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Figure 17 shows a photomicrograph of a root cell.

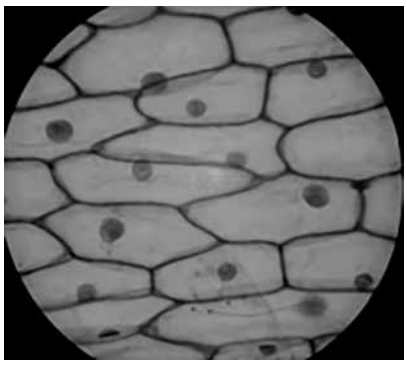

Figure 17

(iii) Draw and label a single plant cell from this photomicrograph.

(3)

(Total for Question 9 = 11 marks)

10 A student wanted to investigate the effect of light on the growth of cress seedlings.

The student had three pots of seedlings grown in different conditions.

Pot A was placed in a window with light from one direction only.

Pot B was placed in a cupboard with no light.

Pot C was placed with light from above.

Figure 18 shows the seedlings at the end of the investigation.

(a) (i) Label the pots of cress seedlings A, B and C.

(2)

(Source: Nigel Cattlin/Science Photo Library)

Figure 18

(ii) What is the response shown by the cress seedlings in Pot A?

(1)

- ☒ **A** negative gravitropism
- ☒ **B** negative phototropism
- ☒ **C** positive gravitropism
- ☒ **D** positive phototropism

(iii) State the plant hormone that causes the cress seedlings to grow towards the light.

(1)

.....

.....

(b) The student wanted to find out where the hormone that caused the response to directional light was found.

The student had two growing plant shoots and placed them both in a window with light coming from one direction.

Describe a method the student could use to show that the hormone was found in the tip of the plant shoot.

(2)

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Figure 19 shows examples of two plants growing in a desert environment.

(Source: Steve Allen/Science Photo Library)

(Source: Pascal Goetgheluck/ Science Photo Library)

Figure 19

*(c) Explain the adaptations that desert plants have that allow them to survive in this extreme environment.

(6)

(Total for Question 10 = 12 marks)

TOTAL FOR PAPER = 100 MARKS

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