www.dynamicpapers.com

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Time 1 hour 45 minutes

Paper reference **4HB1/02**

Human Biology

UNIT: 4HB1
PAPER: 02

You must have:
Calculator, ruler

Total Marks

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.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

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 ▶

P67061A

©2022 Pearson Education Ltd.

L:1/1/1/

P 6 7 0 6 1 A 0 1 2 4

Pearson

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

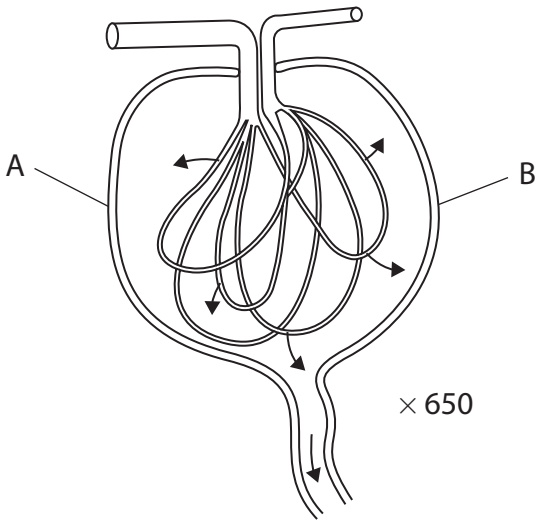
www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Answer ALL questions.

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 (a) The diagram shows the Bowman's capsule and glomerulus of a kidney tubule (nephron).



(i) Complete the diagram to show the missing parts of the kidney tubule.

(3)

(ii) Calculate the actual width of the Bowman's capsule, in mm, from the point labelled A to the point labelled B.

(3)

width of Bowman's capsule = ... mm

www.dynamicpapers.com

(iii) Name two components of the blood that would not pass into the Bowman's capsule.

(2)

1 .....

2 .....

(iv) Name one component of the glomerular filtrate that is completely reabsorbed into the blood from the tubule.

(1)

.....

(b) A scientist uses this method to investigate the effect of room temperature on urine production.

On day 1, a person drinks 1 dm^3 of water. Urine samples from the person are collected at intervals during a time period of four hours.

The room temperature is 20 °C.

This is then repeated on day 2, when the room temperature is 30 °C.

The table shows the results.

Time after drinking in hours	Volume of urine in cm^3	
	day 1 (20 °C)	day 2 (30 °C)
0.5	70	50
1.5	175	70
2.0	300	200
2.5	250	190
3.0	210	150
4.0	100	50

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(i) State two factors that should be controlled in the investigation.

(2)

1 .....

.....

2 .....

.....

(ii) The mean rate of urine production on day 1 is 276 cm^3 per hour.

Calculate the mean rate of urine production on day 2 during the 4 hour time period.

(2)

mean rate of urine production on day 2 = ... cm^3 per hour

(iii) Explain the difference between the mean rate on day 1 and the mean rate on day 2.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 1 = 16 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

2 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

The breathing system consists of airways that allow the movement of air into the lungs. Air can be breathed in through the nose or through the mouth. The lining of the nose has a good supply of blood capillaries and a layer of sticky mucus.

The whole of the trachea and the larger air passages have C-shaped rings of cartilage within their walls. These rings help the air to flow freely into the lungs. The trachea divides into two tubes which then divide further into finer branches. These finer branches eventually end in air sacs. It is in the air sacs that gaseous exchange occurs.

The lungs are located in the thorax which is surrounded by the ribs. The thorax is separated from the abdomen by the diaphragm. Together, the ribs and the diaphragm can change the volume of the thorax and therefore the pressure in the thorax.

During breathing, at rest, an average of 0.50 dm^3 of air is breathed in and out. The air breathed in contains 20% oxygen and the air breathed out contains 16% oxygen. At rest, an adult will breathe 17 times a minute on average. The breathing rate is controlled by a part of the brain which receives information about carbon dioxide levels in the blood.

Carbon monoxide may be present in the air that is breathed in. The carbon monoxide can enter the blood and combine with haemoglobin in the red blood cells. Carbon monoxide is found in cigarette smoke and car exhaust fumes.

(a) (i) Discuss whether it is better to breathe in through the nose or the mouth. (lines 2 to 3)

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) Explain why the larger air passages have C-shaped rings of cartilage within their walls. (lines 4 to 5)

(2)

.....

.....

.....

.....

(iii) The trachea divides into two tubes.

What is the name of these tubes? (line 6)

(1)

☒ **A** alveoli

☒ **B** bronchi

☒ **C** bronchioles

☒ **D** oesophagus

(b) Which of these is the name of the part of the brain that controls breathing rate? (line 16)

(1)

☒ **A** cerebrum

☒ **B** cerebellum

☒ **C** hypothalamus

☒ **D** medulla oblongata

www.dynamicpapers.com

(c) Calculate the average volume of oxygen absorbed by the lungs during one minute of breathing, at rest. (lines 13 to 15)

(3)

volume of oxygen absorbed = ... dm^3

(d) Explain why pregnant women are advised not to smoke cigarettes.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 2 = 14 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

3 The skin is important in the control of body temperature.

(a) State two other functions of the skin.

(2)

1 .....

.....

2 .....

.....

(b) As a result of vigorous exercise, the colour of the skin changes.

Explain why there is this change in skin colour.

(4)

.....

.....

.....

.....

.....

.....

.....

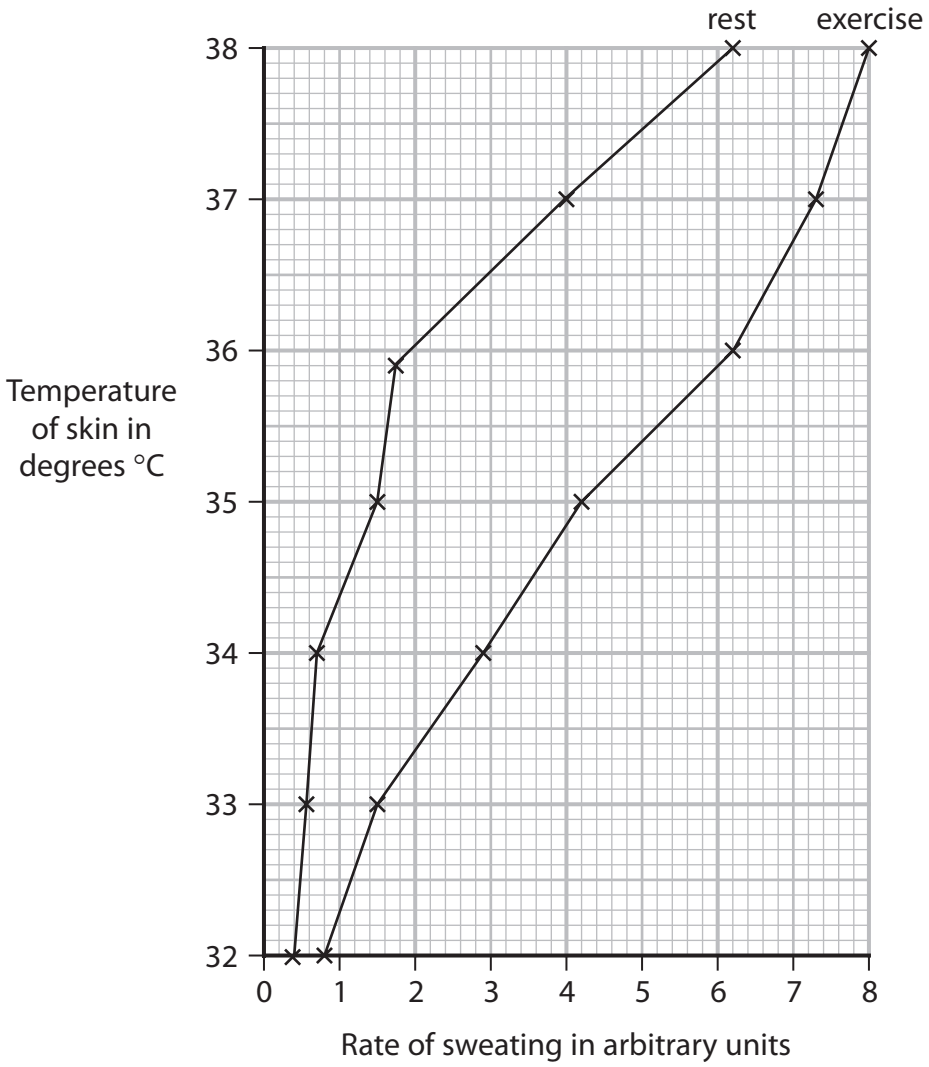
.....

.....

.....

www.dynamicpapers.com

(c) The graph shows how the temperature of the skin varies as the rate of sweating changes in a person at rest and during exercise.



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(i) Describe how the skin temperature varies as the rate of sweating changes for the person at rest.

(2)

(ii) Suggest a method that could be used to measure the rate of sweating.

(2)

(d) Explain the importance of maintaining a constant body temperature.

(3)

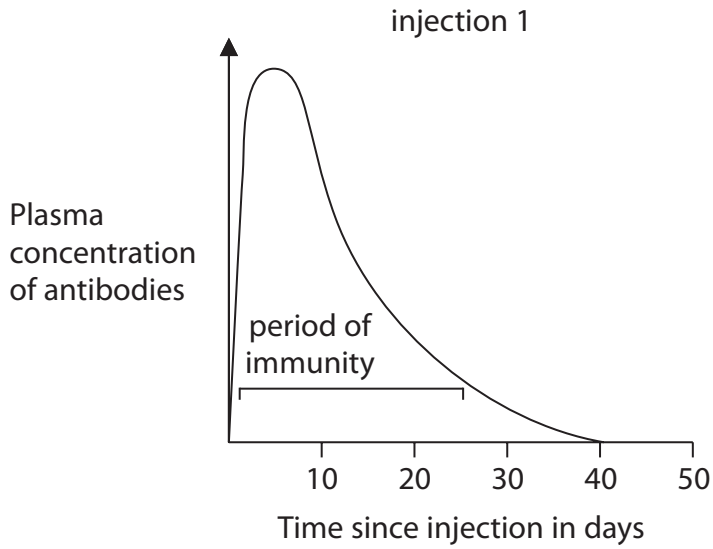
(Total for Question 3 = 13 marks)

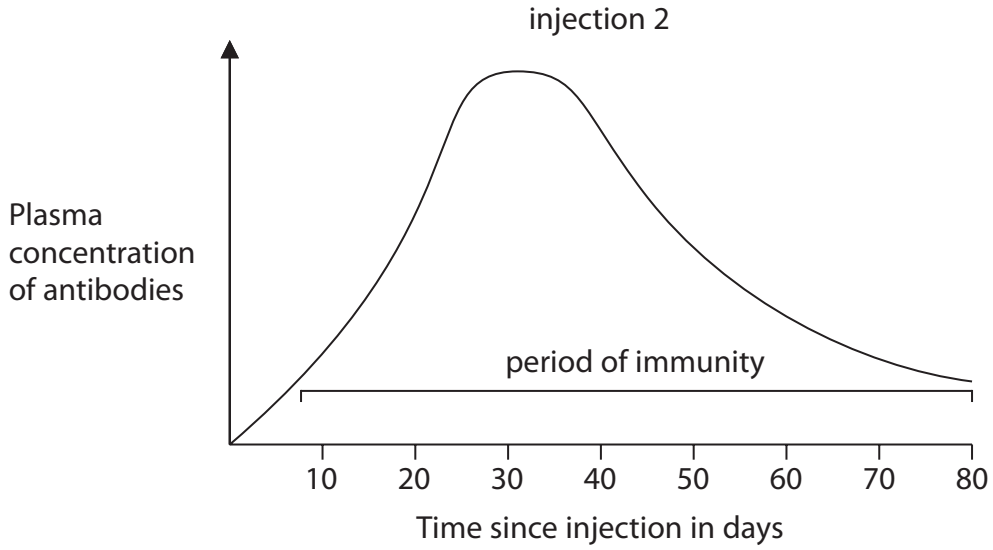
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

4 (a) Artificial immunity can be produced by different types of injection.

The graphs show the plasma concentration of antibodies produced as a result of two types of injection.





(i) Identify the different forms of artificial immunity produced by these two injections.

(2)

1 .....

2 .....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(ii) Explain which injection would be better for someone who already has the disease.

(3)

(b) Describe how natural immunity to a disease can happen.

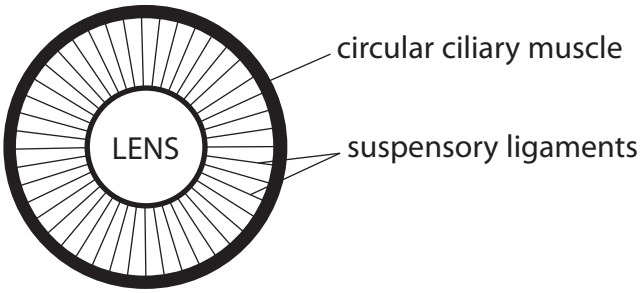
(5)

(Total for Question 4 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

5 (a) The diagram shows a front view of structures in the eye that help to form an image on the retina.



The three structures shown in the diagram change when focusing on near and distant objects.

Complete the table by putting ticks (✓) in the correct boxes to show the condition of each structure of the eye when focusing on near and distant objects.

(3)

	Focusing on a near object	**Focusing on a distant object**
Lens	thin ☐ thick ☐	thin ☐ thick ☐
Circular ciliary muscle	contracted ☐ relaxed ☐	contracted ☐ relaxed ☐
Suspensory ligament	stretched ☐ loose ☐	stretched ☐ loose ☐

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) Humans have stereoscopic vision.

Explain what is meant by the term **stereoscopic vision**.

(3)

www.dynamicpapers.com

(c) Design an investigation to show that it is easier for a person to catch a ball if they have stereoscopic vision.

Your answer should include experimental details and be written in complete sentences.

(6)

(Total for Question 5 = 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

www.dynamicpapers.com

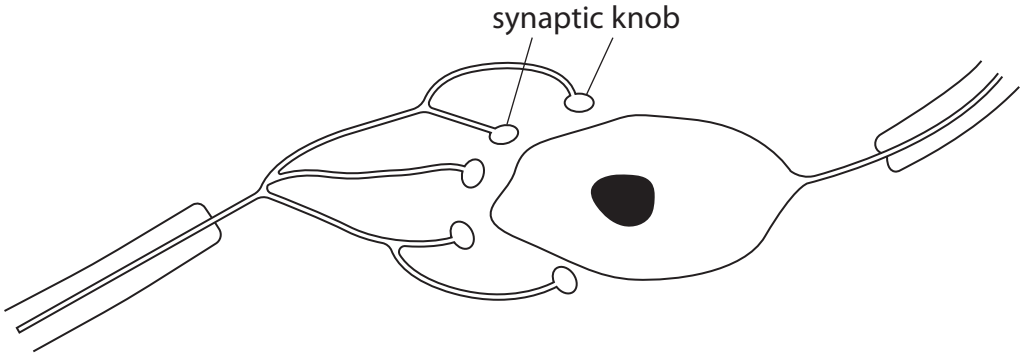
6 (a) Co-ordination of the activities of the body involves the nervous system and the hormonal system.

Complete the table to compare the two systems.

(3)

	Nervous system	**Hormonal system**
Route of transmission		
Type of signal		
Relative speed		

(b) The diagram shows a synapse.



(i) Draw an arrow on the diagram to show the direction an impulse travels.

(1)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(ii) Explain how an impulse travels across a synapse.

(4)

(iii) Explain why an impulse can only travel in one direction across a synapse.

(4)

(Total for Question 6 = 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

7 Huntington's chorea is a dominant genetic condition that results in the nervous system not working correctly. It is not a sex-linked condition.

Diagram 1 shows a family pedigree. Some members of the family have the condition.

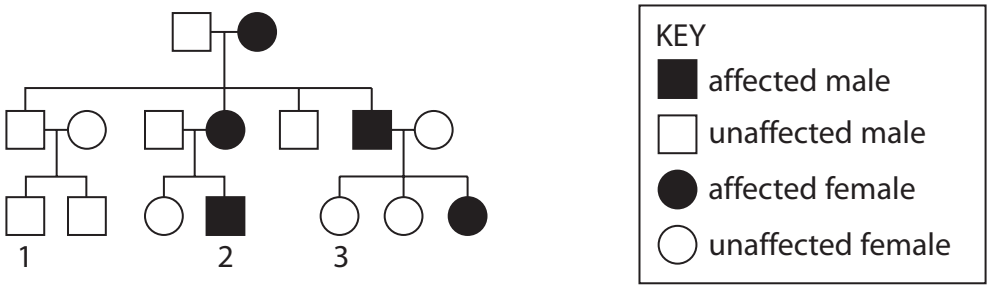


Diagram 1

(a) (i) Evaluate the evidence in the pedigree that supports the statement that this is not a sex-linked condition.

(2)

.....

.....

.....

.....

(ii) Evaluate the evidence in the pedigree to support the statement that this is a dominant condition.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(b) (i) A man has the same genotype as person 1 in the pedigree in Diagram 1.

A woman has the same genotype as person 3 in the pedigree in Diagram 1.

These two people are expecting a child.

Calculate the probability that the child would be a boy not showing the Huntington's condition, giving reasons for your answer.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

(ii) A man has the same genotype as person 2 in the pedigree in Diagram 1.

A woman has the same genotype as person 3 in the pedigree in Diagram 1.

Explain the possible phenotypes and genotypes, with respect to the Huntington's condition, of any offspring they produce.

(6)

(Total for Question 7 = 13 marks)

TOTAL FOR PAPER = 90 MARKS

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

www.dynamicpapers.com

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

www.dynamicpapers.com

BLANK PAGE

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA