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Human Biology

Unit: 4HB0

Paper: 02

Thursday 10 May 2018 – Morning

Time: 1 hour

Paper Reference

4HB0/02

You must have:

Ruler
Calculator

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.
- 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 ☒.

Information

- The total mark for this paper is 60.
- 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.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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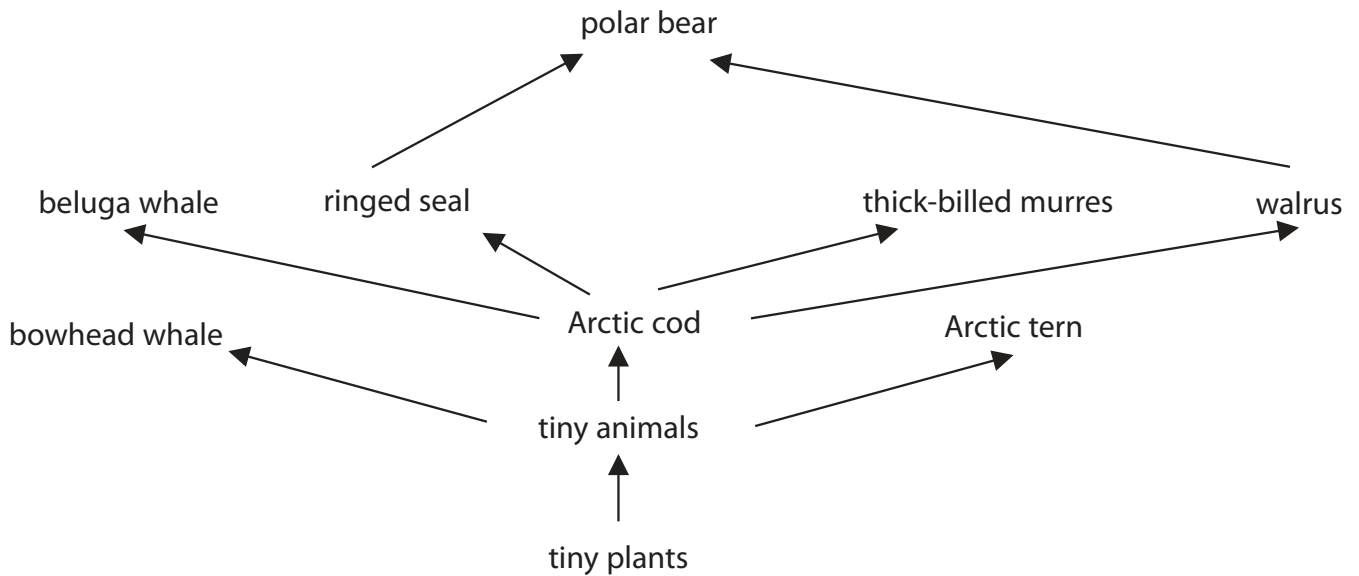
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Answer ALL questions.

1 (a) The diagram shows a food web for the Arctic region.



(i) How many different trophic levels are shown in the food web?

(1)

(ii) Which of these statements is correct?

(1)

- A Arctic cod are producers
- B Arctic cod are herbivores
- C Arctic cod are secondary consumers
- D Arctic cod are tertiary consumers

(iii) Name the two trophic levels between which most energy is transferred.

(1)



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(b) At the 2015 Paris Climate Conference, 195 countries agreed to limit their carbon dioxide emissions.

(i) Explain how human activities have caused an increase in carbon dioxide emissions. (3)

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(ii) Explain why limiting carbon dioxide emissions is important for organisms such as those found in the Arctic food web. (3)

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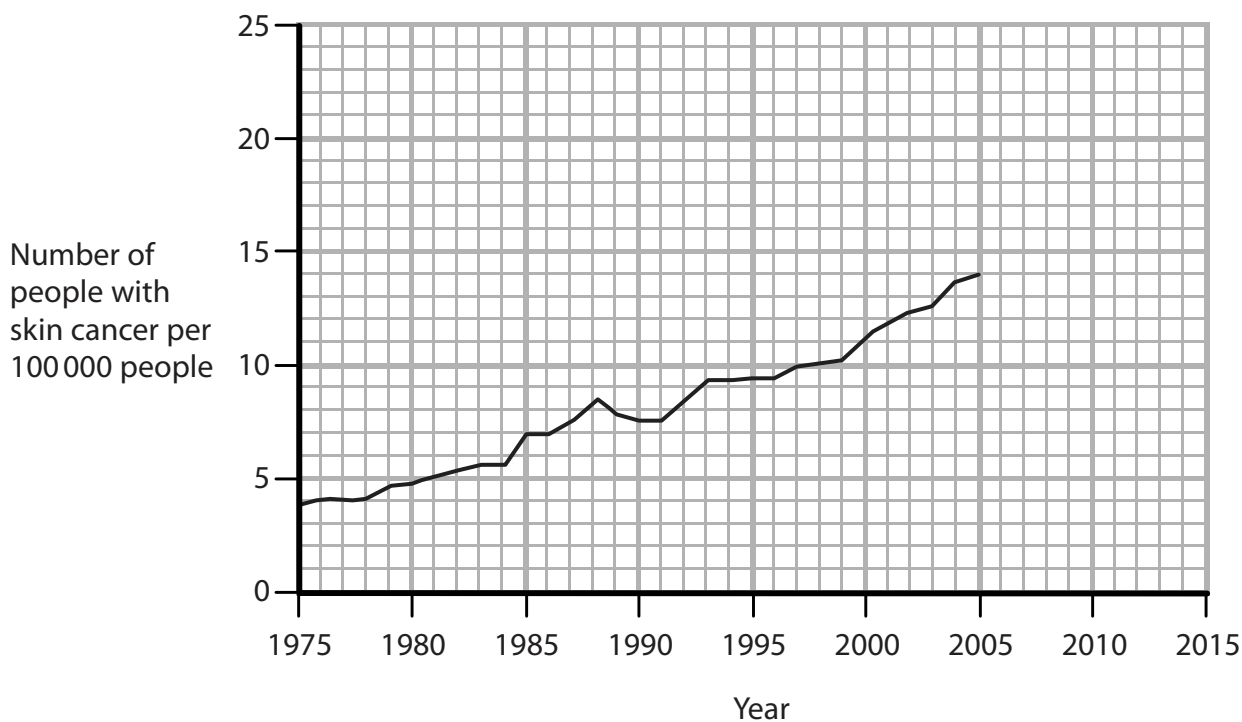
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(c) The graph shows the number of people with skin cancer per 100 000 people in the UK from 1975 to 2005.



(i) Describe the trend in the number of people with skin cancer in the UK between 1975 and 2005.

(1)

(ii) Extend the line on the graph to estimate the number of people with skin cancer per 100 000 people in 2015.

(2)

number of people =



(iii) In 2005 the population of the UK was 63 million.

Calculate the number of people with skin cancer in 2005.

(2)

number of people =

(iv) Suggest why the number of people with skin cancer is increasing.

(1)

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(Total for Question 1 = 15 marks)

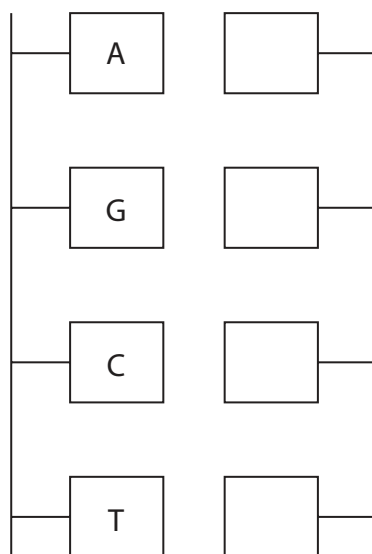
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- 2 (a) The diagram shows a section from a DNA molecule.



Complete the diagram by adding the complementary bases in the boxes on the DNA strand.

(2)

- (b) Chromosomes contain DNA.

The full set of chromosomes found in a body cell is known as a karyotype.

The diagram shows a human karyotype.



- (i) Label the X chromosome and the Y chromosome on this karyotype.

(1)



(ii) The X and Y chromosomes determine the sex of an individual.

Draw a genetic diagram to show how sex is inherited in humans.

(4)

(c) Explain how a genetic mutation in a sperm cell results in all body cells of the offspring having the mutation.

(3)

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(Total for Question 2 = 10 marks)

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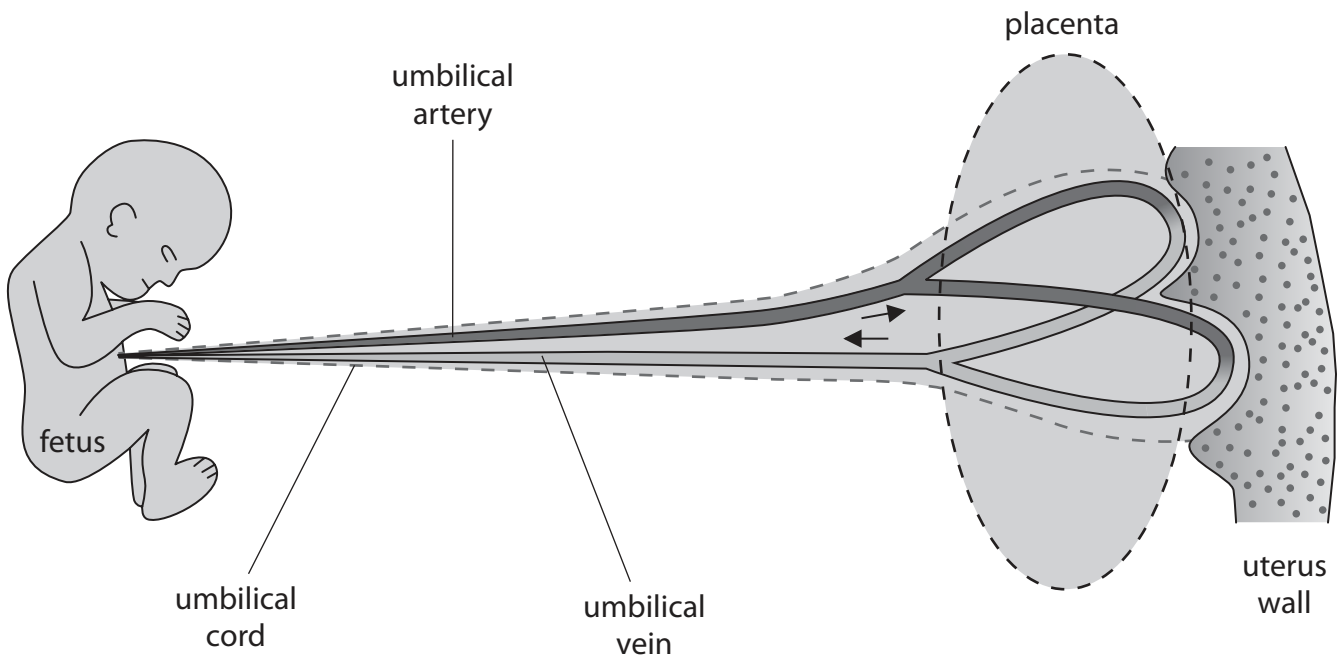
3 (a) The table lists some information about reproductive hormones.

Complete the table by giving the missing information.

(3)

| Gland producing the hormone | Name of hormone | Function of hormone |
|-----------------------------|-----------------|------------------------------------|
| ovaries | progesterone | |
| pituitary | | development of a Graafian follicle |
| ovaries | | stimulates the release of LH |

(b) The diagram shows a developing fetus in the uterus.



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(i) Explain the differences between the composition of the blood in the umbilical artery and in the umbilical vein.

(4)

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(ii) One function of the placenta is to keep the blood of the mother separate from the blood of the fetus.

Explain why it is important that the blood of the mother is not mixed with the blood of the fetus.

(2)

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(Total for Question 3 = 9 marks)

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4 The passage is about the nervous system.

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

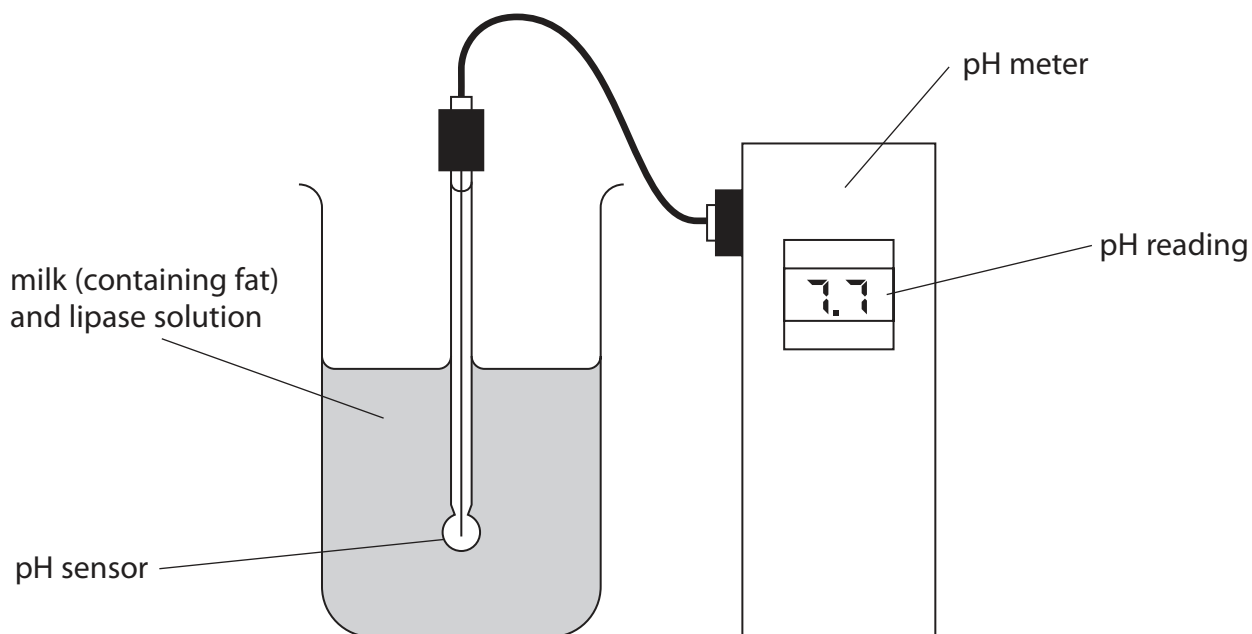
(8)

The eye is an example of a organ. Receptor cells in the at the back of the eye detect changes in intensity. The receptor cells cause an electrical impulse to travel along a neurone to the central nervous system. The impulse then travels in a chemical form across a to a neurone. This neurone then transfers the impulse to a neurone. The impulse travels along this neurone to the iris. The iris acts as an organ as the muscles in the iris contract to bring about a response.

(Total for Question 4 = 8 marks)



5 A student uses this apparatus to investigate the rate at which lipase digests the fat in milk.



(a) (i) Explain why the student can use the changes in pH to investigate fat digestion.

(2)

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(ii) Give one other measurement the student would need to take to determine the rate of fat digestion.

(1)

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(iii) Explain one variable that must be controlled in this investigation.

(2)

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(iv) The student takes pH measurements using a pH meter.

Describe a different method of taking pH measurements.

(2)

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(b) The student repeats the investigation with bile added to the milk and lipase solution.

Explain why the addition of bile changes the student's results.

(3)

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(Total for Question 5 = 10 marks)

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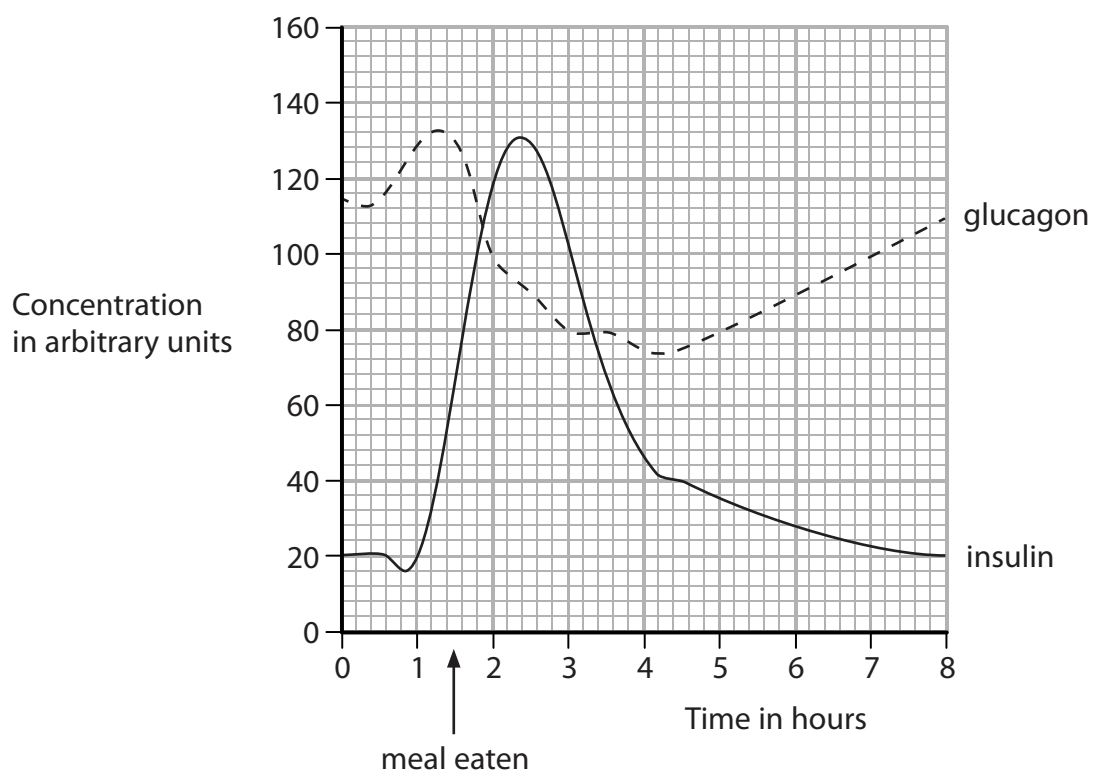
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6 (a) The graph shows the concentrations of glucagon and insulin in the blood.



(i) Explain why the concentration of glucagon in the blood rises before eating a meal. (4)

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(ii) Explain the effect that an increase in the concentration of insulin has on the concentration of glucagon in the blood.

(2)

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(b) Suggest how a person with diabetes can control their blood glucose level without medication.

(2)

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(Total for Question 6 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

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