



**4.5 Homeostasis and Response  
Higher**

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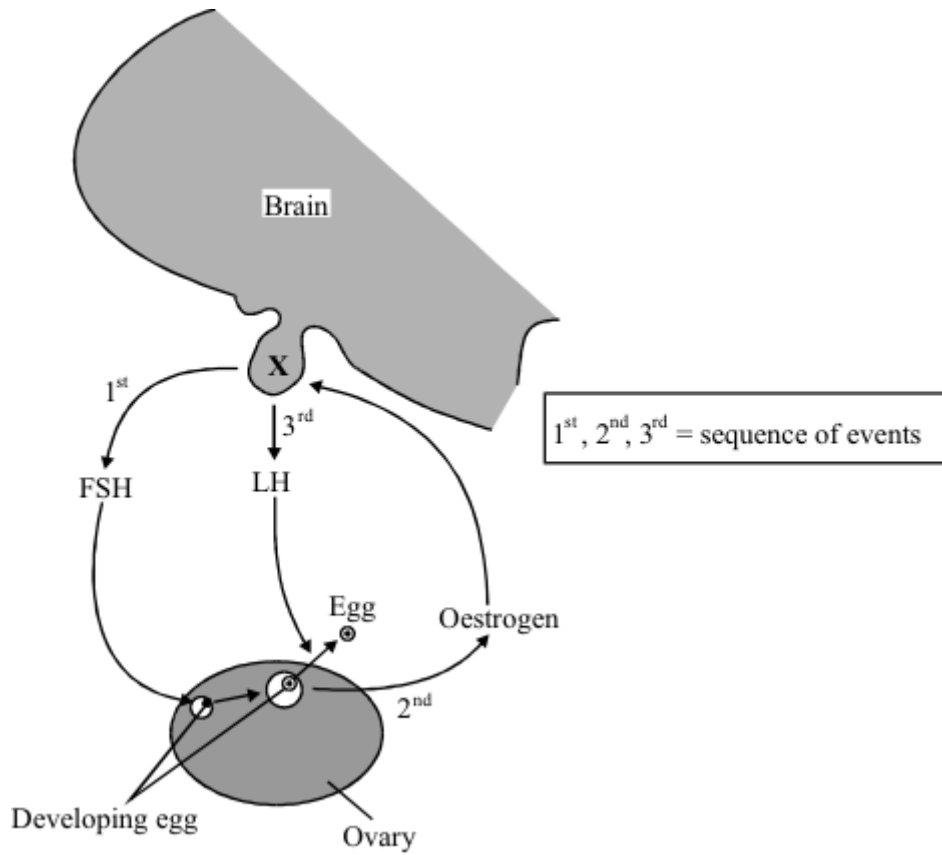
Marks: **247 marks**

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**Q1.**

The diagram shows how three hormones, FSH, LH and oestrogen, work together in a woman's body.



- (a) Name the part of the brain labelled X.

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(1)

- (b) Use information from the diagram and your own knowledge to explain why some oral contraceptive pills contain oestrogen.

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(3)

(Total 4 marks)

**Q2.**

People with Type 1 diabetes cannot control the concentration of glucose in their blood.

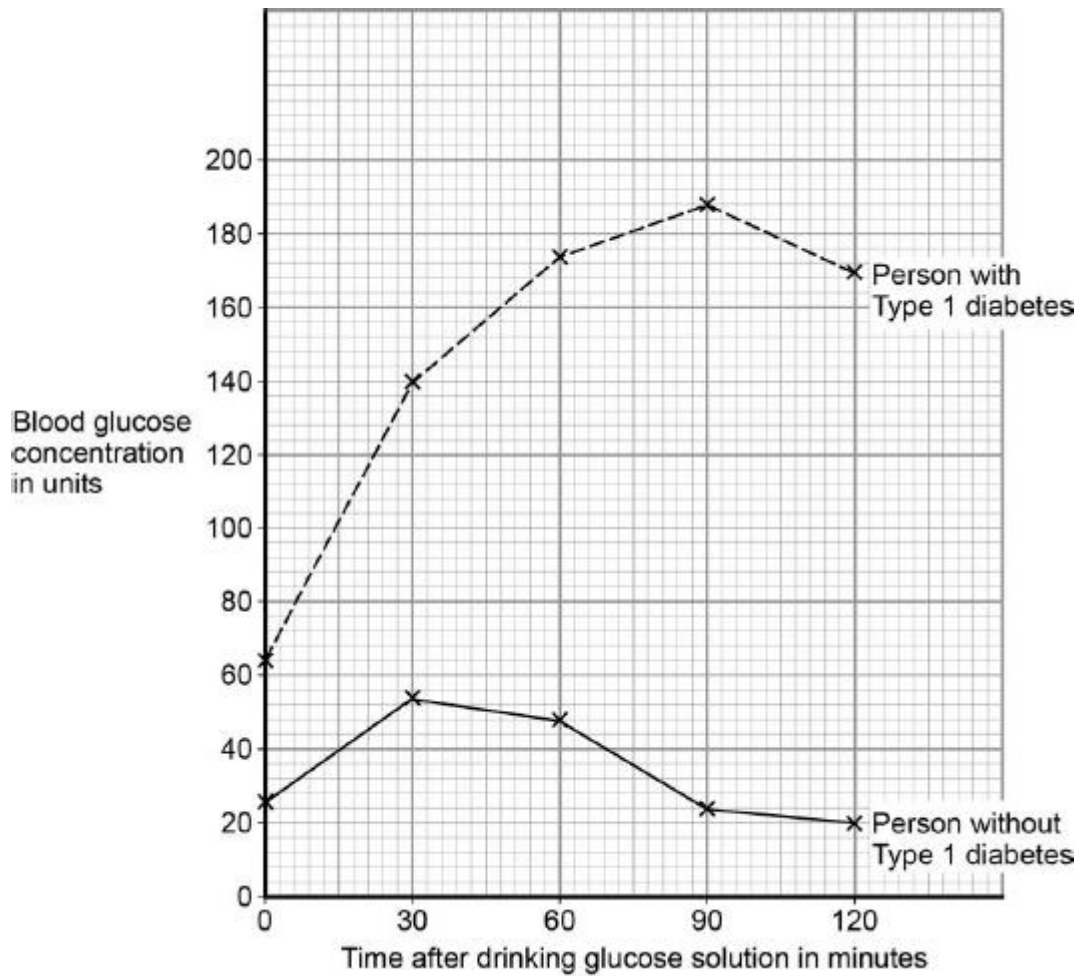
This is because they do **not** produce the hormone insulin.

The same concentration and volume of glucose solution is given to two people.

- Person with Type 1 diabetes.
- Person without Type 1 diabetes.

**Figure 1** shows how the blood glucose concentration of these people changes after they each drink a glucose solution.

**Figure 1**



- (a) The blood glucose concentration increases at a faster rate in the person with diabetes compared to the person without diabetes.

Calculate how much faster the rate of increase in blood glucose concentration is in the person with diabetes.

Give the rate of increase for the first 30 minutes after drinking the glucose solution.

Give your answer in units / h.

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(2)

- (b) The blood glucose concentration of the person without diabetes starts to change 30 minutes after drinking the glucose solution.

Explain why the blood glucose concentration changes.

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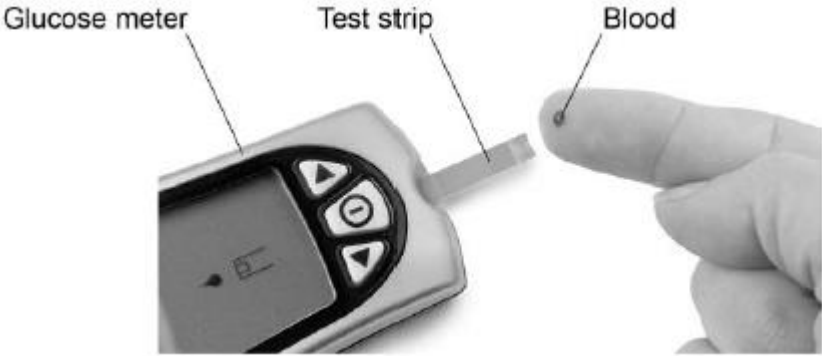
(2)

- (c) People with diabetes should try to keep their blood glucose concentration within the same range as a person without diabetes.

Most people with Type 1 diabetes regularly check their blood glucose concentration using a meter, as shown in **Figure 2**.

The meter reading is used to estimate how much insulin they need to inject.

**Figure 2**

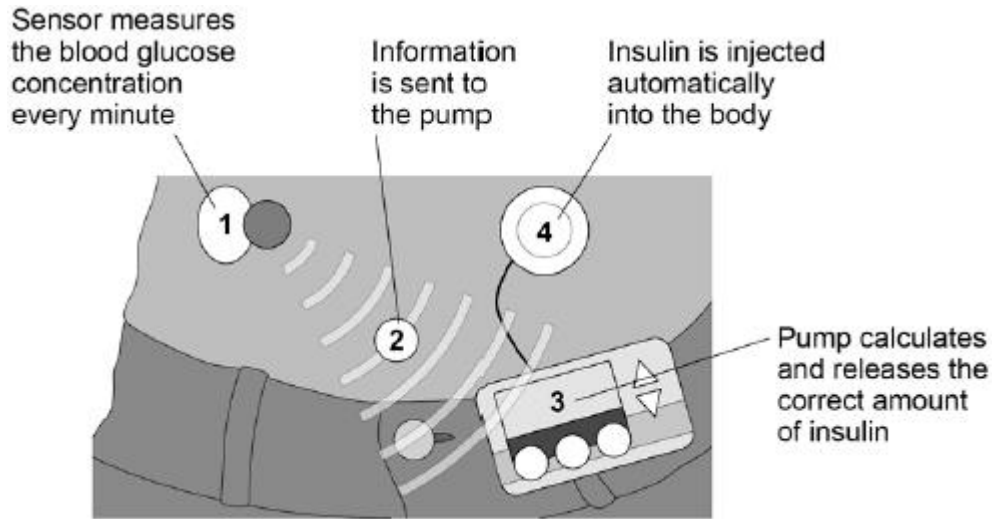


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**Figure 3** shows a new system.

It is connected to the person all the time.

**Figure 3**



The new system:

- gives better control of blood glucose concentration
- reduces the number of times the glucose concentration falls too low.

Evaluate the two systems as methods for controlling blood glucose concentrations for people with Type 1 diabetes.

Give a justified conclusion to your evaluation.

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(4)

(d) How does the body respond if slightly too much insulin is injected into the body.

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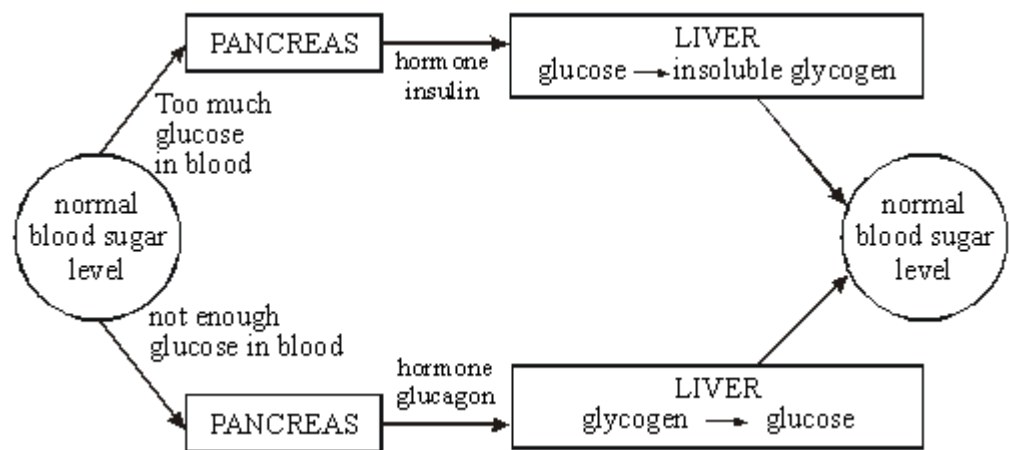
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(5)  
(Total 13 marks)

**Q3.**



The diagram shows how the blood sugar level is controlled in the body.

Explain fully what would happen if somebody ate some glucose tablets.

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(Total 4 marks)

**Q4.**

Hormones can be used to control a woman's fertility.

(a) The first birth control pills contained only oestrogen.

Name another hormone now used in modern birth control pills.

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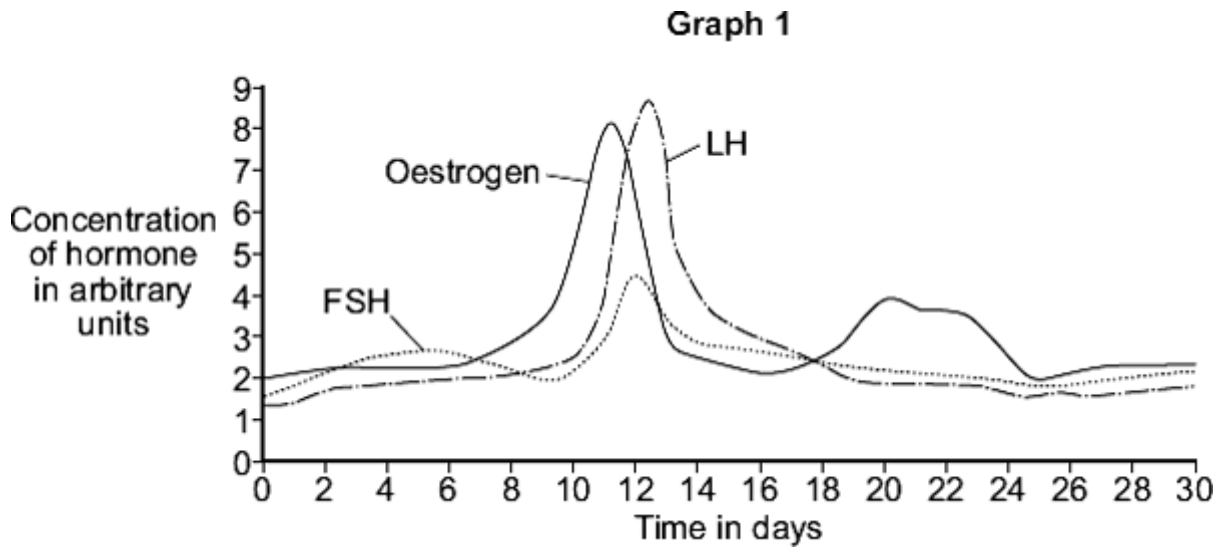
Give an advantage of using this hormone.

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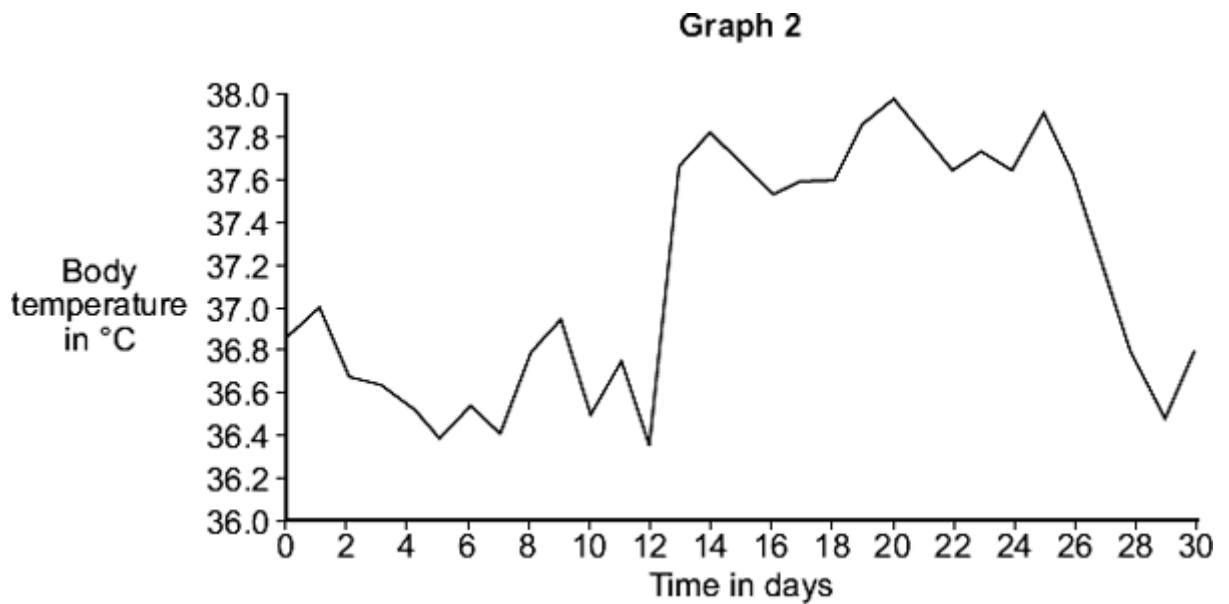
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(b) Hormones control a woman's menstrual cycle.

**Graph 1** shows how the concentrations of hormones change during one menstrual cycle.



**Graph 2** shows how a woman's body temperature changes during one menstrual cycle.



How could a woman use body temperature measurements to find the best time of the month to have sexual intercourse to get pregnant?

Use information from **Graph 1** and **Graph 2** to explain your answer.

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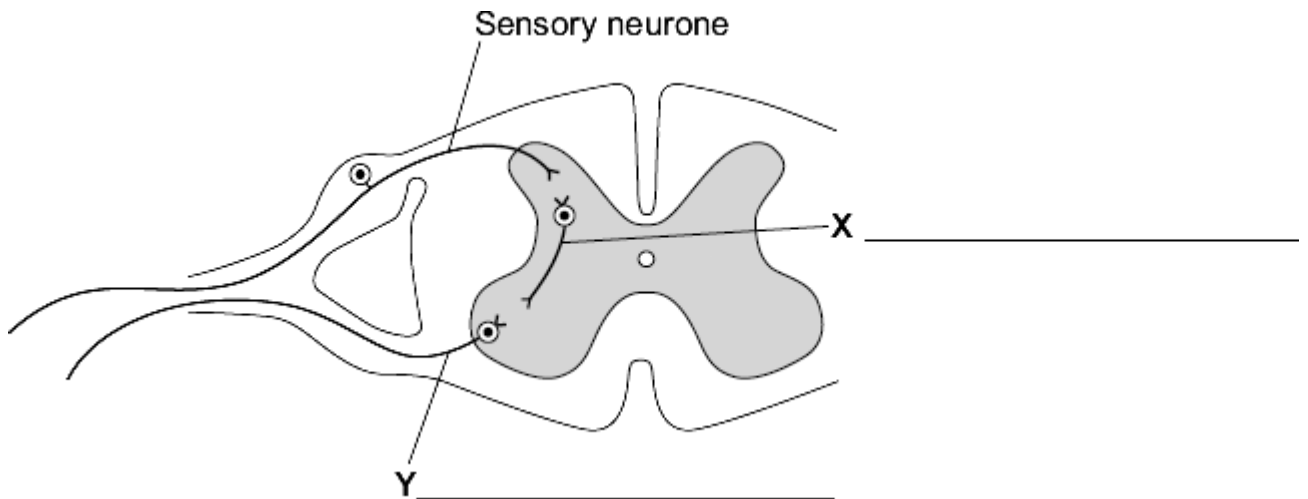
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(4)  
(Total 6 marks)

**Q5.**

The diagram shows some of the structures involved in a reflex action.



(a) On the diagram, name the neurones labelled X and Y.

(1)

(b) Describe how information is transmitted from neurone X to neurone Y.

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(2)  
(Total 3 marks)

**Q6.**

A student did an investigation to see if reaction time was affected by the sense organ stimulated.

A computer measured how quickly she clicked the mouse when she:

- saw a shape appear on the screen

or

- heard a man shout 'Stop!'

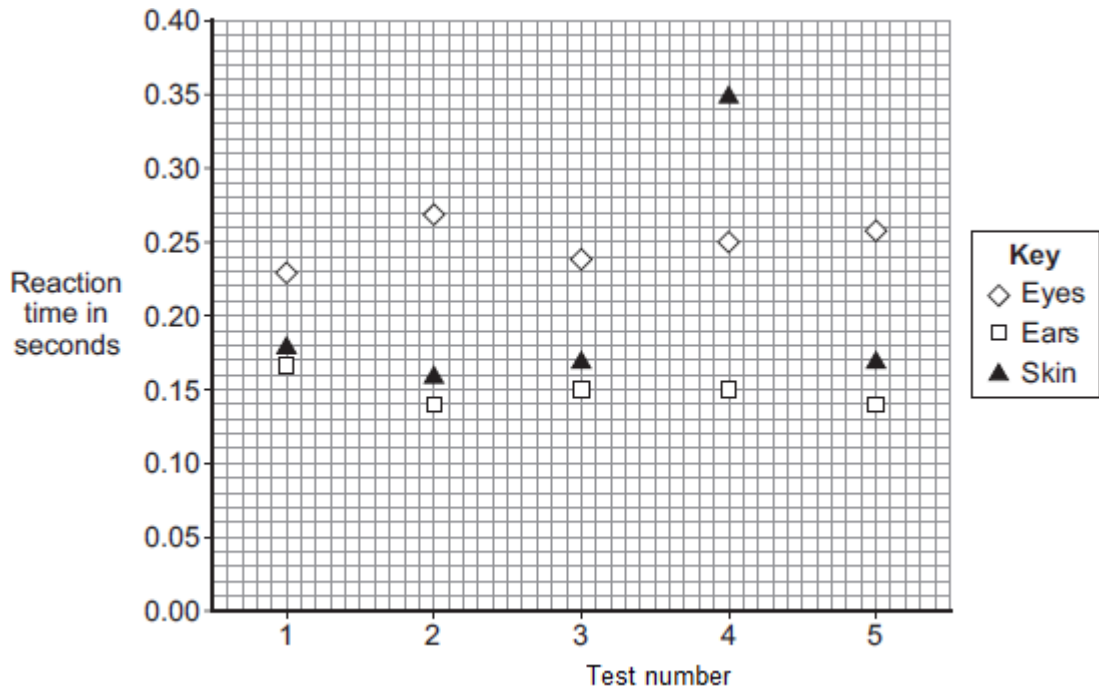
or



- felt a bar vibrate in her hand.

Each sense organ was tested 5 times.

The scatter graph shows her results.



- (a) (i) The data is shown as a scatter graph rather than a line graph.

Suggest why.

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(1)

- (ii) The results shown in the scatter graph might be easier to understand if they were drawn as a bar chart.

Describe what would have to be done with these results before they could be shown in a bar chart.

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(2)

- (b) Give **one** conclusion that can be made from these results.

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(1)

(Total 4 marks)

**Q7.**

A couple wanted to have a baby, but after several years of trying the woman did not become pregnant. Their doctor suggested IVF treatment.

- (a) Describe the main stages in IVF treatment.

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(4)

- (b) As women get older they become less fertile. Eventually the ovaries stop releasing eggs, so a woman cannot become pregnant.

IVF treatment means it is now possible for women in their 50s and 60s to have children, but not everyone thinks this is a good idea.

Suggest reasons for **and** against women in their 50s and 60s having IVF treatment to have children.

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(3)

(Total 7 marks)

**Q8.**

Bacteria and viruses can reproduce quickly inside the body and make us feel ill. These organisms may cause symptoms such as a high body temperature.

(a) How do bacteria and viruses make us feel ill?

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(1)

Two common medicines are paracetamol and ibuprofen. These medicines help to reduce high body temperature.

Data was collected to find out whether paracetamol, ibuprofen or a combination of these two medicines was the best to reduce high body temperature in children.

Children who were ill with high body temperatures were identified at doctors' surgeries.

These children were put into three treatment groups:

Group 1: given paracetamol only

Group 2: given ibuprofen only

Group 3: given a combination of paracetamol and ibuprofen

The children in each group were matched for age and gender.

There were 50 children in each group.

The table below shows how often the medicines were given to the children in each group. The doses were as directed by the manufacturers.

	Time in hours						
	0	2	4	6	8	10	12
Group 1: Paracetamol only	P		P		P		P
Group 2: Ibuprofen only	I			I			I
Group 3: Paracetamol and ibuprofen	P&I		P	I	P		P&I

Key: P = paracetamol only

I = ibuprofen only

P&I = paracetamol and ibuprofen

(b) This investigation would have been improved if a fourth group of children had been included.

(i) The children in each group were matched for age and gender.

Suggest **one** other factor the children should have been matched for to make this investigation valid.

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(1)

(ii) What would the children in the fourth group have been given?

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(1)

(iii) Suggest why this would have improved the investigation.

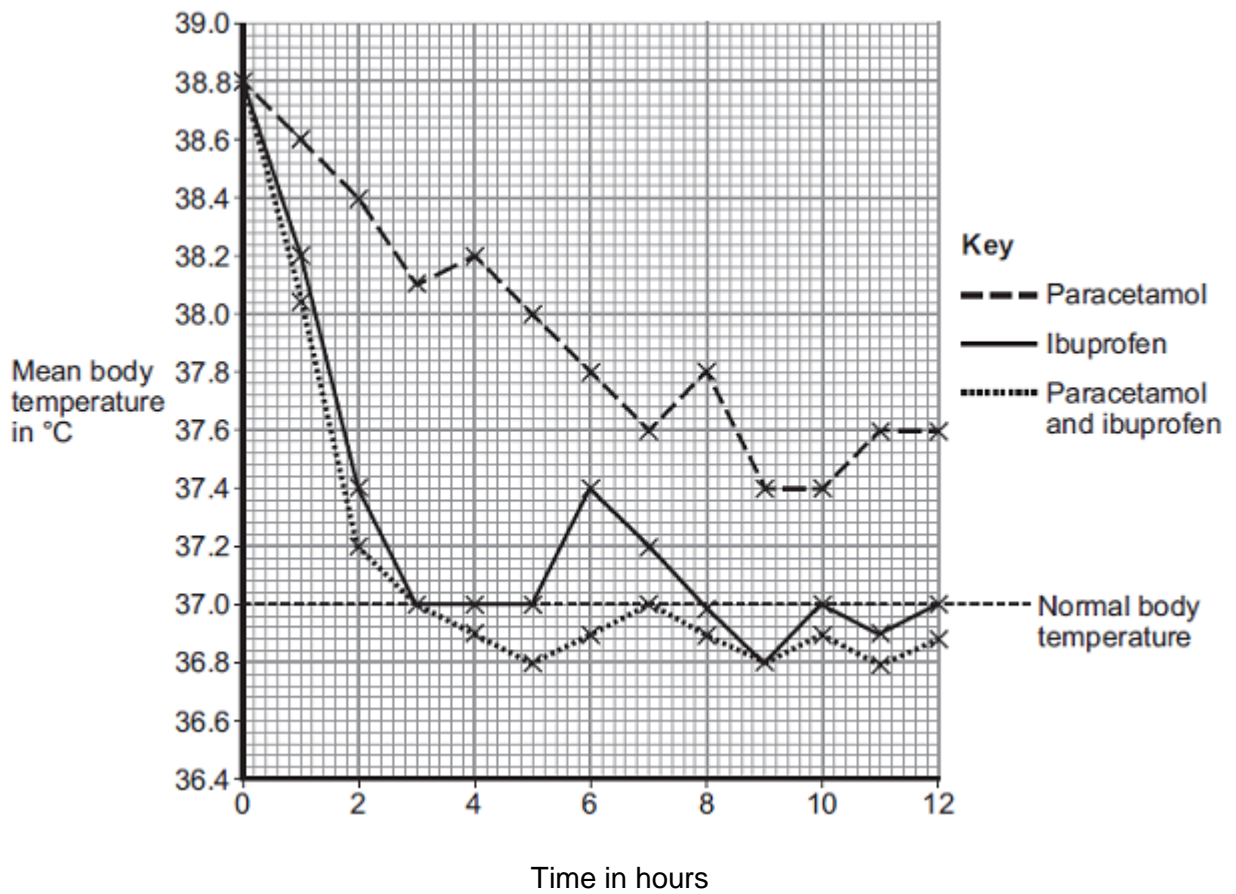
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(1)

(c) The children's body temperatures were measured before any medicine was given and every hour after treatment started.

The mean body temperatures for each of the three groups are shown in the figure below.



(i) What was the difference in mean body temperature after 4 hours between the group taking paracetamol only and the group taking ibuprofen only?

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\_\_\_\_\_ °C

(1)

(ii) How many more hours did the mean body temperature stay normal or below normal, when taking both paracetamol and ibuprofen compared to taking ibuprofen only?

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\_\_\_\_\_ hours

(1)

- (d) Doctors and nurses usually advise parents to give ibuprofen to children with a high body temperature.

Complete the sentences to suggest reasons why giving only ibuprofen might be better than giving only paracetamol or a combination of paracetamol and ibuprofen. You should use information from the table and the figure.

- (i) Giving ibuprofen might be better than giving paracetamol because \_\_\_\_\_

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(2)

- (ii) Giving only ibuprofen might be better than giving a combination of paracetamol and ibuprofen because \_\_\_\_\_

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(2)

(Total 10 marks)

**Q9.**

A woman wants to have a baby. She has been told that her body is not making and releasing eggs. However she has thousands of cells which could develop into them. A possible treatment is to give her a hormone called FSH. This hormone will start the development of these cells.

Once the eggs have developed, explain what causes their release.

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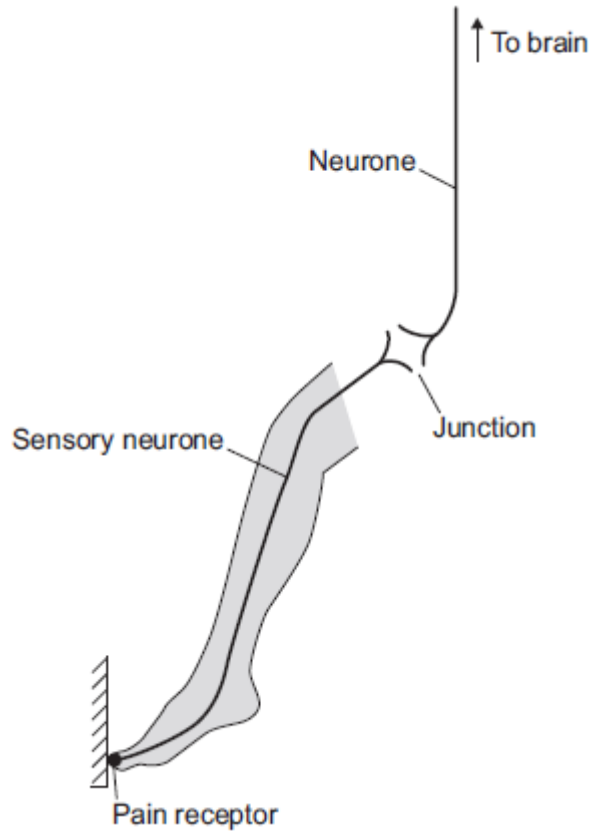
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(Total 4 marks)

**Q10.**

The diagram shows the pathway of an impulse from a pain receptor when someone bangs their toe on a hard surface.



- (a) (i) What is the junction between neurones called?

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(1)

- (ii) How does information cross the junction between neurones?

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(1)

- (b) If you bang your toe you feel the pressure of the impact before you feel the pain. This is because the impulse from a touch receptor travels faster than the impulse from a pain receptor.

The speed of transmission of the impulse from a touch receptor is 76.2 m / s.

The speed of transmission of the impulse from a pain receptor is 0.60 m / s.

The following equation can be used to calculate how long it takes for each impulse to reach the brain:

$$\text{Speed of transmission} = \frac{\text{distance}}{\text{time}}$$

If the distance each impulse has to travel from the toe to the brain is 1.920 metres, it will take 0.025 seconds for the impulse from the touch receptor to reach the brain.

Calculate how much **longer** it will take the impulse from the pain receptor to reach the brain.

You must show your working.

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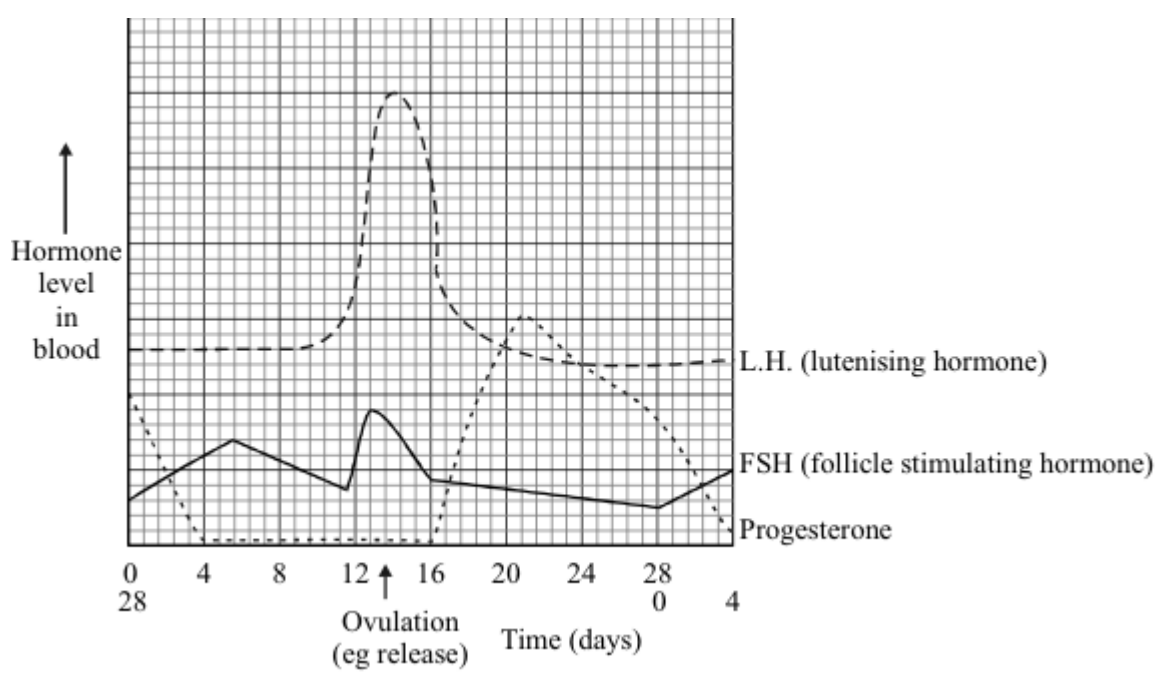
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seconds

(3)  
(Total 5 marks)

**Q11.**

The graph shows changes in the levels of three hormones in a menstrual cycle.



- (a) What does the graph suggest the stimuli might be which cause the egg to be released?

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(3)

- (b) One type of contraceptive pill keeps the level of progesterone high for most of the cycle.

Suggest how this might work.

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(2)

(c) Outline **two** arguments for and **two** against using hormones as contraceptives.

For: 1 \_\_\_\_\_

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For: 2 \_\_\_\_\_

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Against: 1 \_\_\_\_\_

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Against: 2 \_\_\_\_\_

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(4)

(Total 9 marks)

**Q12.**

The figures below show the levels of carbon dioxide in air from 150 000 years ago.

TIME	CARBON DIOXIDE CONCENTRATION
1500 years ago	270 parts per million
1800 AD	290 parts per million
1957	315 parts per million
1983	340 parts per million

(a) Explain why carbon dioxide levels in the atmosphere are changing.

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(3)

(b) It is suggested that the increased level of carbon dioxide in the air is causing the



atmosphere to warm up (the “Greenhouse Effect”).

Describe, as fully as you can, **two** major effects of global warming and how these may affect the human population.

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(6)  
(Total 9 marks)

**Q13.**

A dog runs across the road in front of a car. The driver slams her foot on the brakes.

- (i) Explain how the nervous system brings about this response.

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(4)

- (ii) Explain why alcohol consumption would affect the driver’s response.

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(1)  
(Total 5 marks)

**Q14.**

High levels of oestrogen inhibit the production of FSH by the pituitary gland.

- (i) Explain how this is an example of negative feedback.

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(2)

- (ii) One drug that is used to treat female infertility is clomiphene. Clomiphene blocks the inhibitory effect of oestrogen on FSH production.

Explain how this may help in the treatment of infertility.

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(2)

(Total 4 marks)

**Q15.**

The doctor is testing the child's nervous system by tapping the tendon just below the knee.

This pulls cells which are sensitive to stretching.



- (a) What are cells which are sensitive to stimuli called?

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(1)

- (b) These cells send information to the spinal cord.

In what form is this information sent?

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(2)

(c) The healthy response to the stimulus is the straightening of the leg.

What is the effector in this response?

\_\_\_\_\_

(1)

(d) This response is one example of a reflex action.

Describe **one other** example of a reflex action in terms of:

*stimulus → receptor → coordinator → effector → response*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(5)

(Total 9 marks)

**Q16.**

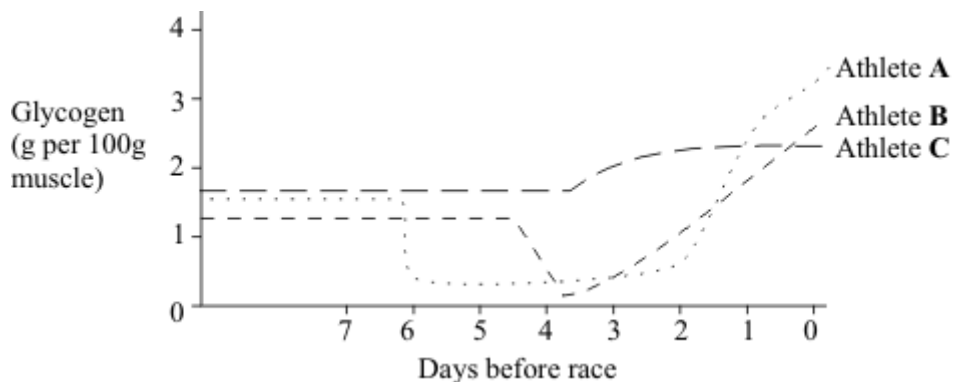
Marathon runners are recommended to have a high carbohydrate diet prior to a race. Three athletes tried out three dietary regimes prior to a marathon race.

These three dietary regimes were as follows.

<b>Athlete A</b>	Up to 7 days before the race	-	Normal mixed diet
	7 days before the race	-	Prolonged extreme physical activity
	6-3 days before the race carbohydrate	-	Protein and fat diet; no
	2 and 1 days before the race	-	Large carbohydrate intake
<b>Athlete B</b>	Up to 5 days before race	-	Normal mixed diet
	5 days before the race	-	Prolonged extreme physical activity
	4-1 days before the race	-	Large carbohydrate intake
<b>Athlete C</b>	Up to 4 days before the race	-	Normal mixed diet
	4-1 days before the race	-	Large carbohydrate intake

The graph below shows the effect of each of these dietary regimes on glycogen levels in

the athletes' muscles



(a) (i) What is the immediate effect of extreme physical activity on the glycogen content of muscles?

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(1)

(ii) Describe how this effect occurs.

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(3)

(b) (i) Evaluate the three regimes as preparation for a marathon race.

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(3)

(ii) Suggest a possible explanation for the different effects of the three regimes.

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(2)  
(Total 9 marks)

**Q17.**

The number of cases of Type 2 diabetes in the UK is increasing rapidly.

- (a) Describe how insulin and glucagon help control the blood sugar concentration in a healthy person.

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(6)

- (b) What is Type 2 diabetes?

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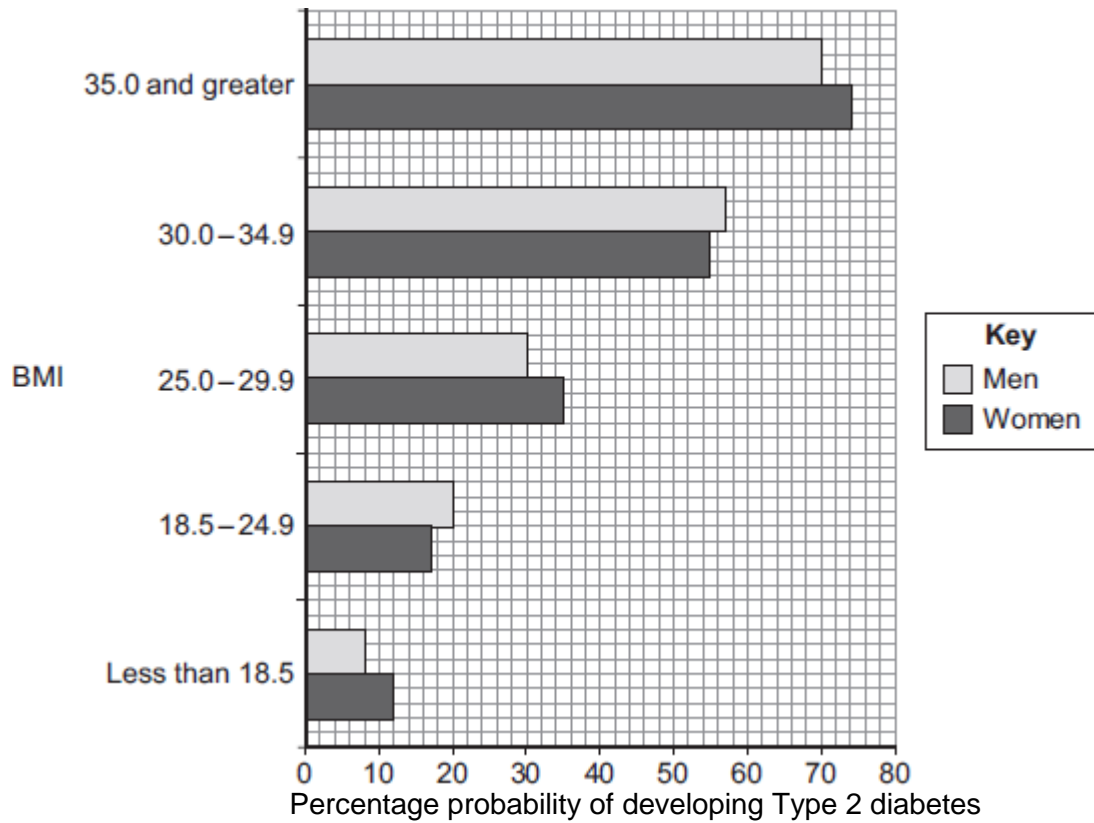
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(1)

- (c) Body mass index (BMI) is a person's body weight divided by the square of his or her height.

- (i) **Graph 1** shows the relationship between BMI and the percentage probability of developing Type 2 diabetes.

**Graph 1**



Suggest an explanation for the relationship between BMI and the risk of developing Type 2 diabetes.

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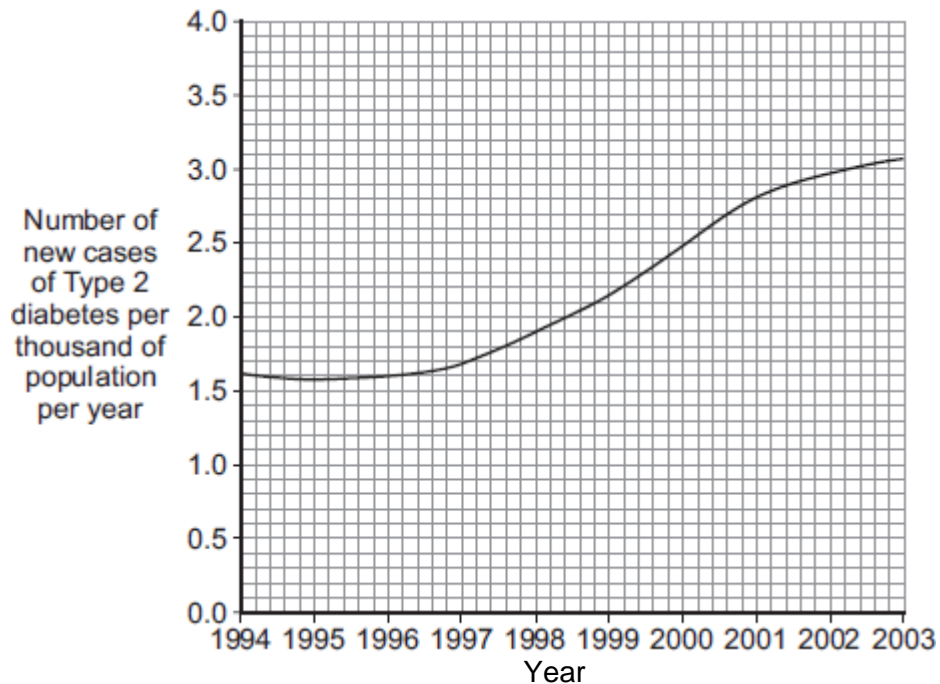


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(2)

- (ii) **Graph 2** shows changes in the number of new cases of Type 2 diabetes in the UK.

**Graph 2**



Suggest explanations for the trend shown by the data in **Graph 2**.

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(3)

(Total 12 marks)

**Q18.**

Read the following passage which is from an advice book for diabetics.



**Insulin Reactions**

Hypoglycaemia or 'hypo' for short, occurs when there is too little sugar in the blood. It is important always to carry some form of sugar with you and take it immediately you feel a 'hypo' start. A hypo may start because:

- you have taken too much insulin, or

- you are late for a meal, have missed a meal altogether, have eaten too little at a meal, or
- you have taken a lot more exercise than usual.

The remedy is to take some sugar.

An insulin reaction usually happens quickly and the symptoms vary – sweating, trembling, tingling of the lips, palpitations, hunger, pallor, blurring of the vision, slurring of speech, irritability, difficulty in concentration.

Do not wait to see if it will pass off, as an untreated 'hypo' could lead to unconsciousness.

(a) Many diabetics need to take insulin.

(i) Explain why.

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(2)

(ii) Explain why there is too little sugar in the blood if too much insulin is taken.

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(3)

(iii) Explain why there is too little sugar in the blood if the person exercises more than usual.

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(3)

(b) Suggest why sugar is recommended for a 'hypo', rather than a starchy food.

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(3)

(c) Explain how the body of a healthy person restores blood sugar level if the level



drops too low.

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(3)

(d) Explain, using insulin as an example, what is meant by negative feedback.

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(3)

(Total 17 marks)

**Q19.**

Oestrogen, luteinising hormone (LH) and follicle stimulating hormone (FSH) work together to coordinate the menstrual cycle. A woman will be infertile if her pituitary gland does not release enough follicle stimulating hormone (FSH).

Explain how injections of FSH could increase her chances of having a baby.

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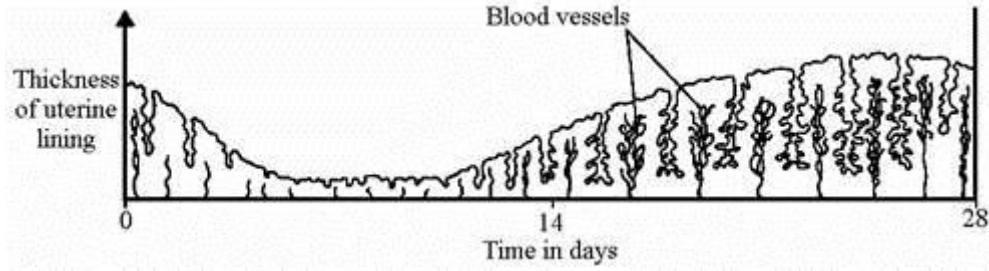
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(Total 3 marks)

**Q20.**

(a) The diagram shows changes in the uterus lining during 28 days of a menstrual cycle.



Describe how changes in the lining shown in the diagram adapt it for its function if an egg is fertilised.

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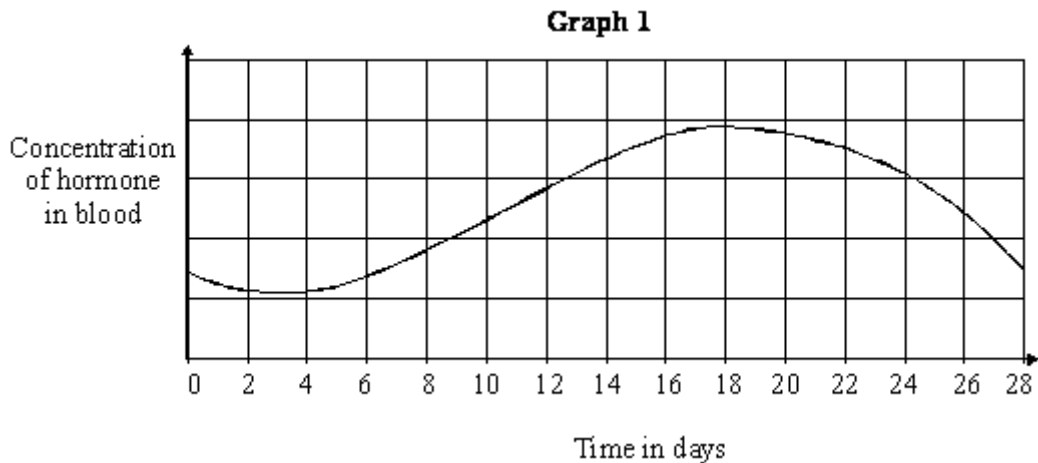
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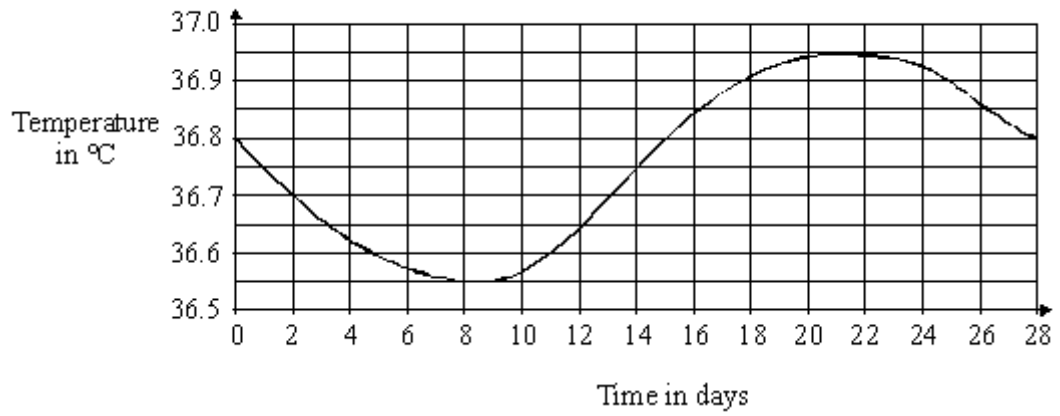
- (b) The concentration of a certain hormone in the blood of a woman was measured during her menstrual cycle. The woman's temperature was also measured each day during this cycle.

**Graph 1** shows the results obtained for the measurement of the concentration of the hormone.

**Graph 2** shows the results obtained for the measurement of her body temperature.



**Graph 2**



- (i) What evidence is there that changes in the concentration of the hormone may be connected with changes in body temperature?

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(1)

- (ii) What is the difference between the minimum and maximum temperatures shown by **Graph 2**? Show your working.

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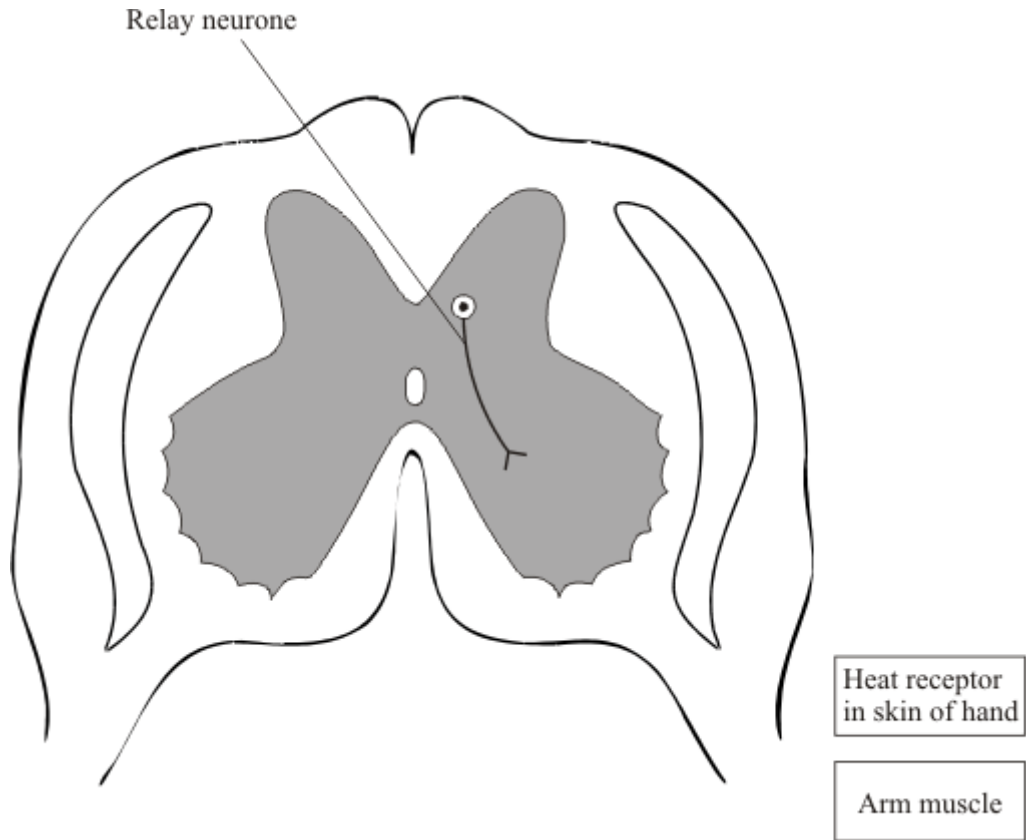
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(2)

(Total 6 marks)

**Q21.**

The diagram shows a section through the spinal cord.



(a) Coordination of a reflex movement of the arm, in response to the hand touching a hot object, involves three neurones. One of these, the relay neurone, is shown in the diagram. Complete the nerve pathway between the receptor and the muscle on the diagram by drawing and labelling:

- (i) the sensory neurone;
- (ii) the motor neurone.

(2)

(b) The nerve pathway linking the heat receptor in the hand with the arm muscle is about 1.5 metres in length. It would take the nervous impulse 0.02 seconds to travel this distance along a neurone. However, it takes about 0.5 seconds for the arm to start moving during the reflex response to the heat stimulus.

Explain the difference.

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(2)

(Total 4 marks)

**Q22.**

Drinking after exercise to replace the water lost in sweat is called rehydration.

Scientists at a Spanish university investigated rehydration after exercise.

- 24 students took part in the investigation.
- All the students ran on a treadmill in a temperature of 40 °C until they were exhausted.
- 12 of the students were each given half a litre of beer to drink.
- The other 12 students were each given half a litre of tap water to drink.
- Both groups of students were then allowed to drink as much tap water as they wanted.
- The scientists measured how quickly each student rehydrated.
- The students who had been given beer rehydrated 'slightly better' than the ones given only water.

A newspaper reported the investigation.

The headline was



The newspaper headline was **not** justified.

Explain why.

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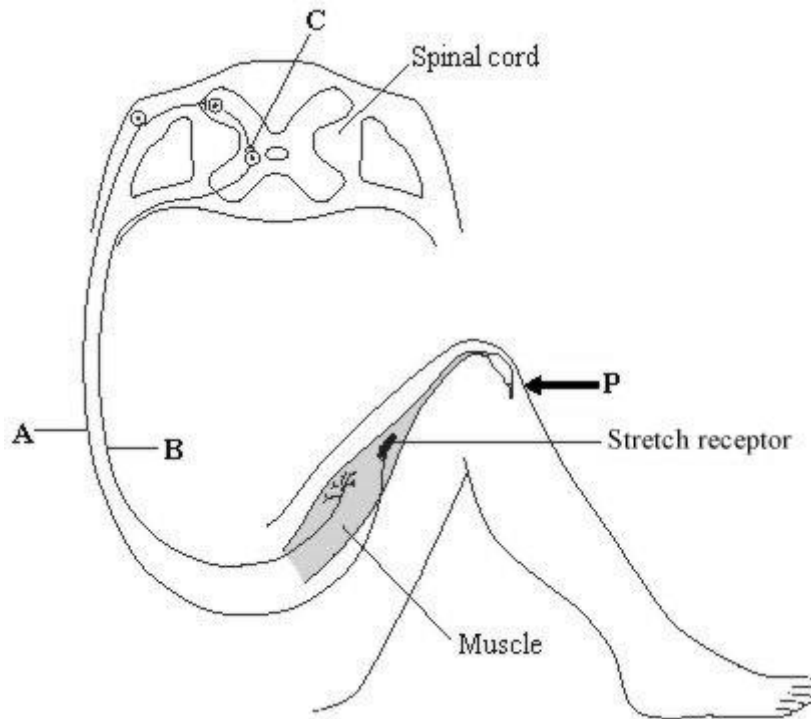
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(Total 3 marks)

**Q23.**

The diagram shows the nervous pathway which is used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



- (a) (i) Name the type of neurone labelled **A**. \_\_\_\_\_ (1)
- (ii) **On the diagram**, draw arrows next to the neurones labelled **A** and **B** to show the direction in which an impulse moves in each neurone. (1)
- (b) How is information passed across the synapse at **C**?  
 \_\_\_\_\_ (1)
- (c) **On the diagram**, label the effector with the letter **X**. (1)
- (Total 4 marks)**

**Q24.**

Hormones are used in contraceptive pills.

- (a) Explain how a contraceptive pill works.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ (2)
- (b) Read the information about the trialling of the first contraceptive pill.

The Pill was developed by a team of scientists led by Gregory Pincus. The team needed to carry out large scale trials on humans.







**Q26.**

The hormone insulin is a protein. Insulin is produced in the pancreas and controls blood glucose concentration.

- (a) Which organ in the body monitors blood glucose concentration?

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(1)

- (b) We now know that a lack of the hormone insulin causes diabetes. In the early twentieth century there was no known cure for diabetes.

Frederick Banting and Charles Best carried out a number of experiments on dogs.

In the first experiment they removed part of the pancreas from a healthy dog (dog **A**). They ground up the pancreas tissue and injected an extract into dog **B**, whose pancreas had been removed to make it diabetic. Dog **B**'s diabetes was **not** cured.

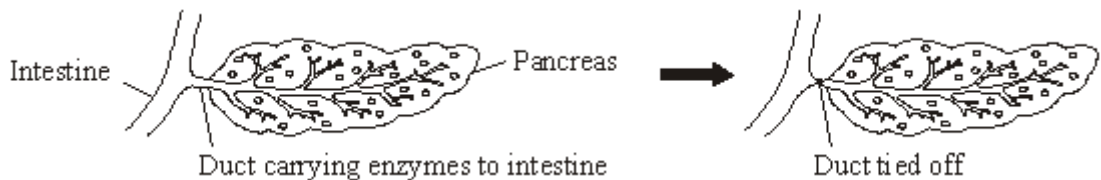
Banting thought that an enzyme produced in the pancreas of dog **A** had digested the hormone before it was injected.

Name the enzyme that might have been responsible for digesting the hormone.

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(1)

- (c) In the second experiment with another healthy dog, Banting and Best tied off the duct which normally carries digestive enzymes out of the pancreas. This did **not** kill the dog.



- (i) The dog survived even though enzymes from the pancreas could not digest food in the intestine.

Explain why the dog survived.

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(1)

- (ii) As a result of these experiments, a method was developed to extract insulin from the pancreas.

Insulin is used to treat humans with diabetes.

The amount of insulin injected needs to be carefully controlled.

Explain why.

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(1)

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(1)

(d) Evaluate the use of dogs in experiments of this type.

Remember to include a conclusion to your evaluation.

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(3)

(Total 7 marks)

**Q27.**

The pancreas and the liver are both involved in the control of the concentration of glucose in the blood.

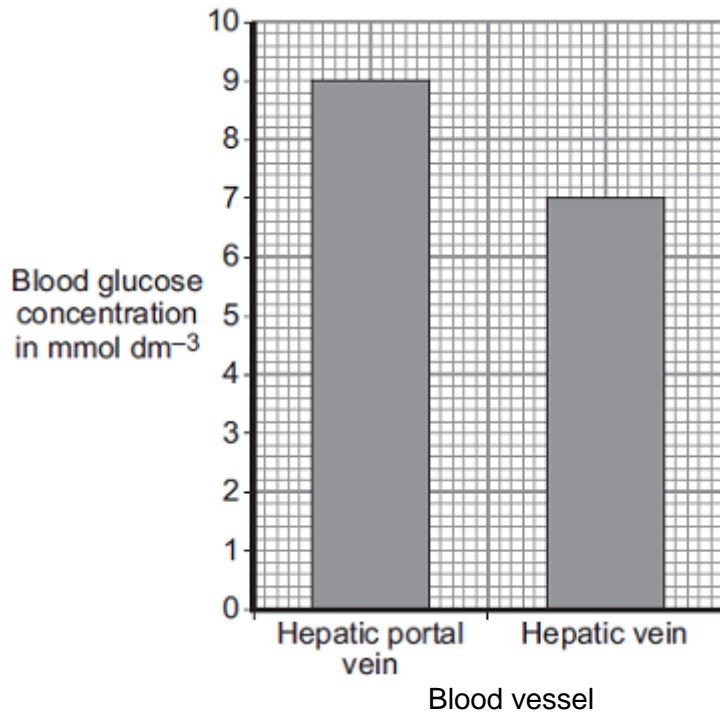
The liver has two veins:

- the hepatic portal vein taking blood from the small intestine to the liver
- the hepatic vein taking blood from the liver back towards the heart.

Scientists measured the concentration of glucose in samples of blood taken from the hepatic portal vein and the hepatic vein. The samples were taken 1 hour and 6 hours after a meal.

**Graph 1** shows the concentration of glucose in the two blood vessels 1 hour after the meal.

**Graph 1**



- (a) The concentration of glucose in the blood of the two vessels is different. Explain why.

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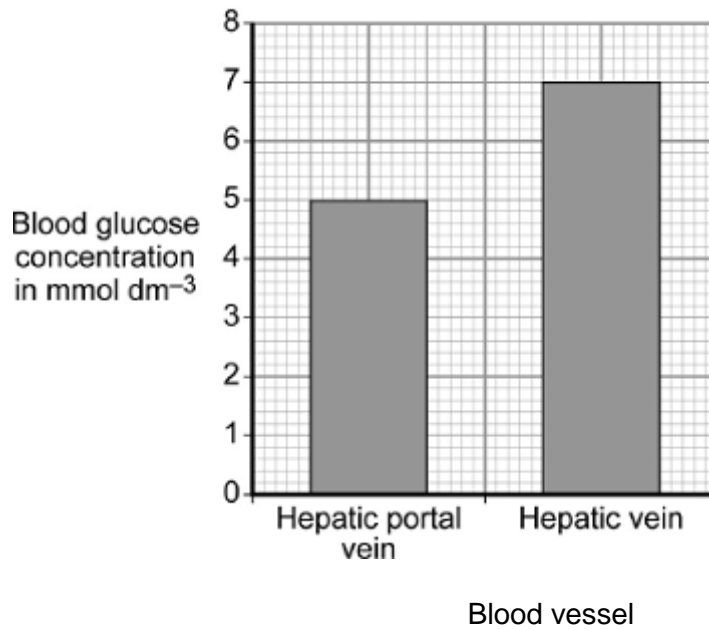


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(3)

- (b) **Graph 2** shows the concentration of glucose in the two blood vessels 6 hours after the meal.

**Graph 2**



- (i) The concentration of glucose in the blood in the hepatic portal vein 1 hour after the meal is different from the concentration after 6 hours.

Why?

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(1)

- (ii) The person does **not** eat any more food during the next 6 hours after the meal.

However, 6 hours after the meal, the concentration of glucose in the blood in the hepatic vein is higher than the concentration of glucose in the blood in the hepatic portal vein.

Explain why.

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(3)

(Total 7 marks)

**Q28.**

Insulin controls blood glucose concentration.

- (a) The rate at which blood glucose concentration changes is affected by the food

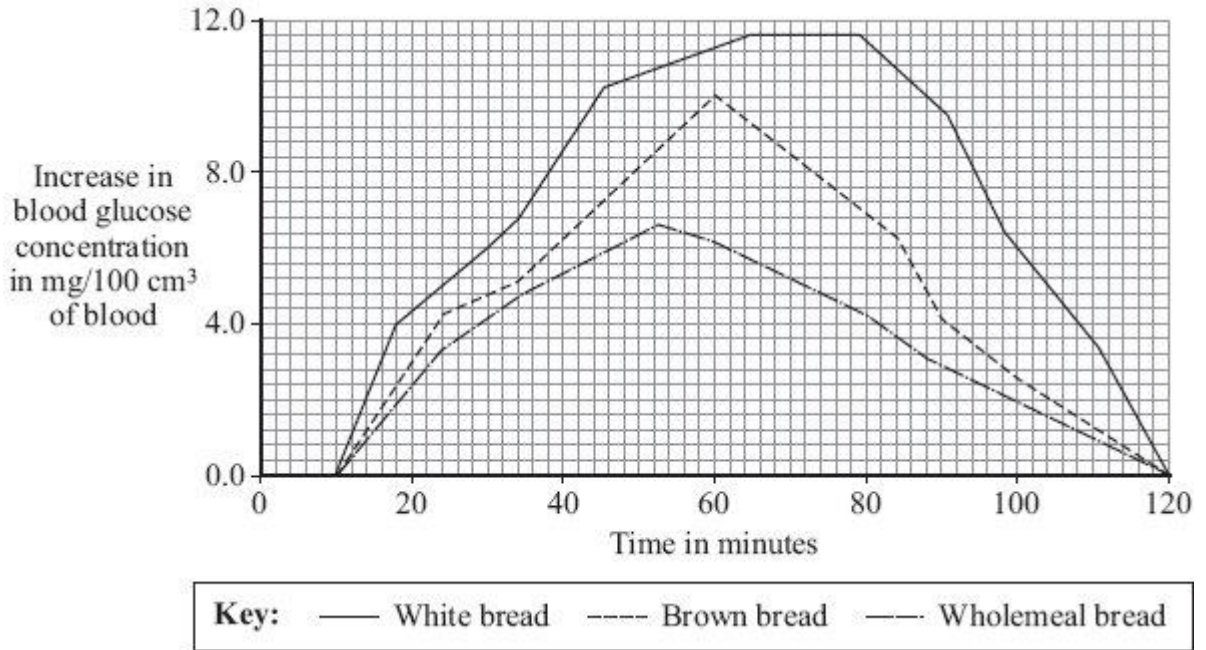
eaten.

In an experiment a person who does not have diabetes ate two slices of white bread.

The change in her blood glucose concentration was recorded over the next 120 minutes.

The experiment was repeated; first with two slices of brown bread and then with two slices of wholemeal bread.

The graph shows the results of the three experiments.



(i) Which type of bread would be most suitable for a person with diabetes?

Type of bread \_\_\_\_\_

Give **two** reasons for your answer.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(ii) Explain, as fully as you can, the reasons for the changes in blood glucose concentration when the person ate the brown bread.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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(4)

- (b) *Pancreatic-cell transplantation* is a new treatment for diabetes. Insulin-making cells are taken from up to three dead donors. The cells are kept alive before being injected into the diabetic in a small operation. The cells soon begin to make insulin.

In one recent study 58 % of recipients of pancreatic-cell transplants no longer needed insulin injections.

Give the advantages and disadvantages of the new treatment for diabetes compared with using insulin injections.

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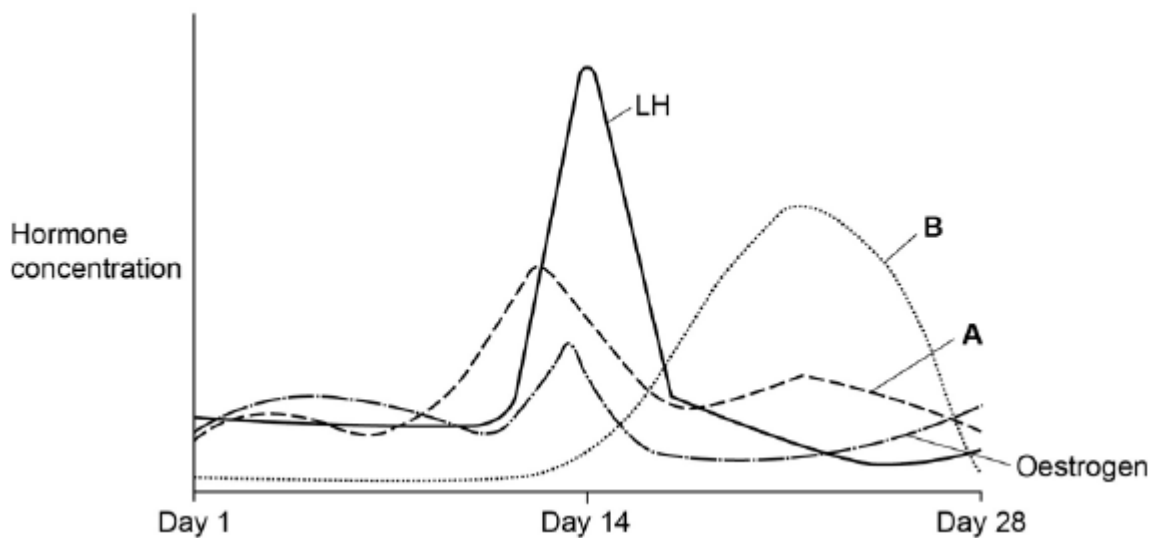
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(3)

(Total 9 marks)

**Q29.**

The figure below shows how the concentrations of the reproductive hormones in the blood of a woman change over 28 days.



- (a) Name hormones **A** and **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

(2)

- (b) Use information from the figure above to explain what happens on Day 14.

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(2)

- (c) In Vitro Fertilisation (IVF) treatment can be used to help women become pregnant. IVF uses some of the hormones shown in the figure above.

Explain why IVF increases the chance of some women becoming pregnant.

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(6)

(Total 10 marks)

**Q30.**

Hormones can be used as contraceptives.

- (a) Explain **one** way in which a hormone can prevent conception (pregnancy).

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(2)

- (b) Two methods of giving contraceptive hormones to a woman are the vaginal ring and the hormone implant.

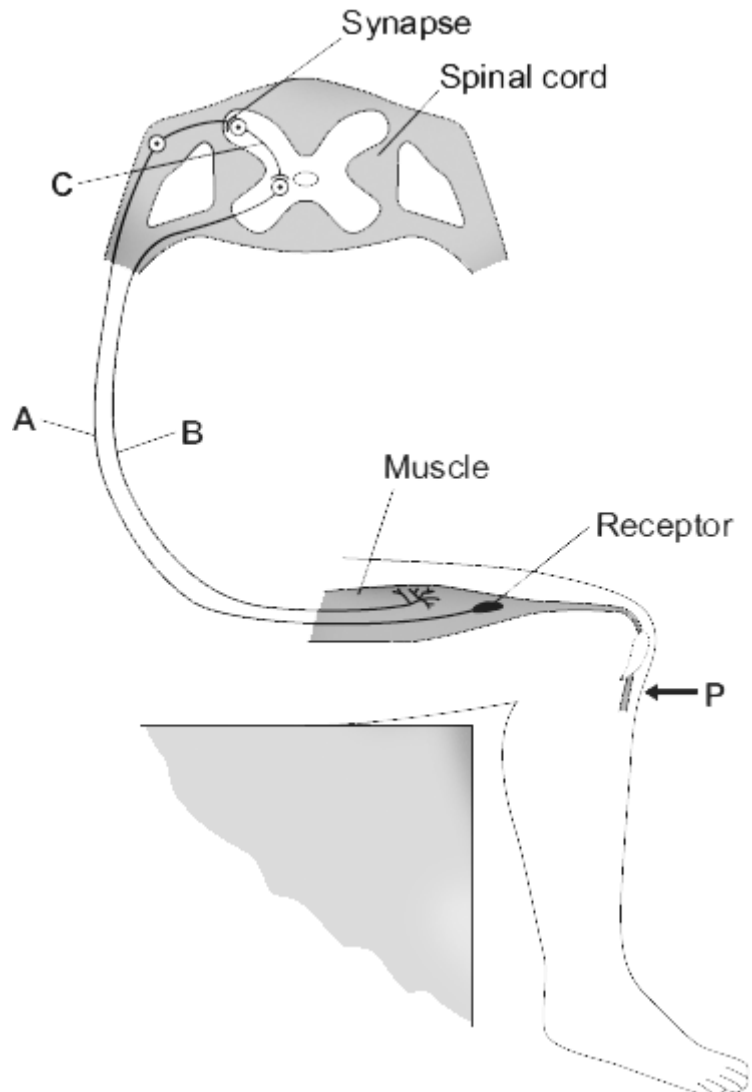
**Vaginal ring**





**Q31.**

The diagram shows the nervous pathway used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



- (a) Name neurones **A**, **B** and **C**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

**C** \_\_\_\_\_

(3)

- (b) The receptor in the muscle in the leg is sensitive to a stimulus.

Suggest the stimulus.

\_\_\_\_\_

(1)

- (c) Describe what happens at the synapse during this reflex.

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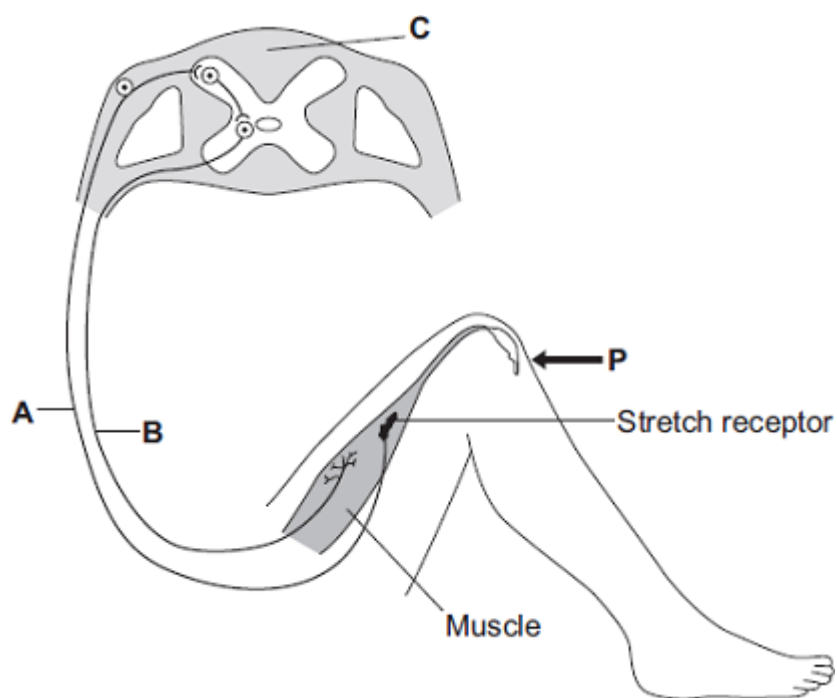


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(3)  
(Total 7 marks)

**Q32.**

The diagram shows the structures involved in the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



(a) Name the structures labelled **A**, **B** and **C**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

**C** \_\_\_\_\_

(3)

(b) How is information passed across a synapse?

---



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(1)

(c) What is the effector in this response?

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**Q33.**

Hormones are released from glands.

- (a) Which gland produces hormones to control other glands in the endocrine system?

Tick **one** box.

Adrenal

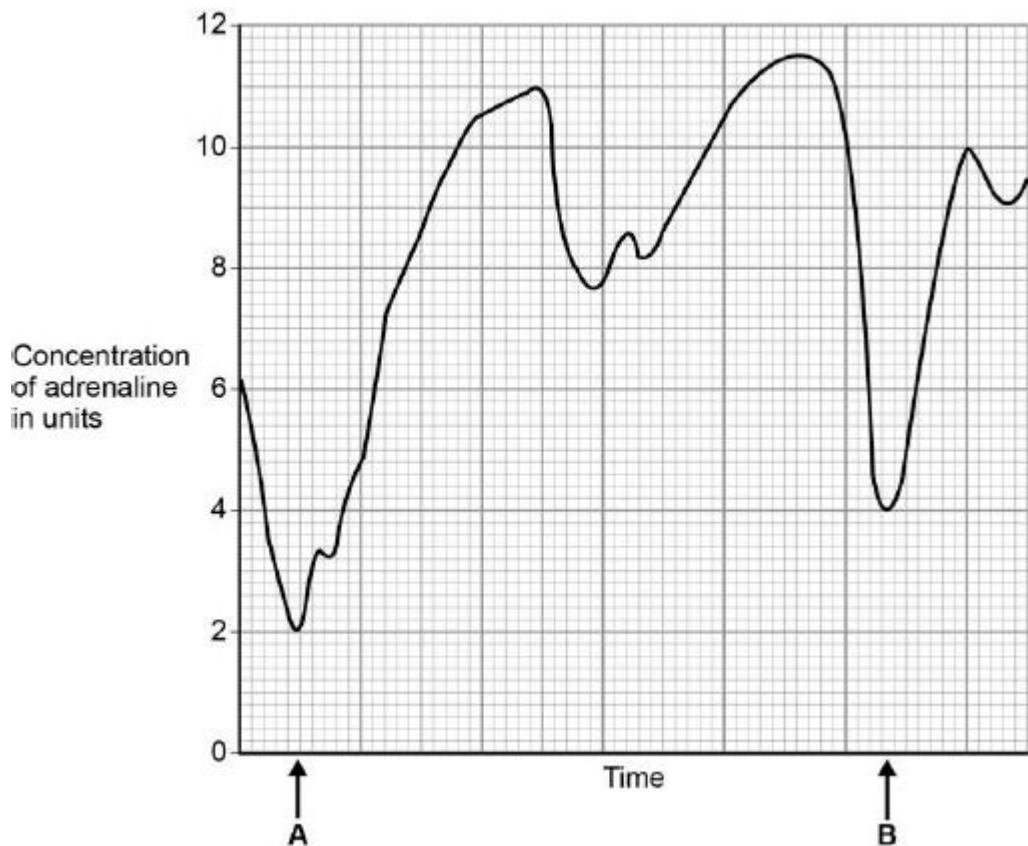
Ovary

Pituitary

Thyroid

(1)

- (b) The figure below shows the level of adrenaline in a man's bloodstream while he was watching a 12-minute film.



Calculate the percentage increase in adrenaline after point B.

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Percentage increase in adrenaline = \_\_\_\_\_

(2)

- (c) Suggest why the percentage increase in adrenaline after point **B** is different from the percentage increase after point **A**.

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(2)

- (d) Adrenaline causes changes in the body to prepare for a 'fight or flight' response.

What changes in the man's body are caused by adrenaline?

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(2)

(Total 7 marks)

**Q34.**

Phenylketonuria (PKU) is an inherited condition. PKU makes people ill.

- (a) PKU is caused by a recessive allele.

- (i) What is an allele?

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(1)

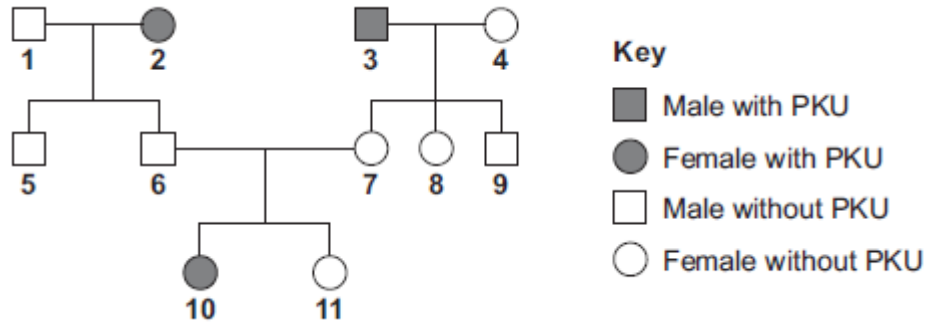
- (ii) What is meant by recessive?

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(1)

- (b) The diagram below shows the inheritance of PKU in one family.



- (i) Give **one** piece of evidence from the diagram that PKU is caused by a recessive allele.

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(1)

- (ii) Persons **6** and **7** are planning to have another child.  
Use a genetic diagram to find the probability that the new child will have PKU.

Use the following symbols in your answer:

**N** = the dominant allele for **not** having PKU

**n** = the recessive allele for PKU.

Probability = \_\_\_\_\_

(4)

- (c) Persons **6** and **7** wish to avoid having another child with PKU.

A genetic counsellor advises that they could produce several embryos by IVF treatment.

- (i) During IVF treatment, each fertilised egg cell forms an embryo by cell division.

Name this type of cell division.

---

(1)

- (ii) An embryo screening technique could be used to find the genotype of each embryo.

An unaffected embryo could then be placed in person **7**'s uterus.

The screening technique is carried out on a cell from an embryo after just three cell divisions of the fertilised egg.

How many cells will there be in an embryo after the fertilised egg has

divided three times?

(1)

- (iii) During embryo screening, a technician tests the genetic material of the embryo to find out which alleles are present.

The genetic material is made up of large molecules of a chemical substance.

Name this chemical substance.

---

(1)

(d) Some people have ethical objections to embryo screening.

(i) Give **one** ethical objection to embryo screening.

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(1)

(ii) Give **one** reason in favour of embryo screening.

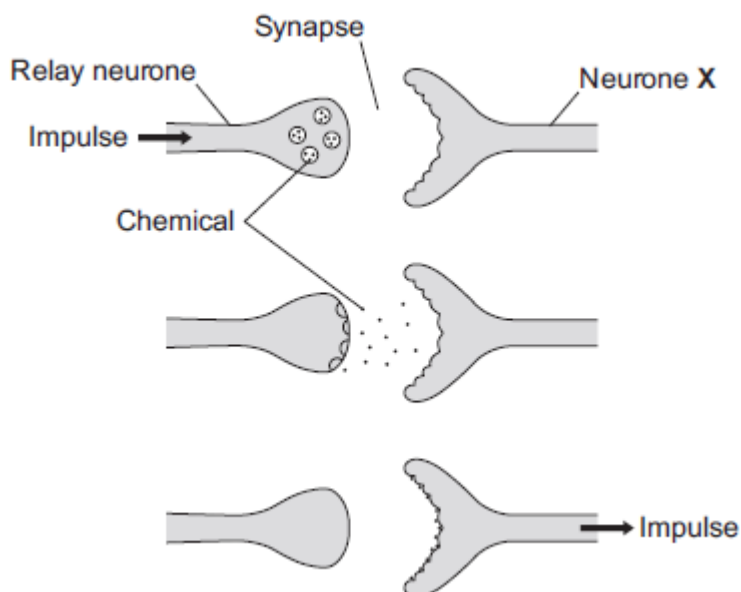
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(1)

(Total 12 marks)

### Q35.

The diagram below shows how a nerve impulse passing along a relay neurone causes an impulse to be sent along another type of neurone, neurone X.



(a) What type of neurone is neurone X?

---

(1)

(b) Describe how information passes from the relay neurone to neurone X. Use the diagram to help you.

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(3)

- (c) Scientists investigated the effect of two toxins on the way in which information passes across synapses. The table below shows the results.

Toxin	Effect at the synapse
Curare	Decreases the effect of the chemical on neurone X
Strychnine	Increases the amount of the chemical made in the relay neurone

Describe the effect of each of the toxins on the response by muscles.

Curare \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Strychnine \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

(Total 6 marks)

**Q36.**

*In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Homeostasis keeps conditions in the body relatively constant.

The amount of water in the body is controlled by homeostasis.

Kidney function is controlled by a gland in the brain.

Describe how the water content of the blood is controlled.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





## Mark schemes

### Q1.

- (a) pituitary (gland / body) 1
- (b) oestrogen inhibits the release of FSH  
*ignore references to LH* 1
- FSH stimulates follicle development / causes egg to develop  
or no follicle / egg development if high oestrogen  
*accept growth / maturing / ripening for development* 1
- no ovulation / no egg release  
*do **not** accept no egg to be fertilised* 1

[4]

### Q2.

- (a)  $(76 - 28) \times 2$  1
- 96 (units / h)  
*allow 96 (units / h) with no working shown for 2 marks* 1
- allow 1.6 units / min for 1 mark*  
*allow answer in range of 94–104*  
*(units / h) for 1 mark*
- (b) increased blood glucose concentration causes insulin release from pancreas 1
- which stimulates cells to absorb glucose / sugar from the blood, so blood glucose concentration decreases 1
- (c) any **three** from:  
*at least one advantage **and** one disadvantage of the system(s) must be given for full marks*  
*allow responses phrased in terms of the meter and injection systems*

#### advantages of the new system:

- better control so reduces risk of future health problems  
*allow fewer low / high blood glucose periods so safer*
- no need to estimate dose of insulin
- less chance of giving too much / little insulin
- system works automatically / continuously so no need to test / inject

#### disadvantages of the new system:

- system is always attached so may restrict activities

- *allow pump is difficult to hide*  
pump has to be carried somewhere
  - *allow risk of discomfort*  
pump will need re-filling
  - risk of infection
  - **or**  
risk of tissue damage (at injection site)
  - line might come out
- accept new system more expensive*

3

qualified conclusion: a statement as to which system is better with reference to at least one advantage and one disadvantage

*for example, the new system is better because although it is more expensive, it works automatically*

1

- (d) blood glucose concentration goes too low

1

blood glucose concentration detected by pancreas

1

pancreas releases glucagon

1

(glucagon causes) cells to convert glycogen into glucose

1

glucose released into blood

1

[13]

### Q3.

*idea:*

glucose level rises  
pancreas releases insulin  
glucose → glycogen (in liver)/removes xs glucose  
glucose level falls/returns to normal

*for 1 mark each*

[4]

### Q4.

- (a) progesterone

1

fewer / less side effects

*allow named side effect*

*eg less chance of nausea / headaches / blood clots / high blood pressure*

*second mark only awarded if correct hormone given*

*if no hormone given second mark can be awarded*

1

- (b) (sharp / sudden / large) temperature increase

*allow correct figures*

eg 36.4–37.6 / 37.8

1

(when) LH peaks / is high

*allow peak of FSH / oestrogen / hormones*

1

LH / luteinising hormone causes ovulation / egg release

1

(therefore) high chance of egg being there to be fertilised

1

[6]

### Q5.

(a) X – relay (neurone)

Y – motor (neurone)

*both required for mark*

*must be in correct order*

1

(b) chemical (released from X)

*do **not** accept electrical impulse*

*accept chemical messenger / transmitter*

*accept neurotransmitter*

*accept named transmitter substance eg acetylcholine*

1

(crosses) synapse

*allow for 2 marks diffusion of the chemical across the synapse*

1

[3]

### Q6.

(a) (i) any **one** from:

- same test being repeated
- test number not a dependent variable / variable being tested
- test number is not a continuous variable  
*allow test number is a categoric variable*  
*allow data is categoric*

1

(ii) ignore / repeat anomalous result

1

calculate means (for each sense organ)

*allow average*

1

(b) any **one** from:

*ignore figures*

- eyes have longest reaction time

*allow slowest*

- ears have shortest reaction time  
*allow fastest*
- ears and skin have similar reaction times  
*ignore references to anomalies / repeat values / test numbers*

1

[4]

**Q7.**

- (a) any **four** from:
- the woman is given FSH / LH  
*allow fertility drug*  
*do **not** allow an incorrect hormone eg oestrogen*
  - (FSH / LH / hormones) to stimulate egg maturation / release / production
  - eggs **and** sperm are collected / mixed
  - fertilisation happens
  - embryo(s) form
  - (embryo(s)) inserted into the woman's uterus / womb.  
*this complete statement gains 2 marks*

4

- (b) **three** arguments given from:  
*arguments for **and** against required for full marks*

*Arguments for:*

- older women (may) have more money / time to support the child
- older women may make better parents  
*allow examples of maturity / life experiences*
- allows women who have late marriage / partnership to have a family.

*Arguments against:*

- mother may die before child has grown up
- baby may not be as healthy  
*allow (higher) risk of genetic disorders / down's syndrome*
- mother may have more problems during pregnancy / birth
- mother might have less energy (than a younger mother) to look after a child.

3

[7]

**Q8.**

- (a) (bacteria and viruses produce) toxins  
*allow poisons*  
*allow damage body cells*

1

- (b) (i) body mass  
*allow weight*  
*allow ethnicity*  
*ignore height / size*

1

- (ii) placebo / fake drug  
*allow sugar pill*  
*allow no treatment* 1
- (iii) any **one** from:  
  - as a control group
  - for comparison
  - to see if the drugs worked
  - to take account of psychological effect*accept placebo effect*  
*allow to avoid bias* 1
- (c) (i) 1.2 (°C) 1
- (ii) 3 (hours) 1
- (d) (i) (Paracetamol)  
 any **two** from:  
  - ibuprofen reduces body temperature faster
  - ibuprofen reduces temperature more
  - ibuprofen doesn't need to be taken as often
  - ibuprofen keeps body temperature lower / normal / 37 °C for longer*allow works faster* 2
- (ii) (Paracetamol + ibuprofen)  
 any **two** from:  
  - body temperature decreases at a similar rate  
*allow ibuprofen works (almost) as fast*
  - ibuprofen maintained body temperature close to normal / 37 °C  
*allow ibuprofen maintained normal body temperature almost as long*  
*allow doesn't make temperature drop below normal as long*
  - (better to) take fewer drugs  
*allow less chance of overdose / giving too much*  
*allow (better to) take drugs less frequently*
  - easier to administer  
*allow less chance of missing doses / taking at the wrong time*2

[10]

**Q9.**

oestrogen produced  
*gains 1 mark*

**but** N.B. sequence important here  
 oestrogen produced by ovary  
*gains 2 marks*

LH produced

*gains 1 mark*

**but**

LH produced by pituitary

*gains 2 marks*

LH causes egg release

*for 1 mark*

[4]

**Q10.**

(a) (i) synapse

1

(ii) chemical

*accept neurotransmitter or named neurotransmitter*

1

(b) 3.175 or 3.18 (seconds)

*allow 2 marks for a time of 3.2 calculated for the pain impulse*

**or**

*allow 1 mark for a correct substitution or reorganisation:*

$$0.6 = 1.92 / t$$

**or**

$$t = 1.92 / 0.6$$

*allow 1 mark for an incorrect time for pain impulse - 0.025 correctly subtracted*

3

[5]

**Q11.**

(a) LH or FSH (only one mentioned)

*gains 1 mark*

**but**

LH and/or FSH (both mentioned)

*gains 2 marks*

rises (sharply)

*for 1 further mark*

3

(b) FSH or LH level kept low  
no ovulation/egg not released

*for 1 mark each*

2

(c) for:  
very effective/prescribed/  
personal preference/convenient/  
promote family values

*any two for 1 mark each*

against:  
upset internal environment  
named side effects (allow two)  
religious belief  
no protection against VD/AIDS  
long-term effects  
moral belief

*any two for 1 mark each*

4

[9]

**Q12.**

- (a) *idea:*  
more (fossil) fuel burned (do not credit simply more people/cars/industry)  
deforestation = less photosynthesis  
deforestation = more respiration/burning

*each for 1 mark*

3

- (b) *idea:*  
climate change

*for 1 mark*

warmer/colder/drier/wetter  
food production affected/starvation  
major ecosystems destroyed/damaged

*any two for 1 mark each*

6

sea level rise

*for 1 mark*

low land flooded  
less food grown/starvation  
homes/factories flooded

*any two for 1 mark each*

*Allow*

polar ice caps melt  
sea water expands

[9]

**Q13.**

- (i) eyes as sense organs/detector/receptors in eye,  
electrical signals (impulses),  
to co-ordinator,  
then to leg muscles/effector

*for 1 mark each*

4

- (ii) affects the nervous system and slows down the reactions

*for 1 mark*

1

[5]

**Q14.**

- (i) reduction in FSH levels will lead to reduction of oestrogen production, therefore oestrogen production is negatively affected by high oestrogen levels

*for 1 mark each*

2

- (ii) high levels of FSH, more likely to lead to egg release/maturation

*for 1 mark each*

2

[4]

**Q15.**

- (a) receptors

*for 1 mark*

1

- (b) electrical/nerve signals/impulses

*for 1 mark each*

2

- (c) muscle

*for 1 mark*

1

- (d) correct description of:  
stimulus  
receptor  
co-ordinator  
effector  
response

*for 1 mark each*

5

[9]

**Q16.**

- (a) (i) reduced sharply

*for 1 mark*

1

- (ii) converted to glucose which is respired to produce energy

*(allow answers in terms of glucagon)*

*gains 3 marks*

3

- (b) (i) athlete A's was most effective since resulted in highest muscle glycogen level on day of race for energy release during race

*for 1 mark each*

3

- (ii) e.g. excess carbohydrate stored as glycogen rather than fat in short term particularly if glycogen stores depleted

*for 1 mark each*



**Q17.**(a) any **six** from:

- hormone(s) / named produced by pancreas
- if blood glucose levels are too high, insulin is produced / released
- allowing glucose to move from the blood into the cells / named eg liver
- glucose is converted to glycogen
- if blood glucose levels fall, glucagon is produced / released
- glycogen is converted to glucose
- causing glucose to be released into the blood

6

(b) diabetes that occurs when the body (cells) do not respond / are less responsive to insulin

1

(c) (i) higher BMIs due to increase in mass / weight (relative to height) / obesity

1

obesity / being overweight / being fat is a (significant) risk factor for Type 2 diabetes*allow causes Type 2 diabetes*

1

(ii) any **three** from:

- related to described change in diet eg fast foods
- and less exercise
- which increases the chance of obesity / increases BMI
- increased awareness has helped to slow the increase

3

[12]

**Q18.**(a) (i) blood sugar rises because insufficient insulin secreted by body  
*for 1 mark each*

2

(ii) increase in rate of conversion of glucose to glycogen  
in liver*for 1 mark each*

3

(iii) muscles use more glucose from blood in respiration to release  
energy needed for exercise*for 1 mark each*

3

(b) 3 of

sugar soluble  
therefore absorbed  
quicker than starch  
which has to be digested*any 3 for 1 mark each*

3

- (c) increased secretion of glucagons by pancreas  
results in increases rate of conversion of glycogen into glucose  
*for 1 mark each*

3

- (d) 3 of eg  
higher blood sugar level results in increased secretion of insulin  
effect of insulin is to lower blood sugar  
which in turn reduces rate of insulin secretion  
overall result is to keep fluctuations in sugar level to a minimum  
*any 3 for 1 mark each*

3

[17]

### Q19.

any **three** from:

FSH stimulates growth / maturing of follicle(s) / eggs

FSH stimulates oestrogen release

oestrogen stimulates development of uterus lining

oestrogen stimulates LH release / production

LH stimulates ovulation / egg release

[3]

### Q20.

(a) any **three** from

increased thickness **or** build up for  
attachment of zygote **or** so zygote can  
implant;

*allow gives more room for blood vessels*

3

increased blood vessels to provide  
nutrients for zygote;

*allow embryo **or** fetus **or** baby  
**or** egg for zygote*

becomes thicker to form placenta;

increased surface area for attachment  
of zygote;

increased glands for secretion;

(b) (i) rise in hormone corresponds with rise  
in temperature;

*allow peak of hormone at same time as increased  
temperature **or** when hormone high, temperature is high  
allow change in hormone concentration followed by change  
in temperature **or** when hormone rises followed shortly by*

rise in temperature **or** graphs follow same pattern **or** graphs are nearly the same

1

(ii) maximum 36.90 °C

1

minimum 36.55 °C;

0.35 °C;

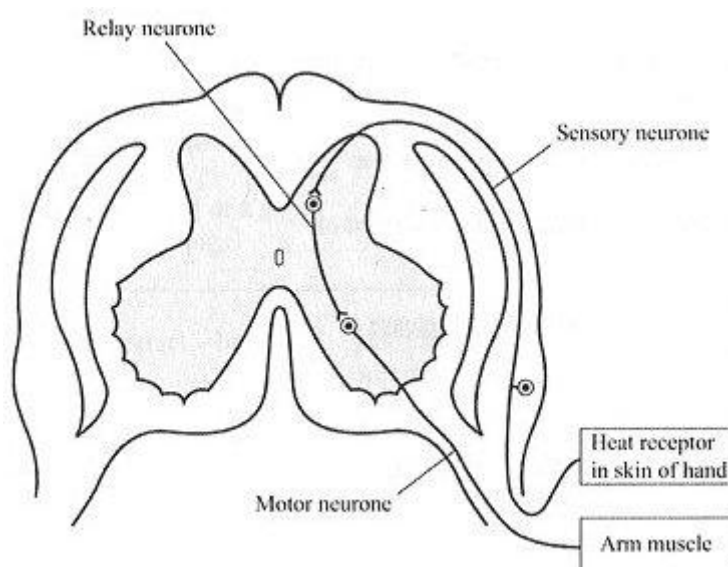
allow **both** marks for correct answer **or one** mark for 0.35 if clearly round up **or** round down allow one mark for working if correct

1

[6]

**Q21.**

(a)



sensory neurone correctly drawn **and** labelled

from receptor + via dorsal root + cell body in ganglion + synapse to relay neurone

1

motor neurone correctly drawn **and** labelled

to muscle + via ventral root + same shape as relay neurone + synapse with relay neurone

**OR** correct pathways for both neurones given (ie without synapse or cell bodies) **and** labelled, **or** correctly drawn but unlabelled = 1 mark for this part)

1

(b) any **two** from:

reference to synapses / gaps between neurones

extra time for release / movement of chemical

extra time for development of muscle 'tone' / tension

2

[4]

**Q22.**

only 24 students tested **or** only one test **or** reference to lack of controls eg gender / age

1

students could drink as much water as they wanted

**or**

some students drank more water than others

**or**

some students drank water and beer

1

differences only slight

*ignore effects of beer or promotion of beer drinking*

1

[3]

**Q23.**

(a) (i) sensory / afferent

1

(ii) on diagram:

arrow (next to neurone **A**) pointing towards spinal cord

**and**

arrow (next to neurone **B**) pointing towards muscle

1

(b) chemical (released) **or** neurotransmitter  
**or** by diffusion

*accept correct named example of a neurotransmitter*

1

(c) on diagram:

**X** labelling muscle **or** motor end plate

*do **not** accept on stretch receptor*

1

[4]

**Q24.**

(a) inhibits FSH (production / secretion)

1

(therefore) no eggs mature / released

*if no other marks gained allow 1*

*mark for no eggs produced*

1

**or**

effect of FSH on ovary described

*references to LH are neutral*

(b)

*maximum 4 marks if no conclusion*

Pros max 2marks from 4 marks e.g.

- large scale trial gave better results
- chose uneducated women so that if these women could use it correctly, women elsewhere would be able to cons max 3 marks from 4 marks e.g.
- used pill with high dose of hormone – **either** so results not valid for general use of hormone **or** dangerous
- side effects ignored
- women not told pill was experimental / pill might have side effects
- no placebo
- should have tried a range of doses
- should have done pre-trial to check for side effects

4

conclusion 1 mark e.g.

trials flawed therefore cons outweigh pros

accept reverse e.g. trials flawed but pros outweigh cons

1

[7]

## Q25.

any **three** from:

*max 2 if only advantages **or** only disadvantages discussed*

*ignore 'side effects' unqualified*

*ignore side effects produced by hormones*

### **advantages of IUCD over pill eg**

- can't forget to take it / have to take pill every day  
*do **not** allow last 5 years unless qualified*
- effect much longer than pill
- more effective in preventing pregnancy  
*do **not** allow reference to figures unless qualified*
- stops sperm entering uterus

### **disadvantages of IUCD over pill eg**

- pain / uncomfortable / risk of infection / may damage uterus
- prevents fertilised egg developing / 'embryo rights'  
*allow kills embryo*
- needs replacement by doctor / nurse / professional  
**or** access to IUCD is more difficult than pill

or IUCD is harder to come off than pill

3

argued conclusion

*must include a preference and a reference to **both** advantages and disadvantages  
or one is better in a given situation but the other is better in a different situation*

1

[4]

**Q26.**

(a) pancreas

1

(b) protease

*allow proteinase*

1

(c) (i) (same) enzymes / named enzymes produced in other parts / named parts of digestive system

*if named, enzymes and part must be correct*

1

(ii) diet / activity varies / amount of glucose in blood varies

*accept too much insulin leads to coma / hypo / low blood sugar*

*accept too little insulin leads to coma / hyper / high blood sugar*

1

(d) any **two** from:

pros

- less / no experimentation on humans
- dogs (more) similar to humans (than lower / named organisms)
- it allows us to find a treatment **or** improves medical understanding  
*accept allows us to find a cure*

cons

- harmful / cruel to dogs  
*accept kills dogs*
- dogs may not be (metabolically) like humans

2

conclusion justified by argument

1

[7]

**Q27.**

(a) (concentration high) in the hepatic portal vein is blood with glucose absorbed from the intestine

concentration is lower in the hepatic vein because insulin

1

(has caused) glucose to be converted into glycogen

1

1

**or**

allows glucose into liver cells

- (b) (i) (after 6 hours) most of the glucose has been absorbed from the intestine **or** from food into the blood

1

- (ii) because glucagon (made in the pancreas) causes  
*if biological terms incorrectly spelt they must be phonetically accurate*  
do **not** accept glucagon made / produced by the liver

1

glycogen to be converted into glucose

1

glucose released into blood

*allow the liver maintains the correct / constant level of glucose in the blood*

1

[7]

### Q28.

- (a) (i) (wholemeal bread)  
any **two** from:

lower maximum / peak / less change

1

slower rise / change

*ignore references to rate of fall **or** first to peak*

need to take less insulin / less likely to hyper

*no mark for identifying the type of bread but max 1 mark if not identified*

1

- (ii) any **four** from:

- amylase / carbohydrase
- starch to sugar  
*allow starch to glucose*
- (sugar) absorbed / diffused / passes into blood
- correct reference to pancreas  
*allow once only as rise or fall*
- insulin produced

- glucose (from blood) into cells / tissue / organ **or** named tissue / organ  
*allow glucose to glycogen*
- glucose used in respiration / for energy  
*max 3 for explaining rise*  
*max 3 for explaining fall*

4

(b) any **three** from:

advantages (compared to insulin injections):

- (may be) permanent / cure
- no / less need for self monitoring
- no / less need for insulin / injections  
*ignore reference to cost*
- no / less need for dietary control

disadvantages (compared to insulin injections):

- low success rate
- (may) still need insulin / dietary control
- operation hazards
- risk of infection from donor
- rejection / need for drugs to prevent rejection  
*max 2 if only advantages **or** only disadvantages discussed*  
*can give converse if clear that it relates to insulin injections*

3

[9]

**Q29.**

(a) **A** FSH

*allow follicle stimulating hormone*

1

**B** Progesterone

1

(b) LH peaks

*allow luteinising hormone*

1

which causes an egg to be released.

1

(c) **Level 3 (5–6 marks):**

A detailed and coherent explanation is given, which logically links the role of different hormones to their use in IVF and a clear explanation of how IVF increases the chance of a successful pregnancy.



**Level 2 (3–4 marks):**

An attempt is made to link the role of hormones to their use in IVF. The logic used in explaining how IVF increases the chance of a successful pregnancy may not be clear or linked to the hormones.

**Level 1 (1–2 marks):**

Discrete relevant points made. The logic may be unclear and links may not be made.

**0 marks:**

No relevant content

**Indicative content**

Identification of hormones used in IVF:

- FSH
- LH.

Role of hormones in IVF:

- FSH causes eggs to mature
- LH causes the eggs to be released.

Effect on chance of successful pregnancy:

- high levels of hormones cause many eggs to be matured and released
- sperm and eggs are collected and eggs are fertilised (so increased probability of fertilisation)
- fertilised eggs are given time to develop into a small ball of cells
- some are transferred into the mother (uterus), to increase the probability of one successfully implanting.

6

[10]

**Q30.**

(a) inhibit FSH production

*ignore LH production  
ignore wrong hormone*

1

so egg does not mature

*ignore egg production / egg release / egg development*

1

(b) any **three** comparisons: eg

- ease of insertion compared ie ring easily inserted by woman whereas implant needs professional **or** no damage to skin with ring

*comparisons must be made ie two separate lists will gain no marks unless the lists are linked by eg whereas / however / on the other hand **and** the points are made in the same order in both lists*

- length of delivery compared eg 3 weeks for ring whereas 3 years for implant **or** delivery longer for implant **or** woman has to remember to insert ring whereas does not have to remember to insert implant

*ignore cost*

- effectiveness compared eg 0.3 % failure with ring whereas nil for implant **or** implant more effective
- number giving up compared eg 4 % for ring whereas 2 % for implant **or** fewer women give up using implant

**or** ring might cause vaginal discomfort whereas implant may cause irregular menstrual bleeding

3

reasoned conclusion (normally at the end)

*ie must state 'better because...'*

1

[6]

### Q31.

(a) *ignore nerve / neuron(e) throughout*

**A** sensory

*accept afferent*

1

**B** motor

*accept efferent*

1

**C** relay

*accept intermediate*

1

(b) stretch

*allow pressure / pull / tension (in muscle)*

*allow a hit at (point) **P***

*ignore pain*

1

(c) any **three** from:

- chemical (release)

*accept neurotransmitter / acetylcholine*

- diffuses (across the gap / synapse)

- transmits impulse / information (across synapse)

*allow transmits signal / message*

- between neurones / nerve cells / named

*if named, must be either sensory / A to relay / C **or** relay / C to motor / B*

*allow 'to the next neurone'*

3

[7]

### Q32.

- (a) **A** sensory (neurone)  
*ignore nerve* 1
- B** motor (neurone)  
*ignore nerve* 1
- C** spinal cord / central nervous system / white matter  
*accept grey matter* 1
- (b) by chemical / substance  
*allow transmitter* 1
- (c) muscle  
*allow extensor*  
*ignore muscle names* 1

[5]

**Q33.**

- (a) Pituitary 1
- (b)  $\frac{10-4}{4}$  **or**  $\frac{6}{4}$  1
- = 150 (%) 1
- (c) the level in the blood is already higher than it was before point **A** 1
- levels hadn't returned to normal yet (before the next scare)  
*allow he had already been scared so he was expecting the second scare* 1
- (d) increased oxygen to brain / muscles 1
- increased glucose to brain / muscles 1

[7]

**Q34.**

- (a) (i) one form of a / one gene  
*do not allow 'a type of gene'*  
*allow a mutation of a gene* 1
- (ii) not expressed if dominant / other allele is present / if heterozygous  
**or**

only expressed if dominant allele not present / or no other allele present  
*allow need two copies to be expressed / not expressed if only one copy / only expressed if homozygous*

1

- (b) (i) two parents without PKU produce a child with PKU / **6** and **7** → **10**  
*allow 'it skips a generation'*

1

- (ii) genetic diagram including:  
*accept alternative symbols if defined*

Parental gametes:

**6: N** and **n**  
**and 7: N** and **n**

1

derivation of offspring genotypes:

**NN**   **Nn**   **Nn**   **nn**

*allow genotypes correctly derived from student's parental gametes*

1

identification: **NN** and **Nn** as non-PKU

**OR nn** as PKU

*allow correct identification of student's offspring genotypes*

1

correct probability only: 0.25 / ¼ / 1 in 4 / 25% / 1 : 3

*do **not** allow 3 : 1 / 1 : 4*

*do **not** allow if extra incorrect probabilities given*

1

- (c) (i) mitosis  
*correct spelling only*

1

- (ii) 8

1

- (iii) DNA

*allow deoxyribonucleic acid*

*do **not** allow RNA / ribonucleic acid*

1

- (d) (i) may lead to damage to embryo / may destroy embryos / embryo cannot give consent

*allow avoid abortion*

*allow emotive terms – eg murder religious argument must be qualified*

*allow ref to miscarriage*

*allow idea of avoiding prejudice against disabled people*

*allow idea of not producing designer babies*

1

(ii) any **one** from:

- prevent having child with the disorder / prevent future suffering / reduce incidence of the disease  
*ignore ref to having a healthy child*  
*ignore ref to selection of gender*
- embryo cells could be used in stem cell treatment  
*allow ref to long term cost of treating a child (with a disorder)*  
*allow ref to time for parents to become prepared*

1

[12]

### Q35.

(a) motor

*allow efferent / postsynaptic*  
*allow **another** relay (neurone)*

1

(b) release of chemical (from relay neurone)

*allow ecf for 'motor' neurone from (a)*  
*allow release of neurotransmitter / named example*

1

chemical crosses gap / junction / synapse

*allow diffuses across*  
*allow chemical moves to X*

1

chemical attaches to X / motor / next neurone (causing impulse)

1

(c) (curare) decrease / no contraction

*accept (muscle) relaxes*

1

(strychnine) increase / more contraction

*if no other mark awarded allow 1 mark for (curare) decrease*  
*/ no response **and** (strychnine) increase / more response*

1

[6]

### Q36.

Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best-fit' approach to the marking.

#### 0 marks

No relevant content.

#### Level 1 (1 – 2 marks)

There is a brief description of kidney function including a mention of pituitary gland **or** hormones but roles may be confused.

#### Level 2 (3 – 4 marks)

There is a clear description of kidney function in relation to fluctuations in blood water levels and the roles of the pituitary gland **or** hormone is mentioned with

correct role.

**Level 3 (5 – 6 marks)**

There is a clear and detailed scientific description of kidney function in relation to fluctuations in blood water levels and of the roles of the pituitary gland and ADH.

**examples of biology points made in the response:**

- if water content too low, ADH released
- from pituitary gland
- into the blood
- (causing) kidney reabsorbs more water
- more concentrated / small volume urine produced
- if water content too high, ADH lowered / not produced
- less water reabsorbed by kidney
- more dilute / larger volume urine produced

*full marks may be awarded for detailed description of either water loss or gain*