Q1. Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A, B, C** and **insulin,** used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain ncreased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain ncreased risk of lung damage

(a) Which drug, **A, B, C** or **insulin,** is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug .....

Explanation

.....

.....

(2)

(b) (i) Drugs **A, B and C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

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(1)

(ii) Other than using drugs, give **two** methods of treating diabetes.

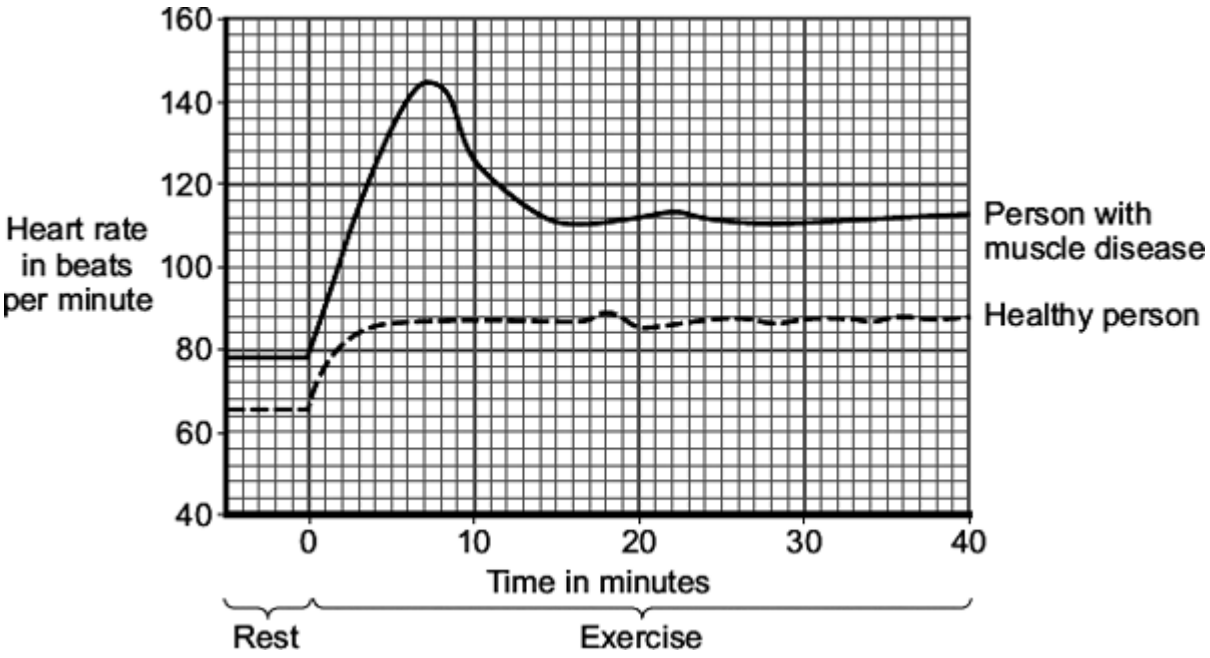
1 .....

2 .....

(2)
(Total 5 marks)

Q2. Two people did the same amount of gentle exercise on an exercise cycle. One person had a muscle disease and the other had healthy muscles.

The graph shows the effect of the exercise on the heart rates of these two people.



(a) Describe **three** ways in which the results for the person with the muscle disease are different from the results for the healthy person.

To gain full marks in this question you need to include data from the graph in your answer.

1 .....

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2 .....

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3 .....

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(3)

(b) The blood transports glucose to the muscles at a faster rate during exercise than when a person is at rest.

(i) Name **one** other substance that the blood transports to the muscles at a faster rate during exercise.

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(1)

(ii) People with the muscle disease are not able to store glycogen in their muscles.

The results shown in the graph for the person with the muscle disease are different from the results for the healthy person.

Suggest an explanation for the difference in the results.

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(3)
(Total 7 marks)

Q3. This question is about hormones.

(a) (i) Hormones carry messages.

What type of messenger is a hormone?

Draw a ring around the correct answer.

chemical **electrical** **environmental**

(1)

(ii) Which part of the brain secretes hormones?

Draw a ring around the correct answer.

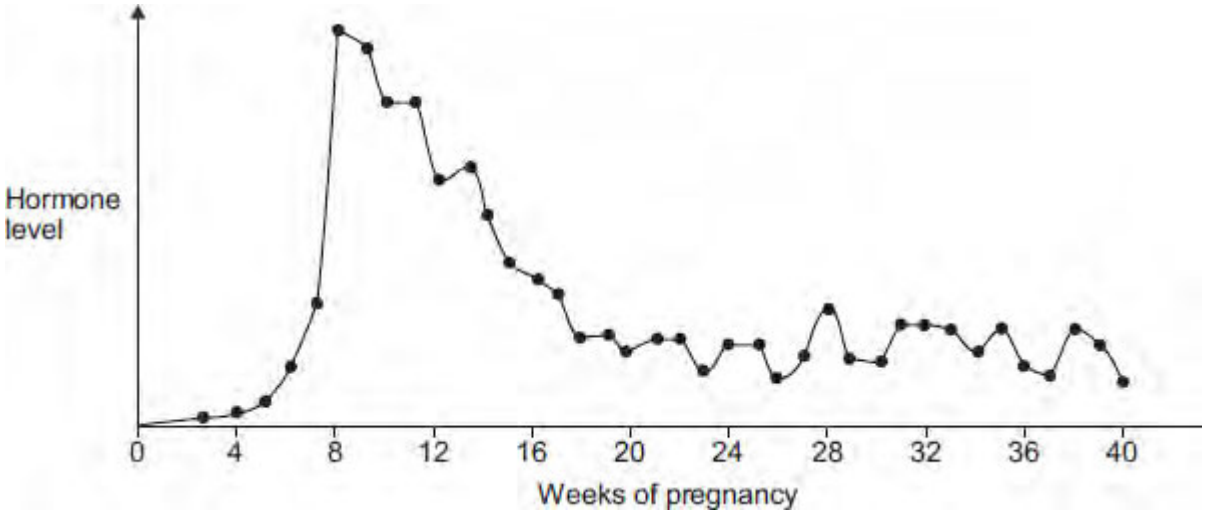
cerebellum **medulla** **pituitary gland**

(1)

(b) **Figure 1** shows the level of a pregnancy hormone over a 40-week pregnancy.

This hormone can be detected in a pregnancy test.

Figure 1



A woman takes a pregnancy test.

In which week of pregnancy is the test most likely to give a positive result?

Use information from **Figure 1**.

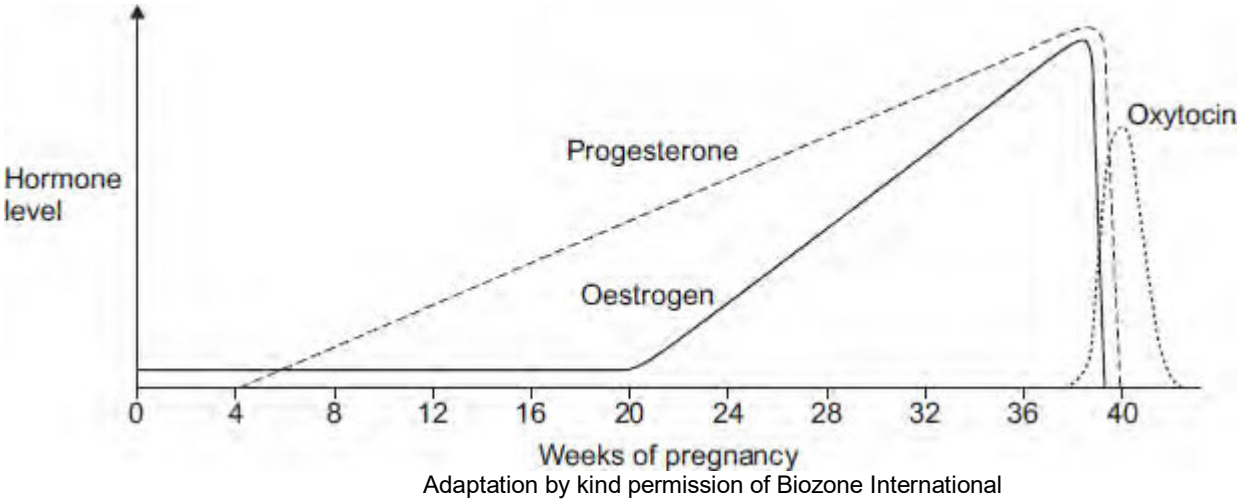
Write the correct answer in the box.

(1)

(c) **Figure 2** shows the levels of three other hormones during pregnancy.

The baby is usually born at about 40 weeks.

Figure 2



Adaptation by kind permission of Biozone International

(i) Describe the patterns in the levels of oestrogen and progesterone from 0 to 36 weeks.

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(4)

(ii) Which hormone is likely to stimulate contractions of the uterus (womb)

when the baby is born?

Use information from **Figure 2** to give a reason for your answer.

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(2)
(Total 9 marks)

Q4. One factor that may affect body mass is *metabolic rate*.

(a) (i) What is meant by *metabolic rate* ?

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(1)

(ii) Metabolic rate is affected by the amount of activity a person does.

Give **two** other factors that may affect a person's metabolic rate.

1.....

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2.....

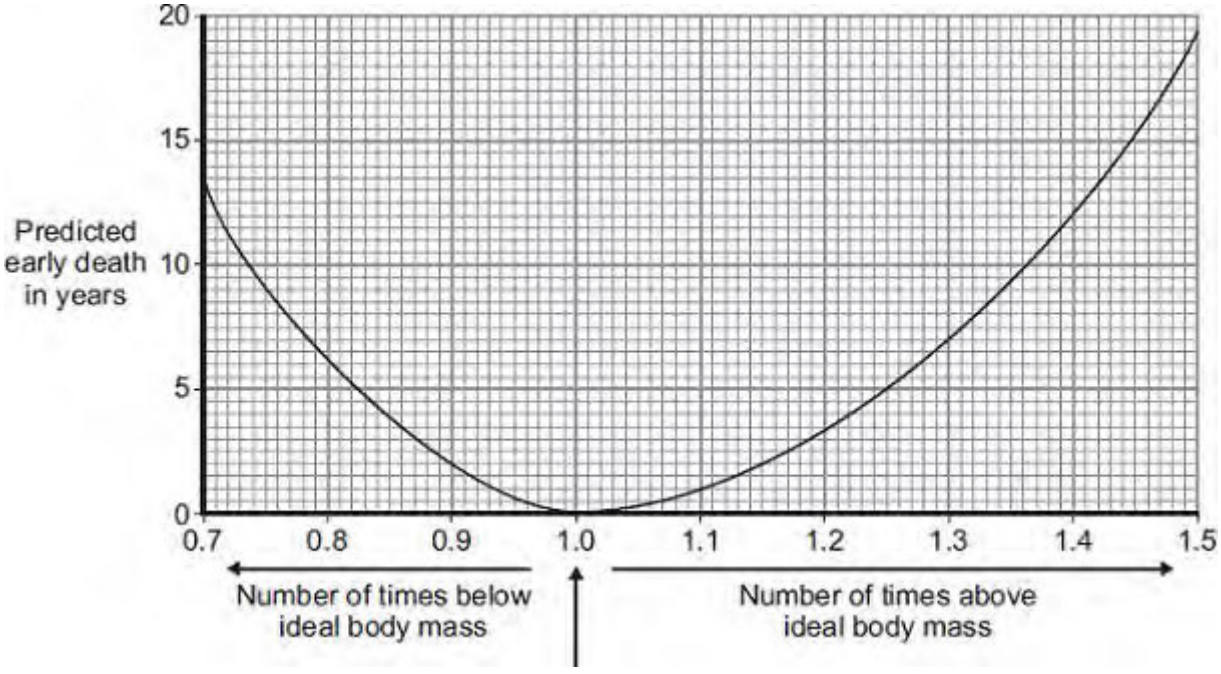
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(2)

(b) Predicted early death is the number of years that a person will die before the mean age of death for the whole population. The predicted early death of a person is affected by their body mass.

Scientists have calculated the effect of body mass on predicted early death.

The graph shows the results of the scientists' calculations.



Ideal body mass

The number of times above or below ideal body mass is given by the equation:

$$\frac{\text{Actual body mass}}{\text{Ideal body mass}}$$

In the UK the mean age of death for women is 82.

A woman has a body mass of 70 kg. The woman's ideal body mass is 56 kg.

(i) Use the information from the graph to predict the age of this woman when she dies.

.....

.....

.....

Age at death = ... years

(2)

(ii) The woman could live longer by changing her lifestyle.

Give **two** changes she should make.

1.....

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2.....

.....

(2)

(Total 7 marks)

Q5. The human body produces many hormones.

(a) (i) What is a *hormone*?

.....

.....

(1)

(ii) Name an organ that produces a hormone.

.....

(1)

(iii) How are hormones transported to their target organs?

.....

(1)

(b) Describe how the hormones FSH, oestrogen and LH are involved in the control of the menstrual cycle.

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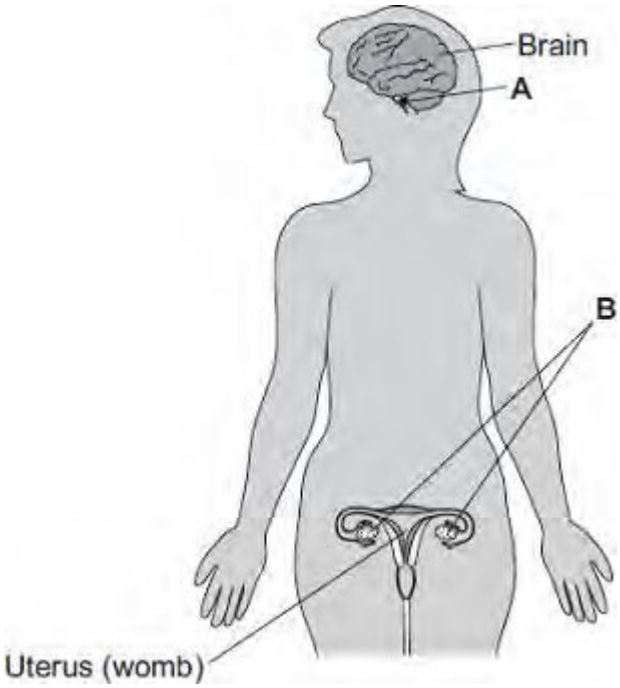
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(3)

(Total 6 marks)

Q6. The diagram shows the position of two glands, **A** and **B**, in a woman.



(a) (i) Name glands **A** and **B**.

A .....

B .....

(2)

(ii) Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).

FSH controls changes in gland **B**.

How does FSH move from gland **A** to gland **B**?

.....

(1)

(b) (i) A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

Tick (✓) **one** box.

FSH and Luteinising Hormone (LH) ☐

FSH and oestrogen ☐

Luteinising Hormone (LH) and oestrogen ☐

(1)

(ii) Giving these hormones to the woman helps her to produce several mature eggs.
Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

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(3)

(iii) IVF clinics have been set a target to reduce multiple births.

> At least 76% of IVF treatments should result in single babies and a maximum of 24% of treatments should result in multiple births.

Suggest **one** reason why the clinics have been set this target to reduce multiple births.

.....

.....

(1)

(c) Two clinics, **R** and **S**, used IVF treatment on women in 2007. Doctors at each clinic used the results of the treatments to predict the success rate of treatments in 2008.

The table shows the information.

	Total number of IVF treatments in 2007	Number of IVF treatments resulting in pregnancy in 2007	Predicted percentage success rate in 2008
Clinic **R**	1004	200	18–23
Clinic **S**	98	20	3–56

(i) Compare the success rates of the two clinics in 2007.

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(1)

(ii) The range of the predicted success rate in 2008 for clinic **R** is much smaller than the range of the predicted success rate for clinic **S**.

Suggest why.

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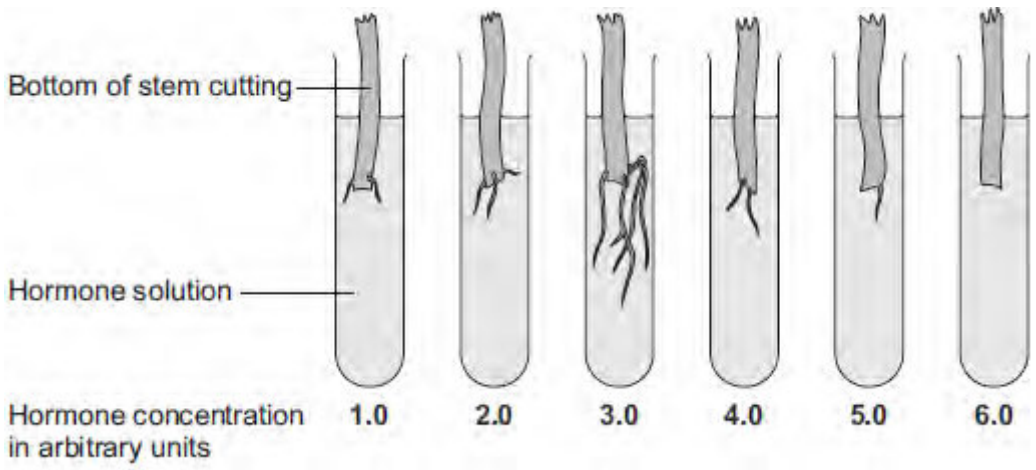
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(2)
(Total 11 marks)

Q7.(a) A student investigated the effect of a plant hormone on the growth of roots by plant cuttings.

The student took six stem cuttings from the same plant. He put the cuttings in test tubes containing hormone solutions of different concentrations.

The image below shows the six cuttings after 2 weeks.



(i) What is the best concentration of hormone for encouraging root growth?

..... arbitrary units

(1)

(ii) Give **two** functions of plant roots.

1 .....

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2 .....

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(2)

(iii) Draw a ring around the correct answer to complete the sentence.

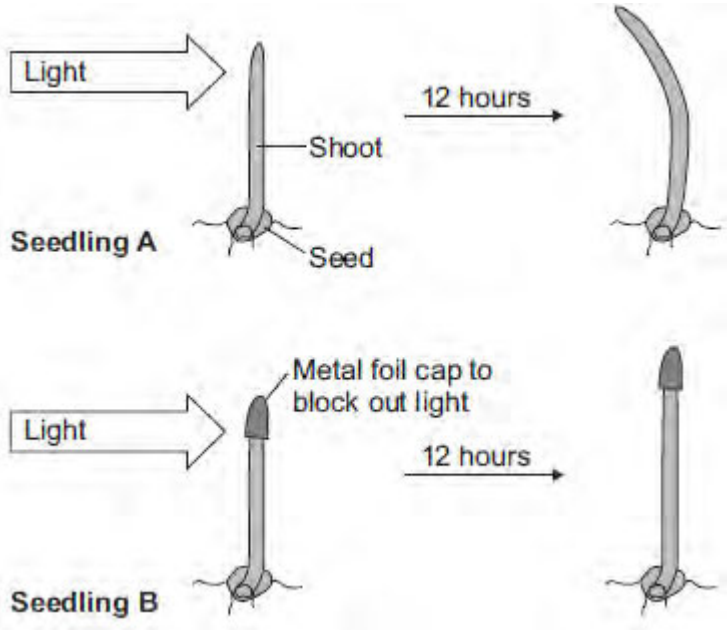
Taking cuttings to produce new plants is an example of

asexual reproduction.
genetic engineering.
sexual reproduction.

(1)

(b) Another student investigated the effect of light, shining from one side, on the growth of plant shoots.

The diagram below shows how the student treated the shoots and the results she obtained after 12 hours.



(i) What is the response to light shown by **Seedling A** called?

Tick (✓) **one** box.

cloning ☐

a reflex ☐

a tropism ☐

(1)

(ii) The student concluded that the shoot **tip** is sensitive to light.

What evidence is there in the diagram above for this conclusion?

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(2)

(c) The seedling produces a hormone which helps to control its response to light.

(i) What is the name of the hormone?

Tick (✓) **one** box.

auxin ☐

glucagon ☐

glycerol ☐

(1)

(ii) How does the hormone control the response of **Seedling A** to light shining from one side?

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(4)
(Total 12 marks)