Questions are for both triple and combined science students
unless indicated in the question

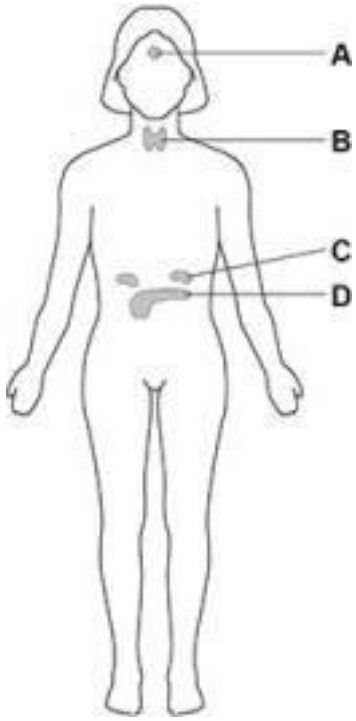
Q1.

Many internal processes of the human body are controlled by hormones.

Hormones are produced by glands.

Figure 1 shows glands in a woman's body.

Figure 1



(a) Which gland is the pituitary gland?

Tick (✓) one box.

A ☐ B ☐ C ☐ D ☐

(1)

(b) Which gland is the pancreas?

Tick (✓) one box.

A ☐ B ☐ C ☐ D ☐

(1)

The hormone insulin helps to decrease the blood glucose concentration.

Insulin causes its target organs to take in glucose from the blood.

(c) Which of the following is a target organ for insulin? Tick

(✓) one box.

Bladder ☐

Heart ☐

Liver ☐

(1)

(d) The glucose is stored as an insoluble substance.

What is the insoluble storage substance that is formed from glucose? Tick

(✓) one box.

Glycogen ☐

Protein ☐

Urea ☐

(1)

Scientists investigated the effect of a glucose drink on the concentration of glucose in a person's blood.

This is the method used.

1. Take a small sample of blood from the person.
2. Measure the concentration of glucose in the person's blood.
3. Give the person a drink containing 50 grams of glucose.
4. Measure the concentration of glucose in the person's blood at intervals.
5. Calculate the change in blood glucose concentration from the starting value.

Figure 2 shows the results.

Figure 2

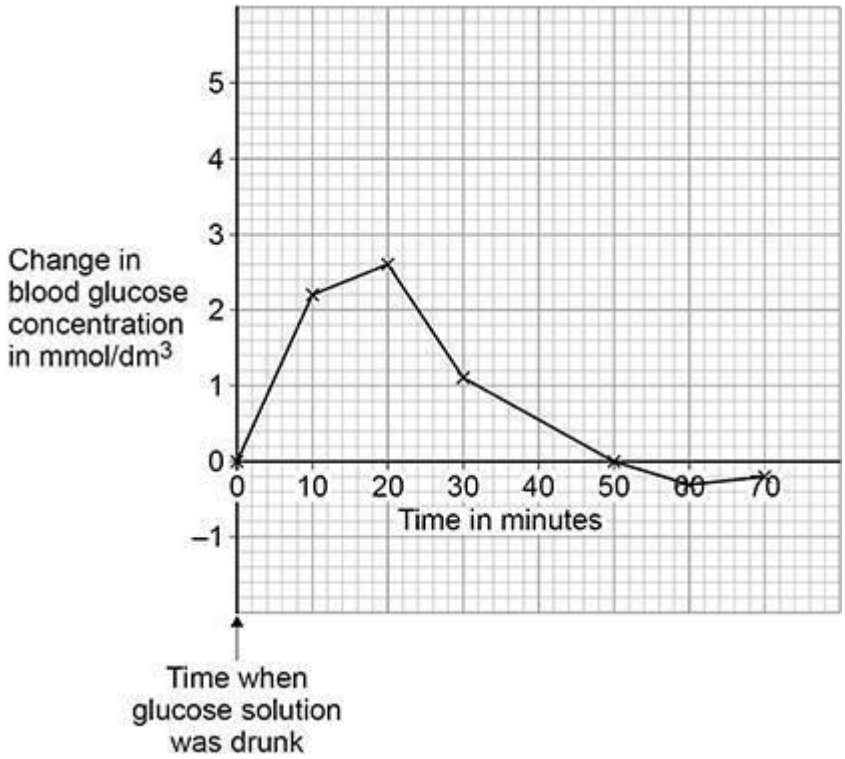


Figure 2 shows the change in blood glucose concentration.

(e) At the start of the investigation, the blood glucose concentration was 5 mmol/dm3.

Calculate the highest blood glucose concentration during the investigation. Use information from Figure 2 in your answer.

_____

_____

_____

Highest blood glucose concentration = _____ mmol/dm3

(2)

(f) What is the time taken for the blood glucose concentration to decrease from its highest value back to the starting value?

Use data from Figure 2 in your answer.

_____

Time taken = _____ minutes

(1)

(g) Why can you not be certain that your answer to part (f) is accurate?

_____

_____

(1)

(h) Figure 2 above shows the results for a person who does not have Type 2 diabetes.

Sketch a line on Figure 2 to show the results you would expect for a person who has Type 2 diabetes.

(2)
(Total 10 marks)

Q2.

Reflex actions are coordinated by the nervous system.

(a) What is meant by the term 'reflex action'?

_____

_____

_____

_____

(2)

(b) A woman's hand accidentally touches a hot object. The

woman moves her hand away rapidly.

Describe how the woman's nervous system coordinates the reflex action.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(c) The endocrine system coordinates many internal functions of the body.

Give three ways coordination by the endocrine system is different from coordination by the nervous system.

1 _____

_____

2 _____

_____

3 _____

_____

(3)

(d) Describe how hormones control the menstrual cycle.

_____

_____

_____

_____

_____

_____

_____

_____

_____

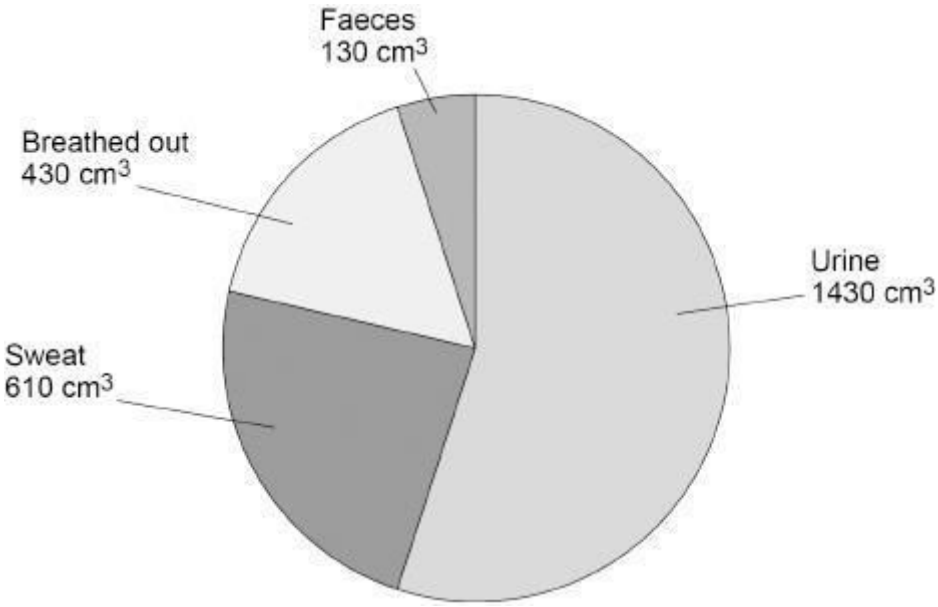
_____

(5)

(Total 16 marks)

Q3. **(triple only)**

The pie chart below shows the water loss from a person on one day.



(a) The total water loss was 2600 cm^3. **(triple only)**

Calculate the percentage of the total water loss that was lost as urine.

_____

_____

_____

Percentage lost as urine = _____ %

(2)

A marathon race is 42 km long.

(b) What happens to the volume of water lost as sweat when a person runs a marathon? **(triple only)**

_____

_____

(1)

(c) What must marathon runners do to prevent themselves becoming dehydrated? **(triple only)**

_____

_____

(1)

(d) Complete the sentences.

Choose answers from the box. **(triple only)**

digestion	excretion	fertilisation	filtration	reabsorption

Blood entering the kidneys goes through the process of _____.

Glucose is not found in urine because of _____.

Urine is removed from the body in the process of _____.

(3)

(e) People with kidney failure can have dialysis or a kidney transplant.

Dialysis is often needed 3 times each week and can take over 4 hours each time.

Dialysis usually happens in a hospital.

Kidney transplants require a donor and major surgery.

Describe the advantages and disadvantages of having a kidney transplant instead of having dialysis. **(triple only)**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 11 marks)

Q4.

Two of the substances the body excretes are urea and carbon dioxide.

(a) Complete the sentence.

Choose the answer from the box. **(triple only)**

carbohydrate	lipid	protein	salt

A person makes a lot of urea if the person's diet contains

a lot of _____

(1)

(b) Why must urea be excreted from the body? **(triple only)**

_____

_____

(1)

(c) A person produces more carbon dioxide during exercise than when resting.

Complete the sentences.

Choose answers from the box.

breathing	digestion	egestion
osmosis	respiration	

The process that makes carbon dioxide is

_____

During exercise, extra carbon dioxide can be removed from the body by increasing

the rate of _____.

(2)

(d) Excess water must also be removed from the body.

If a person sweats a lot, less water will be excreted in the urine.

A healthy person did the same amount of exercise on each of 3 days. The following table shows information for the 3 days.

Day	Air temperature in °C	Volume of water consumed in cm3	Relative amount of urine produced by the kidneys
1	30	1500	

2	20	1500	
3	15	2000	

Complete the table.

Choose answers from the box. **(triple only)**

least	medium	most

(2)

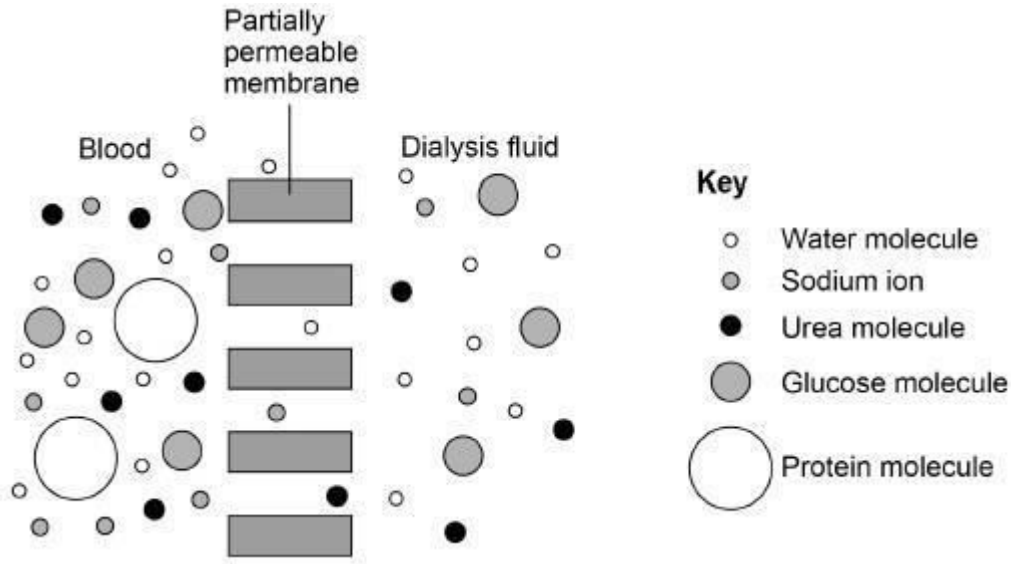
Some people have kidney disease.

Kidney disease may be treated by dialysis or by having a kidney transplant operation.

- During dialysis, a person is connected to a machine that filters the blood.
- Each dialysis session lasts about 6 hours.
- The person has several dialysis sessions each week.

Figure 1 shows how dialysis works.

Figure 1



(e) How does urea move out of the blood during dialysis?

Tick (✓) one box. **(triple only)**

Diffusion ☐

Digestion ☐

Osmosis ☐

Respiration ☐

(1)

(f) Which substance in Figure 1 does not pass from the blood into the dialysis fluid?

Give the reason for your answer. **(triple only)**

Substance

_____

Reason

_____

_____

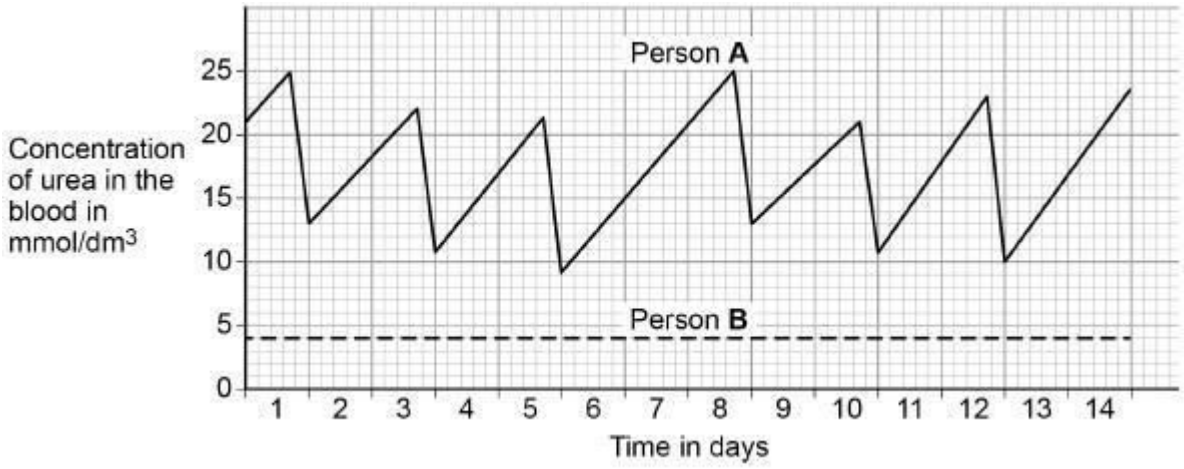
(2)

Two people have kidney disease.

- Person A is treated by dialysis.
- Person B has had a kidney transplant.

Figure 2 shows changes in the urea concentration in the blood of each person over 2 weeks.

Figure 2



(g) How many dialysis sessions did person A have each week? **(triple only)**

_____

(1)

(h) What happens to the concentration of urea in the blood between dialysis

sessions? **(triple only)**

_____

(1)

(i) Give two reasons why a kidney transplant is a better method for treating kidney disease than dialysis. **(triple only)**

1 _____

_____

2 _____

_____

(2)

(Total 13 marks)

Q5. **(triple only)**

Water conservation is important to the human body.

(a) Which gland releases the hormone that controls water loss from the body? Tick (✓) one box. **(triple only)**

Adrenal	☐
Pancreas	☐
Pituitary	☐
Thyroid	☐

(1)

(b) Which hormone helps the kidneys to control water loss from the body?

Tick (✓) one box. **(triple only)**

ADH	☐
Adrenaline	☐
LH	☐

Thyroxine 

(1)

(c) A man is walking across a desert.

The man has used up his supply of drinking water.

Explain how the gland you named in part (a) and the kidneys reduce water loss. **(triple only)**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(d) Some people have kidney failure.

Doctors may treat patients with kidney failure by either:

- dialysis
- a kidney transplant.

Explain two biological reasons why most doctors think that a kidney transplant is a better method of treatment than dialysis. **(triple only)**

Do not refer to cost or convenience.

Reason
1 _____

_____

_____

Reason
2 _____

_____

_____

_____

(4)

(Total 9 marks)

Q6.

It is important to keep the blood glucose concentration within narrow limits.

(a) A person eats a meal containing a lot of carbohydrate. This causes an increase in the person's blood glucose concentration.

Explain how the hormones insulin and glucagon control the person's blood glucose concentration after the meal.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5)

(b) The body cells of a person with Type 2 diabetes do not respond to insulin.

A person with Type 2 diabetes often has a higher blood insulin concentration than a non-diabetic person.

Explain why.

_____

_____

_____

_____

_____

_____

(3)

Metformin is a drug used for treating people who have Type 2 diabetes.

Scientists investigated the effects of metformin and two other drugs, A and B.

The scientists wanted to see how the drugs affected the blood glucose concentrations of 220 people with Type 2 diabetes.

This is the method used.

1. Put the 220 people into five groups.

2. Treat each group with a different drug or combination of drugs for several weeks.

3. Give each person a meal high in carbohydrate.

4. Measure the blood glucose concentration of each person 30 minutes after the meal and again 3 hours after the meal.

(c) Suggest three variables that the scientists should have controlled in the investigation.

1 _____

_____

2 _____

_____

3 _____

_____

(3)

The scientists recorded their results as a mean value for each group.

The scientists calculated the 'standard deviation' for each group's result.

Standard deviation is a measure of the spread of the individual results above or below (±) the mean value.

The scientists gave each group's result as:

mean ± standard deviation

The larger the standard deviation, the greater is the spread of results around the mean.

(d) Which of the results is the most precise?

Tick (✓) one box.

Mean = 171.6 ± 16.3 ☐

Mean = 177.2 ± 15.4 ☐

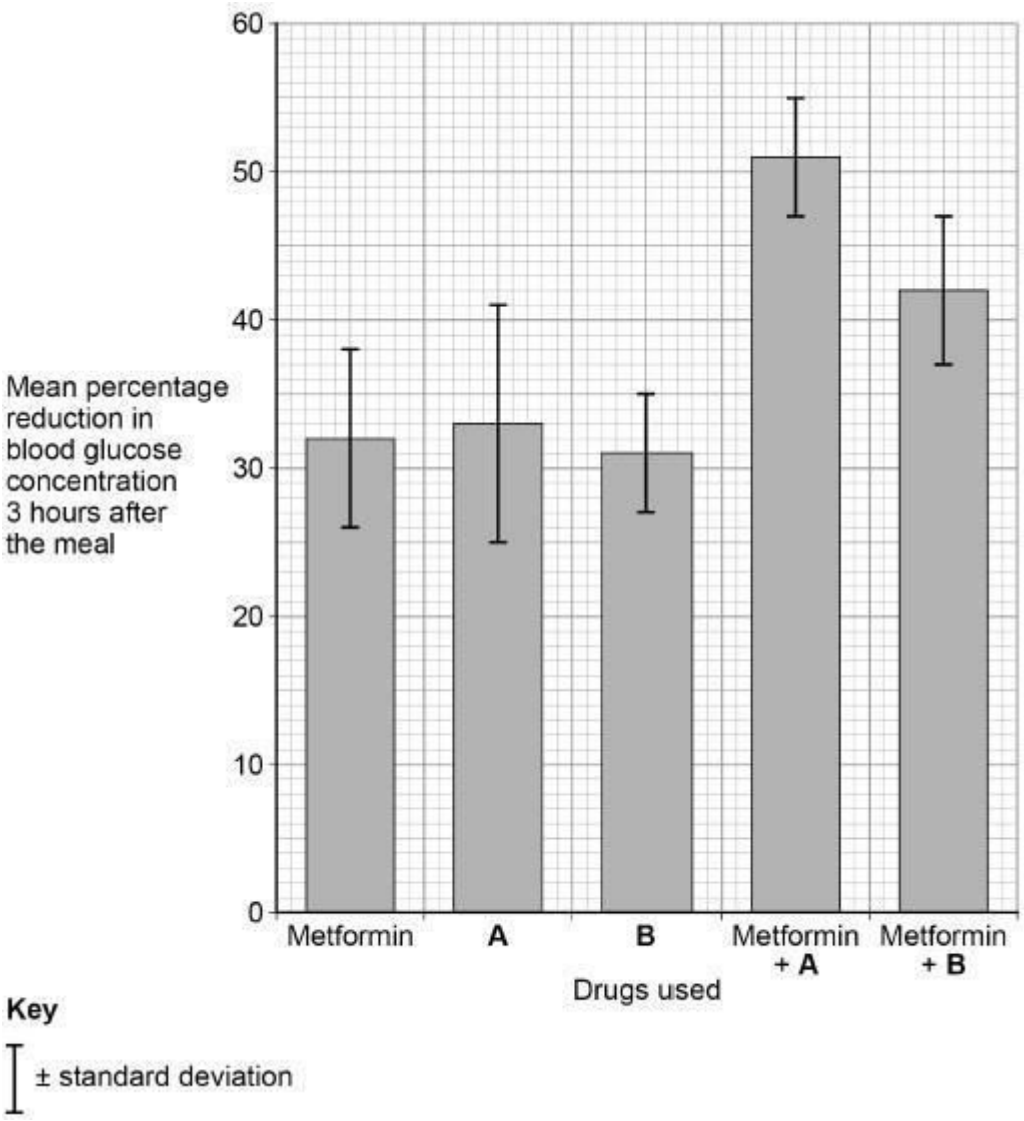
Mean = 182.5 ± 18.2 ☐

Mean = 205.2 ± 19.4 ☐

(1)

The following table and the figure show the scientists' results.

Drugs used	Metformin	A	B	Metformin + A	Metformin + B
Number of people	60	40	25	65	30
Mean blood glucose concentration 30 minutes after the meal in mg/100 cm3 ± standard deviation	177.2 ± 15.4	182.5 ± 18.2	171.6 ± 16.3	205.2 ± 19.4	206.5 ± 19.6



In the table and the figure some standard deviations of results overlap.

- An overlap of standard deviations shows the difference between the means is not significant.
- No overlap of standard deviations shows a significant difference between the means.

(e) A student looked at the scientists' method and the results in the table and figure above.

The student stated:

'Metformin works better when used with other drugs.'

Evaluate the student's statement.

_____

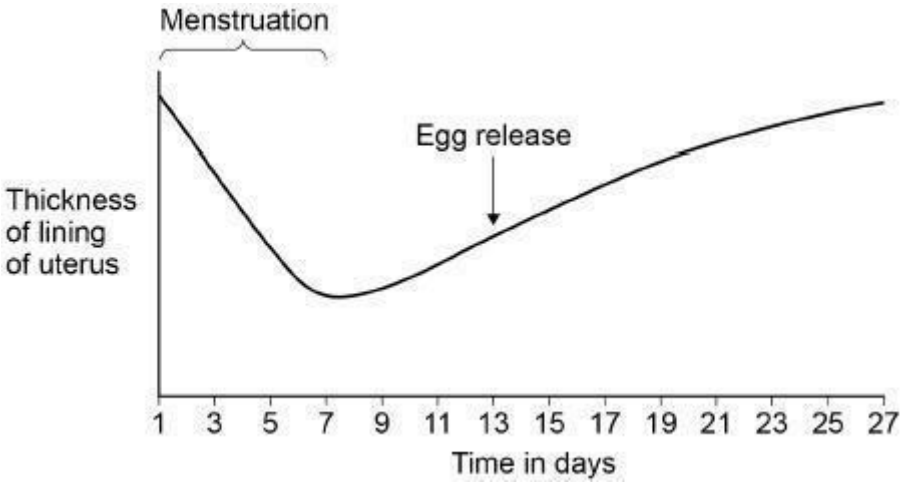
_____

(6)

(Total 18 marks)

Q7.

The graph below shows some changes that occur during the menstrual cycle.



(a) The graph above shows that the lining of the uterus thickens between days 7 and 27.

What is the purpose of thickening the lining of the uterus? Tick one box.

To allow implantation of the embryo ☐

To break down waste ☐

To prevent sperm reaching the egg ☐

(1)

(b) Which hormone causes thickening of the lining of the uterus? Tick one box.

Auxin ☐

Oestrogen ☐

Testosterone ☐

(1)

(c) On which day is fertilisation most likely to occur? Use information from the graph above.

_____

(1)

Contraception can be used to lower the chance of pregnancy.

(d) Draw one line from each method of contraception to how the method works.

Method of contraception	How the method works
Contraceptive pill	Barrier to prevent sperm reaching the egg
Diaphragm	Contains hormones to stop eggs maturing
Spermicidal cream	Kills sperm
	Slows down sperm production

(3)

(e) The table below gives information about some different methods of contraception.

Method	Number of pregnancies per 100 women in one year	Possible Side effects
Diaphragm and spermicidal cream	8	Usually none, but can cause bladder infection in some women
Condom	2	None
Contraceptive pill	1	Mood swings, headaches, high blood pressure, blood clots, breast cancer

A man and a woman decide to use the condom as their method of contraception.

Suggest three reasons for this decision.

Use information from the table above and your own knowledge.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(Total 9 marks)

Q8.

A person with Type 1 diabetes cannot make enough insulin.

(a) Which organ makes insulin?

Tick one box.

Adrenal gland ☐

Pancreas ☐

Pituitary gland ☐

Thyroid ☐

(1)

(b) A person with Type 1 diabetes can control the concentration of glucose in the blood by injecting insulin.

Complete the sentences.

Choose answers from the box.

DNA	glycogen	kidney
liver	protein	skin

Insulin acts on an organ called the _____ .

This organ then takes in excess glucose from the blood and changes the glucose into _____ .

(2)

(c) Insulin cannot be taken as a tablet. This is because insulin is a type of protein.

What would happen to the insulin in the tablet if it reached the stomach?

_____

_____

(1)

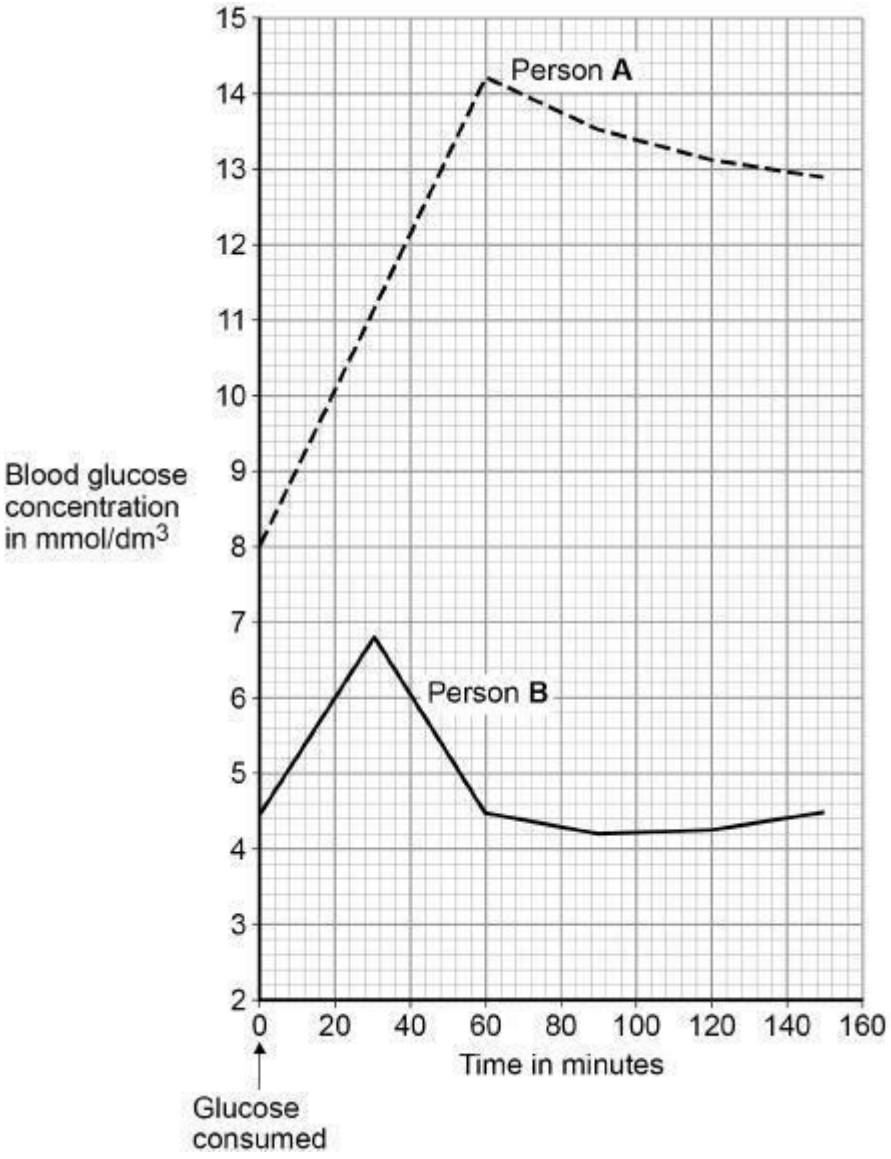
Two people each drank the same volume of a glucose drink.

Person A has Type 1 diabetes.

Person B does not have diabetes.

Figure 1 shows how the concentration of glucose in their blood changed.

Figure 1



(d) How much higher was the highest concentration of glucose in the blood of person A than the highest concentration in person B?

Use information from Figure 1.

_____

_____

_____

_____

Answer = _____ mmol/dm3

(2)

(e) Describe one other way that the results for person A were different from the results for person B.

Use information from Figure 1.

_____

_____

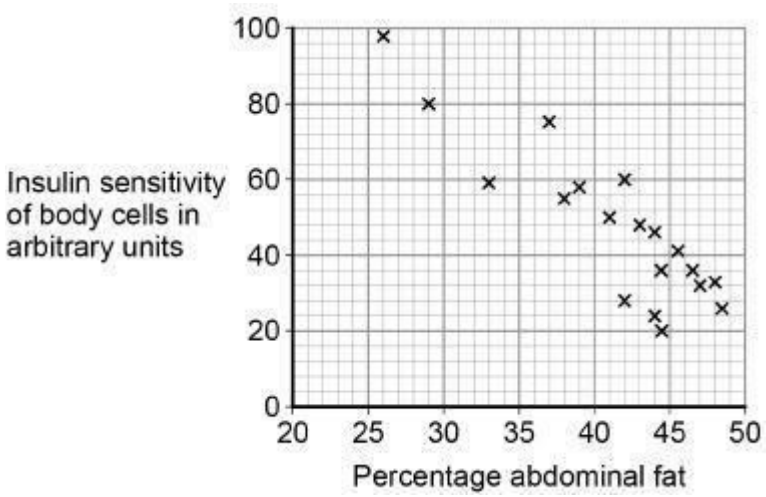
(1)

Type 2 diabetes is another form of diabetes. Type 2 diabetes is common in obese people.

People with Type 2 diabetes make enough insulin, but still cannot control their blood glucose concentration. This is because the body cells are not sensitive to the insulin.

Figure 2 shows information about abdominal fat and insulin sensitivity in body cells.

Figure 2



(f) What type of relationship is shown in Figure 2? Tick one box.

A negative correlation ☐

No correlation ☐

A positive correlation ☐

(1)

(g) A person is at risk of developing Type 2 diabetes.

Suggest two ways the person could lower the chance of developing Type 2 diabetes.

1. _____

_____

2. _____

_____

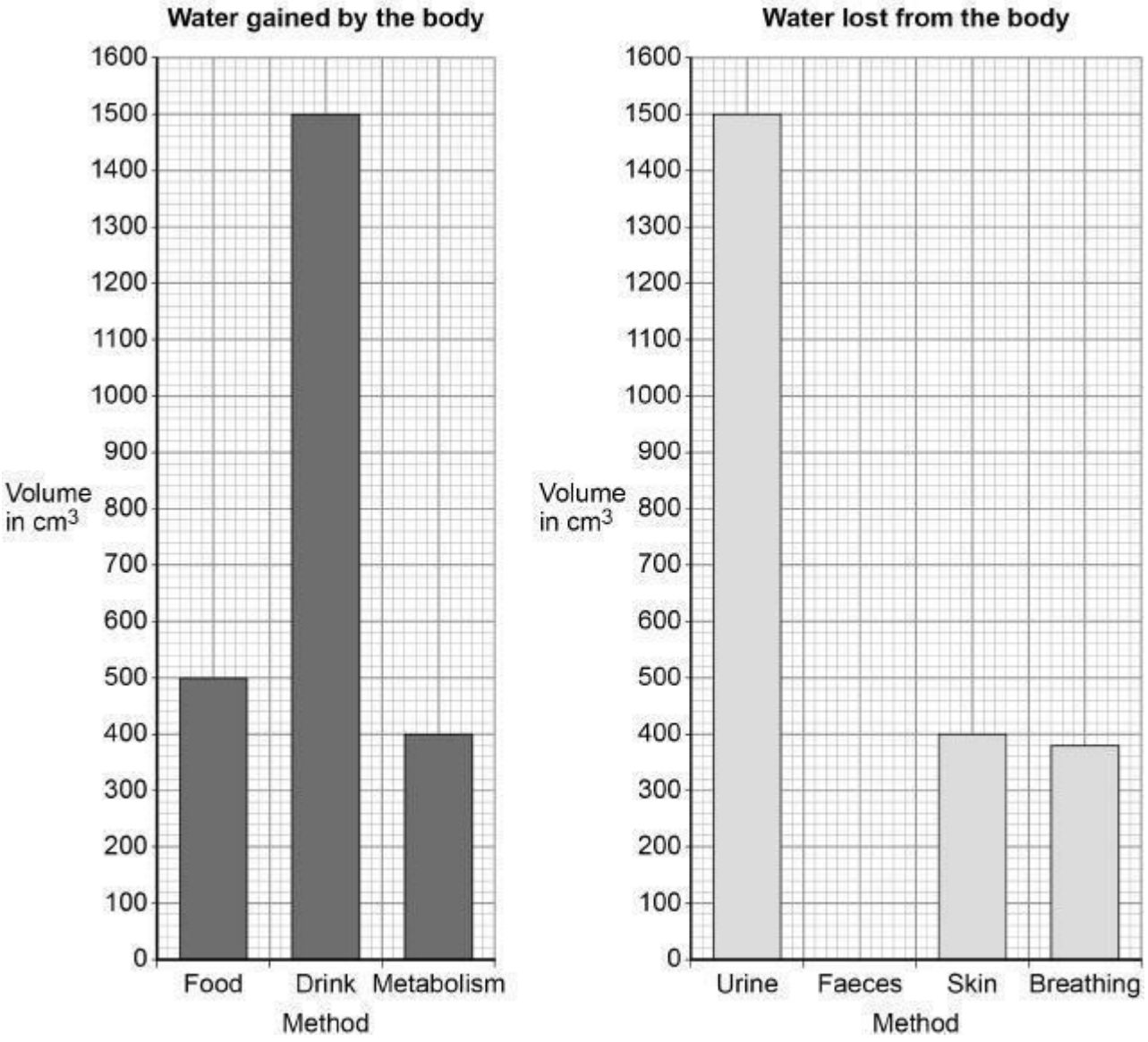
(2)

(Total 10 marks)

Q9. **(triple only)**

It is important to maintain water balance in the body.

The graphs below show how much water a person gained and lost by different methods in one day.



When water is balanced, the volume of water taken in by the body is equal to the volume of water lost from the body.

(a) Calculate the volume of water the person lost in one day in faeces.

Use information from the graphs above. **(triple only)**

_____

_____

_____

_____

Volume lost in faeces = _____ cm3

(2)

(b) The graphs above show that one method of gaining water is by metabolism.

Which metabolic process produces water?

Tick one box. **(triple only)**

Breakdown of protein to amino acids	☐
Changing glycogen into glucose	☐
Digestion of fat	☐
Respiration of glucose	☐

(1)

The next day, the person ran a 10-kilometre race.

The volume of water lost from the body through the skin and by breathing increased.

(c) Explain why more water was lost through the skin during the race. **(triple only)**

_____

_____

_____

_____

(2)

(d) Explain why more water was lost by breathing during the race. **(triple only)**

_____

_____

_____

_____

_____

_____

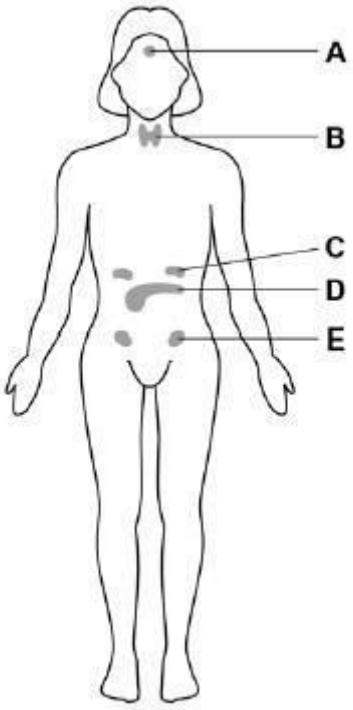
(3)

(Total 8 marks)

Q10.

The menstrual cycle in a woman is controlled by hormones.

The diagram shows some of the glands in a woman's body that produce hormones.



The hormones that control the menstrual cycle are produced by the pituitary gland and by the ovaries.

(a) Which gland is the pituitary gland?

Tick one box.

A ☐ B ☐ C ☐ D ☐ E ☐

(1)

(b) Which gland is the ovary?

Tick one box.

A ☐ B ☐ C ☐ D ☐ E ☐

(1)

(c) Complete the sentence.

In the menstrual cycle, one egg is released approximately every _____ days.

(1)

(d) Which hormone is used in the oral contraceptive pill? Tick one box.

Adrenaline ☐

Insulin ☐

Progesterone ☐

Testosterone ☐

(1)

(e) Describe how the oral contraceptive pill stops a woman becoming pregnant.

_____

_____

_____

_____

(2)

(f) Complete the sentences.

Choose the answers from the box.

adrenaline	insulin	oestrogen	progesterone	testosterone

Development of the female secondary sex characteristics is controlled by

_____ .

Sperm production is stimulated by _____ .

(2)

(Total 8 marks)

Q11. **(triple only)**

Blood is filtered in the kidneys.

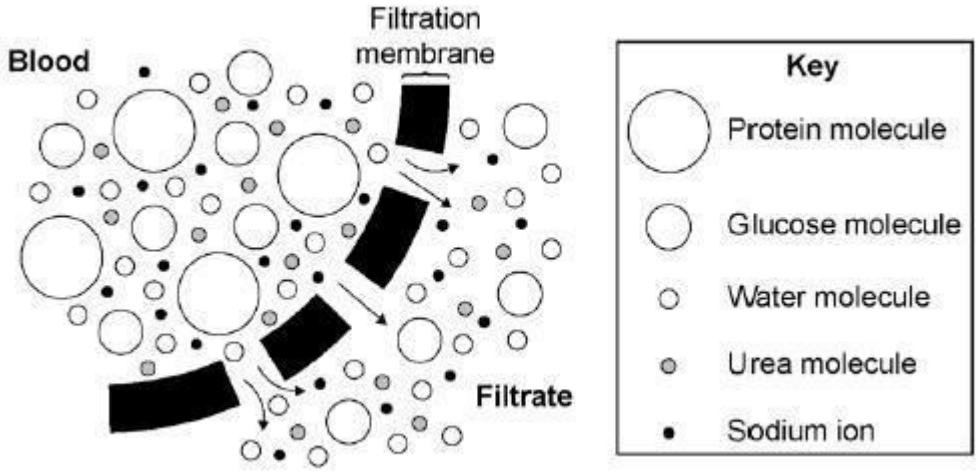
Some substances are then reabsorbed.

The amount of each substance reabsorbed varies.

Each day, a person:

- filters 180 dm3 of water out of the blood
- produces 2 dm3 of urine.

The diagram shows the process of filtration in the kidney.



(a) Explain why protein is not found in the urine of a healthy person. **(triple only)**

_____

_____

_____

_____

(2)

(b) Explain why glucose is not found in the urine of a healthy person. **(triple only)**

_____

_____

_____

_____

(2)

(c) Explain: **(triple only)**

- why urea and sodium ions are found in urine
- why their concentration is higher on a hot day than on a cold day.

_____

_____

_____

_____

_____

_____

(3)

(d) The information below gives some features of two types of treatment for kidney disease.

Dialysis treatment
A dialysis session lasts about 8 hours.
A person needs 3 dialysis sessions every week for the rest of their life.
The person must have a diet low in protein and salt.
Dialysis costs £30 000 per year.
Kidney transplant
A kidney transplant requires surgery using general anaesthetic.
A suitable kidney donor is needed.
Drugs are used to suppress the immune system.
A transplant, and the first year's medical care, costs £51 000. After the first year, the cost of drugs is £5 000 per year.

Evaluate the use of a kidney transplant instead of dialysis treatment for kidney disease. **(triple only)**

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 13 marks)

Q12.

Many functions of the human body are controlled by chemicals called hormones.

(a) What is a hormone?

_____

_____

_____

_____

_____

_____

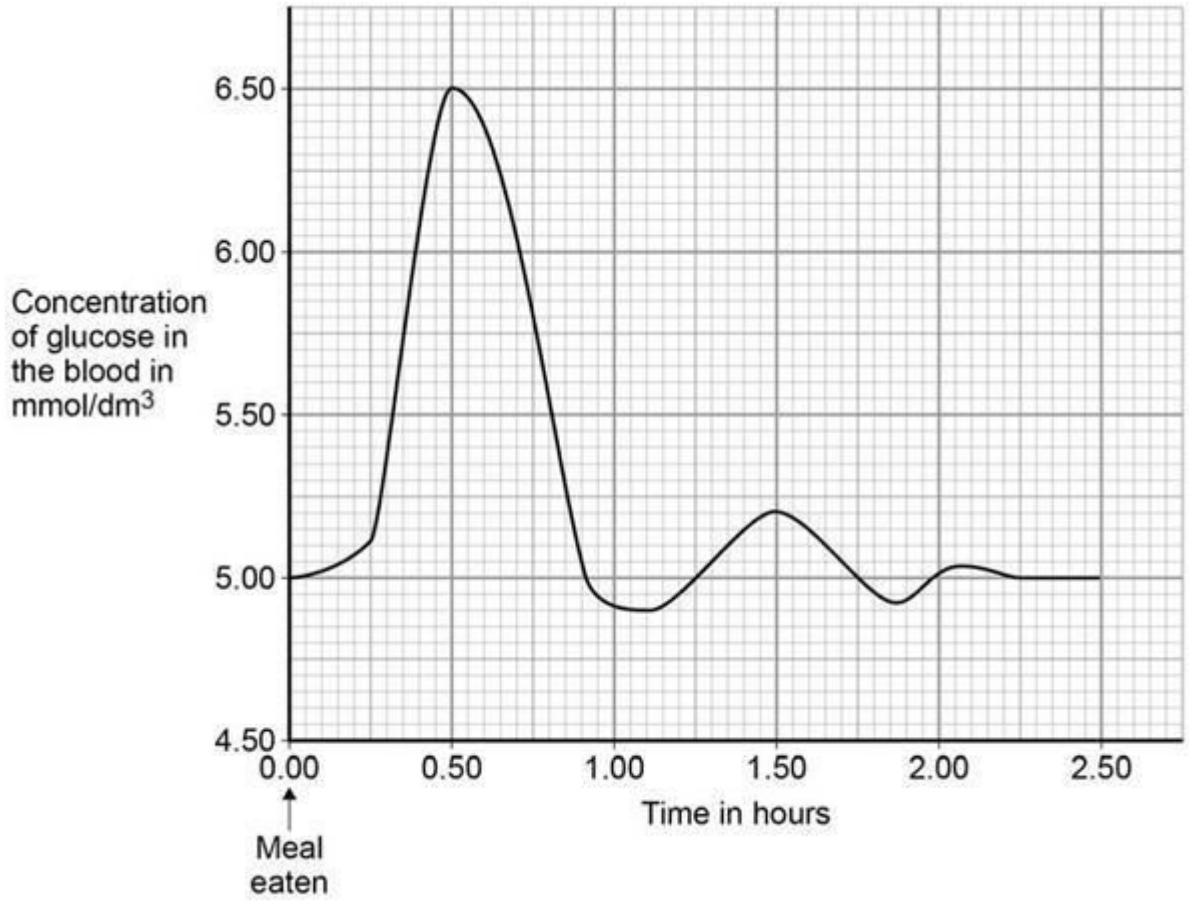
(3)

(b) Name the two hormones that control blood glucose concentration.

_____ and
_____

(1)

The graph shows changes in the concentration of glucose in the blood of a healthy person following a meal.



(c) Explain how negative feedback controls the blood glucose concentration during the first one and a half hours after the meal.

_____

_____

_____

_____

_____

_____

_____

_____

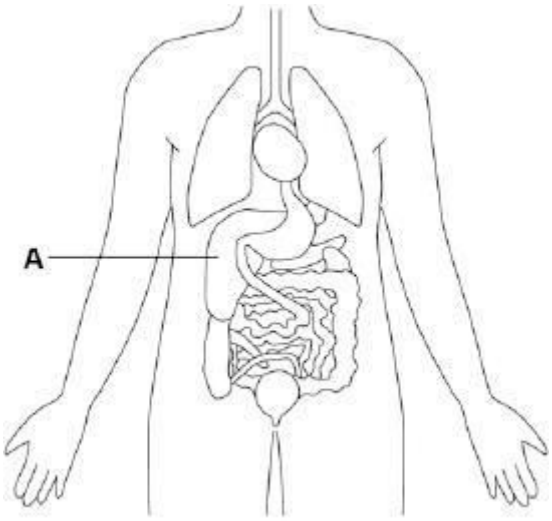
(4)

(Total 8 marks)

Q13.

Humans control their internal environment in many ways.

Look at the diagram below.



(a) Name organ A.

_____

(1)

(b) Organ A stores glucose.

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

Name the hormone people with Type 1 diabetes have to inject to decrease their blood glucose level.

_____

(1)

(c) Which organ produces urine? Tick one box. **(triple only)**

Brain ☐

Lungs ☐

Kidney ☐

Thyroid ☐

(1)

(d) Marathon runners often drink sports drinks during a race.

Explain why. **(triple only)**

_____

_____

_____

_____

(2)

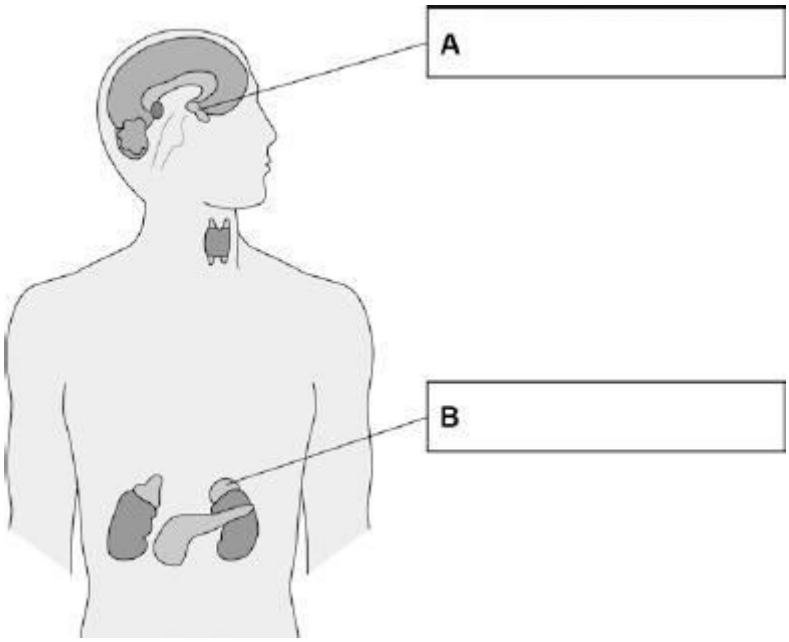
(Total 5 marks)

Q14.

Glands in the body produce hormones.

(a) Use words from the box to label gland A and gland B on the diagram below.

Adrenal	Pancreas	Pituitary	Testis	Thyroid



(2)

(b) Which gland produces oestrogen?

Tick one box.

Ovary ☐

Pancreas ☐

Testis ☐

Thyroid ☐

(1)

(c) Table 1 shows some methods of contraception.

Table 1

Type of contraception	Percentage (%) of pregnancies prevented
Oral pill	>99
Implant	99
Condom	98
Diaphragm	<96

Which method of contraception in Table 1 is least effective at preventing pregnancy?

_____

(1)

(d) Which method of contraception in Table 1 will protect against sexually transmitted diseases like HIV?

_____

(1)

(e) Another method of contraception is called the intrauterine device (IUD). There are two main types of IUD:

- copper
- plastic.

Both types of IUD are more than 99% effective.

Look at Table 2.

Table 2

	Copper IUD	Plastic IUD
How the IUD works	• releases copper • copper changes the	• releases a hormone • hormone thickens mucus from the cervix

	fluids in the uterus to kill sperm	so the sperm have more difficulty swimming to the egg
Benefits	• prevents pregnancy for up to 10 years • can be removed at any time • can be used as emergency contraception	• prevents pregnancy for up to 5 years • can be removed at any time
Possible side effects	• very painful periods • heavy periods or periods which last for a long time • feeling sick, back pain	• painful periods • light periods or no periods • feeling sick, headaches, breast pain, acne • hormones may affect mood • ovarian cysts

Evaluate the use of the plastic IUD as a contraceptive compared to the copper IUD.

Use the information in Table 2.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 9 marks)

Q15.

Homeostasis controls the internal conditions of the body.

(a) Explain how blood glucose levels are controlled in the body of someone who does not have diabetes.

(4)

(b) Compare how each type of diabetes is caused.

Suggest how each type of diabetes can be treated.

(4)

(c) Look at the table below.

Population of UK in 2015	6.5 × 107
Number of people diagnosed with diabetes	3.45 × 106
Estimated number of people with undiagnosed diabetes	5.49 × 105

Calculate the percentage (%) of the UK population estimated to have diabetes.

You should include both diagnosed and undiagnosed people in your calculation.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

Estimated percentage of population with diabetes = ___ %

(3)

(d) A urine test can be used to check for the presence of glucose in the urine.

Diabetes can also be diagnosed with a blood test to measure the concentration of blood glucose.

Suggest why a blood test is more reliable than a urine test.

_____

_____

(1)

(e) A blood test called the glucose tolerance test checks how well the body processes glucose.

Concentrations of glucose in the blood are measured before and after drinking a glucose drink.

Patients are not allowed to eat food for 8 hours before the glucose tolerance test.

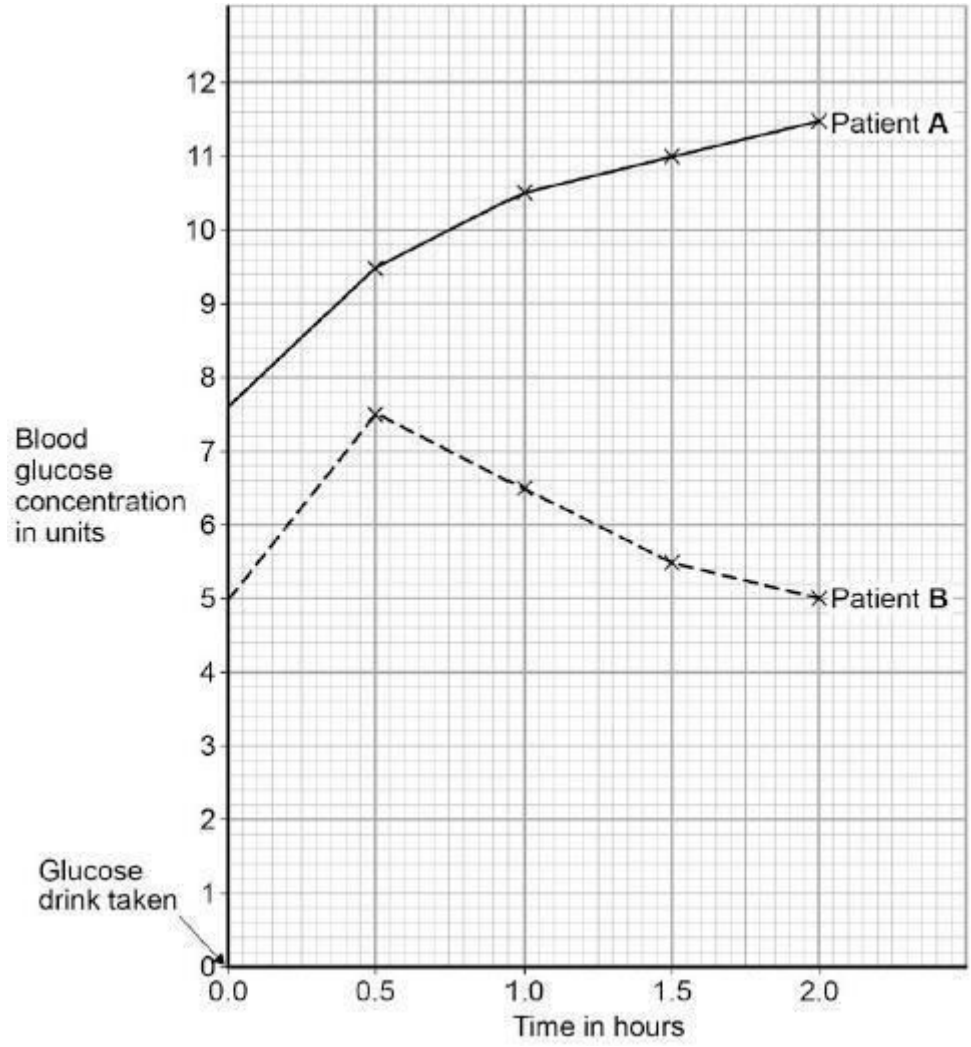
Suggest why patients are not allowed to eat for 8 hours before the test.

_____

_____

(1)

(f) The diagram below shows the results of a glucose tolerance test for two patients, A and B.



Which patient has diabetes?

Justify your answer.

Patient _____

Justification _____

_____

_____

_____

(2)

(Total 15 marks)

Q16.

Endocrine glands produce hormones.

(a) Hyperthyroidism is caused by an overactive thyroid gland.

Suggest what would happen in the body of a person with hyperthyroidism.

(3)

(b) Describe the roles of FSH and LH in the menstrual cycle.

(2)

(c) The combined pill is a contraceptive that contains progesterone and oestrogen.

The 'mini-pill':

- is a contraceptive that only contains the progesterone hormone
- has to be taken at the same time each day to prevent pregnancy.

The success rate of the mini-pill in preventing pregnancy is lower than that of the combined pill.

Explain why missing a dose of the mini-pill would reduce the success rate of the mini-pill.

_____

(4)
(Total 9 marks)

Q17.

Hormones are involved in controlling the menstrual cycle and fertility.

(a) (i)Use the correct answer from the box to complete the sentence.

auxin	follicle stimulating hormone (FSH)	thalidomide

A hormone produced by the pituitary gland is

_____

(1)

(ii) Use the correct answer from the box to complete the sentence.

luteinising hormone (LH)	oestrogen	statin

A hormone produced by the ovaries is

_____

(1)

(b) (i)Why are fertility drugs given to some women?

_____

_____

(1)

(ii) A doctor injects fertility drugs into a woman. After the injection, the hormones travel to the woman's ovaries.

How do the hormones travel to the ovaries?

Draw a ring around the correct answer.

through the bloodstream	through the neurones	through the skin

(1)

(c) Which two hormones are used in contraceptive pills? Tick

(✓) two boxes.

FSH ☐ oestrogen ☐

LH ☐ progesterone ☐

(2)

(Total 6 marks)

Q18.

(a) Which organ of the human body produces egg cells?

Draw a ring around the correct answer.

liver ovary testis

(1)

(b) An egg joins with a sperm and develops into an embryo.

How many chromosomes are there in each cell of a human embryo? Draw a ring around the correct answer.

23 46 48

(1)

(c) Some women find it difficult to have a baby. A doctor may suggest that these women should use In Vitro Fertilisation (IVF) to help them have a baby.

Table 1 shows how successful IVF was for women of different ages at one clinic.

Table 1

Age of women in years	Percentage of women who had a baby
<35	35
35–37	31
38–39	25
40–42	32
43–44	7
>44	0

(i) A student thought that the result for women aged 40–42 was anomalous.

Suggest why the student thought this result was anomalous.

_____

_____

(1)

(ii) Describe the general trend in the results in Table 1. You should ignore the anomalous result.

_____

_____

(1)

(d) Some babies are born with a faulty chromosome.

Scientists investigated whether the chance of having a baby with a faulty chromosome is also related to the age of the woman.

Table 2 shows the scientists' results.

Table 2

Age of women in years	Number of women per 1000 who had a baby with a faulty chromosome
25	2.0
30	2.6
35	6.1
40	19.6
45	66.0

(i) A 45-year-old woman is more likely than a 25-year-old woman to have a baby with a faulty chromosome.

How many times more likely?

_____

_____

Answer = _____ times

(2)

(ii) Suggest two reasons why many fertility clinics will not accept women over 40 years of age for IVF treatment.

Use information from Table 1 and Table 2 in your answer.

1.

_____

_____

2.

_____

_____

(2)

(Total 8 marks)

Q19.

Some people with diabetes do not produce enough insulin to keep their blood glucose at the correct levels.

(a) (i)Which organ monitors blood glucose levels?

Tick (✓) one box.

liver ☐

pancreas ☐

skin ☐

(1)

(ii) What effect does insulin have on glucose in the blood?

Tick (✓) one box.

Insulin causes glucose to move into the cells. ☐

Insulin increases the amount of glucose in the blood. ☐

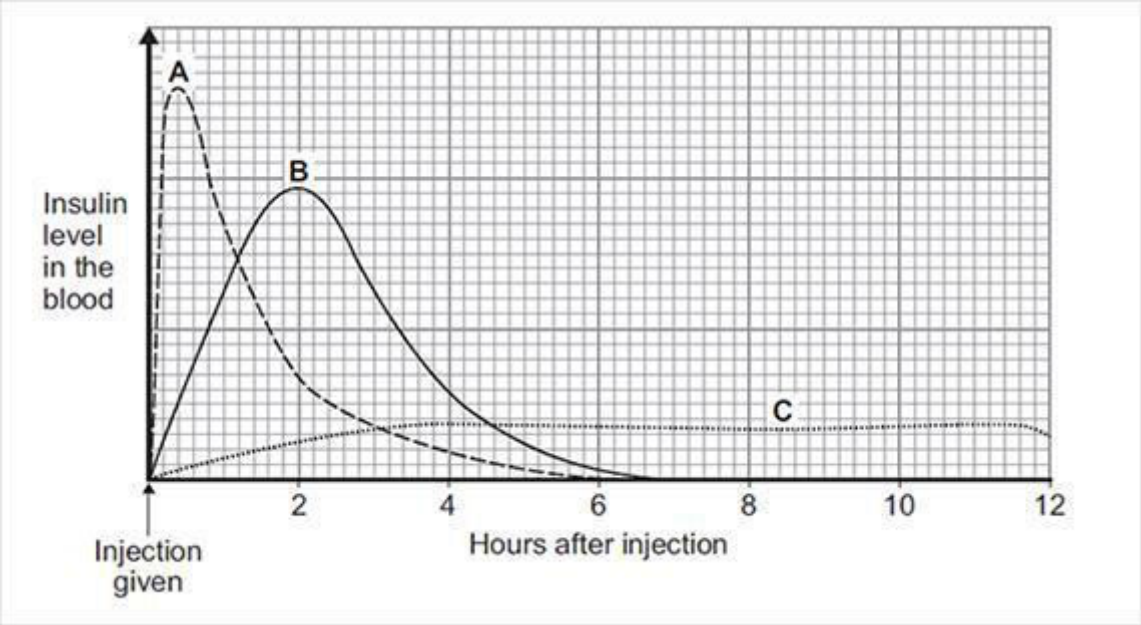
Insulin converts glucose to starch. ☐

(1)

(b) Some people with diabetes inject insulin several times a day.

There are different types of insulin.

The graph shows some information about three different types of insulin, A, B and C.



(i) Which type of insulin, A, B or C, should a person with diabetes inject just before eating a meal high in carbohydrates?

_____

Give a reason for your answer.

_____

_____

(2)

(ii) A woman with diabetes has a blood glucose level of 12 mmol per dm3 of blood.

The woman's normal blood glucose level is 6 mmol per dm3.

The woman will need to inject insulin to lower her blood glucose level.

For each unit of insulin injected the blood glucose level will fall by 3 mmol per dm3.

How many units of insulin does the woman need to inject to bring her blood glucose level down to the normal level?

_____

Number of units = _____

(1)

(c) Some people have pancreas transplants to treat diabetes. Give

one possible disadvantage of a pancreas transplant.

Tick (✓) one box.

The pancreas could be rejected. ☐

The patient will need to inject insulin every day. ☐

The patient's blood glucose levels may rise and fall too much. ☐

(1)

(Total 6 marks)

Q20.

People with type 1 diabetes inject insulin to control their blood glucose level.

A pancreas transplant is another treatment for type 1 diabetes.

One risk of a pancreas transplant is organ rejection.

(a) Explain why a transplanted organ may be rejected.

_____

_____

_____

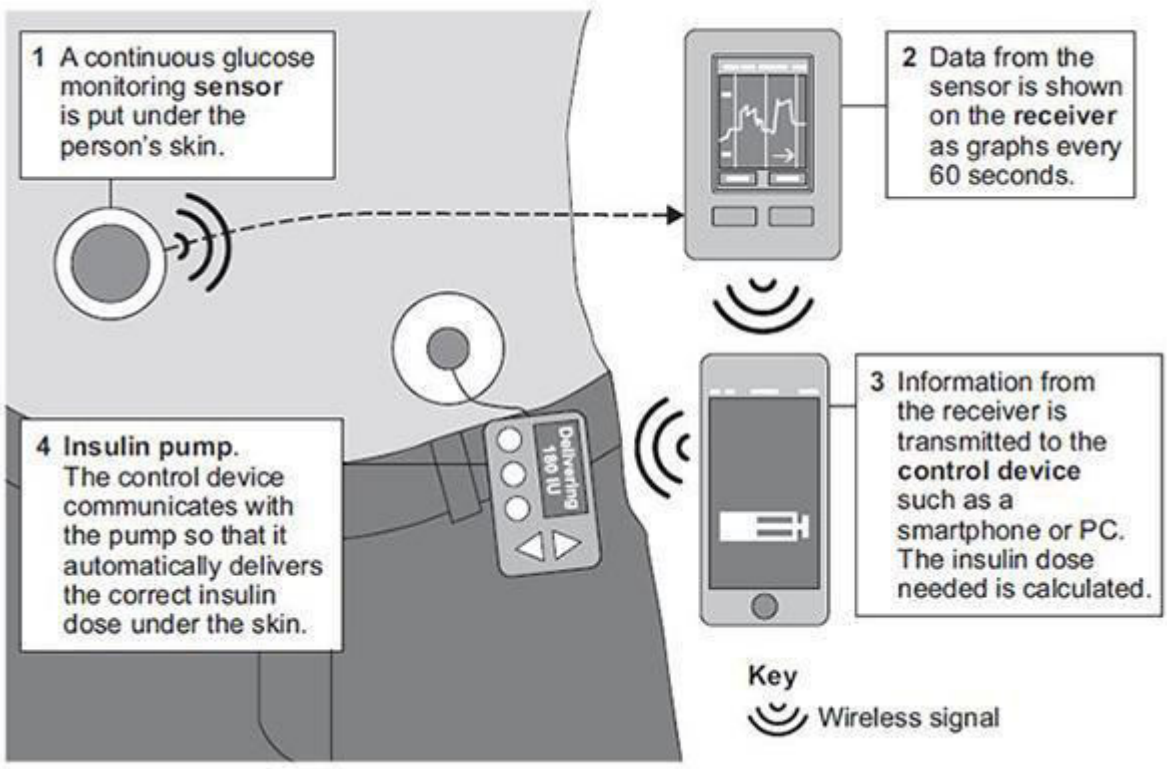
_____

_____

_____

(3)

(b) Scientists have developed an artificial pancreas to treat type 1 diabetes. The diagram below shows how an artificial pancreas works.



(i) A woman with type 1 diabetes has an artificial pancreas. The woman eats a meal high in sugar. The meal causes her blood glucose level to rise.

Use information from the diagram above to describe what happens to bring the blood glucose level of the woman back to normal.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(ii) The traditional way of monitoring and treating type 1 diabetes is to take a small sample of blood and put it on a test strip to find out how much insulin to inject.

Suggest one possible advantage, other than not having to do blood

tests, of the method used in the diagram above.

_____

_____

(1)

(Total 8 marks)