AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.5.3 HORMONAL COORDINATION IN HUMANS (PACK 4)

SCORE	PERCENTAGE
/238	%

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Q1.

A runner might drink a special 'sports drink' at intervals during a marathon race. The table shows the substances present in a sports drink.

Substance	Percentage
Water	
Sugar	5.0
Ions	0.2

(a) Complete the table to show the percentage of water in the sports drink.

(1)

(b) The runner sweats and also breathes heavily during the race.

(i) Why does the runner need to sweat?

_____

(1)

(ii) Which **two** substances in the table are lost from the body in sweat?

_____

(1)

(iii) Which substance in the table is lost from the body during breathing?

_____

(1)

(c) How does the sugar in the sports drink help the athlete during the marathon?

_____

_____

(2)

(Total 6 marks)

Q2.

Kidney transplants were introduced in the twentieth century as one way of treating patients with kidney failure.

(i) Give **one** other way of treating kidney failure.

_____

(1)

(ii) The patient's body may reject a transplanted kidney unless doctors take precautions.

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Some of these precautions are listed below.

- A donor kidney is specially chosen.
- The recipient's bone marrow is treated with radiation.
- The recipient is treated with drugs.
- The recipient is kept in sterile conditions.

Explain how **each** of these precautions may help the patient to survive.

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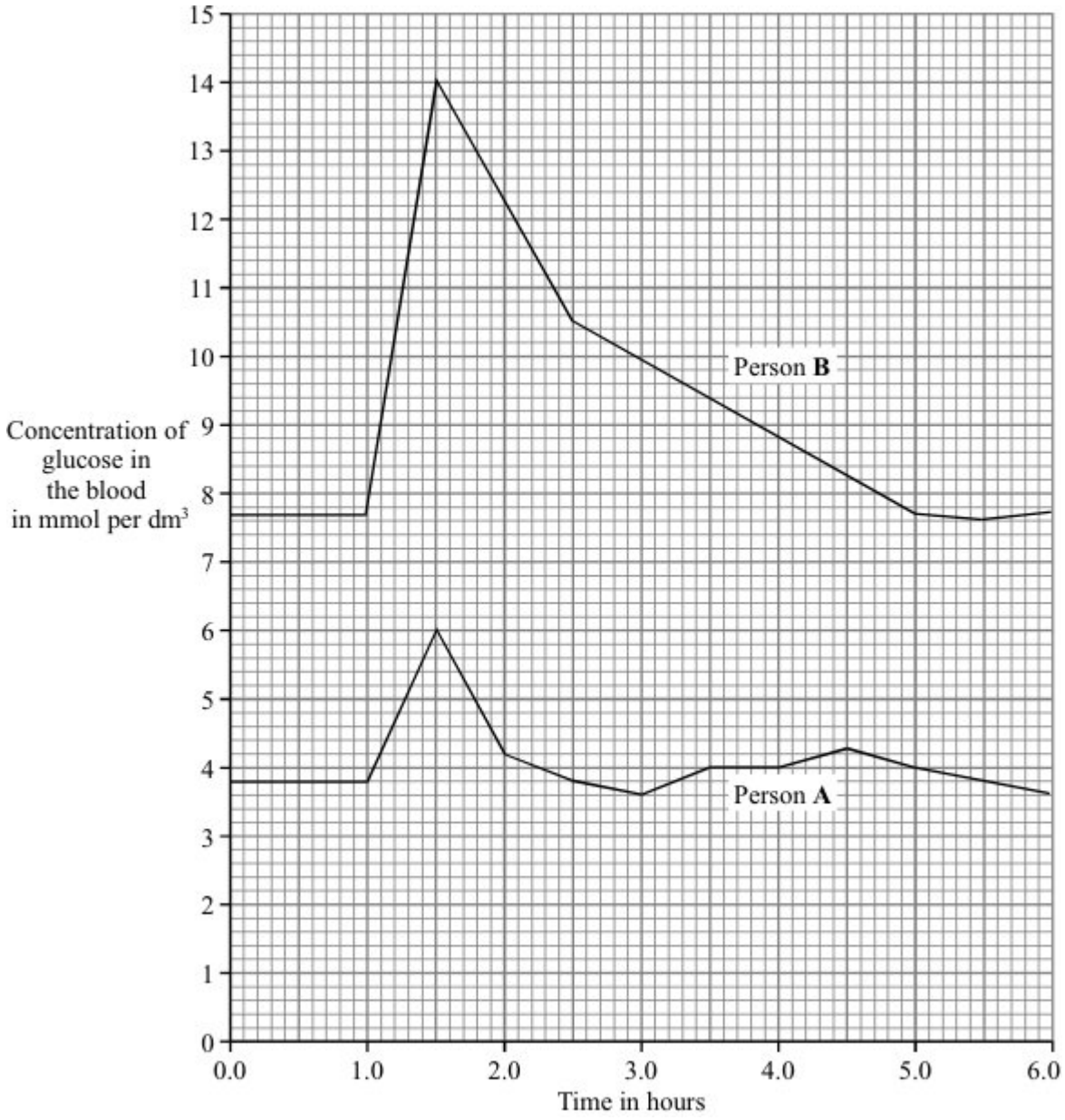
(4)

(Total 5 marks)

Q3.

The graph shows the concentration of glucose in the blood of two people. Person **A** is a non-diabetic. Person **B** has diabetes. Each person ate 75 grams of glucose at 1.0 hours.

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(a) (i) What was the maximum concentration of glucose in the blood of Person **A**?

_____ mmol per dm^3

(1)

(ii) After eating the glucose, how long did it take for the concentration of glucose in the blood of Person **B** to return to normal?

_____ hours

(1)

(b) A diabetic person does not produce enough insulin.

(i) Which organ produces insulin?

_____

(1)

(ii) Write the letter **X** on the graph to show one time when the blood of Person **A** would contain large amounts of insulin.

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(1)

(c) A high concentration of glucose in the blood can harm body cells as a result of osmosis.
Explain why.

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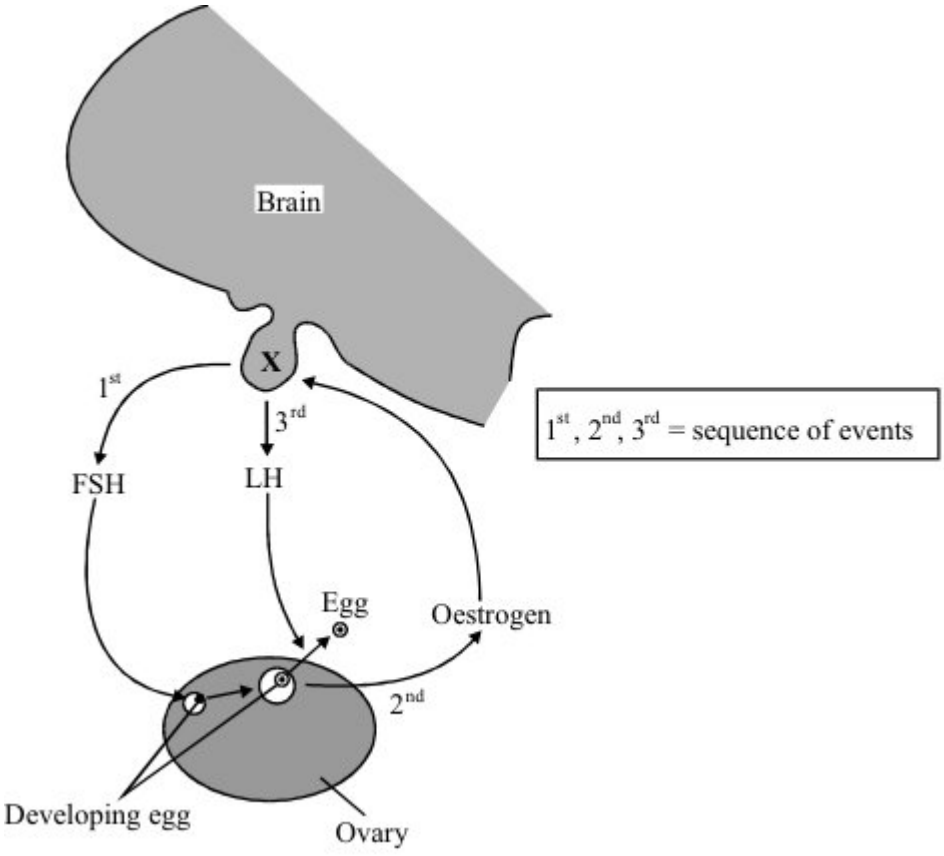
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(4)

(Total 8 marks)

Q4.

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)

Q5.

The table shows the concentrations of some substances in human blood plasma, in the filtrate produced by the kidney and in the urine.

	Concentration in grams per dm^3		
Substance	**Blood plasma**	**Filtrate**	**Urine**
Glucose	1.0	1.0	0.0
Amino acids	0.5	0.5	0.0
Urea	0.3	0.3	20.0
Protein	80.0	0.0	0.0
Ions	7.2	7.2	15.0
Water	912.0	990.0	970.0

(a) Explain why:

(i) the concentration of glucose in the filtrate is the same as in the blood plasma;

_____

_____

(1)

(ii) there is no glucose present in the urine.

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_____

_____

(1)

(b) Suggest why there is no protein present in either the filtrate or the urine.

_____

_____

(1)

(c) The volume of water removed in the urine is variable. Explain how the human body reduces the volume of urine produced when less water is consumed.

_____

_____

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_____

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_____

(3)

(Total 6 marks)

Q6.

When people suffer from kidney failure, they may be treated with a dialysis machine. The patients' blood is passed through the machine where the composition of the blood is adjusted.

(a) Name a waste substance, carried in the blood, which is removed by the dialysis machine.

_____

(1)

(b) Doctors sometimes give these patients dialysis treatment, rather than a kidney transplant.

Suggest **four** reasons for this.

_____

_____

_____

_____

_____

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_____

_____

(4)

(Total 5 marks)

Q7.

Hormones are sometimes used to regulate human reproduction.

(a) (i) What is a hormone?

_____

_____

(1)

(ii) How are hormones transported around the body?

_____

_____

(1)

(b) Describe the benefits and possible problems that may result from the use of hormones to regulate human reproduction. You should refer to fertility drugs and contraceptives in your answer.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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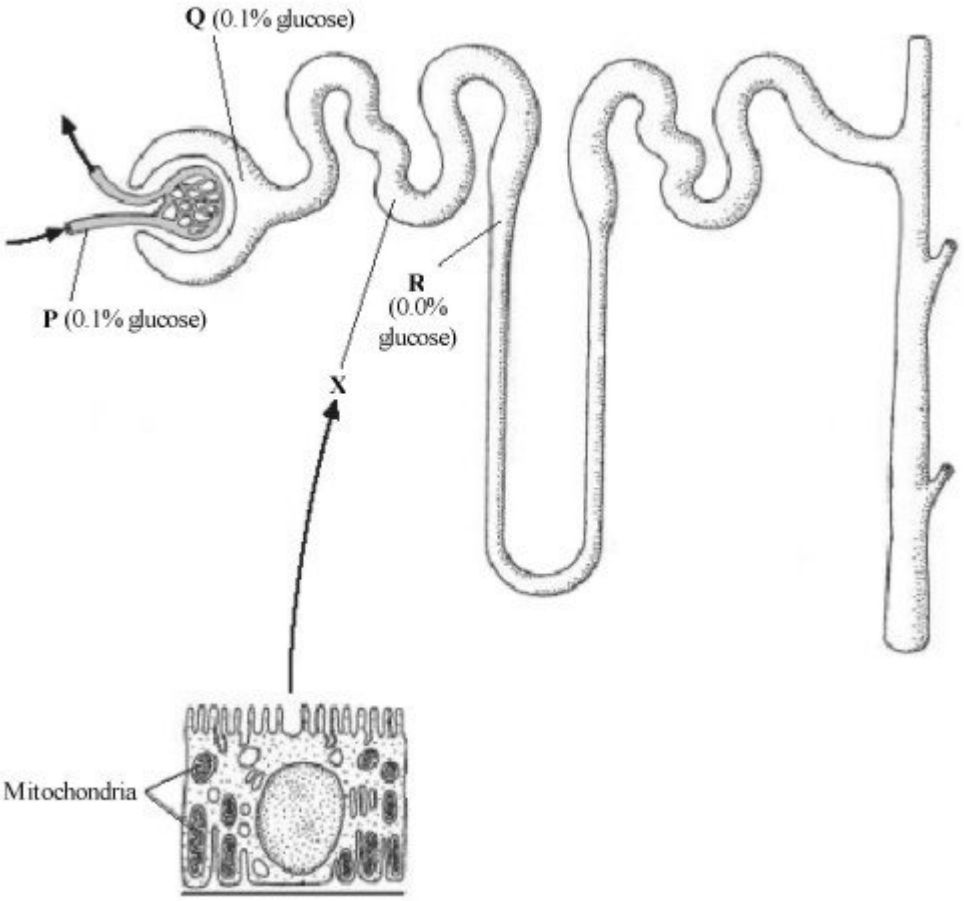
(4)

(Total 6 marks)

Q8.

The diagram shows the structure of a kidney tubule.

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Cell in wall of Region X.

All of these cells have
large numbers of mitochondria.

(a) Give the full name of the process which takes place in the mitochondria.

_____

(2)

(b) The concentration of glucose in the blood at **P**, and in the fluid at **Q**, is 0.1 per cent. The concentration of glucose in the fluid at **R** is 0.0 per cent.

Use information from the diagram, and your own biological knowledge, to explain the change in glucose concentration from point **P** through to point **R**.

_____

_____

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(5)

(Total 7 marks)

Q9.

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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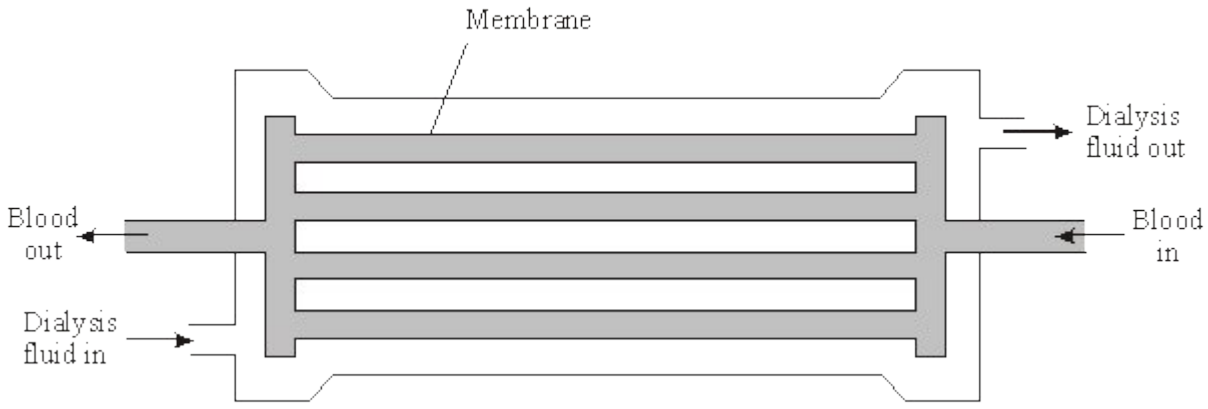
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(Total 3 marks)

Q10.

A woman suffers a minor infection that affects her kidneys. She is sent to hospital for treatment with a dialysis machine.

A simplified diagram of a dialysis machine is shown below.



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(a) Explain why the membrane is important in the dialysis machine.

_____

_____

(2)

(b) Some of the components of the woman's blood and of the dialysis fluid entering the machine are shown in the table.

Component	Woman's blood entering machine	Dialysis fluid entering machine
Blood cells	✓	✗
Glucose	✓	✓
Urea	✓	✗

Key: ✓ = present ✗ = absent

Use the information in the table to explain the composition of the dialysis fluid entering the machine.

_____

_____

_____

_____

_____

_____

_____

(4)

(c) One alternative to treatment with a dialysis machine is to have a kidney transplant.

Suggest why a kidney transplant might **not** be suitable in this woman's case.

_____

_____

_____

(2)

(d) Before dialysis treatment begins, the dialysis machine must be filled with blood. The woman has blood group **O**.

(i) What features of her blood make it group **O**?

_____

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_____

(2)

(ii) Why must the blood in the dialysis machine, before her treatment begins, also be blood group **O**?

_____

(1)

(Total 11 marks)

Q11.

(a) Why is the removal of water from the body an example of homeostasis?

_____

_____

_____

_____

(1)

(b) Why is homeostasis important in the body?

_____

_____

_____

(1)

(c) This system also excretes a substance called urea.

What is excretion, and why is it necessary in the body?

_____

_____

_____

_____

_____

(2)

(Total 4 marks)

Q12.

Coordination of the body can be affected by chemicals called hormones

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(a) (i) Where are hormones produced?

_____

(1)

(ii) How do hormones move around the body?

_____

(1)

(b) Insulin is a hormone.

(i) Where is insulin produced?

_____

(1)

(ii) Explain the role of insulin in controlling blood sugar levels.

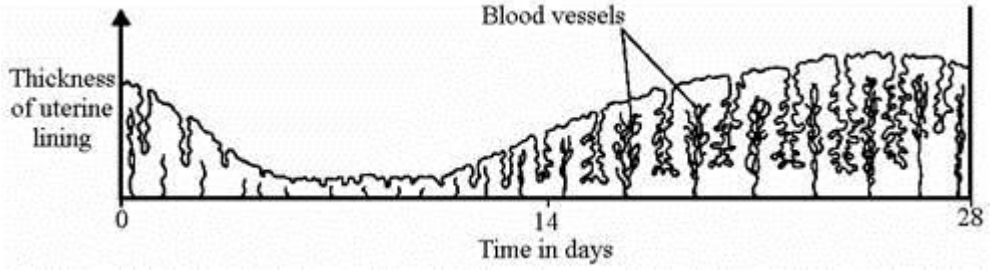
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(4)

(Total 7 marks)

Q13.

(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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(3)

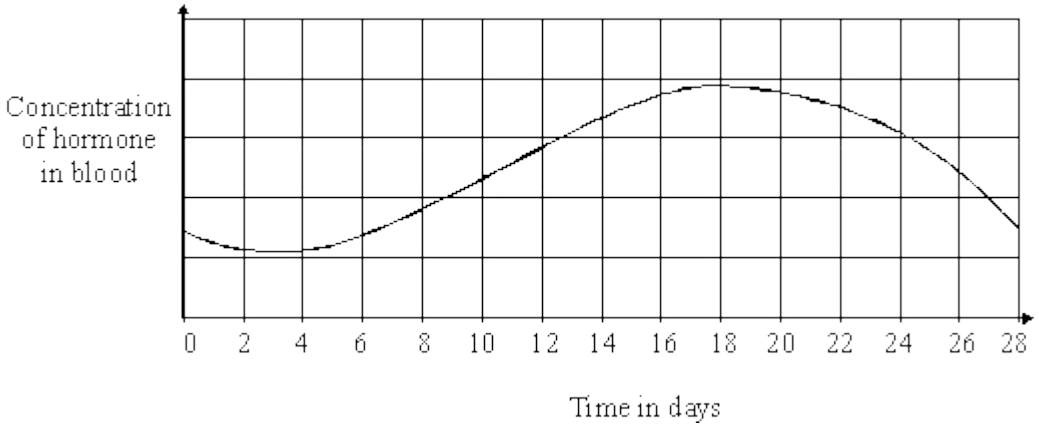
(b) The concentration of a certain hormone in the blood of a woman was measured during her menstrual cycle. The woman's temperature was also measured each day during this cycle.

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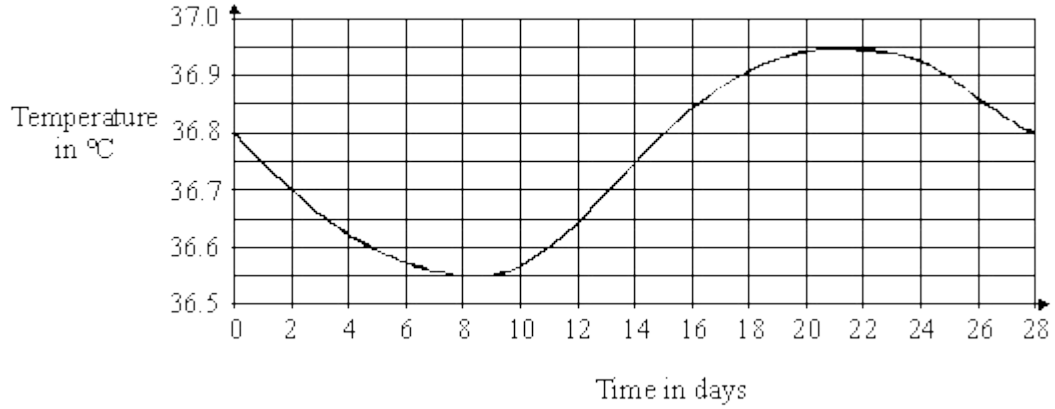
Graph 1 shows the results obtained for the measurement of the concentration of the hormone.

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

Graph 1



Graph 2



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

_____

_____

(1)

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

_____

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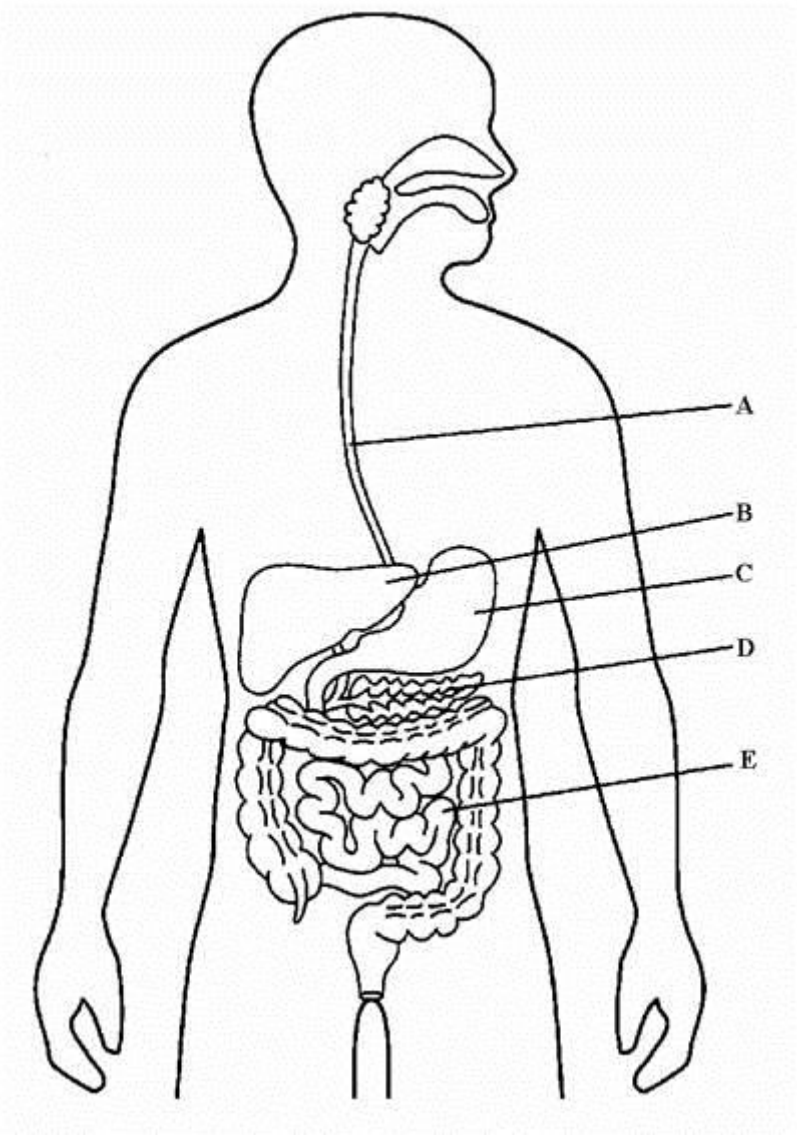
(2)

(Total 6 marks)

Q14.

The diagram shows part of the human digestive system.

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(i) Name part **B**.

_____

(1)

(ii) Describe the role of **B** and **D** in reducing blood sugar levels.

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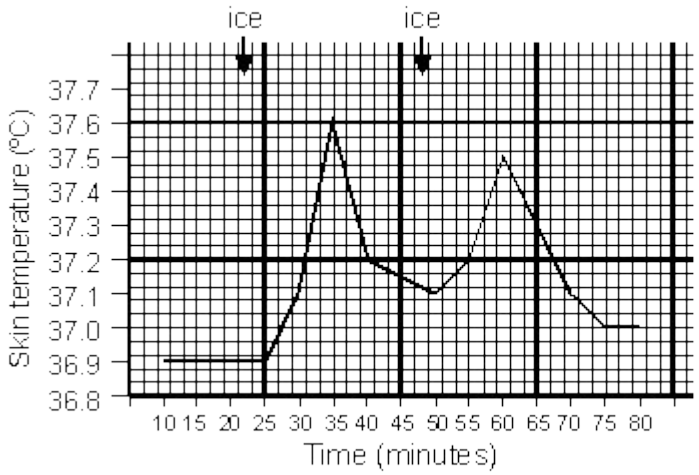
(2)

(Total 3 marks)

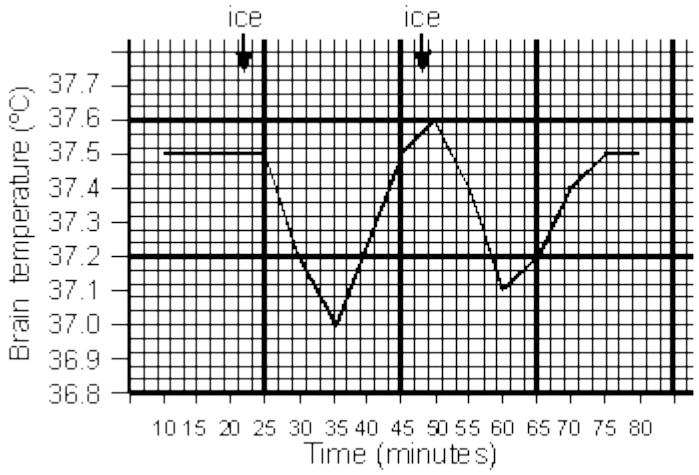
Q15.

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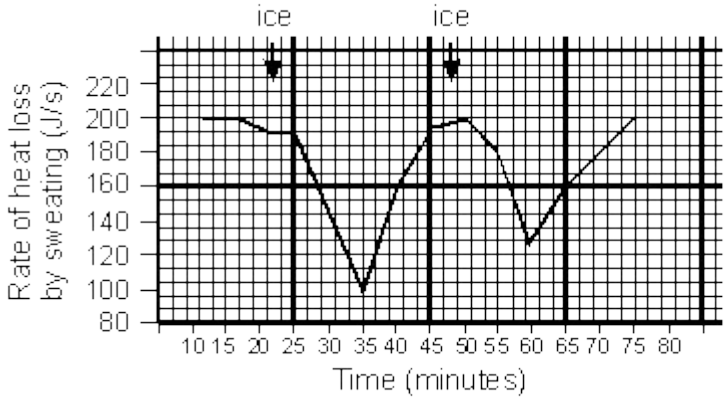
The graphs show the results of an investigation into the control of sweating in humans. The subject was placed in a chamber where the temperature was maintained at 45ºC. The subject swallowed ice at the times indicated on the graphs.



Skin Temperature



Brain Temperature



Rate of Heat Loss by Sweating

(a) What was the relationship between swallowing ice and the subject's

(i) skin temperature?

_____

_____

(1)

(ii) brain temperature?

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_____

_____

(1)

(iii) rate of heat loss by sweating?

_____

_____

(1)

(b) Explain, as fully as you can, why the subject's brain temperature, skin temperature and rate of heat loss by sweating were affected by swallowing ice in the way shown by the graphs.

_____

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(8)

(Total 11 marks)

Q16.

(a) Describe, as fully as you can, the job of

(i) the circulatory system.

_____

_____

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(2)

(ii) the digestive system.

_____

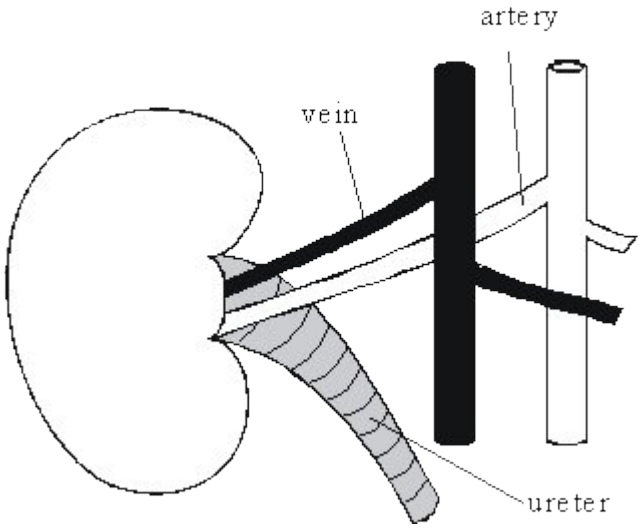
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(3)

(b)



The drawing shows a kidney, its blood supply and the ureter (a tube which carries urine from the kidney to the bladder). The amount and composition of the urine flowing down the ureter change if the blood in the artery contains too much water. Describe these changes and explain how they take place.

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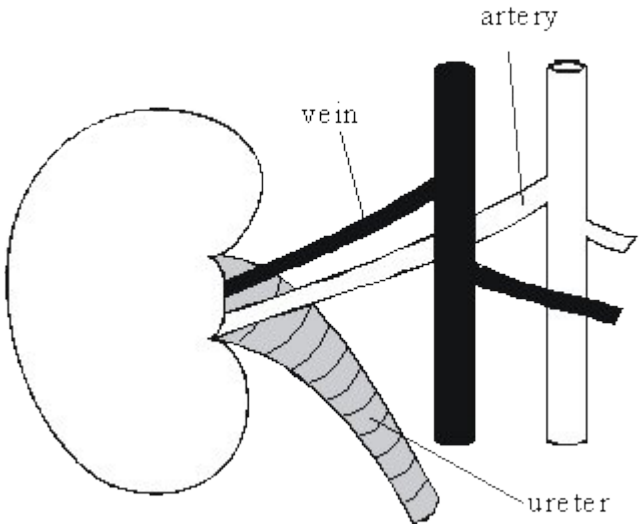
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(4)

(Total 9 marks)

Q17.

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(a) The drawing shows a kidney, its blood supply and the ureter (a tube which carries urine from the kidney to the bladder). The amount and composition of the urine flowing down the ureter changes if the blood in the artery contains too much water. Describe these changes and explain how they take place.

_____

_____

_____

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(4)

(b) (i) Describe, as fully as you can, **two** methods of treating patients who suffer from kidney failure.

1. _____

_____

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2. _____

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(4)

(ii) Compare the advantages and disadvantages of the two methods of treatment which you have described.

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(5)

(Total 13 marks)

Q18.

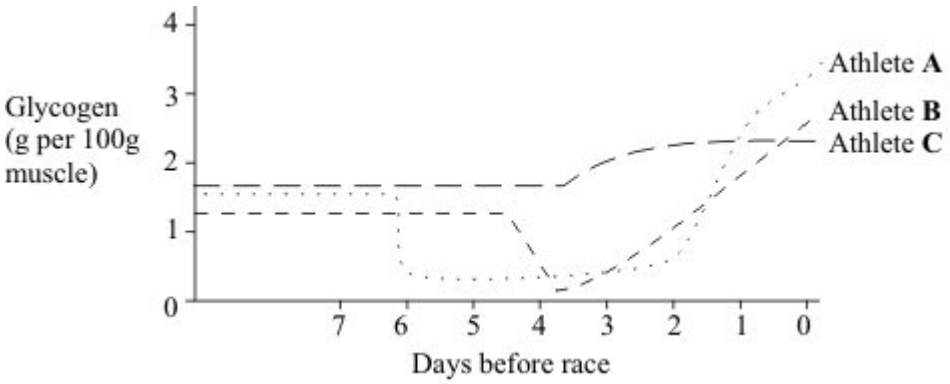
Marathon runners are recommended to have a high carbohydrate diet prior to a race. Three athletes tried out three dietary regimes prior to a marathon race.

These three dietry regimes were as follows.

Athlete A	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	-	Protein and fat diet; no carbohydrate
	2 and 1 days before the race	-	Large carbohydrate intake
Athlete 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
Athlete C	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

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

_____

_____

(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)

Q19.

(a) Describe, as fully as you can, how a human foetus gets rid of the carbon dioxide produced during respiration.

_____

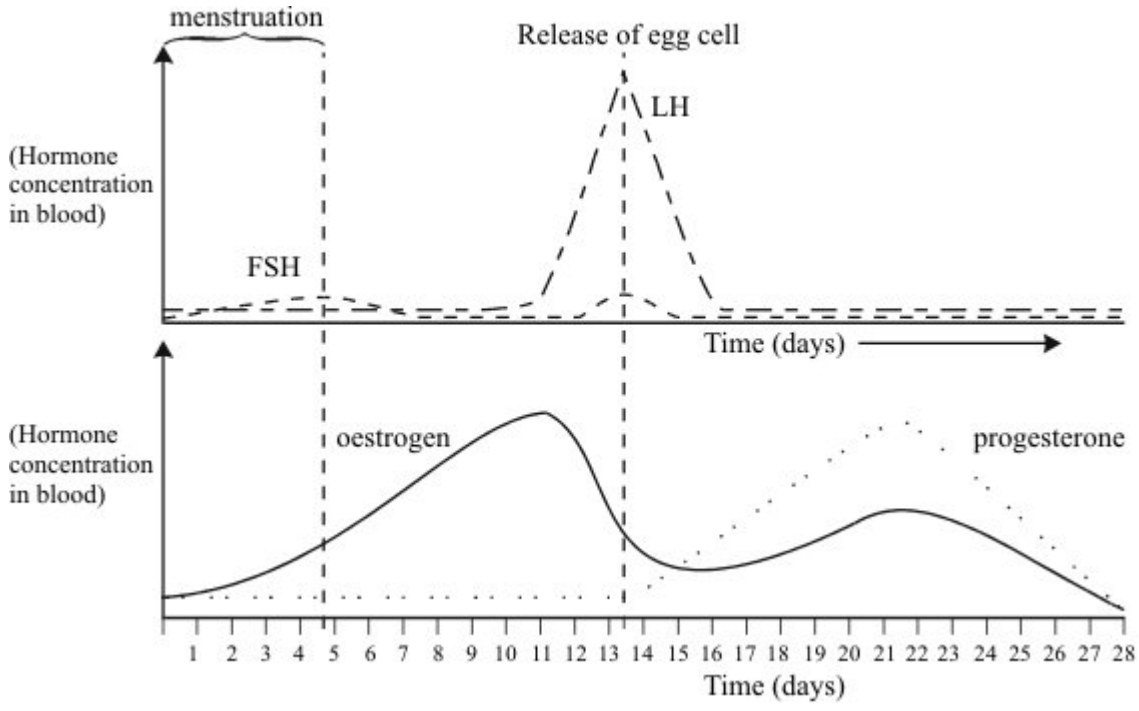
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(3)

(b) The female menstrual cycle is controlled by a number of hormones. The graph below shows the concentrations of four of these hormones at different times during the menstrual cycle.



The functions of the four hormones include:

FSH – stimulates the development of immature cells into eggs in the ovary.

LH – stimulates the release of the mature egg cell.

Oestrogen – stimulates production of LH, but inhibits FSH production.

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Progesterone – inhibis production of both LH and FSH.

Use this information to explain as fully as you can:

(i) how the concentration of oestrogen can affect and control the development and release of an egg during the monthly cycle;

_____

_____

_____

_____

_____

_____

(3)

(ii) why progesterone continues to be produced throughout pregnancy.

_____

_____

_____

_____

_____

_____

(3)

(c) Explain, as fully as you can, how one or more of these hormones could be used to treat infertility.

_____

_____

_____

_____

_____

_____

(3)

(d) A hormone called mifepristone is used in low doses as a female contraceptive. Higher doses can be used to induce an abortion. As a consequence mifepristone is often referred to as 'the morning-after pill'. The use of mifepristone is currently tightly controlled by the medical profession.

Evaluate the benefits and problems which might arise from making this hormone more freely available.

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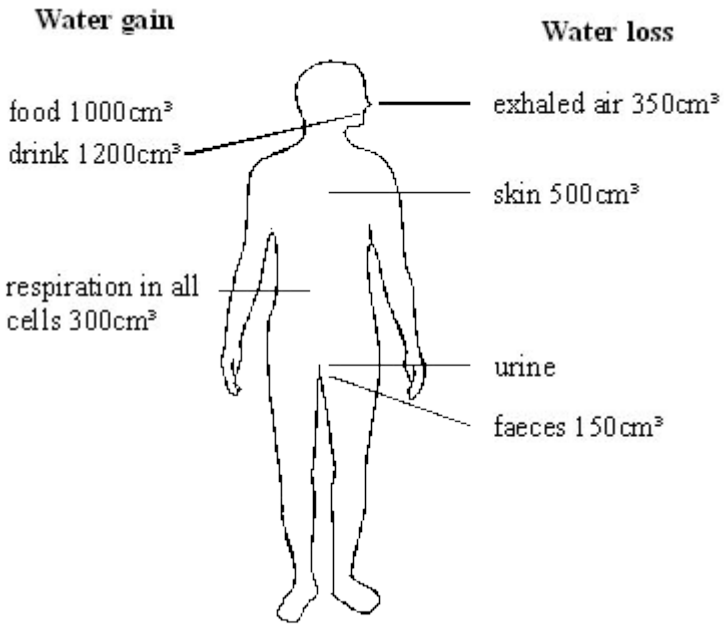
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(4)

(Total 16 marks)

Q20.

The diagram shows the mean daily input and output of water for an adult.



The kidneys keep the water content of the body constant by controlling the volume of water passed out in the urine.

(i) Use data from the diagram to calculate the mean daily output of water in urine. Show your working.

Answer _____ cm^3

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(2)

(ii) Describe how the amount of water in the body is controlled by the kidneys.

_____

_____

_____

_____

(3)

(Total 5 marks)

Q21.

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.

_____

_____

_____

_____

(3)

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

_____

_____

_____

_____

(3)

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

_____

_____

_____

_____

(3)

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

_____

_____

_____

_____

(3)

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

_____

_____

_____

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_____

(3)

(Total 17 marks)

Q22.

The kidneys remove waste materials from the liquid part of the blood.

(a) What name is given to the solution of waste stored in the bladder? _____

(1)

(b) The table shows the concentration of certain substances

- in the liquid part of the blood
- in the liquid that has just been filtered from the blood in the kidneys
- in the solution in the bladder.

SUBSTANCE	CONCENTRATION (%)		
	IN LIQUID PART OF BLOOD	IN LIQUID THAT HAS BEEN FILTERED IN THE KIDNEYS	IN LIQUID IN THE BLADDER
Protein	7.0	0	0
Salt	0.35	0.35	0.5
Glucose	0.1	0.1	0
Urea	0.03	0.03	2.0

(i) Which **one** of these substances does **not** pass into the liquid that is filtered in the kidneys?

_____

(1)

(ii) Suggest **one** reason why this substance does **not** pass out of the blood.

_____

(1)

(c) What happens to the glucose in the liquid that is filtered in the kidneys?

_____

(1)

(d) Explain why the concentration of urea in the liquid in the bladder is much greater than the concentration of urea in the liquid that is filtered in the kidneys.

_____

(1)

(Total 5 marks)

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Q23.

The kidneys remove waste materials from the liquid part of the blood.

The table shows the concentration of certain substances

- in the liquid part of the blood
- in the liquid that has just been filtered from the blood in the kidneys
- in the solution in the bladder.

SUBSTANCE	CONCENTRATION (%)		
	IN LIQUID PART OF BLOOD	IN LIQUID THAT HAS BEEN FILTERED IN THE KIDNEYS	IN LIQUID IN THE BLADDER
Protein	7.0	0	0
Salt	0.35	0.35	0.5
Glucose	0.1	0.1	0
Urea	0.03	0.03	2.0

(a) (i) Which **one** of these substances does **not** pass into the liquid that is filtered in the kidneys?

_____

(1)

(ii) Suggest **one** reason why this substance does **not** pass out of the blood.

_____

(1)

(b) Explain why the concentration of urea in the liquid in the bladder is much greater than the concentration of urea in the liquid that is filtered in the kidneys.

_____

_____

(1)

(c) (i) Describe how a kidney dialysis machine works.

_____

_____

_____

_____

_____

_____

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(3)

(ii) Use the data in the table to suggest the concentration that the salt in the dialysis fluid should be. Explain your answer.

Concentration _____

Explanation _____

_____

_____

(2)

(Total 8 marks)

Q24.

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

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

_____

_____

_____

_____

(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.

_____

_____

_____

_____

(2)

(Total 4 marks)

Q25.

(a) Explain, as fully as you can, why respiration has to take place more rapidly during exercise.

_____

_____

_____

(2)

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(b) During exercise the process of respiration produces excess heat. Explain how the body prevents this heat from causing a rise in the core (deep) body temperature.

_____

_____

_____

_____

_____

_____

_____

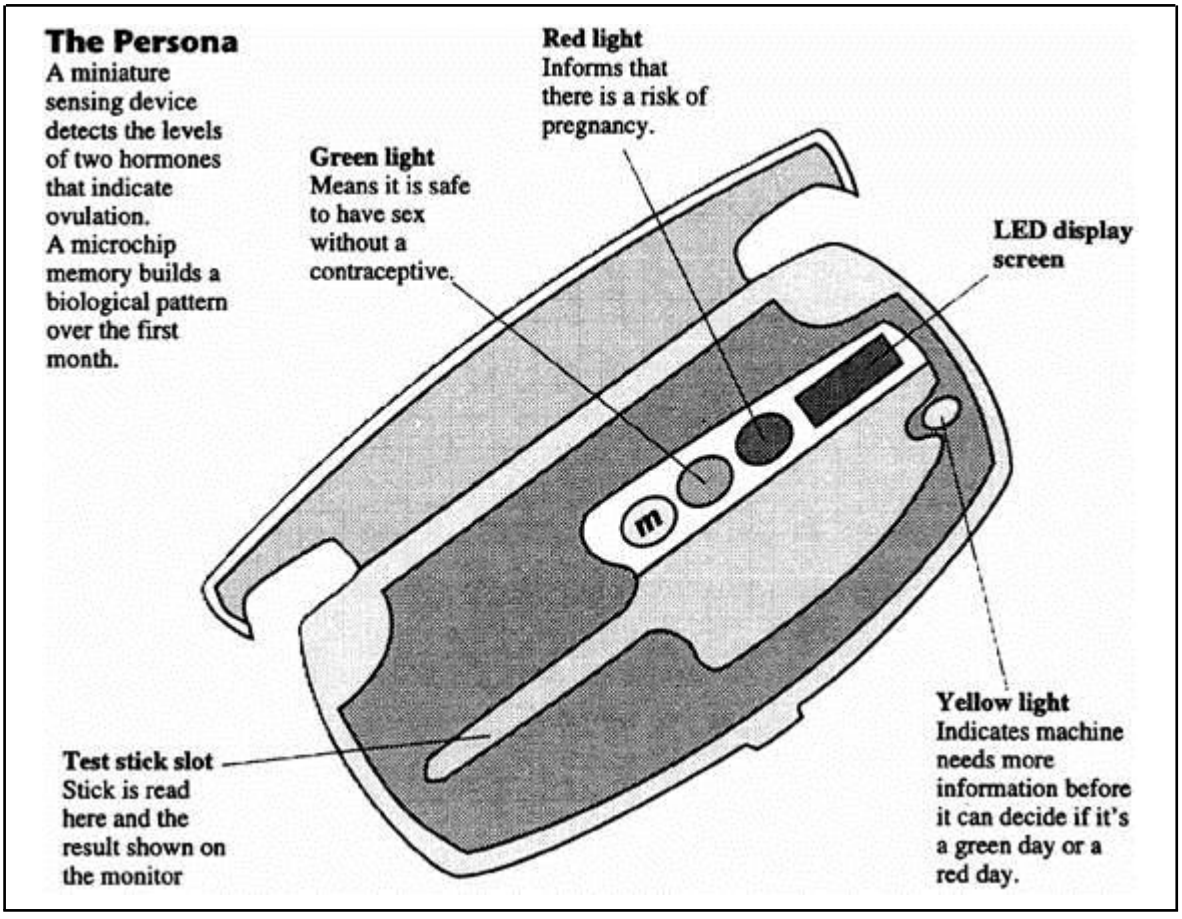
_____

(4)

(Total 6 marks)

Q26.

In women, two hormones control ovulation (the release of eggs from the ovaries). The drawing shows a monitoring machine which women can use to measure the amounts of the two hormones. A test stick is dipped in the woman's urine each morning, then placed in a slot in the machine.



(a) The machine monitors the levels of two hormones.

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(i) What is a hormone?

_____

_____

(1)

(ii) How are hormones transported around the body?

_____

_____

(1)

(b) A woman is unlikely to become pregnant if she has sex on the days when the machine shows a green light during the test. Use information from the drawing to suggest why.

_____

_____

(1)

(Total 3 marks)

Q27.

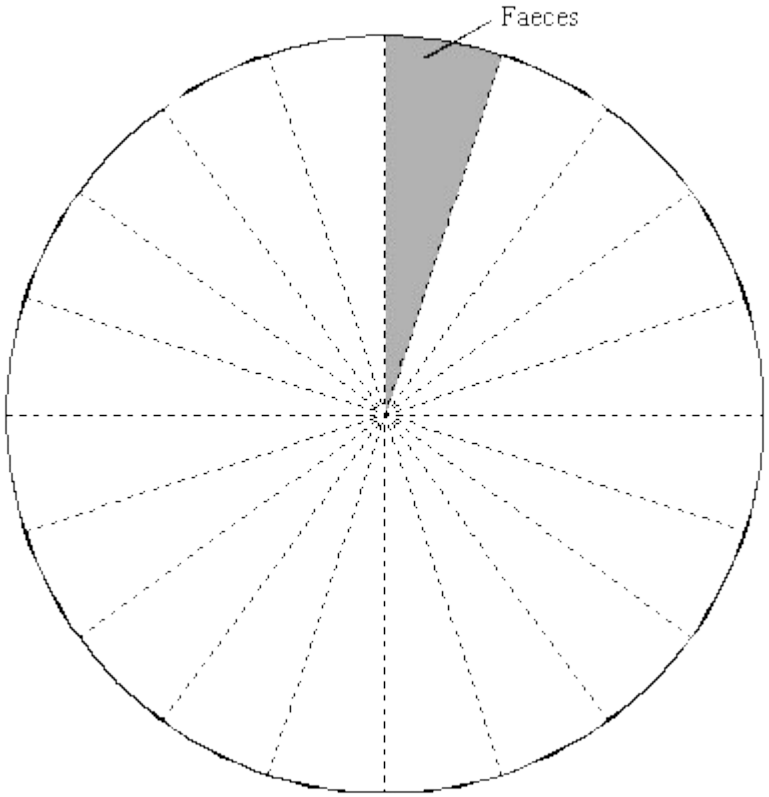
The table shows how much water is lost in different ways from a student's body.

Way in which water is lost	Percentage of total
Breath	15
Faeces	5
Sweat	50
Urine	30

(a) Complete the pie chart.

One part has been done for you. Remember to label the pie chart.

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(3)

(b) The table is about waste products which are removed from the student's body.

Complete the table by using the correct words from the box.

amino acids	breath	circulation	digestion	fatty acids
glucose	respiration	sweat	urine	

Waste product	How it is produced	How it leaves the body
carbon dioxide	by _____	in _____
urea	from _____	in _____

(4)

(Total 7 marks)

Q28.

The monthly cycle of women is controlled by hormones.

(a) Name the **two** glands that secrete these hormones.

1. _____

2. _____

(2)

(b) Describe **two** ways in which fertility in women can be controlled by giving hormones.

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1. _____

_____

2. _____

_____

(2)

(Total 4 marks)

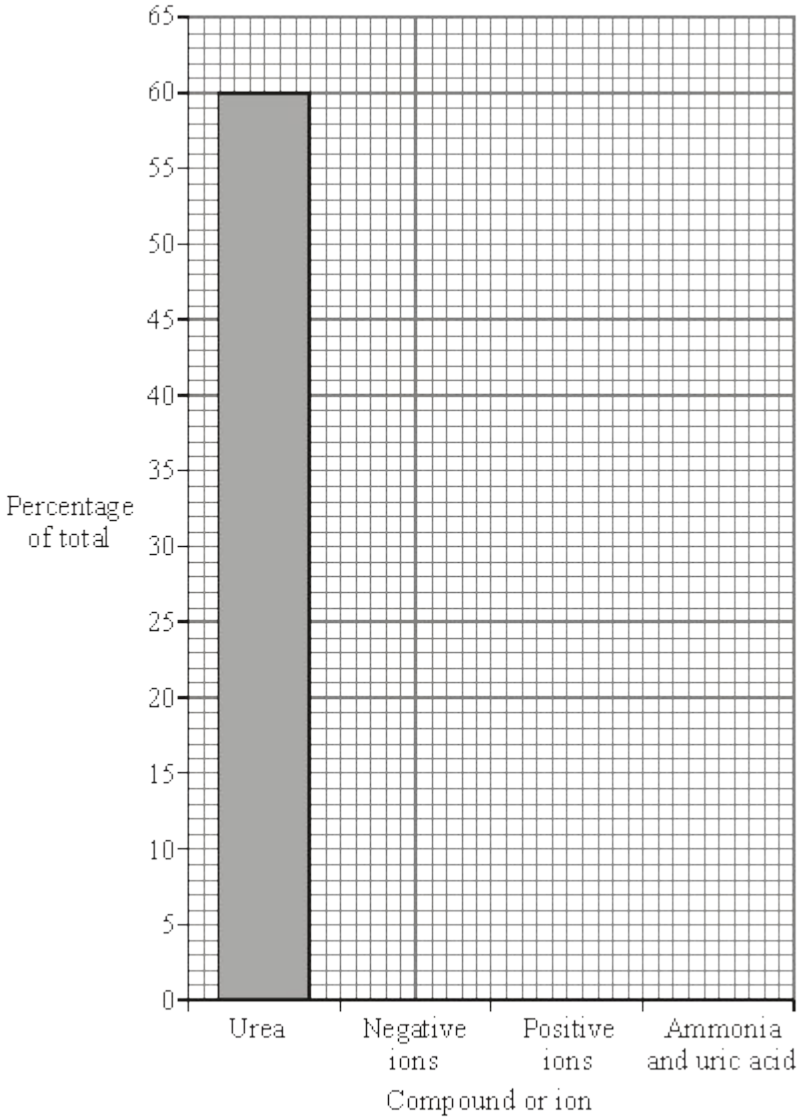
Q29.

(a) The table shows the compounds and ions dissolved in a student's urine.

Compound or ion	Percentage of total
urea	60
negative ions	25
positive ions	10
ammonia and uric acid	5

(i) Complete the bar chart. One bar has been drawn for you.

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(2)

(ii) There is a total of 10 g of compounds and ions dissolved in a sample of this student's urine. Calculate the mass of urea in the sample. Show clearly how you work out your answer.

_____

_____

_____

Mass of urea _____ g

(2)

(b) Use words from the box to complete the sentences.

anus	bladder	kidneys	liver	lungs

Plasma transports carbon dioxide from the body to the _____ .

Plasma transports urea from the _____ to the _____ .

(3)

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(Total 7 marks)

Q30.

This question is about the hormones that control the monthly cycle in women.

Complete the sentences.

Hormones control the monthly release of an egg from a woman's _____ .

They also control the thickness of the lining of her _____ .

Hormones that are given to women to stimulate the release of eggs are called

_____ drugs.

Hormones that are given to women to prevent the release of eggs are called

oral _____ .

(Total 4 marks)

Q31.

The table shows the amounts of some of the substances filtered, reabsorbed and excreted by the kidneys in one day.

Substance	Amount filtered	Amount reabsorbed	Percentage reabsorbed	Amount excreted
water		178.5 litres	99.2 %	1.5 litres
urea	56 g	28 g	50 %	28 g
glucose	800 units	800 units	100 %	0
sodium	25 200 units	25 050 units		150 units
chloride	18 000 units	17 850 units	99.2 %	150 units

(a) Calculate the amount of water filtered by the kidneys in one day.

_____

Amount _____ litres

(1)

(b) Calculate the percentage of the filtered sodium that was reabsorbed. Show clearly how you work out your answer.

_____

_____

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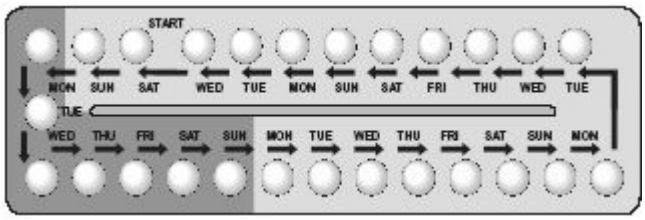
Percentage reabsorbed _____

(1)

(Total 2 marks)

Q32.

The picture shows some birth control (contraceptive) pills for women.



These are some facts about using the birth control pills:

- birth control pills are 99 per cent effective in preventing pregnancy
- the hormones in the pills have some rare but serious side effects
- this method of birth control gives no protection against sexually transmitted diseases
- the hormones in the pills give protection against some women's diseases
- the woman has to remember to take the pill every day
- the woman's monthly periods become more regular.

Use the information above to answer these questions.

(a) Give **two** advantages of using birth control pills.

1. _____

_____

2. _____

_____

(2)

(b) Give **two** disadvantages of using birth control pills.

1. _____

_____

2. _____

_____

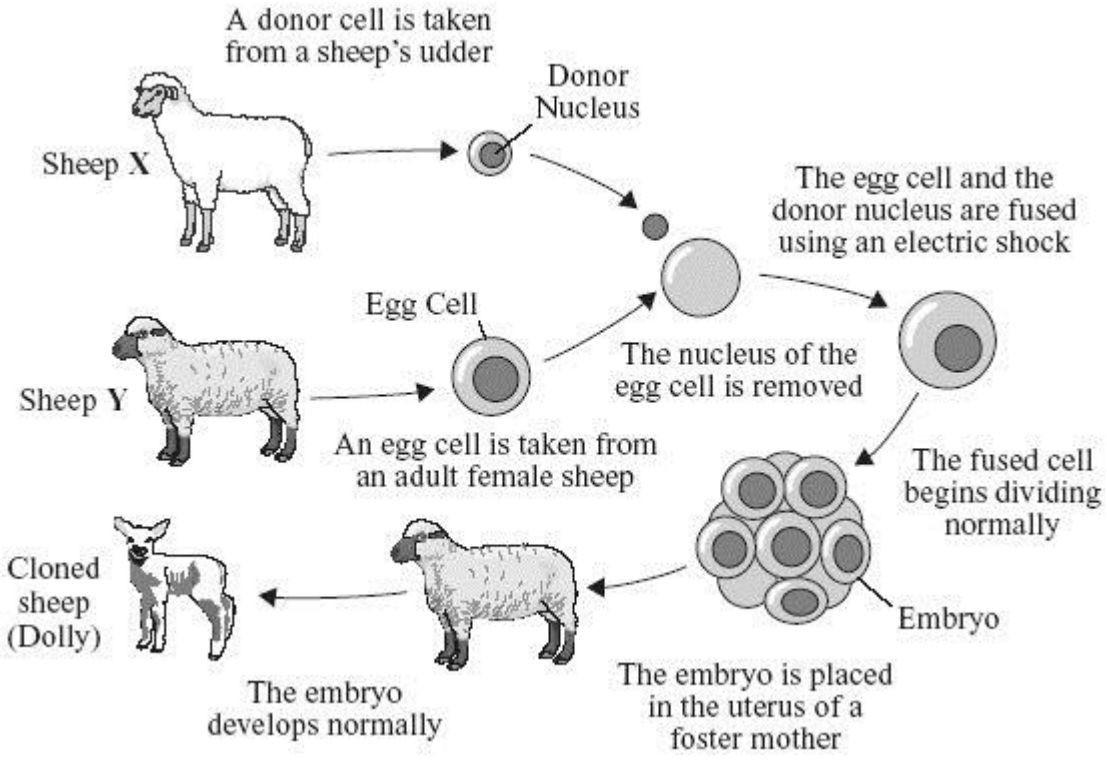
(2)

(Total 4 marks)

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Q33.

The diagram shows how Dolly the sheep was cloned.



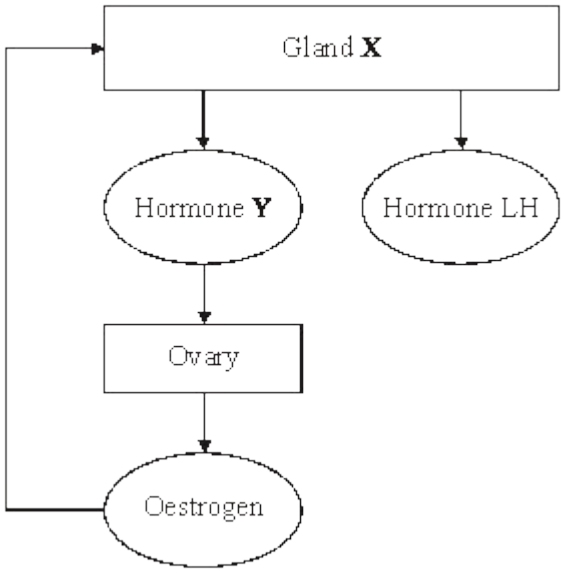
(a) Name the type of cell division that occurs:

(i) as the egg cell is produced; _____

(ii) as the fused cell begins to divide normally. _____

(2)

(c) The diagram below shows the relationships between the glands and hormones that control the menstrual cycle of a woman.



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(i) Name:

gland **X**; _____

hormone **Y**. _____

(2)

(ii) Give **two** effects of the hormone oestrogen on gland **X**.

1. _____

_____

2. _____

_____

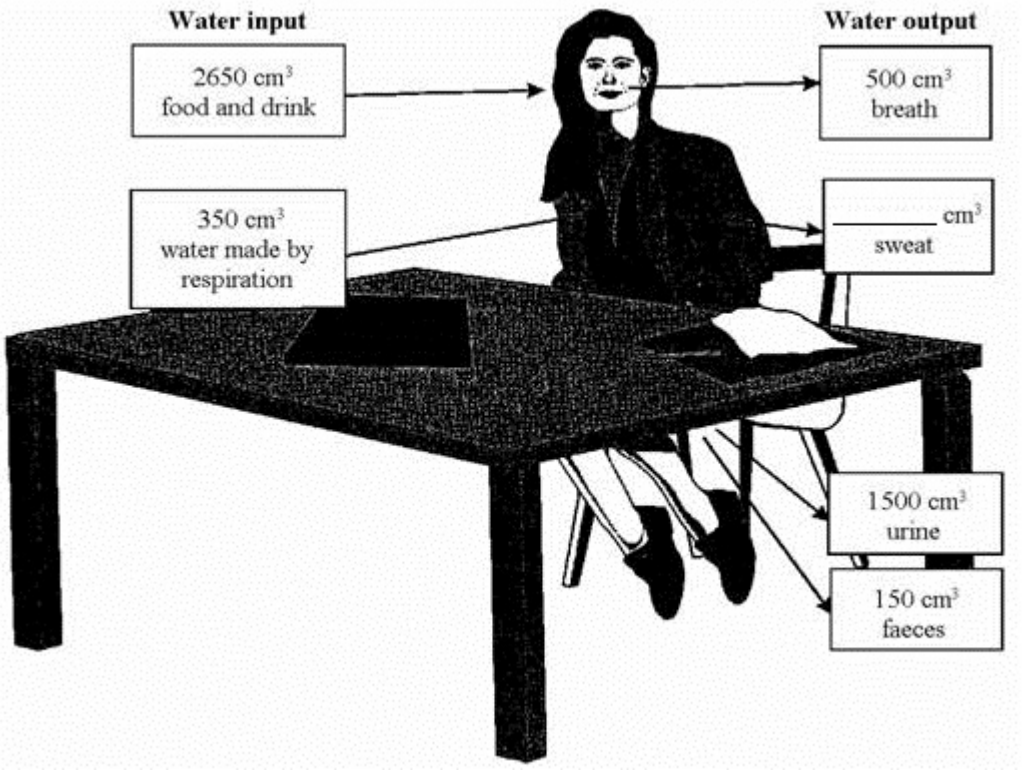
(2)

(Total 6 marks)

Q34.

The diagram shows a water balance for a girl who spends most of the day working at a desk. It is not complete.

(a) Complete the diagram by writing in the volume of sweat produced.



(1)

(b) The next day she spent much of the day training, doing many different types of exercise.

State how **each** of the following would change and why it would be different from the previous day.

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(i) The amount of water given off as sweat.

_____

_____

_____

(2)

(ii) The amount of water breathed out.

_____

_____

_____

(2)

(iii) The amount of urine passed, if she had the same water intake as on the previous day.

_____

_____

_____

(2)

(c) Which organ controls the amount of water in the body?

_____

(1)

(Total 8 marks)

Q35.

Information is passed to target organs in the body by hormones.

(a) (i) How do hormones travel around the body?

_____

(1)

(ii) What name is given to the organs that secrete hormones?

_____

(1)

(b) Explain the cause of diabetes and how it is controlled.

_____

_____

_____

_____

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(3)
(Total 5 marks)

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