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EDEXCEL GCSE BIOLOGY: QUESTIONS BY TOPIC

Animal Coordination, Control and Homeostasis (7)

GCSE Biology (Foundation) Topic 7

18 questions · 182 marks · Mark schemes included

Pearson Edexcel GCSE (9-1) Biology 1BI0, Foundation Tier, June 2018 - June 2025

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HOW TO USE THIS BOOKLET

Questions run from the lowest mark tariff to the highest, so similar questions sit together.

Click any row below to jump straight to that question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme.

Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

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QUESTIONS

18 questions · 182 marks · lowest tariff first



7-MARK QUESTIONS

1 question in this booklet



- 1 (a) Draw **one** straight line from each hormone to the endocrine gland that produces it.

(2)

hormone	endocrine gland
insulin	pituitary
	adrenal
	ovaries
oestrogen	testes
	pancreas

- (b) Figure 1 shows the concentration of glucose in the blood of a person for a period of six hours.

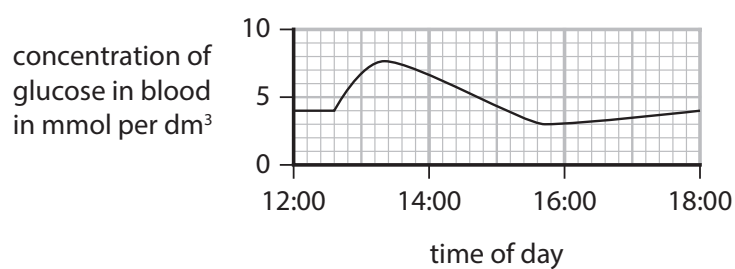


Figure 1

- (i) State the highest blood glucose concentration during this six hour period.

(1)

..... mmol per dm³



(ii) Insulin was released from the pancreas at 13:30.

Describe the changes in the concentration of glucose in the blood from 13:30 to 18:00.

(2)

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(c) The cells of people with type 2 diabetes do not respond to insulin.

Describe **two** ways that a person with type 2 diabetes can control the concentration of glucose in their blood.

(2)

1

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2

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(Total for Question 1 = 7 marks)



8-MARK QUESTIONS

2 questions in this booklet



6 (a) Figure 13 shows a kidney nephron.

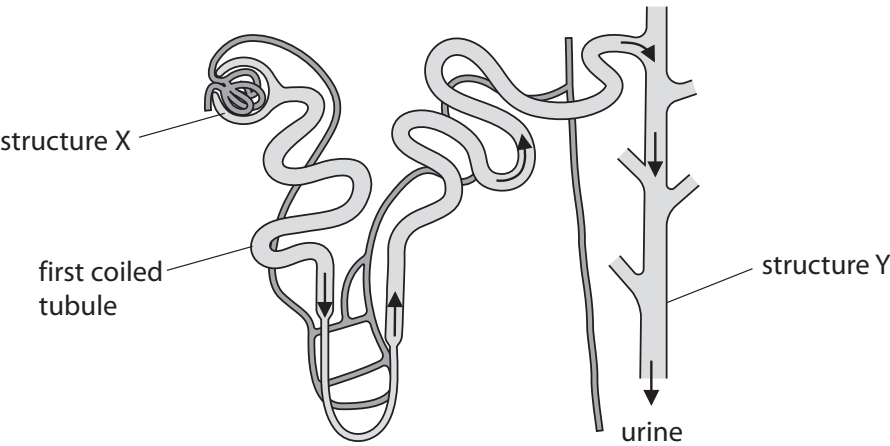


Figure 13

(i) Structure X is the (1)

- ☐ A glomerulus
- ☐ B Bowman's capsule
- ☐ C collecting duct
- ☐ D capillary

(ii) Figure 14 shows the concentration of glucose in the filtrate in the nephron.

filtrate	mean concentration of glucose in millimoles per litre
filtrate in the start of first coiled tubule	6
filtrate in the end of first coiled tubule	0

Figure 14

Explain why the concentration of glucose changes as it moves through the first coiled tubule.

(2)

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.....

.....

(iii) Name the structure that carries urine from the kidney to the bladder.

(1)

(b) The concentration of protein in urine from person A and person B was measured each year from 2015 to 2019.

Person A had healthy kidneys. Person B had kidney disease.

year	concentration of protein in urine in arbitrary units	
	person A (with healthy kidneys)	person B (with kidney disease)
2015	2	25
2016	4	37
2017	5	57
2018	4	79
2019	3	106

Figure 15

Use the data in Figure 15 to compare the changes in the concentration of protein in the urine from person A and person B.

(2)

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(c) Person B needs a kidney transplant.
Person B has a twin sister.

Explain why this twin sister could be a suitable kidney donor for Person B.

(2)

(Total for Question 6 = 8 marks)

3 Figure 3 shows a diagram of the skin.

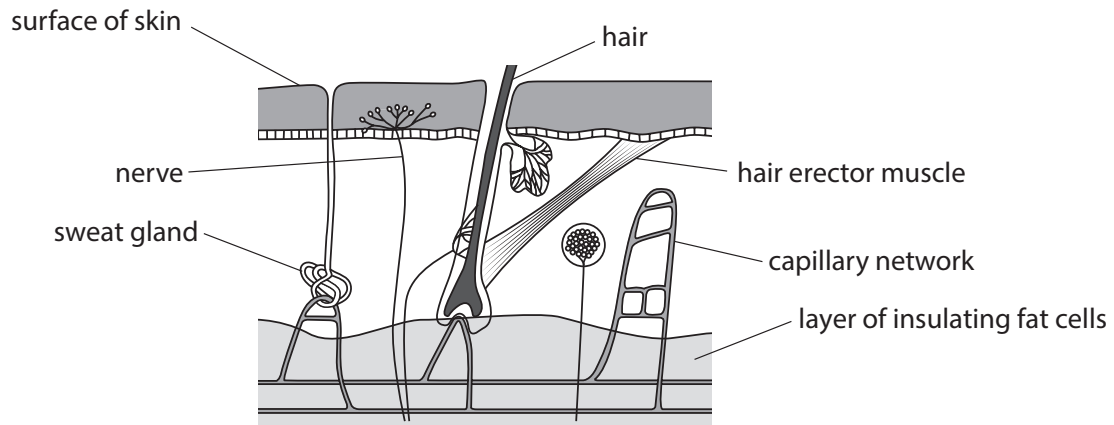


Figure 3

(a) Structures in the skin, shown in Figure 3, help to control body temperature.

(i) Explain how the action of the hair erector muscle helps to keep the body warm.

(2)

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(ii) Explain how sweating decreases body temperature.

(2)

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- (b) A scientist investigated the air temperature at which women start to shiver.

The scientist recorded the air temperature at which a 40-year-old woman started to shiver.

Which would improve the quality of the results in this investigation?

(1)

- ☐ A repeat the investigation on a 40-year-old man
- ☐ B record the body temperature of the 40-year-old woman
- ☐ C reduce the air temperature after shivering started
- ☐ D repeat the investigation on 20 different women

- (c) Figure 4 shows the responses to body temperatures that are too cold or too warm.

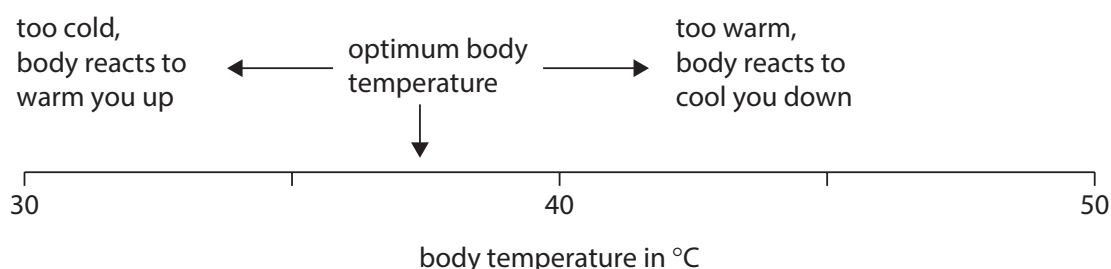


Figure 4

- (i) State the optimum body temperature as shown in Figure 4.

(1)

..... °C

- (ii) Temperature affects the rate of diffusion of gases into and out of cells.

State **two** other factors that affect the rate of diffusion.

(2)

1

2

(Total for Question 3 = 8 marks)



9-MARK QUESTIONS

4 questions in this booklet



1 Insulin is produced by an endocrine gland and is transported in the blood.

(a) (i) Which row shows the endocrine gland and the target organs for insulin?

(1)

	endocrine gland	target organs
☐ A	adrenal	liver and muscles
☐ B	adrenal	small and large intestines
☐ C	pancreas	liver and muscles
☐ D	pancreas	small and large intestines

(ii) Which part of the blood transports insulin to its target organs?

(1)

- ☐ A plasma
- ☐ B red blood cells
- ☐ C white blood cells
- ☐ D platelets

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



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DO NOT WRITE IN THIS AREA

(b) Figure 1 shows the blood glucose and blood insulin concentration for a healthy person during one day.

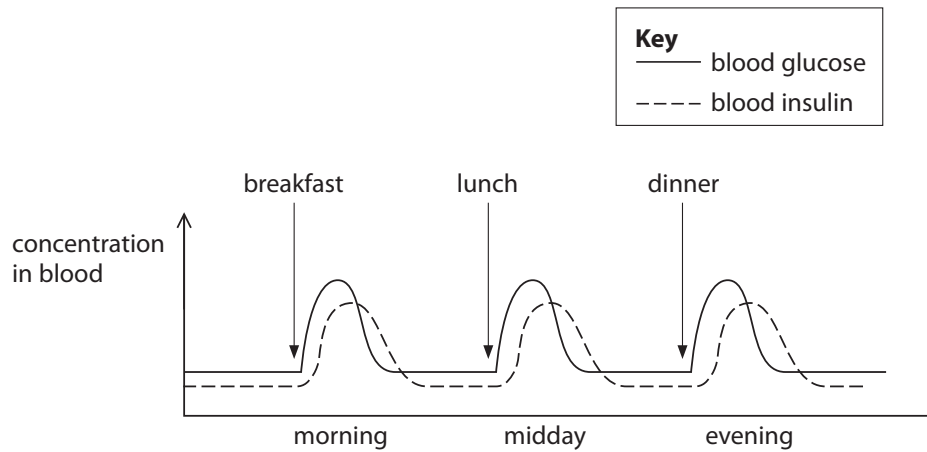


Figure 1

The blood glucose concentration increases after a meal.

Explain why the blood glucose concentration then decreases.

(2)

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(c) State **one** cause of type 1 diabetes.

(1)

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(d) Explain how controlling the diet can be used to treat type 2 diabetes.

(2)

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(e) A scientist is planning to test a new treatment for type 2 diabetes.

She selects 300 volunteers who have type 2 diabetes.

State **two** other factors that the scientist should consider when selecting the 300 volunteers.

(2)

1

2

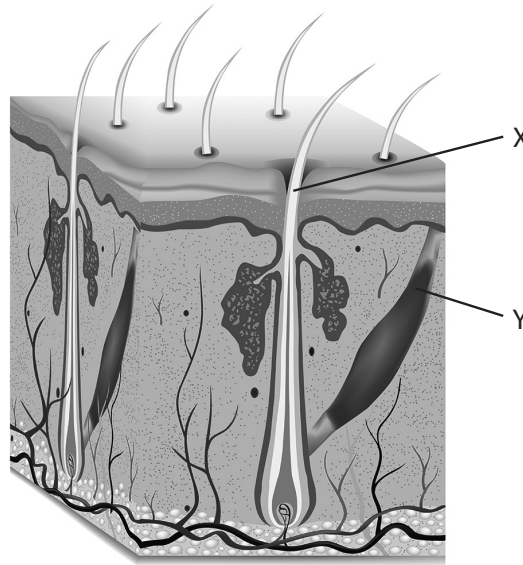
(Total for Question 1 = 9 marks)

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3 (a) Figure 3 shows a section through the skin.



(Source: © mariyaermolaeva/Shutterstock)

Figure 3

The skin helps to keep body temperature constant.

(i) Which is the correct term for maintaining a constant internal environment?

(1)

- ☐ A excretion
- ☐ B homeostasis
- ☐ C respiration
- ☐ D sweating

(ii) Explain how structures X and Y help to regulate body temperature when the body is too cold.

(2)

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(iii) Explain how shivering can help a person regulate their body temperature.

(2)

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(b) Figure 4 shows a person's body temperature during 24 hours.

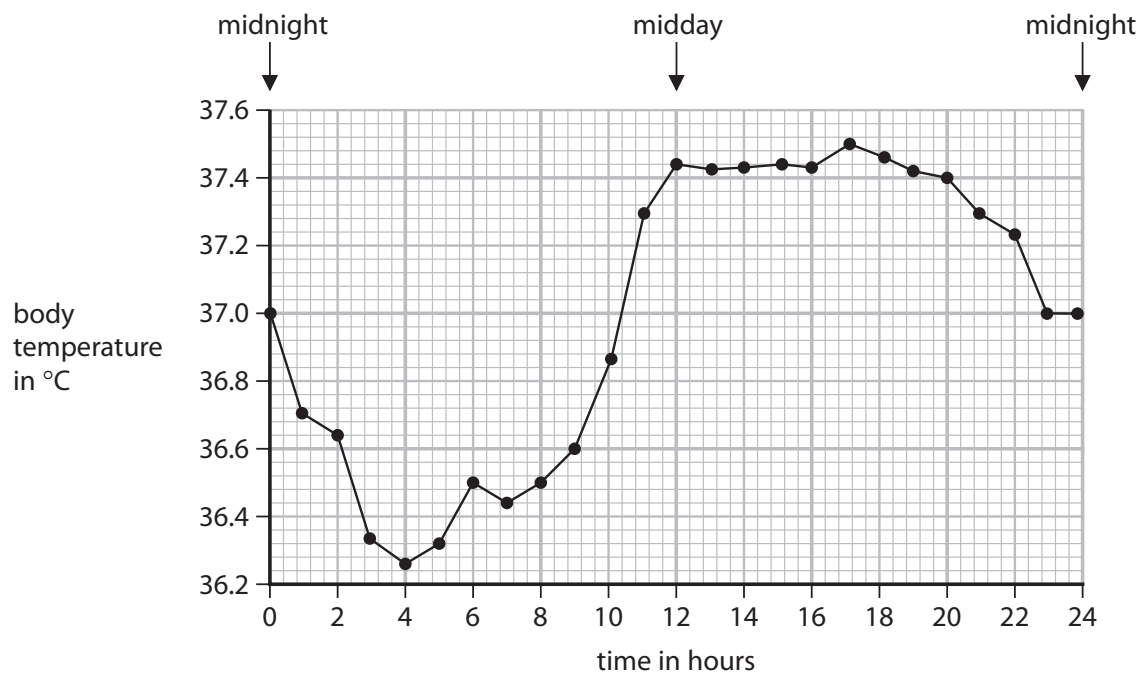


Figure 4

(i) State this person's highest body temperature.

(1)

(ii) Explain the change in body temperature from 0 hours to 4 hours.

(3)

(Total for Question 3 = 9 marks)



4 Hormones are chemicals produced in endocrine glands.

(a) Draw **one** straight line from each hormone to the endocrine gland that produces it.

(2)

hormone

thyroxine

adrenalin

endocrine gland

thyroid gland

pituitary gland

pancreas

adrenal glands

ovaries



(b) Figure 8 shows some of the changes that occur during the menstrual cycle.

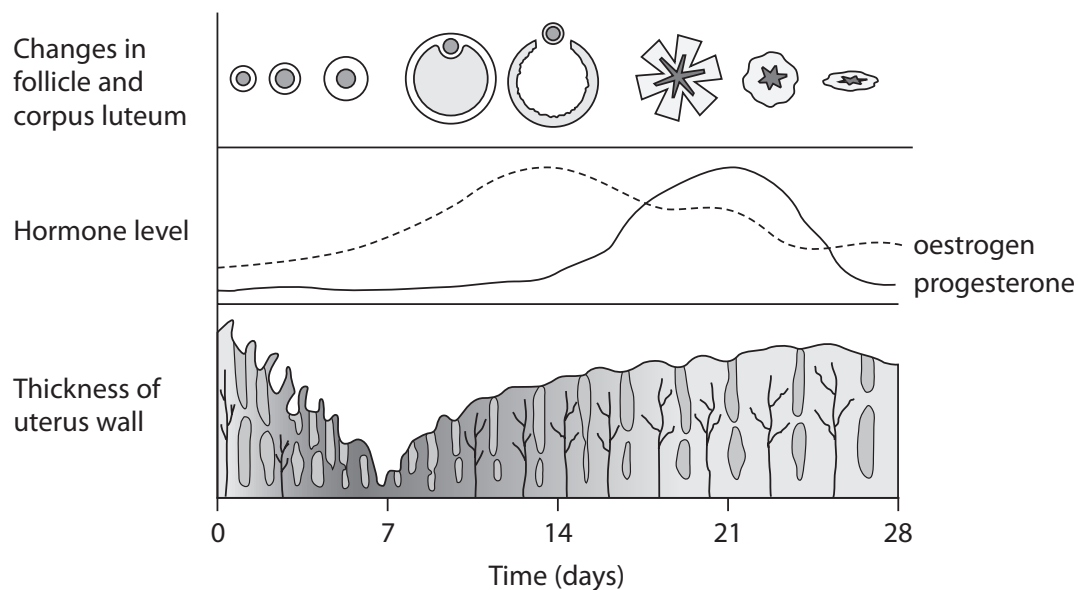


Figure 8

(i) The level of oestrogen peaks on day 13.

State the effect on the follicle caused by the peak in oestrogen.

(1)

(ii) Describe the effect of progesterone on the uterus lining from day 13 to day 21.

(2)

(c) The condom is an example of a barrier contraceptive.

State **one** advantage and **one** disadvantage of using this barrier method of contraception.

(2)

Advantage

Disadvantage

(d) The contraceptive pill is an example of a hormonal method of contraception.

Explain **one** way that the contraceptive pill stops a woman from becoming pregnant.

(2)

(Total for Question 4 = 9 marks)



5 Figure 9 shows a nephron from a kidney.

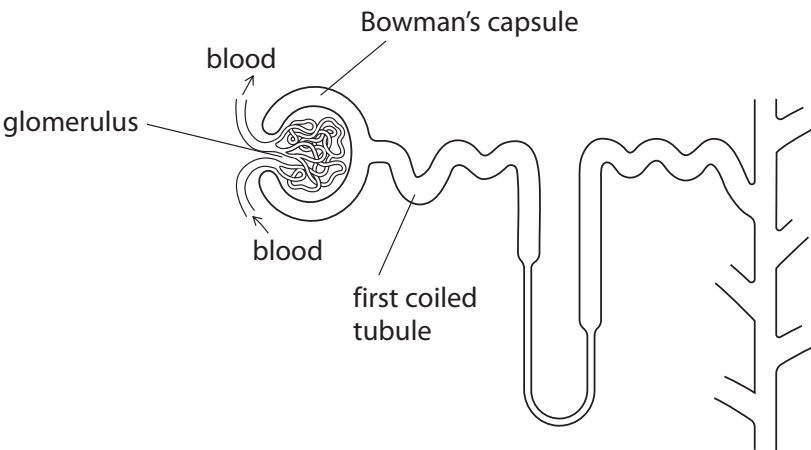


Figure 9

(a) The pressure of the liquid in the Bowman's capsule is 1.3 kPa.

The pressure of the liquid in the glomerulus is 5.6 times greater than the pressure in the Bowman's capsule.

(i) Calculate the pressure in the glomerulus.

Give your answer to one decimal place.

(2)

..... kPa

(ii) The higher pressure in the glomerulus forces some parts of the blood into the Bowman's capsule.

Which row of the table shows the parts of the blood that move into the Bowman's capsule?

(1)

	blood cells	urea	water
☐ A	✓	✓	✗
☐ B	✗	✓	✓
☐ C	✓	✗	✗
☐ D	✗	✗	✓

(b) A scientist investigated the concentration of glucose in liquids from three different parts of the nephron.

(i) Describe how the equipment shown in Figure 10 can be used to see if these liquids contain different concentrations of glucose.

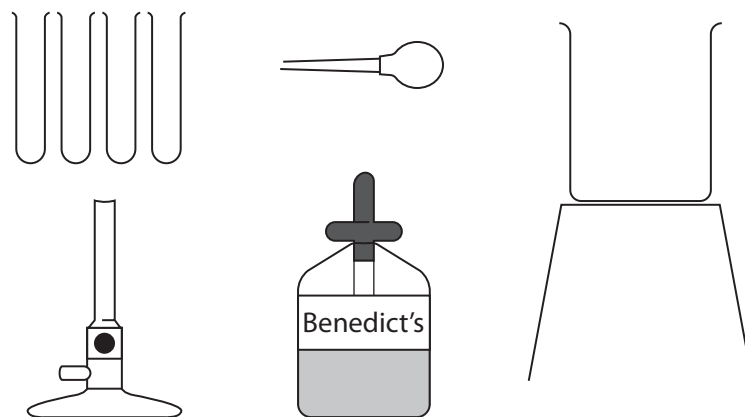


Figure 10

(4)

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(ii) Figure 11 shows the concentration of glucose in the three different parts of the nephron.

	part of nephron		
	Bowman's capsule	start of first coiled tubule	end of first coiled tubule
concentration of glucose in millimoles per dm ³	8	8	0

Figure 11

Explain **one** conclusion that can be made from the data in Figure 11.

(2)

(Total for Question 5 = 9 marks)

10-MARK QUESTIONS

3 questions in this booklet



- 5 (a) (i) Which row of the table shows the endocrine gland and hormone involved in the control of blood glucose concentration?

(1)

	endocrine gland	hormone
☐ A	ovary	oestrogen
☐ B	ovary	insulin
☐ C	pancreas	oestrogen
☐ D	pancreas	insulin

- (ii) State a target organ for the hormone that controls blood glucose concentration.

(1)

- (b) People with a high BMI are more likely to develop type 2 diabetes.
Figure 11 shows the mass, height and BMI for two people.

person	mass in kilograms	height in metres	BMI
A	110	2.0	?
B	85	1.5	38

Figure 11

- (i) Use the formula to calculate the BMI for person A

$$\text{BMI} = \frac{\text{mass}}{\text{height}^2}$$

(2)



(ii) Person B develops type 2 diabetes.

Describe **two** lifestyle changes person B should make to help to control their blood glucose concentration.

(2)

1

2

(c) (i) Which row of the table shows the type or types of respiration that use glucose?

(1)

	aerobic respiration	anaerobic respiration
☐ A	yes	yes
☐ B	yes	no
☐ C	no	yes
☐ D	no	no

- (ii) A scientist measured the rate of respiration in a person when sleeping and then running at different speeds.

Figure 12 shows the results.

activity	speed in km per hour	respiration rate in kJ per minute
sleeping	0	3
running slowly	8	90
running quickly	12	130

Figure 12

Explain the trend shown in Figure 12.

(3)

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(Total for Question 5 = 10 marks)

4 (a) Endocrine glands make hormones.

Which endocrine gland is situated in the head and is attached to the brain?

(1)

- ☐ **A** adrenal
- ☐ **B** pancreas
- ☐ **C** pituitary
- ☐ **D** thyroid

Diabetics cannot effectively control the concentration of glucose in their blood.

(b) Person A has type 1 diabetes.

Person B has type 2 diabetes.

Draw one straight line from each person to the cause of their type of diabetes.

(2)**person****cause**

person A (type 1)

• does not have a pancreas

• cannot digest fatty foods

• does not produce insulin

person B (type 2)

• has cells that have stopped responding to insulin

• cannot transport insulin in the blood

- (c) A scientist investigated how the waist to hip ratio affected the probability of developing type 2 diabetes.

The scientist chose 100 females in each of five waist to hip ratio groups and recorded if they developed type 2 diabetes.

Figure 7 shows the results.

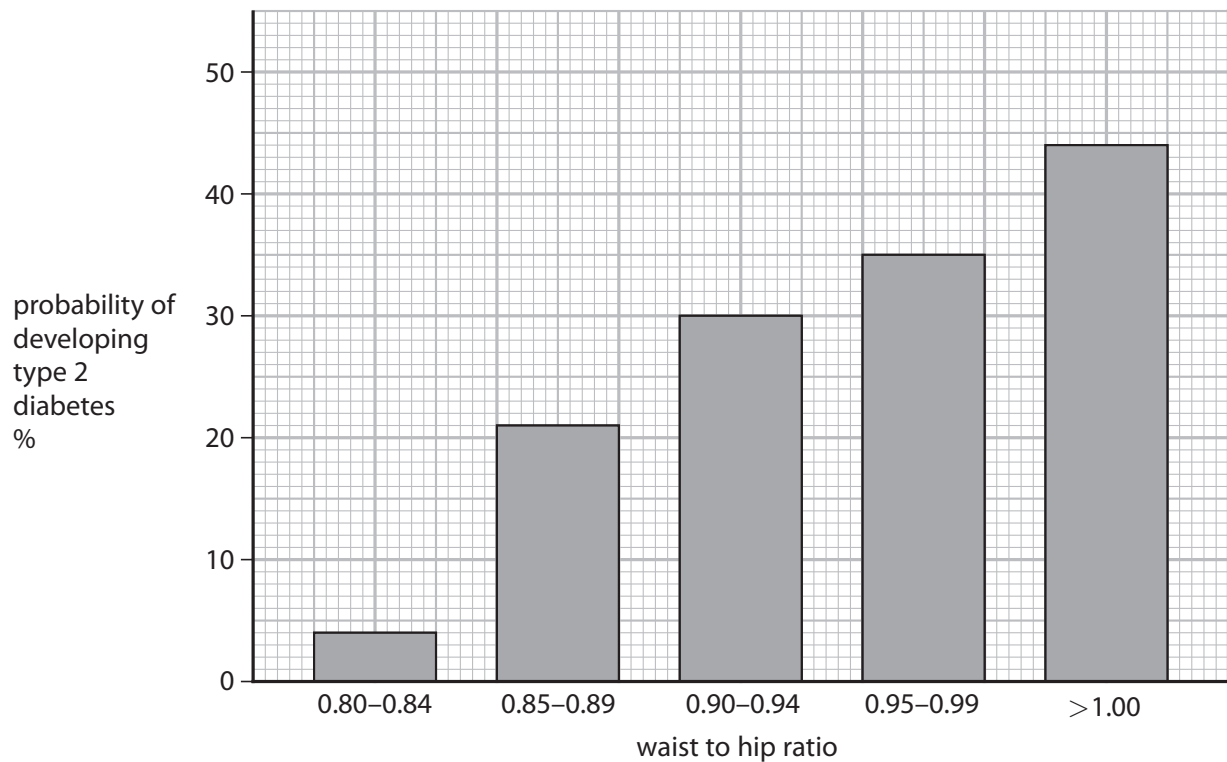


Figure 7

- (i) Describe the trend shown in Figure 7.

Use data from Figure 7 in your answer.

(2)

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.....

- (ii) A female has a waist measurement of 78.3 cm and a hip measurement of 90.0 cm.

Calculate the waist to hip ratio for this female and use Figure 7 to estimate the probability that she will develop type 2 diabetes.

(2)

probability..... %

- (d) (i) The scientist also measured the BMI of the females.

BMI and waist to hip ratio are two factors that affect the probability of females developing type 2 diabetes.

State **two** other factors about the females in the study that would affect the probability of them developing type 2 diabetes.

(2)

1

2

- (ii) State why an athlete may have a high BMI but still have a low probability of developing type 2 diabetes.

(1)

(Total for Question 4 = 10 marks)



4 Endocrine glands produce hormones.

(a) Draw **two** crosses on Figure 5 to show the position of the ovaries.

(1)



Figure 5

(b) Progesterone is produced in the ovaries.

State **one** effect of progesterone on the uterus lining.

(1)

(c) Insulin is a hormone that controls blood glucose concentration.

(i) Which endocrine gland produces insulin?

(1)

- ☐ **A** thyroid
- ☐ **B** pancreas
- ☐ **C** adrenal
- ☐ **D** pituitary

(ii) State how insulin is transported from its endocrine gland to its target organs.

(1)

(iii) Name the main target organ for insulin.

(1)

(d) People with type 1 diabetes cannot produce insulin.

Figure 6 shows the blood glucose concentration for a person with type 1 diabetes.

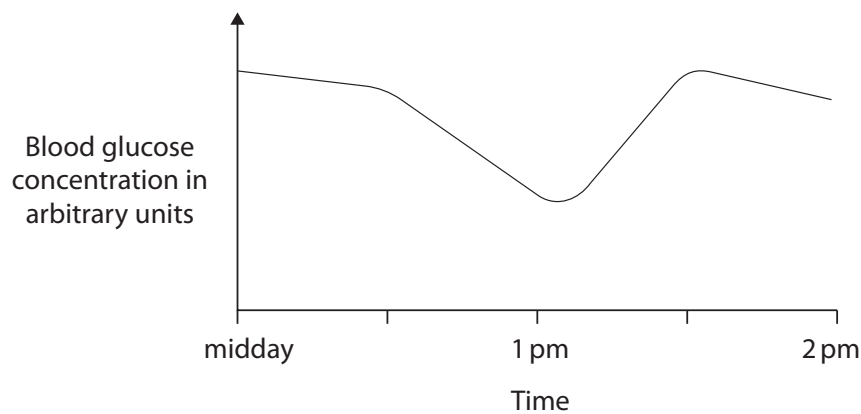


Figure 6

(i) Describe the trend from midday to 1 pm.

(2)

(ii) State what a person with type 1 diabetes could have done to cause the change in the blood glucose concentration from 1.05 pm to 1.30 pm.

(1)



(e) People with type 2 diabetes have cells that do not respond to insulin.

State **two** ways that people with type 2 diabetes can control their blood glucose concentration.

(2)

1

2

(Total for Question 4 = 10 marks)

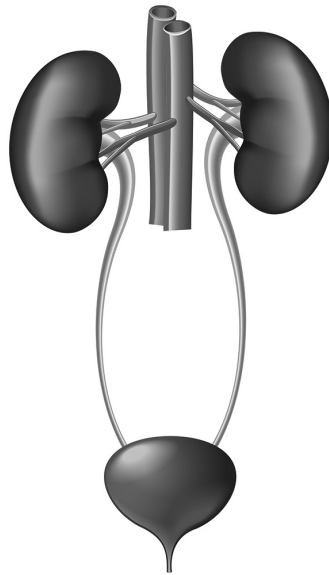


11-MARK QUESTIONS

4 questions in this booklet



10 Figure 21 shows the human urinary system.



(Source: © La Gorda/Shutterstock)

Figure 21

(a) Urine is made by removing water, urea and salts from the blood.

Use the letter X to label where urine is made.

(1)

(b) Which substance is converted to urea in the liver?

(1)

- ☒ **A** amino acids
- ☒ **B** sugars
- ☒ **C** lipids
- ☒ **D** potassium ions

- (c) A patient cannot remove enough urea from the blood when making urine.

Figure 22 shows a dialysis machine attached to the arm of this patient.

Their blood is pumped out of their arm, passed through the dialysis machine, and then put back into the patient.

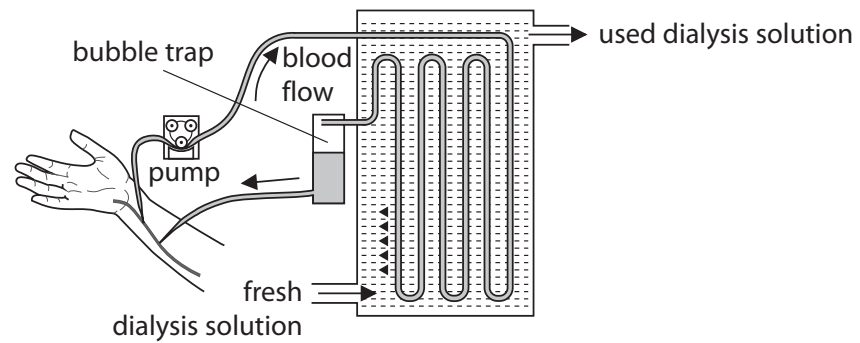


Figure 22

- (i) Describe what happens to urea as the blood passes through the dialysis machine.

(2)

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- (ii) Two patients need to have dialysis treatment.

Patient A needs this treatment three times a week.

Patient B needs this treatment once a week.

Give **one** reason why patient B needs dialysis treatment less often than patient A.

(1)

.....

.....

(d) Describe how to test for glucose in the dialysis fluid.

(3)

(e) Urease is an enzyme that breaks down urea into smaller molecules.

Explain why urease will not break down starch into smaller molecules.

(3)

(Total for Question 10 = 11 marks)



7 Figure 12 shows the urinary system of a mammal.

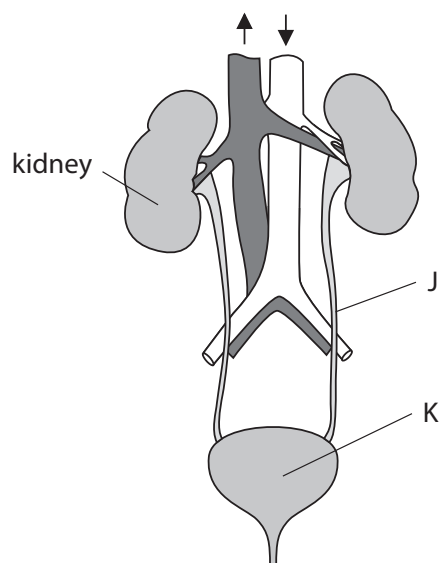


Figure 12

(a) Name structure J and structure K.

(2)

Structure J

Structure K

(b) Nephrons in the kidney filter the blood to produce urine.

Urine contains urea.

(i) What is urea made from?

(1)

- ☒ **A** excess amino acids
- ☒ **B** excess carbohydrates
- ☒ **C** excess vitamins
- ☒ **D** excess lipids

(ii) Figure 13 shows which components of the blood are filtered into the nephron.

blood component	is the component filtered into the nephron?
blood cells	no
large proteins	no
glucose	yes
sodium ions	yes

Figure 13

Explain the conclusions that can be made from this information.

(2)

*(c) It is estimated that about 3 million people in the UK are at risk of developing chronic kidney disease (CKD).

The most severe stages of CKD can result in kidney failure.

Discuss the use of different treatments for kidney failure.

(6)

(Total for Question 7 = 11 marks)



- 8 People with diabetes cannot always control the concentration of glucose in their blood.

(a) Two people eat identical meals.

One person has diabetes, the other person does not have diabetes.

Figure 15 shows the concentration of glucose in the blood of these two people after eating the meals.

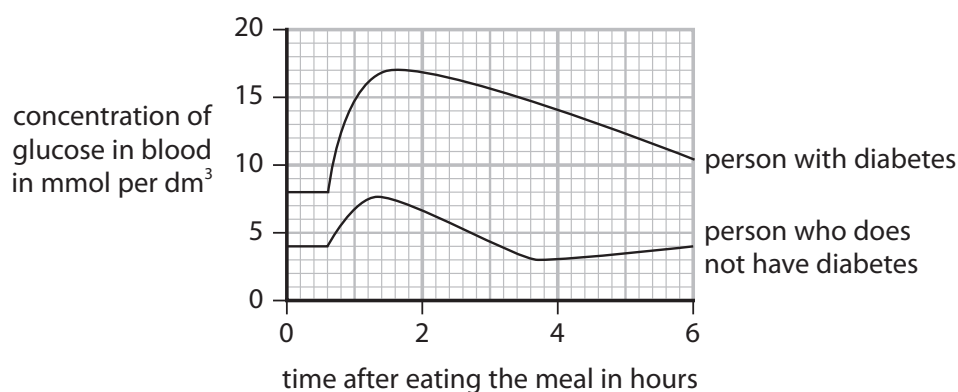


Figure 15

- (i) Describe **two** differences in the concentration of glucose in the blood of the two people shown in Figure 15.

(2)

1

2

- (ii) Calculate the maximum increase in the concentration of glucose in the blood of the person with diabetes.

(1)

..... mmol per dm³

- (iii) Water moved out of the red blood cells of the person with diabetes when the concentration of glucose in the blood was above 15 mmol per dm^3 .

Explain why water moved out of the red blood cells of the person with diabetes.

(2)

- (b) The pancreas produces a hormone that causes the concentration of glucose in the blood to decrease.

(i) Name this hormone.

(1)

(ii) State how this hormone is transported from the pancreas to its target organs.

(1)

- (iii) Which is the target organ for the hormone that controls the concentration of glucose in the blood?

(1)

- ☐ A kidney
- ☐ B pancreas
- ☐ C liver
- ☐ D lung

(c) Explain how type 2 diabetes can be controlled.

(3)

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(Total for Question 8 = 11 marks)



10 (a) A student wanted to make a jacket to wear in cold weather.

The student compared the insulation properties of wool as a natural material with polyester as a synthetic material.

Each material was wrapped around a beaker containing hot water as shown in Figure 17.

The temperature was recorded every 2 minutes for 12 minutes.

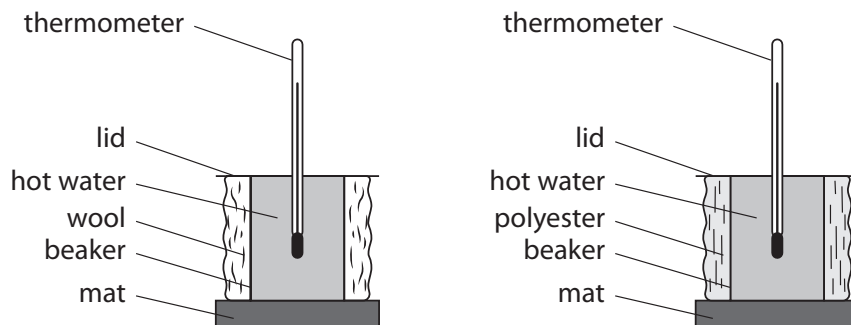


Figure 17

(i) Which part of the body controls the regulation of body temperature?

(1)

- ☐ **A** kidney
- ☐ **B** pituitary gland
- ☐ **C** hypothalamus
- ☐ **D** pancreas

(ii) State **one** variable that should be controlled in this investigation.

(1)

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(iii) Describe a control that could be used for this investigation.

(2)

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(b) The results for this investigation are shown in Figure 18.

wool		polyester	
time in minutes	temperature in °C	time in minutes	temperature in °C
0	64	0	82
2	61	2	74
4	56	4	68
6	53	6	63
8	49	8	59
10	45	10	53
12	42	12	48

Figure 18

(i) Compare and contrast the temperature changes for wool and polyester in this investigation.

(2)

(ii) State **one** improvement to this investigation that would make the results more comparable.

(1)

(c) (i) Wearing an insulated jacket may cause a person to sweat.

Explain how sweating helps to regulate temperature in humans.

(2)

(ii) Sweat contains urea.

State where and how urea is produced in the human body.

(2)

(Total for Question 10 = 11 marks)

12-MARK QUESTIONS

3 questions in this booklet



7 People produce sweat when they are hot.

Sweat consists of substances dissolved in water.

Figure 16 shows the concentration of dissolved substances in the sweat of two patients in a hospital.

substance in sweat	concentration in mmol per dm ³	
	patient A	patient B
urea	8.0	32.0
glucose	0.5	0.4
sodium ions	40.0	36.0
chloride ions	35.0	32.0

Figure 16

- (a) (i) Calculate the ratio of the concentration of urea in the sweat of patient A to the concentration of urea in the sweat of patient B.

Give your answer in its simplest form.

(2)

- (ii) Describe how urea is produced in the body.

(2)



(iii) The blood of patient B has a very high concentration of urea.

Which organ removes most urea from the blood?

(1)

- ☐ **A** kidney
- ☐ **B** lung
- ☐ **C** liver
- ☐ **D** stomach

(b) The human body can regulate the temperature of the blood.

(i) Which part of the brain controls body temperature?

(1)

- ☐ **A** cerebral hemispheres
- ☐ **B** medulla oblongata
- ☐ **C** cerebellum
- ☐ **D** hypothalamus



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(Total for Question 7 = 12 marks)

7 Figure 11 shows the structure of a kidney nephron.

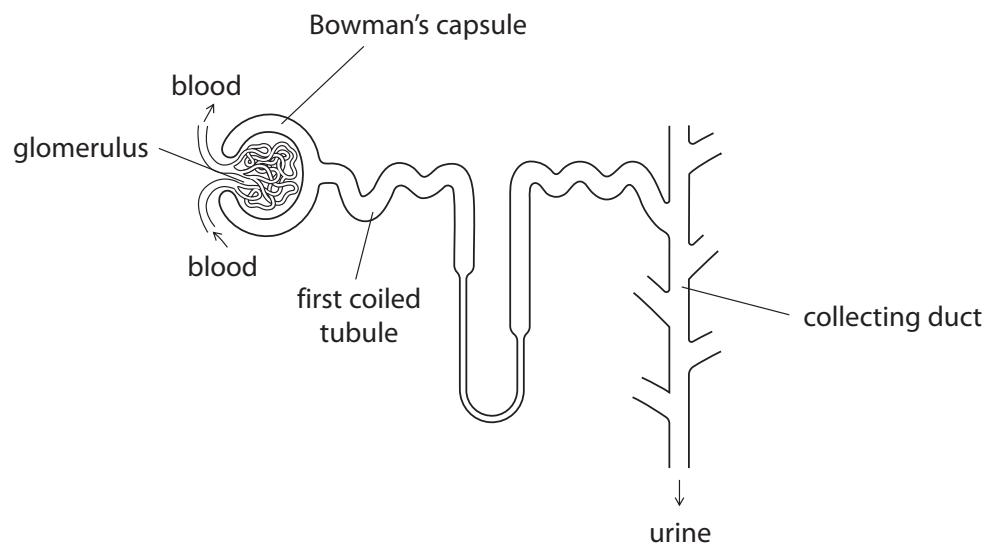


Figure 11

- (a) Small soluble substances including glucose are forced out through small holes in the glomerulus into the Bowman's capsule.

Which term describes this process?

(1)

- ☐ A diffusion
- ☐ B osmosis
- ☐ C filtration
- ☐ D absorption

- (b) Explain why red blood cells do not move from blood in the glomerulus into the Bowman's capsule.

(2)

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.....

.....

(c) (i) Describe what happens in the collecting duct to make the urine more concentrated.

(2)

(ii) State where urine is stored before it leaves the body.

(1)



7 Urine contains water, urea and other dissolved substances.

(a) Where is urea produced in the human body?

(1)

- ☐ **A** kidneys
- ☐ **B** liver
- ☐ **C** lungs
- ☐ **D** bladder

(b) Name the substance that is broken down to produce urea.

(1)

(c) The kidneys are part of the urinary system.

People with kidney disease can be treated by dialysis or by having a kidney transplant.

(i) Figure 14 shows some stages of the process of dialysis.

Complete boxes 3 and 4 by writing the missing details of the process of dialysis.

(2)

1. The patient's blood is taken out of a vein and transferred to the dialysis machine.

2. In the machine, the blood flows through a porous tube, surrounded by dialysis fluid.

3. Urea moves from the blood into the dialysis fluid by

4. This lowers the concentration of urea in the

Figure 14



- (ii) State **two disadvantages** of using kidney donation to treat a patient with kidney failure.

(2)

1

2

- *(d) Figure 15 shows the human urinary system.

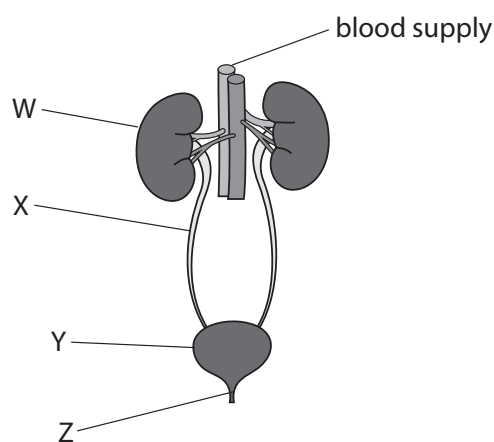


Figure 15

Describe the roles of parts W, X, Y and Z in making urine and removing the urine from the body.

Name parts W, X, Y and Z in your answer.

(6)

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(Total for Question 7 = 12 marks)



13-MARK QUESTIONS

1 question in this booklet



7 Figure 16 shows the urinary system of a human.

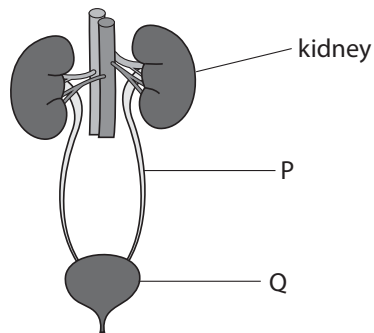


Figure 16

(a) Name the structures labelled P and Q.

(2)

P.....

Q.....

(b) The kidney contains nephrons.

Figure 17 shows the concentration of glucose and protein found in the blood plasma and in the filtrate inside a nephron.

	concentration in the blood plasma	concentration in the filtrate in the nephron
glucose	1 mg per cm ³	1 mg per cm ³
protein	47 g per dm ³	0 g per dm ³

Figure 17

(i) Explain the difference in the concentration of protein in the blood plasma and in the filtrate in the nephron.

(2)

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DO NOT WRITE IN THIS AREA

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(ii) Explain how glucose moves from the blood plasma into the nephron.

(3)

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Handwriting practice area with five horizontal dotted lines.

(Total for Question 7 = 13 marks)



MARK SCHEMES

official Pearson Edexcel mark schemes



Question number	Answer	Mark
1(a)	hormone endocrine gland <pre> graph LR subgraph Hormone_Box [hormone] I[insulin] O[oestrogen] end subgraph Endocrine_Box [endocrine gland] P[pituitary] A[adrenal] OV[ovaries] T[testes] PR[pancreas] end I --- PR O --- OV </pre> Do not award mark if two lines are drawn from either hormone box.	(2)

Question number	Answer	Additional guidance	Mark
1(b)(i)	7.6 (mmol per dm ³)	accept a range of 7.2 - 8.0	(1)

Question number	Answer	Additional guidance	Mark
1(b)(ii)	A description including two from: - decreases (1) - and then increases (1)		(2)

Question number	Answer	Additional guidance	Mark
1(c)	A description including two from: • control diet (1) • exercise (1) • take medication (1)	accept eat fewer carbohydrates / sugars / glucose / eat a low fat diet ignore healthy diet / balanced diet / go on a diet accept lose weight against MP1 or MP2 accept use metformin accept use insulin accept take named medication	(2)

Total for Question 1 = 7 marks

Question number	Answer	Mark
6(a)(i)	B Bowman's capsule The only correct answer is B Bowman's capsule A is incorrect because structure X is not the glomerulus C is incorrect because structure X is not the collecting duct D is incorrect because structure X is not a capillary	(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation linking two from - the concentration of glucose has decreased (1) - as glucose is (re)absorbed (1) - by the cells of the first coiled tubule / into the blood / by active transport (1)	accept the concentration has changed from 6 to 0 (millimoles per litre) accept definitions / descriptions of active transport	(2)

Question number	Answer	Additional guidance	Mark
6(a)(iii)	ureter	reject urethra	(1)

Question number	Answer	Mark
6(b)	A comparison including two from • both have some protein in their urine (1) • person A has less protein in their urine (than person B) (1) • amount of protein in the urine from person A is roughly the same / varies between 2 and 5 (arb units) / increases and then decreases (slightly) (1) • amount of protein in the urine from person B increases (each year) / changes from 25 to 106 (arb units) (1)	(2)

Question number	Answer	Additional Guidance	Mark
6(c)	An explanation including two from: • the kidney is less likely to be rejected (1) • {tissues / cells / blood} will match / have {same / similar} {genes / DNA / antigens} (1) • because tissues / cells will not cause an immune response (1) • the donor can live (well) with only one kidney (1)	accept the kidney will be a suitable match accept: the donated kidney will be healthy / will remove urea without losing other substances (1)	(2)

Total for question 6 = 8 marks

Question number	Answer	Mark
3(a)(i)	An explanation including two from: • (muscle) contracts (1) • raising hair (1) • which traps air (1) • which insulates the skin / reduces heat loss (1)	(2)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	An explanation linking two from: • (sweat) spreads over skin (1) • taking heat from the {skin / body} (1) • which then evaporates (1)	accept released onto skin / sweat is on the skin	(2)

Question number	Answer	Mark
3(b)	The only correct answer is D repeat the investigation on 20 different women A is incorrect because testing a man would not give information about women. B is incorrect because the body temperature is not what is being tested C is incorrect because reducing the temperature of the air further is not testing when the adult starts to shiver	(1)

Question number	Answer	Additional guidance	Mark
3(c)(i)	37 (°C) (1)	accept any temperature in the range of 36 °C to 38 °C	(1)

Question number	Answer	Additional guidance	Mark
3(c)(ii)	Any two from: - concentration gradient (1) - diffusion distance (1) - surface area (1)	accept differences in concentration accept surface area: volume ratio accept size of particle (1)	(2)

Total for Question 3 = 8 marks

Question number	Answer	Mark
1(a)(i)	C pancreas liver and muscles 1. The only correct answer is C <i>A is not correct because the adrenal glands do not produce insulin</i> <i>B is not correct because the adrenal glands do not produce insulin and the small and large intestines are not the target organs for insulin</i> <i>D is not correct because the small and large intestines are not the target organs for insulin</i>	(1) AO 1 1

Question number	Answer	Mark
1(a)(ii)	A plasma 1. The only correct answer is A <i>B is not correct because red blood cells do not transport insulin</i> <i>C is not correct because white blood cells do not transport insulin</i> <i>D is not correct because platelets do not transport insulin</i>	(1) AO 1 1

Question number	Answer	Additional guidance	Mark
1(b)	An explanation that includes two from: • (More) insulin (is released / produced) (1) • causes glucose to be converted to glycogen (1) • glucose is used for respiration (1)	accept glucose is stored (in the body / muscles / liver) accept glucose is used in exercise	(2) AO 2 1

Question number	Answer	Mark
1(c)	Any one from: • (pancreas / body) {does not make insulin / makes very little insulin} (1) • {pancreatic /beta} cells are absent / destroyed (by immune system) (1) • (condition is) {inherited / genetic} / (can be) born with the condition (1)	(1) AO 1 1

Question number	Answer	Mark
1(d)	An explanation that includes the following: • reduce the levels of carbohydrate / sugars / glucose in the diet (1) • to ensure that blood glucose levels do not rise too high / too quickly / so that the insulin can cope. (1) OR • lose weight (1) • insulin resistance reduced / body will produce more insulin / cells respond to insulin (1)	(2) AO 1 2

Question number	Answer	Additional Guidance	Mark
1(e)	Any two from: • gender (1) • age (1) • life style / exercise / diet (1) • size / weight / BMI (1)	accept health (1)	(2) AO 2 2

Total for Question 1 = 9 marks

Question Number	Answer	Mark
3(a)(i)	B homeostasis The only correct answer is B <i>A is not correct because excretion is not the correct term for maintaining a constant internal environment</i> <i>C is not correct because respiration is not the correct term for maintaining a constant internal environment</i> <i>D is not correct because sweating is not the correct term for maintaining a constant internal environment</i>	(1) AO1 1

Question Number	Answer	Mark
3(a)(ii)	An explanation linking two from: • Y / muscle contracts (1) • X / hair stands up (1) • (more / a thicker (insulating layer of) air trapped (close to the skin) (1) • less heat leaves / escapes (from the skin) (1) • by convection / radiation (1)	(2) AO1 1

Question Number	Answer	Mark
3(a)(iii)	An explanation including two from: • (uncontrolled) muscle contraction (1) • heat generated (1) • so body temperature increases / becomes warmer (1)	(2) AO1 1

Question Number	Answer	Mark
3(b)(i)	37.5 °C	(1) AO3 1a

Question Number	Answer	Mark
3(b)(ii)	An explanation including: • there is a decrease in temperature (between 0 – 4 hours) (1) • because the body is at rest / asleep (1) • lower rate of respiration / less heat energy (generated / released) (1)	(3) AO3 2a 2b

(Total for Question 3 = 9 marks)

Question number	Answer	Mark
4(a)	hormone thyroxine adrenalin endocrine gland thyroid gland pituitary gland pancreas adrenal glands ovaries thyroxine adrenalin thyroid gland pituitary gland pancreas adrenal glands ovaries Do not award mark if more than one line is drawn from the thyroxine box. Do not award mark if more than one line is drawn from the adrenalin box.	(2)

Question number	Answer	Mark
4(b)(i)	follicle ruptures / ovulation / {egg / ovum} is released	(1)

Question number	Answer		Mark
4(b)(ii)	A description including two from: - progesterone levels increase (1) - uterus (lining) thickens / is maintained (1) - number of blood vessels (in uterus (lining)) increase / blood vessels increase in size (1)	accept prepares uterus (lining) for an ovum (to implant) (1)	(2)

Question number	Answer	Additional guidance	Mark
4(c)	An answer including one advantage and one disadvantage advantages: gives protection from STIs / non-prescription / easy to use / does not affect (the users) fertility / high success rate (if used properly) (1) disadvantages: can split / not as effective if past use by date / allergic to latex / reduced sensitivity (1)		(2)

Question number	Answer	Additional guidance	Mark
4(d)	An explanation including: - the pill contains oestrogen and / or progesterone (1) (which) prevents ovulation / thickens mucus (1) (so) sperm can't {reach / join / fertilise} the ovum	accept egg for ovum throughout	(2)

Total for question 4 = 9 marks

Question number	Answer	Additional guidance	Mark
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Question number	Answer	Additional guidance	Mark
5(a)(i)	evaluation $(1.3 \times 5.6 =) 7.28$ (1) to 1 decimal place $= 7.3$	award full marks for correct answer no working	(2)

Question number	Answer	Mark								
5(a) (ii)	The only correct answer is <table><tr><td></td><td>blood cells</td><td>urea</td><td>water</td></tr><tr><td>B</td><td>X</td><td>✓</td><td>✓</td></tr></table> A is incorrect because the filtrate does not contain blood cells C is incorrect because the filtrate does not contain blood cells D is incorrect because the filtrate does contain urea		blood cells	urea	water	B	X	✓	✓	(1)
	blood cells	urea	water							
B	X	✓	✓							

Question number	Answer	Mark
5(b) (i)	A description including four from: • add (nephron) liquids to different test tubes • add Benedict's (solution to the nephron liquids in test tubes) (1) • boil / heat (the mixture) (1) • if colour changes (from blue) to {green/yellow / orange / (brick) red} then glucose is present (1) • colour change is linked to concentrations of glucose / time taken for a colour change to occur (1) • control of one variable, e.g. use the same volume of {liquid / Benedict's solution} / put tubes in a {water bath / water in a beaker} / heat for same length of time / at the same temperature (1)	(4)

Question number	Answer	Mark
5(b) (ii)	An explanation including: • there is no glucose by the end of the first coiled tubule / in the urine (1) • because (all) the glucose has been reabsorbed (into the blood) (1) OR • all the glucose is reabsorbed (1) • because glucose is a useful molecule to the body (1) OR • there is the same concentration in the Bowman's capsule (and at the start of the first coiled tubule) • because no glucose is reabsorbed in the Bowman's capsule / the Bowman's capsule wall is impermeable to glucose (1)	(2)

Total for question 5 = 9 marks



Question number	Answer	Mark
5(a)(i)	D pancreas insulin The only correct answer is D pancreas insulin A is incorrect because the ovary does not produce a hormone that controls blood glucose concentration. B is incorrect because the ovary does not produce a hormone that controls blood glucose concentration. C is incorrect because oestrogen does not control blood glucose concentration.	(1)

Question number	Answer	Mark
5(a)(ii)	Liver / muscles / named muscle	(1)

Question number	Answer	Additional guidance	Mark
5(b)(i)	Substitution $110 \div 2.0^2$ (1) Evaluation $= 27.5$	accept 28 Award full marks for correct answer with no working.	(2)

Question number	Answer	Mark
5(b)(ii)	A description that includes two from: - lose weight (1) - control diet / eat less sugary food (1) - exercise more (1)	(2)

Question number	Answer	Mark
5(c)(i)	A aerobic respiration and anaerobic respiration. The only correct answer is A aerobic respiration and anaerobic respiration B is incorrect because anaerobic respiration uses glucose. C is incorrect because aerobic respiration uses glucose. D is incorrect because aerobic respiration and anaerobic respiration use glucose.	(1)

Question number	Answer	Mark
5(c)(ii)	An explanation linking three of: • as activity / speed increases, the respiration rate increases (1) • because respiration supplies energy (to muscles / cells) (1) • when sleeping you are not moving / using muscles very much (1) • the faster you run / the more you use muscles (1) • so more energy is required. (1)	(3)

Total for question 5 = 10 marks



Question Number	Answer	Additional guidance	Mark
4(a)	C pituitary The only correct answer is C <i>A is not correct because the adrenal glands is situated in the abdomen.</i> <i>B is not correct because the pancreas is situated in the abdomen.</i> <i>D is not correct because the thyroid gland is situated in the neck.</i>		(1) AO1.1

Question Number	Answer	Additional guidance	Mark
4(b)			(2)

Question Number	Answer	Additional guidance	Mark
4(c)(i)	A description including: - as the waist to hip ratio increases the probability of developing type 2 diabetes increases (1) - accurate data from the results is used in the answer (1)	accept as one increases, the other increases ignore the columns get bigger	(2) AO3.1ab

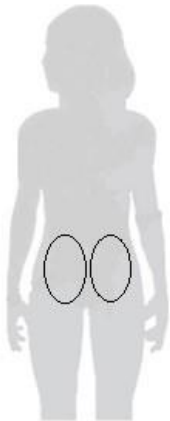
Question Number	Answer	Additional guidance	Mark
4(c)(ii)	evaluation $(78.3 \div 90.0) = 0.87$ (1)		(2)

Question Number	Answer	Additional guidance	Mark
4(d)(i)	Any two from: • age (1) • diet (1) • exercise regime (1) • ethnicity (1) • genetic makeup (1)	accept other valid factors	(2) A03.3b

Question Number	Answer	Additional guidance	Mark
4(d)(ii)	their high BMI is due to a high % of muscle (instead of fat)	accept their waist to hip ratio is low	(1) A03.3ab

(Total for question 4 = 10 marks)

Question Number	Answer	Additional guidance	Mark
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Question Number	Answer	Additional guidance	Mark
4(a)	two crosses to show the position of the ovaries in the regions shown. 	accept dots, letters, shading for crosses accept label lines to correct areas do not award if three crosses are drawn on the diagram	(1)

Question Number	Answer	Additional guidance	Mark
4(b)	repairs / thickens / increases blood supply / maintains (uterus lining)	ignore it expands / strengthens	(1)

Question Number	Answer	Mark
4(c) (i)	B pancreas The only correct answer is B A is incorrect because the thyroid gland does not make insulin C is incorrect because the adrenal glands do not make insulin D is incorrect because the pituitary gland does not make insulin	(1)

Question Number	Answer	Additional guidance	Mark
4 (c) (ii)	in the blood / plasma	accept in the blood system / in blood vessels / in arteries / in veins ignore capillaries	(1)

Question Number	Answer	Additional guidance	Mark
4 (c) (iii)	liver	accept muscles	(1)

Question Number	Answer	Additional guidance	Mark
4(d) (i)	A description including: the concentration of glucose in the blood • decreases (1) • then decreases at a faster rate (between 12.30pm and 1pm) (1)	accept negative correlation	(2)

Question Number	Answer	Additional guidance	Mark
4 (d) (ii)	eaten a meal / eaten food	accept drink a named source of sugar e.g. fruit juice accept injected with glucagon	(1)

Question Number	Answer	Additional guidance	Mark
4 (e)	An answer including two from: • reduce {carbohydrate / sugar / glucose} in their diet (1) • exercise (1) • lose weight (1)	accept control their diet ignore healthy diet / balanced diet / go on a diet accept inject insulin / take medication /	(2)

		take named medication (1) award one mark for control their lifestyle if no other mark is awarded	
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Total for question 4 = 10 marks



Question Number	Answer	Additional guidance	Mark
10(a)	a labelled line X to either kidney	accept X written on a kidney	(1) AO2 1

Question Number	Answer	Mark
10(b)	A amino acids The only correct answer is A <i>B is not correct because sugars are not converted to urea in the liver</i> <i>C is not correct because lipids are not converted to urea in the liver</i> <i>D is not correct because potassium ions are not converted to urea in the liver</i>	(1) AO1 1

Question Number	Answer	Additional guidance	Mark
10(c)(i)	A description including: • blood is filtered (in a dialysis machine) (1) • urea moves {out of the blood / into dialysis solution} (1) • by diffusion (1)	accept tube for blood	(2) AO2 1

Question Number	Answer	Additional guidance	Mark
10(c)(ii)	Any one from: - patient B has {kidney failure / disease} which is less advanced than patient A (1) - patient B may have a {better diet / low protein diet} (1)	accept patient B only just developed kidney disease	(1) AO2 1

Question Number	Answer	Additional guidance	Mark
10(d)	A description including the following: - add Benedict's solution (to some dialysis fluid) (1) {heat / boil / put in water bath} (1) - see if it turns {green / yellow / orange / red} (1)	accept brown	(3) AO2 2

Question Number	Answer	Additional guidance	Mark
10(e)	An explanation including three of the following: - enzymes are specific (1) - their shape is complementary to their substrate (1) - so starch will not fit into the active site (of urease) (1) - so no reaction can take place. (1)	accept amylase only acts on starch	(3) AO2 1

(Total for question 10 = 11 marks)



Question Number	Answer	Mark
7(a)	J - ureter (1) K - bladder (1) Accept ureta Do not accept urethra, uthra	(2) AO1 1

Question Number	Answer	Mark
7(b)(i)	A excess amino acids The only correct answer is A <i>B is not correct because urea is not made from excess carbohydrates</i> <i>C is not correct because urea is not made from excess vitamins</i> <i>D is not correct because urea is not made from excess lipids</i>	(1) AO1 1

Question Number	Answer	Mark
7(b)(ii)	An explanation including two from: • blood cells / large proteins (are not found in the filtrate because they) are too large (1) • to pass through nephron wall / capillary / Bowman's capsule (1) • glucose / sodium ions are small enough (1) • to pass through nephron wall / capillary / Bowman's capsule (1)	(2) AO3 2a 2b



Question Number	Indicative content	Mark
7*(c)	<u>General</u> • Kidney failure is when you can no longer move sufficient urea out of the body. • Improve health / diet eg less salt / take more exercise • You can live on just one kidney <u>Treatment 1 dialysis</u> • waste substances removed / filtered from blood by dialysis machine • blood and dialysis fluid separated by partially permeable membrane <u>Consequences / requirements</u> • urea / other substances removed / water balance of body restored to normal • medication can be administered at the same time • increased risk of eg infection / low blood pressure • regular trips to hospital / need a (dialysis) machine at home • patients return to good health / live a normal life <u>Treatment 2 organ donation</u> • a healthy kidney is used to replace the damaged kidney by an operation <u>Consequences / requirements</u> • not enough healthy kidneys available / may have to wait a kidney becomes available • requires a suitable donor / risk of rejection / tissue matching • not appropriate if patient is too weak • need to take immunosuppressant drugs • patients return to good health / live a normal life	(6) AO1 1



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. - Presents a description which is not logically ordered or with significant gaps.
Level 2	3-4	- Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific, enquiry, techniques and procedures is not fully detailed and/or developed. - Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing.
Level 3	5-6	- Demonstrates accurate and relevant biological understanding throughout. Understanding of scientific, enquiry, techniques and procedures is detailed and fully developed. - Presents a description that has a well-developed structure which is clear, coherent and logical.



Additional guidance

Level	Mark	Additional Guidance	General additional guidance The level is determined by the treatments covered in the response. The mark within the level is determined by linking the treatments to the consequences /requirements of the treatments.
	0	No rewardable material	<u>Possible candidate responses</u>
Level 1	1-2	• makes a simple statement about kidney failure or type of treatment of kidney failure or states both types of treatment for kidney failure	• you can have an organ transplant • you have a transplant, or you have kidney dialysis
Level 2	3-4	• describes one consequence of one type of kidney failure and refers to the other type of treatment • describes more than one consequence of a treatment and refers to the other type of treatment OR describes one consequence of both types of treatment for kidney failure	• You can have a failed kidney replaced with one from someone else or have your blood cleaned by a machine. • You can have an organ transplant, but you have to wait for a suitable kidney which has to be matched so you don't reject it.
Level 3	5-6	• Describes more than one consequence of one type of kidney failure and one consequence of the other • One of the descriptions is detailed	• You go to hospital for dialysis. You may get an infection but you can live a normal life. For a transplant you may have to wait for a kidney. • both kidney transplant and dialysis let you can live a normal life but there is a waiting list for a kidney donor as they must match the new kidney to you, so you don't reject it.

(Total for question 7 = 11 marks)



Question number	Answer	Additional guidance	Mark
8(a) (i)	A description including two from: The blood glucose concentration for the person with diabetes (compared with the person who does not have diabetes) is • always higher (1) • reduces at a slower rate (1) • does not return to pre meal levels (in the six-hour period) (1) • does not get lower than pre meal levels (1)	accept reverse description accept other valid comparisons (1) accept concentrations (without units) from graph	(2)

Question number	Answer	Mark
8(a) (ii)	9 (mmol per dm ³)	(1)

Question number	Answer	Additional guidance	Mark
8(a)(iii)	An explanation including: • (water moves out) by osmosis (1) • because the concentration of glucose is higher in the blood (plasma) (1) • across a partially permeable membrane (1)	accept from a high water potential inside the cell to a low water potential outside the cell	(2)

Question number	Answer	Mark
8(b)(i)	insulin	(1)

Question number	Answer	Additional guidance	Mark
8(b)(ii)	in the blood / plasma	accept dissolved / in solution	(1)

Question number	Answer	Mark
8(b)(iii)	The only correct answer is C liver A is incorrect because the target organ is not the kidney B is incorrect because the pancreas produces insulin D is incorrect because the target organ is not the lungs	(1)

Question number	Answer	Additional guidance	Mark
8(c)	An explanation including three from: • exercise (1) • control diet / lose weight (1) • to {reduce / control} blood glucose (1)	accept avoid {sugar/carbohydrate} in your diet accept methods of testing blood for signs of diabetes (1) accept take {medication / metformin / insulin} (1)	(3)

Total for question 8 = 11 marks

Question number	Answer	Mark
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Question number	Answer	Mark
10(a)(i)	The only correct answer is C hypothalamus A is incorrect because the kidney does not control body temperature B is incorrect because the pituitary gland does not control body temperature D is incorrect because the pancreas does not control body temperature	(1)

Question number	Answer	Mark
10(a)(ii)	Any one from • volume of water in each beaker (1) • {size / shape} of container (1) • mass / weight / thickness of material (1) • starting temperature (1)	(1)

Question number	Answer	Additional guidance	Mark
10(a)(iii)	A description including the following • repeat the experiment / set the apparatus up as shown in Figure 8 (1) • without the insulating material (1)	accept set up a beaker and a thermometer	(2)

Question number	Answer	Mark
10(b)(i)	An answer which compares and contrasts the two materials including the following • with both materials the temperature drops over time (1) • the drop in temperature for polyester was faster / greater than wool (1)	(2)

Question number	Answer	Mark
10(b)(ii)	Any one from - begin with the same starting temperature (1) - continue the investigation until the temperature stops dropping (1)	(1)

Question number	Answer	Mark
10(c)(i)	An explanation linking the following - sweat is released onto (the surface of) the skin (1) - which evaporates (1) - that cools the body / removes heat (1)	(2)

Question number	Answer	Additional guidance	Mark
10(c)(ii)	A statement including the following: (urea) is produced in the liver (1) - from excess amino acids / protein (1)	accept by (the process of) deamination	(2)

Total for question 10 = 11 marks



Question number	Answer	Additional guidance	Mark
7(a)(i)	Substitution 8:32 / 32 ÷ 8 (1) Simplest form 1:4 / 1 to 4	accept 4 accept 1/4 Award full marks for answer without working	(2)

Question number	Answer	Additional guidance	Mark
7(a)(ii)	A description including two from: (excess) amino acids (1) - are broken down (1) - in the liver (1)	accept deamination	(2)

Question number	Answer	Mark
7(a)(iii)	A kidney The only correct answer is A kidney B is incorrect because the lungs do not remove most urea from the body C is incorrect because the liver does not remove most urea from the body D is incorrect because the stomach does not remove most urea from the body	(1)

Question number	Answer	Mark
7(b)(i)	D hypothalamus The only correct answer is D hypothalamus A is incorrect because the cerebral hemispheres do not control body temperature. B is incorrect because the medulla oblongata does not control body temperature C is incorrect because the cerebellum does not control body temperature	(1)



Question number	Indicative content	Mark
7(b)(ii) *	(6 marks) How skin structures respond during hot weather Gland • sweat glands • produce sweat Hair / muscle • (erector) muscle will relax • hairs will 'lie down' Capillary • capillary (loop) allows more blood to flow through it Nerve (endings) • detect heat • send nerve impulses to the brain / CNS / hypothalamus. How responses help to reduce body temperature Sweat • sweat will spread out onto the surface of the skin • sweat / water will evaporate • using heat from the body Hair • less air will be trapped • air is an insulator • so less insulation • so more heat lost from skin • through convection Capillary • more blood flows closer to surface of the skin • so heat has less distance to travel until it leaves the body • so less insulation for heat to travel though • so more heat is lost through convection / radiation	(6)



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail • Presents an explanation with some structure and coherence
Level 2	3–4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and fully developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.



Level	Mark	Additional Guidance	General additional guidance
	0	No rewardable material	The level is determined by how skin structures react to hot weather The mark within the level is determined by the link between the responses of structures to heat is lost within each description.
Level 1	1–2	- A simple description of a response of the skin to hot weather. - A simple explanation of how the response causes heat loss.	<u>Possible candidate responses</u> - Sweat is produced from the gland. - The sweat evaporates.
Level 2	3–4	- A description of the way at least one structures respond to hot weather - An explanation of how this response causes heat loss.	<u>Possible candidate responses</u> - The muscle relaxes letting the hair lie flat against the skin. - There is less air trapped so there is less insulation.
Level 3	5–6	- A detailed description of how more than one structures respond to hot weather. - A detailed explanation of how these responses cause heat loss.	<u>Possible candidate responses</u> - Sweat from the sweat glands spreads on to the skin surface. More blood flows through the capillary so the blood is nearer to the surface of the skin. - The sweat will evaporate taking the heat with it. The blood will be nearer to the surface of the skin so more heat will be lost by radiation.

Total for question 7 = 12 marks



Question Number	Answer	Mark
7(a)	C Filtration. The only correct answer is C A is incorrect because diffusion is due to the random movement of particles B is incorrect because osmosis only refers to water molecules. D is not correct because absorption relates to being taking in rather than being forced out.	(1)

Question Number	Answer	Additional guidance	Mark
7(b)	An explanation including: • red blood cells are too large (1) • to pass out of the blood capillaries (1)	accept to pass through the small holes in the glomerulus accept the red blood cells are too big to be filtered for 2 marks	(2)



Question Number	Answer	Additional guidance	Mark
7(c)i	A description including: • water (from the urine) (1) • is (re)absorbed / moved back into the blood / body (1)	accept by osmosis / from high to low concentration (of water) (1) accept osmoregulation for 2 marks	(2)

Question Number	Answer	Additional guidance	Mark
7(c)ii	the bladder accept phonetic spellings of bladder		(1)



Question number	Indicative content	Mark
7 *(d)	Preparation • add food to a boiling tube / spotting tile • reference to size of food sample • reference to other equipment used e.g. water bath Glucose / reducing sugar • add Benedict's solution • reference to volume of reagent used • heat / boil • look for the colour change • blue to green / orange / yellow / (brick) red • to indicate glucose is present Protein • add Biuret solution • reference to volume of reagent used • do not heat / no mention of heat • wait / reaction takes a little time • look for the colour change • blue to purple / pink • to indicate protein is present	(6)



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) - Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	- Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) - Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	- Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) - Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)



Level	Mark	Additional guidance	General additional guidance
			The level is driven by the workability of the plan for the food tests for glucose and protein. The mark within the level is determined by the completeness of the plan
	0	No rewardable material.	
Level 1	1-2	States a relevant part of a test for glucose OR protein Presents a description for one of the tests with significant gaps	<u>Possible candidate responses</u> - add Benedict's (solution) to the food - add Benedict's solution to the food and see what colour it goes.
Level 2	3-4	Produces a workable plan for the tests for glucose OR protein Presents a description of one of the tests with reference to a colour change	<u>Possible candidate responses</u> - add some Benedict's solution to some food and heat it. - add some Benedict's solution to the food and heat it, and look for a colour change
Level 3	5-6	Produces a workable plan for the tests for both glucose AND protein Presents a description of both tests including a correct colour change and links this to glucose OR protein	<u>Possible candidate responses</u> - add Benedict's solution to the food and heat it. For protein, add Biuret solution / reagent to the food. - add Benedict's solution to the food and heat it. See if it goes orange / red and this will mean it contains glucose. For protein, add Biuret solution / reagent and see what colour it goes

Total for question 7 = 12 marks



Question number	Answer	Mark
7(a)	The only correct answer is B liver A, C and D are incorrect because urea is made in the liver	(1)

Question number	Answer	Mark
7(b)	amino acids / proteins / ammonia	(1)

Question number	Answer	Additional guidance	Mark
7(c)(i)	A description including: (3rd box) diffusion (1) (4th box) blood (1)	accept patient / vein	(2)

Question number	Answer	Additional guidance	Mark
7(c)(ii)	An answer including two from: - risks of surgery (1) - rejection (of kidney) (1) - lifelong medication (1) - difficult to find a donor (1)	accept risk of infection accept references to donated kidney needing replacing over time accept anti-rejection drugs / immunosuppressants accept take named medications accept risks for the donor (1)	(2)



Question number	Indicative content	Mark
7(d)*	Part W Kidney: - removes urea / other named substances from blood (ultra) filtration - reabsorbs useful molecules e.g. glucose - reabsorbs water - produces urine Part X Ureter: - takes urine to bladder Part Y Bladder: - stores urine - pushes urine out of body Part Z Urethra: - takes urine out of body	(6)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) - Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	- Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) - Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	- Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) - Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)



Level	Mark	Additional guidance	General additional guidance Description of parts is the level driver. The detail / names used determines the mark within the level.
	0	No rewardable material.	
Level 1	1–2	- describes a role of one part linked to a correct letter or name - names at least one part	<u>Possible candidate responses:</u> - Z releases urine - The urethra releases urine
Level 2	3–4	- describes a role of more than one part linked to a correct letter or name - names more than one part	<u>Possible candidate responses:</u> - W filters urea and water to make urine. Y stores the urine - The kidney filters urea and water to make urine. The bladder is where urine is stored.
Level 3	5–6	- describes a role of at least three parts linked to a correct letter or name - names at least three parts	<u>Possible candidate responses:</u> - W is where small molecules including urea are filtered out of the blood. X is where urine moves from the kidney to be stored in Y - The kidney is where small molecules including urea are filtered out of the blood. The ureter is where urine moves from the kidney to be stored in the bladder

Total for Question 7 = 12 marks

Question number	Answer	Additional guidance	Mark
7(a)	P ureter Q bladder	reject urethra	(2) AO 1 1

Question number	Answer	Mark
7(b)(i)	An explanation that includes • there is no / 0g (protein) in the filtrate / nephron(1) • because protein molecules are too large (to pass through the membrane / enter nephron) (1)	(2) AO 2 1

Question number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation that includes any three of the following • ultrafiltration (1) • due to higher pressure in the blood plasma (1) • across a partially permeable membrane (into the nephron) (1) • from the glomerulus / into the bowman's capsule (1)		(3) AO 1 1

Question number	Indicative content		Mark
*7(c)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. Blood to machine • kidney dialysis is used when a person's kidneys are damaged / don't remove urea from blood • blood taken from arm / passes into the dialysis machine • blood is separated from the dialysis solution by a (partially permeable) membrane • blood returned to body Unwanted substances • toxic substances • for example urea / alcohol • excess ions / named ions e.g. sodium and chloride How substances are removed from blood • (unwanted substances) move into the dialysis fluid • by diffusion across the membrane • down a concentration gradient • fresh dialysis fluid is pumped through to maintain the concentration gradient		(6) AO 1 1
Level	Mark	Descriptor	
	0	No rewardable material.	
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail • Presents an explanation with some structure and coherence	
Level 2	3–4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and fully developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.	
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.	

Total for Question 7 = 13 marks

