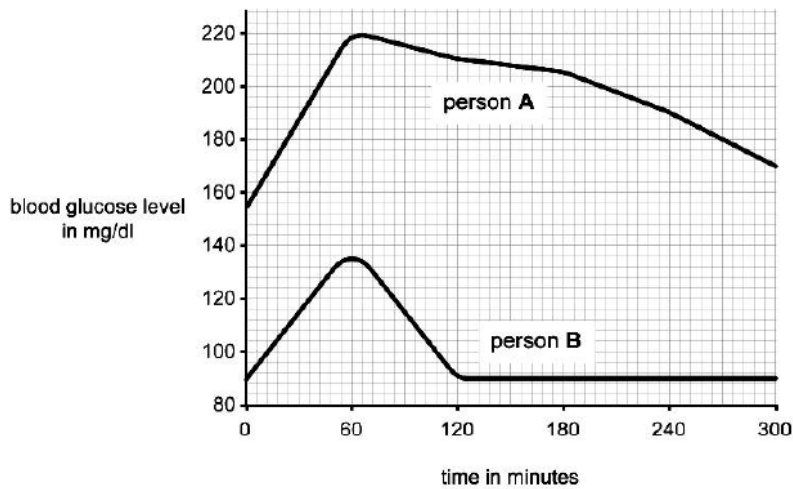


1.

(i) Insulin is a hormone produced by the pancreas.

The graph below shows data from two people who were given a sugary drink.

Their blood sugar level was recorded every 60 minutes from when they had the drink.



There are two types of diabetes – type 1 and type 2.

Person A has type 2 diabetes.

Person B does not have diabetes.

Describe how the graph shows this and explain why there is a difference in the blood sugar level.

[2]

(ii) The statements below apply to type 1 and type 2 diabetes.

Draw two lines to link the sentences to **type 1 diabetes**.

Type 1 diabetes

body no longer responds to the insulin produced

should eat a diet high in complex carbohydrates and exercise

will need to inject insulin

pancreas stops producing insulin

[2]

2.

(i) Mia has an eye disease that weakens the fibres that hold her cornea in place.

Her cornea has become damaged causing its shape to change.

What is the role of the cornea and how will damage to the shape affect Mia's sight?

[2]

(ii) Scientists are now using stem cells to repair damage to corneas.

What is a stem cell?

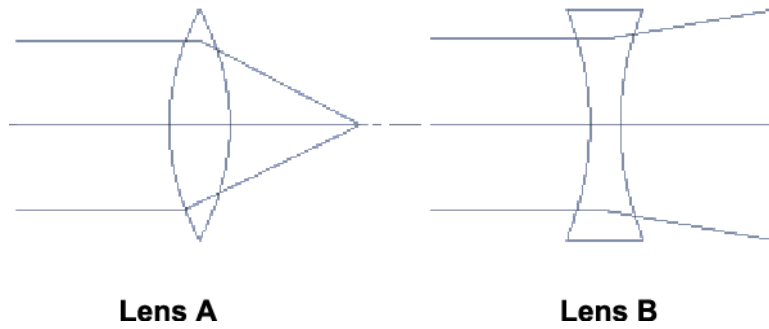
[1]

(iii) Stem cells can be obtained from embryos.

Why are some people against using embryos as a source of stem cells?

[1]

3(a). Nikita draws ray diagrams for two lenses, A and B.



(i) Suggest which lens, A or B, would improve Nikita's vision.

Explain your answer.

----- [2]

(ii) Nikita investigates other lenses. One is shown below.



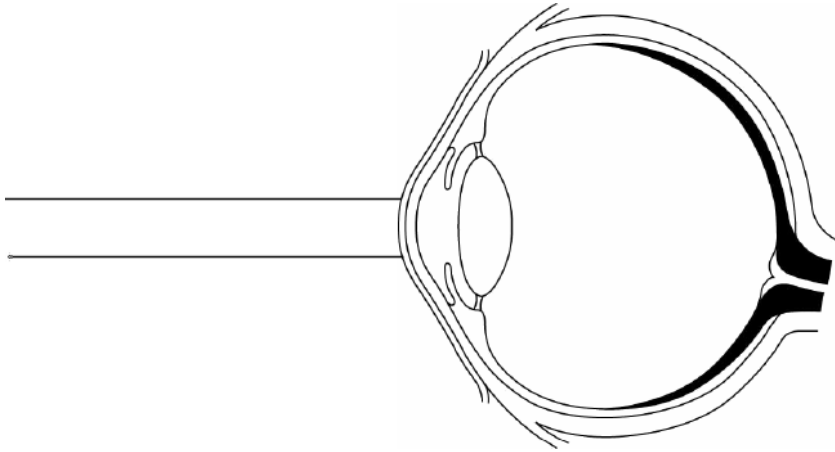
Use the ray diagrams from part (b) to suggest the type of visual impairment that a pair of glasses with this lens would correct.

Explain your answer.

----- [4]

(b). Nikita visits her optician who tells her she is **long sighted**.

Complete the ray diagram to show what happens to the rays of light when they enter Nikita's eye.



[2]

(c). Failure of vision can sometimes be caused by brain damage and disease.

Describe and explain the limitations of treating damage to the brain.

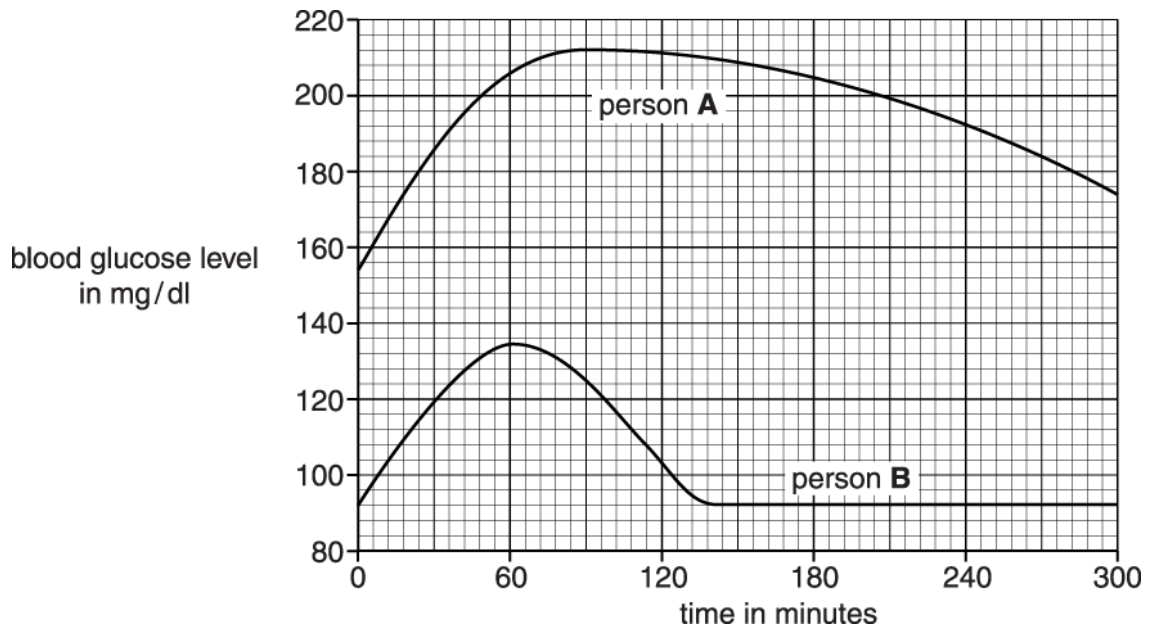
[4]

4(a). The Oral Glucose Tolerance Test (OGTT) is done to measure how quickly glucose is removed from our blood after we swallow a glucose drink. The levels of blood glucose are measured using blood samples taken over a period of time.

The stages in this test are:

1. Do not eat or drink for eight hours.
2. Give a blood sample.
3. Drink a glucose drink.
4. Give blood samples over the next few hours.

The graph shows the results of this test on two different people.



After how many minutes did person A and person B reach a maximum blood glucose level?

person A minutes

person B minutes

[1]

(b). Use the graph to describe **three** other ways that the blood glucose level of person **A** differs from the blood glucose level of person **B**.

[3]

(c). What conclusions can you make about the health of person **A** and person **B**?

Explain your answer.

[3]

(d). A doctor observed an OGTT graph of another patient and predicted that the patient was healthy. Further tests showed this patient was indeed healthy.

Explain what it means to a scientist when an observation agrees with a prediction.

[2]

5(a). Jenny has type 2 diabetes.

Which of the following dietary factors can help Jenny to control her diabetes?

Put ticks (?) in the boxes next to the correct answers.

take vitamin supplements

have a high fibre diet

eat more protein

increase energy (food) intake

eat more complex carbohydrates

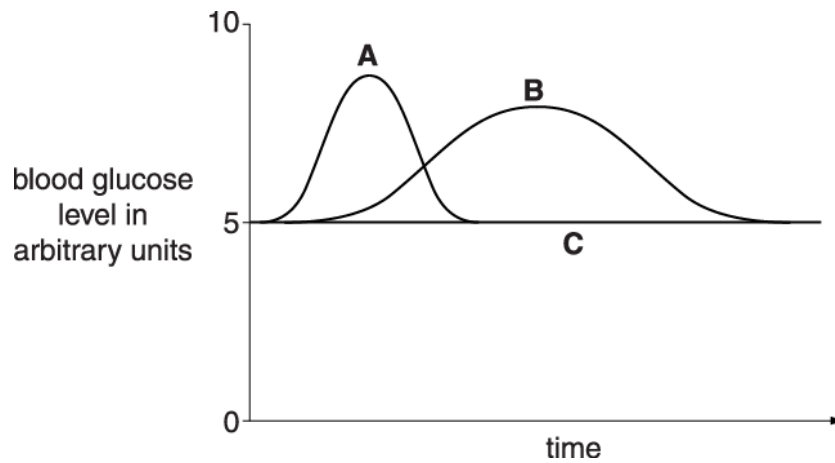
take mineral supplements

[2]

(b). Controlling glucose level in the blood is important.

After eating a meal, the blood glucose level may rise and then fall back to normal.

The graph shows changes in blood glucose level after eating meals containing three different foods, A, B and C.



Write the correct letter, A, B or C next to the most likely food in each meal.

type of food	letter
fibre	
glucose drink	
complex carbohydrate (starch)	

[2]

(c). Protein in food has to be processed by the digestive system in the same way as complex carbohydrates, before entering the blood stream.

Some people with type 1 diabetes do not produce enough of the hormone insulin.

These people inject themselves with insulin.

Insulin is a protein.

Why is insulin usually injected rather than taken as a tablet?

Put ticks (?) in the boxes next to the **two** correct answers.

Insulin in tablets enters the blood stream too quickly.

Tablets are more likely to cause infection.

Insulin in tablets is more likely to cause an overdose.

Insulin in injections will work faster.

Insulin needs to be injected straight into the pancreas.

Insulin in tablets is likely to be digested and broken down.

[2]

END OF QUESTION PAPER

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
1		i	<p>Any one from <i>Descriptions</i></p> <p>1. Person B sugar level falls faster / person A sugar level falls more slowly ✓</p> <p>2. Person B sugar level falls back to starting level after just over 2 hours / Person A sugar level remains high ✓</p> <p>Any one from <i>Reasons why</i></p> <p>3. Person A does not respond to the hormone / insulin produced to convert sugar to glycogen ✓</p> <p>4. Person B produces a hormone / insulin in response to the rise in blood sugar and this causes cells to convert the sugar to glycogen so the level falls ✓</p>	2	<p>Max 1 for description and max 1 for the reason why</p> <p>MPs 3 and 4 DO NOT ALLOW a reference to hormone response or lack of response without reference to the role of insulin.</p>
		ii		2	If more than 2 lines are drawn, delete one mark for each incorrect line
			Total	4	
2		i	<p>Cornea – responsible for bending the light ✓</p> <p>Light rays will no longer meet on the retina so sight will be poor ✓</p>	2	ALLOW reference to blindness
		ii	An unspecialised cell which can become any cell type ✓	1	
		iii	<p>Any one from</p> <p>Embryos killed in the process ✓</p> <p>Embryos could be a life ✓</p>	1	
			Total	4	
3	a	i	<p>Explanation of what Nikita needs i.e. more convergence ✓</p> <p>Lens A gives more convergence / lens B does not ✓</p>	2	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
		ii	Lens thinner at centre rather than edges ✓ Therefore it will diverge ✓ Therefore the defective lens must converge light rays too much ✓ Therefore the eye defect is short sight ✓	4	
	b		Rays converge ✓ But do not meet ✓	2	
	c		Any four from Damaged tissue difficult to get to ✓ Treatment might damage other areas ✓ Nervous tissue highly specialised / differentiated ✓ Nervous tissue / neurons cannot regrow ✓ Therefore treatment must not cause further damage ✓	4	
			Total	12	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
4	a	Person A 84 – 90 mins; Person B 60 mins;	1	Both answers for 1 mark Examiner's Comments Most candidates managed to score the mark for this question. Examiners allowed a wide range of 84 to 90 minutes for person A in order to ensure that any reasonable answer was credited.
	b	Any three from: A is higher than B; B starts to drop before A; B glucose dropped / removed more quickly; B returns to start / normal level;	3	ORA Ignore reference to numbers - refers to rate of drop Ignore constant / steady Ignore idea that A does not return to start Examiner's Comments This question proved to be more challenging. Candidates were asked to state how the level differed between the two people. A common failing was simply to state what was happening to one of the individuals rather than compare the two.
	c	B is healthy / A is unhealthy; A is diabetic / B is not diabetic; (Correct reference to) insulin;	3	Examiner's Comments Some candidates failed to realise that this was a three mark question and consequently needed three conclusions. Good answers included the idea that A was a diabetic, produced too little insulin and that B was healthy.
	d	The observation increases the likelihood / confidence in the prediction; But does not necessarily prove it is correct;	2	Ignore prediction is correct Ignore reinforces / supports / strengthens Examiner's Comments Good answers referred to increasing confidence in the prediction but not necessarily proving that the prediction was correct. However this question was not answered well by most candidates. Answers that stated that it proved the prediction was correct did not score.
		Total	9	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
5	a	<p>take vitamin supplements</p> <p>have a high fibre diet</p> <p>eat more protein</p> <p>increase energy (food) intake</p> <p>eat more complex carbohydrates</p> <p>take mineral supplements</p>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<p>2</p> <p>3 ticks = 1 mark max. 4 or more ticks = 0 marks</p> <p>Examiner's Comments</p> <p>Approximately half of the candidates scored both marks for this question. Correct answers referred to a high fibre diet and eating more complex carbohydrates.</p>
	b	<p>C</p> <p>A</p> <p>B</p>	2	<p>3 correct = 2 marks 2 or 1 correct = 1 mark</p> <p>Examiner's Comments</p> <p>This question was answered very well by the majority of candidates. Errors were few but when they did occur it was nearly always to transpose fibre with carbohydrate. This scored candidates one of the two marks available.</p>
	c	<p>Insulin in tablets enters the blood stream too quickly.</p> <p>Tablets are more likely to cause infection.</p> <p>Insulin in tablets is more likely to cause an overdose.</p> <p>Insulin in injections will work faster.</p> <p>Insulin is injected straight into the pancreas.</p> <p>Insulin in tablets is likely to be digested and broken down.</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<p>2</p> <p>3 ticks = 1 mark max. 4 or more ticks = 0 marks</p> <p>Examiner's Comments</p> <p>This question was answered well with almost all candidates scoring at least one of the two marks available. When errors did occur they were randomly spread across the other distractors.</p>
		Total	6	