PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 2: CELLS AND CONTROL (PACK 1)

SCORE	PERCENTAGE
/62	%

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Q1.

There is a shortage of kidneys for organ transplants.

Scientists are investigating how to grow kidneys using genetically modified pig embryos.

Figure 5 shows this process.

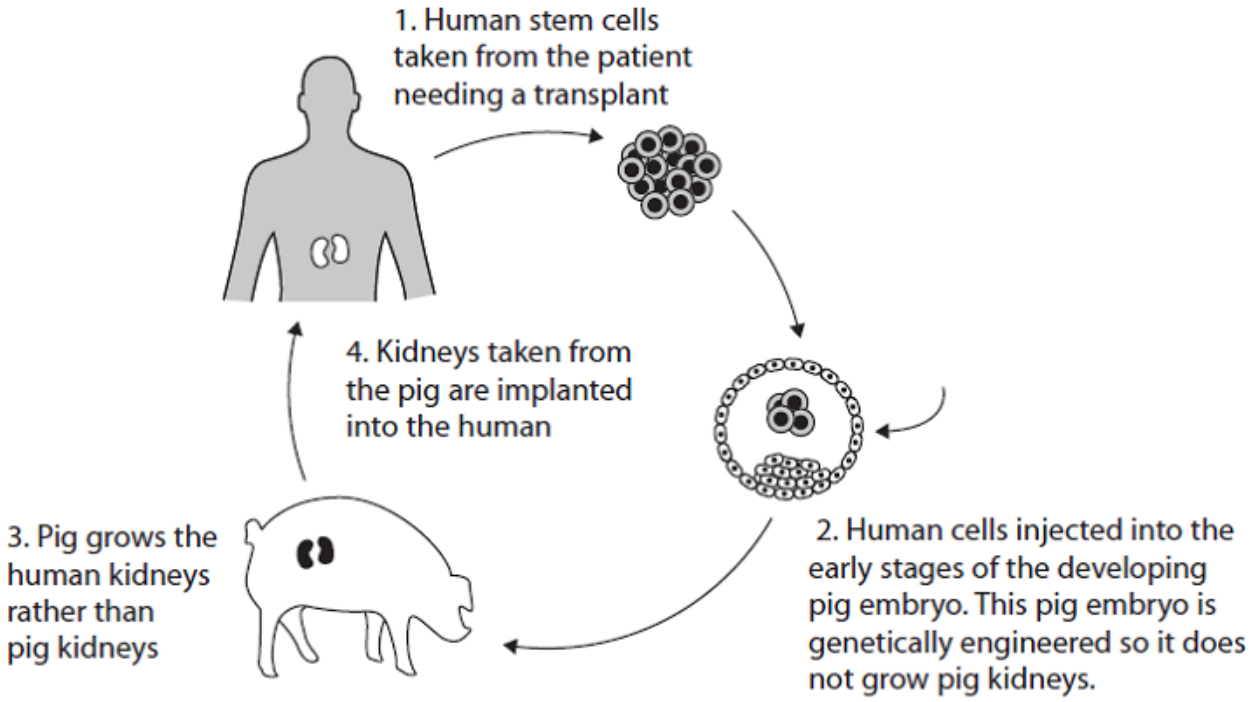


Figure 5

(i) State why the embryo of the pig must be engineered so it does not grow pig kidneys.

(1)

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(ii) Explain why human stem cells are used for this process.

(2)

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(Total for question = 3 marks)

Q2.

Short-sightedness, also known as myopia, is a common eye defect.

Figure 4 shows a section through the human eye with light rays from a distant object.

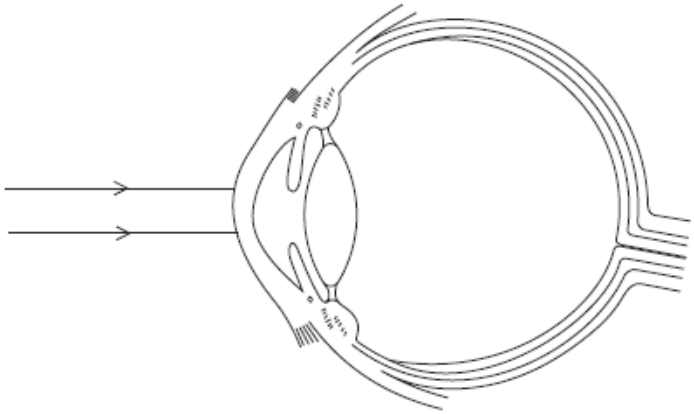


Figure 4

In an investigation, scientists asked three volunteers to look at a computer screen which changes from red to green.

Each volunteer was given a drink containing an amount of caffeine.

The volunteers hit a button with their index finger each time the screen changed colour.

Their reaction times were measured.

The results are shown in Figure 5.

	reaction time in seconds			
volunteer	**repeat 1**	**repeat 2**	**repeat 3**	**mean**
volunteer 1 – 100 mg caffeine	0.45	0.52	0.50	0.49
volunteer 2 – 300 mg caffeine	0.22	0.16	0.24	0.21
volunteer 3 – 600 mg caffeine	0.19	0.19	0.22	0.20

Figure 5

(i) Describe the effect of concentration of caffeine on the reaction times of these volunteers.

(2)

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(ii) Give **two** ways in which the scientists could improve this investigation.

(2)

1 .....

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2 .....

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(Total for question = 4 marks)

Q3.

Figure 8 shows how alcohol consumption increases the risk of developing liver cancer.

Someone who does not drink alcohol has a 1.0 risk of developing liver cancer.

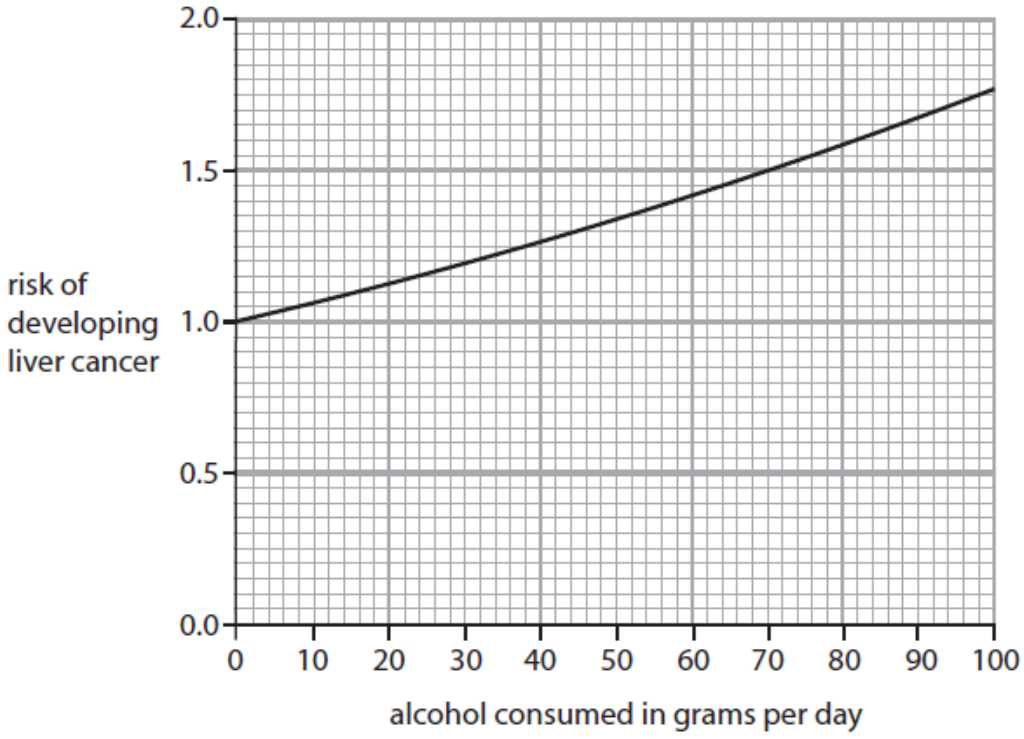


Figure 8

(i) One unit of alcohol contains 8 grams of alcohol.

Calculate the risk of developing liver cancer for someone who consumes 4 units of alcohol a day.

(2)

..... risk of developing liver cancer

(ii) Describe how cancer develops in the liver.

(2)

.....

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(Total for question = 4 marks)

Q4.

Figure 16 shows the number of neurones in the brain of different animals.

animal	number of neurones in the brain
lobster	1.0×10^5
frog	1.6×10^7
rat	2.0×10^8
human	8.6×10^{10}

Figure 16

(i) Calculate the difference between the number of neurones in the brain of the rat and the brain of the frog.

Give your answer in standard form.

(2)

..... neurones

(ii) Most neurones in the brain are unmyelinated whereas motor neurones are myelinated.

Explain why myelination is needed on motor neurones but not on neurones in the brain.

(3)

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(Total for question = 5 marks)

Q5.

Figure 8 shows the number of neurones in the brain of different animals.

animal	number of neurones in the brain
lobster	1.0×10^5
frog	1.6×10^7
rat	2.0×10^8
human	8.6×10^{10}

Figure 8

(i) Calculate the difference between the number of neurones in the brain of the rat and the brain of the frog.

Give your answer in standard form.

(2)

..... neurones

(ii) Most neurones in the brain are unmyelinated whereas motor neurones are myelinated.

Explain why myelination is needed on motor neurones but not on neurones in the brain.

(3)

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(Total for question = 5 marks)

Q6.

The reaction time of five people was tested using a computer.

These people were then given 100 cm^3 of a liquid to drink.

Their reaction times were recorded 10 minutes after drinking the liquid.

Figure 9 shows the results.

person	reaction time in seconds		
	before drinking the liquid	after drinking the liquid	difference
1	0.256	0.245	–0.011
2	0.234	0.232	–0.002
3	0.268	0.259	–0.009
4	0.254	0.248	–0.006
5	0.215	0.208	–0.007

Figure 9

(i) Calculate the mean difference in reaction time.

Give your answer in milliseconds.

(2)

..... ms

(ii) The drinks manufacturer wants to advertise the effect of the drink on reaction time.

The manufacture needs to confirm the effect on reaction time by improving the investigation.

Give **two** improvements the manufacturer would need to make to this investigation.

(2)

1 .....

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2 .....

.....

(Total for question = 4 marks)

Q7.

The reaction time of five people was tested using a computer.

These people were then given 100 cm^3 of a liquid to drink.

Their reaction times were recorded 10 minutes after drinking the liquid.

Figure 6 shows the results.

person	reaction time in seconds		
	before drinking the liquid	after drinking the liquid	difference
1	0.256	0.245	–0.011
2	0.234	0.232	–0.002
3	0.268	0.259	–0.009
4	0.254	0.248	–0.006
5	0.215	0.208	–0.007

Figure 6

(i) Calculate the mean difference in reaction time.

Give your answer in milliseconds.

(2)

..... ms

(ii) The drinks manufacturer wants to advertise the effect of the drink on reaction time.

The manufacture needs to confirm the effect on reaction time by improving the investigation.

Give **two** improvements the manufacturer would need to make to this investigation.

(2)

1 .....

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2 .....

.....

(Total for question = 4 marks)

Q8.

The effect of age on focusing distance was investigated.

Volunteers of different ages had their eyes tested.

Each volunteer was asked to read words from a book. The book was moved closer to their eyes.

When the words became out of focus, the distance was recorded.

Figure 4 shows the results.

age of volunteers	distance (mm)			mean distance (mm)
	person 1	person 2	person 3	
40	256	261	257	258
45	282	275	280	279
50	292	301	297	?
55	311	309	307	309

Figure 4

(i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.

(3)

..... mm

(ii) Give **one** conclusion that can be made from the data in Figure 4.

(1)

.....

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(iii) Give **two** improvements that are needed in this investigation before a valid conclusion can be made.

(2)

1 .....

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2 .....

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(Total for question = 6 marks)

Q9.

The student observed 89 cells on the microscope slide.

Figure 6 shows the number of cells at each stage of the cell cycle.

stage of cell cycle	number of cells
Interphase	44
Prophase	12
Metaphase	6
Anaphase	18
Telophase	9

Figure 6

Use this equation to calculate the mitotic index for this slide.

$$\text{mitotic index} = \frac{\text{number of cells in mitosis}}{\text{total number of cells}} \times 100$$

Give your answer to three significant figures.

(3)

Mitotic index .....

(Total for question = 3 marks)

Q10.

Figure 5 shows how alcohol consumption increases the risk of developing liver cancer.

Someone who does not drink alcohol has a 1.0 risk of developing liver cancer.

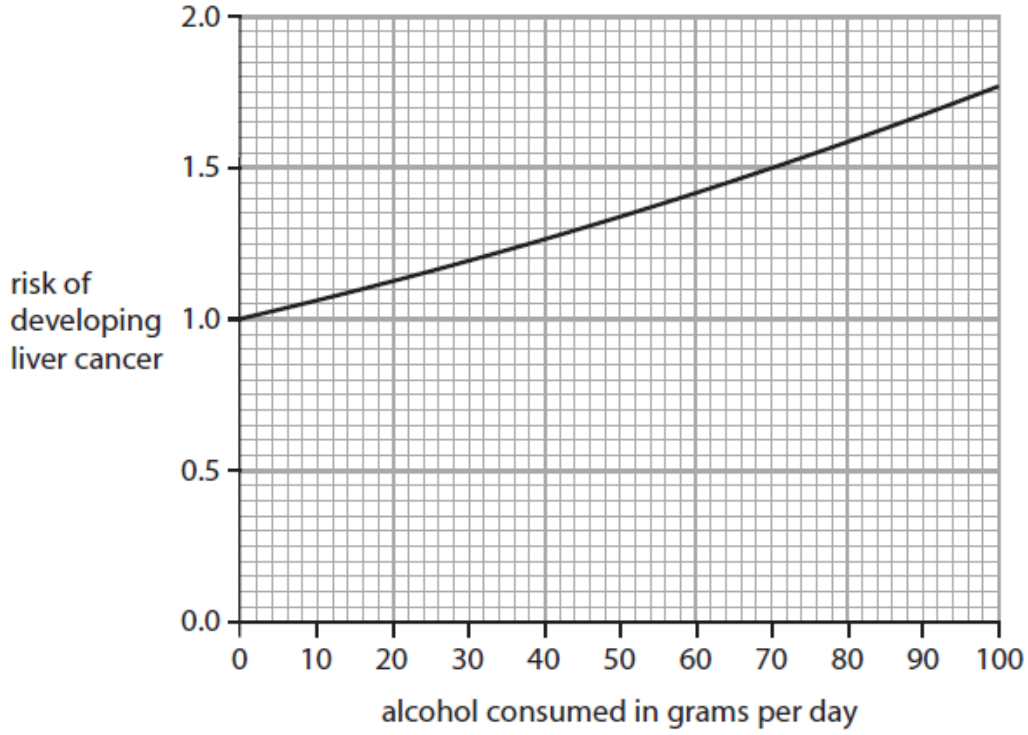


Figure 5

(i) One unit of alcohol contains 8 grams of alcohol.

Calculate the risk of developing liver cancer for someone who consumes 4 units of alcohol a day.

(2)

..... risk of developing liver cancer

(ii) Describe how cancer develops in the liver.

(2)

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(Total for question = 4 marks)

Q11.

Mitosis and meiosis are processes that produce new cells.

Compare the outcomes of mitosis and meiosis.

(3)

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(Total for question = 3 marks)

Q12.

Mitosis and meiosis are processes that produce new cells.

Compare the outcomes of mitosis and meiosis.

(3)

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(Total for question = 3 marks)

Q13.

Figure 2 shows part of a reflex arc in the spinal cord.

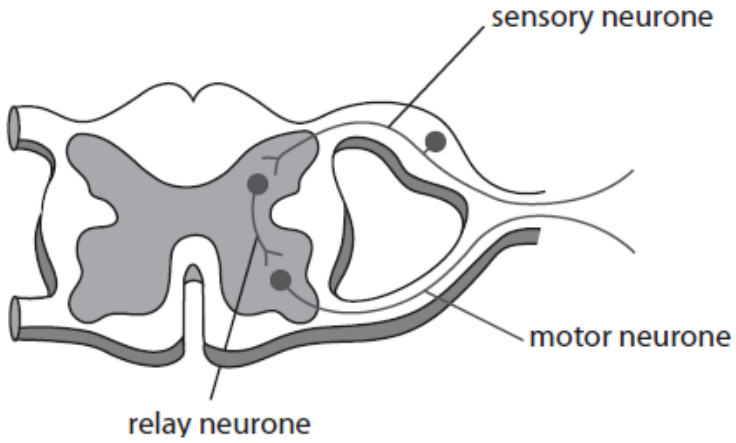


Figure 2

(i) Describe how an impulse passes from the relay neurone to the motor neurone.

(3)

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(ii) Explain the function of a reflex arc.

(2)

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(Total for question = 5 marks)

Q14.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 1 shows part of a reflex arc in the spinal cord.

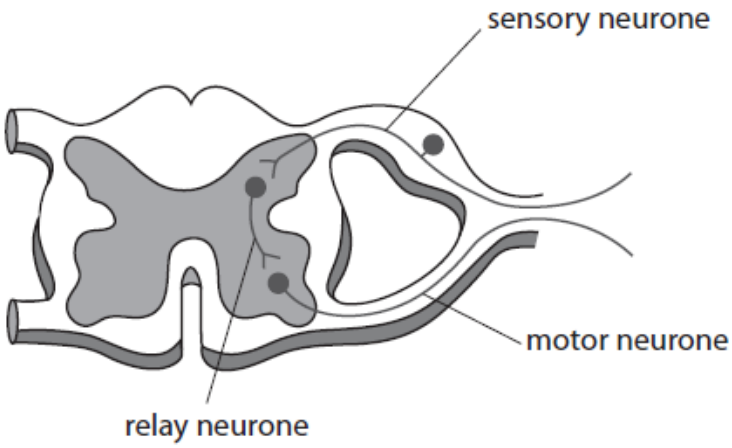


Figure 1

(i) Describe how an impulse passes from the relay neurone to the motor neurone.

(3)

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(ii) Explain the function of a reflex arc.

(2)

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(Total for question = 5 marks)

Q15.

Figure 5 shows light rays entering the eye of a person with normal vision.

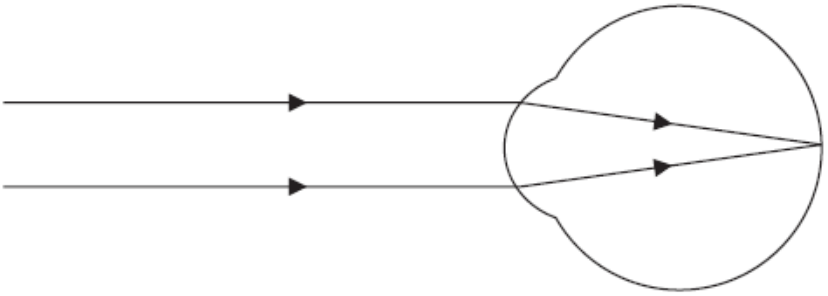


Figure 5

(i) Describe how light rays are focused to give normal vision.

(2)

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(ii) Figure 6 shows light rays entering the eye of a person with an eye defect and two lenses that can be used to correct eye defects.

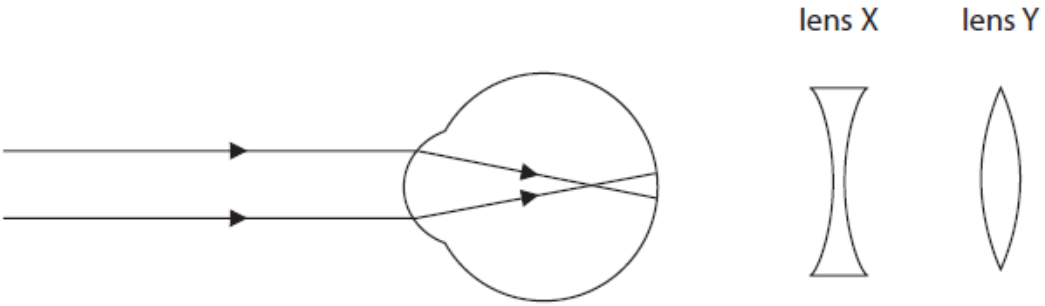


Figure 6

Explain which lens would correct the eye defect shown in Figure 6.

(2)

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(Total for question = 4 marks)