PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

BIOLOGY



EXAM QUESTION PACK

TOPIC 2: CELLS AND CONTROL (PAPER 1, PACK 1)

SCORE	PERCENTAGE
/76	%

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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.

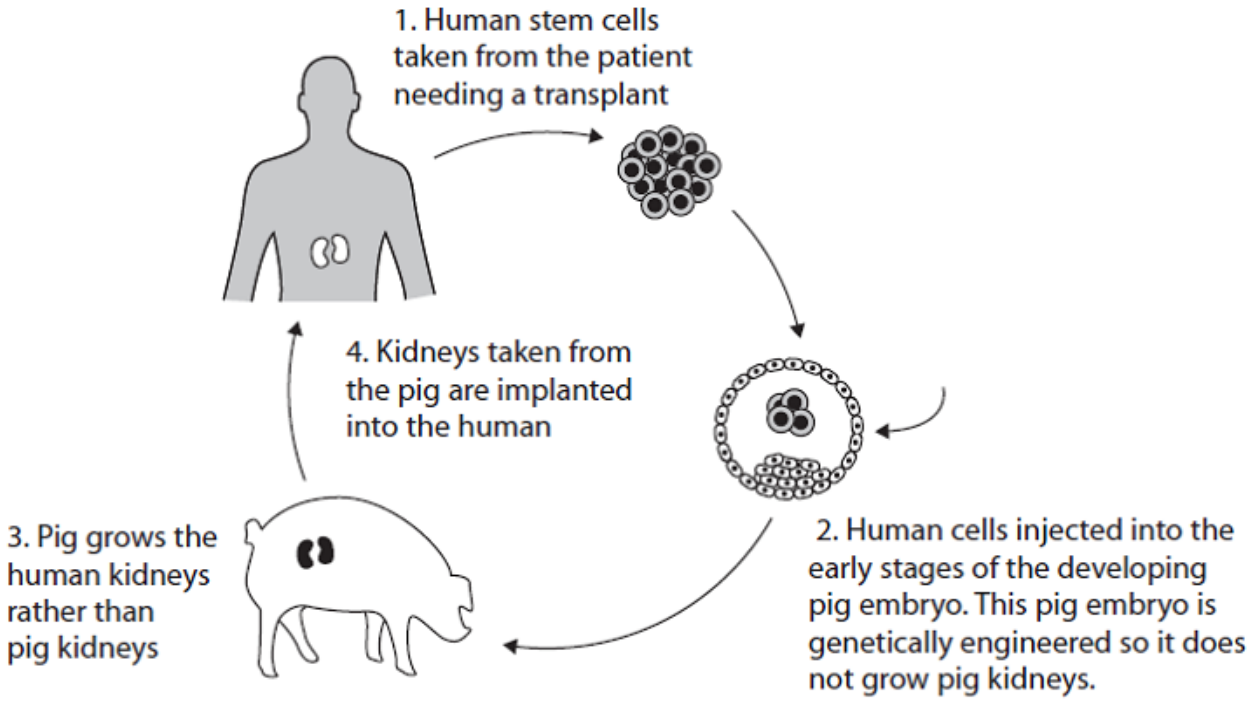


Figure 5

(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.

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)

Q3.

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 .....

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(Total for question = 4 marks)

Q4.

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.

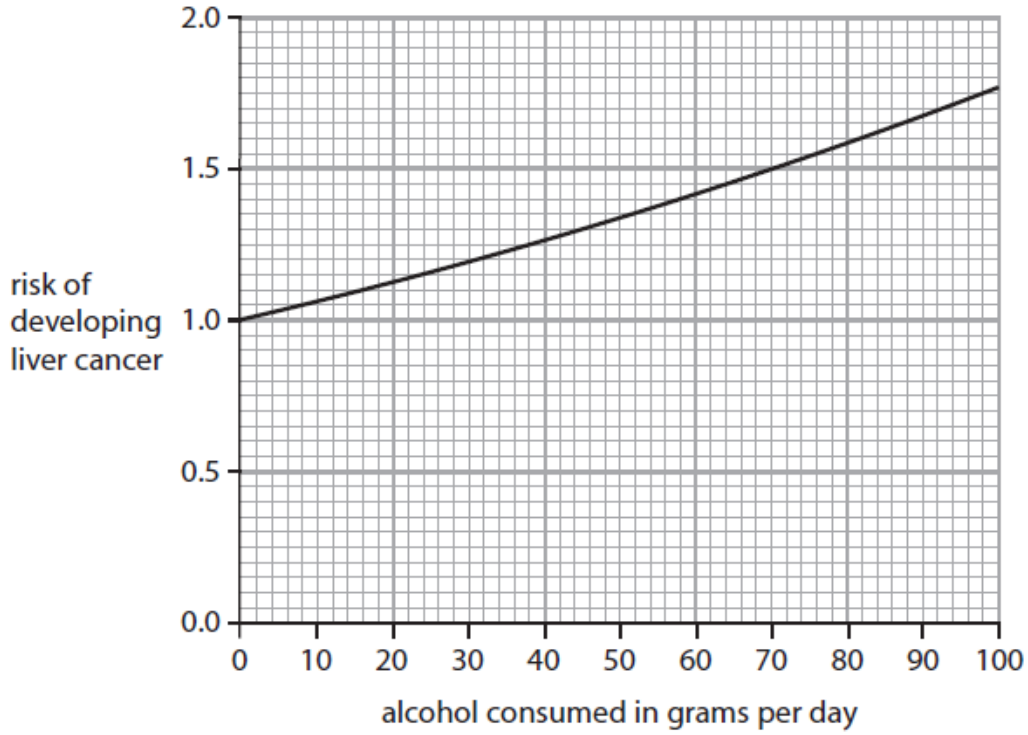


Figure 5

(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)

Q5.

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)

Q6.

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.

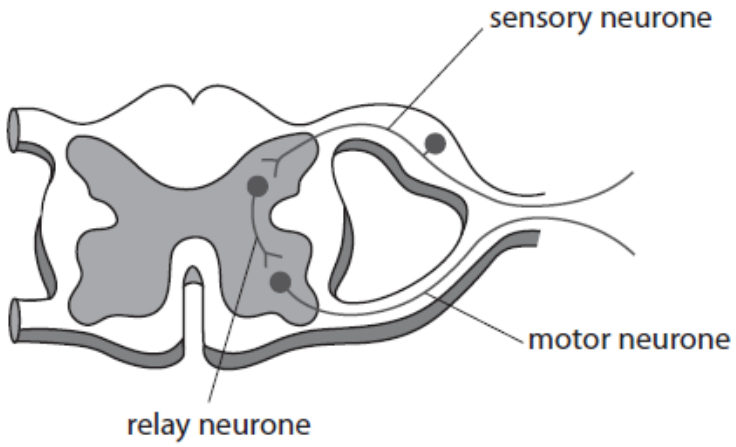


Figure 1

(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)

Q7.

Figure 2 shows a banana plantation.



© warmer/Shutterstock

Figure 2

After the bananas have been harvested, the old plants are cut down.

The suckers then develop into mature plants producing the next crop of bananas.

The tip of each sucker contains a group of cells called a meristem.

(i) Describe the function of a meristem in the growth of a plant.

(2)

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(ii) A student took a sample of cells from a meristem to view under a light microscope.

Describe how the student would prepare a microscope slide using these cells.

(3)

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(Total for question = 5 marks)

Q8.

In 2012, two scientists were awarded the Nobel prize for their research on stem cells.

They showed that adult cells could be reprogrammed to become cells with the properties of embryonic stem cells.

Describe the possible benefits of this research.

(3)

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(Total for question = 3 marks)

Q9.

Describe what is produced when a single cell divides by mitosis.

(3)

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(Total for question = 3 marks)

Q10.

Figure 5 shows a plant cell in anaphase of mitosis.



Figure 5

Describe what occurs during anaphase of mitosis.

(3)

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(Total for question = 3 marks)

Q11.

Arthritis is a condition that occurs when cells in joints get damaged or destroyed.

Stem cell therapy can be used to treat arthritis.

Discuss the benefits and risks of using stem cell therapy to treat arthritis.

(4)

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(Total for question = 4 marks)

Q12.

Some painkillers prevent neurotransmitters binding to receptors in a synapse.

Explain how a signal is transmitted at a synapse and how the painkillers reduce the pain felt by the person.

(6)

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(Total for question = 6 marks)

Q13.

Explain how impulses are transmitted at synapses.

(4)

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(Total for question = 4 marks)

Q14.

Colistin is an antibiotic used to treat infections in the bloodstream.

Some bacteria are resistant to Colistin.

Explain how these bacteria have become resistant to Colistin.

(4)

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(Total for question = 4 marks)

Q15.

In 2011, South Korean scientists genetically engineered a cell from a beagle.

They then cloned this cell to create a beagle.

They called this beagle Tegon.

Tegon glows in the dark when UV light is shone on him.



© Dentistry Today

Cloning involves cells that divide by mitosis.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

When a cell divides by mitosis it produces

(1)

☒ **A** two cells that are genetically different

☒ **B** two cells that are genetically identical

☒ **C** four cells that are genetically different

☒ **D** four cells that are genetically identical

(b) To genetically engineer the original cell so that it would glow, the scientists had to obtain a suitable gene.

(i) Describe the stages that a scientist would complete to obtain this gene.

(2)

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*(ii) Describe the stages used in the laboratory to clone and produce Tegon from the genetically engineered cell.

(6)

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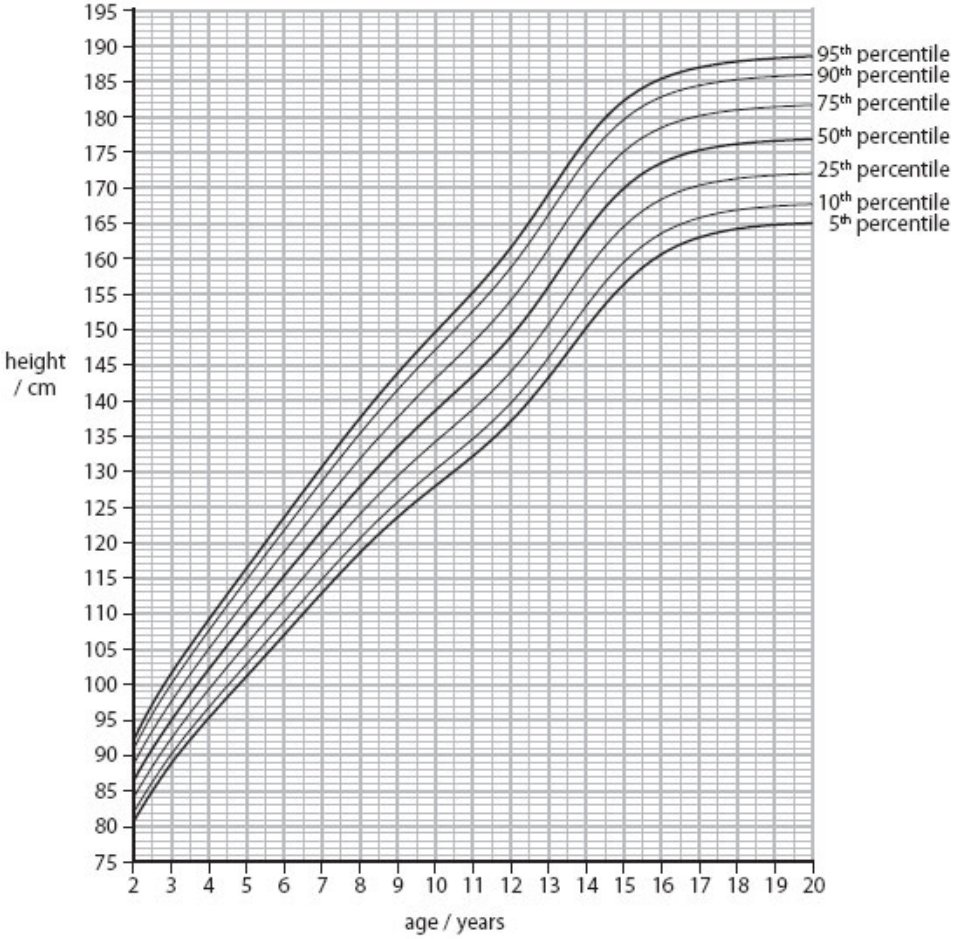
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Q16.

Height can be used to monitor growth.

(a) The graph shows a percentile chart for height for males aged between 2 and 20 years.



(i) Describe how the height of males changes from the age of 2 to 20 years.

(2)

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.....

(ii) Calculate the difference in height of an 11 year old male in the 95th percentile and an 11 year old male in the 5th percentile.

(2)

answer = ... cm

(iii) Explain what is meant by the 95th percentile on this graph.

(2)

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(b) Protein is needed for growth.

(i) Name the first stage of protein synthesis.

(1)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The second stage of protein synthesis produces a

(1)

☒ **A** polypeptide made of amino acids

☒ **B** polypeptide made of bases

☒ **C** strand of mRNA made of amino acids

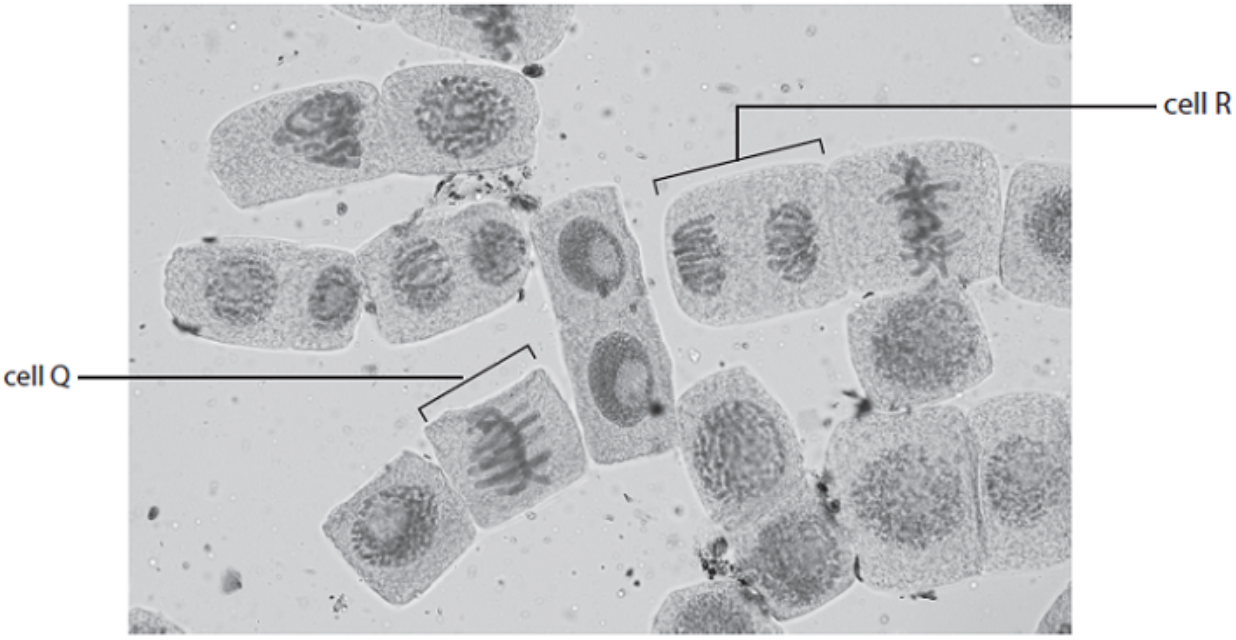
☒ **D** strand of mRNA made of bases

(Total for Question is 8 marks)

Q17.

Answer the questions with a cross in the boxes you think are 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 4 shows cells from an onion root tip as seen using a light microscope.



(Source: © Rattiya Thongdumhyu/Shutterstock)

Figure 4

(i) Identify the stages of mitosis shown in cell Q and cell R.

(1)

	cell Q	cell R
☒ **A**	metaphase	anaphase
☒ **B**	telophase	anaphase
☒ **C**	metaphase	interphase
☒ **D**	telophase	interphase

(ii) Describe **two** processes that occur in cells during prophase.

(2)

1 .....

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2 .....

.....

(iii) State the term used to describe the process which occurs after mitosis, when the cell divides into two.

(1)

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(iv) The diameter of one cell in Figure 4 is 0.075 mm.

Which is this diameter in µm?

(1)

☒ **A** 0.75 µm

☒ **B** 75 µm

☒ **C** 750 µm

☒ **D** 75 000 µm

(Total for question = 5 marks)

Q18.

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 ☒.

A scientist investigated the reaction times of five students using a computer program.

The computer screen showed a blue square at the start.

As soon as the blue square turned yellow, each student had to press a key on the keyboard as fast as possible.

Figure 2 shows the results for the five students.

student	reaction time in milliseconds
1	245
2	200
3	210
4	215
5	225

Figure 2

(i) Which is the median result for these students?

(1)

☒ **A** 200 milliseconds

☒ **B** 210 milliseconds

☒ **C** 215 milliseconds

☒ **D** 225 milliseconds

(ii) The scientist wanted to investigate if the colours of the squares used on the computer program affected reaction time.

The computer program started with blue squares that turned into yellow squares.

Describe how the scientist could compare the reaction times of these students when they respond to red squares turning into yellow squares.

(3)

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(Total for question = 4 marks)

Q19.

Figure 11 shows four stages of mitosis, labelled P, Q, R and S.

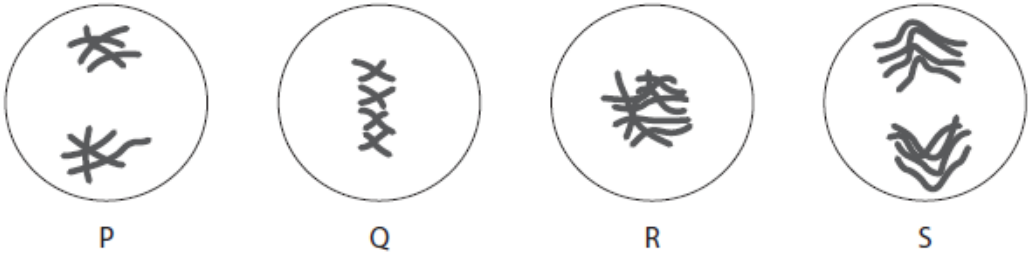


Figure 11

(i) Which is the correct order for these stages?

(1)

☒ **A** Q → R → S → P

☒ **B** R → Q → S → P

☒ **C** R → S → Q → P

☒ **D** Q → S → R → P

(ii) The stage of mitosis labelled S in figure 11 is

(1)

☒ **A** anaphase

☒ **B** prophase

☒ **C** telophase

☒ **D** metaphase

(iii) Interphase is part of the cell cycle.

Describe what happens during interphase.

(2)

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(Total for question = 4 marks)

Q20.

During prophase of mitosis, the

(1)

☒ **A** cell elongates

☒ **B** cell halves in size

☒ **C** cytoplasm divides

☒ **D** nuclear membrane breaks down

(Total for question = 1 mark)

Q21.

Give the name of the phase of the cell cycle during which DNA replication takes place.

(1)

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(Total for question = 1 mark)

Q22.

Figure 9 shows a sensory neurone.

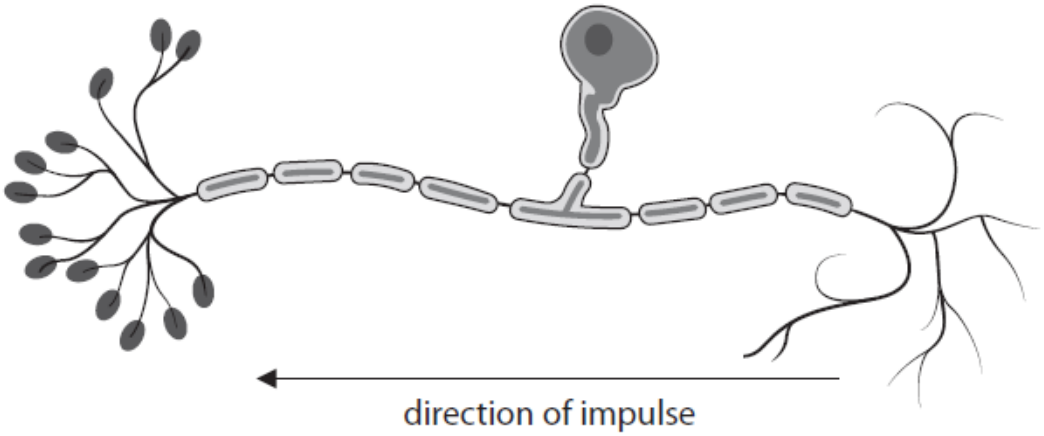


Figure 9

(i) Label the axon on Figure 9.

(1)

(ii) Describe the role of sensory neurones.

(2)

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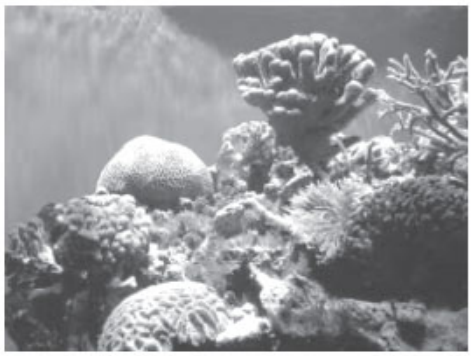
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(Total for question = 3 marks)

Q23.

Corals are animals that live on the sea bed.

The photograph shows some species of coral.



After fertilisation, mitosis takes place to form an embryo.

The embryo develops into new coral.

(i) Describe mitosis.

(3)

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(ii) Describe how the embryo develops into new coral.

(3)

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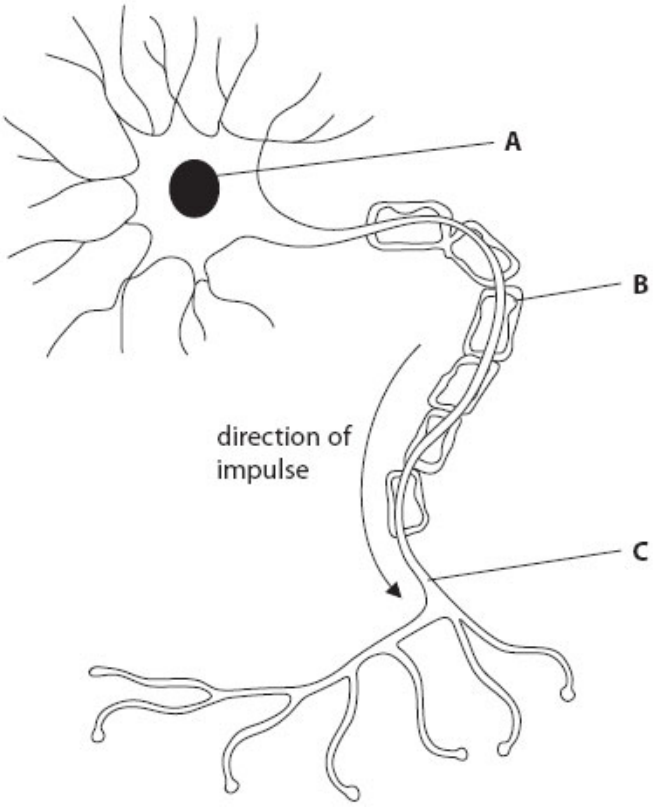
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Q24.

The diagram shows a motor neurone.



(i) Name the structures labelled **A**, **B**and **C**.

(3)

A .....

B .....

C .....

(ii) When the brain receives impulses from receptor cells it coordinates a response.

Complete the sentence by putting a cross (☒) in the box next to your answer.

Responses are carried out by

(1)

- ☒ **A** alleles
- ☒ **B** dendrons
- ☒ **C** effectors
- ☒ **D** senses

Q25.

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 7 shows a neurone.

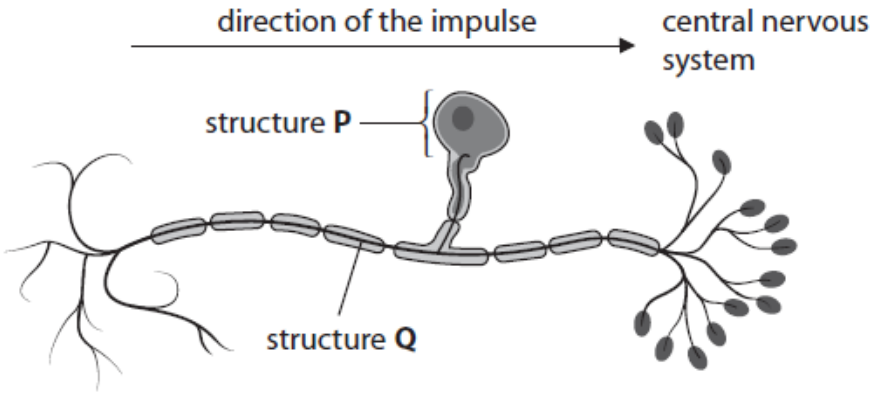


Figure 7

(i) Name the type of neurone shown in Figure 7.

(1)

.....

(ii) Which row identifies structure **P** and structure **Q**?

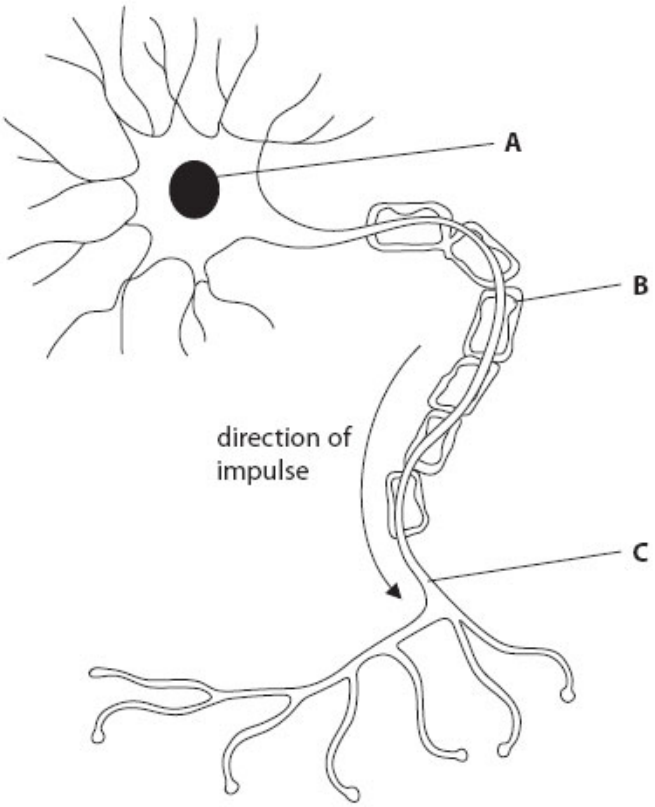
(1)

	structure P	structure Q
☒ **A**	myelin sheath	axon
☒ **B**	cell body	dendron
☒ **C**	myelin sheath	dendron
☒ **D**	cell body	axon

(Total for question = 2 marks)

Q26.

The diagram shows a motor neurone.



(a) (i) Name the structures labelled **A**, **B**and **C**.

(3)

A .....

B .....

C .....

(ii) When the brain receives impulses from receptor cells it coordinates a response.

Complete the sentence by putting a cross (☒) in the box next to your answer.

Responses are carried out by

(1)

- ☒ **A** alleles
- ☒ **B** dendrons
- ☒ **C** effectors
- ☒ **D** senses

(b) A response can be affected by drugs.

The effect of drinking alcohol on reaction time was investigated using five adult volunteers A, B, C, D and E.

After drinking a number of units of alcohol, the reaction time for each volunteer was measured three times.

The results are shown in the table.

		Reaction time / ms				
Volunteer	**Number of units of alcohol drunk**	**1st attempt**	**2nd attempt**	**3rd attempt**	**Mean**	
A	0.5	34	38	27	33	
B	1.5	36	47	40	41	
C	3.0	59	62	59	60	
D	4.5	67	60	62		
E	6.0	80	68	83	77	

(i) Calculate the mean reaction time for volunteer D.

(2)

Answer ..... ms

(ii) Explain why alcohol causes a change in reaction time.

(2)

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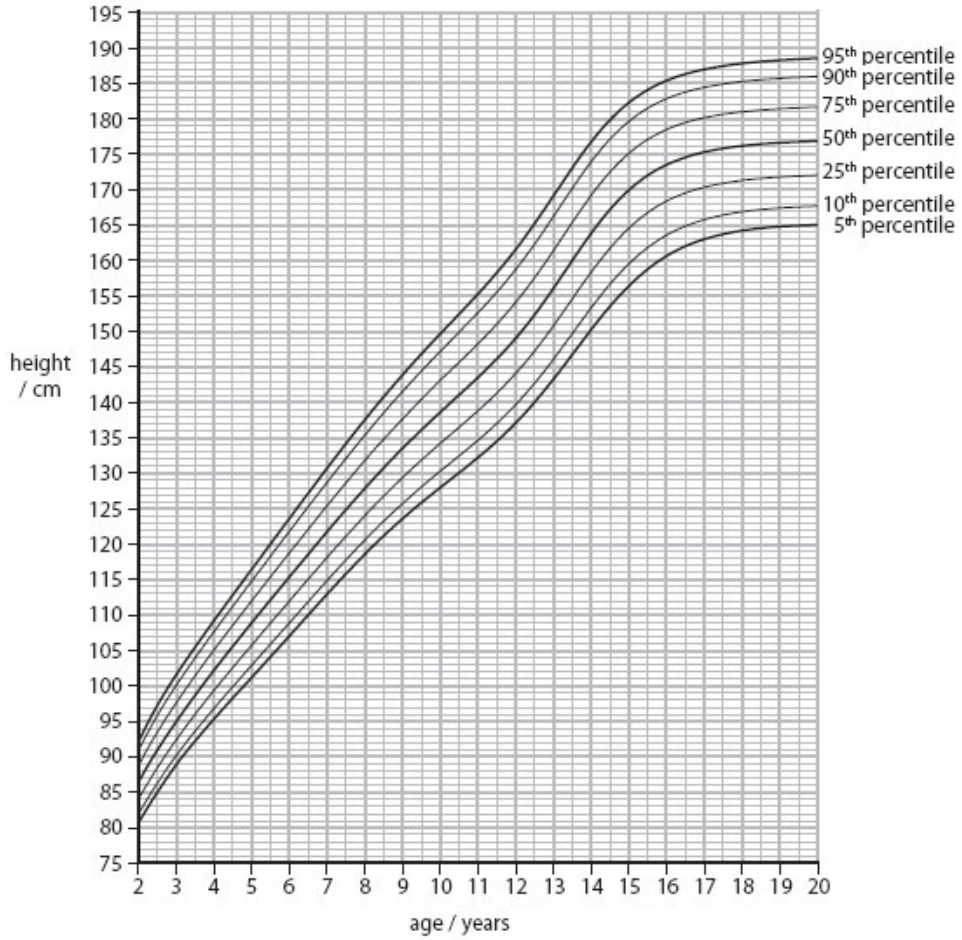
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(Total for Question is 8 marks)

Q27.

Height can be used to monitor growth.

The graph shows a percentile chart for height for males aged between 2 and 20 years.



(i) Describe how the height of males changes from the age of 2 to 20 years.

(2)

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(ii) Calculate the difference in height of an 11 year old male in the 95th percentile and an 11 year old male in the 5th percentile.

(2)

answer = ... cm

(iii) Explain what is meant by the 95th percentile on this graph.

(2)

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Q28.

Humans have reflexes.

Describe the route of an impulse through a reflex arc.

(4)

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