PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 2: CELLS AND CONTROL (PACK 3)

SCORE	PERCENTAGE
/94	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

Explain how impulses are transmitted at synapses.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q2.

Explain how impulses are transmitted at synapses.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q3.

Some myelinated motor neurones transmit impulses at speeds of approximately 100 m/s.

Figure 2 shows the technique used to measure the speed of nerve impulses in the lower leg of a person.

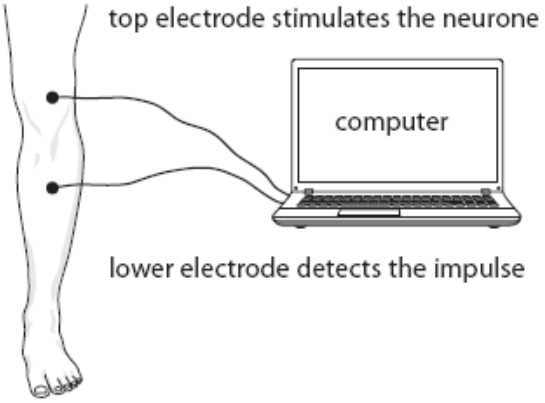


Figure 2

(i) Explain how the technique shown in Figure 2 could be used to calculate the speed of a nerve impulse.

(2)

.....

.....

.....

.....

.....

(ii) Guillain-Barré syndrome is a disease that causes the body to break down the myelin sheaths on motor neurones.

Explain why Guillain-Barré syndrome can cause reduced movement of the legs.

(2)

.....

.....

.....

.....

(Total for question = 4 marks)

Q4.

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)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q5.

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)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q6.

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)

.....

.....

.....

.....

.....

.....

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

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q7.

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)

.....

.....

.....

.....

.....

.....

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

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q8.

There is a shortage of kidneys for organ transplants.

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

Figure 8 shows this process.

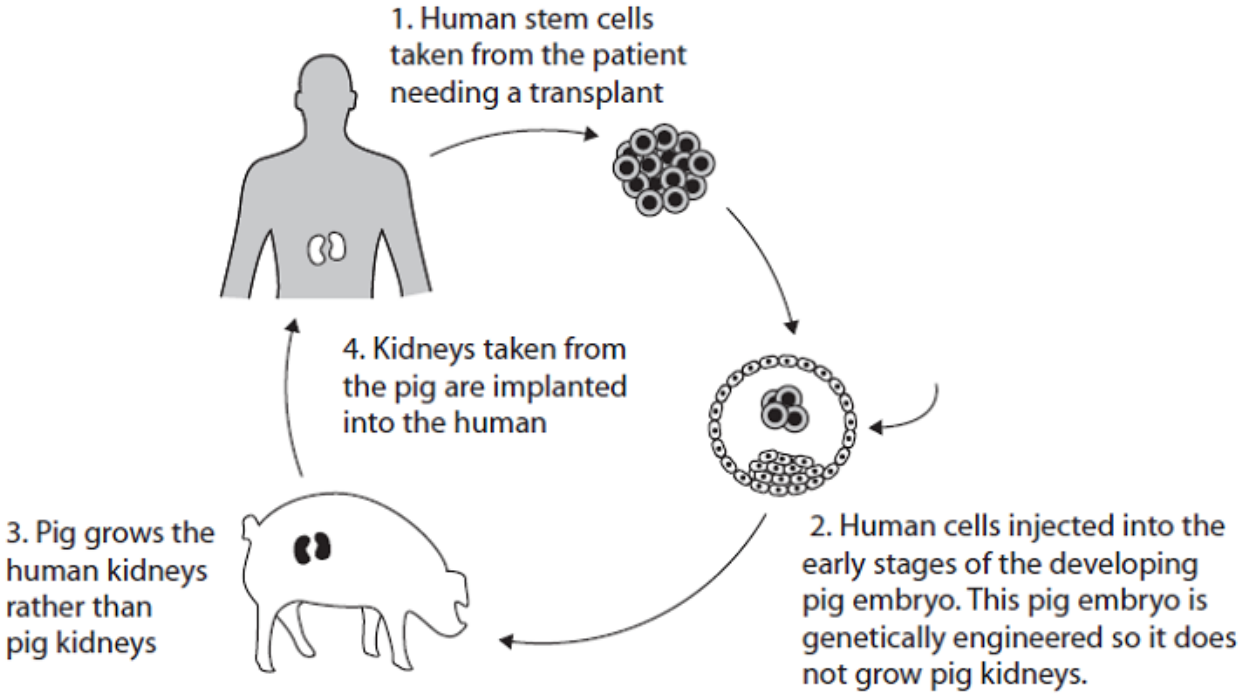


Figure 8

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

(1)

.....

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

(2)

.....

.....

.....

.....

(Total for question = 3 marks)

Q9.

Some diseases can cause irreversible damage to the nervous system.

Give reasons why stem cells could be used to treat these neurological diseases.

(2)

.....

.....

.....

.....

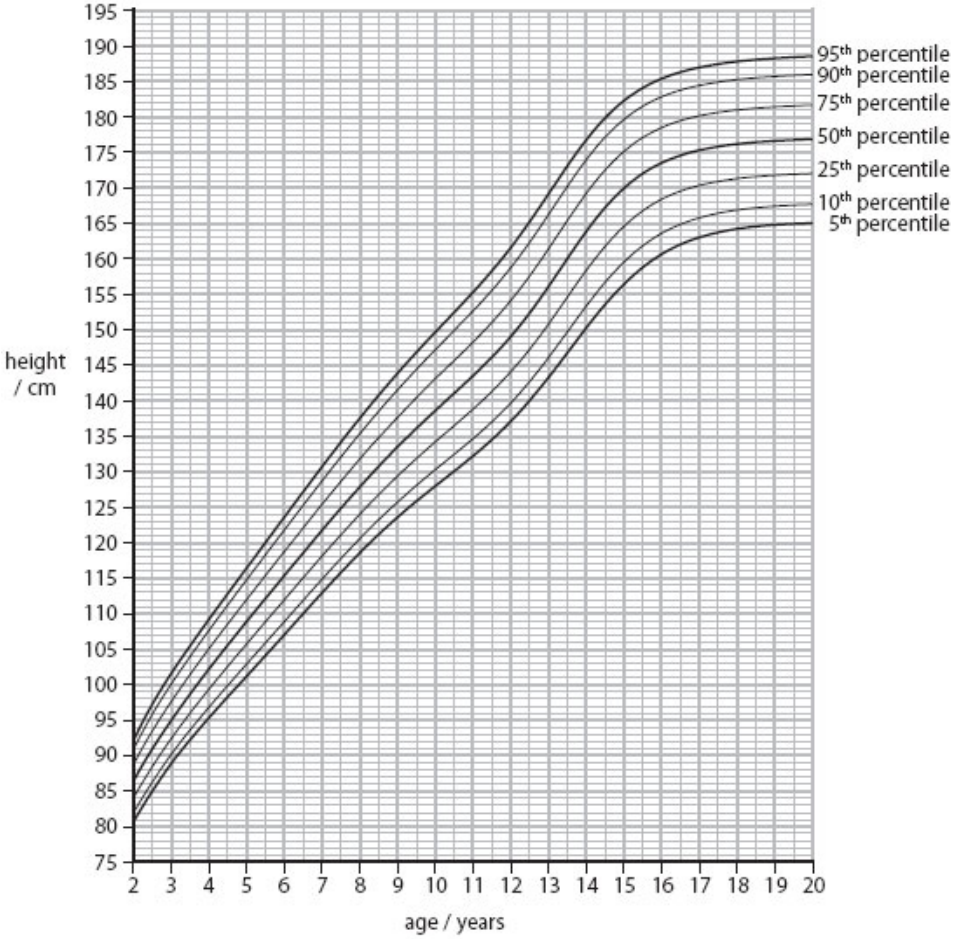
.....

(Total for question = 2 marks)

Q10.

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)

.....

.....

.....

.....

(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)

.....

.....

.....

.....

(b) Protein is needed for growth.

(i) Name the first stage of protein synthesis.

(1)

.....

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

The second stage of protein synthesis produces a

(1)

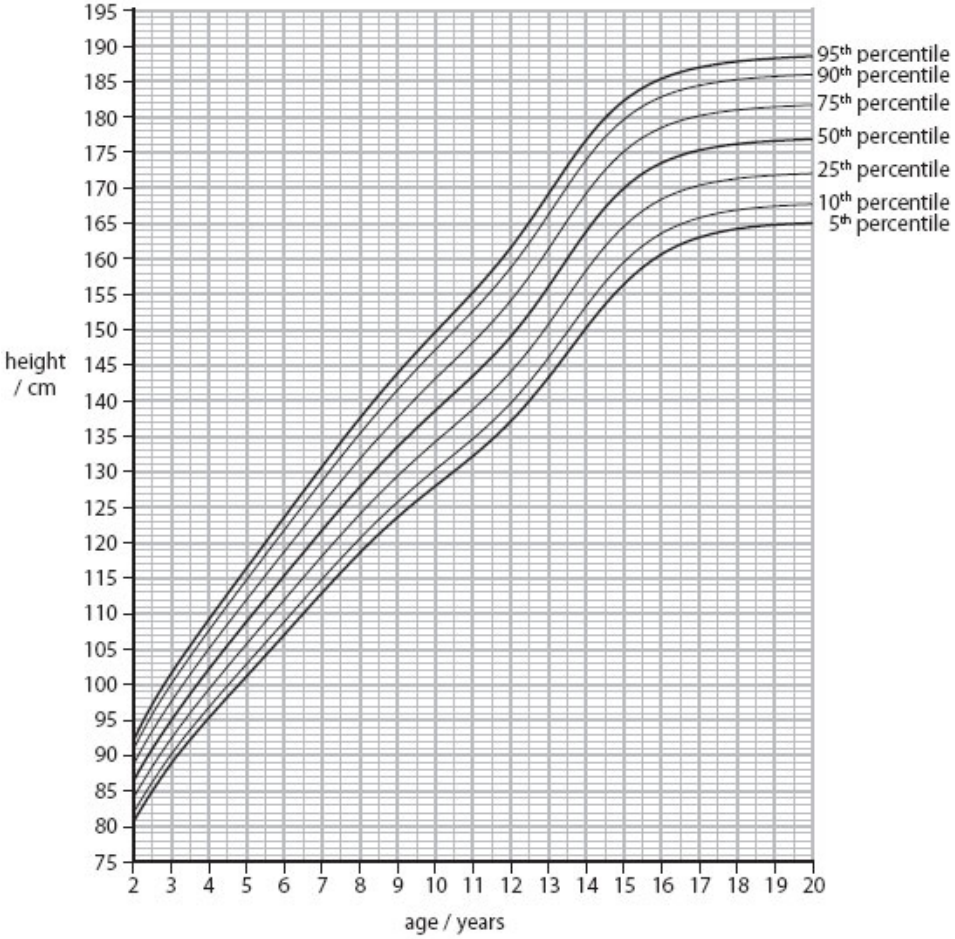
- ☒ **A** polypeptide made of amino acids
- ☒ **B** polypeptide made of bases
- ☒ **C** strand of mRNA made of amino acids
- ☒ **D** strand of mRNA made of bases

(Total for Question is 8 marks)

Q11.

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)

.....

.....

.....

.....

(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)

.....

.....

.....

.....

(b) Protein is needed for growth.

(i) Name the first stage of protein synthesis.

(1)

.....

(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)

Q12.

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 3 shows the results for the five students.

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

Figure 3

(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)

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q13.

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 .....

.....

2 .....

.....

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

(1)

.....

(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

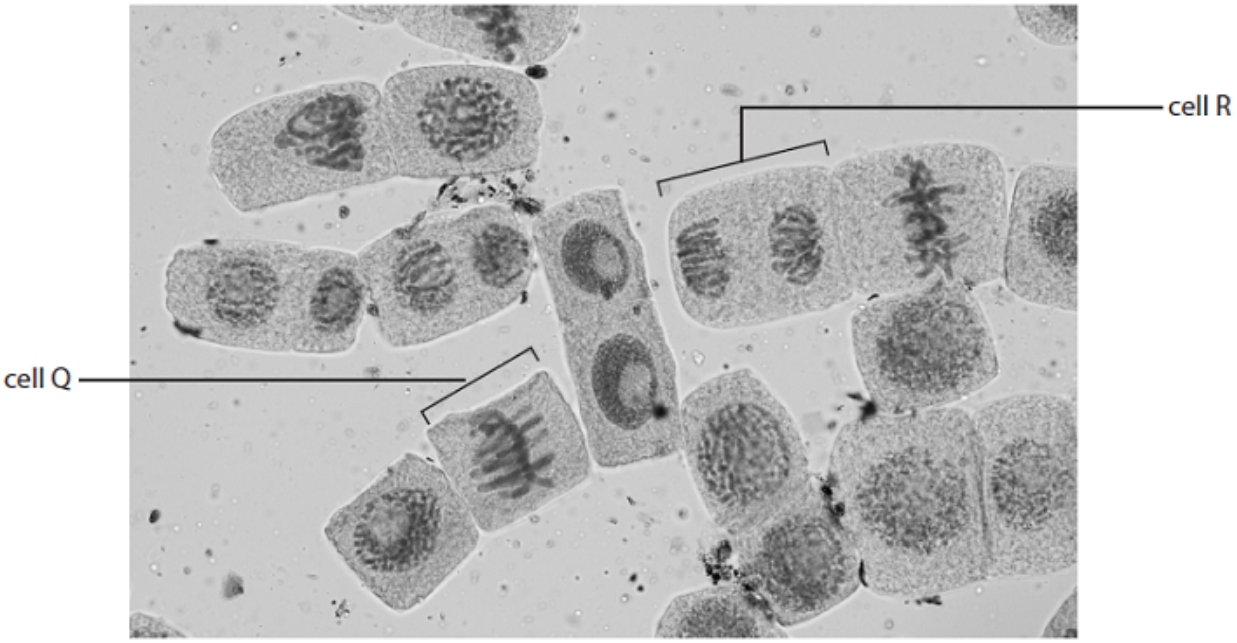
☒ **D** 75 000 µm

(Total for question = 5 marks)

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 7 shows cells from an onion root tip as seen using a light microscope.



(Source: © Rattiya Thongdumhyu/Shutterstock)

Figure 7

(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 .....

.....

2 .....

.....

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

(1)

.....

(iv) The diameter of one cell in Figure 7 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)

Q15.

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 ☒.

Colour blindness affects approximately 1 in 12 men.

In a city of 2 million people, 51% are men.

(i) What is the number of men who are colour blind in the city?

(1)

☒ **A** 42 500

☒ **B** 85 000

☒ **C** 166 666

☒ **D** 1 020 000

(ii) Colour blindness is a sex-linked genetic disorder caused by a recessive allele.

Colour blindness only affects 1 in 200 women.

Explain why more men than women are colour blind.

(2)

.....

.....

.....

.....

.....

(iii) A female without the allele for colour blindness has a baby boy.

The father is colour blind.

Explain the probability of the baby boy being colour blind.

(2)

.....

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)

Q16.

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 a diagram of the human eye.

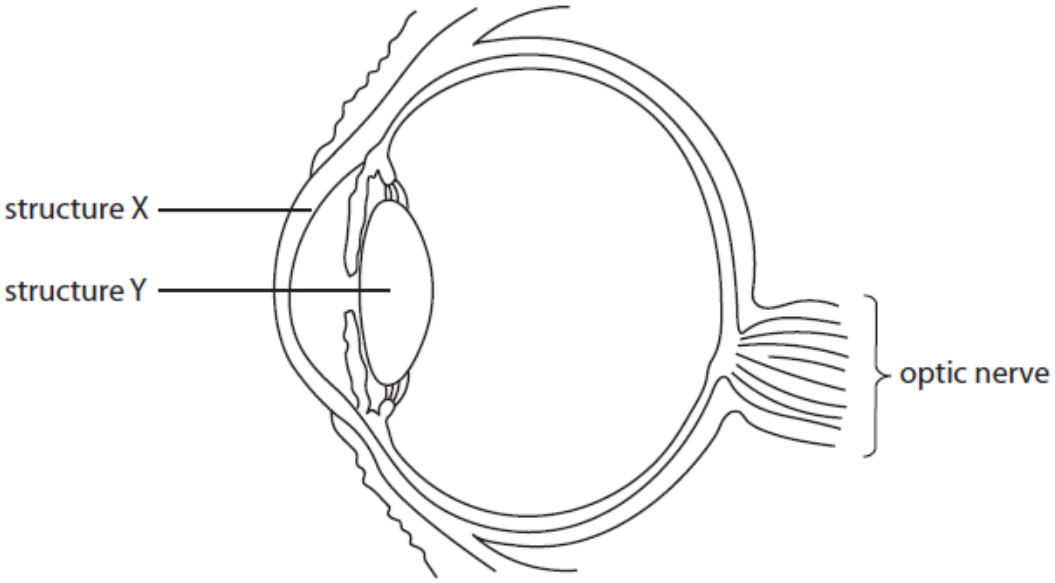


Figure 1

(i) Which row in the table gives the function of structure X and structure Y?

(1)

	function of structure X	function of structure Y
☒ **A**	refracts light	detects light
☒ **B**	detects light	refracts light
☒ **C**	reflects light	detects light
☒ **D**	refracts light	refracts light

(ii) Describe the changes that occur in the eye when a bright light is directed into the eye.

(2)

.....

.....

.....

.....

(Total for question = 3 marks)

Q17.

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)

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q18.

Which part of the eye detects coloured light?

(1)

- ☒ **A** iris
- ☒ **B** lens
- ☒ **C** cones
- ☒ **D** cornea

(Total for question = 1 mark)

Q19.

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

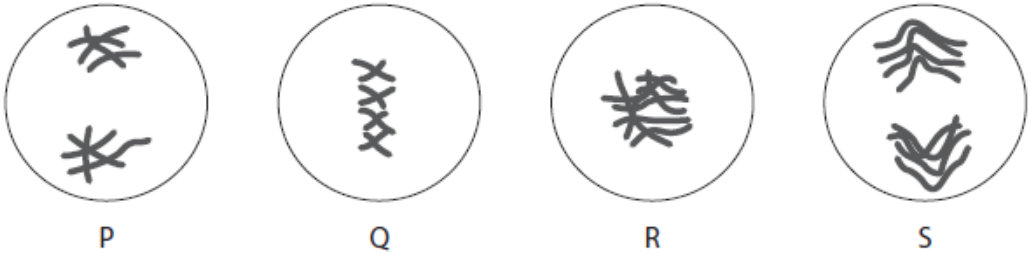


Figure 11

(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)

.....

.....

.....

.....

(Total for question = 4 marks)

Q20.

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

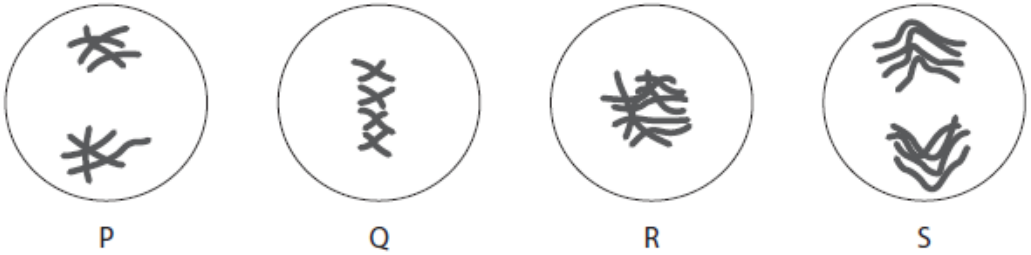


Figure 11

(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)

.....

.....

.....

.....

(Total for question = 4 marks)

Q21.

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)

Q22.

Figure 7 shows the steps involved in making a slide to observe mitosis in plant tissue.

step 1	a small sample of tissue is removed from a plant
step 2	the plant tissue is placed in a weak acid solution
step 3	a stain is added to the plant tissue
step 4	the stained plant tissue is squashed onto a slide
step 5	a cover slip is placed over the stained plant tissue
step 6	the stained plant tissue is observed using a microscope

Figure 7

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 ☒ .

(i) To observe mitosis, the plant tissue should be removed from the

(1)

☒ **A** middle of the root

☒ **B** centre of the stem

☒ **C** middle of the leaf cell

☒ **D** tip of the root

(ii) State why the stain is added to the plant tissue in step 3.

(1)

.....

(iii) The microscope has an eyepiece lens with a ×10 magnification and three objective lenses: ×4, ×10 and ×40.

Describe the best method of using the microscope to focus on the plant tissue and reach a magnification of ×400.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)

Q23.

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

(1)

.....

(Total for question = 1 mark)

Q24.

(a) Some research has shown that increased use of computers and other digital media can affect eyesight and reaction times.

A scientist wanted to test if prolonged use of a computer affected reaction time.

The scientist tested the reaction times of 10 people under the same environmental conditions.

These people then used a computer for three hours.

The scientist tested their reaction time again.

Give **three** ways that the scientist could improve this method to determine if prolonged use of a computer affects reaction time.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(b) Figure 9 shows the reaction times of five people.

person	1	2	3	4	5
reaction time/seconds	0.258	0.685	0.236	0.246	0.268

Figure 9

(i) Calculate the mean reaction time in milliseconds.

(2)

..... ms

(ii) Give the name of the mathematical term which is used to describe the reaction time value of person 1.

(1)

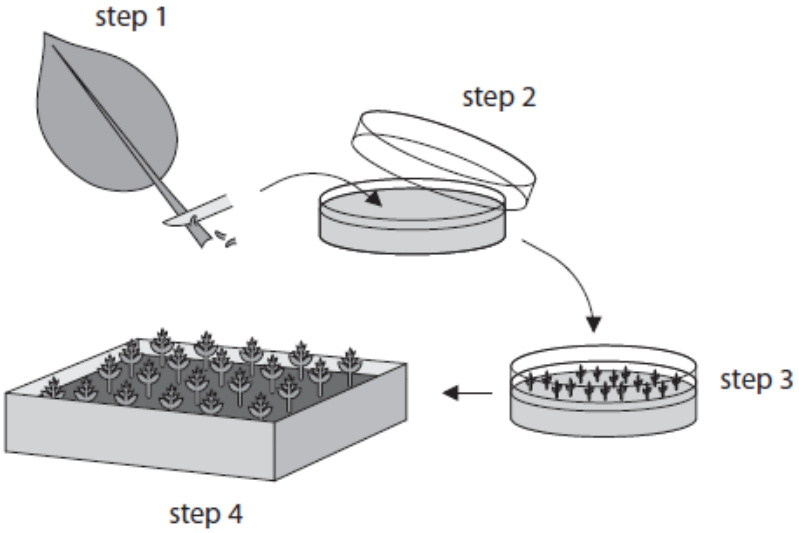
.....

.....

(Total for question = 6 marks)

Q25.

Figure 8 shows a method of producing plants.



Step 1. Cells taken from parent plant.

Step 2. Cells placed on agar growth medium.

Step 3. Cells develop into tiny plantlets.

Step 4. Plantlets grown in compost.

Figure 8

(i) Some cells in each plantlet develop into root cells.

Name the process occurring as these cells develop into root cells.

(1)

.....

(ii) Describe the advantages of producing plants by the method shown in Figure 8.

(2)

.....

.....

.....

.....

(iii) An autoclave is used to prepare the agar growth medium used in Step 2.

Explain why the agar growth medium is autoclaved.

(2)

.....

.....

.....

.....

.....

(iv) One of the plantlets had different coloured leaves.

Give **one** reason why this plantlet had different coloured leaves.

(1)

.....

.....

(Total for question = 6 marks)

Q26.

Figure 8 shows a diagram of the human eye.

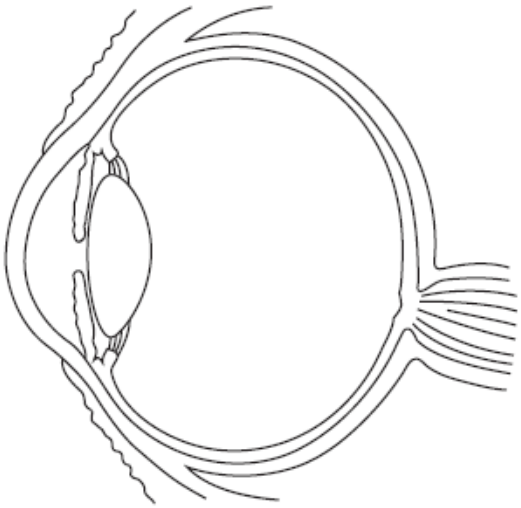


Figure 8

(i) Which structure of the eye contains the light receptor cells?

(1)

☒ **A** iris

☒ **B** lens

☒ **C** cornea

☒ **D** retina

(ii) The optic nerve transfers electrical signals from the eye to the central nervous system.

(1)

The optic nerve is a

☒ **A** relay neurone

☒ **B** motor neurone

☒ **C** sensory neurone

☒ **D** reflex neurone

(iii) Name the region of the central nervous system responsible for vision.

(1)

.....

.....

(Total for question = 3 marks)

Q27.

Figure 17 shows a sensory neurone.

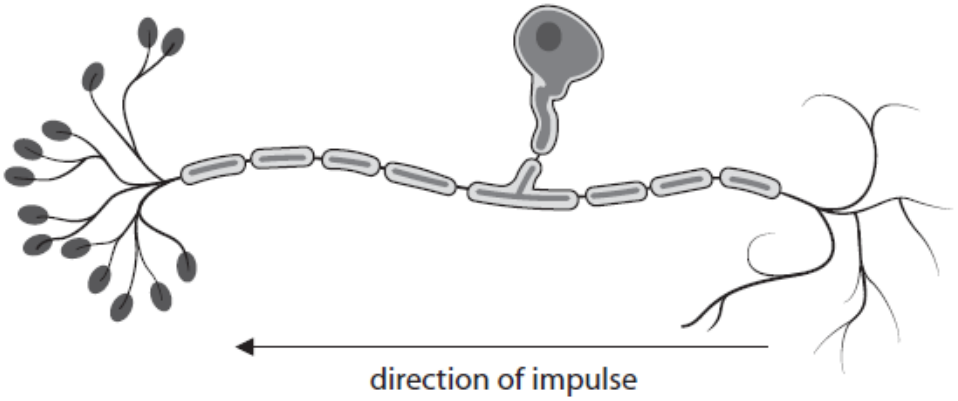


Figure 17

(i) Label the axon on Figure 17.

(1)

(ii) Describe the role of sensory neurones.

(2)

.....

.....

.....

.....

(Total for question = 3 marks)

Q28.

Figure 9 shows a sensory neurone.

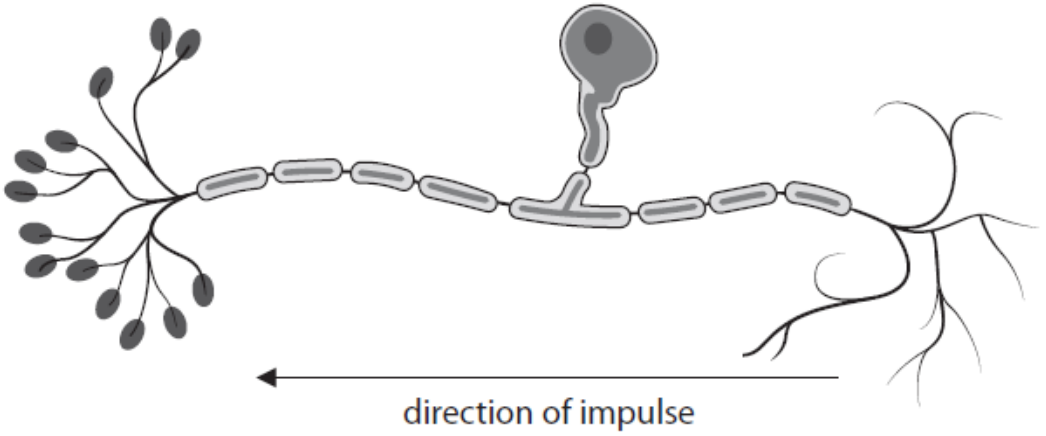


Figure 9

(i) Label the axon on Figure 9.

(1)

(ii) Describe the role of sensory neurones.

(2)

.....

.....

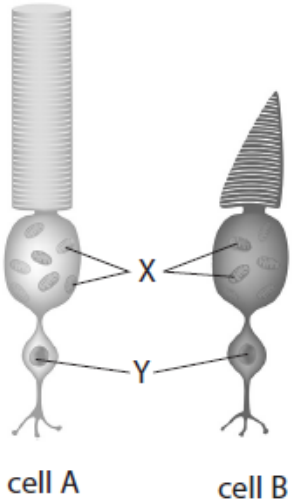
.....

.....

(Total for question = 3 marks)

Q29.

Figure 3 shows two light receptor cells from the human eye.



(Source: © Kokhanchikov/Shutterstock)

Figure 3

(i) Which part of the eye contains light receptor cells?

(1)

- ☒ **A** cornea
- ☒ **B** iris
- ☒ **C** lens
- ☒ **D** retina

(ii) These cells require energy.

The cell organelles labelled X release energy during respiration.

Name the organelles labelled X.

(1)

.....

(iii) The cell organelle labelled Y contains chromosomes.

Name the organelle labelled Y.

(1)

.....

(iv) Cell A responds to dim light and is responsible for night vision.

Name cell A.

(1)

.....

(v) Describe how the role of light receptor cell B is different from the role of light receptor cell A.

(2)

.....

.....

.....

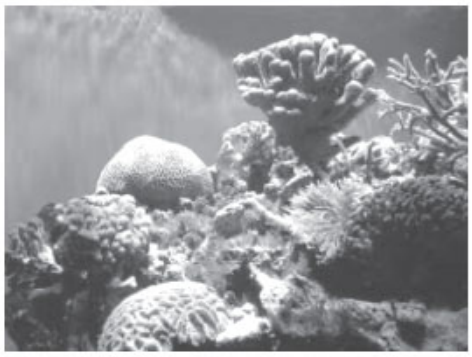
.....

(Total for question = 6 marks)

Q30.

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)

.....

.....

.....

.....

.....

.....

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

(3)

.....

.....

.....

.....

.....

.....