PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 2: CELLS AND CONTROL (PACK 2)

SCORE	PERCENTAGE
/58	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Mark
	An explanation that makes reference to: identification – knowledge (1 mark) and reasoning /justification – knowledge (1 mark): • embryonic stem cells can be stimulated to produce cells of the retina (1) • which can be transplanted into a patient's eye to replace the damaged cells (1)	**(2)**

Q2.

Question number	Indicative content	Mark
	AO2 (6 marks) **Synapse transmission** • neurones transmit electrical impulses • the synapse is a gap between 2 neurones • triggering the release of neurotransmitters • which diffuse across the synapse • as a chemical signal • neurotransmitters bind to receptors on the next neurone • triggering an electrical impulse in the next neurone **Painkillers** • prevent neurotransmitters binding to receptors in the next neurone • electrical impulse is not triggered • signal is not received by the central nervous system • person does not feel pain	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning mostly supported through the application of relevant evidence
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning are supported by sustained application of relevant evidence

Level	Mark	Descriptor
Level 1	1-2	A simple explanation of how messages are transmitted either over the synapse or along the neurone Linked to the effect of painkillers
Level 2	3-4	At least one link between how messages are transmitted between the neurone and the synapse or across the synapse Linked to the effect of painkillers
Level 3	5-6	A detailed description of how messages are passed across the synapse Linked to the effect of painkillers binding to receptors

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1	• Messages are passed along neurones as electrical impulses
	2	• A synapse is a gap between neurones and the painkillers prevent the pain message getting through to the brain
Level 2	3	• Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone.
	4	• Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone. The painkillers bind to receptors stopping the message being passed on to the CNS so the person does not feel pain.
Level 3	5	• Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone.
	6	• Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone. The painkillers prevent the neurotransmitters binding to the next neurone, so a new impulse is not generated and the message is not passed to the CNS.

Q3.

Question number	Indicative content	Mark
	AO2 (6 marks) **Synapse transmission** • neurones transmit electrical impulses • the synapse is a gap between 2 neurones • triggering the release of neurotransmitters • which diffuse across the synapse • as a chemical signal • neurotransmitters bind to receptors on the next neurone • triggering an electrical impulse in the next neurone **Painkillers** • prevent neurotransmitters binding to receptors in the next neurone • electrical impulse is not triggered • signal is not received by the central nervous system • person does not feel pain	**(6)**

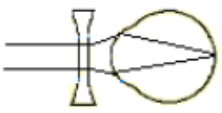
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning mostly supported through the application of relevant evidence
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning are supported by sustained application of relevant evidence

Level	Mark	Descriptor
Level 1	1-2	A simple explanation of how messages are transmitted either over the synapse or along the neurone Linked to the effect of painkillers
Level 2	3-4	At least one link between how messages are transmitted between the neurone and the synapse or across the synapse Linked to the effect of painkillers
Level 3	5-6	A detailed description of how messages are passed across the synapse Linked to the effect of painkillers binding to receptors

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1 2	• Messages are passed along neurones as electrical impulses • A synapse is a gap between neurones and the painkillers prevent the pain message getting through to the brain
Level 2	3 4	• Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone. • Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone. The painkillers bind to receptors stopping the message being passed on to the CNS so the person does not feel pain.

Level 3	5 6	• Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone. • Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone. The painkillers prevent the neurotransmitters binding to the next neurone, so a new impulse is not generated and the message is not passed to the CNS.

Q4.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • (a diverging lens) {bends/refracts} light rays outwards (1) • so the light rays {meet/converge/focus} on the retina (1)	ignore refract light rays less accept refract light onto the retina. accept the back of the eye accept a diagram for either or both marking points 	**(2)** **AO1 1**

Q5.

Question Number	Answer	Additional Guidance	Mark
	An answer including **four** from: Benefits (maximum 2 marks): • stem cells can differentiate / become specialised (1) • replace (damage) cells (1) • reduce symptoms of arthritis (1) Risks (maximum 2 marks): • new cells do not function correctly (1) • stem cells continue to divide (1) • risk of side effects / symptoms worsen / rejecting cells (1)	accept can become {joint cells / any type of cell} accept repair damaged joints accept cell division could develop into cancer accept may have to take medication to prevent rejection / suppress immune system	**(4)** **AO2 1**

Q6.

Question Number	Answer	Additional Guidance	Mark
	An answer including **four** from: Benefits (maximum 2 marks): • stem cells can differentiate / become specialised (1) • replace (damage) cells (1) • reduce symptoms of arthritis (1) Risks (maximum 2 marks): • new cells do not function correctly (1) • stem cells continue to divide (1) • risk of side effects / symptoms worsen / rejecting cells (1)	accept can become {joint cells / any type of cell} accept repair damaged joints accept cell division could develop into cancer accept may have to take medication to prevent rejection / suppress immune system	**(4)** **AO2 1**

Q7.

Question Number	Answer	Additional guidance	Mark
	An answer that combines the following points to provide a plan: • choose **equal** numbers of people with brown and blue eyes (1) • test their vision /details of a method to test vision (1) • count the number of people in each group who are short-sighted/if more people with brown eyes are short-sighted the hypothesis is correct / ORA (1)	accept compare the results for the two groups	**(3)** AO 3 3a

Q8.

Question number	Answer	Mark
	An answer that combines points of interpretation and evaluation to provide a logical description: • the chromosomes are split (1) • then the chromatids are pulled to either side of the cell (1) • by spindle fibres (1)	**(3)**

Q9.

Question number	Answer	Additional guidance	Mark
	A description including **three** from: • two cells (1) • diploid cells / same number of chromosomes as parent cell (1) • **genetically** identical cells (1) • body cells (1)	 accept 23 pairs of chromosomes / 46 chromosomes accept **cells** for growth / repair	**(3)** **AO1 1**

Q10.

Question number	Answer	Additional guidance	Mark
	A description including **three** from: • two cells (1) • diploid cells / same number of chromosomes as parent cell (1) • **genetically** identical cells (1) • body cells (1)	 accept 23 pairs of chromosomes / 46 chromosomes accept **cells** for growth / repair	**(3)** **AO1 1**

Q11.

Question Number	Answer	Additional guidance	Mark
	Any three from:		**(3)**
	• have the potential to produce any cell type (1)	accept can turn into **many** cell types /pluripotent /totipotent	AO 2 1
	• no need to use embryonic stem cells (1)	accept embryos do not need to be killed	
	• less chance of patient rejecting their own cells (1)		
	• used to treat conditions which are currently incurable / used for **cell** transplants /used to replace faulty cells (1)	accept named conditions e.g Parkinson's / diabetes ignore references to cloning body parts / replace organs / treat cancer unless qualified	

Q12.

Question Number	Answer	Additional guidance	Mark
	Any three from:		**(3)**
	• have the potential to produce any cell type (1)	accept can turn into **many** cell types /pluripotent /totipotent	AO 2 1
	• no need to use embryonic stem cells (1)	accept embryos do not need to be killed	
	• less chance of patient rejecting their own cells (1)		
	• used to treat conditions which are currently incurable / used for **cell** transplants /used to replace faulty cells (1)	accept named conditions e.g Parkinson's / diabetes ignore references to cloning body parts / replace organs / treat cancer unless qualified	

Q13.

Question number	Answer	Additional guidance	Mark
(i)	Two from: • (meristem cells) are undifferentiated • (meristem cells) divide / produce more cells (1) • by mitosis (1)	accept are stem cells accept (the cells produced) can differentiate /become specialised/elongate (1)	(2) AO1 1

Question number	Answer	Additional guidance	Mark
(ii)	An answer including: • use a thin section of {cells/meristem} (1) • add a stain / named stain (1) • place a cover slip on top of the sample (1)	accept add a sample of the cells to the microscope slide accept a description of a coverslip	(3) AO1 2

Q14.

Question number	Answer	Additional guidance	Mark
(i)	Two from: • (meristem cells) are undifferentiated • (meristem cells) divide / produce more cells (1) • by mitosis (1)	accept are stem cells accept (the cells produced) can differentiate /become specialised/elongate (1)	(2) AO1 1

Question number	Answer	Additional guidance	Mark
(ii)	An answer including: • use a thin section of {cells/meristem} (1) • add a stain / named stain (1) • place a cover slip on top of the sample (1)	accept add a sample of the cells to the microscope slide accept a description of a coverslip	(3) AO1 2

Q15.

Question number	Answer	Mark
Expert	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. Prophase • the nuclear membrane disappears • the DNA unwinds and condenses into chromosomes / chromatids • spindle fibres become visible Metaphase • the chromosomes line up along the centre / equator of the cell • spindle fibres attach to chromosomes at the centromere Anaphase • chromatids are pulled to the edges of the cell • by the spindle fibres Telophase • a nuclear membrane forms around each of the sets of chromosomes • separating them from one another Cytokinesis occurs Splitting the cytoplasm to create two separate diploid cells each with identical chromosomes	**(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 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, 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 scientific, 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)