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B1 L6

B1 L6 Cell division: mitosis: Exam questions worksheet

Mark scheme · Total 20 marks

/ means alternative answers. ( ) words in brackets are not needed for the mark. **allow** = accept this answer. **ignore** = this does not lose or gain a mark. **do not accept** = this answer cannot score the mark. If a tick-box question has more than one box ticked, give 0 marks.

Question	Answers	Extra information	Mark	AO / Spec. ref.
01.1	1: **chromosome** (1) 2: **cell membrane** (1) 3: **cytoplasm** (1)	1 mark for each correct label. If more than one word from the box is written on one line, do not give that mark. **do not accept** "nucleus" for 1. **do not accept** "cell wall" for 2 (an animal cell has no cell wall).	3	AO1 4.1.2.1, 4.1.2.2
01.2	One set of chromosomes is being pulled to each end of the cell. (1)	If more than one box is ticked, give 0 marks.	1	AO2 4.1.2.2
		Question 01 total	**4**	
02.1	30 ÷ 250 × 100 (1) = **12** (%) (1)	Correct answer with no working = 2 marks. **allow** 0.12 for 1 mark (not multiplied by 100). **do not accept** 833 (250 ÷ 30 × 100).	2	AO2 4.1.2.2 (maths)
02.2	the further from the root tip, the fewer cells are dividing (1)	**allow** the reverse: the closer to the tip, the more cells are dividing. **allow** "the number of dividing cells goes down as the distance goes up".	1	AO3 4.1.2.2
02.3	the cells there are getting longer / are becoming specialised / are differentiating (1)	**allow** "growth (cell division) happens at the root tip". **ignore** "they have stopped dividing" on its own (it repeats the question). **ignore** "they are old".	1	AO2 4.1.2.2
		Question 02 total	**4**	
03	the cell grows (1) it makes more sub-cellular structures / ribosomes / mitochondria (1) its DNA replicates / is copied / two copies of each chromosome form (1)	**allow** "the chromosomes are copied" for the third mark. **do not accept** "the cell divides" or "the nucleus divides" (that is mitosis). **ignore** the names of the phases.	3	AO1 4.1.2.2
		Question 03 total	**3**	
04.1	**8** (hours) (1)		1	AO2 4.1.2.2
04.2	the cell divides (into two) / the cytoplasm and cell membrane divide (1) one copy of each chromosome goes into each new cell / the copied DNA is shared equally between the two cells (1)	**allow** "half the DNA goes into each daughter cell" for the second mark. **do not accept** "half the chromosomes are lost / destroyed".	2	AO2 4.1.2.2
		Question 04 total	**3**	

Question	Answers	Extra information	Mark	AO / Spec. ref.
05	Level of response: see the level descriptors and indicative content below.		6	AO1, AO2 4.1.2.2
		Question 05 total	**6**	
		TOTAL	**20**	

05 Level descriptors

Level	Marks	Descriptor
3	**5–6**	A detailed and coherent answer. All three stages of the cell cycle are described in the correct order, including copying the DNA before mitosis, and growth of the root is clearly explained by more cells being made by mitosis, again and again.
2	**3–4**	At least two stages are described correctly, with a simple link to growth, such as “more cells are made”. The order or some detail may be missing.
1	**1–2**	Simple statements, such as “the cell splits in two” or “the root gets more cells”, with little or no link between them.
0	**0**	No relevant content.

05 Indicative content

- stage 1: the cell grows
- it makes more sub-cellular structures, such as ribosomes and mitochondria
- the DNA replicates to form two copies of each chromosome
- stage 2, mitosis: the chromosomes line up, and one set of chromosomes is pulled to each end of the cell
- the nucleus divides
- stage 3: the cytoplasm and cell membrane divide (a new cell wall forms between the cells)
- two daughter cells are made, genetically identical to each other and to the parent cell
- each new cell has the same number of chromosomes as the parent cell (16 in an onion cell)
- the new cells grow and divide again, so the number of cells keeps doubling
- more cells make the root longer: growth
- cells further from the tip stop dividing, get longer and become specialised
- **ignore** the names of the phases of mitosis; **allow** “meristem” for the root tip; **do not accept** “four cells are made”

Model answers

01.1 1 chromosome; 2 cell membrane; 3 cytoplasm. **01.2** One set of chromosomes is being pulled to each end of the cell. **02.1** 30 ÷ 250 = 0.12. 0.12 × 100 = 12 %. **02.2** The further from the root tip, the fewer cells are dividing. **02.3** The cells there are getting longer and becoming specialised, instead of dividing. **03** The cell grows and makes more sub-cellular structures, such as ribosomes and mitochondria. Its DNA replicates to form two copies of each chromosome.

04.1 8 hours. **04.2** The cell divides into two. One copy of each chromosome goes into each new cell, so each new cell has half of the copied DNA: the same amount as the cell had at the start.

05 (Level 3) In stage 1, the root tip cell grows and makes more sub-cellular structures, such as ribosomes and mitochondria. Its DNA replicates, so there are two copies of each chromosome. In stage 2, mitosis, the chromosomes line up and one set is pulled to each end of the cell, and the nucleus divides. In stage 3, the cytoplasm and cell membrane divide, making two daughter cells. They are genetically identical, with the same number of chromosomes as the parent cell. The new cells grow and divide again, so the number of cells at the root tip keeps increasing. More cells make the root longer, so the root grows. Further from the tip, the cells stop dividing and get longer.

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