D2.1 Cell and nuclear division

What the Cell · DP Biology · worksheet · SL statements D2.1.1–11

Name _____ **Date** _____ **Total** _____ / 48

About 50 minutes, or one section at a time. A calculator is allowed. The number of marks shows how many separate points to make.

Section A: Recall

9 marks

1 **State** the name given to the two DNA molecules held together at a centromere. D2.1.5 **[1]**

2 **State** the proteins around which DNA wraps during condensation. D2.1.6 **[1]**

3 **List** the four phases of mitosis, in order. D2.1.7 **[1]**

4 **Define** haploid and diploid. D2.1.9 **[2]**

5 **State** two examples of unequal cytokinesis. D2.1.3 **[2]**

6 **State** the number of chromosomes in a nucleus of a person with Down syndrome. D2.1.10 **[1]**

7 **State** the phase in which homologous chromosomes form pairs. D2.1.11 **[1]**

Section B: Understanding

17 marks

8 **Explain** why nuclear division occurs before cell division. D2.1.4 **[2]**

9 **Distinguish** between cytokinesis in animal cells and in plant cells. D2.1.2 **[3]**

10 **Explain** how mitosis produces two genetically identical nuclei. D2.1.5, D2.1.7 **[4]**

11 **Explain** why meiosis is needed in a sexual life cycle. D2.1.9 **[2]**

12 **Outline** the two rounds of segregation in meiosis. D2.1.9 **[3]**

13 **Explain** how crossing over generates genetic variation. D2.1.11 **[3]**

Section C: Working with data

14 marks

All data in this section are invented for practice. The patterns are realistic.

14 D2.1.7, D2.1.8

A student counted onion root tip cells in three regions, at increasing distance from the tip.

Region	Interphase	Prophase	Metaphase	Anaphase	Telophase
A: closest to tip	160	22	8	4	6
B: further from tip	185	9	3	1	2
C: furthest from tip	198	2	0	0	0

a **Calculate** the mitotic index for region A. **[2]**

b **Describe** the trend in dividing cells with distance from the tip. **[1]**

c **Suggest** why most cells in every region are in interphase. **[1]**

d **Describe** how you would identify a cell in anaphase. **[2]**

15 D2.1.10

The table shows live births with trisomy 21 by age of the mother.

Age of mother / years	25	30	35	40	45
Births with trisomy 21 per 10 000	8	10	27	95	300

a **Calculate** how many times greater the rate is at 45 years than at 25 years. **[1]**

b **Describe** the relationship. **[2]**

c **Explain** how an error in meiosis results in trisomy 21. **[3]**

d A species has a haploid number of 5. **Calculate** the combinations possible from random orientation alone. **[2]**

Section D: Longer answer

8 marks

16 **Compare and contrast** mitosis and meiosis, including both what they share and what they produce. D2.1.4–11 **[8]**