Cell Division and Specialisation

1. Which row, **A** to **D**, shows the stages of meiosis where crossing over and independent assortment occur?

	Crossing over	**Independent assortment**
A	prophase 1	metaphase 1 and 2
B	metaphase 1	metaphase 2 only
C	prophase 1	metaphase 1 only
D	prophase 2	metaphase 1 and 2

Your answer ☐ **[1]**

2. The enzyme microtubule depolymerase is responsible for the breakdown of spindle fibres in mitosis.

Which of the phases, **A** to **D**, will have the highest number of active microtubule depolymerase enzymes?

A anaphase

B metaphase

C prophase

D telophase

Your answer ☐ **[1]**

3. Which statement explains the significance of mitosis in the development of whole organisms?

A Mitosis can be controlled at certain points in development, which will change body plans.

B Sex cells are produced by mitosis, which allows new organisms to be produced.

C Mitosis limits the total number of cells in an organism, which will change its shape.

D Budding in yeast is an example of mitosis, producing new multicellular organisms.

Your answer ☐

[1]

4. Which of the following statements is / are true?

Statement 1: Microtubules are part of the '9 + 2' formation in bacterial flagella.

Statement 2: Microtubules can be prevented from functioning by a respiratory inhibitor.

Statement 3: Microtubules are involved in moving chromosomes from the equator to the poles of the cell during mitosis.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer ☐

[1]

5. The following passage has four key terms missing:

Meristem cells in plants are used to generate new plant tissues. When ..... tissue is formed, ... impregnates the cell walls, making them impermeable to water. All cytoplasm is lost. When ..... tissue is formed, cytoplasm remains, but the ..... become elongated and lose most of their cytoplasm.

What is the correct order of missing terms?

A sclerenchyma, phloem, lignin, xylem vessels

B xylem, lignin, parenchyma, phloem vessels

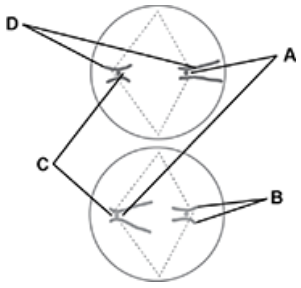
C phloem, collenchyma, xylem, sieve tube elements

D xylem, lignin, phloem, sieve tube elements

Your answer ☐

[1]

6. The diagram below shows the arrangement of chromosomes in a cell during metaphase 2.



Which letter indicates a homologous pair of chromosomes?

Your answer ☐

[1]

7. Which of the following, **A** to **D**, is an **incorrect** statement about blood cells?

A Erythrocytes and neutrophils are derived from the same stem cells.

B Erythrocytes develop large numbers of ribosomes early in their differentiation.

C The majority of organelles in red blood cells are broken down by hydrolysis.

D Neutrophils undergo mutation during differentiation.

Your answer ☐

[1]

8. The cell cycle includes a number of checkpoints.

Which of the following statements about the cell cycle is correct?

A If damaged DNA is detected at a checkpoint apoptosis is triggered.

B If damaged DNA is detected at the G_2 checkpoint the cell cycle is halted and the cell tries to repair the damage.

C If a mistake is detected at a checkpoint the cycle reverts to an earlier checkpoint and is repeated.

D The G_1 checkpoint checks for mistakes in DNA replication.

Your answer ☐ **[1]**

9. Meiosis is an important feature of sexual reproduction.

Which of the following processes occurs during meiosis **and** contributes to genetic variation in the offspring?

1 crossing over
2 gene mutation
3 random fertilisation

A 1, 2 and 3

B only 1 and 2

C only 2 and 3

D only 1

Your answer ☐ **[1]**

10. Which of the following stages, **A** to **D**, of the cell cycle, would DNA polymerase be most active?

A G_1

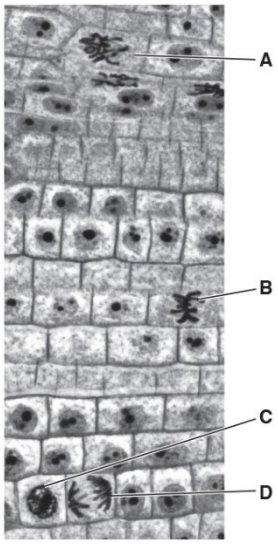
B G_2

C mitosis

D S

Your answer ☐ **[1]**

11. The image below shows onion root tissue. Some of the cells in the tissue are undergoing mitosis.



Which of the label lines, **A** to **D**, shows a cell that is in anaphase?

Your answer ☐ **[1]**

12. Which of the following, **A** to **D**, is **not** true about adult stem cells?

A They are found in bone marrow.

B They are not specialised.

C They are totipotent.

D They can be used as a renewing source of undifferentiated cells.

Your answer ☐ **[1]**

13. Which of the following statements, **A** to **D**, is not true of human erythrocytes?

A They are produced from stem cells.

B They are produced in bone marrow.

C They are specialised cells.

D They undergo mitosis.

Your answer ☐ **[1]**

14. In human cells, the tumour suppressor gene *TP53* codes for a protein that interrupts the cell cycle if there is any damage to the DNA and prevents the copying of damaged DNA.

Which of the stages, **A** to **D**, could *TP53* interrupt the cell cycle?

A mitosis

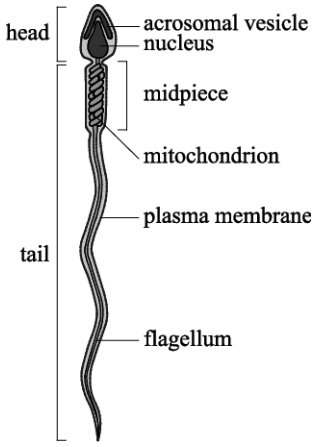
B G_1

C S

D cytokinesis

Your answer ☐ **[1]**

15. Sperm cells are an example of a specialised cell.



Which statement correctly describes one specialisation of a sperm cell?

A. tail contains flagellum which generates ATP

B. head contains chromosomes in homologous pairs

C. acrosome contains enzymes to digest outer portion of egg

D. midpiece contains mitochondria which enter egg

Your answer ☐

[1]

16. There are two types of nuclear division, mitosis and meiosis. Meiosis incorporates two divisions of the nucleus.

Which table shows the correct results of nuclear division?

A

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	×	×

C

	Genetic variation	Reduction division
Mitosis	×	✓
Meiosis 1	✓	×
Meiosis 2	✓	✓

B

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	✓	×

D

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	×	✓

Your answer ☐

[1]

17. The **second division** of meiosis is different from mitosis because…

A …individual chromosomes line up randomly on the equator.

B …each chromosome replicates during metaphase.

C …chiasmata form between the chromatids of a bivalent.

D …the separating chromatids of a pair are not the same.

Your answer ☐

[1]

18. A student observed mitosis in a prepared slide of a root tip.
The student recorded a description for each of four cells (**A-D**) and then tried to identify which stage of mitosis had been observed.

Which of the mitotic stages has been identified correctly?

	Description	**Mitotic stage identified**
A	Spindle fibres clearly visible	Telophase
B	Chromosomes aligned at equator	Anaphase
C	Sister chromatids pulled to poles of cell	Metaphase
D	Dark bodies visible within nucleus	Prophase

Your answer ☐

[1]

19. Which of the following statements is a step in meiosis that can lead to variation within a species?

A Mutations occurring during DNA replication.

B Random fusion of gametes.

C Independent assortment of homologous chromosomes.

D Chromosomes forming homologous pairs called bivalents.

Your answer ☐

[1]

20. Fig. 9.1 shows some of the checkpoints of the cell cycle.

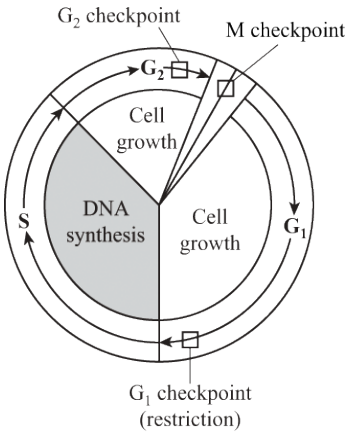


Fig. 9.1

Which statement correctly describes the events that happen if DNA damage is discovered at the G_2 checkpoint?

A The cell cycle continues to mitosis and the DNA will be replicated during metaphase.

B The cell cycle is halted and the cell tries to repair the DNA.

C The cell cycle returns to the G1 phase to try to correct the damage.

D The cell cycle stops and the cell dies.

Your answer ☐

[1]

21. The mitotic cell cycle is divided into a number of stages.

In which of the following stages will the chromosomes line up at the equator of the cell?

A anaphase

B interphase

C metaphase

D telophase

Your answer ☐

[1]

22. After being mixed with iodine, which of the following would show a blue / black colour?

A potato tuber cells

B erythrocytes

C sieve tube elements

D neutrophils

Your answer ☐

[1]