

**A Level Biology A**  
**H420/01 Biological Processes**

**Question Set 4**

4 (a)

Sperm cells in animals are formed by a process known as spermatogenesis. Fig. 19.1 is a summary of the process of spermatogenesis.

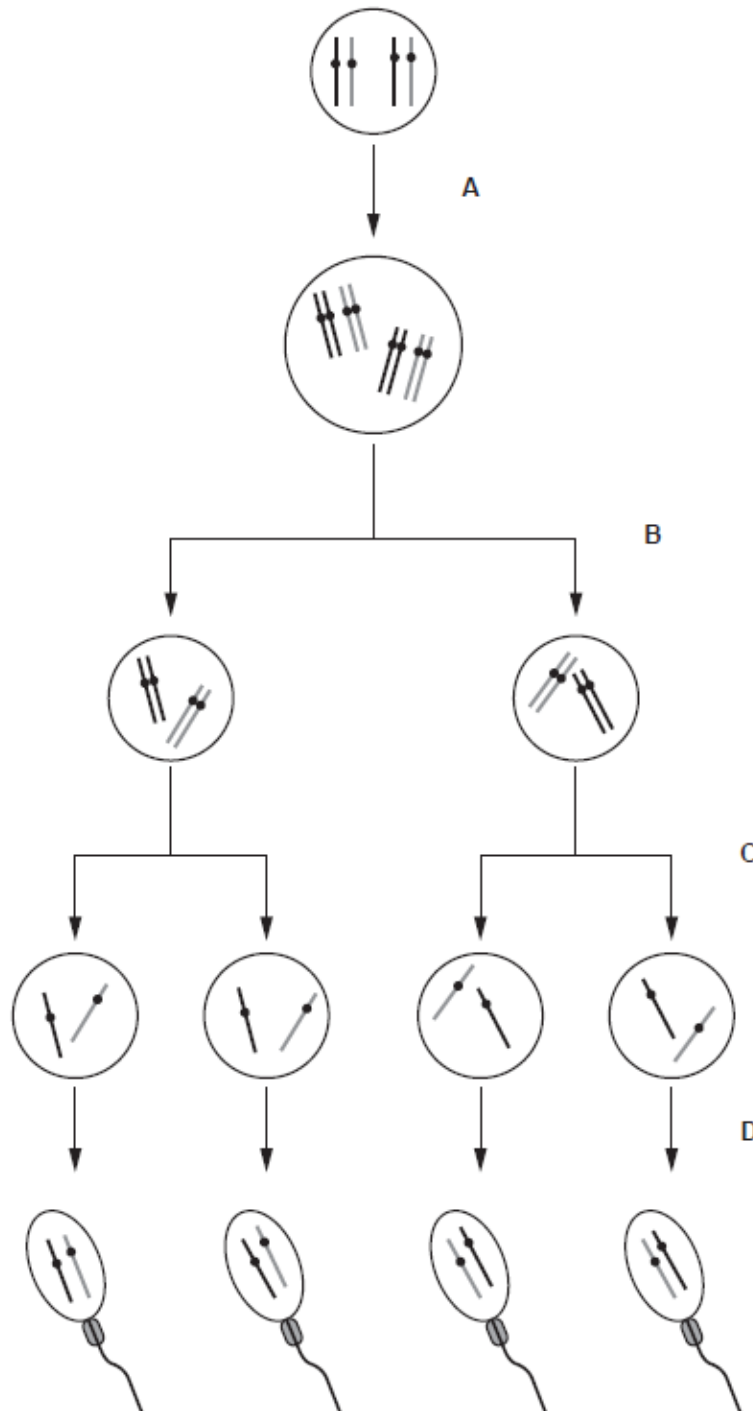


Fig. 19.1

Three phases of meiosis are listed below.

Match each phase of meiosis to a letter on Fig. 19.1.

Metaphase 1 occurs during the stage labelled .....**B**.....

Telophase 2 occurs during the stage labelled .....**C**.....

Anaphase 1 occurs during the stage labelled .....**B**.....

[3]

4 (b)

The chromosomes carried by sperm are made of DNA.

The following passage about nucleic acids has four words missing. Choose the correct missing words from the list below and complete the passage by writing them in the gaps.

pentose    nucleus                    adenosine            hydrolysis  
spiral            polymers                    nucleotide  
fibres    hexose  
                          phosphate            strands            base            two

Nucleic acids are made from ..... **nucleotide** ..... monomers.

Phosphodiester bonds form between the monomers. They consist of a  
..... **phosphate** ..... group between the ..... **pentose** ..... molecules,  
forming the 'backbone' of the molecule.

In DNA, hydrogen bonding between the two antiparallel ..... **Strands** .....  
causes the characteristic double helix shape.

[4]

- 4 (c) (i) Fig. 19.2 is a transverse section of a sperm cell. The mitochondria of sperm cells form a spiral around the central flagellum.

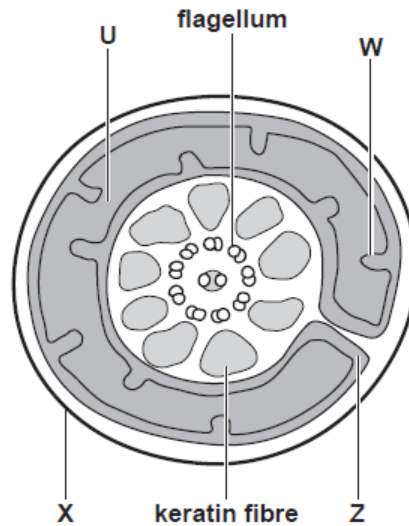


Fig. 19.2

Identify the structures labelled with the following letters:

- U                    Matrix.....
- W                    Inner mitochondrial membrane.....
- Z                    Inter-membrane space.....

[3]

- 4 (c) (ii) ATP, FADH<sub>2</sub> and hexose 1,6-bisphosphate are three organic products of respiration in sperm cells.

Table 19 shows how the production of ATP, FADH<sub>2</sub> and hexose 1,6-bisphosphate in sperm cells is affected by three different substances.

| Substance | Organic products of respiration per sperm cell  |   |   |
|-----------|---|---|---|
|           | ATP<br>(10 <sup>-10</sup> mol s <sup>-1</sup> ) | FADH <sub>2</sub><br>(10 <sup>-11</sup> mol s <sup>-1</sup> ) | Hexose 1,6-<br>bisphosphate<br>(10 <sup>-11</sup> mol s <sup>-1</sup> ) |
| Cyanide   | 2.54  | 0.00  | 5.78  |
| Fluoride  | 0.00  | 0.00  | 0.00  |
| Sucrose   | 6.89  | 2.53  | 5.42  |

Table 19

What can be concluded about the difference between the effects of **cyanide** and **fluoride** on respiration in sperm?

[1]

**Cyanide inhibits anaerobic respiration in sperm. Fluoride inhibits both anaerobic and aerobic respiration.**

**Total Marks for Question Set 4: 11**

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