17. Inheritance

17.3 Meiosis

Paper 4

Question Paper

Paper 4

Questions are applicable for extended candidates only

1 **(a)** Meiosis and mitosis are important processes in the life cycles of organisms.

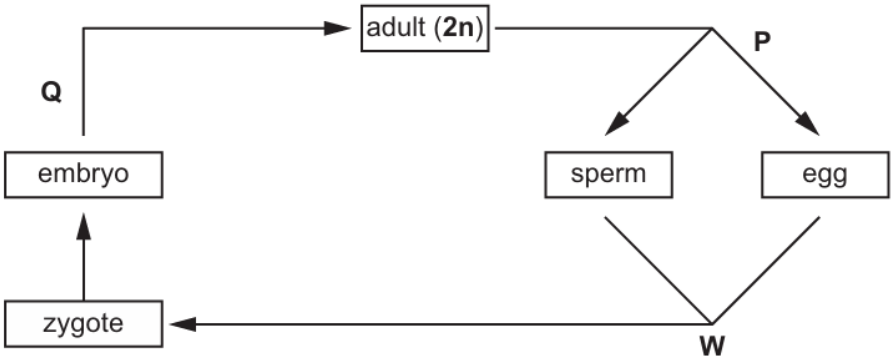
Fig. 3.1 shows the life cycles of two different organisms.

Organism **1** has a simple life cycle.

Organism **2** has a complex life cycle. It has a stage **A** that produces spores and a stage **B** that produces gametes.

In the diagrams, the haploid number of chromosomes is represented by **n.** The diploid number of chromosomes is represented by **2n**.

organism **1**



organism **2**

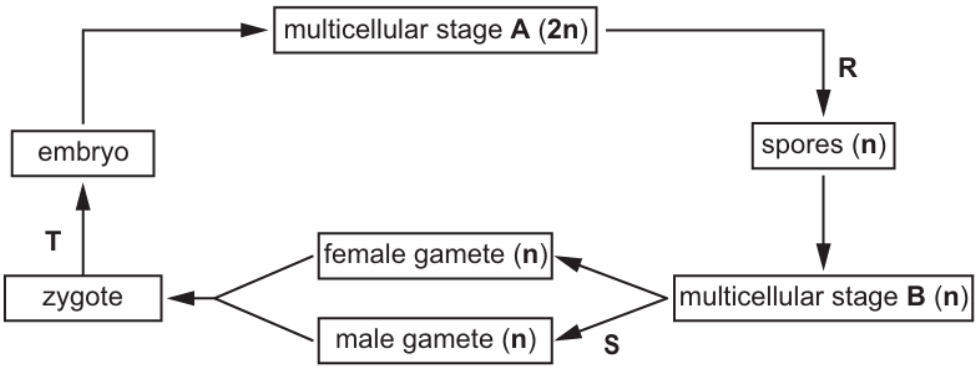


Fig. 3.1

(i) Table 3.1 shows the letters **P** to **T** in Fig. 3.1 and the type of nuclear division.

Place a tick (✓) in each row to indicate the type of nuclear division that occurs at each of the letters, **P** to **T**.

Table 3.1

letter in Fig. 3.1	meiosis	mitosis
P		
Q		
R		
S		
T		

[3]

(ii) State the name of process **W** shown in Fig. 3.1.

..... [1]

(iii) An embryo contains stem cells.

Complete the sentences about stem cells and body cells.

Stem cells are ..... cells that divide by

..... to produce daughter cells that can become

..... for a specific function.

Most body cells in an organism contain the same genes, but many genes in a

particular cell are not ..... because the cell only makes the

specific ..... it needs.

[5]

2 Mitosis and meiosis are both important processes for life.

(a) Complete the sentences about mitosis and meiosis.

Mitosis is a type of nuclear division which produces genetically identical cells.

It is important for growth, ... of tissues and

..... reproduction.

Just before mitosis the chromosomes are replicated and then the chromosomes

..... so that the chromosome number is maintained in each daughter cell.

Meiosis is another type of nuclear division that is involved in the production of gametes. The chromosome number is halved from ..... to haploid resulting in genetically different cells. The fusion of the nuclei of two gametes formed by meiosis forms a ..... . This process is known as

..... .

[6]

3

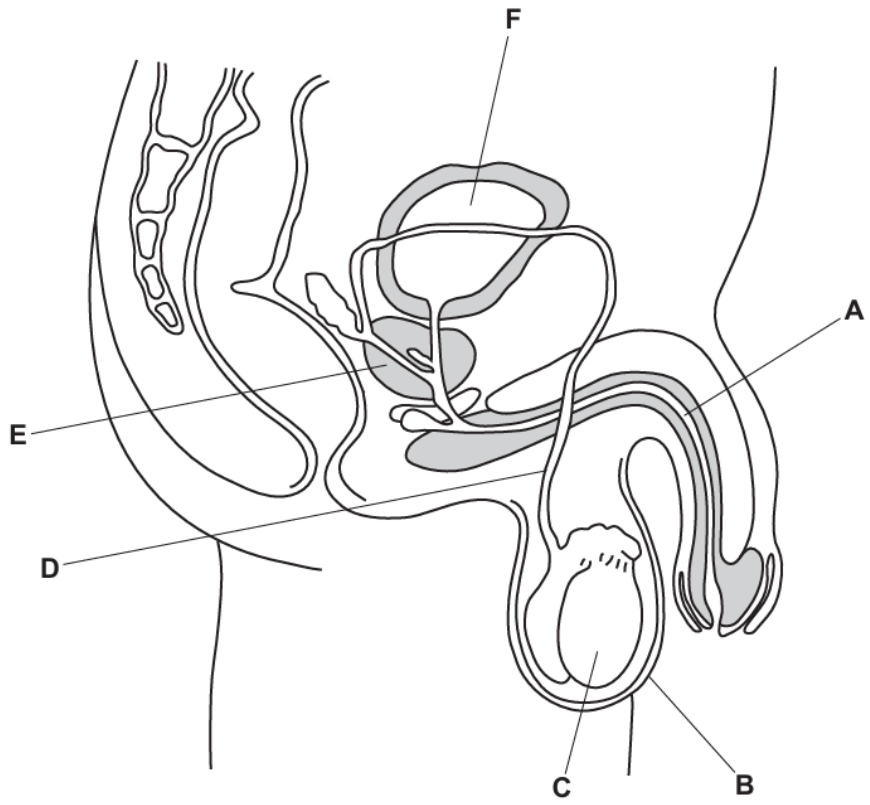


Fig. 4.1

(c) Draw an **X** on Fig. 4.1 on the structure where meiosis occurs. [1]

(d) Sperm and eggs each have a nucleus which is haploid.

(i) Define the term *haploid nucleus*.

.....

.....

..... [1]

(ii) State the number of chromosomes in a human haploid nucleus.

..... [1]

4 Fig. 5.2 is a photomicrograph of part of a mammalian testis.

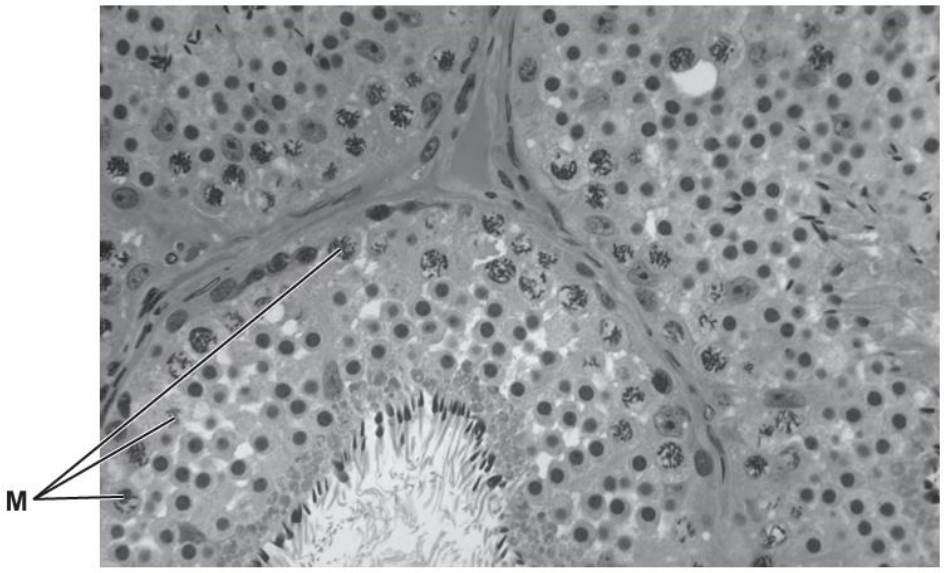


Fig. 5.2

(b) The cells labelled **M** in Fig. 5.2 are undergoing meiosis.

Explain why meiosis is necessary in the testes.

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..... [3]