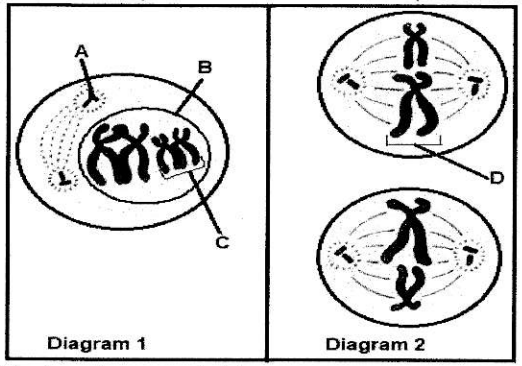
MEIOSIS

4.1 The diagrams below represent a cell in two different phases of meiosis.



4.1.1 Which phase is represented in:

(a) Diagram **1** (1)

(b) Diagram **2** (1)

4.1.2 Provide labels for:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

4.1.3 Give the functions of the parts labelled:

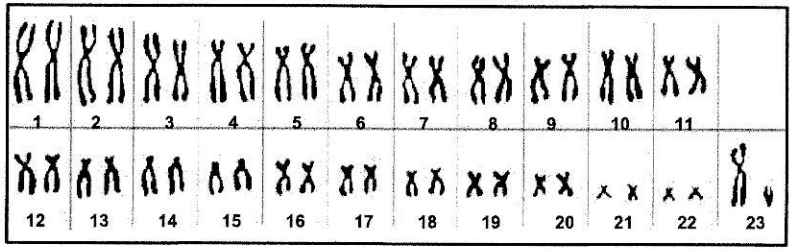
(a) **A** (2)

(b) **D** (1)

4.1.4 Are the cells in Diagram **2** haploid or diploid? (1)

4.1.5 Name the process that would have caused variation in structure **D**. (1)
(10)

4.2 The diagram below shows a karyotype.



4.2.1 How many of the following are present in the karyotype:

(a) Chromosomes (1)

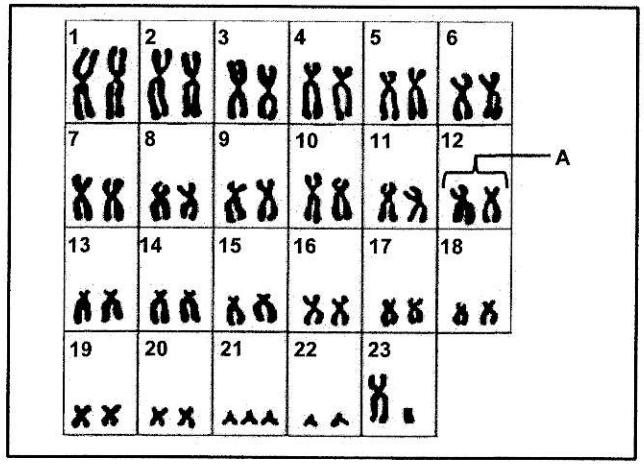
(b) Autosomes (1)

(c) Gonosomes (1)

4.2.2 How many chromosomes would be present in the gametes produced by this individual? (1)

4.2.3 Is the karyotype in the diagram that of a male or a female? (1)
(5)

4.3 The karyotype below shows the chromosomes of a person with Down syndrome.



4.3.1 Give the label for **A**. (1)

4.3.2 How many autosomes are there in a nucleus of this cell? (1)

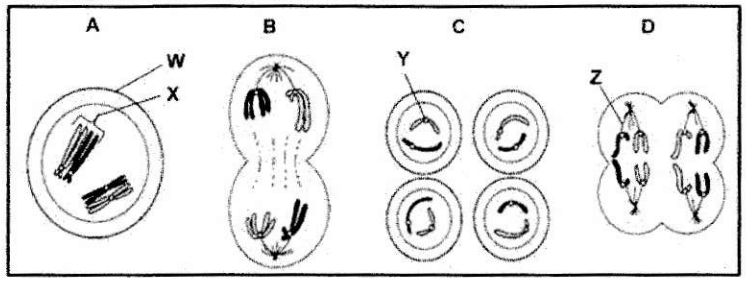
4.3.3 Name the type of chromosomes at position **23**. (1)

4.3.4 What evidence suggests that this is a karyotype of a male? (1)

4.3.5 Name the type of mutation represented in the diagram. (1)

4.3.6 Describe the events that led to Down syndrome. (6)
(11)

4.4 The diagrams below show different phases in meiosis.



4.4.1 Label the structures **W** and **X**. (2)

4.4.2 How many chromosomes are present in each cell in:

(a) Phase **A** (1)

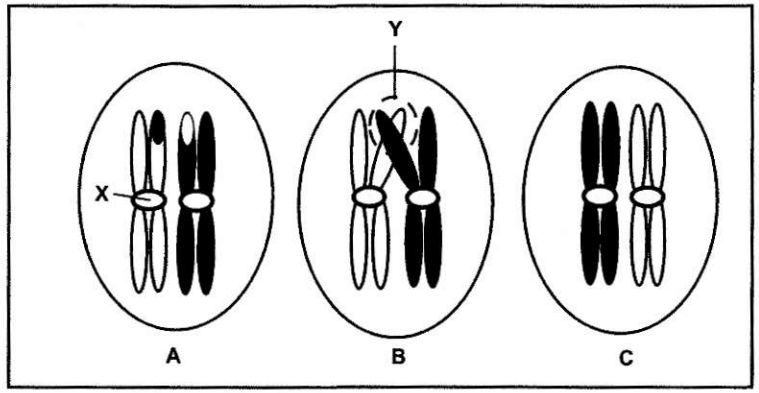
(b) Phase **C** (1)

4.4.3 Give only the LETTER of the diagram that represents anaphase II. (1)

4.4.4 State the function of structure **Y** and structure **Z**. (2)

4.4.5 Identify phase **C**. (1)
(8)

4.5 The diagrams below represent a chromosome pair in a female human cell. The cells (**A**, **B** and **C**) show different events in a phase of meiosis, which are not necessarily in the correct sequence.



4.5.1 How many pairs of chromosomes occur in a normal human cell? (1)

4.5.2 Give labels for:

(a) Structure **X** (1)

(b) Area **Y** (1)

4.5.3 Name the organ in the human female where meiosis occurs. (1)

4.5.4 Name the:

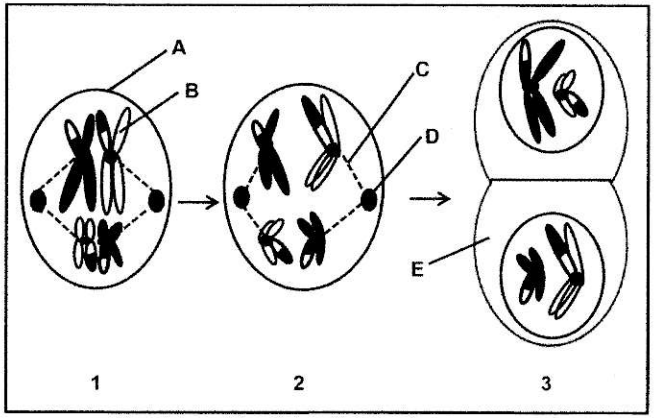
(a) Process occurring in diagram **B** (1)

(b) Phase represented by the diagrams above (1)

(c) Type of cells that would result from meiosis of this cell (1)

4.5.5 Arrange the letters **A**, **B** and **C** to show the correct sequence of the events. (1)
(8)

4.6 Diagrams **1** to **3** below represent some of the phases of meiosis shown in the correct order.



4.6.1 Identify the phase represented by diagram:

(a) **1** (1)

(b) **3** (1)

4.6.2 Give the LETTER only of the part that:

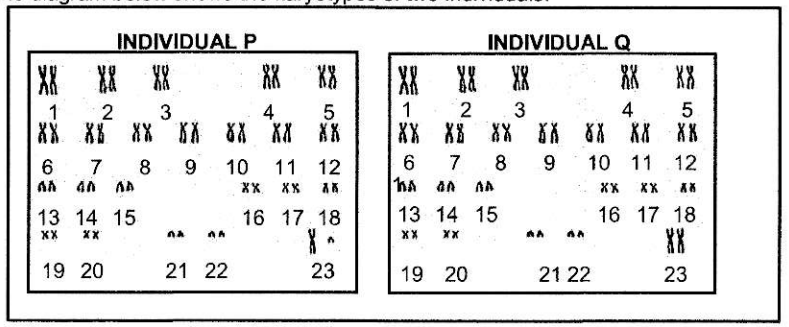
(a) Contains DNA (1)

(b) Attaches to the centromeres of chromosomes (1)

(c) Forms the spindle fibres (1)

4.6.3 Name the organ in a human male where meiosis occurs. (1)
(6)

4.7 The diagram below shows the karyotypes of two individuals.



4.7.1 What term is given to the chromosomes numbered:

(a) **1** to **22** (1)

(b) **23** (1)

4.7.2 State the gender of individual **P**. (1)

4.7.3 Give ONE observable reason for your answer to QUESTION 4.7.2. (2)

4.7.4 Each of the pairs shown is a homologous pair of chromosomes.

State the origin of each chromosome in a homologous pair of chromosomes. (2)
(7)

4.2 4.2.1 (a) 46✓ (1)
(b) 44✓ (1)
(c) 2✓ (1)

4.2.2 23✓ (1)

4.2.3 Male✓ (1)
(5)

4.3 4.3.1 Homologous chromosomes✓ (1)

4.3.2 45✓ (1)

4.3.3 Gonosomes✓ (1)

4.3.4 The presence of a Y chromosome✓/XY chromosome (1)

4.3.5 Chromosome✓mutation (1)

4.3.6 - Non-disjunction occurred✓/A homologous pair of chromosomes failed to separate
- at position 21✓
- during Anaphase✓
- resulting in one gamete with 24 chromosomes✓/an extra chromosome/2 chromosomes at position 21
-The fertilisation of this gamete with a normal gamete✓/gamete with 23 chromosomes/1 chromosome at position 21
- results in a zygote with 47 chromosomes✓
- There are 3 chromosomes✓/an extra chromosome at position 21/ this is Trisomy 21 Any 6 (6)
(11)

4.4 4.4.1 W Cell membrane ✓/ Plasmalemma (1)
X Homologous chromosomes✓/Bivalent (1)

4.4.2 (a) 4✓ (1)
(b) 2 ✓ (1)

4.4.3 D✓ (1)

4.4.4 Y Holds the sister chromatids together✓
Z Pulls chromosomes/chromatids to the poles✓ (2)

4.4.5 Telophase II✓ (1)
(8)

4.5 4.5.1 23✓ (1)

4.5.2 (a) Centromere✓ (1)

(b) Chiasma✓/chiasmata (1)

4.5.3 Ovary✓ (1)

4.5.4 (a) Crossing over✓ (1)

(b) Prophase I✓ (1)

(c) ova✓/gametes/sex cells (1)

4.5.5 C→ B→ A✓(correct sequence) (1)
(8)

4.6 4.6.1 (a) Metaphase I✓ (1)
(b) Telophase I✓ (1)

4.6.2 (a) B✓ (1)
(b)C✓
(c)D✓ (1)

4.6.3 Testis✓ (1)
(6)

4.7 4.7.1 (a) Autosomes✓ (1)
(b) Gonosomes✓ /sex chromosomes (1)

4.7.2 Male✓ (1)

4.7.3 - There is a Y-chromosome✓/XY chromosomes
-at chromosome pair 23✓ (2)

4.7.4 One comes from the male parent✓ and the other comes from the female parent✓
OR
One comes from the sperm✓ and the other comes from the ovum✓ (2)
(7)

4.8 4.8.1 (a) Down syndrome✓/ Trisomy 21 (1)

(b) Anaphase✓ **I/ II** (1)

(c) Chromosomal✓ mutation (1)

4.8.2 Autosomes✓ (1)
(4)