#### LIFE SCIENCES GRADE 12 - PAPER 2 (Answers from past Assessment Guidelines)

#### MEIOSIS

# STRUCTURE AND ARRANGEMENT OF CHROMOSOMES IN A NORMAL HUMAN KARYOTYPE

- Each chromosome comorises two chromatids
- held together by a centromere
- There are 23 pairs 1/46 chromosomes in
- human somatic cells //body cells
- which are arranged into homologous pairs√
- that are similar in length
- carry genes for the same characteristics√
- have alleles of a particular gene at the same loci√and
- have the same centromere position
- Each somatic cell has 22 pairs/44 autosomes√and
- a pair/2 gonosomes√/sex chromosomes/X and Y chromosomes
- Autosomes are arranged in pairs from largest to smallest in a karyotype
- Males have XY chromosomes√
- Females have XX chromosomes
- The X chromosome is larger than the Y chromosome

#### BEHAVIOUR OF THE CHROMOSOMES DURING THE DIFFERENT PHASES OF MEIOSIS I

- During prophase√ I
- chromosomes pair up/homologous pairs /bivalents form
- Crossing overviexchange of genetic material occurs
- between chromatids //adjacent chromosome pairs
- During metaphase I of meiosis
- homologous chromosomes-//chromosome pairs are arranged
- at the equatory of the cell
- In a random√ way
- with the chromosome attached to the spindle fibre.
- During anaphase ✓ I
- chromosome pairs separate //chromosomes move to opposite poles
- During telophase ✓ I
- the chromosomes reach the poles of the cell

#### **EVENTS THAT LEAD TO DOWN SYNDROME**

- Non-disjunction occurred \( / A \) homologous pair of chromosomes
- at position 21√
- failed to separate/
- during anaphase
- resulting in one gamete with 24 chromosomes / / an extra chromosome / 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

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**Rachel S Tattersall** 

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