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CONSOLIDATION EXERCISE B

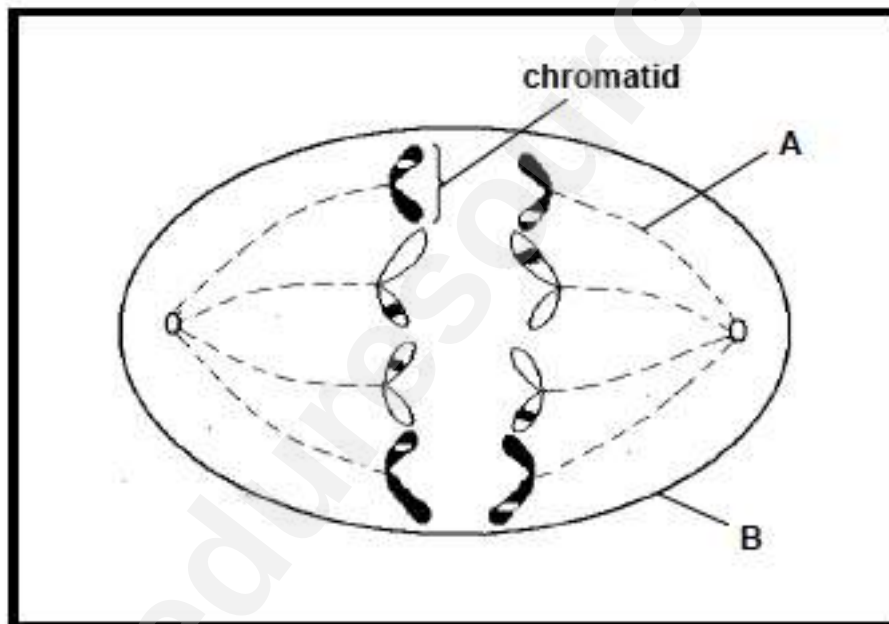
Learner Note: The Consolidation exercises have been extracted from past examination papers to assist you to assess yourself, and To assist you with exam techniques and time allocation. Please ensure that you adhere to the time allocations. We suggest the following:

- Read through the question first.
- Check the important words and underline these words.
- Take careful note of the marks per question, then start the question and the time.
- After the allocated period, stop and begin to go through the next question and follow the same process.
- If you have not completed a question, you must complete it when your teacher works through the memo.
- You will lose the marks for the questions that you have not completed.
- You MUST work fast but correctly.

EXERCISES: - 60 minutes including going through the memo

QUESTION 1: - 13 minutes

The diagram below represents an animal cell in a phase of meiosis.



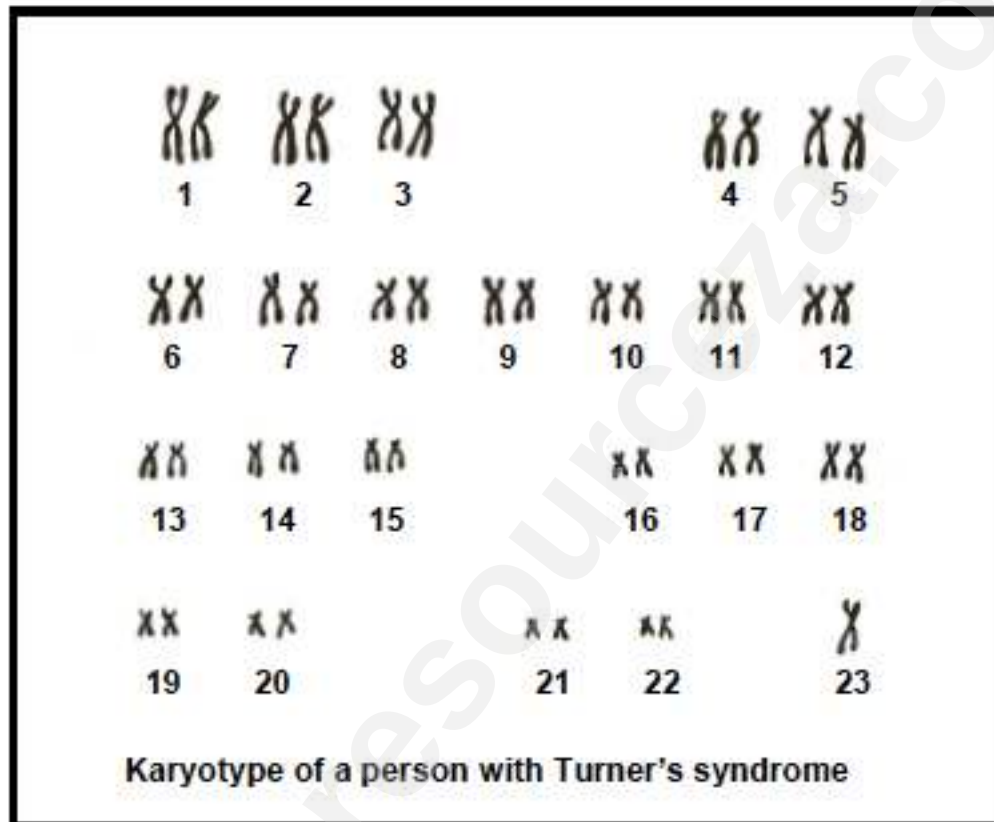
Remember to complete the labels before you move on to the questions.

- 1.1 State which **phase of meiosis** is represented in the diagram above. (1)
- 1.2 Give a reason for your answer to QUESTION 1.1. (2)
- 1.3 Identify parts A and B. (2)
- 1.4 How **many chromosomes** ...
 - (a) were present in the parent cell **before** it underwent **meiosis**? (1)
 - (b) will be present in each cell at the **end** of the **meiotic division**? (1)
- 1.5 State ONE place in the body of a human **female** where meiosis would take place.

- 1.6 Could the cell represented in the diagram be that of a human? (1)
- 1.7 Explain your answer to QUESTION 1.6. (1)
- 1.8 Give TWO reasons why meiosis is biologically important. (2)

QUESTION 2: - 4 minutes

Study the karyotype below of a person suffering from Turner's syndrome. Females with Turner's syndrome do not develop mature sex organs.

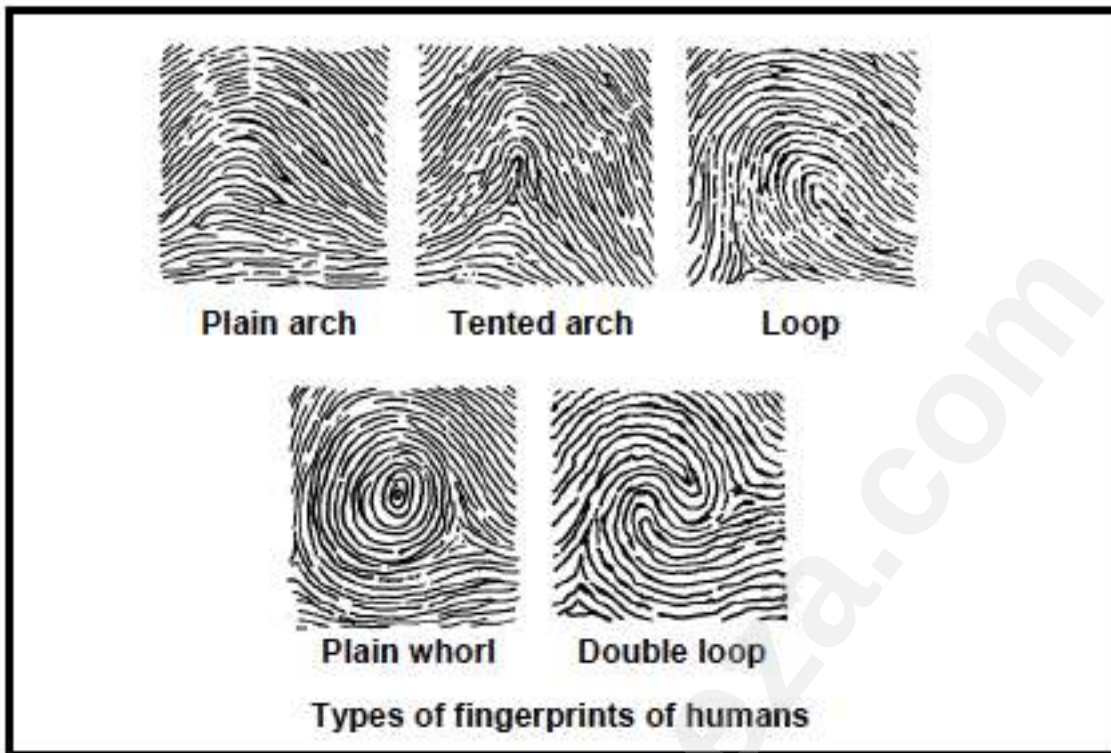


Remember: there are 44 autosomes and only one X chromosome. Chromosome pair 23 is the sex chromosomes: in males XY and in females XX normally.

- 2.1 State the differences between the karyotype for a normal female and a female with Turner's syndrome. (2)
- 2.2 Explain ONE effect of the disorder in a female. (2)

QUESTION 3: - 13 minutes

Humans show differences in characteristics such as fingerprints. Humans have five main types of fingerprints as shown in the diagram below:



A fingerprint is a useful way of **identifying people** and **classifying** them into groups. A fingerprint is taken by rolling the right index finger onto an ink pad and then onto a piece of paper.

During a discussion of this topic, a group of learners asked the following question: "Which one of the five main types of fingerprints is **most common** amongst the learners of this school?"

3.1 State any **FOUR steps** in the planning process that must be considered when **planning an investigation** to answer the question above. (4)

3.2 The learners carried out an investigation and the results are shown in the table below.

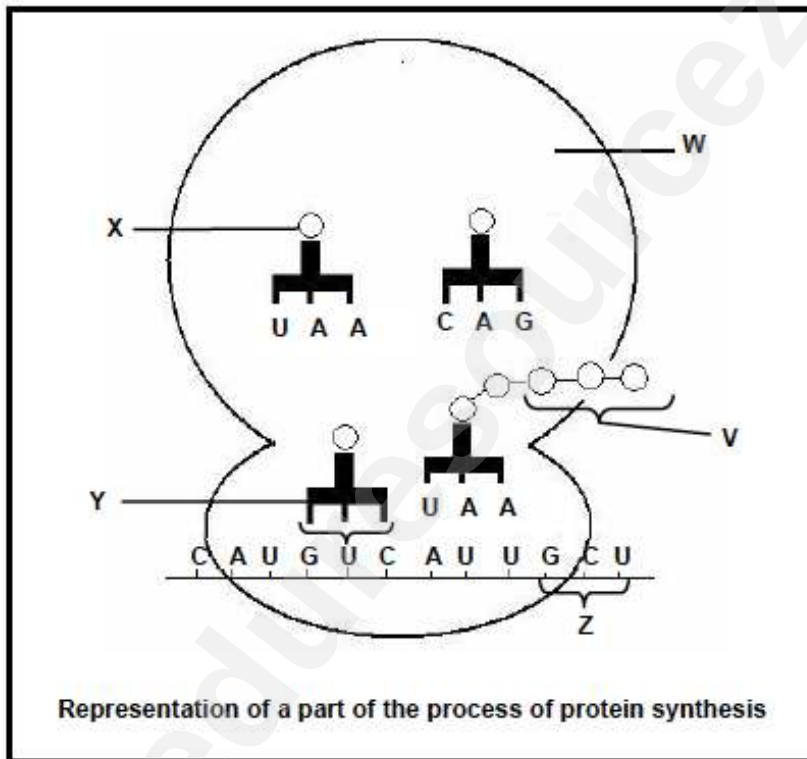
Main types of fingerprints	Number of learners
Plain arch	123
Tented arch	112
Loop	124
Plain whorl	150
Double loop	50

(a) Give a **caption** for the table. (2)
 (Remember that a caption is a heading where the words 'types of fingerprints' and 'learners' would have to be included since these are the headings of the two columns.)

- (b) Learners came to the following conclusion:
Most learners have the plain arch-type fingerprint.
 Is this a valid conclusion? (1)
(Remember that validity is based on the numbers, the accuracy and similar conditions like ages, males/females as applicable, etc)
- (c) Give a reason for your answer to QUESTION (b). (2)
- 3.3 State the following:
- (a) **TWO advantages** of having a fingerprint database of every citizen and visitor in South Africa (2)
- (b) **TWO disadvantages** of having a fingerprint database of every citizen and visitor in South Africa (2)

QUESTION 4: - 9 minutes

The diagram below represents a part of the process of protein synthesis.



- 4.1 Name the part/**stage of protein synthesis** that is illustrated in the diagram above. (1)
- 4.2 Name the organelle labelled W. (1)
- 4.3 The table below shows the base triplets of mRNA that correspond to the different amino acids.

mRNA	AMINO ACID
CAU	histidine
AUU	isoleucine
GUC	valine
CUU	leucine
GCU	alanine
CCU	proline
CGA	arginine

With reference to the diagram in QUESTION 4 above:

- Name the amino acid labelled X. (1)
- State the base sequence of the molecule labelled Y. (1)
- What **collective name** is given to the triplet of mRNA bases that correspond to each amino acid? (1)
- How would the **composition** of the protein molecule change if the base sequence at Z was CGA instead of GCU? (2)

- 4.4 Use the information in the table to write the **DNA base sequence** that would correspond with the amino acid **histidine**. (2)

SECTION B: SOLUTIONS

- Anaphase II✓ (1)
- (Sister) chromatids✓/(daughter) chromosomes are moved✓/pulled towards the poles (2)
- Spindle✓fibre
 - Cell membrane✓
(2)
- 8✓
 - 4✓
(1)
(1)
- Ovary✓/germinal epithelium/follicle (1)
- No✓ (1)
- Humans would have 23✓chromosomes/46 chromatids in this hase. This diagram shows only 4 chromosomes✓/8 chromatids /incorrect number of chromosomes (2)
- Reduction/halving of chromosome number✓/ allows for

creation of gametophyte/ keep chromosome number constant
from generation to generation/prevents doubling of
chromosome number at fertilisation (2)

- Contributes to genetic variation✓
- Leads to the formation of gametes✓ any (**Mark first TWO only**) (13)

2.1 Normal female: Chromosome pair 23 = XX✓/46 chromosomes
Female with Turner's syndrome: Only one X✓ chromosome/ 45chromosomes (2)

2.2 She will not be able to have children✓ since her sex organs will not develop✓

OR

No menstrual cycle✓ because there are underdeveloped gonads✓/ and therefore no hormones

OR

No sex hormones✓ and therefore secondary sexual characteristics will not appear✓ (2)
(**Mark first ONE only**)

3.1 Hypothesis formulation Formulate hypothesis✓ on what the most common type of fingerprint might be
Identify dependent and independent variables✓

Sample selection Determine the sample size✓ of learners to be used

Method of data collection Learn how to identify the different fingerprint types correctly✓
Organise an ink-pad and paper to take an imprint✓ of the fingerprint
Arrange a time and place✓ to take fingerprints

Data representation Design a table✓ to record the number that have each fingerprint type

(**Mark first FOUR only**) any (4)

NOTE: Answers must be contextualised to the specific investigation on fingerprint types

- 3.2. (a) Number of learners✓ with different fingerprint types✓ (2)
- (b) No✓ (1)
- (c) Results indicate✓ that most learners✓ have the plain whorl type✓ of fingerprinting any 2

OR

Results indicate✓ that learners with a plain arch type✓ do not make up the largest number✓ any 2 (2)

OR

Results ✓are not in line with the conclusion✓

- 3.3. (a) **Advantages**
 Can be used to identify criminals✓
 lost children✓
 deceased bodies✓
 Immigration control✓ can be more strict any
(Mark first TWO only) (2)
- (b) **Disadvantages**
 Falsely incriminated✓/ (people can be framed)
 Infringing on the rights of people✓/invasion of privacy
 It is costly✓
 Incorrect capture of data✓/human error
 Not all persons✓ can be fingerprinted e.g. amputees
(Mark first TWO only) (2)

- 4.1 Translation(1)
- 4.2 Ribosome(1)
- 4.3 (a) Isoleucine(1)
 (b) CAG✓/cytosine,adenine,guanine✓(1)
 (c) Codon✓(1)
 (d) Have arginine✓ instead of alanine✓/have different✓ amino acids✓(any 2)
- 4.4 GTA✓✓(2)

SECTION E: NO HOMEWORK GIVEN - CONSOLIDATION EXERCISE