basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GRADE 12

LIFE SCIENCES

INFORMAL TEST 3 (MEIOSIS)

MARKS: 50

TIME: 50 minutes

This question paper consists of 7 pages

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

SECTION A
QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.2) in the ANSWER BOOK, for example 1.1.3 D.

1.1.1 Meiosis differs from mitosis in that in meiosis, ...

A the nucleus divides.
B the new cells formed are different from each other.
C DNA replication takes place.
D the cytoplasm divides.

1.1.2 The structure holding two sister chromatids together is called a …

A centrosome.
B chiasma.
C centromere.
D centriole.

(2 x 2) **(4)**

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.3) in the ANSWER BOOK.

1.2.1 The phase of meiosis where individual chromosomes arrange themselves on the equator of the spindle

1.2.2 The process that takes place at the end of meiosis, to bring about the separation of daughter cells

1.2.3 A point where the exchange of genetic material occurs during crossing over

(3 x 1) **(3)**

1.3 Indicate whether each of the statements in COLUMN I applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN II. Write **A only**, **B only**, **both A and B**, or **none** next to the question number (1.3.1 to 1.3.8) in the ANSWER BOOK.

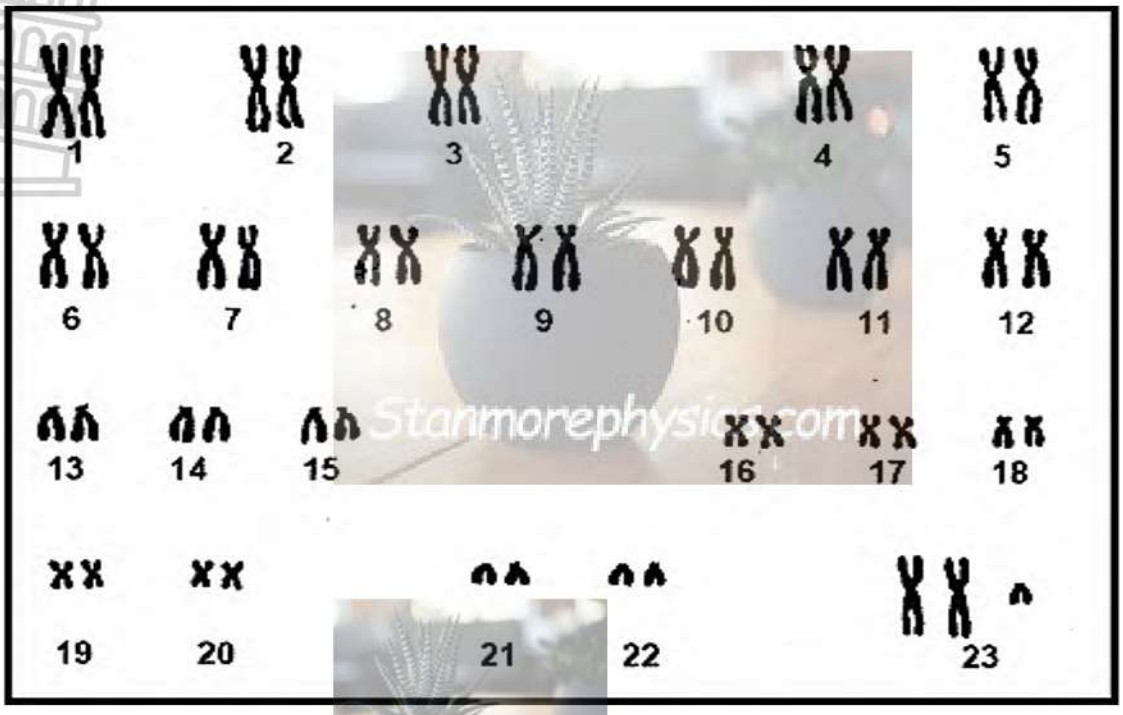
COLUMN I		COLUMN II	
1.3.1	Chromosomes align at the equator	A B	Metaphase I Metaphase II
1.3.2	Result of non-disjunction of chromosome pair 21 in humans	A B	Gamete with 22 chromosomes Gamete with 24 chromosomes
1.3.3	Having a single set of chromosomes	A B	Diploid Haploid

(3 x 1) **(3)**

TOTAL SECTION A: 10

SECTION B
QUESTION 2

2.1 Study the diagram showing the human karyotype.



2.1.1 What collective name is given to the pairs of chromosomes 1 to 22? (1)

2.1.2 Write down the NUMBER only of the set of chromosomes indicating an abnormality. (1)

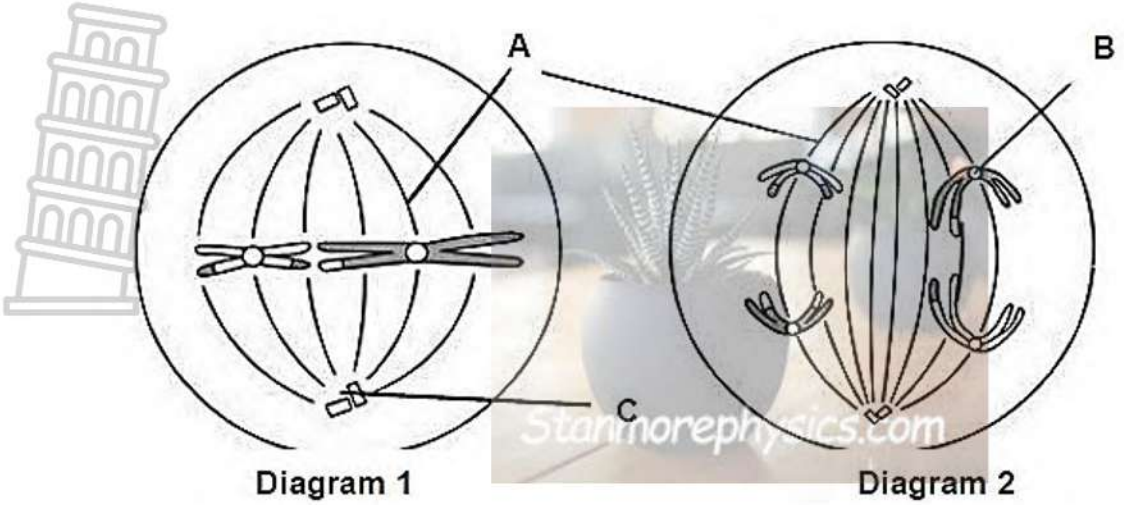
2.1.3 Explain how the abnormality referred to in Question 2.1.2 would have occurred through meiosis. (4)

2.1.4 Name the genetic disorder that results when chromosome 21 is having an extra chromosome. (1)

2.1.5 Explain why chromosomes normally appear in pairs in a karyotype. (2)

2.1.6 Name the process that resulted in all chromosomes appearing double stranded (1)
(10)

2.2 The diagrams below represent two different phases in meiosis of the same cell.



2.2.1 Give the names of the parts labelled:

(a) A (1)
(b) B (1)
(c) C (1)

2.2.2 Identify the phase represented in:

(a) Diagram 1 (1)
(b) Diagram 2 (1)

2.2.3 Name the phase that follows the phase in Diagram 2. (1)

2.2.4 Is the cell in Diagram 1 haploid or diploid? (1)

2.2.5 State the number of chromosomes in the original mother cell (1)

2.2.6 State the function of structures **A** and **B**. (2)

2.2.7 Explain TWO ways in which meiosis is important. (4)

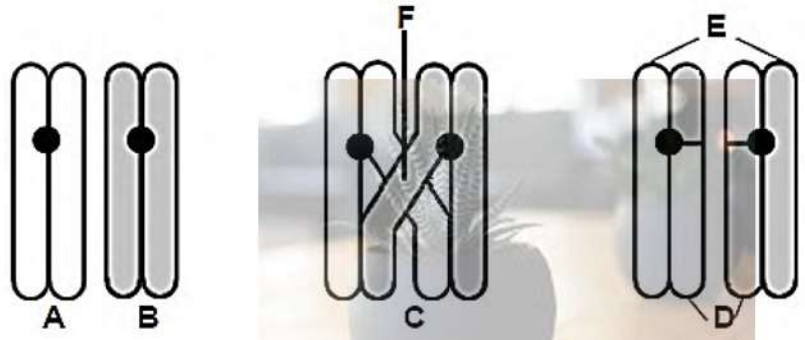
2.2.8 State ONE place where meiosis takes place in:

(a) males (1)

(b) females (1)
(16)

QUESTION 3

3.1 Study the diagram below of a cell division process and answer the questions:



3.1.1 Name the type of cell division (mitosis or meiosis) in which this process takes place (1)

3.1.2 Identify the process taking place at **C** (1)

3.1.3 The phase in which the process mentioned in QUESTION 3.1.2 takes place (1)

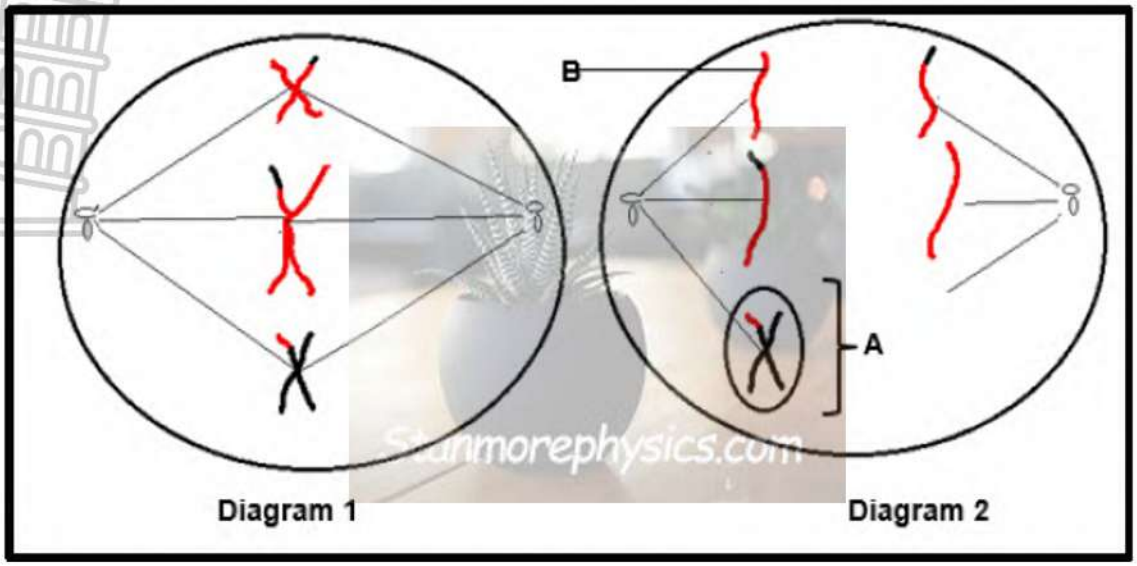
3.1.4 The structure that holds the two chromatids together (1)

3.1.5 The region marked **F** (1)

3.1.6 The phase that follows the phase represented in the diagrams above (1)

3.1.7 Identify TWO observable feature which indicates that chromosome pair A and B above are regarded as homologous (2)
(8)

3.2 Study the diagram below representing two phases of meiosis and answer the question that follow.



3.2.1 Identify the phase represented by Diagram 2. (1)

3.2.2 Name part labelled **B**. (1)

3.2.3 Describe what happens during the phase illustrated in Diagram 1. (2)

3.2.4 In Diagram 2 the part circled and labelled **A**, is an abnormality during the process of meiosis.

(a) Name this abnormality. (1)

(b) What genetic disorder would result in humans if this abnormality occurred in chromosome pair no. 21? (1)
(6)

TOTAL SECTION B: 40
GRAND TOTAL: 50

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GRADE 12

LIFE SCIENCES

INFORMAL TEST 3 (MEIOSIS)
MEMORANDUM

MARKS: 50

TIME: 50 MINUTES

This memorandum consists of 4 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2011

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if differences / similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context**.**

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No credit

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately

16. Be sensitive to the **sense of an answer, which may be stated in a different way**.

17. **Caption**
    All illustrations (diagrams, graphs, tables, etc.) must have a caption

18. **Code-switching of official languages (terms and concepts)**
    A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official language

SECTION A
QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	C✓✓	(2 x 2)	**(4)**
1.2	1.2.1	Metaphase II✓		
	1.2.2	Cytokinesis✓		
	1.2.3	Chiasma✓		**(3)**
1.3	1.3.1	Both A and B✓		
	1.3.2	Both A and B✓		
	1.3.3	B only✓		**(3)**

TOTAL SECTION A: [10]

SECTION B
QUESTION 2

2.1 2.1.1 Autosomes✓ (1)

2.1.2 23✓ (1)

2.1.3
- During anaphase✓ I/II
- The sex chromosomes/gonosomes/23rd pair of chromosomes failed to separate✓/non-disjunction
- At the end of meiosis some of the gametes contained 2 sex chromosomes✓/two chromosomes at position 23
- Fertilisation with a normal gamete/gamete with one sex chromosome occurred✓
- It resulted in a zygote with three sex chromosomes✓/three chromosomes at position 23 **(Any 4)** (4)

2.1.4 Down Syndrome✓ (1)

2.1.5
- They are homologous✓
- where one chromosome is maternal and one paternal✓ (2)

2.1.6 DNA replication✓ (1)
(10)

2.2 2.2.1 (a) Spindle fibres✓ (1)
(b) Centromere✓ (1)
(c) Centriole✓ (1)

2.2.2 (a) Metaphase II✓ (1)
(b) Anaphase I✓ (1)

2.2.3 Telophase I✓ (1)

2.2.4 Haploid✓ (1)

2.2.5		4✓	(1)
2.2.6		A – pulls chromosome/chromatids to the opposite poles✓ B – joins two chromatids together✓	(2)
2.2.7		- Exchange of genetic material/crossing over✓ introduces genetic variation✓ - Reduction of chromosome number to haploid number✓ to keep the chromosome number constant from generation to generation✓ - Random arrangement✓ introduces genetic variation✓ - Form gametes✓ for sexual reproduction✓ (MARK FIRST TWO ONLY)	(4)
2.2.8		(a) Testes/seminiferous tubules✓	(1)
		(b) Ovaries✓	(1) **(16)**

QUESTION 3

3.1	3.1.1	Meiosis✓	(1)
	3.1.2	Crossing over✓	(1)
	3.1.3	Prophase I✓	(1)
	3.1.4	Centromere✓	(1)
	3.1.5	Chiasma✓	(1)
	3.1.6	Metaphase I✓	(1)
	3.1.7	They are the same size and shape✓ They have the same centromere position✓	(2) **(8)**
3.2	3.2.1	Anaphase II✓	(1)
	3.2.2	Chromatid✓/daughter chromosome	(1)
	3.2.3	- Chromosomes are randomly arranged singly along the equator✓ - attached to the spindle fibres✓	(2)
	3.2.4	(a) Non-disjunction✓	(1)
		(b) Down syndrome✓	(1) **(6)**

TOTAL SECTION C: 40
GRAND TOTAL: 50