KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12



LIFE SCIENCES

COMMON TEST

MARCH 2022

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MARKS: 60

TIME: 1 hour

This question paper consists of 10 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, tables 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 may use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

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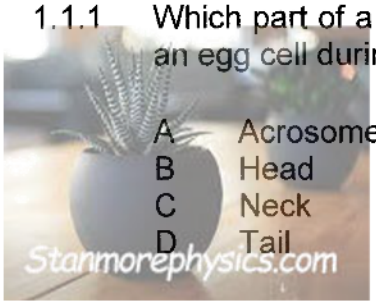
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SECTION A

QUESTION 1

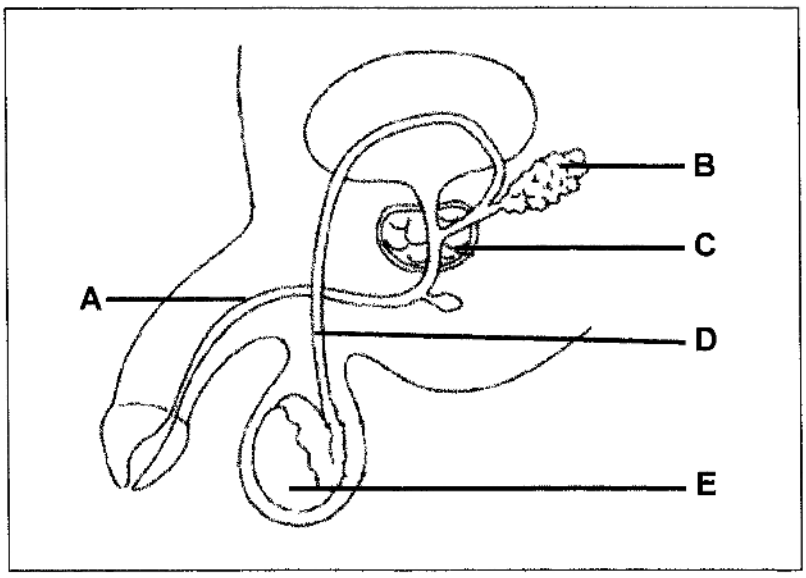
1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.3) in the ANSWER BOOK, for example 1.1.4 D.

1.1.1 Which part of a sperm cell has a nucleus that fuses with a nucleus of an egg cell during fertilisation?



A Acrosome
B Head
C Neck
D Tail

1.1.2 The diagram below represents the male reproductive system.



Which part indicates the tube that transports semen and the gland that secretes testosterone respectively?

A **A** and **B**
B **D** and **E**
C **A** and **C**
D **A** and **E**

1.1.3 Study the following factors related to Down syndrome as an example of abnormal meiosis.

(i) Non-disjunction during anaphase in pair number 23
(ii) Non-disjunction of chromosomes at position 21 during Anaphase
(iii) 47 chromosomes in somatic cells as a result of non-disjunction at any position of chromosome during anaphase
(iv) The fusion between an abnormal gamete (extra copy of chromosome in pair 21) and a normal gamete

Which ONE of the following combinations are related to Down syndrome as an example of abnormal meiosis?

A (i), (ii) and (iv) only
B (ii), ((iii) and (iv) only
C (ii) and (iv) only
D (iii) and (iv) only



(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 The natural shape of a DNA molecule

1.2.2 The type of bond found between nitrogenous bases

1.2.3 The point at which chromatids overlap during crossing over

1.2.4 The type of egg produced by bird that has extra-embryonic membranes

(4 x 1) **(4)**

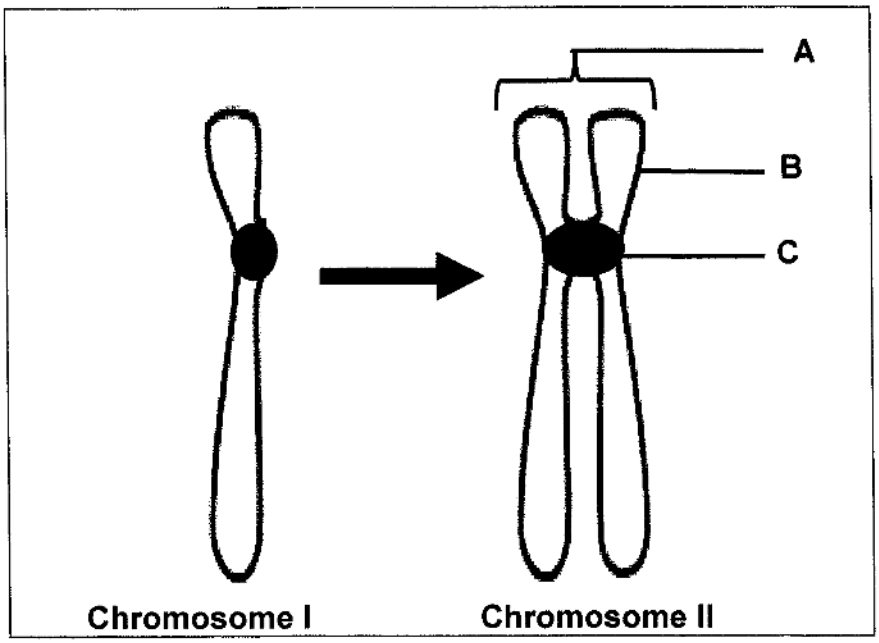
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B or NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B,** or **none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	**COLUMN II**
1.3.1	A nitrogenous base found in mRNA only	A: Adenine B: Uracil
1.3.2	The phase of meiosis during which random arrangement of chromosomes occur	A: Metaphase I B: Metaphase II
1.3.3	The hormone that maintains the thickness of the endometrium	A: LH B: FSH

(3 x 2) **(6)**

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1.4 The diagram below represents two forms of chromosomes.



1.4.1 Give the LETTER and the NAME of the part that joins two chromatids together. (2)

1.4.2 Name the:

(a) Phase that resulted in the formation of chromosome **II**. (1)

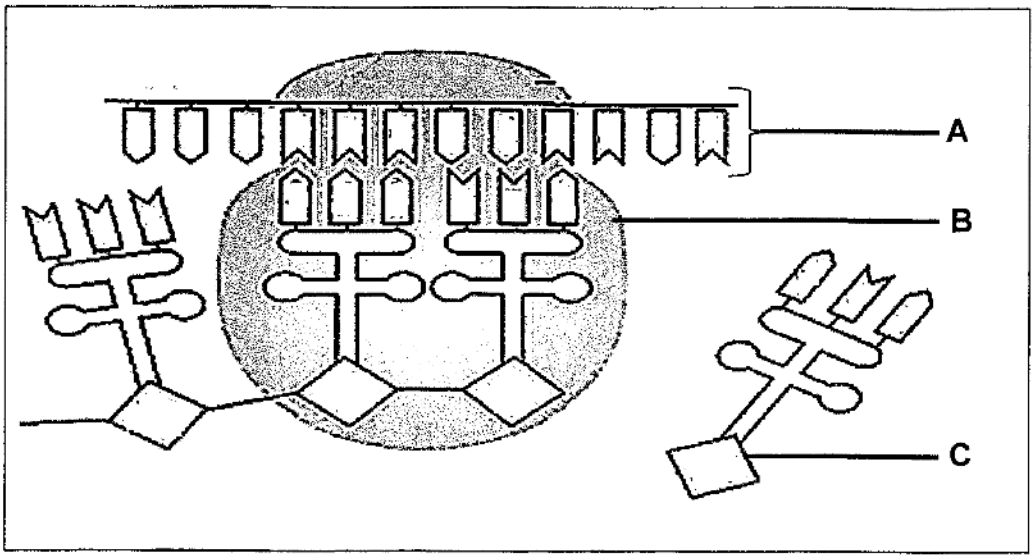
(b) Process that resulted in the formation of chromosome **II**. (1)
(4)

TOTAL SECTION A: 20

SECTION B

QUESTION 2

2.1 The diagram below shows a process of protein synthesis,



2.1.1 Identify:

(a) Organelle **B** (1)

(b) Monomer **C** (1)

2.1.2 State the process of protein synthesis during which molecule **A** is formed. (1)

2.1.3 Explain the significance of molecule **A** during protein synthesis? (2)

2.1.4 A short piece of DNA that is 12 nitrogenous bases long, was analysed to determine the number of nitrogenous bases in molecule **A** in the diagram.

The results are shown in the table below

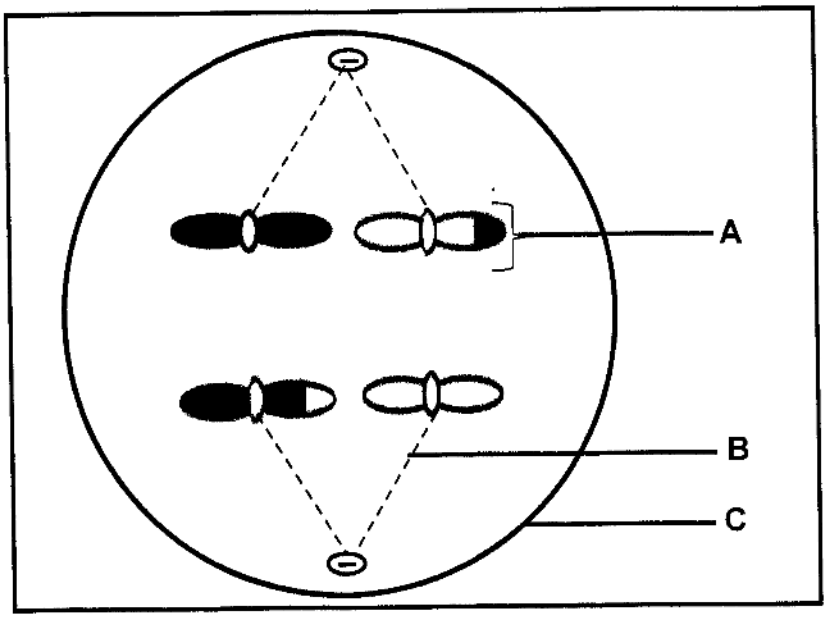
Bases	**Cytosine**	**Guanine**	**Adenine**	**Thymine**
DNA strand	4	3	-	2

Calculate the percentage of *uracil* in molecule **A** in the diagram and using the table above. Show all working. (3)

2.1.5 Describe the process of *translation*. (5)
(13)

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2.2 The diagrams below represent the phase of meiosis.



2.2.1 Identify part:

(a) **A** (1)

(b) **C** (1)

2.2.2 Name the:

(a) Phase of meiosis shown in the diagram above. (1)

(b) Process that resulted in the appearance of part **A** in the diagram. (1)

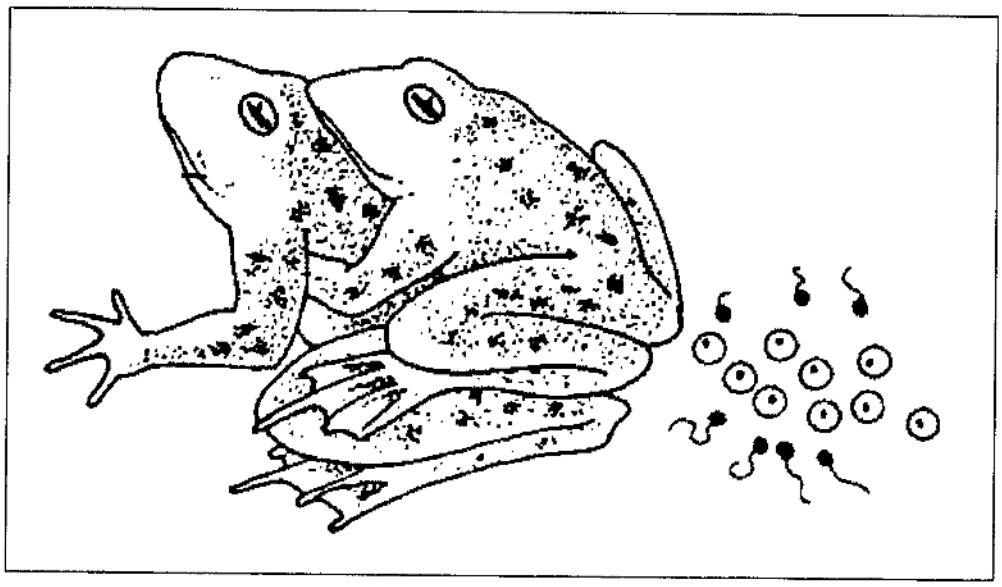
2.2.3 Name and describe the phase of meiosis that occurs before the one named in QUESTION 2.2.2. (3)
(7)

[20]

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QUESTION 3

3.1 The diagram below shows the type of fertilisation in frogs.



3.1.1 State the type of fertilisation shown in frogs above. (1)

3.1.2 Are the frogs viviparous, ovoviviparous, or oviparous? (1)

3.1.3 Give a reason for your answer in QUESTION 3.1.2. (2)

3.1.4 State ONE significance for this type of fertilisation in frogs to occur in water. (1)
(5)

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3.2 Men never stop producing sperms unless some specific diseases like diabetes, high blood pressure and other diseases. Sperm count changes as a man ages. Other several indirect factors might have an effect on older men fertility.

Scientists wanted to investigate whether the age had an impact on men fertility in 2002.

The average number of births per 1000 men was calculated and used as an indication of fertility. The data was collected from home affairs as per birth certificates issued in 2002.

The table below shows the results of their investigation.

AGE	BIRTH RATE PER 1000 MEN IN 2002
15-19	18
20-24	78
25-29	105
30-34	100
35-39	50
40-44	21
45-49	5
50-55	1
55 and older	0

3.2.1 Identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

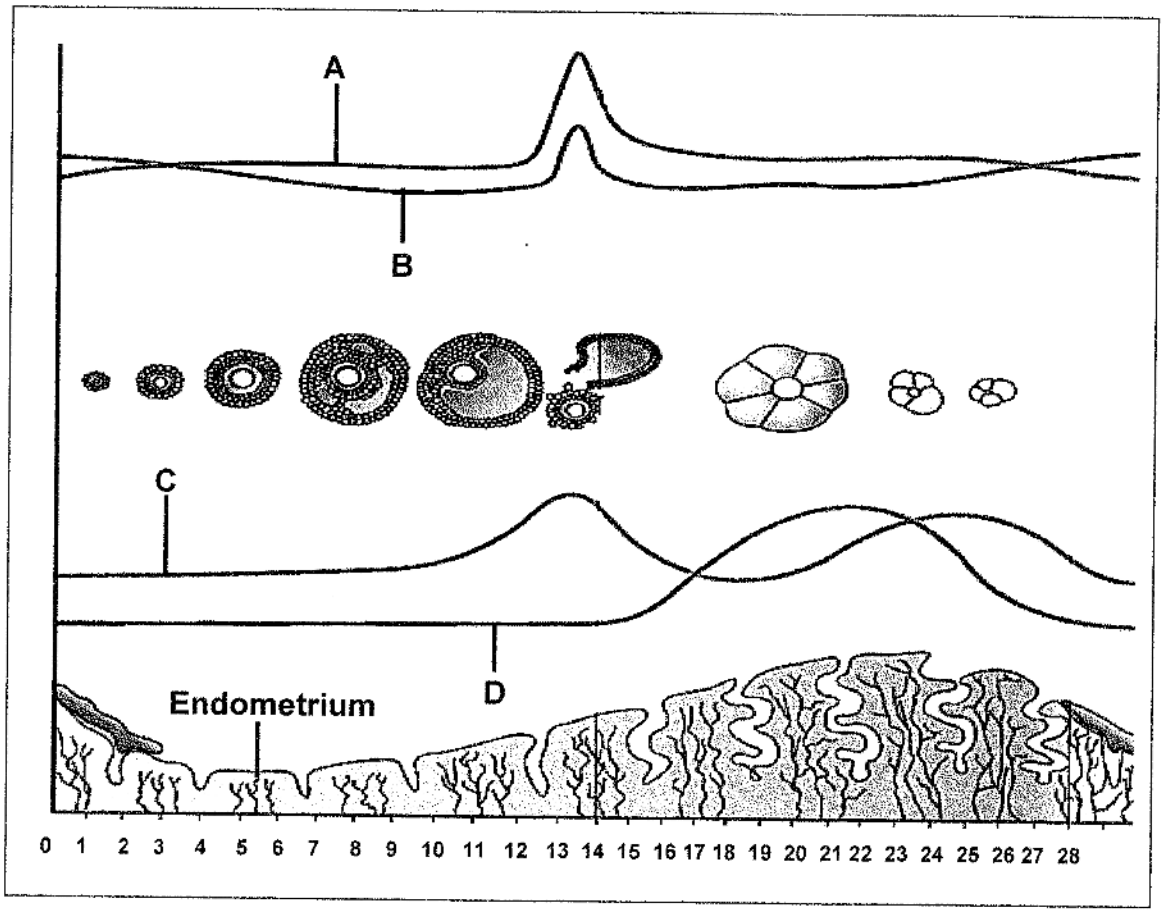
3.2.2 State how the dependent variable in QUESTION 3.2.1(a) was determined. (1)

3.2.3 Name TWO planning steps that were taken before the beginning of this investigation. (2)

3.2.4 Give the conclusion of the above investigation based on the results shown on the table above. (2)
(7)

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3.3 The diagram below shows the changes in the concentraton of hormones in the blood and uterine membrane during a menstrual cycle.



3.3.1 Identify hormone:

(a) **A** (1)

(b) **D** (1)

3.3.2 Describe the relationship between the level of hormone **C** and the endometrium from day 9 to day 13. (2)

3.3.3 Explain why the level of hormone **B** increases after day 23 during menstrual cycle. (4)
(8)

TOTAL SECTION B: 40

GRAND TOTAL: 60

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TO: THE CHIEF INVIGILATOR OF ALL SCHOOLS OFFERING: LIFE SCIENCES

NATIONAL SENIOR CERTIFICATE: MARCH 2022 COMMON TEST: GRADE 12

ERRATA

Page 10

Please take note of the following information that was omitted for the diagram in 3.3

A and B are pituitary hormones and
C and D are ovarian hormones

Kindly ensure that candidates are informed of the Errata.

MS N.E. MKHIZE
DIRECTOR: EXAMINATION AND ASSESSMENT

10/03/2022
DATE