

HILLCREST HIGH SCHOOL



NATURAL SCIENCE EXAM

GRADE 9

TIME : 2 HRS

EXAMINERS: MRS KNOX-WHITEHEAD / MRS SMITH

JUNE 2022

TOTAL : 120

INSTRUCTIONS

1. This question paper consists of 16 pages and 4 sections A – D.
2. Answer all of the questions from SECTIONS A to D in the ANSWER BOOK provided.
3. Non-programmable calculators may be used.
4. Number the answers correctly according to the numbering system used in this question paper
6. Give brief motivations, discussions, et cetera where required.
7. Write neatly and in pen.
8. **RULE OFF** after each question 1 – 16.
9. A **Periodic Table** has been attached at the end of the question paper for your use. You may detach it from the question paper.

SECTION A : LIFE AND LIVING

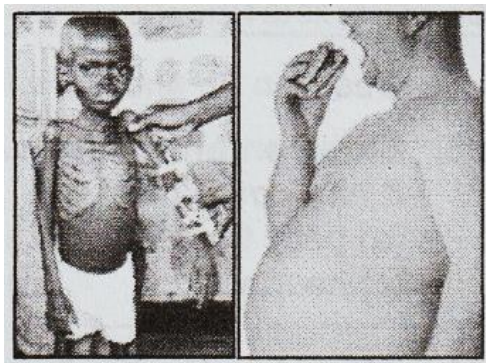
(20)

QUESTION 1: MULTIPLE CHOICE QUESTIONS

(10)

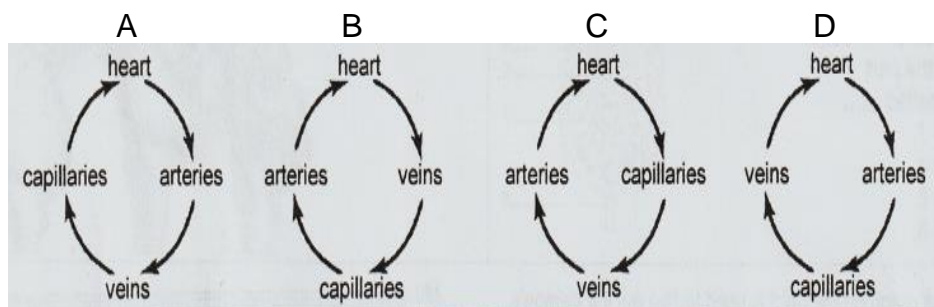
Four options are provided as possible answers to the following questions. Each question has only one correct answer. Write only the letter (A - D) next to the question number (1.1 – 1.10) in the answer book.

- 1.1 The rotating nosepiece in a microscope...
- A. is used to locate the object being observed
 - B. controls the amount of light passing through the specimen
 - C. hold objectives with low and high power lenses
 - D. focuses light rays onto the object
- 1.2 The correct sequence in which food moves along the alimentary canal is...
- A. oesophagus → stomach → liver → rectum
 - B. stomach → colon → small intestine → liver
 - C. small intestine → rectum → colon → anus
 - D. oesophagus → stomach → small intestine → colon
- 1.3 Study the picture below. What do these two individuals have in common?



- A. Malnutrition
- B. Overnutrition
- C. Kwashiorkor
- D. Obesity

- 1.4 In which of the following diagrams, **A – D**, is the blood flowing in the correct direction?



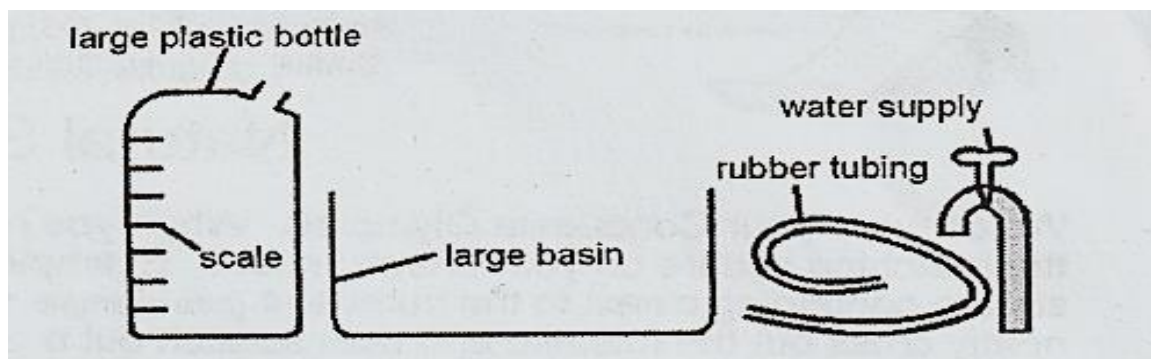
1.5 The table below shows the effect of smoking on the life expectancy of men.

Present age (years)	Further years expected to live (life expectancy)			
	non-smoker	1-10 cigarettes daily	11-20 cigarettes daily	21-30 cigarettes daily
25	49	44	43	42
35	39	35	34	33
45	30	26	25	24
55	21	18	17	16

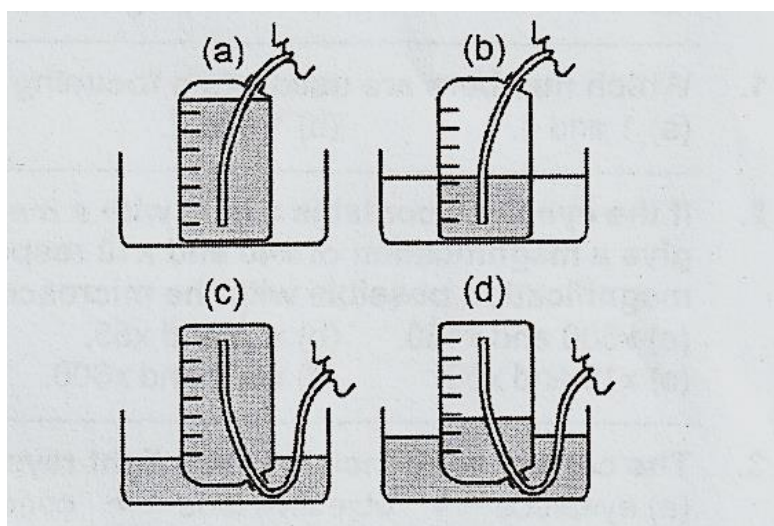
According to the data in the table, the life expectancy for men age 55 who smoke 15 cigarettes a day, is a further _____ years

- A. 16
- B. 17
- C. 18
- D. 25

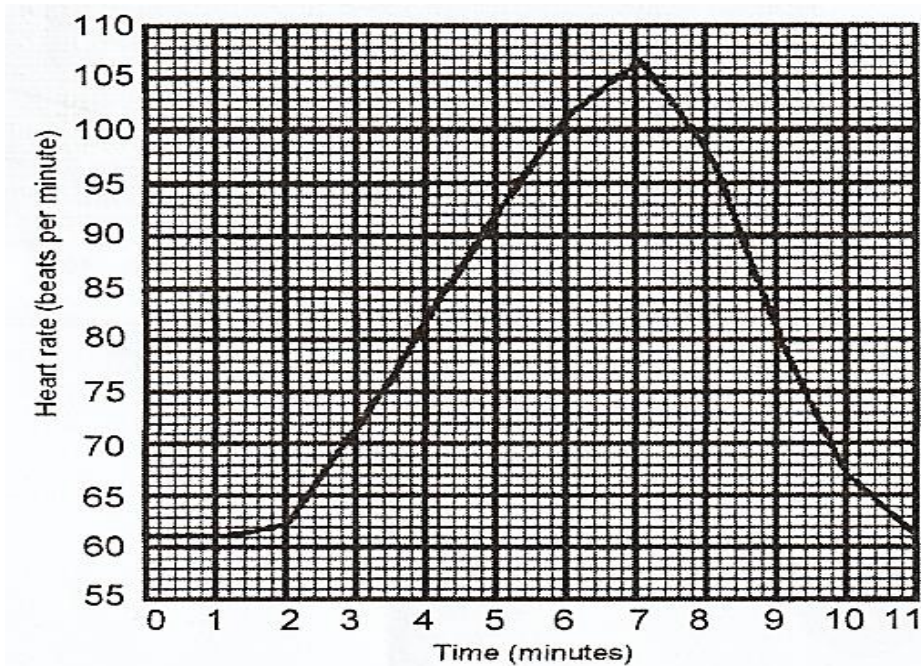
1.6 The following diagram shows a set of apparatus that can be used to measure lung capacity of humans.



Which one of the diagrams below, **A – D**, shows the apparatus correctly set up and the person ready to breathe out?

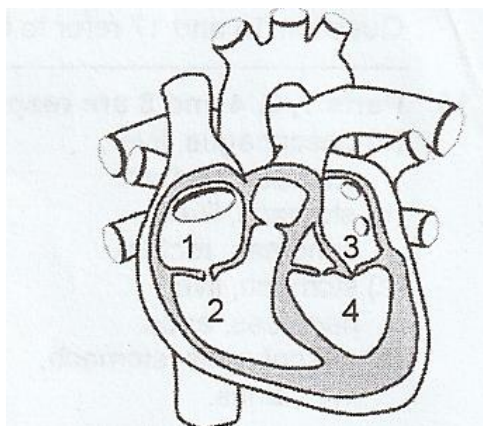


- 1.7 The graph below shows the results of monitoring the heart rate of an athlete before, during and after a race over a period of 11 minutes.



During which time interval did the greatest increase in heart rate occur?

- A. 0 – 1 minutes
 - B. 1 – 2 minutes
 - C. 4 – 5 minutes
 - D. 6 – 7 minutes
- 1.8 Blood entering the heart at chamber 1 has a low concentration of oxygen. It has come from the...

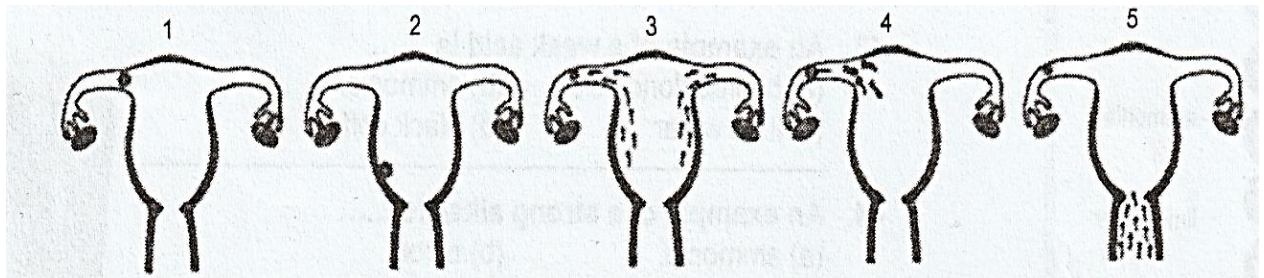


- A. body tissue
- B. lung capillaries
- C. heart valves
- D. septum

1.9 In females, which one of the following is associated with the development of an embryo?

- A. Fallopian tube
- B. Urethra
- C. Ureter
- D. Uterus

1.10 The series of diagrams below shows the stages of fertilization in the **INCORRECT** order. Which of the following sequences of numbers shows the **CORRECT** order for the stages of fertilization?



- A. 5 : 3 : 4 : 1 : 2
- B. 4 : 1 : 5 : 2 : 3
- C. 2 : 1 : 5 : 4 : 3
- D. 5 : 1 : 2 : 3 : 4

QUESTION 2 :

2.1 MATCHING COLUMNS

(5)

Match the statements in column A with the correct words in column B.

Write only the correct letter next to the number in your answer book e.g. (2.1.1 = C)

COLUMN A		COLUMN B
2.1.1	structural and functional unit of the body	A trachea B white
2.1.2	blood cells that carry oxygen	C stomach D oesophagus
2.1.3	sac-like organ containing bile	E gall bladder F nucleus
2.1.4	tube that connects the mouth to the stomach	G red H cell
2.1.5	blood cells that fight germs	

2.2 TERMINOLOGY

(5)

Give one word / term that best describes the following statements.

2.2.1 Outer boundary of an animal cell.

2.2.2 Removal of the foreskin protecting the urethral opening of the penis.

2.2.3 The acid found in the stomach that assists with digestion.

2.2.4 Different methods of preventing pregnancy.

2.2.5 Disorder in children caused by the mother consuming alcohol during pregnancy.

TOTAL SECTION A : [20]

SECTION B : LIFE AND LIVING

[40]

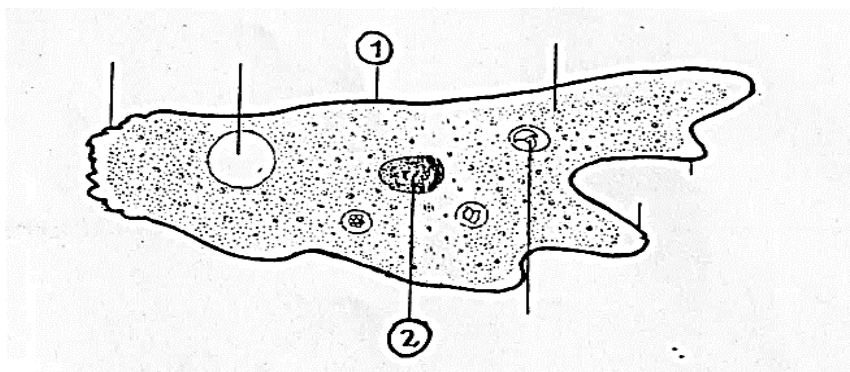
INSTRUCTIONS

1. Leave a line between each sub question for example, between **QUESTION 3.1** and **QUESTION 3.2**.
2. Rule off after each QUESTION for example, between **QUESTION 3** and **QUESTION 4**.

QUESTION 3

(6)

The diagram below shows an Amoeba, a unicellular micro-organism which hunts for its own food and is found in pond water .

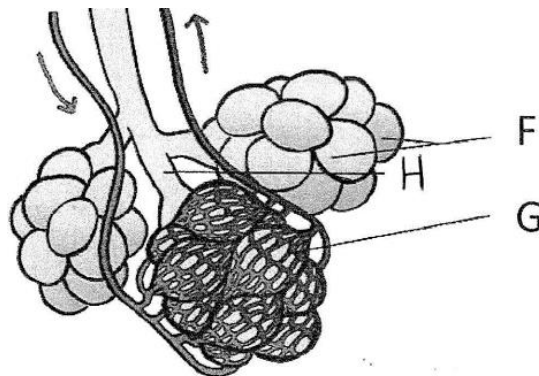


- 3.1 What does the word unicellular mean? (1)
- 3.2 What two structures, which would be present in a cell from a leaf, are totally absent in this cell? (2)
- 3.3 Why are the structures mentioned in QUESTION 3.2 absent in the amoeba, do you think? (2)
- 3.4 Give the name of the part labelled **2** which contains DNA. (1)

QUESTION 4

(5)

The diagram below shows structures that are present in the respiratory system in humans.



4.1 Name the organ where this structure can be found. (1)

4.2 Identify the parts labelled:

4.2.1 **F** (1)

4.2.2 **G** (1)

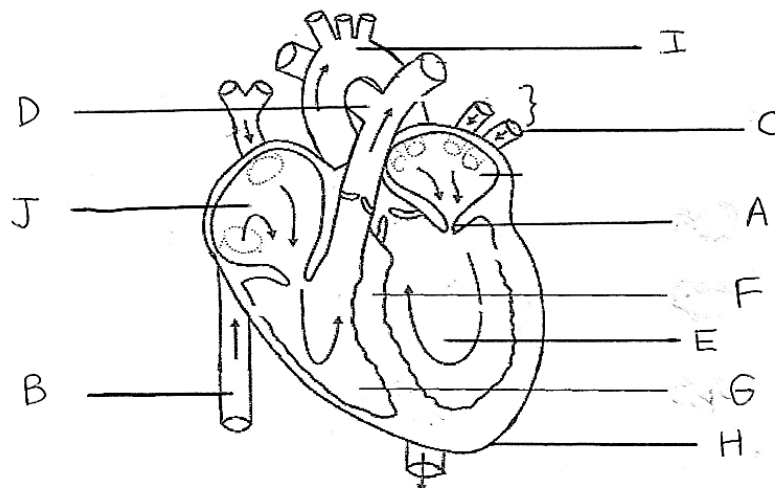
4.2.3 **H** (1)

4.3 Name the process that takes place between the cells of the parts labelled **F** and **G**. (1)

QUESTION 5

(9)

The diagram below shows part of the circulatory system. Study the diagram and answer the questions that follow.



5.1 Write down the name of the structure represented by

5.1.1 **A** (1)

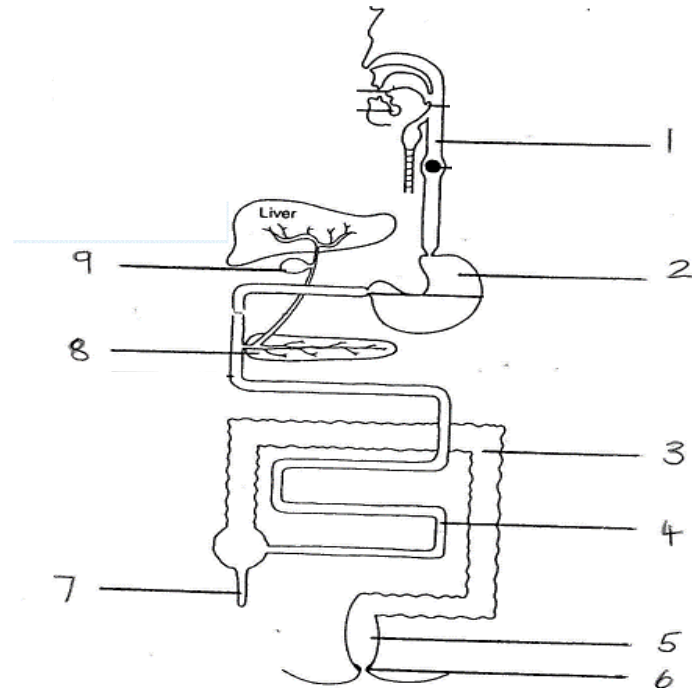
5.1.2 **B** (1)

5.1.3 **C** (1)

- 5.1.4 **E** (1)
- 5.2 Write down only the LETTER that represents the
- 5.2.1 right atrium (1)
- 5.2.2 pericardium (1)
- 5.3 Describe the blood pressure in the chamber labelled **E**. (1)
- 5.4 Consider structure **D**.
- 5.4.1 Is the blood in **D** oxygenated or deoxygenated? (1)
- 5.4.2 Where is the blood exiting through **D** going to? (1)

QUESTION 6 (8)

The diagram below shows the digestive system. Study the diagram and answer the questions that follow.



- 6.1 Which NUMBER represents the
- 6.1.1 appendix (1)
- 6.1.2 colon (1)
- 6.2 The liver secretes an enzyme called bile.
What is the function of this liquid? (1)
- 6.3 Write down only the NUMBER of the structure mostly responsible for
- 6.3.1 mechanical digestion (1)
- 6.3.2 absorption of nutrients (1)

- 6.4 NAME the structure responsible for the
- 6.4.1 absorption of water (1)
 - 6.4.2 egestion of waste material (1)
 - 6.4.3 storage of faeces (1)

QUESTION 7 (7)

Pregnancies in schoolgirls are increasing alarmingly. The table below shows the number of pregnancies recorded each year in a rural, co-educational school over the past six years, somewhere in South Africa.

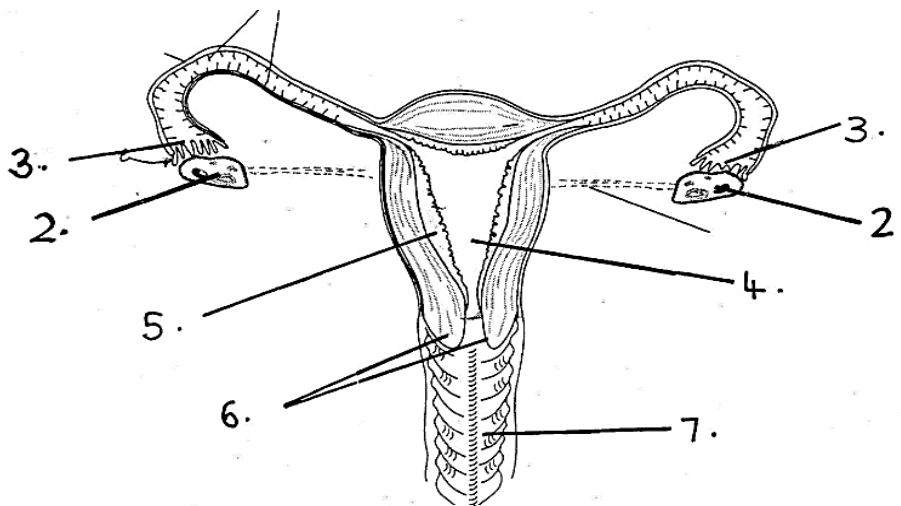
Study the table and answer the questions that follow.

YEAR	2016	2017	2018	2019	2020	2021
NO OF PREGNANCIES	3	2	2	3	11	12
ENROLMENT OF GIRLS	301	292	301	299	303	300

- 7.1 How many cases of pregnancy were recorded over the six-year period? (1)
- 7.2 During which two years was the enrolment number of girls in the school the same? (1)
- 7.3.1 Which year show the greatest increase in the number of pregnancies? (1)
- 7.3.2 What percentage of girls were pregnant in that year? Show your working. (2)
- 7.4 What do you regard as the most detrimental (harmful) effect of this high level of pregnancy for teenage girls in particular? (1)
- 7.5 In a paragraph of no more than 3 lines, explain what you think may have caused the huge increase in teenage pregnancy in the year 2020. (1)

QUESTION 8 (5)

The diagram below shows the female reproductive system.



- 8.1 How many days does the typical menstrual cycle last in females? (1)
- 8.2 On which day of her menstrual cycle is a female most likely to ovulate? (1)
- 8.3 Give the name and ONE function of the structure labelled **2**. (2)
- 8.4 Give the NUMBER of the structure that dilates to 10cm during labour. (1)

TOTAL SECTION B : [40]
TOTAL SECTION A & B : [60]

SECTION C : MATTER AND MATERIALS (20)

INSTRUCTIONS

1. Start this section at the top of a new page.
 2. Leave a line between each sub question for example, between **QUESTION 9.1 and QUESTION 9.2.**
 3. Rule off after each question for example between **QUESTION 9 and QUESTION 10.**
-

QUESTION 9 : MULTIPLE CHOICE QUESTIONS (10)

Four options are provided as possible answers to the following questions. Each question has only one correct answer. Write only the letter (A-D) next to the question number (9.1 – 9.10) in the answer book.

9.1 A gas which forms diatomic molecules is....

- A. carbon dioxide
- B. chlorine
- C. helium
- D. neon

9.2 The Periodic Table is ordered according to

- A. Atomic number
- B. Mass number
- C. number of electrons
- D. number of nucleons

- 9.3 The columns of the Periodic Table are called ...
- A. blocks
 - B. families
 - C. groups
 - D. periods
- 9.4 The correct name for the compound Na_3PO_4 is
- A. trisodium phosphate
 - B. trisodium phosphide
 - C. sodium phosphate
 - D. sodium triphosphate
- 9.5 Which equation is **not** balanced?
- A. $\text{Na} + 2 \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
 - B. $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$
 - C. $\text{Zn} + \text{Cu}(\text{NO}_3)_2 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{Cu}$
 - D. $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$
- 9.6 The total number of atoms present in $\text{Zn}(\text{NO}_3)_2$ is ...
- A. 3
 - B. 6
 - C. 9
 - D. 10
- 9.7 Acids have a pH of
- A. 1 – 6
 - B. 7
 - C. 8 – 14
 - D. 1 – 14
- 9.8 Soil with a pH of between 7,5 and 8,5 is said to be ...
- A. salty
 - B. basic
 - C. neutral
 - D. acidic
- 9.9 Which of the following ions are included in the formula $\text{Al}(\text{NO}_3)_3$?
- A. Al^{3+} and NO_3^{3-}
 - B. Al^{3-} and NO_3^+
 - B. Al^+ and NO_3^{3-}
 - D. Al^{3+} and NO_3^-

9.10 Which of the following is a base?

- A. CH_3COOH
- B. H_3PO_4
- C. $\text{Ca}(\text{OH})_2$
- D. HCl

QUESTION 10 :

10.1 MATCHING COLUMNS

(5)

Match the statements in column A with the correct words in column B.

Write only the correct letter next to the number in your answer book e.g. (10.1.1 = C)

COLUMN A		COLUMN B
10.1.1	The colour of litmus paper in acid	A orange
10.1.2	The flame colour observed when carbon burns in oxygen	B red
10.1.3	The gas formed when sulfur burns in oxygen	C blue
10.1.4	A gas that causes metals to rust	D white
10.1.5	The colour of blue litmus paper in distilled water	E SO_2
		F O_2
		G CO_2

10.2 TERMINOLOGY

(5)

Give one word / term that best describes the following statements:

10.2.1 Particles that occur within the nucleus.

10.2.2 Horizontal rows on the Periodic Table.

10.2.3 Number that indicates the number of protons in an atom.

10.2.4 Substance that has a different colour in acid and in base.

10.2.5 A base that is dissolved in water.

TOTAL SECTION C : [20]

SECTION D : MATTER AND MATERIALS**(40)****INSTRUCTIONS**

1. Leave a line between each sub question for example between question 11.1 and question 11.2.
2. Rule off after each question for example between question 11 and question 12.

QUESTION 11**(8)**

Write ONLY the numbers 11.1 – 11.8 in your answer booklet and fill in the correct answer for each square of the table next to the relevant number. **DO NOT** copy the table into your booklet.

A Z notation	Name of element	Number of protons	Number of neutrons	Number of electrons	Mass number
${}_{20}^{40}\text{Ca}$	<u>11.1</u>	<u>11.2</u>	20	<u>11.3</u>	40
${}_{15}^{31}\text{P}$	Phosphorus	<u>11.4</u>	<u>11.5</u>	15	31
<u>11.6</u>	<u>11.7</u>	6	6	6	<u>11.8</u>

QUESTION 12**(10)**

Study the diagram which represents an element on the Periodic Table and answer the questions which follow.



- 12.1 Read the paragraph below and choose the correct answers.
Write **ONLY** the question number and the correct answer. (3)

The element above can be mixed with other elements to make car bodies, drink cans and other items that need to be light and strong. This element is a **12.1.1 metal / non-metal / semi-metal**.

This element is flammable, so one of its main uses is for flares and fireworks. It burns brightly in air to give a **12.1.2 white / orange / blue** flame.

Humans take in about 250-350 milligrams of this element each day and we can store about 20 g in our bodies. The name of the element is **12.1.3 manganese / magnesium**.

- 12.2 Answer the questions below relating to the element in the diagram above:

12.2.1 In which period on the Periodic Table does this element appear? (1)

12.2.2 What is the name of the group on the Periodic Table that this element belongs to? (1)

12.2.3 Write down the mass number for this element. (1)

12.2.4 How many neutrons does an atom of this element have in its nucleus? Show your workings. (2)

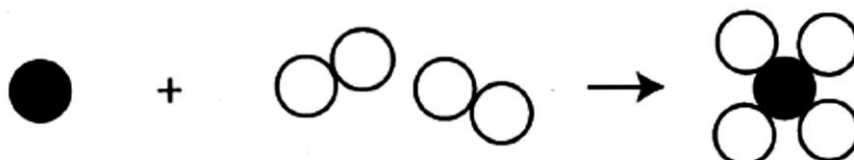
- 12.3 Write down the formula for the product that forms when this element combines with:

12.3.1 chlorine (1)

12.3.2 oxygen (1)

QUESTION 13 (4)

In the diagram below the black circles represent carbon atoms and the white circles represent hydrogen atoms.



13.1 Write a balanced symbol equation to represent this chemical reaction. (3)

13.2 Give the NAME of the product that is formed. (1)

QUESTION 14 (9)

14.1 Name the following compounds.



14.2 Write formulae for the following compounds:

14.2.1 lithium carbonate

14.2.2 aluminium oxide

14.2.3 dihydrogen monosulfide (3)

QUESTION 15 (5)

15.1 Re-write and balance the following equations:



15.2 Write the following word equation into symbols to represent a balanced chemical equation.

sulfur + oxygen gas \rightarrow sulfur dioxide (3)

QUESTION 16 (4)

A type of corrosion that occurs in metal objects is called *rusting*.

16.1 Define *rusting*. (2)

16.2 Name one example of a method to prevent rusting and explain how this method stops the rusting process. (2)

TOTAL SECTION D : [40]

TOTAL SECTION C & D : [60]

GRAND TOTAL : [120]

TABLE 3: THE PERIODIC TABLE OF ELEMENTS
 TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
(I)	(II)											(III)	(IV)	(V)	(VI)	(VII)	(VIII)
1 H 1,008	2 He 4,003	3 Li 7,016	4 Be 9,012	5 B 10,811	6 C 12,011	7 N 14,007	8 O 15,999	9 F 18,998	10 Ne 20,180	11 Na 22,990	12 Mg 24,305	13 Al 26,982	14 Si 28,086	15 P 30,974	16 S 32,065	17 Cl 35,453	18 Ar 39,948
19 K 39,098	20 Ca 40,078	21 Sc 44,956	22 Ti 47,88	23 V 50,942	24 Cr 51,996	25 Mn 54,938	26 Fe 55,845	27 Co 58,933	28 Ni 58,693	29 Cu 63,546	30 Zn 65,38	31 Ga 69,723	32 Ge 72,63	33 As 74,922	34 Se 78,96	35 Br 79,904	36 Kr 83,80
37 Rb 85,468	38 Sr 87,62	39 Y 88,906	40 Zr 91,224	41 Nb 92,906	42 Mo 95,94	43 Tc 98,906	44 Ru 101,07	45 Rh 102,905	46 Pd 106,32	47 Ag 107,868	48 Cd 112,411	49 In 114,818	50 Sn 118,710	51 Sb 121,757	52 Te 127,6	53 I 126,905	54 Xe 131,29
55 Cs 132,905	56 Ba 137,327	57 La 138,905	58 Ce 140,12	59 Pr 140,908	60 Nd 144,242	61 Pm 144,913	62 Sm 150,36	63 Eu 151,964	64 Gd 157,25	65 Tb 158,925	66 Dy 162,50	67 Ho 164,930	68 Er 167,259	69 Tm 168,930	70 Yb 173,054	71 Lu 174,967	
87 Fr 223,019	88 Ra 226,025	89 Ac 227,037	90 Th 232,038	91 Pa 231,036	92 U 238,029	93 Np 237,048	94 Pu 244,064	95 Am 243,061	96 Cm 247,070	97 Bk 247,070	98 Cf 251,080	99 Es 252,083	100 Fm 257,103	101 Md 258,103	102 No 259,108	103 Lr 260,105	

KEY/SLEUTEL	Atomic number Atoomgetal	Electronegativity Elektronegatiwiteit	Symbol Simbool
	29	1,9	Cu
		63,5	

Approximate relative atomic mass Benaderde relatiewe atoommassa	29	28	27	26	25	24	23	22	21
	Cu	Ni	Co	Fe	Mn	Cr	V	Ti	Sc
	63,5	59	59	56	55	52	51	48	45