

Hillcrest High School

NATURAL SCIENCE

JUNE 2023

Grade 9

MARKS: 120

EXAMINERS: Mrs Smith & Mrs Knox-Whitehead

TIME: 2 Hours

MODERATOR: Mrs R. Harmse

Instructions:

1. Answer ALL the questions.
2. This question paper consists of TWO sections:
3. SECTION A: LIFE SCIENCE (60)
SECTION B: CHEMISTRY (60)
Answer SECTIONS A and B in the ANSWER BOOK.
4. Non-programmable calculators may be used.
5. Appropriate mathematical instruments may be used.
6. Number the answers correctly according to the numbering system used in this question paper.
7. A periodic table is attached for your use.

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 part of the microscope that controls the amount of light reaching the specimen is

- A diaphragm
- B ocular
- C objective
- D condenser

1.2 The processes below belong to the _____ system.

ingestion, absorption, egestion

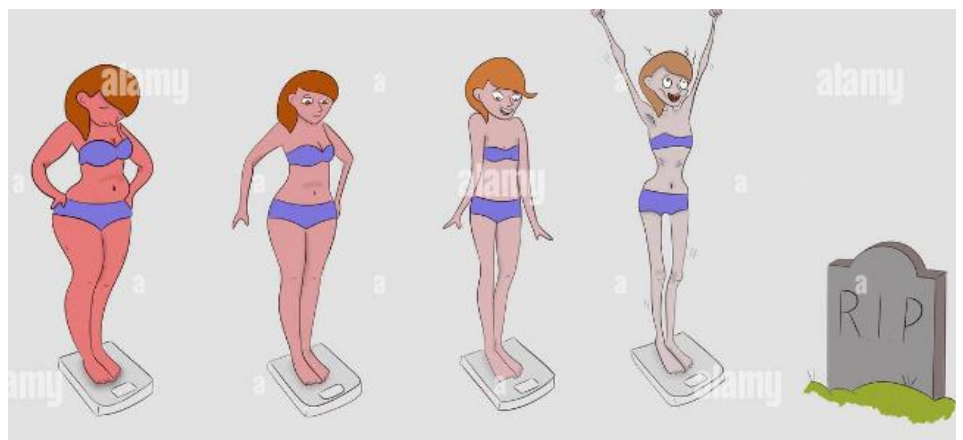
- A circulatory
- B digestive
- C respiratory
- D excretory

1.3 Which component of the blood is responsible for clotting of the blood after an injury?

- A blood plasma
- B red blood cells
- C blood platelets
- D white blood cells

1.4 The teenage girl in the image is most likely suffering from a disease called...

- A marasmus
- B rickets
- C kwashiorkor
- D anorexia



1.5 The function of valves in the heart is:

- A to keep the oxygenated and deoxygenated blood separate
- B to prevent the blood from flowing backwards
- C to assist with maintaining the blood pressure
- D to direct the blood to the lungs

1.6 Which of the following does not form part of the alimentary canal?

- A pancreas
- B stomach
- C colon
- D rectum

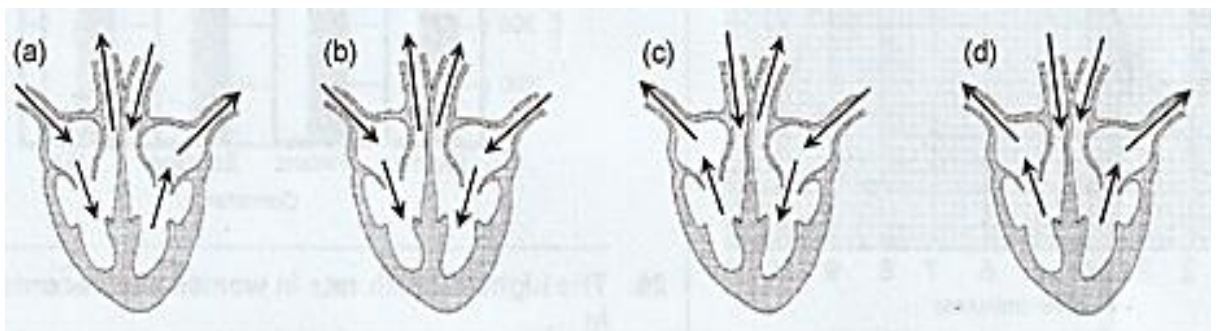
1.7 Which of the following are responsible for keeping the trachea open?

- A pleura
- B intercostal muscles
- C C-shaped cartilage rings
- D ribs

1.8 The heart pumps blood throughout the body. This process is known as

- A respiration
- B gaseous exchange
- C excretion
- D circulation

1.9 In which of the following diagrams of the heart, (a) to (d), is the blood flowing in the correct direction?



- A (a)
- B (b)
- C (c)
- D (d)

1.10 The stage in the human life cycle, when sex organs mature for reproduction, is called ...

- A copulation
- B conception
- C puberty
- D menstrual cycle

QUESTION 2 :

2.1 TERMINOLOGY

(5)

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

2.1.1 The lens of the microscope that is closest to the specimen

2.1.2 The outermost layer of an animal cell.

2.1.3 The physical breakdown of food by crushing, mashing and churning.

2.1.4 The sac that stores urine.

2.1.5 The jelly-like part of the cell where water and dissolved nutrients are mostly found.

2.2 MATCHING COLUMNS

(5)

For each of the following questions, write only the number of the question and the answer from the following list. Choose from **A, B, Both, None**.

2.2.1	specialized structures within the cell that perform specific functions for the cell	A. tissue B. organ
2.2.2	A nutritional disease caused by a diet high in carbohydrates but lacking in protein	A. kwashiorkor B. obesity
2.2.3	organ which produces insulin to break down sugars	A. pancreas B. liver
2.2.4	function of the ovaries	A. store eggs B. produce oestrogen
2.2.5	also known as the voice box	A. larynx B. trachea

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 diagrams below show examples of both a plant and an animal cell.

FIGURE 1:

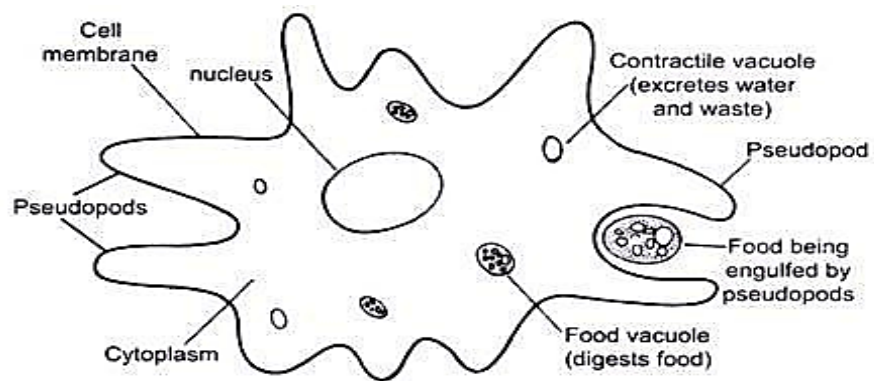
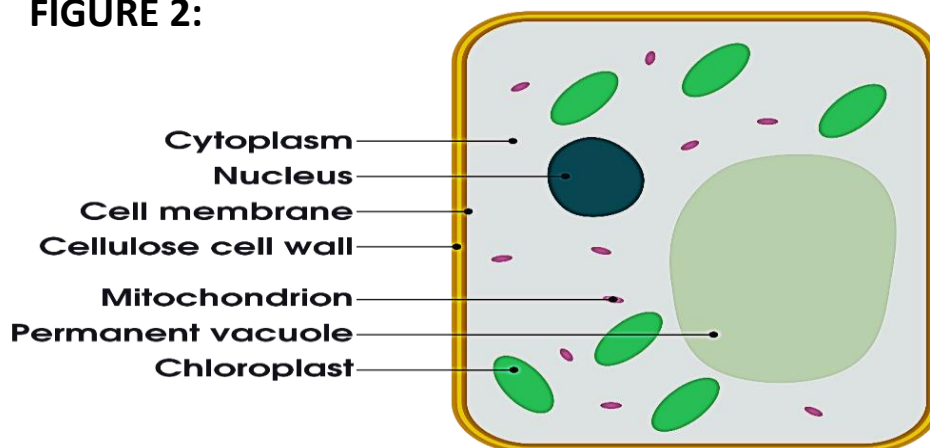


FIGURE 2:



- 3.1.1 Which diagram shows a plant cell?
(Write down only **figure 1** or **figure 2**.) (1)
- 3.1.2 Support your answer in question 3.1.1 above, **with evidence from the diagrams**. (1)
- 3.2.1 Which diagram shows an animal cell?
(Write down only **figure 1** or **figure 2**.) (1)

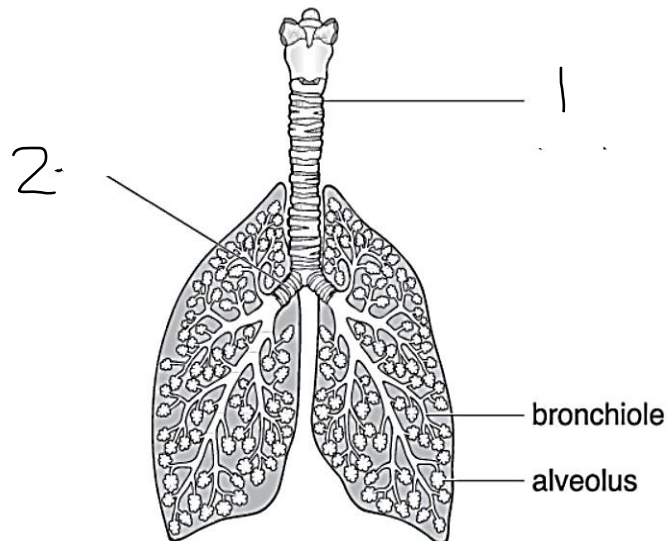
3.2.2 Support your answer in question 3.2.1 above, **with evidence from the diagrams.** (1)

3.3.1 Identify the organelle responsible for respiration in the cell. (1)

3.3.2 Name any **one** product of respiration. (1)

QUESTION 4 (5)

The diagram below shows structures of the lungs.



4.1 Which body system do these structures belong to? (1)

4.2 Identify the parts labelled:

4.2.1 1 (1)

4.2.2 2 (1)

4.3 From which part is oxygen absorbed into the blood? (1)

4.4 Name the process that refers to the swapping of carbon dioxide for oxygen at the site mentioned in QUESTION 4.3 above. (1)

QUESTION 5 (7)

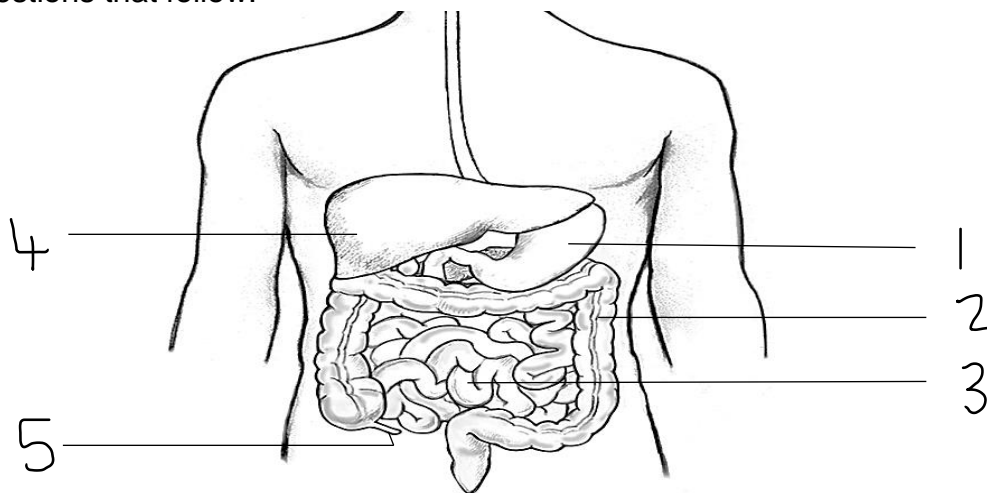
Read the following paragraph on the human heart. Select the correct answer from the choice in the brackets. Write down only the question numbers 5.1 – 5.7 and the correct answer next to each number.

Do NOT re-write the paragraph.

“The heart is a muscular organ which forms part of the (**5.1 respiratory / circulatory**) system. The human heart is composed of (**5.2 four / five**) chambers. The upper chambers are called (**5.3 ventricles / atria**). The right half of the heart is associated with (**5.4 oxygenated / deoxygenated**) blood. Deoxygenated blood is carried to the lungs by the (**5.5 pulmonary artery / pulmonary vein**). The walls of the (**5.6 left ventricle / right ventricle**) are thicker because it pumps blood under tremendous pressure to all parts of the body. The membrane that protects and surrounds the heart is the (**5.7 pleura / pericardium**).”

QUESTION 6**(7)**

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.

6.2.1 What is the function of this liquid? (1)

6.2.2 Where is the bile stored? (1)

6.3 Write down only the NUMBER of the structure mostly responsible for the 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)

QUESTION 7

(5)

The table below gives information about 100 g of five different types of food.

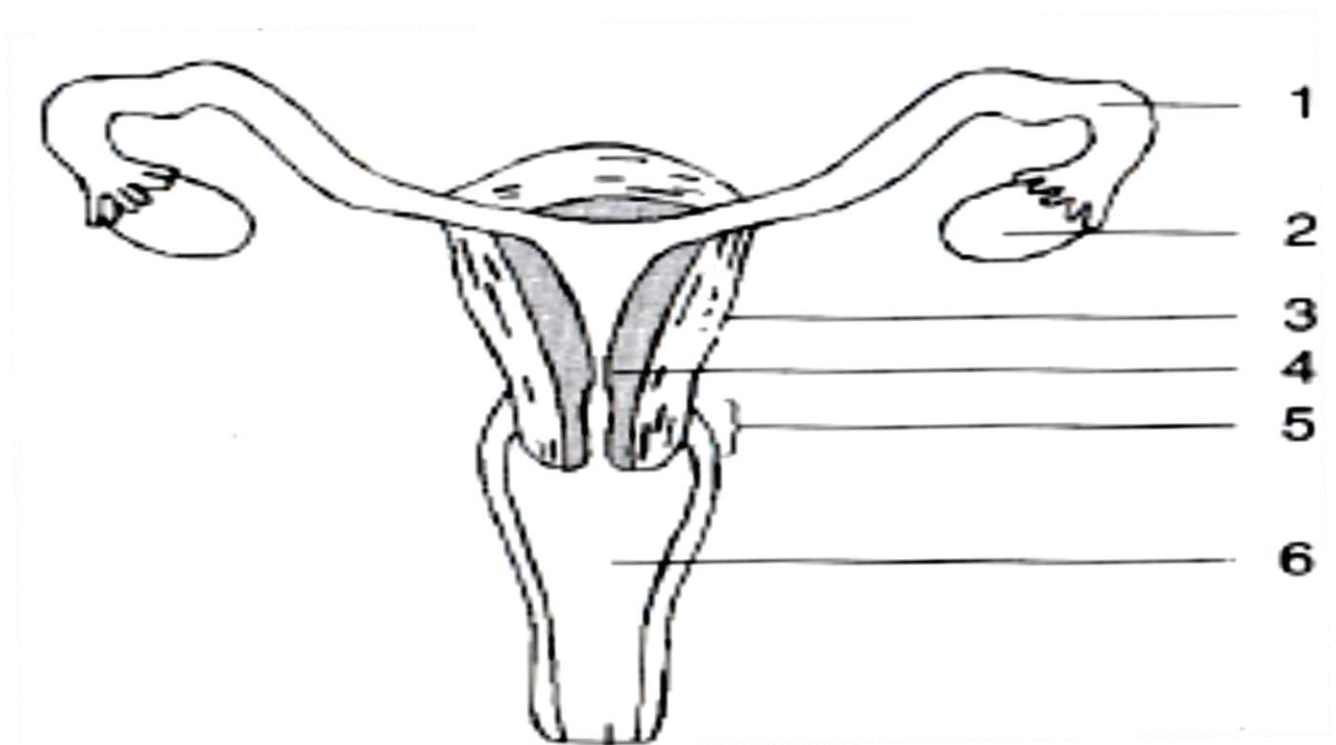
Food	Energy per 100 g of food (kJ)	Nutrients per 100 g of food			
		protein (g)	fat (g)	carbohydrate (g)	calcium (g)
banana	403	1,2	0,3	23,2	0,006
bread	914	9,2	2,5	41,6	0,054
butter	3031	0,5	81,7	0	0,015
cheese	1708	22,5	34,4	0,1	0,72
milk	275	3,2	3,9	4,8	0,115

- 7.1 Which of the four nutrients, protein, fat, carbohydrate and calcium provides most of the energy in 100g of cheese? (1)
- 7.2 Which of the four nutrients is needed for strong bones and teeth? (1)
- 7.3 The recommended daily amount of protein for a woman is 45g. How many grams of cheese would provide 45g of protein. Consult the table above and show all your working. (2)
- 7.4 Which food contains the most calcium? (1)

QUESTION 8

(10)

The diagram below shows the female reproductive system.



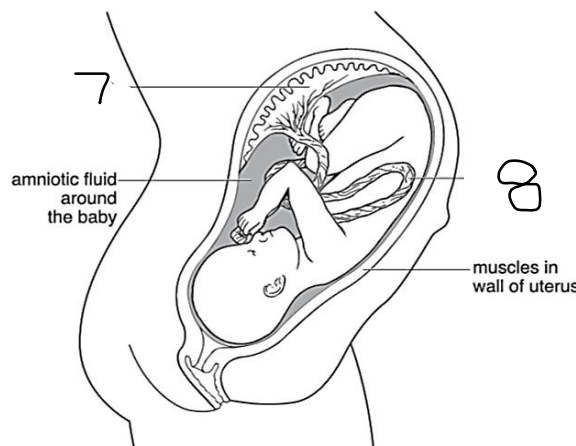
8.1 Provide labels for the following organs:

- 8.1.1 5 (1)
- 8.1.2 1 (1)
- 8.1.3 6 (1)

8.2 Write down only the number (1 - 6) of the part where:

- 8.2.1 semen is released during intercourse (1)
- 8.2.2 fertilization takes place (1)

The diagram below shows the female reproductive system during pregnancy.



8.3 Provide labels for the following

- 8.3.1 7 (1)
- 8.3.2 8 (1)

8.4 What is the normal length of pregnancy in weeks? (1)

8.5 When a baby is born, it is pushed out of the mother's body. How is the uterus adapted to help push the baby out? (1)

8.6 Name the birth defect that a child may be born with should their mother consume alcohol during pregnancy? (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.**
-

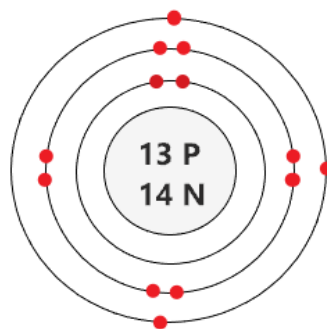
QUESTION 9 : MULTIPLE CHOICE QUESTIONS**(5)**

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 – 9.5) in the answer book.

- 9.1 Which of the following ions are included in the formula $\text{Ca}(\text{NO}_3)_2$?
- A. Ca^{2+} and NO_3^{3-}
 - B. Ca^{2-} and NO_3^+
 - B. Ca^+ and NO_3^{2-}
 - D. Ca^{2+} and NO_3^-
- 9.2 The correct name for the compound $\text{Al}_2(\text{SO}_4)_3$ is
- A. dialuminium sulfate
 - B. aluminium sulfide
 - C. aluminium sulfate
 - D. dialuminium trisulfate
- 9.3 The number of elements present in CH_3COOH is ..
- A. 2
 - B. 3
 - C. 6
 - D. 8
- 9.4 The total number of atoms present in $\text{Cu}_3(\text{PO}_4)_2$ is ...
- A. 3
 - B. 5
 - C. 8
 - D. 13

- 9.5 Sodium hydroxide, NaOH, would have a pH of:
- A. 0
 - B. 1 – 6
 - C. 7
 - D. 8 – 14
- 9.6 The correct symbol for silver on the periodic table:
- A. Ag
 - B. Au
 - C. S
 - D. Si
- 9.7 A semi-metal:
- A. aluminium
 - B. boron
 - C. gallium
 - D. tin
- 9.8 A strong acid:
- A. CaCO_3
 - B. CH_3COOH
 - C. HCl
 - D. NaOH
- 9.9 Vertical columns on the Periodic Table:
- A. Families
 - B. Groups
 - C. Periods
 - D. Rows
- 9.10 The element shown in the diagram below is:

- A. Al
- B. Co
- C. Fe
- D. Si



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	A diatomic gas	A orange
10.1.2	The flame colour observed when magnesium burns in oxygen	B red
10.1.3	The gas formed when carbon burns in oxygen	C blue
10.1.4	The colour of litmus paper in acid	D white
10.1.5	An acidic, choking gas	E SO ₂
		F O ₂
		G CO ₂
		H CO

10.2 TERMINOLOGY**(5)**

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

10.2.1 Reaction of an acid with a base.

10.2.2 Protons and neutrons.

10.2.3 The process where iron reacts with oxygen in the presence of water.

10.2.4 A scale from 0 to 14 that indicates whether a substance is acidic or basic.

10.2.5 Negative sub-atomic particles found in an atom.

TOTAL SECTION C : [20]

SECTION D : MATTER AND MATERIALS**[40]****INSTRUCTIONS**

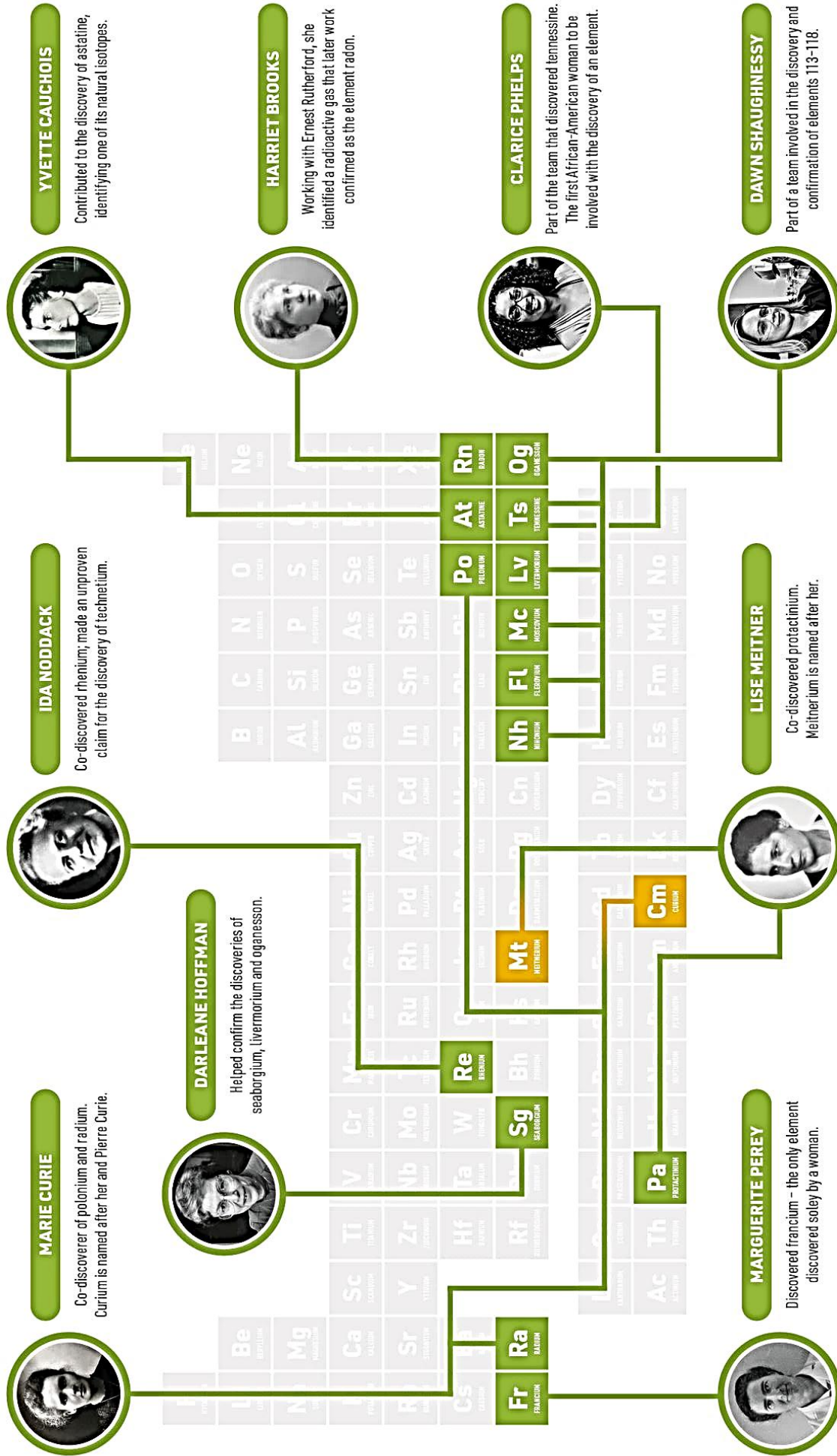
1. Leave a line between each sub question for example between 11.1 and 11.2.
 2. Rule off after each question for example between question 11 and question 12.
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QUESTION 11**(10)**

Study the picture on the next page showing some famous female scientists and answer the questions which follow. You will also need the Periodic Table attached at the end of the exam for this question. (**You may detach the Periodic Table to make it easier to use.**)

- 11.1 The Periodic Table is a list of elements ordered from left to right across the rows with increasing element number. Dawn Shaughnessy was part of a team which discovered elements numbered **113 – 118**.
- 11.1.1 What is the name of the number which is used to order the elements of the Periodic Table?
Choose from ATOMIC NUMBER / MASS NUMBER / GROUP NUMBER. (1)
- 11.1.2 What does this number tell you about the element?
Choose from NUMBER OF PROTONS / NUMBER OF NUCLEONS / CHARGE. (1)
- 11.2 Harriet Brooks was involved with the discovery of a radioactive gas, Radon (Rn).
- 11.2.1 Using your Periodic Table, state which PERIOD this element is found in. (1)
- 11.2.2 What is the name of the GROUP this element belongs to? (1)
- 11.3 Yvette Cauchois contributed to the discovery of Astatine.
Is this element a METAL / NON-METAL / SEMI-METAL? (1)
- 11.4 Marie Curie helped to discover the metal Radium (Ra).
- 11.4.1 Give the NAME of another metal in the same group. (1)
- 11.4.2 How many neutrons does Radium contain in its nucleus?
(Show your workings.) (2)
- 11.5 Francium, Fr, is the only element to have been discovered solely by a woman, Marguerite Perey.
- 11.5.1 What is the name of the GROUP that Fr belongs to? (1)
- 11.5.2 Give the SYMBOL of another element in the same PERIOD as Fr. (1)
-

THE WOMEN OF THE PERIODIC TABLE



QUESTION 12**(9)**

12.1 Write ONLY the numbers **12.1.1 – 12.1.7** 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
${}_{20}^{40}\text{Ca}$	Calcium	<u>12.1.1</u>	20	<u>12.1.2</u>	<u>12.1.3</u>
${}_{16}^{32}\text{S}$	Sulfur	<u>12.1.4</u>	<u>12.1.5</u>	15	31
	<u>12.1.6</u>	1	<u>12.1.7</u>	1	1

12.2 Calcium and sulfur could react with each other to form a new compound.

12.2.1 Give the NAME of the compound that would form. (1)

12.2.2 Give the FORMULA of the compound. (1)

QUESTION 13**(7)**

In the diagram below the small circles represent hydrogen atoms and the large circles represent oxygen atoms.



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

13.2 Write a balanced symbol equation to represent this chemical reaction. (4)

QUESTION 14 (8)

14.1 Name the following compounds.

14.1.1 Ca(OH)_2 (2)14.1.2 H_2S (2)14.1.3 $\text{Zn}_3(\text{PO}_4)_2$ (2)

14.2 Write formulae for the following compounds:

14.2.1 lithium nitrate (1)

14.2.2 sulfur trioxide (1)

QUESTION 15 (6)

15.1 Re-write and balance the following equations:

15.1.1 $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$ (1)15.1.2 $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$ (1)

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

magnesium + oxygen gas \rightarrow magnesium oxide (4)

TOTAL SECTION D : [40]**TOTAL SECTION C & D : [60]**
GRAND TOTAL : [120]

