

# HILLCREST HIGH SCHOOL



## NATURAL SCIENCE EXAM

**GRADE 9**  
**TIME : 2 HRS**  
**EXAMINER: MRS KNOX-WHITEHEAD**  
**MODERATOR: MRS SMITH**

**JUNE 2021**  
**TOTAL : 120**

### INSTRUCTIONS

1. This question paper consists of 14 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
  5. Write neatly and in pen.
  6. **RULE OFF** after each question 1 – 14.
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## SECTION A : LIFE AND LIVING

[10]

### QUESTION 1: 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 (1.1 – 1.5) in the answer book.

- 1.1 The structure of the microscope that controls the amount of light directed onto the specimen is the .....
- A. rotating nose piece
  - B. mirror
  - C. diaphragm
  - D. ocular lens
- 1.2 The organelle which is known as the powerhouse of the cell is...
- A. chloroplast
  - B. mitochondrion
  - C. nucleus
  - D. vacuole
- 1.3 The liver produces ... which aids in the breakdown of fats.
- A. bile
  - B. enzymes
  - C. hydrochloric acid
  - D. insulin
- 1.4 The heart chamber which RECEIVES blood is called the ...
- A. aorta
  - B. atrium
  - C. septum
  - D. ventricle
- 1.5 The female gamete is released once every 28 days in a process called...
- A. copulation
  - B. fertilization
  - C. ovulation
  - D. implantation
-

## QUESTION 2 : TERMINOLOGY

[5]

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

- 2.1 The organelle where dissolved food, water and waste material is stored.
- 2.2 The non-living substance found in a plant cell wall that provides support and strength to the structure.
- 2.3 The tube that forms a passage for air from the larynx to the lungs.
- 2.4 The structure that allows nutrients and oxygen to diffuse from the mother's blood into the embryo's blood.
- 2.5 The hormone responsible for female secondary sexual characteristics.

**TOTAL SECTION A : [10]**

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## SECTION B : LIFE AND LIVING

[40]

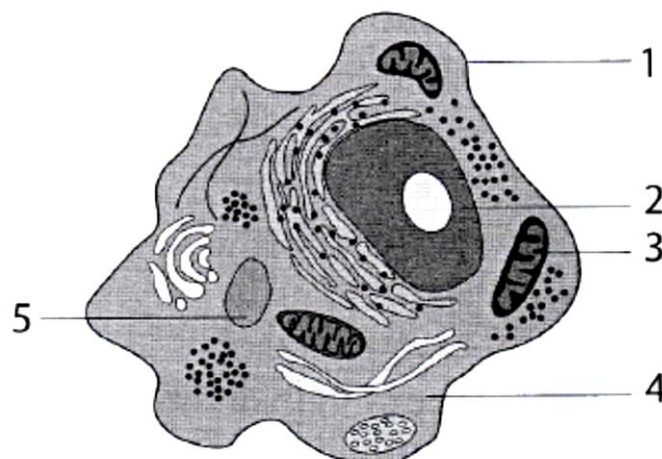
### INSTRUCTIONS

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.
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## QUESTION 3

[11]

- 3.1 Study the diagram below:



- 3.1.1 Give an appropriate heading for this diagram. (1)
- 3.1.2 Identify the parts labelled 1 – 5. (5)
- 3.1.3 What is the name of the process that takes place in the organelle numbered 3. (1)
- 3.2 List the ways that a plant cell is DIFFERENT FROM an animal cell. (4)
- 

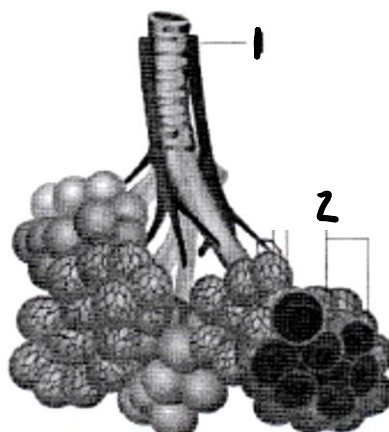
**QUESTION 4 [9]**

Choose the correct word/s for each of the following:

- 4.1 The pulmonary vein carries (**oxygenated / deoxygenated**) blood to the heart. (1)
- 4.2 The right ventricle receives (**oxygenated / deoxygenated**) blood from the body. (1)
- 4.3 The blood vessels carrying deoxygenated blood flow from (**heart to body / heart to lungs**). (1)
- 4.4 Copy and complete the table below which describes the properties of the main blood vessels in the human body: (6)

	Arteries	Veins
Wall thickness		
Blood direction		
Blood pressure		

**QUESTION 5 [4]**

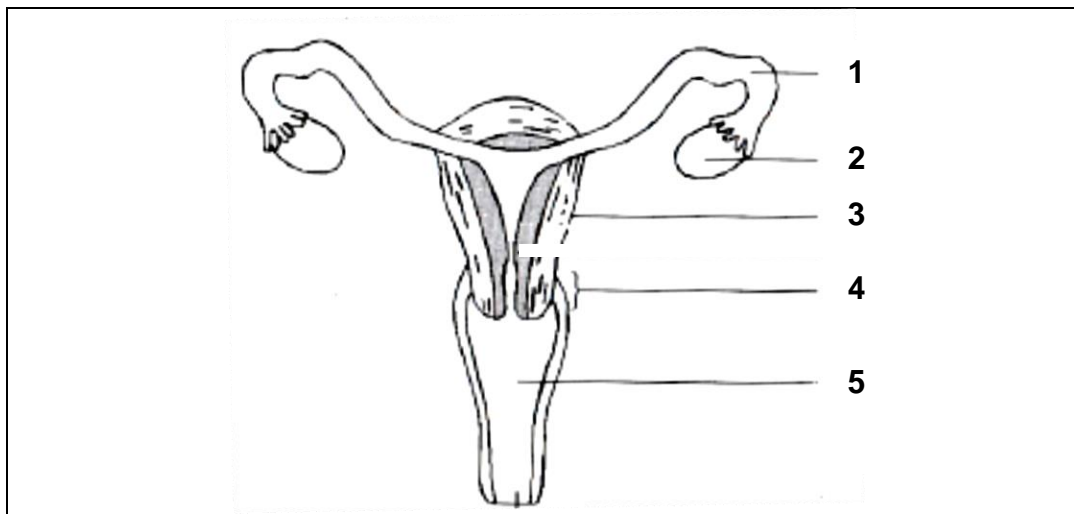


Study the diagram above and then answer the questions that follow:

- 5.1 Write a suitable label for the parts numbered:
- 5.1.1 **1** (1)
- 5.1.2 **2** (1)
- 5.2 What process takes place in the structures numbered **2**? (1)
- 5.3 Where else in the body does this process take place? (1)
- 

## QUESTION 6

[9]



- 6.1 Provide labels for the following parts:
- 6.1.1 **1** (1)
- 6.1.2 **2** (1)
- 6.1.3 **5** (1)
- 6.2 Write down only the number **1 - 5** for the part...
- 6.2.1 where the female sex hormone is produced (1)
- 6.2.2 where implantation takes place (1)
- 6.2.3 which is the birth canal for the foetus (1)
- 6.3 Explain the difference between menstruation and the menstrual cycle (2)
- 6.4 On which day of the menstrual cycle is ovulation expected to occur? (1)
-

## QUESTION 7

[7]

Read the case study below and answer the questions that follow.

### Malnourished Children Admitted to Hospital

Two boys, one aged 8 years and the other aged 12 years, were admitted to hospital for treatment of the worst form of malnutrition. They were just skin and bone. The boys each weighed about 10 kg. An 8-year-old child should weigh 25 kg and a 12-year-old should weigh 30 kg. They had only been fed porridge without milk. Their brain activity was lower than for normal children of that age. Serious starvation has an overall influence on children's development causing the body tissues and skeleton not to develop. The heart muscles are weak and there is no layer of fat under the skin.

- 7.1 Define the term *malnutrition*. (1)
- 7.2 How many kilograms underweight was each boy when compared to the normal weight of an 8-year-old and a 12-year-old? (2)
- 7.3 What food were the boys given before they were admitted to hospital? (1)
- 7.4 To which food group does the food mentioned in QUESTION 6.3 belong? (1)
- 7.5 Which nutrient was missing in their diet that is responsible for developing and building healthy bones? (1)
- 7.6 Which disease caused by malnutrition do you think these boys are suffering from? (1)

**TOTAL SECTION B : [40]**  
**TOTAL SECTION A & B : [50]**

## 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 8.1 and QUESTION 8.2.
3. Rule off after each question for example between QUESTION 8 and QUESTION 9.

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### QUESTION 8 : 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 (8.1 – 8.10) in the answer book.

- 8.1 A gas which forms diatomic molecules is....
- A. helium
  - B. chlorine
  - C. neon
  - D. carbon monoxide
- 8.2 A harmful compound formed when non-metal oxides are released into the atmosphere is ...
- A. rust
  - B. acid rain
  - C. sulphuric acid
  - D. hydrochloric acid
- 8.3 Metals are galvanised by coating them in a layer of this metal:
- A. aluminium
  - B. iron
  - C. steel
  - D. zinc
- 8.4 The correct name for the compound  $\text{Al}(\text{OH})_3$  is
- A. aluminium oxide
  - B. aluminium oxate
  - C. aluminium hydroxide
  - D. aluminium oxyhydride

- 8.5 Which equation is NOT balanced ?
- A.  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
  - B.  $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$
  - C.  $2\text{SO}_2 + \text{O}_2 \rightarrow \text{SO}_3$
  - D.  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- 8.6 The total number of elements present in  $3\text{Mg}(\text{NO}_3)_2$  is...
- A. 2
  - B. 3
  - C. 9
  - D. 27
- 8.7 Acids have a pH of ...
- A. 1-6
  - B. 7
  - C. 8-14
  - D. 1-14
- 8.8 Which of the following elements is classified as a semi-metal?
- A. aluminium
  - B. mercury
  - C. silicon
  - D. gallium
- 8.9 Bromine (Br) is from the group called ...
- A. noble gases
  - B. alkali earth metals
  - C. halogens
  - D. alkali metals
- 8.10 Which of the following ions are included in the formula  $\text{K}_2\text{SO}_4$  ?
- A.  $\text{K}^{2+}$  and  $\text{SO}_4^-$
  - B.  $\text{K}^{2-}$  and  $\text{SO}_4^+$
  - C.  $\text{K}^+$  and  $\text{SO}_4^{2-}$
  - D.  $\text{K}^-$  and  $\text{SO}_4^{2+}$
-

**QUESTION 9 : MATCHING COLUMNS****[10]**

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. (9.1 = C)

COLUMN A		COLUMN B	
9.1	Particles that make up the mass number of an atom	A	NaOH
9.2	The flame colour observed when sulfur burns in oxygen	B	O <sub>2</sub>
9.3	Colour of litmus paper when dipped into vinegar	C	diatomic
9.4	A gas that causes metals to rust	D	white
9.5	Uncharged particles found within the atomic nucleus	E	blue
9.6	A compound made up of 2 elements	F	neutrons
9.7	The flame colour observed when magnesium burns in oxygen	G	H <sub>2</sub> SO <sub>4</sub>
9.8	A solution that is an acid	H	binary
9.9	Nitrogen gas	I	nucleons
9.10	A solution that feels smooth and soapy	J	red

**TOTAL SECTION C : [20]**

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## SECTION D : MATTER AND MATERIALS

[50]

### INSTRUCTIONS

1. Leave a line between each sub question for example between question 10.1 and question 10.2.
2. Rule off after each question for example between question 10 and question 11.

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### QUESTION 10

[14]

10.1 Consider the formula **Cu(NO<sub>3</sub>)<sub>2</sub>**.

10.1.1 What is the name of this compound? (2)

10.1.2 Name the elements contained in this compound. (3)

10.1.3 How many atoms are there in 1 molecule of this compound? (1)

10.2 Study the table below:

Element	Symbol	Charge on the ion
a) Lithium	Li	+1
b) Silver	Ag	+1
c) Calcium	Ca	+2
d) Aluminium	Al	+3
e) Ammonium	NH <sub>4</sub> <sup>+</sup>	+1
f) Iodine	I	-1
g) Phosphate	PO <sub>4</sub> <sup>3-</sup>	-3
h) Fluorine	F	-1
i) Carbonate	CO <sub>3</sub> <sup>2-</sup>	-2
j) Nitrogen	N	-3

Using the above table, state the NAME and the FORMULA of the compound formed when:

10.2.1 (b) combines with (j) (2)

10.2.2 (c) combines with (f) (2)

10.2.3 (a) combines with (h) (2)

10.2.4 (e) combines with (i) (2)

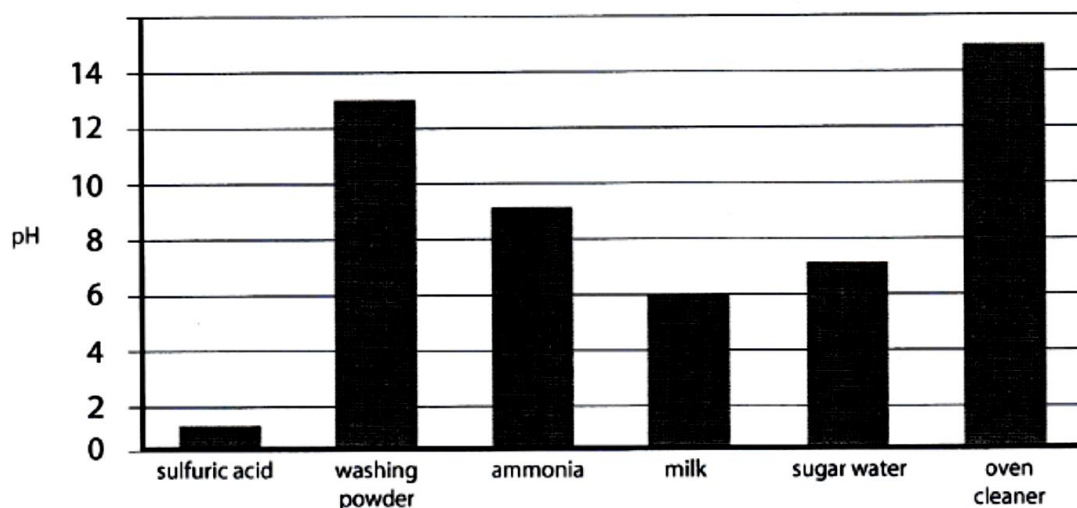
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## QUESTION 11

[6]

Grade 9 learners tested the pH of various substances using universal indicator. Their results are plotted in the following graph:

The pH of certain substances

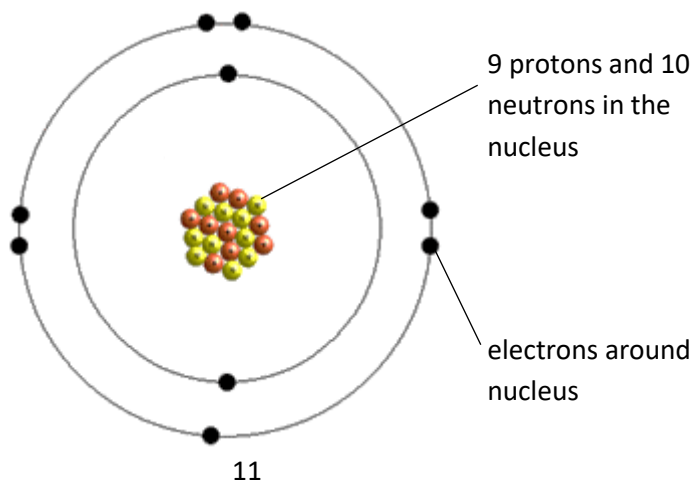


- 11.1 Write down the dependent variable in the experiment conducted by the learners. (1)
- 11.2 Write down the substance with pH 7. (1)
- 11.3 What colour will the substance in QUESTION 11.2 be in universal indicator? (1)
- 11.4 Arrange all the substances in a list from the strongest acid to the strongest base. (3)

## QUESTION 12

[5]

Use the diagram below to answer the questions which follow:

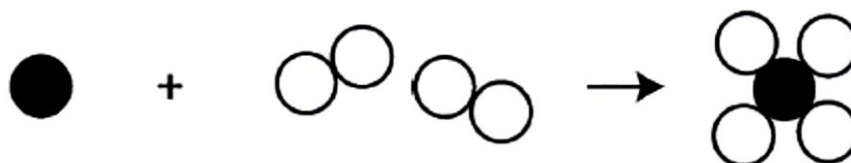


- 12.1 Write down the element's atomic number. (1)
- 12.2 Write down the element's mass number. (1)
- 12.3 Write down the NAME of this element. (1)
- 12.4 Write down the group number of the element on the Periodic Table. (1)
- 12.5 Is this element a metal, non-metal or semi-metal? (1)
- 

### QUESTION 13

[16]

- 13.1 The particle diagram below represents a chemical reaction. The black atom represents carbon and the white atoms represent hydrogen.



- 13.1.1 Write a balanced symbol equation for this chemical reaction. (3)

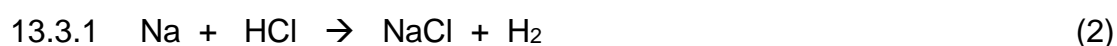
- 13.1.2 Complete the sentence:

One carbon atom reacts with \_\_\_\_\_ hydrogen molecule/s to form \_\_\_\_\_ methane molecule/s. (2)

- 13.2 Hydrogen gas will react with oxygen gas to form water.

Use ○ to represent a hydrogen atom and ● to represent an oxygen atom and draw a diagram to represent a balanced equation for this reaction. (3)

- 13.3 Re-write and balance the following equations:



- 13.4 Name the following compounds:



- 13.4.2  $\text{CF}_4$  (1)
- 13.5 Write formulae for the following compounds:
- 13.5.1 Sodium phosphide (1)
- 13.5.2 Magnesium hydroxide (1)
- 

**QUESTION 14**

**[9]**

- 14.1 Answer TRUE or FALSE for the following statements about chemical reactions:
- 14.1.1 Sulfur burns in oxygen to form carbon dioxide. (1)
- 14.1.2 Rusting is a chemical reaction of iron with oxygen in the air in the presence of water. (1)
- 14.1.3 Electroplating is a method used to protect metals from rusting. (1)
- 14.1.4 Iron burns in oxygen with a bright blue flame. (1)
- 14.2 A learner burns carbon powder over a Bunsen burner in air.
- 14.2.1 Write down a word equation of the reaction of carbon in air. (2)
- 14.2.2 Write down a balanced chemical equation for this reaction. (3)
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**TOTAL SECTION D : [50]**  
**TOTAL SECTION C & D : [70]**  
**GRAND TOTAL : [120]**

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