SCIENCE

Preamble for the Preparatory Test Items Developed Based on The Common Core Programme Science Curriculum for Junior High School. (SET 2)

CCP Science Curriculum Overview

Science is a collaborative and creative human endeavour arising from our desire to understand the world around us and the wider universe. The study of a Common Core Science Programme from Basic Year 7 through Basic Year 9 (JHS1 – JHS 3) enables learners to build on what they have learnt from B1 to B6, and to further develop their knowledge of and about science. We are surrounded by technology and the products of science every day. Government policy decisions that affect every aspect of our lives are based on scientific evidence. The immensely complex natural world that surrounds us illustrates infinite scientific concepts. As humans grow up in an increasingly technologically and scientifically advanced world, they need to be scientifically literate to understand issues and be able to live successfully. Economic, political, social and physical development of a country is hinged on science, technology and innovation. It is a never-ending creative process, which serves to promote discovery and understanding. It consists of a body of knowledge that attempts to explain and interpret phenomena and experiences. Science has changed our lives and it is vital to Ghana's future development. To provide quality science education, teachers must facilitate learning in an enabling science classroom. This will provide the foundations for discovering and understanding the world around us and lay the grounds for science and science-related studies at higher levels of education. Learners should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave and analyse causes and the origin of things in our environment. The science curriculum has considered the desired outcomes of education for learners at the upper basic level. Science is also concerned with the development of attitudes and therefore it is important for all citizens to be scientifically and technologically literate for sustainable development. Science therefore ought to be taught using practical and minds-on approaches, which learners will find as fun and consequently, adopt science as a culture.

GOAL AND AIMS

The CCP science curriculum is to develop individuals to become scientifically literate, good problem solvers, have the ability to think creatively and have both the confidence and competence to participate fully in Ghanaian society as responsible local and global citizens. Specific Aims The curriculum of the Common Core Science Programme for B7 to B9 is designed for learners to achieve the following aims:

1. Develop the spirit of curiosity, creativity, innovation and critical thinking for investigating and understanding their environment.
2. Develop skills, habits of the mind and attitudes necessary for scientific inquiry.
3. Communicate scientific ideas effectively.
4. Use scientific concepts in explaining their own lives and the world around them.
5. Live a healthy and quality life.
6. Develop humane and responsible attitude towards the use of all resources in Ghana and elsewhere.
7. Show concern and understanding of the interdependence of all living things and the Earth on which they live.
8. Design activities for exploring and applying scientific ideas and concepts.
9. Develop skills for using technology to enhance learning.
10. Use materials in their environment in a sustainable manner.

The Purpose of the Preparatory Test Items

This preparatory test has been developed to assess your understanding of key science concepts covered in the Common Core Programme Curriculum.

Again, this test goes beyond simply testing your knowledge (understanding of key concepts). It also assesses your ability to following core competencies:

Critical Thinking and Problem Solving: The ability to analyse situations, think logically, and find solutions to scientific problems.

Creativity and Innovation: Thinking outside the box and coming up with new ideas to explore scientific concepts.

Communication and Collaboration: Effectively communicating scientific findings and working together in teams to achieve shared goals.

Cultural Identity and Global Citizenship: Understanding the role of science in different cultures and its impact on global issues.

Personal Development and Leadership: Demonstrating self-awareness, taking initiative, and leading by example in scientific exploration.

Digital Literacy: Using technology effectively to research, analyse data, and present scientific findings.

This test aims to assess your learning across different cognitive domains, focusing on:

Knowledge: Understanding key scientific concepts and terminology.

Understanding: Interpreting information, explaining concepts in your own words, and making connections between ideas.

Application: Applying scientific knowledge to solve problems, conduct experiments, and make informed decisions.

Process Skills: Demonstrating essential scientific skills like observing, classifying, measuring, experimenting, and drawing conclusions.

Attitudes and Values: Developing a positive attitude towards science, appreciating its importance in everyday life, and acting responsibly towards the environment.

The test consists of a variety of question formats, including multiple-choice, short answer, experiments, and tasks that encourage you to demonstrate your core competencies.

Test Design:

The test items within each strand are aligned with the content standards, performance indicators, and core competences outlined in the Common Core Programme Curriculum. They assess your understanding across various cognitive domains, encompassing:

Knowledge: Recall and understanding of key scientific concepts.

Application: Ability to apply scientific knowledge to new situations and solve problems.

Reasoning: Analyse information, draw conclusions and evaluate the validity of scientific claims. At a higher level of learning behaviour, the learner is required to analyse an issue or a problem. At a much higher level, the learner is required to synthesise knowledge by integrating a number of ideas to formulate a plan, solve a problem, and compose a story. Further, the learner is required to evaluate, estimate and interpret a concept. At the last level, which is the highest, the learner is required to create, invent, compose, design, and construct. These learning behaviours “knowing”, “understanding”, “applying”, “analysing”, “synthesising”, “evaluating” and “creating” fall under the domain “Knowledge, Understanding, and Application”. These preparatory test items reflect all the above-listed demands of the science curriculum.

This test focuses on the five strands of the science curriculum:

Diversity of Matter: This strand explores the properties and composition of matter, including states of matter, elements, mixtures, and compounds.

Cycles: This strand focuses on natural cycles including the water cycle, rock cycle, and the carbon cycle. It explores how these cycles interact and sustain life on Earth.

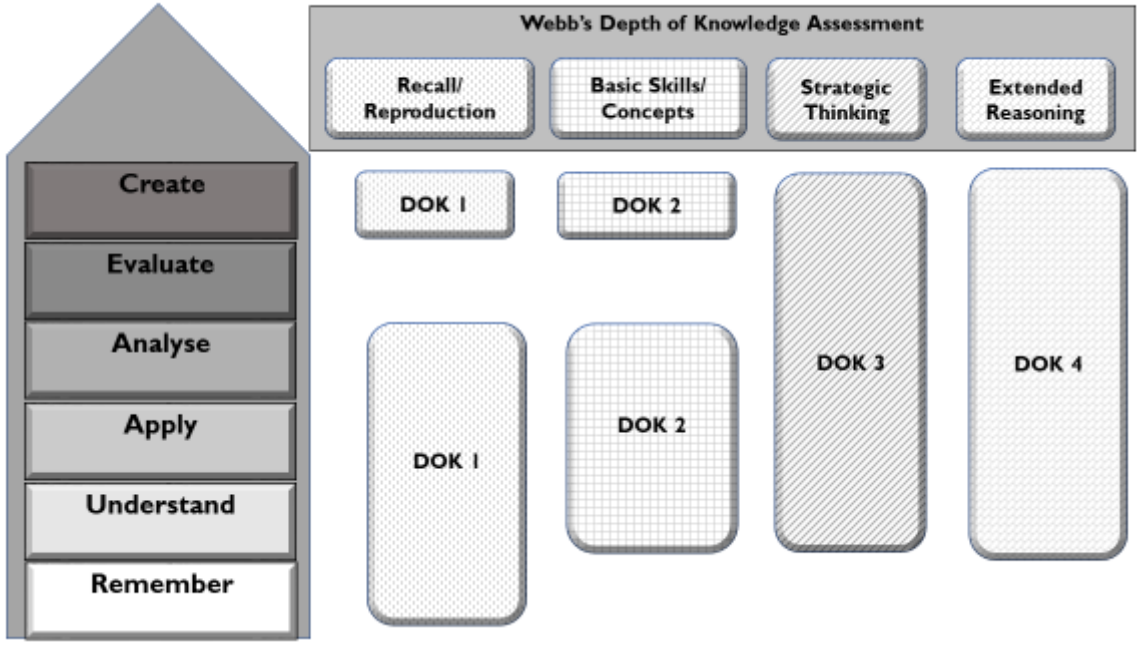
Systems: This strand investigates how different parts of a system interact to create a whole. It covers topics like the human body, ecosystems, and technological systems.

Forces and Energy: This strand explores the different types of forces, including gravity, electricity, and magnetism, and their relationship to energy transfer and conversion.

Humans and the Environment: This strand examines the interactions between humans and the environment, including topics like resource conservation, pollution, and sustainable practices.

ASSESSMENT: This preparatory assessment material for JHS 3 learners emphasises Webb's Depth of Knowledge and the revised Bloom's Taxonomy. Questions are designed to enhance critical thinking, problem-solving, and analytical skills, ensuring a comprehensive evaluation of learners' understanding and abilities across various cognitive levels.

By taking this test, you will gain valuable insights into your strengths and weaknesses in each scientific strand and core competence. This information can help you focus your studies and prepare effectively for future assessments.



BLUE-PRINT SUMMARY TABLE: BASIC 7-8-9 SCIENCE

		Assessment Areas		
		Level 1	**Level 2**	**Level 3**
Strand	**Sub-Strand**	**Know & Unders.**	**Application**	**Reasoning**
1: DIVERSITY OF MATTER	Materials	x	x	x
		x	x	X
		x	x	x
		X	x	x
	Living Cells	x	x	x
		x	x	x
			x	
	Earth Science	X	X	X
		X	X	
			X	

2: CYCLES	Life Cycle of Organisms	X	X	X
		X	x	x
	Crop Production	X	X	X
		X	X	x
			X	x
			x	
	Animal Production	X	X	X
		x	X	x
			X	x
3: SYSTEMS	The Human Body System	x	X	X
		x	X	x
			X	
	The Solar System	x	X	X
	Ecosystem	x	X	
			x	

	FARMING SYSTEMS	X	X	X
			X	x
			X	x
4: FORCES AND ENERGY	Energy	x	X	X
		X	X	X
		X	X	x
		X	X	x
			X	x
			X	
	Electricity And Electronics	x	X	X
		x	X	X
		x	X	X
			X	X
			x	x
	Agricultural Tools	X	X	X
		x	X	x

		x	X	
	Conversion & Conservation	x	X	X
		x	x	x
	Forces & Motion	X	X	X
		x	X	X
		X	X	X
		x	X	
		x	x	
		x		
5: HUMANS AND THE ENVIRONMENT	Waste Management	x	X	
		x	X	
			x	
	Human Health	x	X	x
		x	X	X
			x	x
			x	
	Science And Industry	x	X	x

		x		X
	Climate Change And Green Economy	x	X	X
		x	x	
		x		
	Understanding The Environment	x	X	X
		x	X	X
			x	
	Total	**48 (31%)**	**62 (40%)**	**46 (29%)**

SUMMARY TABLE				
Level	**Total Number of Indicators Count**	**Total Number of Indicators used**	**Percentage Number of Indicators used**	
B7	52	50	32	
B8	50	50	32	
B9	58	56	36	
TOTAL	**160**	**156**	**100**	

SCIENCE SET II MULTIPLE-CHOICE QUESTIONS

1. Which of the following sets of sub-atomic particles are located in the nucleus of the atom in diagram A

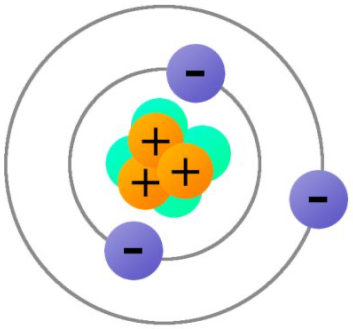


Diagram A

I neutrons
II Protons
III Electrons

A. **I and II**
B. **II and III**
C. **II only**
D. **I only**

level 1: application

2.The table below shows the properties of two materials

Properties of Material 1	Properties of Material 2
I. Conducts heat quickly II. Solid III. Does not dissolve in water IV. Attracted by magnets	I. Conducts heat slowly II. Solid III. Dissolves in water IV. Not attracted by magnets

Which statement about materials 1 and 2 is most likely to be correct? A. Material 1 is glass, and material 2 is clay.

B. Material 1 is copper, and material 2 is wood.

C. Material 1 is iron, and material 2 is sugar.

D. Material 1 is cork, and material 2 is gold

level 3: analyse

3.

Diagram X

Diagram X shows a torch switched on in a foggy atmosphere. The path of the light becomes visible. The scattering of the light is caused by

A. air particles in the fog.

B. dust particles in the fog.

C. sunlight passing in the fog.

D. water droplets in the fog.

level 3: application

4. There are different ways of separating mixtures. What name is given to the method of separation of mixtures as shown in Diagram A.

Diagram A

A. Threshing
B. Thriving
C. Sieving
D. Winnowing

level 1: application

5. Which of the following statements best describes the relationship between magnetic force and Newton's Second Law?

A. They are unrelated concepts.
B. Magnetic force only applies to very strong magnets.
C. Magnetic force explains why objects fall to the ground.
D. Newton's Second Law can be used to calculate the force exerted by a magnet.

level 1: knowledge/understanding

6. How do calcium and potassium contribute to the body's functions, as shown in the diagram

A. Calcium: blood pressure; Potassium: oxygen transportation.
B. Calcium: hydration; Potassium: digestion, nutrient absorption.
C. Calcium: metabolism; Potassium: immune system, hormone production.
D. Calcium: muscle, blood clotting, bone health; Potassium: heartbeat

level 3: application

7. A prokaryotic cell possesses all the following characteristics **except**

A. Exhibit asexual reproduction.
B. Exhibit sexual reproduction.
C. Have genetic materials in its nucleus.
D. D. Lack of nuclear membrane.

level 2: knowledge / understanding

8. In a pond ecosystem, algae are eaten by small fish, which are then eaten by larger fish. What is the role of the algae in this food chain?

A. Decomposer
B. Primary Consumer
C. Producer
D. Secondary Consumer

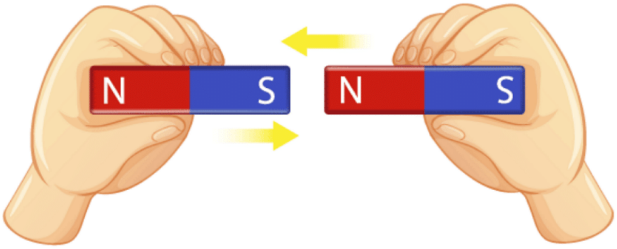
level 2: application

9. A fox eats a rabbit, which gets its energy from eating grass. How many trophic levels are there in this food chain?

A. 1
B. 2
C. 3
D. 4

level 3: reasoning

10. How do the poles of a bar magnet in the diagram show the important principle of magnetic attraction and repulsion?



A. Only similar poles attract, while opposite poles neither attract nor repel.
B. Opposite poles attract, and similar poles repel.
C. Opposite poles repel, and similar poles attract with varying degrees of force.
D. Similar poles attract, and opposite poles repel.

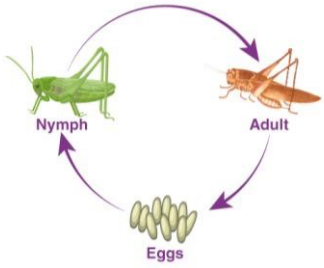
level 3: application

11. According to Newton's Second Law, the acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass. If a stronger magnet is used to repel the steel ball from question 10, what will happen to its acceleration?

A. It will decrease.
B. It will increase.
C. It will stay the same.
D. It's impossible to determine without knowing the mass of the ball.

level 3: application

12. In a bright grassland, grasshoppers go through incomplete metamorphosis, changing from egg to nymph to adult. The diagram illustrating these stages provides awareness into the grasshopper's development, emphasizing the importance of each stage in its life cycle.



What is the primary difference between grasshopper nymphs and adult grasshoppers as shown in the diagram?

A. Adults have fully developed reproductive organs
B. Nymphs are smaller in size compared to adults
C. Nymphs exhibit a different feeding behavior than adults
D. Nymphs have wings, while adults do not

level 1: knowledge/understanding

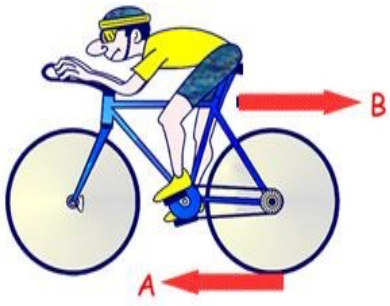
13. Asamoah Gyan kicked a ball with a large force as shown in the diagram.

According to Newton's Second Law of motion, what will happen to the acceleration of the ball?

A. It will be slow because the ball is round.
B. It will be very high due to the large force.
C. It will depend on the direction of the ball.
D. It will not accelerate at all.

level 3: application

14. Alhassan is riding a bicycle at a constant speed. Suddenly he was crossed by a goat and he quickly applied the brakes to help him slow down.

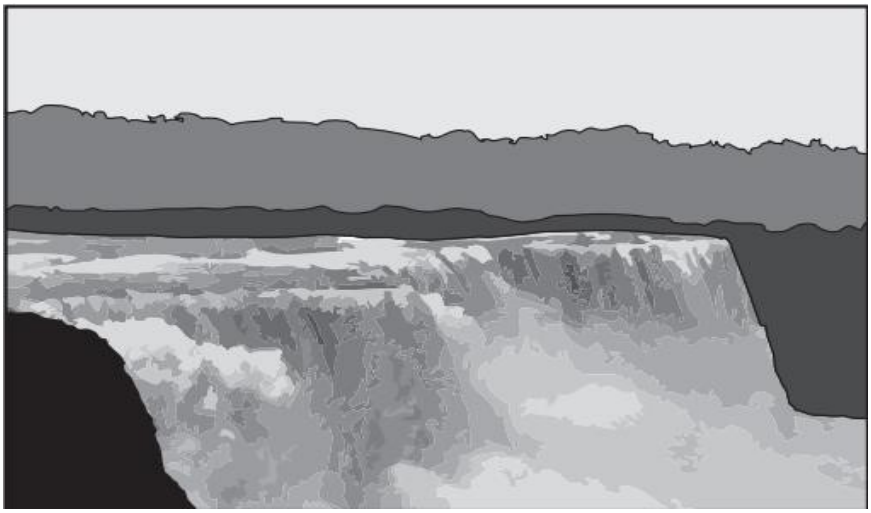


How will you best describe the relationship between the force exerted by the brakes and the bicycle's acceleration when Alhassan applied the brakes while riding at a constant speed and being crossed by a goat?

A. The force exerted by the brakes is greater than the bicycle's acceleration.
B. The force exerted by the brakes is equal to the bicycle's acceleration.
C. The force exerted by the brakes is less than the bicycle's acceleration.
D. The force exerted by the brakes causes the bicycle to accelerate faster.

level 3: application

15. A river flowing over a waterfall has a lot of energy



Which of the following energy is made from the waterfall?

A. hot water
B. solar power
C. electricity
D. drinking water

level 2: application

16. Miss Nancy Asieduwaa is performing an experiment where she adds a solid substance to a liquid. After stirring, she noticed that the solid particles were evenly distributed throughout the liquid, forming a homogeneous mixture. Which of the following terms best describes this mixture?

A. Solute
B. Solvent
C. Suspension
D. Solution

level 3: reasoning

17. In warehouses, forklifts are complex machines designed to lift and transport heavy objects as seen in the diagram Y. How does a forklift address the challenge of lifting heavy objects that humans face in warehouses?

Diagram Y

A. By relying on human strength
B. By using hydraulic systems for lifting
C. By utilizing magnetic technology
D. By utilizing telekinetic powers

level 3: application

18. In this experiment, car A is pushed down the track with a constant force. If you then place the bar magnet near car A, repelling it, what will happen to the car's acceleration compared to when there was no magnet?

A. It will increase because the magnet attracts the car.
B. It will decrease due to the repulsive force from the magnet.
C. It will stay the same.
D. It is impossible to determine without knowing the magnet's strength.

level 3: reasoning

19. Two toy cars with the same mass are pushed with different forces. The car pushed with a greater force will

A. experience a higher acceleration than the other car.
B. experience a lower acceleration than the other car.
C. experience the same acceleration as the other car.

D. It's impossible to determine without more information.

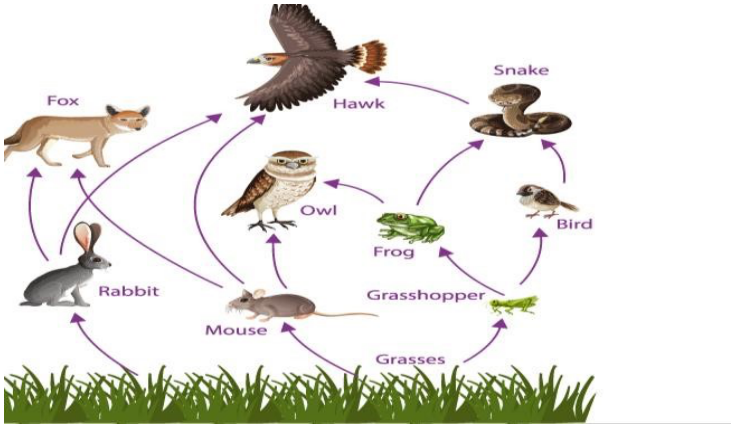
level 2: application

20. Mr. Mark Kwakye was given three substances, **X**, **Y**, and **Z**, and was asked to identify the solute and the solvent in each substance. He observes that substance **X** is a mixture of sugar dissolved in water, substance **Y** is a mixture of sand suspended in water, and substance **Z** is a mixture of oil floating on top of water. Which of the following correctly identifies the solute and solvent in substance **X**?

A. Solute: Sugar; Solvent: Water
B. Solute: Water; Solvent: Sugar
C. Solute: Petrol; Solvent: Water
D. Solute: Water; Solvent: Sand

Level 3 : application

Use the illustration in diagram R below to answer questions 20---21.



21. This illustration can best be found
in A. arboreal ecosystem.
B. desert ecosystem.
C. forest ecosystem.
D. grassland ecosystem.

level 1: analyse

22. Which organism occupies the trophic level with the least energy?

A. Eagle
B. Frog
C. Grasshopper
D. Snake

level 1: knowledge and understanding

23. What are the common symptoms of hepatitis?

A. Fever, cough, sore throat
B. Jaundice, abdominal pain, nausea
C. Muscle aches, fatigue, headache
D. Rash, dizziness, chest pain

level 1: application

24. Which option best describes the first step in a dammed river's process to produce electricity, as shown in the diagram?

A. Construction of the dam
B. Generation of hydroelectric power
C. Regulating water flow
D. Water flowing through turbines

level 1: application

25. The greenhouse gases impact the carbon cycle by

A. accelerating the process of photosynthesis.

B. decreasing the levels of carbon dioxide in the atmosphere.

C. increasing the repeated pattern of the carbon cycle.

D. trapping heat in the atmosphere, leading to global warming.

level 1: reasoning

26. This human activity contributes to the increase of greenhouse gases in the atmosphere.

A. Recycling waste materials to reduce emissions.

B. Planting more trees to absorb carbon dioxide.

C. Conservation efforts to reduce emissions.

D. Burning fossil fuels and deforestation.

level 1: application

27. What is the role of prokaryotes in the human microbiome?

A. They compete with other microorganisms, leading to infections.

B. They do not affect the microbiome.

C. They do not interact with other microorganisms in the body.

D. They help maintain a healthy balance of microorganisms in the body.

level 2: application

28. As shown in diagram E, Which of the following is not an adaptive feature of plants that do well in dry environments with little water?


Diagram E

A. Stem coated with a waxy.

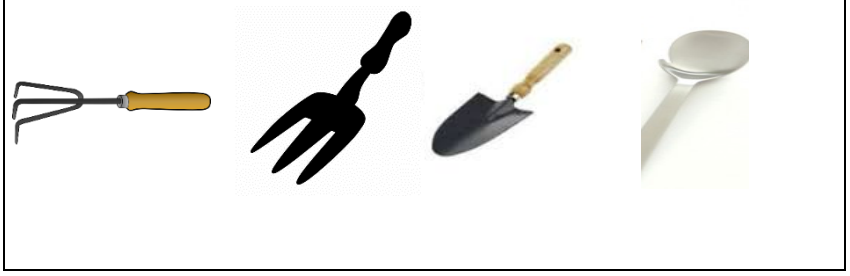
B. Roots deep in the earth.

C. Leaves look like spines.

D. Complicated root system.

level 3: reasoning

29. Which of the following is used for loosening the soil and cultivating the soil around the growing plants and putting a small amount of compost in the soil?



A. Hand cultivator

B. Hand fork

C. Hand spoon

D. Hand trowel

level 1: knowledge/understanding

30. The work input of a machine is 1000 J. If the work output is 800 J, calculate the machine's efficiency.

A. 75%

B. 79%

C. 80%

D. 82%

level 2: application

31. The efficiency of a machine is 75%. If the work output is 450 J, what is the work output? A. 600 J

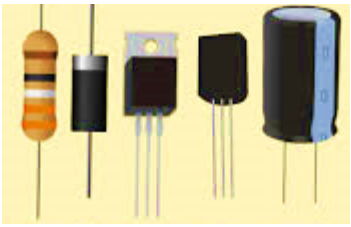
B. 500 J

C. 450 J

D. 400 J

level 2: application

32. In the illustration provided, the electronic component that enables current to flow in one direction only within an electric circuit is called ……



A. Capacitor

B. Diode

C. Resistor

D. Transistor

level 2: application

Use the diagram below labelled D to answer questions 33 -35

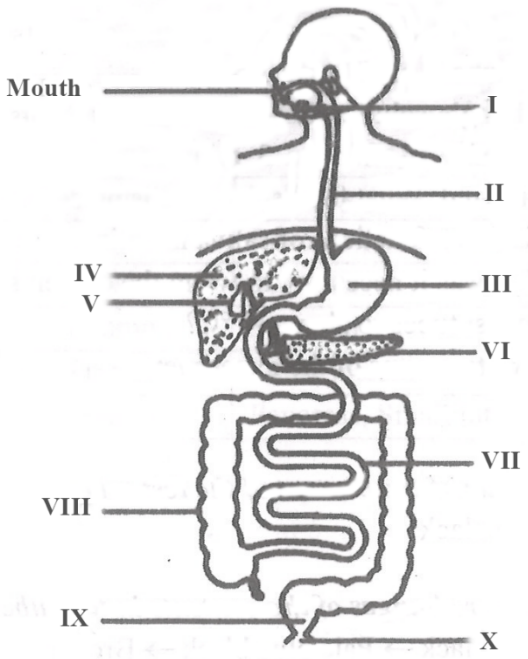


Diagram D

33. How does the digestive system function?

A. The body's blood-transporting system.
B. The body's breathing system.
C. The body's food-processing system.
D. The body's nervous system.
E.

level 1: reasoning

34. What occurs in the absence of the part labelled VII?

A. Elimination of waste from the body
B. No breakdown of food for body cells to use
C. Production of energy for life
D. Regulation of body temperature

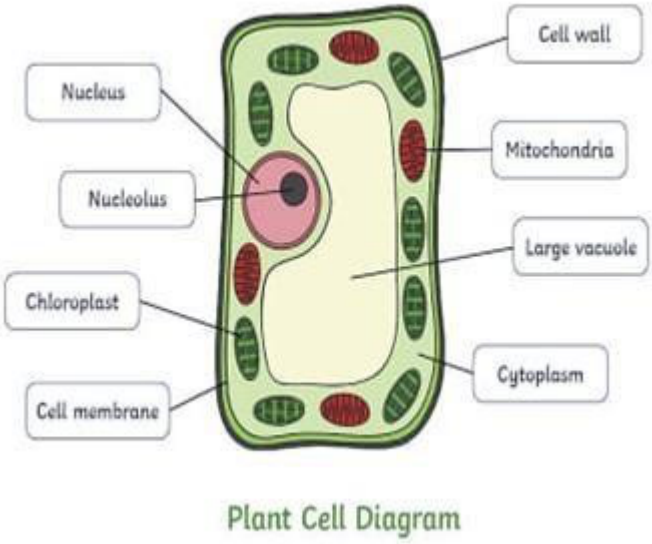
35. How does hydrochloric acid function in the part labelled III within the digestive system?

A. Hydrochloric acid aids in food digestion by breaking down proteins
B. Hydrochloric acid destroys germs that come with food substances
C. Hydrochloric acid provides essential nutrients to the body
D. Hydrochloric acid serves as an energy source for the cells in the stomach

level 3: reasoning

Use the diagram of the plant cell below to answer questions 36 and 37

36. Which organelle in the plant cell diagram below is responsible for photosynthesis?



Plant Cell Diagram

A. Chloroplast
B. Endoplasmic reticulum
C. Golgi apparatus
D. Vacuole

level 1: knowledge/understanding

37. All living cells contain the following parts below except?

A. Cellulose
B. Chloroplast

C. Cytoplasm

D. Starch

level 1: knowledge/understanding

37. Digestion takes place in a long tube-like canal called the alimentary canal

Food travels through these organs in the following order:

A. Mouth, gullet, stomach, small intestine, large intestine and rectum.

B. Mouth, oesophagus, stomach, large intestine, small intestine and rectum.

C. Mouth, stomach, gullet, small intestine, large intestine, and rectum.

D. Mouth, stomach, oesophagus, small intestine, large intestine, and rectum.

level 1: knowledge/understanding

38. The problems and disorders of the respiratory system shown in diagram T include:

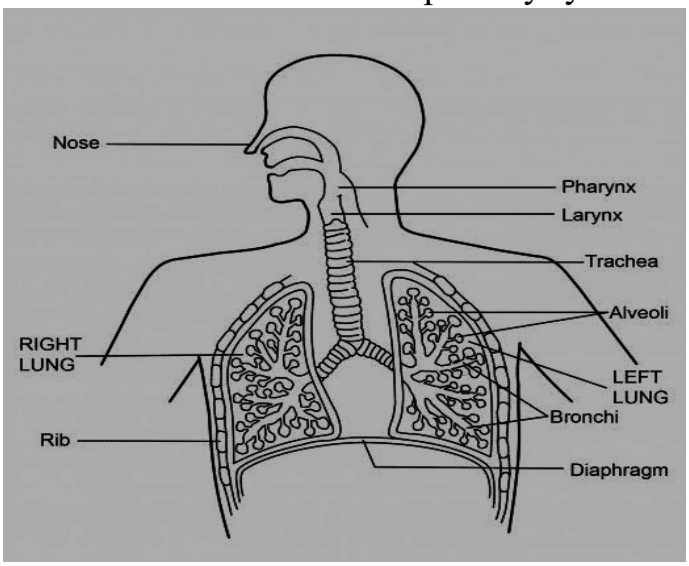


Diagram T

I. Asthma II. Tuberculosis III. Lung cancer IV. Pneumonia V. Arteriosclerosis

A. I, II, III, IV

B. I, II, III, V

C. I, II, IV, V

D. II, III, IV, V

level 1: analyse

39. Efficiency of energy is never 100%. This is because parts of the energy put into work

A. are changed into other forms of energy.

B. are used to overcome friction and inertia.

C. are used to overcome weight and gravity.

D. vanish into thin air without being seen.

level 2: application

40. Which of the following does NOT manufacture digestive juices?

A. Kidneys

B. Liver

C. Pancreas

D. Stomach

level 1: knowledge/understanding

Use the falling pawpaw to answer questions 41and 42.

A pawpaw falls to the ground from its stalk on a tree which is 4 m above the ground. If the mass of the pawpaw is 20 kg and rolls on the ground at 12 ms^{-1}, calculate the:

[take g = 10 ms^{-2}]

41. potential energy of the pawpaw.

A. 800 J

B. 700 J

C. 600 J

D. 500 J

level 2: application

42. kinetic energy of the pawpaw

A. 1420 J

B. 1430 J

C. 1440 J

D. 1450 J

2

level 2: application

43. Based on the information provided in diagram X, which of the following binary compounds

contain two molecules of hydrogen?

Diagram x

A. Hydrochloric acid

B. Nitrous oxide

C. Sodium chloride

D. Water

level 2: application

44. Which specialized animal cell in **diagram Y** is responsible for transmitting signs in the body?

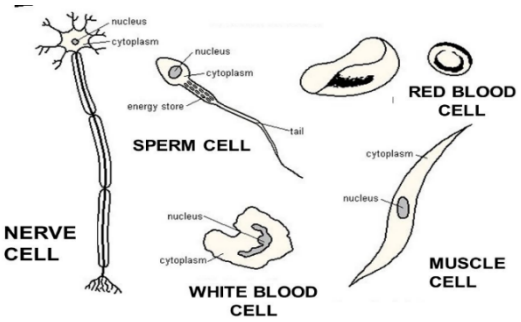


diagram Y

A. Blood Cell

B. Muscle Cell

C. Nerve Cell

D. Sperm Cell

level 1: knowledge/understanding

45. What does ammonification in the nitrogen cycle refer to?

A. Absorption of nitrogen by plants through their roots.

B. Breakdown of organic nitrogen compounds into ammonia by decomposers.

C. Conversion of atmospheric nitrogen into a usable form by plants.

D. Release of nitrogen gas back into the atmosphere by denitrifying bacteria.

2

level 1: application

46. In a green grazing land ecosystem, grasshoppers play a key role in nutrient recycling through their feeding habits. As they consume grasses and weeds as seen in diagram Z, their actions lead to a series of consequences that influence the nutrient cycle. How do grasshoppers contribute to nutrient recycling in the ecosystem?

Diagram Z

A. By breaking down organic matter

B. By increasing water availability in the soil

C. By decreasing plant growth

D. By attracting more predators

level 2: reasoning

47. A seasoned farmer is preparing to plant the crops as seen in the diagram F below.

Diagram F

How will the knowledge of the maturity stages of different crops help the farmer in this journey?

Choose the best option.

A. Quality of the harvest.

B. Selection of crops that align with only growing season.

C. Selection of time of harvest only

D. Selection of varieties of crops that align with the climate, soil type and time of harvest.

level 3: application

48.

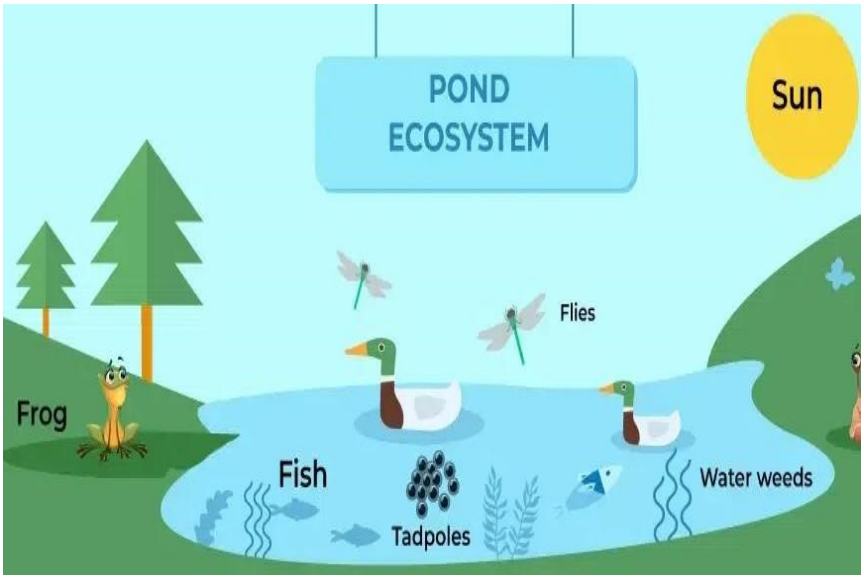


Diagram Z

Yaa Mansa found some tadpoles and fish in a pond as shown above in Diagram Z. How did the tadpoles get there?

A. They developed from eggs laid by frogs in the pond.

B. They formed from mud at the bottom of the pond.

C. They hatched from eggs laid by fish in the pond.

D. They were made from materials dissolved in pond water. =

level 2: application

49. You are pushing a shopping cart with a constant force. If you add more foodstuffs to the shopping cart (increasing its mass), what will happen to its acceleration?

A. It will become erratic.

B. It will decrease.

C. It will increase.

D. It will remain the same.

level 3: application

50. In a calm tropical rainforest, natural factors such as closeness to large bodies of water, altitude, and dense vegetation play key roles in shaping the region's climate. These factors give to the special weather patterns and environmental conditions experienced within the rainforest ecosystem as shown in diagram X

Diagram X

How does the closeness to large bodies of water influence the climate of the tropical rainforest?

A. It accelerates soil erosion

B. It increases the frequency of droughts

C. It leads to extreme temperature fluctuations
D. It moderates temperature changes throughout the year

level 2: reasoning

51. Baaba and Ali are discussing the colours of light. They decided to think about how they can see the colours of the Ghana flag.

What scientific principle is helping them to see the colours?

A. diffraction
B. Mirage
C. Reflection
D. Refraction

level 3: application

52. In a flourishing farm ecosystem, water and feed play serious roles in supporting the growth and reproduction of animals. Suitable access to these important resources ensures the health and well-being of the livestock, contributing to a workable farming procedure.

Why is water vital for the growth and reproduction of animals on the farm?

A. It accelerates the ageing process in animals
B. It decreases the need for regular veterinary care
C. It helps regulate body temperature and digestion
D. It provides essential nutrients for bone development

level 3: reasoning

53. How do modern industries typically differ from indigenous industries in terms of market reach?

indigenous industries

modern industry

A. Indigenous industries mostly target niche markets for specialized products.

B. Indigenous industries rely on e-commerce platforms, whereas modern industries follow traditional marketing methods.

C. Modern industries cater to local markets, while indigenous industries focus on international trade.

D. Modern industries have a broader market reach due to advanced distribution networks.

level 2: application

54. A battery of voltage, 20V is connected across a resistor of resistance, 3.0Ω. What is the current flowing in the circuit?

A. 6.70A

B. 6.50A

C. 7.03A

D. 6.67A

level 2: application

55. Look at the diagrams. How will you describe them in terms of electrical connection and flow of current?

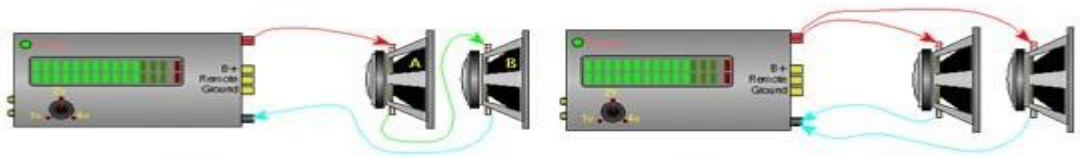
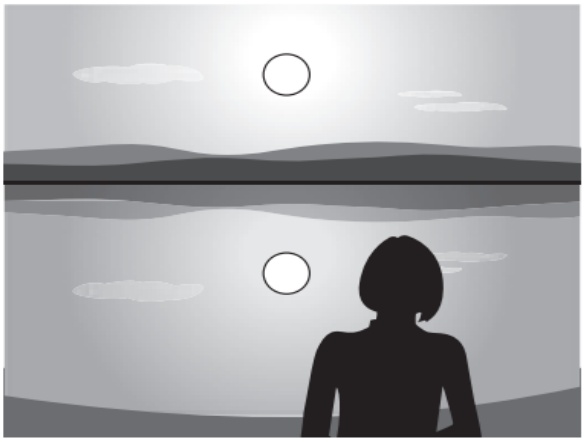


Diagram A **Diagram B**

a. Current flows through all the devices are different.
b. Each device receives the same voltage in diagram B.
c. Speakers in diagram A and B are in series.
d. Speakers in diagram B are in series.

level 3: application

56. Alice watches a sunrise from across a calm lake. She sees a sun in the sky and a sun in the lake as shown below.



Why does Alice see a sun in the lake?

A. The sunlight warms that part of the lake.
B. The sky spreads sunlight over the lake.
C. The sunlight reflects off the lake water.
D. Clouds reflect sunlight into the lake

level 3: application

57. In the agricultural fields, farm workers are thoroughly working on their crops under the healthy sun. Explore the tools they use to carry out their tasks efficiently

How can farm workers best break up clumps of dirt and remove weeds when preparing the soil for planting?

A. By using Hoe
B. By using Pitchfork
C. By using Rake
D. By using Shovel

Level3: reasoning

58. It is crucial to understand the environmental impact of plastic, glass, paper, and metal waste for effective waste management. Each type of waste has distinct challenges and recycling opportunities. Proper disposal and recycling practices are vital to reduce the environmental footprint and foster a more sustainable future.

How does plastic waste differ from glass waste, paper waste, and metal waste in terms of its environmental impact, especially on wildlife and ecosystems?

A. Glass waste is easy to recycle but may pose risks of breakage during handling.
B. Metal waste can be recycled into new products, reducing the need for virgin resource
C. Paper waste is biodegradable but can contribute to deforestation if not recycled efficiently.
D. Plastic waste is non-biodegradable and can lead to pollution and harm to wildlife.

level 2: application

59. In the field of science, which career involves researching sea life, ecosystems, and environmental conservation through observation and analysis?
A. Astrophysicist
B. Biomedical Engineer
C. Marine Biologist
D. Meteorologist

Level 3: application

60. The picture below shows an iron.

When considering an iron as an example of a system, what is the input?
A. electricity
B. temperature
C. motion on clothes
D. steam from the plate

Level 3: Application

SCIENCE

PART I: TEST OF PRACTICALS

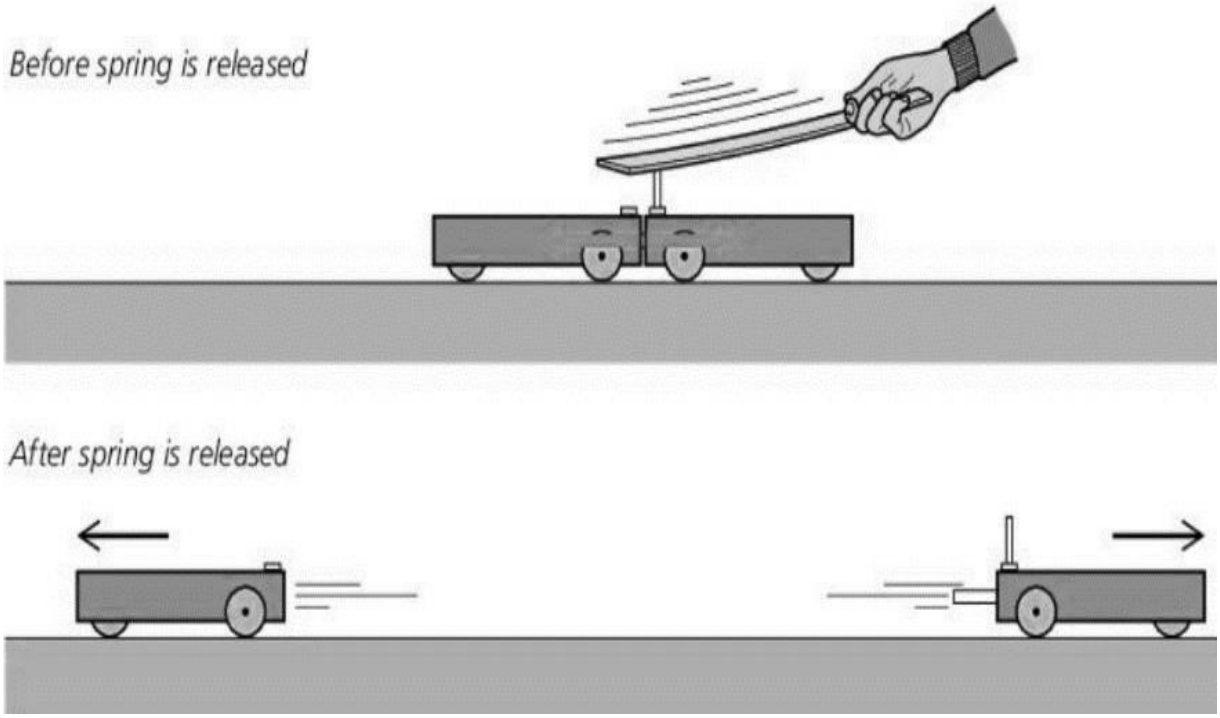
Answer all the questions from this part

1. a. Carefully read the brief description of the ecosystem. Answer the questions that follow based on the information provided to show your understanding of the ecosystem.

In an interconnected ecosystem with terrestrial, marine, and arboreal elements, the delicate balance of interdependence among various animals maintains a calm balance for life on Earth. From the high trees providing shelter for birds to aquatic plants releasing oxygen for marine life, each organism plays an important role in the health and stability of the ecosystem. Birds play an important role in pollination and seed dispersal, aiding in the reproduction of various plant species within the ecosystem. By appreciating the relationships between these components and preserving natural habitats, we ensure biodiversity, ecological stability, and the well-being of our planet and its inhabitants.

a. How do birds benefit from trees from the description?
b. Explain how birds and plants affect one another in an ecosystem.
c. Write **three** examples of ecosystem as a self-sustaining unit in which components interact.
d. How will life on earth be without the sun?
e. Predict how mining, "galamsey," will disrupt the balance within an ecosystem.

b. The experiment below shows the effect of a pair of forces. The two trolleys are stationary. One of them contains a spring-loaded piston which shoots out when a release pin is hit. Study the diagram



carefully and answer the questions that follow.

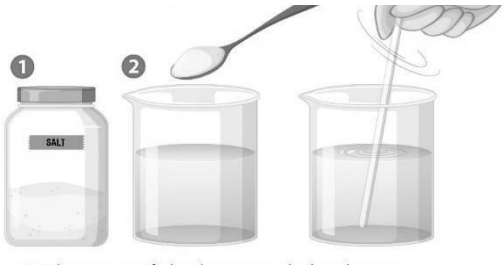
I. What happens when the trolley is released?

II. How will you describe the pair of forces?

III. Which Newton's law of motion is shown above?

IV. If the mass of the trolley is 100kg and is moved with an acceleration of $4m/s^2$. Find the force with which it moves.

c. The excited students of the scientific club have embarked on an interesting experiment in which they hope to make a solution by combining salt and water with beakers and stirring rods. The students assemble around the laboratory bench, ready to learn about salt dissolving to form solutions. Lively talks about salt characteristics and its solubility fill the room as students readily await the results of their hands-on experiment through the following steps.



I. Take a container of salt and measure out the desired amount you want to dissolve.

II. Pour the salt into a beaker of water.

III. Using a stirring rod, gently stir the water until the salt is dissolved.

Look at the set up and the steps carefully and give answers to the questions.

a) What factors affect the rate of salt dissolving in water when stirred with a stirring rod?

b) How can you determine if all the salt has completely dissolved in the water after stirring?

c) How does the temperature of the water used influence the process of dissolving salt in water?

d) What specific properties of salt make it soluble in water compared to other substances?

e) How would you separate the dissolved salt from the water to recover the salt from the solution?

d. A group of willing students strongly decided on sowing seeds find themselves without traditional seed beds. They chose to use disposable bowl as temporary containers for growing their seeds. A diagram illustrates the setup with seeds planted in the bowl, showcasing their big ideas to starting a mini garden. Study the diagram carefully and answer the questions that follow.

I. What **four** specific requirements are there for the growth of the seeds.

II. How will you ensure adequate drainage within the disposable bowl cups to prevent waterlogging.

III. What strategies will you put in place to provide sufficient sunlight and warmth for the seeds to germinate in the absence of a traditional seedbed?

IV. How frequently do you plan to water the seeds in the yogurt cups, and what indicators will you observe to determine the moisture levels for optimal plant growth? V. Write the **two** types of seed beds that you can transplant the seedlings into

V. What **two** different plant parts will you advise the students to select and plant in different seed beds.

PART II

Answer any **four** questions from this part

Imagine you are a tiny water droplet named Anokye, embarking on a journey through the water cycle. Starting from the Volta Lake, you evaporate into the sky as sunlight warms the water's surface. As you rise higher and higher, you join other water droplets to form fluffy clouds. Suddenly, the temperature drops, and you condense into larger droplets, eventually falling back

to earth as rain. Your journey continues as you seep into the soil, becoming groundwater, and eventually flowing back into the lake where your adventure began.

(a) Describe in detail each stage of your journey.

(b) Explain the processes involved in transforming from one state to another.

(c) What role do you play in sustaining life on earth throughout your journey?

(d) Distinguish between energy conversion and energy conservation.

(a) The heart in every human plays a very important role in the distribution of blood carrying oxygen and nutrients to all parts of the body. By taking care of the heart, individuals can help ensure the proper distribution of blood carrying essential nutrients to all parts of the body. One early morning, after a vigorous exercise, a 54-year-old man developed a heart infection and was rushed to the hospital. He had taken appropriate precautions and so asked how the infection could have occurred. The doctor used the symptoms of the infection to explain this.

(i) What signs and symptoms of the heart problems did the doctor most likely highlight?

(ii) How would regular exercise benefit the man?

(iii) What lifestyle habits should be adopted to promote heart health?

(b) What will happen if the nitrogen cycle is interrupted by human activities?

(c) Show with the help of a sketch the arrangement of solid, liquid and gas particles.

3 (a) Explain **three** effects of thermal electricity generation on the environment.

(b) Describe **four** ways your household can employ to reduce electricity bills on daily routine activities.

(c) Write the chemical formula for each of the following binary compound

(i) Carbon(IV) oxide

(ii) (ii)Iron(II) sulphide (iii) Magnesium oxide

(d) At sunrise, farmers plant seeds and make tools from plants on the farm. Later, they build shelters for animals using leaves and branches, all coming together in with nature for a sustainable and pleasant-sounding environment. From the scenario, how do farmers use plant parts for agricultural practices.

4 (a) "Science and technology are often described as two sides of the same coin". Explain this statement giving at least three examples.

(b) A group of farmers in your community invests in wind turbines to harness the power of wind energy to generate electricity for their agricultural practices.

(i) Explain **three** environmental benefits that farmers can expect to gain from their project.

(c) Your community has been exposed to the activities of the housefly for the past two weeks.

(i) Write **three** things you can put on posters to educate your community on how to reduce the housefly menace? (ii) Distinguish between ionic bonding and covalent bonding.

5 (a) Explain **three** ways science and technology are used in the community.

(b) (i) Draw and label the structure of a plant cell.

(ii) Briefly explain how the absence of mitochondrion and lysosome would affect the cell's functioning and overall survival.

(iii) Describe **three** observable impacts of climate change on your local community.

(c) Predict what happens when.

(i) a force is exerted on an object.
(ii) there is a reaction from the object
(iii) the force exerted is the same as the reaction of the object.

(a) Draw the electron configuration of aluminum.

END OF QUESTIONS