UNITED ARAB EMIRATES
MINISTRY OF EDUCATION

الإمارات العربية المتحدة
وزارة التربية والتعليم

G8 Advanced EoT1 Example Questions 2025-26

Question 1 a
Design a simple investigation and identify which step of the scientific method you would begin with. You will begin with stating the problem in the form of a question.
Question 1 b
1. **Define** Summarize the steps you might use to carry out an investigation using scientific methods. • state the problem • gather information • form a hypothesis • test the hypothesis • analyze the results • draw conclusions

Question 2 a
During a chemical reaction in a closed system, what happens to the total mass of the substances involved? The mass is conserved (stays the same).
Question 2 b

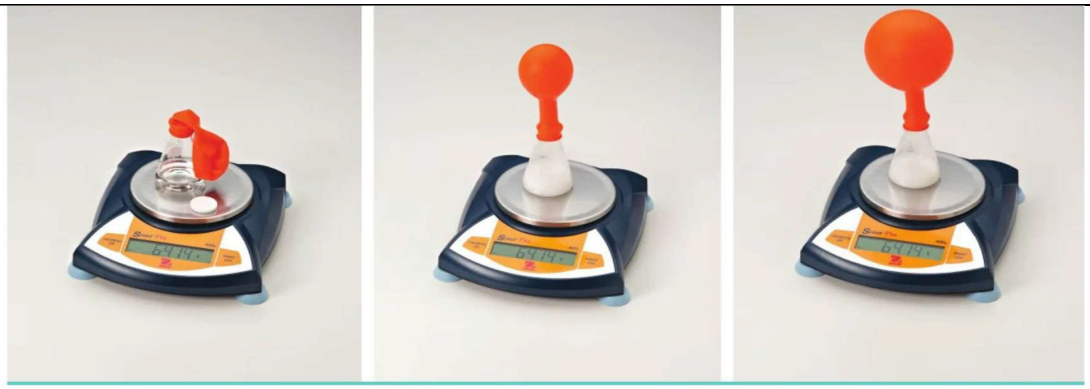


Figure 19 The reaction between sodium bicarbonate and hydrochloric acid produces carbon dioxide gas, which is collected in the balloon.

Describe *How can you tell that matter was not created or destroyed in this reaction?*

The mass was the same before and after the reaction.

Question 3 a
How would changing the number of protons in an atom affect the element it represents? Changing the number of protons changes the identity of the element.
Question 3 b
Get It? **Interpret Table 4** to identify the name and the atomic number of the element with 29 protons. The element is Copper (Cu).

Question 4 a
Describe where plasma is commonly found in the universe and why it is so abundant. The sun, stars, and outer space
Question 4 b
How does plasma differ from the other states of matter? Plasma is made of electrons and other charged particles.

Question 5 a
What is the name of the element with the symbol 'Na'? Sodium
Question 5 b
What is the name of the element with the symbol 'Cl'?

Chlorine

Question 6 a

Compare two isotopes of carbon and explain how they are similar and different.
They are similar because they have the same number of protons.
They are different because they have a different number of neutrons.

Question 6 b

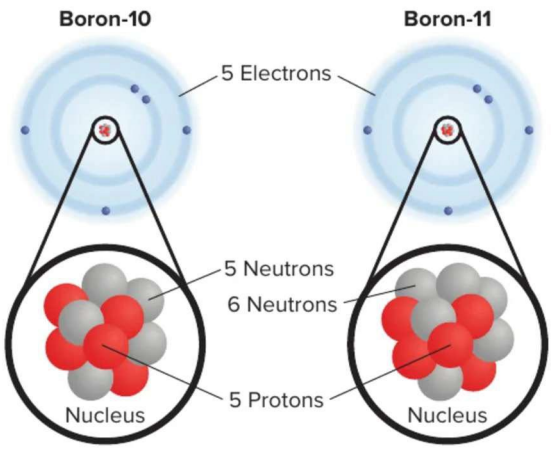


Figure 7 Boron-10 and boron-11 are two isotopes of boron. These two isotopes differ by one neutron. Most naturally occurring elements have more than one naturally occurring isotope.

Explain *why these atoms are isotopes.*

The atoms are isotopes because they have a different number of neutrons.

Question 7 a

Two objects of the same size are placed in water. One floats and the other sinks.
Explain how their densities compare and why this affects their behavior in water.
The object that floats has a density less than water and the object that sinks has a density greater than water. Objects with a density less than water will float, objects with a density greater than water will sink.

Question 7 b

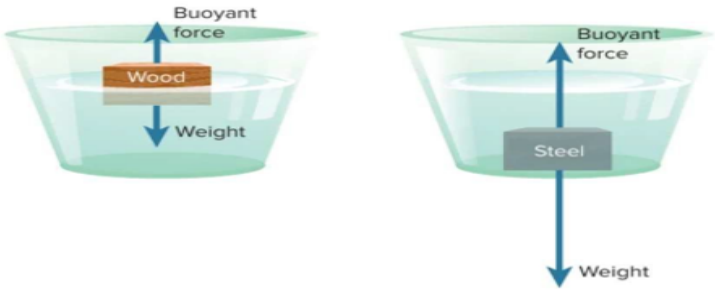


Figure 13 The steel block sinks because the buoyant force from the fluid is less than the gravitational force on the object. When the buoyant force is the same as or greater than the gravitational force—as with the wooden block—the object floats.

Compare *the volumes of the wood block and the steel block. How do the masses of the wood block and the steel block compare?*

The volume of both blocks is the same. The steel block has more mass than the wood block.

Question 8 a
Give a real-life example of sublimation and explain the process involved. Sublimation is the process in which a solid changes directly into a gas, skipping the liquid state. Frozen carbon dioxide (dry ice) is an example of sublimation. The frozen carbon dioxide changes directly into a gas.

Question 8 b
Figure 6 Carbon dioxide (CO_2) turns from a solid directly to a gas. Because this gas is very cold, it causes water in the air to condense, forming a white fog. **Explain,** *at the molecular level, the behavior of CO_2 as it undergoes this phase transition.* The particles in the CO_2 begin to move faster and spread farther apart, overcoming the forces of attraction.

Question 9 a
Classify milk and muddy water as either colloids or suspensions and justify your answer. Milk is a colloid because the particles do not settle. Muddy water is a suspension because the mud particles settle at the bottom of the water.

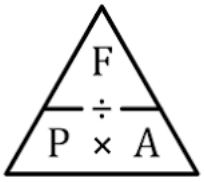
Question 9 b
Figure 7 River water is a suspension that carries soil and sediment. If river water slows or sits undisturbed, the suspended particles settle out. **Explain** *How can you tell that river water is a suspension?* The sediment in the river will settle out at the bottom of the river.

Question 10 a
Explain what happens to the energy of particles during the melting process. The kinetic energy of particles increases.
Question 10 b
Figure 7 Although thermal energy is added at a constant rate, the temperature of the water increases only at *a*, *c*, and *e*. At *b* and *d*, the added energy is used to overcome the attractions between the particles. **Infer** *how this graph would be different if 2.0 kg of water were being heated instead of 1.0 kg of water. How would this graph be different if 0.5 kg of water were being heated?* The shape of the graph would not change but the time needed for 2.0 kg of water will double and the time for 0.5 kg will be halved.

Question 11 a
16. **MATH Connection** In a survey, it was reported that 56 out of 245 people would rather drink orange juice than coffee in the morning. Calculate the percentage of a circle graph that orange-juice drinkers would occupy. 22.9%: 56 / 245 × 100 = 22.9%, 0.229 × 360 = 82° of circle graph
Question 11 b
14. **Compare and Contrast** How are line, bar, and circle graphs similar? How are they different? All three graphs are used to display data. A line graph shows relationships between two variables. A bar graph can be used to compare information. A circle graph can be used to show percentages.

Question 12 a
11. **MATH Connection** What is the density of an unknown metal that has a mass of 158 g and a volume of 20 mL? Use **Table 4** to identify this metal. Density = mass / volume D = 158 g / 20 mL D = 7.9 g/mL; the metal is iron
Question 12 b
An object has a mass of 135 grams and a volume of 50 cm^3. Calculate the density of the object. Density = mass / volume D = 135 g / 50 cm^3 D = 2.7 g/cm^3

Question 13 a
Describe how you could use physical properties to separate sand from sugar. Add water to the mixture to separate the sand, then use evaporation to separate the sugar from the water.
Question 13 b
You are given a mixture of salt and sand. Which method would best separate them? Add water to the mixture to separate the sand, then use evaporation to separate the salt from the water.

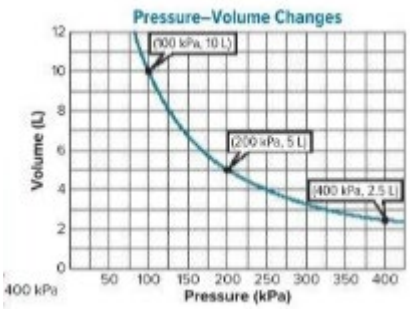
Question 14 a
A student applies a force of 200 N over an area of 0.01 m². Calculate the pressure. Pressure = Force / Area Pressure = 200 N / 0.01m^2 Pressure = 20,000 Pa
Question 14 b
EXAMPLE Problem 1 **CALCULATE FORCE** Atmospheric pressure at sea level is about 101 kPa. With how much total force does Earth's atmosphere push on an average human being at sea level? Assume that the surface area of an average human is 1.80 m².    101 kPa = 101,000 Pa F = pressure x area F = 101,000 x 1.80 F = 181,800 N

Question 15 a
6. **Determine** the mass number and the atomic number of a chlorine atom that has 17 protons and 18 neutrons. Mass number = protons + neutrons Mass number = 17 + 18 Mass number = 35 Atomic number = number of protons Atomic number = 17

Question 15 b
An oxygen atom has 8 protons and 10 neutrons. Determine the atomic number and mass number of this atom. Atomic number = 8 Mas number = 18

Question 16 a
How do the Bohr model and the electron cloud model each help scientists understand the behavior and location of electrons in an atom? The **Bohr model** helped scientists understand that electrons occupy specific energy levels, while the **electron cloud model** shows that electrons move unpredictably within regions of where they are most likely to be found.
Question 16 b
Get It? **Explain** the difference between the Bohr model and the electron cloud model. The electron cloud model states that there is an area around the nucleus of an atom where the electrons can be found. The Bohr model places the electrons in fixed orbits around the nucleus.

Question 17 a
Explain how the electron configuration of neon makes it unreactive. Neon has 8 valence electrons which means its energy levels are complete and it does not need to gain or lose electrons.
Question 17 b
1. **Explain** why some elements are stable on their own, while others are more stable in compounds. If an element has a full outer energy level, it has a tendency to not react because it is stable already. If an element does not have a full outer energy level, then it will form a compound by gaining, losing, or sharing electrons with other atoms in order to achieve a full outer energy level.

Question 18 a
Use Charles's Law to predict how the volume of a gas changes with temperature. If the temperature increases, then the volume will increase. If the temperature decreases, then the volume will decrease.
Question 18 b
23. CHALLENGE A gas is heated so that it expands from a volume of 1.0 L to a volume of 1.5 L. If the initial temperature of the gas was 5.0°C, then what is the final temperature of the gas? $\frac{V_i}{T_i} = \frac{V_f}{T_f}$ 5 + 273 = 278 1 / 278 = 1.5 / x X = 417 – 273 = 144°C
Question 19 a
Analyze a pressure-volume graph to determine the relationship between pressure and volume. As the pressure increases, the volume decreases. 
Question 19 b
Figure 20 As volume is decreased, a gas exerts increased pressure on the walls of its container. The three canisters are depicted on the graph. **Interpret** *What happens to the volume of a gas if the pressure on that gas is doubled?* The volume will decrease by the same amount.

Question 20 a
An experiment was designed to investigate the effect of caffeine on reaction time. Identify the dependent variable. Reaction time
Question 20 b
An experiment was designed to test whether the amount of sleep affects students' test performance. Identify the independent variable. The amount of sleep

Question 21

What happens to particles when a solid turns into a liquid?
The particles begin to move faster and slide past each other.

Why do gases have more kinetic energy than solids?
Gases are able to overcome the force of attraction between particles as the kinetic energy increases, and the particles start to move faster.

What is thermal expansion, and how does it affect materials when they are heated?
Thermal expansion is an increase in the size of a substance when the temperature is increased. The materials get bigger when heated.

What does a heating curve tell us about how substances change state?

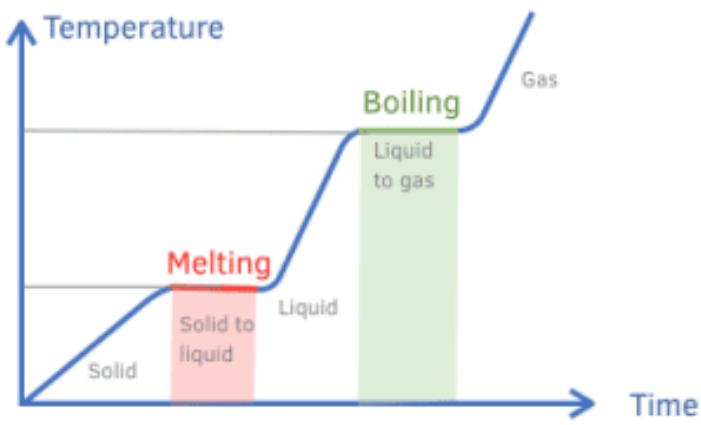


Fig 2. Heating Graph.

Figure 7 Although thermal energy is added at a constant rate, the temperature of the water increases only at *a*, *c*, and *e*. At *b* and *d*, the added energy is used to overcome the attractions between the particles.

Can you think of a material that behaves differently when heated? Describe what happens.

When metals are heated, their particles move faster and spread out a little, causing **thermal expansion**. This change in behavior is due to the increased motion of atoms as they absorb heat energy.

Question 22

What is viscosity, and why does it matter in everyday life?
Viscosity is the **"thickness" or resistance to flow** of a liquid. It matters because it affects how fluids move, spread, and perform in many everyday situations — from cooking and driving to cleaning and healthcare.

Why do some objects float while others sink in water?
Density and buoyancy

How does pressure applied to a fluid affect its movement?
Applying pressure to a fluid **pushes its particles**, causing the fluid to **move from high-pressure areas to low-pressure areas**.

What happens to the speed of a fluid when it flows through a narrow space?
It increases

How does a hydraulic lift help raise heavy objects like cars?
A hydraulic lift uses **pressurized fluid** to multiply force.
By applying a small force on a small piston, that pressure is transmitted through the fluid to a larger piston, creating a **larger lifting force** that can easily raise a car.

A heavy crate applies a force of 1500 N on a 25 m^2 piston. The smaller piston is 1/30 the size of the larger one. What force is needed to lift the crate?

$$\frac{F_{in}}{A_{in}} = \frac{F_{out}}{A_{out}}$$

1500 / 25 = x / 0.833
25x = 1249.50
X = 49.98 = 50 N

Question 23

Write some applications of the elements, copper, silver, lead, aluminum, silicon, americium, titanium, and magnesium.

Element	Common Uses	Fun Fact
Copper	Wires, coins, pipes	Great conductor of electricity
Silver	Jewelry, mirrors, electronics	Very shiny and valuable
Lead	Car batteries, X-ray shields	Heavy and protects from radiation
Aluminum	Cans, airplanes, foil	Light and doesn't rust
Silicon	Computer chips, solar panels	Found in sand

Americium	Smoke detectors	Helps keep homes safe
Titanium	Airplanes, implants, bikes	Super strong and rust-proof
Magnesium	Fireworks, vitamins, car parts	Burns with a bright light

What is a compound, and how is it different from a mixture?
A compound is two or more different elements chemically combined. Mixtures are physically combined.

How are elements and compounds related?
Elements make up compounds.

Make a table that compares the properties of colloids, solutions, and suspensions.

Property	Solution	Colloid	Suspension
Particle size	Very small (too tiny to see)	Medium-sized (seen with microscope)	Large (can be seen easily)
Appearance	Clear and uniform	Cloudy but looks even	Cloudy or separates into layers
Settling	Particles do **not settle**	Particles **do not settle**	Particles **settle over time**
Filtering	**Cannot** be separated by a filter	**Cannot** be separated by a filter	**Can** be separated by a filter
Light test (Tyndall effect)	Light passes through (no scattering)	Light scatters (you can see the beam)	Light may scatter or be blocked
Examples	Salt water, sugar water, lemonade	Milk, fog, gelatin	Muddy water, sand in water, orange juice with pulp

What is the Tyndall effect?
The scattering of a light beam as it passes through a colloid.

Differentiate between homogeneous and heterogeneous mixtures.
Homogeneous = same throughout.
Heterogeneous = different throughout.

Question 24
What are the main parts of an atom, and where are they located? Protons = in the nucleus Neutrons = in the nucleus Electrons = outside the nucleus in the electron cloud What do the symbols C, Ca, Au, Al, H, Cl, and O stand for in the periodic table? C – carbon Ca – calcium Au – gold Al – aluminum H – hydrogen Cl – chlorine O – oxygen How is the Bohr model of the atom different from the electron cloud model? The electron cloud model states that there is an area around the nucleus of an atom where the electrons can be found. The Bohr model places the electrons in fixed orbits around the nucleus. Why do elements in the same group of the periodic table behave similarly? They have the same number of valence electrons. What makes some elements unreactive? They have 8 valence electrons.