

Question 1

Which of the following is the first step of the scientific method? (1 points)

- A) Test the hypothesis
 - B) Analyze data
 - C) Make an observation
 - D) Form a conclusion
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Question 2

What is a hypothesis? (1 points)

- A) A proven fact
 - B) A testable prediction
 - C) A random guess
 - D) A scientific theory
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Question 3

Convert 2.5×10^3 to a decimal number. (1 points)

- A) 25
 - B) 250
 - C) 2500
 - D) 25000
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Question 4

Convert 4.75×10^{-2} to a decimal number. (1 points)

- A) 0.0475
 - B) 0.475
 - C) 47.5
 - D) 475
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Question 5

How many significant figures does the number 0.004560 have? (1 points)

- A) 2
 - B) 3
 - C) 4
 - D) 5
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Question 6

How many significant figures does the number 5.6700 have? (1 points)

- A) 3
 - B) 4
 - C) 5
 - D) 6
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Question 7

What is the correct result of $5.63 + 7.857$ with the appropriate number of significant figures? (1 points)

- A) 13.487
 - B) 13.49
 - C) 13.5
 - D) 13.4870
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Question 8

Calculate 0.00450×1200.0 and express the answer using the correct number of significant figures. (1 points)

- A) 5.4
 - B) 5.40
 - C) 5.400
 - D) 5.4000
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Question 9

Which phase of matter is characterized by having particles that are free to move and fill the container they're in? (1 points)

- A) Solid
 - B) Liquid
 - C) Gas
 - D) Plasma
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Question 10

Compared to gases, liquids have a _____. (1 points)

- A) Higher density and definite volume
 - B) Lower density and indefinite volume
 - C) Higher compressibility
 - D) More freely moving particles
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Question 11

Convert 25°C to Fahrenheit. (1 points)

- A) 77°F
 - B) 68°F
 - C) 80°F
 - D) 70°F
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Question 12

Convert 100°F to Celsius. (1 points)

- A) 37.8°C
 - B) 48.2°C
 - C) 40°C
 - D) 34°C
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Question 13

Convert 0°C to Kelvin. (1 points)

- A) 273.15 K
 - B) 273 K
 - C) 274 K
 - D) 272 K
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Question 14

What is nitrogen gas (N_2)? (1 points)

- A) Element
 - B) Compound
 - C) Heterogeneous mixture
 - D) Homogeneous mixture
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Question 15

What is salad? (1 points)

- A) Element
 - B) Compound
 - C) Heterogeneous mixture
 - D) Homogeneous mixture
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Question 16

What is air? (1 points)

- A) Element
 - B) Compound
 - C) Heterogeneous mixture
 - D) Homogeneous mixture
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Question 17

Which of the following is an example of a chemical change? (1 points)

- A) Ice melting
 - B) Sugar dissolving in water
 - C) Burning wood
 - D) Tearing paper
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Question 18

If a metal tarnishes, what type of change is occurring? (1 points)

- A) Physical change
 - B) Chemical change
 - C) No change
 - D) Reversible change
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Question 19

A 100 g piece of copper (specific heat capacity ($c = 0.385 \text{ J/g}^\circ\text{C}$)) is heated from 25°C to 75°C. How much heat is absorbed by the copper? (1 points)

- A. 1925 J
- B. 2310 J
- C. 3850 J
- D. 1650 J

Question 20

If 500 J of heat is added to a 10 g sample of water (specific heat capacity ($c = 4.18 \text{ J/g}^\circ\text{C}$)), by how many degrees Celsius will the temperature increase? (1 points)

- A. 5.2°C
 - B. 7.5°C
 - C. 10°C
 - D. 12°C
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Question 21

Which of the following correctly describes a neutral atom? (1 points)

- A) An atom with more electrons than protons
 - B) An atom with an equal number of protons and electrons
 - C) An atom with more protons than neutrons
 - D) An atom with more neutrons than protons
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Question 22

What is an ion? (1 points)

- A) An atom with a different number of neutrons
 - B) An atom that has lost or gained electrons
 - C) An element on the periodic table
 - D) A type of molecule
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Question 23

Which statement is true about isotopes? (1 points)

- A) They have the same number of protons and different numbers of electrons.
 - B) They have different numbers of protons but the same mass.
 - C) They have the same number of protons but different numbers of neutrons.
 - D) They are always radioactive.
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Question 24

An ion has 12 protons, 10 electrons, and 12 neutrons. Identify its atomic symbol. (1 points)

- A. $^{24}_{12}\text{Mg}^{2+}$
 - B. $^{24}_{14}\text{Mg}^{2+}$
 - C. $^{22}_{12}\text{Mg}^{4+}$
 - D. $^{24}_{12}\text{Mg}^{4-}$
 - E. $^{26}_{12}\text{Mg}^{2+}$
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Question 25

An ion has an atomic number of 17, a charge of 1-, and a mass number of 35. Identify the atomic symbol of this ion. (1 points)

- A. $^{35}_{17}\text{Cl}^{-}$
 - B. $^{36}_{16}\text{Cl}^{-}$
 - C. $^{34}_{17}\text{Cl}^{2-}$
 - D. $^{35}_{18}\text{Cl}^{+}$
 - E. $^{36}_{17}\text{Cl}^{-}$
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Question 26

An ion has 20 protons, 18 electrons, and a mass number of 40. Identify the atomic symbol of this ion. (1 points)

- A. $^{40}_{20}\text{Ca}^{2+}$
 - B. $^{40}_{21}\text{Ca}^{2-}$
 - C. $^{42}_{20}\text{Ca}^{2+}$
 - D. $^{39}_{20}\text{Ca}^{4+}$
 - E. $^{40}_{20}\text{K}^{+}$
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Question 27

Chemical Formula: $\text{Ca}_3(\text{PO}_4)_2$

How many atoms of each element are present? (1 points)

- A) Ca: 3, P: 2, O: 8
 - B) Ca: 3, P: 2, O: 6
 - C) Ca: 3, P: 2, O: 4
 - D) Ca: 1, P: 2, O: 8
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Question 28

Chemical Formula: $(\text{NH}_4)_2\text{SO}_4$

How many atoms of each element are present? (1 points)

- A) N: 2, H: 8, S: 1, O: 4
 - B) N: 1, H: 4, S: 2, O: 4
 - C) N: 2, H: 4, S: 1, O: 4
 - D) N: 2, H: 8, S: 2, O: 4
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Question 29

Silicon has three naturally occurring isotopes: $^{28}_{14}\text{Si}$ with a mass of 27.977 amu (92.23% abundance), $^{29}_{14}\text{Si}$ with a mass of 28.976 amu (4.67% abundance), and $^{30}_{14}\text{Si}$ with a mass of 29.974 amu (3.10% abundance). Calculate the average atomic mass of silicon in amu. You must use proper mathematical notation and units throughout your calculations. (3 points)

Question 30

Answer the following questions in your own words. What subatomic property defines an element's identity? What happens to a neutral atom to yield an ion? What is the *natural abundance* of an isotope? (3 points)