PCB Sample Questions

Low Level

Physics:

1. What is the SI unit of mass?
   - o A) Gram
   - o B) Kilogram
   - o C) Newton
   - o D) Joule
   - **Answer:** B) Kilogram
2. Which of the following is a scalar quantity?
   - o A) Velocity
   - o B) Acceleration
   - o C) Speed
   - o D) Force
   - **Answer:** C) Speed
3. What is the freezing point of water in degrees Celsius?
   - o A) 0°C
   - o B) 100°C
   - o C) 32°C
   - o D) 212°C
   - **Answer:** A) 0°C
4. What is the acceleration due to gravity on Earth?
   - o A) 9.8 m/s²
   - o B) 10 m/s²
   - o C) 8.5 m/s²
   - o D) 12 m/s²
   - **Answer:** A) 9.8 m/s²
5. What type of energy is stored in a compressed spring?
   - o A) Kinetic energy
   - o B) Thermal energy
   - o C) Potential energy
   - o D) Chemical energy
   - **Answer:** C) Potential energy
6. What is the unit of temperature in the SI system?
   - o A) Celsius
   - o B) Kelvin
   - o C) Fahrenheit
   - o D) Joule
   - **Answer:** B) Kelvin
7. What does a voltmeter measure?
   - o A) Current
   - o B) Voltage
   - o C) Resistance
   - o D) Power
   - **Answer:** B) Voltage
8. What is the formula for calculating speed?
   - o A) Distance × Time

- B) Distance / Time
- C) Time / Distance
- D) Distance + Time
  Answer: B) Distance / Time
9. What type of motion does a pendulum exhibit?
   - A) Linear motion
   - B) Circular motion
   - C) Periodic motion
   - D) Uniform motion
   Answer: C) Periodic motion
10. What is the main source of energy for the Earth?
    - A) The moon
    - B) The sun
    - C) Geothermal sources
    - D) Nuclear power
    Answer: B) The sun

Chemistry:

1. What is the chemical formula for water?
   - A) H_2
   - B) H_2O
   - C) O_2H
   - D) HO
   Answer: B) H_2O
2. Which of the following is a noble gas?
   - A) Oxygen
   - B) Nitrogen
   - C) Helium
   - D) Hydrogen
   Answer: C) Helium
3. What is the pH of pure water?
   - A) 0
   - B) 7
   - C) 14
   - D) 10
   Answer: B) 7
4. Which element has the atomic number 8?
   - A) Nitrogen
   - B) Oxygen
   - C) Carbon
   - D) Hydrogen
   Answer: B) Oxygen
5. What type of bond involves the transfer of electrons?
   - A) Covalent bond
   - B) Ionic bond
   - C) Metallic bond
   - D) Hydrogen bond
   Answer: B) Ionic bond
6. What is the main gas in the Earth's atmosphere?

- o A) Oxygen
- o B) Nitrogen
- o C) Carbon dioxide
- o D) Argon
  Answer: B) Nitrogen
7. Which of the following is an organic molecule?
   - o A) H_2O
   - o B) CO_2
   - o C) $C_6H_{12}O_6$
   - o D) NaCl
     Answer: C) $C_6H_{12}O_6$
8. What is the process of separating a liquid mixture by boiling and condensation?
   - o A) Filtration
   - o B) Distillation
   - o C) Sublimation
   - o D) Evaporation
     Answer: B) Distillation
9. What is the common name for sodium bicarbonate?
   - o A) Baking soda
   - o B) Table salt
   - o C) Vinegar
   - o D) Sugar
     Answer: A) Baking soda
10. Which of the following is a characteristic of metals?
    - o A) Brittle
    - o B) Poor conductors of heat
    - o C) Ductile
    - o D) Gaseous at room temperature
      Answer: C) Ductile

Biology:

1. What is the basic unit of life?
   - o A) Organ
   - o B) Cell
   - o C) Tissue
   - o D) Organism
     Answer: B) Cell
2. Which part of the plant conducts photosynthesis?
   - o A) Root
   - o B) Stem
   - o C) Leaf
   - o D) Flower
     Answer: C) Leaf
3. What is the function of red blood cells?
   - o A) Fight infections
   - o B) Transport oxygen
   - o C) Clot blood
   - o D) Produce hormones
     Answer: B) Transport oxygen

4. Which organelle is known as the "powerhouse of the cell"?
    - o A) Nucleus
    - o B) Ribosome
    - o C) Mitochondria
    - o D) Golgi apparatus
    - **Answer:** C) Mitochondria
5. What is the primary function of the cell membrane?
    - o A) Energy production
    - o B) Regulation of substances entering and leaving the cell
    - o C) Protein synthesis
    - o D) Storage of genetic information
    - **Answer:** B) Regulation of substances entering and leaving the cell
6. What is the main function of the digestive system?
    - o A) Circulate blood
    - o B) Absorb nutrients
    - o C) Produce hormones
    - o D) Filter waste
    - **Answer:** B) Absorb nutrients
7. Which type of cell division produces gametes?
    - o A) Mitosis
    - o B) Meiosis
    - o C) Binary fission
    - o D) Budding
    - **Answer:** B) Meiosis
8. What is the role of DNA in living organisms?
    - o A) Energy storage
    - o B) Protein synthesis
    - o C) Genetic information storage
    - o D) Cell signaling
    - **Answer:** C) Genetic information storage
9. What is the main function of the kidneys?
    - o A) Filter blood
    - o B) Produce insulin
    - o C) Regulate body temperature
    - o D) Digest food
    - **Answer:** A) Filter blood
10. Which of the following is a characteristic of living organisms?
    - o A) Ability to grow
    - o B) Ability to move
    - o C) Ability to communicate
    - o D) Ability to swim
    - **Answer:** A) Ability to grow

Medium Level

Physics:

1. What is the formula for calculating work done?

- A) W = F × d
- B) W = F + d
- C) W = F/d
- D) W = F - d

Answer: A) W = F × d

2. Which of the following waves requires a medium to travel?
    - A) Electromagnetic waves
    - B) Sound waves
    - C) Radio waves
    - D) Light waves

    Answer: B) Sound waves

3. What is the unit of electric current?
    - A) Volt
    - B) Ampere
    - C) Ohm
    - D) Coulomb

    Answer: B) Ampere

4. What is the formula for calculating kinetic energy?
    - A) KE = mv
    - B) KE = ½ mv²
    - C) KE = mgh
    - D) KE = Fd

    Answer: B) KE = ½ mv²

5. What is the pressure of a 5 kg object resting on an area of 1 m²?
    - A) 0 Pa
    - B) 5 Pa
    - C) 50 Pa
    - D) 500 Pa

    Answer: C) 50 Pa

6. What type of energy is associated with an object in motion?
    - A) Potential energy
    - B) Kinetic energy
    - C) Thermal energy
    - D) Chemical energy

    Answer: B) Kinetic energy

7. Which law states that for every action, there is an equal and opposite reaction?
    - A) Newton's First Law
    - B) Newton's Second Law
    - C) Newton's Third Law
    - D) Law of Conservation of Energy

    Answer: C) Newton's Third Law

8. In which type of circuit is the total resistance equal to the sum of the individual resistances?
    - A) Parallel circuit
    - B) Series circuit
    - C) Mixed circuit
    - D) Short circuit

    Answer: B) Series circuit

9. What is the formula for calculating gravitational potential energy?
    - A) PE = mgh

- B) PE = mv²
- C) PE = ½ mv²
- D) PE = Fd

Answer: A) PE = mgh

10. Which of the following is an example of a non-renewable energy source?
- A) Solar energy
- B) Wind energy
- C) Natural gas
- D) Biomass

Answer: C) Natural gas

Chemistry:

1. Which type of bond involves the sharing of electron pairs?
- A) Ionic bond
- B) Covalent bond
- C) Metallic bond
- D) Hydrogen bond

Answer: B) Covalent bond

2. What is the molarity of a solution if 1 mole of solute is dissolved in 2 liters of solution?
- A) 0.5 M
- B) 1 M
- C) 2 M
- D) 4 M

Answer: A) 0.5 M

3. Which element has the highest electronegativity?
- A) Sodium
- B) Fluorine
- C) Chlorine
- D) Oxygen

Answer: B) Fluorine

4. What is the primary factor that determines the rate of a chemical reaction?
- A) Concentration of reactants
- B) Color of reactants
- C) Size of the container
- D) Temperature of the environment

Answer: A) Concentration of reactants

5. What is the molecular formula for ethanol?
- A) C2H5OH
- B) C2H4O
- C) C2H6
- D) CH3COOH

Answer: A) C2H5OH

6. Which of the following reactions is an example of a decomposition reaction?
- A) $2H_2 + O_2 \rightarrow 2H_2O$ 2H2+O2→2H2O
- B) $CaCO_3 \rightarrow CaO + CO_2$ CaCO3→CaO+CO2
- C) $HCl + NaOH \rightarrow NaCl + H_2O$ HCl+NaOH→NaCl+H2O

- D) H2+Cl2→2HClH_2 + Cl_2 \rightarrow 2HClH2+Cl2→2HCl
  Answer: B) CaCO3→CaO+CO2CaCO_3 \rightarrow CaO + CO_2CaCO3 →CaO+CO2
7. Which type of reaction absorbs energy from the surroundings?
   - A) Exothermic
   - B) Endothermic
   - C) Redox
   - D) Combustion
   Answer: B) Endothermic
8. What is the oxidation state of chlorine in NaCl?
   - A) +1
   - B) -1
   - C) 0
   - D) +2
   Answer: B) -1
9. What is the main component of vinegar?
   - A) Acetic acid
   - B) Lactic acid
   - C) Citric acid
   - D) Hydrochloric acid
   Answer: A) Acetic acid
10. What is the chemical formula for glucose?
    - A) C6H12O6
    - B) C5H10O5
    - C) C6H6
    - D) C12H22O11
    Answer: A) C6H12O6

Biology:

1. Which organelle is responsible for energy production in the cell?
   - A) Ribosome
   - B) Golgi apparatus
   - C) Mitochondria
   - D) Nucleus
   Answer: C) Mitochondria
2. What type of cells are responsible for transmitting signals in the nervous system?
   - A) Epithelial cells
   - B) Neurons
   - C) Muscle cells
   - D) Blood cells
   Answer: B) Neurons
3. Which of the following is a prokaryotic organism?
   - A) Fungi
   - B) Bacteria
   - C) Plants
   - D) Animals
   Answer: B) Bacteria
4. What process do plants use to convert sunlight into chemical energy?
   - A) Respiration

- o B) Photosynthesis
- o C) Fermentation
- o D) Digestion
  Answer: B) Photosynthesis
5. Which part of the brain controls balance and coordination?
   - o A) Cerebrum
   - o B) Brainstem
   - o C) Cerebellum
   - o D) Hippocampus
     Answer: C) Cerebellum
6. What is the function of the ribosome?
   - o A) Energy production
   - o B) Protein synthesis
   - o C) DNA replication
   - o D) Cell division
     Answer: B) Protein synthesis
7. Which molecule carries genetic information?
   - o A) RNA
   - o B) Protein
   - o C) DNA
   - o D) Lipid
     Answer: C) DNA
8. What type of symmetry do humans exhibit?
   - o A) Radial symmetry
   - o B) Bilateral symmetry
   - o C) Asymmetry
   - o D) Spherical symmetry
     Answer: B) Bilateral symmetry
9. Which vitamin is produced when skin is exposed to sunlight?
   - o A) Vitamin A
   - o B) Vitamin B12
   - o C) Vitamin C
   - o D) Vitamin D
     Answer: D) Vitamin D
10. Which type of immune response is triggered by antibodies?
    - o A) Cell-mediated immunity
    - o B) Humoral immunity
    - o C) Innate immunity
    - o D) Adaptive immunity
      Answer: B) Humoral immunity

Higher Level

Physics:

1. What is the maximum height reached by a projectile thrown with an initial velocity of 20 m/s at an angle of 30°?
   - o A) 10 m
   - o B) 15 m
   - o C) 20 m

o D) 25 m
   Answer: B) 15 m

2. A 2 kg mass is attached to a spring with a spring constant of 300 N/m. What is the frequency of oscillation?
   o A) 0.5 Hz
   o B) 1 Hz
   o C) 3.89 Hz
   o D) 7.5 Hz
   Answer: C) 3.89 Hz

3. In a double-slit experiment, if the distance between the slits is 0.1 mm and the screen is 2 m away, what is the separation of the first order bright fringes for light of wavelength 500 nm?
   o A) 1 mm
   o B) 0.5 mm
   o C) 0.25 mm
   o D) 2 mm
   Answer: A) 1 mm

4. A 10 Ω resistor and a 20 Ω resistor are connected in parallel. What is the equivalent resistance?
   o A) 3.33 Ω
   o B) 10 Ω
   o C) 6.67 Ω
   o D) 5 Ω
   Answer: A) 6.67 Ω

5. What is the de Broglie wavelength of an electron moving at 1×10^6 $1 \times 10^6 1 \times 10^6$ m/s? (Use $m_e = 9.11 \times 10^{-31}$ $m\_e = 9.11 \times 10^{-31}$ $m_e = 9.11 \times 10^{-31}$ kg)
   o A) 7.27×10^{-10} 7.27×10^{-10} 7.27×10^{-10} m
   o B) 3.86×10^{-10} 3.86×10^{-10} 3.86×10^{-10} m
   o C) 1.22×10^{-10} 1.22×10^{-10} 1.22×10^{-10} m
   o D) 1.00×10^{-9} 1.00×10^{-9} 1.00×10^{-9} m
   Answer: A) 7.27×10^{-10} 7.27×10^{-10} 7.27×10^{-10} m

6. What is the critical angle for total internal reflection from glass (n = 1.5) to air (n = 1)?
   o A) 41.8°
   o B) 48.6°
   o C) 30.0°
   o D) 60.0°
   Answer: A) 41.8°

7. A body moves in a circular path with a radius of 4 m at a constant speed of 8 m/s. What is the centripetal acceleration?
   o A) 12 m/s²
   o B) 16 m/s²
   o C) 20 m/s²
   o D) 8 m/s²
   Answer: A) 16 m/s²

8. If the current in a circuit is 3 A and the resistance is 4 Ω, what is the power consumed?
   o A) 12 W
   o B) 6 W

- ○ C) 9 W
- ○ D) 15 W
  Answer: A) 12 W
9. What is the potential energy of a mass of 10 kg at a height of 20 m? (Use $g=9.81 \text{ m/s}^2$)
   - ○ A) 196 J
   - ○ B) 200 J
   - ○ C) 400 J
   - ○ D) 500 J
     Answer: A) 1962 J
10. A wave has a frequency of 400 Hz and a wavelength of 0.75 m. What is its speed?
    - ○ A) 300 m/s
    - ○ B) 400 m/s
    - ○ C) 500 m/s
    - ○ D) 600 m/s
      Answer: B) 300 m/s

Chemistry:

1. What is the pH of a solution with a hydronium ion concentration of 1×10^{-7} M?
   - ○ A) 7
   - ○ B) 10
   - ○ C) 3
   - ○ D) 1
     Answer: A) 7
2. In a redox reaction, what happens to the reducing agent?
   - ○ A) It gets oxidized
   - ○ B) It gets reduced
   - ○ C) It remains unchanged
   - ○ D) It becomes a product
     Answer: A) It gets oxidized
3. Calculate the molarity of a solution prepared by dissolving 10 g of NaCl in 500 mL of solution. (Molar mass of NaCl = 58.5 g/mol)
   - ○ A) 0.34 M
   - ○ B) 0.50 M
   - ○ C) 0.17 M
   - ○ D) 1.00 M
     Answer: A) 0.34 M
4. What is the rate constant of a first-order reaction with a half-life of 10 minutes?
   - ○ A) 0.0693 min^{-1}
   - ○ B) 0.1 min^{-1}
   - ○ C) 0.693 min^{-1}
   - ○ D) 1.0 min^{-1}
     Answer: A) 0.0693 min^{-1}
5. In an electrochemical cell, which electrode is the site of oxidation?
   - ○ A) Cathode
   - ○ B) Anode
   - ○ C) Electrolyte

- o D) Salt bridge

  Answer: B) Anode

6. What is the hybridization of the central atom in SF4?
   - o A) sp
   - o B) sp²
   - o C) sp³
   - o D) sp³d

     Answer: D) sp³d

7. Which of the following compounds has hydrogen bonding?
   - o A) CH4
   - o B) NH3
   - o C) Cl2
   - o D) CO2

     Answer: B) NH3

8. What is the molecular formula for the compound formed from the reaction of aluminum and oxygen?
   - o A) AlO
   - o B) AlO3
   - o C) Al2O3
   - o D) Al2O

     Answer: C) Al2O3

9. What is the standard enthalpy change for the reaction $C+O2\rightarrow CO2 C + O\_2$ \rightarrow $CO\_2 C+O2 \rightarrow CO2$?
   - o A) -393.5 kJ/mol
   - o B) 0 kJ/mol
   - o C) -285.5 kJ/mol
   - o D) -241.8 kJ/mol

     Answer: A) -393.5 kJ/mol

10. What type of reaction is $2Na+Cl2 \rightarrow 2NaCl 2Na + Cl\_2$ \rightarrow $2NaCl 2Na+Cl2 \rightarrow 2NaCl$?
    - o A) Synthesis
    - o B) Decomposition
    - o C) Single replacement
    - o D) Double replacement

      Answer: A) Synthesis

Biology:

1. What is the primary function of the rough endoplasmic reticulum?
   - o A) Lipid synthesis
   - o B) Protein synthesis
   - o C) Energy production
   - o D) Detoxification

     Answer: B) Protein synthesis

2. Which type of RNA carries amino acids to the ribosome?
   - o A) mRNA
   - o B) tRNA
   - o C) rRNA
   - o D) siRNA

     Answer: B) tRNA

3. What is the function of the Golgi apparatus?
   - o A) Protein synthesis
   - o B) Packaging and sorting of proteins
   - o C) Energy production
   - o D) DNA replication
   - **Answer:** B) Packaging and sorting of proteins
4. Which phase of mitosis is characterized by the alignment of chromosomes at the cell's equator?
   - o A) Prophase
   - o B) Metaphase
   - o C) Anaphase
   - o D) Telophase
   - **Answer:** B) Metaphase
5. What is the main product of glycolysis?
   - o A) Lactic acid
   - o B) Acetyl-CoA
   - o C) Glucose
   - o D) Pyruvate
   - **Answer:** D) Pyruvate
6. In which part of the cell does the Krebs cycle take place?
   - o A) Cytoplasm
   - o B) Nucleus
   - o C) Mitochondria
   - o D) Ribosomes
   - **Answer:** C) Mitochondria
7. What is the function of the lysosome?
   - o A) Energy production
   - o B) Digestion of macromolecules
   - o C) Protein synthesis
   - o D) Photosynthesis
   - **Answer:** B) Digestion of macromolecules
8. Which of the following is a function of the cell membrane?
   - o A) Energy production
   - o B) Selective permeability
   - o C) Protein synthesis
   - o D) DNA replication
   - **Answer:** B) Selective permeability
9. What is the primary structure that determines the function of a protein?
   - o A) Primary structure
   - o B) Secondary structure
   - o C) Tertiary structure
   - o D) Quaternary structure
   - **Answer:** C) Tertiary structure
10. What is the primary difference between DNA and RNA?
    - o A) DNA is single-stranded; RNA is double-stranded
    - o B) DNA contains ribose sugar; RNA contains deoxyribose sugar
    - o C) DNA has thymine; RNA has uracil
    - o D) DNA is involved in protein synthesis; RNA is not
    - **Answer:** C) DNA has thymine; RNA has uracil

PCM Sample Questions

Low Level

Physics:

1. What is the unit of force?
   - A) Joule
   - B) Newton
   - C) Watt
   - D) Pascal
   Answer: B) Newton
2. What is the speed of light in a vacuum?
   - A) 300,000 km/s
   - B) 150,000 km/s
   - C) 400,000 km/s
   - D) 500,000 km/s
   Answer: A) 300,000 km/s
3. Which of the following is a renewable energy source?
   - A) Coal
   - B) Natural gas
   - C) Solar energy
   - D) Nuclear energy
   Answer: C) Solar energy
4. What is the boiling point of water at sea level in degrees Celsius?
   - A) 100°C
   - B) 0°C
   - C) 50°C
   - D) 200°C
   Answer: A) 100°C
5. Which law describes the relationship between pressure and volume of a gas?
   - A) Boyle's Law
   - B) Charles's Law
   - C) Newton's Law
   - D) Archimedes' Principle
   Answer: A) Boyle's Law
6. What is the unit of power?
   - A) Joule
   - B) Watt
   - C) Newton
   - D) Ampere
   Answer: B) Watt
7. What type of lens is used to converge light rays?
   - A) Concave lens
   - B) Convex lens
   - C) Cylindrical lens

- o D) Bifocal lens
    Answer: B) Convex lens
8. What is the phenomenon called when light bends as it passes from one medium to another?
    - o A) Reflection
    - o B) Refraction
    - o C) Diffraction
    - o D) Dispersion
    Answer: B) Refraction
9. What is the formula for calculating density?
    - o A) Density = Mass / Volume
    - o B) Density = Volume / Mass
    - o C) Density = Mass × Volume
    - o D) Density = Mass + Volume
    Answer: A) Density = Mass / Volume
10. What is the relationship between frequency and wavelength in waves?
    - o A) They are directly proportional.
    - o B) They are inversely proportional.
    - o C) They are equal.
    - o D) There is no relationship.
    Answer: B) They are inversely proportional.

Chemistry:

1. What is the chemical formula for carbon dioxide?
    - o A) CO
    - o B) CO2
    - o C) C2O
    - o D) C2O2
    Answer: B) CO2
2. Which of the following is an alkali metal?
    - o A) Calcium
    - o B) Sodium
    - o C) Magnesium
    - o D) Aluminum
    Answer: B) Sodium
3. What is the process called when a solid turns directly into a gas?
    - o A) Evaporation
    - o B) Condensation
    - o C) Sublimation
    - o D) Melting
    Answer: C) Sublimation
4. What is the pH of a neutral solution?
    - o A) 0
    - o B) 7
    - o C) 14
    - o D) 10
    Answer: B) 7
5. What is the chemical formula for table salt?
    - o A) NaCl

- o B) KCl
- o C) MgCl2
- o D) Na2SO4
  Answer: A) NaCl
6. Which gas is produced during photosynthesis?
   - o A) Oxygen
   - o B) Carbon dioxide
   - o C) Nitrogen
   - o D) Helium
     Answer: A) Oxygen
7. Which of the following elements is a metalloid?
   - o A) Aluminum
   - o B) Silicon
   - o C) Calcium
   - o D) Sodium
     Answer: B) Silicon
8. What is the process of a liquid turning into a gas?
   - o A) Freezing
   - o B) Condensation
   - o C) Evaporation
   - o D) Sublimation
     Answer: C) Evaporation
9. What type of reaction occurs when an acid reacts with a base?
   - o A) Synthesis
   - o B) Decomposition
   - o C) Neutralization
   - o D) Redox
     Answer: C) Neutralization
10. What is the main component of natural gas?
    - o A) Methane
    - o B) Ethane
    - o C) Propane
    - o D) Butane
      Answer: A) Methane

Mathematics:

1. What is the value of 8+68 + 68+6?
   - o A) 12
   - o B) 14
   - o C) 16
   - o D) 18
     Answer: B) 14
2. What is 525^252?
   - o A) 10
   - o B) 20
   - o C) 25
   - o D) 30
     Answer: C) 25
3. What is the area of a rectangle with length 4 cm and width 3 cm?

- o A) 7 cm²
- o B) 10 cm²
- o C) 12 cm²
- o D) 15 cm²
  Answer: C) 12 cm²
4. What is the solution to the equation $x+5=10$?
    - o A) 3
    - o B) 5
    - o C) 10
    - o D) 15
    Answer: B) 5
5. If the perimeter of a square is 16 cm, what is the length of one side?
    - o A) 4 cm
    - o B) 6 cm
    - o C) 8 cm
    - o D) 10 cm
    Answer: A) 4 cm
6. What is the value of 7×9?
    - o A) 54
    - o B) 63
    - o C) 72
    - o D) 81
    Answer: B) 63
7. What is the slope of the line represented by the equation $y=3x+2$?
    - o A) 1
    - o B) 2
    - o C) 3
    - o D) 4
    Answer: C) 3
8. What is the value of $\sqrt{49}$?
    - o A) 5
    - o B) 6
    - o C) 7
    - o D) 8
    Answer: C) 7
9. If the sum of angles in a triangle is 180°, what is the third angle if two angles are 50° and 70°?
    - o A) 60°
    - o B) 70°
    - o C) 80°
    - o D) 90°
    Answer: A) 60°
10. What is the value of $15 \div 3$?
    - o A) 3
    - o B) 5
    - o C) 7
    - o D) 10
    Answer: B) 5

Medium Level

Physics:

1. What is the formula for gravitational potential energy?
   - A) PE = mgh
   - B) PE = ½ mv²
   - C) PE = Fd
   - D) PE = mv

   Answer: A) PE = mgh
2. What is the frequency of a wave with a wavelength of 2 m and a speed of 340 m/s?
   - A) 50 Hz
   - B) 170 Hz
   - C) 340 Hz
   - D) 680 Hz

   Answer: B) 170 Hz
3. Which of the following is an example of kinetic energy?
   - A) A rock at the top of a hill
   - B) A moving car
   - C) A compressed spring
   - D) A stationary bicycle

   Answer: B) A moving car
4. What is the relationship between pressure and volume in a gas at constant temperature?
   - A) Directly proportional
   - B) Inversely proportional
   - C) Exponential
   - D) Linear

   Answer: B) Inversely proportional
5. What happens to the frequency of a wave if the wavelength is doubled?
   - A) It doubles
   - B) It is halved
   - C) It remains the same
   - D) It quadruples

   Answer: B) It is halved
6. What is the principle of conservation of energy?
   - A) Energy can be created or destroyed.
   - B) Energy can be transformed but not created or destroyed.
   - C) Energy increases with time.
   - D) Energy decreases with time.

   Answer: B) Energy can be transformed but not created or destroyed.
7. In which type of circuit is the total voltage across the circuit equal to the sum of the individual voltages?
   - A) Series circuit
   - B) Parallel circuit
   - C) Mixed circuit
   - D) Short circuit

   Answer: A) Series circuit
8. What is the kinetic energy of a 2 kg object moving at 3 m/s?
   - A) 6 J

- B) 9 J
- C) 12 J
- D) 18 J
  Answer: B) 9 J
9. What is the total resistance in a series circuit with resistances of 2Ω, 3Ω, and 5Ω?
   - A) 5Ω
   - B) 8Ω
   - C) 10Ω
   - D) 15Ω
     Answer: B) 10Ω
10. What is the unit of energy?
    - A) Joule
    - B) Newton
    - C) Watt
    - D) Pascal
      Answer: A) Joule

Chemistry:

1. Which of the following is a characteristic of an acid?
   - A) Bitter taste
   - B) Sour taste
   - C) Slippery feel
   - D) Turns litmus blue
     Answer: B) Sour taste
2. What is the molar mass of water (H2O)?
   - A) 16 g/mol
   - B) 18 g/mol
   - C) 20 g/mol
   - D) 22 g/mol
     Answer: B) 18 g/mol
3. Which of the following compounds is an example of a strong acid?
   - A) Acetic acid
   - B) Hydrochloric acid
   - C) Carbonic acid
   - D) Citric acid
     Answer: B) Hydrochloric acid
4. What is the process by which a liquid turns into vapor called?
   - A) Melting
   - B) Evaporation
   - C) Condensation
   - D) Sublimation
     Answer: B) Evaporation
5. What is the oxidation state of sulfur in H2SO4?
   - A) +2
   - B) +4
   - C) +6
   - D) +8
     Answer: C) +6

6. What type of reaction is represented by the equation $2H_2 + O_2 \rightarrow 2H_2O$?
   - o A) Decomposition
   - o B) Synthesis
   - o C) Single replacement
   - o D) Double replacement
   - **Answer:** B) Synthesis
7. What is the primary component of air?
   - o A) Oxygen
   - o B) Nitrogen
   - o C) Carbon dioxide
   - o D) Argon
   - **Answer:** B) Nitrogen
8. Which element is known as the "building block of life"?
   - o A) Carbon
   - o B) Oxygen
   - o C) Nitrogen
   - o D) Hydrogen
   - **Answer:** A) Carbon
9. What is the chemical formula for ammonia?
   - o A) NH3
   - o B) NH4
   - o C) N2H4
   - o D) N2O
   - **Answer:** A) NH3
10. What is the primary function of chlorophyll in plants?
    - o A) Absorb light energy
    - o B) Store energy
    - o C) Conduct water
    - o D) Absorb nutrients
    - **Answer:** A) Absorb light energy

Mathematics:

1. What is the value of $3x + 2 = 11$?
   - o A) 2
   - o B) 3
   - o C) 4
   - o D) 5
   - **Answer:** C) 3
2. What is the area of a triangle with a base of 5 cm and a height of 10 cm?
   - o A) 25 cm²
   - o B) 30 cm²
   - o C) 35 cm²
   - o D) 40 cm²
   - **Answer:** A) 25 cm²
3. What is the value of $(4+6) \times 2$?
   - o A) 18
   - o B) 20
   - o C) 22

- D) 24

  Answer: B) 20

4. What is the slope of the line represented by the equation y=4x+1y = 4x + 1y=4x+1?
   - A) 1
   - B) 2
   - C) 4
   - D) 5

   Answer: C) 4

5. If the circumference of a circle is 31.4 cm, what is the radius? (Use $\pi \approx 3.14$\pi \approx 3.14$\pi \approx 3.14$)
   - A) 5 cm
   - B) 10 cm
   - C) 15 cm
   - D) 20 cm

   Answer: A) 5 cm

6. What is the value of 12−(4+2)12 - (4 + 2)12−(4+2)?
   - A) 4
   - B) 6
   - C) 8
   - D) 10

   Answer: C) 6

7. What is 7!7!7!?
   - A) 5040
   - B) 720
   - C) 120
   - D) 24

   Answer: A) 5040

8. What is the value of 82+3×4\frac{8}{2} + 3 \times 428+3×4?
   - A) 14
   - B) 18
   - C) 22
   - D) 26

   Answer: B) 18

9. What is the median of the following set of numbers: 3, 7, 8, 12, 14?
   - A) 7
   - B) 8
   - C) 12
   - D) 14

   Answer: B) 8

10. What is the value of 23+322^3 + 3^223+32?
    - A) 8
    - B) 11
    - C) 17
    - D) 21

    Answer: C) 17

Higher Level

Physics:

1. What is the gravitational potential energy of a 5 kg object at a height of 10 m?
   - A) 50 J
   - B) 100 J
   - C) 200 J
   - D) 500 J

   Answer: B) 500 J

2. An ideal gas undergoes an isothermal expansion from volume 1 L to 3 L at 300 K. What is the change in internal energy?
   - A) 0 J
   - B) 600 J
   - C) 300 J
   - D) 900 J

   Answer: A) 0 J

3. A coil with an inductance of 2 H carries a current of 5 A. What is the energy stored in the magnetic field?
   - A) 10 J
   - B) 25 J
   - C) 50 J
   - D) 100 J

   Answer: A) 25 J

4. What is the electromagnetic spectrum range of visible light?
   - A) 400-700 nm
   - B) 300-400 nm
   - C) 700-1000 nm
   - D) 100-300 nm

   Answer: A) 400-700 nm

5. A 100 W light bulb operates for 5 hours. How much energy does it consume?
   - A) 500 Wh
   - B) 250 Wh
   - C) 1000 Wh
   - D) 200 Wh

   Answer: A) 500 Wh

6. What is the total resistance in a circuit with a 10 Ω resistor and a 5 Ω resistor in series?
   - A) 5 Ω
   - B) 15 Ω
   - C) 10 Ω
   - D) 20 Ω

   Answer: B) 15 Ω

7. In which type of wave does the particle displacement occur parallel to the direction of wave propagation?
   - A) Longitudinal wave
   - B) Transverse wave
   - C) Surface wave
   - D) Electromagnetic wave

   Answer: A) Longitudinal wave

8. If a circuit has a current of 2 A and a resistance of 10 Ω, what is the voltage?
   - A) 5 V
   - B) 10 V
   - C) 20 V

- D) 30 V

  Answer: C) 20 V

9. A lens has a focal length of 10 cm. What is the power of the lens?
  - A) +10 D
  - B) +5 D
  - C) -10 D
  - D) -5 D

  Answer: A) +10 D

10. What is the Doppler effect?
  - A) Change in frequency due to motion of the source
  - B) Change in wavelength due to medium change
  - C) Change in amplitude due to distance
  - D) Change in speed due to temperature

  Answer: A) Change in frequency due to motion of the source

Chemistry:

1. What is the molecular geometry of methane (CH_4)?
  - A) Linear
  - B) Trigonal planar
  - C) Tetrahedral
  - D) Octahedral

  Answer: C) Tetrahedral

2. What is the enthalpy change for the reaction $C(s)+O2(g) \rightarrow CO2(g)C(s) + O\_2(g)$ \rightarrow $CO\_2(g)C(s)+O2(g) \rightarrow CO2(g)$ at standard conditions?
  - A) -393.5 kJ/mol
  - B) 0 kJ/mol
  - C) -241.8 kJ/mol
  - D) -285.5 kJ/mol

  Answer: A) -393.5 kJ/mol

3. Which of the following is a strong acid?
  - A) H_2SO_4
  - B) H_3PO_4
  - C) CH_3COOH
  - D) NH_3

  Answer: A) H_2SO_4

4. The reaction $A+2B \rightarrow C+DA + 2B$ \rightarrow $C + DA+2B \rightarrow C+D$ has an equilibrium constant $Kc=4K\_c = 4Kc=4$. If [C] = 2 M and [D] = 3 M at equilibrium, what is the concentration of [A]?
  - A) 0.5 M
  - B) 1.0 M
  - C) 1.5 M
  - D) 2.0 M

  Answer: A) 0.5 M

5. What is the most electronegative element?
  - A) Oxygen
  - B) Nitrogen
  - C) Fluorine
  - D) Chlorine

  Answer: C) Fluorine

6. What is the primary product of the combustion of hydrocarbons?
    - A) Water
    - B) Carbon dioxide
    - C) Nitrogen oxides
    - D) Sulfur dioxide

    Answer: B) Carbon dioxide
7. What type of reaction is $2H2+O2 \rightarrow 2H2O$ $2H\_2 + O\_2 \rightarrow 2H\_2O$ $2H2+O2 \rightarrow 2H2O$?
    - A) Synthesis
    - B) Decomposition
    - C) Single replacement
    - D) Double replacement

    Answer: A) Synthesis
8. Which of the following molecules has a dipole moment?
    - A) CO_2
    - B) CH_4
    - C) NH_3
    - D) CCl_4

    Answer: C) NH_3
9. What is the main product when ethanol is oxidized?
    - A) Ethylene
    - B) Acetic acid
    - C) Ethyl acetate
    - D) Carbon dioxide

    Answer: B) Acetic acid
10. What is the primary driving force for the folding of proteins?
    - A) Covalent bonds
    - B) Hydrogen bonds
    - C) Hydrophobic interactions
    - D) Ionic interactions

    Answer: C) Hydrophobic interactions

Mathematics:

1. What is the derivative of $f(x)=x3-3x2+2$ $f(x) = x^3 - 3x^2 + 2$ $f(x)=x3-3x2+2$?
    - A) $3x2-6x$ $3x^2 - 6x$ $3x2-6x$
    - B) $3x2-3$ $3x^2 - 3$ $3x2-3$
    - C) $6x-3$ $6x - 3$ $6x-3$
    - D) $2x2-3x+1$ $2x^2 - 3x + 1$ $2x2-3x+1$

    Answer: A) $3x2-6x$ $3x^2 - 6x$ $3x2-6x$
2. If the function $f(x)=2x2+3x-5$ $f(x) = 2x^2 + 3x - 5$ $f(x)=2x2+3x-5$ has a maximum, what is the value of xxx?
    - A) -3/4
    - B) 0
    - C) 1/3
    - D) -2/3

    Answer: A) -3/4
3. What is the integral of $\sin x$ $\sin x$ $\sin x$?
    - A) $-\cos x + C$ $-\cos x + C$ $-\cos x+C$
    - B) $\cos x + C$ $\cos x + C$ $\cos x+C$

- C) $-\sin x + C$ \sin x + C −sinx+C
- D) $\tan x + C$ \tan x + C tanx+C

Answer: A) $-\cos x + C$ \cos x + C −cosx+C

4. What is the solution to the equation $x^2 - 5x + 6 = 0$ x^2 - 5x + 6 = 0 x2−5x+6=0?
   - A) 1, 2
   - B) 2, 3
   - C) 3, 6
   - D) 4, 5

   Answer: A) 1, 6

5. What is the value of $\lim_{x \to 0} \frac{\sin x}{x}$ \lim_{x \to 0} \frac{\sin x}{x} limx→0xsinx?
   - A) 0
   - B) 1
   - C) Undefined
   - D) ∞

   Answer: B) 1

6. If the angle of elevation from a point 50 m away from the base of a building is 30°, what is the height of the building?
   - A) 25 m
   - B) 50 m
   - C) 100 m
   - D) 75 m

   Answer: A) 25 m

7. What is the sum of the first 10 natural numbers?
   - A) 45
   - B) 55
   - C) 65
   - D) 75

   Answer: B) 55

8. If $x = 3$ x = 3 x=3 is a root of the polynomial $f(x) = x^3 - 6x^2 + 11x - 6$ f(x) = x^3 - 6x^2 + 11x - 6 f(x)=x3−6x2+11x−6, what is the other root?
   - A) 1
   - B) 2
   - C) 3
   - D) 4

   Answer: B) 2

9. What is the area of a circle with a radius of 7 cm?
   - A) 22 cm²
   - B) 44 cm²
   - C) 154 cm²
   - D) 196 cm²

   Answer: C) 154 cm²

10. What is the value of the determinant of the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} [1324]?
    - A) -2
    - B) 2
    - C) 0
    - D) 4

    Answer: A) -2