Physics

1. Kinematics:
   A ball is thrown vertically upward with a velocity of 20 m/s. What is the maximum height it can reach? (Take g = 10 m/s²)
   A. 20 m
   B. 15 m
   C. 10 m
   D. 25 m

2. Electrostatics:
   Two charges, $q_1 = +3\,\mu C$ and $q_2 = -3\,\mu C$, are placed 2 m apart in vacuum. What is the magnitude of the force between them? (Use $k = 9 \times 10^9 \, N \cdot m^2/C^2$)
   A. 20.25 N
   B. 40.5 N
   C. 60.75 N
   D. 80 N

3. Thermodynamics:
   Which of the following is correct according to the first law of thermodynamics?
   A. $\Delta Q = \Delta U + \Delta W$
   B. $\Delta Q = \Delta U - \Delta W$
   C. $\Delta W = \Delta Q - \Delta U$
   D. $\Delta U = \Delta Q \cdot \Delta W$

Chemistry

1. Organic Chemistry:
   Which of the following compounds will undergo electrophilic substitution most easily?
   A. Benzene
   B. Toluene
   C. Nitrobenzene
   D. Phenol

2. Inorganic Chemistry:
   Identify the product formed when potassium permanganate reacts with acidified oxalic acid:
   A. CO_2
   B. CO
   C. H_2O
   D. H_2O_2

3. Physical Chemistry:
   The rate of a reaction doubles when the temperature increases from 300 K to 310 K. What is the activation energy of the reaction? (Given R = 8.314 J/mol·K)
   A. 52.1 kJ/mol

B. 34.7 kJ/mol
C. 41.6 kJ/mol
D. 48.2 kJ/mol

Mathematics

1. Algebra:
   If $x^2 - 5x + 6 = 0$, find the roots of the equation.
   A. 2, 3
   B. 1, 6
   C. -2, -3
   D. None of the above

2. Calculus:
   The derivative of $y = x^2 \sin(x)$ is:
   A. $2x \cos(x) + \sin(x)$
   B. $2x \sin(x) + x^2 \cos(x)$
   C. $2x \cos(x) - x^2 \sin(x)$
   D. None of the above

3. Probability:
   A bag contains 5 red balls, 3 green balls, and 2 blue balls. What is the probability of drawing a green ball?
   A. $\frac{1}{5}$
   B. $\frac{3}{10}$
   C. $\frac{1}{2}$
   D. $\frac{2}{5}$

English

1. Error Detection:
   Identify the grammatical error in the sentence:
   "He is senior than me in the office."
   A. He is
   B. senior
   C. than
   D. No error

2. Vocabulary:
   Choose the correct synonym for the word "Ambiguous":
   A. Clear
   B. Uncertain
   C. Transparent
   D. Bright

3. Reading Comprehension:
   Read the passage and answer:

"The sun sets in the west, giving the sky a bright orange hue."
What is the tone of the passage?
A. Pessimistic
B. Optimistic
C. Neutral
D. Melancholic