Performance Report

Name: Charlie

Date: 22/05/2024

Test ID: PHY101

Marks Obtained: 52.0/84

Q1: Which of the following is a vector quantity? [2 marks]

A: Speed

B: Velocity

C: Distance

D: Time

Student Response: D

Correct Answer: B

Explanation: Velocity is a vector quantity as it has both magnitude and direction, while the others are scalar quantities.

Marks Awarded: 0.0

Q2: The displacement of a particle is given by s(t) = 3t^2 + 2t + 1. Find the velocity of the particle at t = 2s. [10 marks]

Student Response: Unattempted

Correct Answer: Velocity at t=2 is v(2) = ds/dt = 6t + 2, so v(2) = 6(2) + 2 = 14 m/s

Explanation: Differentiate s(t) = 3t^2 + 2t + 1 with respect to t to get the velocity function v(t) = 6t + 2. Then, substitute t = 2 to find v(2).

Marks Awarded: 0

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Q3: A car accelerates uniformly from rest to a speed of 20 m/s in 10 seconds. What is the magnitude of its acceleration? [2 marks]

A: 1 m/sÂ²

B: 2 m/sÂ²

C: 3 m/sÂ²

D: 4 m/sÂ²

Student Response: B

Correct Answer: B

Explanation: Acceleration is calculated as (final velocity - initial velocity) / time = (20 m/s - 0 m/s) / 10 s = 2 m/s^2.

Marks Awarded: 2.0

Q4: A ball is thrown vertically upwards with an initial velocity of 30 m/s. Calculate the maximum height reached by the ball. (Take g = 10 m/sÂ²) [10 marks]

Student Response: Height = 45 m using u^2 / (2g)

Correct Answer: Maximum height h = u^2 / (2g) = (30 m/s)^2 / (2 * 10 m/s^2) = 45 m

Explanation: Using the formula for maximum height in vertical motion, h = u^2 / (2g), where u is the initial velocity and g is the acceleration due to gravity.

Marks Awarded: 8.5

Q5: Derive the equation of motion: v^2 = u^2 + 2as. [10 marks]

Student Response: Derivation using equations of motion.

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Correct Answer: Derivation of v^2 = u^2 + 2as from the equations of motion.

Explanation: Use the equations of motion to derive the required equation: start from v = u + at and s = ut + 0.5at^2.

Marks Awarded: 5.5

Q6: Explain the difference between average speed and instantaneous speed. [10 marks]

Student Response: Average speed is different from instantaneous speed.

Correct Answer: Average speed is the total distance traveled divided by the total time taken, while instantaneous speed is the speed at any given instant of time.

Explanation: Explain the differences in definitions and implications of average speed and instantaneous speed.

Marks Awarded: 4.5

Q7: An object moves along a straight line with an initial velocity of 5 m/s and a constant acceleration of 3 m/sÂ². Determine the position of the object after 4 seconds. [10 marks]

Student Response: s = ut + 0.5at^2 = 44 m

Correct Answer: Position after 4s, s = ut + 0.5at^2 = 5*4 + 0.5*3*4^2 = 20 + 24 = 44 m

Explanation: Use the equation of motion s = ut + 0.5at^2, where u is the initial velocity, a is the acceleration, and t is the time.

Marks Awarded: 9.0

Q8: A cyclist travels a distance of 15 km in 50 minutes. Calculate the average speed in m/s. [10

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marks]

Student Response: Average speed = 5 m/s

Correct Answer: Average speed = Total distance / Total time = 15 km / (50/60) hr = 15 km / (5/6) hr = 18 km/hr = 18 * 1000 / 3600 m/s = 5 m/s

Explanation: Convert time into hours, calculate the average speed in km/hr, and then convert to m/s.

Marks Awarded: 9.0

Q9: Explain the significance of the slope of a velocity-time graph. [10 marks]

Student Response: The slope indicates acceleration.

Correct Answer: The slope of a velocity-time graph represents the acceleration of the object.

Explanation: Explain that the gradient of a velocity-time graph gives the rate of change of velocity, which is acceleration.

Marks Awarded: 6.5

Q10: Two objects are thrown vertically upwards with the same initial velocity. Explain why their times of flight are the same, irrespective of their masses. (Ignore air resistance) [10 marks]

Student Response: Time of flight is the same due to constant gravitational acceleration.

Correct Answer: The time of flight is independent of mass because the acceleration due to gravity is constant for all objects, regardless of their masses.

Explanation: Using the equations of motion and the concept that gravitational acceleration is the same for all masses, explain why time of flight remains unchanged.

Marks Awarded: 7.0

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