



# Performance Report

Name: Alice

Date: 22/05/2024

Test ID: PHY101

Marks Obtained: 56.5/84

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

A: Speed

B: Velocity

C: Distance

D: Time

Student Response: A

Correct Answer: B

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

Feedback: None

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  $t = 2$ s. [10 marks]

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

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  $v(2)$ .

Feedback: Your answer is correct, but it lacks explanation and clarity. To improve, provide a brief explanation of how you derived the velocity equation ( $ds/dt = 6t + 2$ ) and how you applied it to find



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the velocity at  $t = 2\text{s}$ . Additionally, consider adding units to your answer to make it more precise.

Marks Awarded: 10.0

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

A:  $1\text{ m/s}^2$

B:  $2\text{ m/s}^2$

C:  $3\text{ m/s}^2$

D:  $4\text{ m/s}^2$

Student Response: C

Correct Answer: B

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

Feedback: None

Marks Awarded: 0.0

Q4: A ball is thrown vertically upwards with an initial velocity of  $30\text{ m/s}$ . Calculate the maximum height reached by the ball. (Take  $g = 10\text{ m/s}^2$ ) [10 marks]

Student Response: Maximum height  $h = u^2 / (2g) = (30\text{ m/s})^2 / (2 * 10\text{ m/s}^2) = 45\text{ m}$

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

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.



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Feedback: Your answer is correct, but it's a straightforward copy of the correct answer. To improve, try to explain the reasoning behind the calculation. For example, you could mention that the initial velocity is used to calculate the maximum height using the equation  $u^2 / (2g)$ , and then plug in the given values to get the answer. This will demonstrate your understanding of the concept and not just the calculation.

Marks Awarded: 10.0

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

Student Response: Derivation of  $v^2 = u^2 + 2as$

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  $s = ut + 0.5at^2$ .

Feedback: Your answer is concise and correctly states the equation of motion. However, it lacks the actual derivation process. To improve, provide the step-by-step derivation of the equation, starting from the initial velocity ( $u$ ), acceleration ( $a$ ), and final velocity ( $v$ ). This will demonstrate your understanding of the concept and show how the equation is derived.

Marks Awarded: 7.5

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

Student Response: Average speed is the total distance traveled divided by the total time taken.

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.



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

Feedback: Your answer correctly defines average speed as the total distance traveled divided by the total time taken. However, it lacks information about instantaneous speed, which is a crucial concept in understanding speed. To improve, expand your answer to include the definition of instantaneous speed as the speed at any given instant of time. This will provide a more comprehensive understanding of the difference between the two concepts.

Marks Awarded: 5.5

Q7: An object moves along a straight line with an initial velocity of 5 m/s and a constant acceleration of  $3 \text{ m/s}^2$ . Determine the position of the object after 4 seconds. [10 marks]

Student Response: Position after 4s,  $s = ut + 0.5at^2 = 44 \text{ m}$

Correct Answer: Position after 4s,  $s = ut + 0.5at^2 = 5 \times 4 + 0.5 \times 3 \times 4^2 = 20 + 24 = 44 \text{ m}$

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.

Feedback: Your answer is close, but it's missing the calculation steps. To improve, show your work and calculate the position using the equation  $s = ut + 0.5at^2$ . In this case, you would multiply the initial velocity (5 m/s) by the time (4 s) to get 20 m, then add half the acceleration ( $1.5 \text{ m/s}^2$ ) multiplied by the time squared (16) to get 24 m. Finally, add these two values to get the total position of 44 m.

Marks Awarded: 9.0



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

Student Response: Average speed = Total distance / Total time = 15 km / (50/60) hr = 18 km/hr = 5 m/s

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

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

Feedback: Your answer is mostly correct, but it lacks the conversion of the average speed from km/hr to m/s. To improve, include the step where you convert the average speed from km/hr to m/s by multiplying by 1000/3600. This will ensure that your answer is accurate and in the correct units.

Marks Awarded: 8.0

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

Student Response: Unattempted

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.

Feedback:

Marks Awarded: 0

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]



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Student Response: Time of flight is independent of mass because acceleration due to gravity is constant.

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.

Feedback: Your answer correctly identifies the reason for the same time of flight, citing the constant acceleration due to gravity. However, it lacks a clear explanation of why the acceleration due to gravity is independent of mass. To improve, expand on this point by stating that the acceleration due to gravity ( $g$ ) is a fundamental constant, unaffected by the mass of the object. This highlights the underlying physics behind the phenomenon.

Marks Awarded: 6.5



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