

One Dimensional Motion Test

Overview: This is a test on one-dimensional motion for a high school physics I class. I assumed that students would either have a “cheat sheet” with equations or they would be provided elsewhere. I used Popham’s guide on assessment to help me write the questions.

Instructions: Where applicable, assume $g=10 \text{ m/s/s}$ and ignore air resistance. Partial credit is possible on free response problems, so be sure to show your work.

1) State Newton’s three laws of motion. (5 points)

Multiple Choice: There is only one correct response for each question.

2a) A car accelerates from rest in a straight line at 5 m/s/s . What is its speed after 5 seconds? (5 points)

- a) 10 m/s
- b) 15 m/s
- c) 20 m/s
- d) 25 m/s

2b) How far did the car travel in those 5 seconds? (5 points)

- a) 10 m
- b) 25 m
- c) 62.5 m
- d) 125 m

3) You drop a ball off the edge of a cliff and find that it takes 7 seconds to hit the ground. How tall is the cliff? (Ignore air resistance.) (5 points)

- a) 35 m

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- b) 70 m
- c) 180 m
- d) 245 m

5) Who of the following are **NOT** experiencing acceleration? (5 points)

- a) A cyclist coasting down a hill at constant velocity
- b) A racecar driver going around a turn at constant velocity
- c) An astronaut during a rocket launch
- d) A driver slamming on her brakes

4a) Sketch the position vs. time graph you would expect from an object (that started at rest) moving in the positive direction at constant velocity. (5 points)

4b) Sketch the velocity vs. time graph would expect from an object (that started at rest) accelerating in the negative direction. (5 points)

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6) A particle is initially at $x=10$ m with velocity $v_0 = -3$ m/s.

a) Where is the particle after 4 seconds? (5 points)

b) At $t=4$ s the particle begins accelerating (in the positive direction) at 2 m/s/s. Where is the particle at $t=10$ s? (5 points)

7) You throw a ball straight up at 10 m/s and catch it in the same spot.

a) How long did it take to come back to you? (5 points)

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b) How high did the ball go? (5 points)

True or False: Fill each blank with either T or F indicating your “true” or “false” response.

8) ____ The area under a velocity graph gives position

9) ____ An accelerating object is always speeding up

10) ____ The distance an object traveled and its displacement will always be the same number.

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Key/Bloom Level

1) (Knowledge) (1 point) An object in motion will remain in motion until acted on by an outside force

(2 points) The acceleration of an object is proportional to and in the direction of the net force divided by the mass (or an equivalent statement)

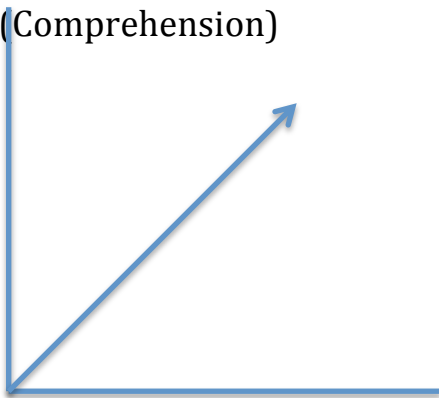
(2 points) For every action there is an equal and opposite reaction

2a) (Knowledge) d

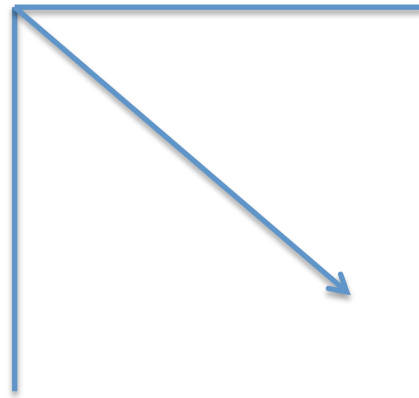
2b) c

3) (Knowledge) d

4a) (Comprehension)



4b)



5) (Knowledge) a

6a) (Application) $x = -2\text{m}$

6b) 16m

7a) (Application) $t = 2\text{s}$

7b) 5m 8) True 9) False 10) False

Learning Objectives

Students will be able to:

- Use and manipulate the kinematic equations to solve problems
- Interpret graphs of one dimensional motion
- Explain Newton's three laws of motion
- Understand the relationship between position, velocity, and acceleration