

General Physics Semester 1 Review Guide

1. A car is moving to the right. Every second a dot marks it's location. Label each of the following as constant velocity, speeding up or slowing down.

a.

b.

c.

2. A car accelerates at 4.2 m/s^2 from rest. How much road is needed to reach a velocity of 50 m/s ?

3. Vectors have magnitude (size) and direction. Which of the following are vectors?

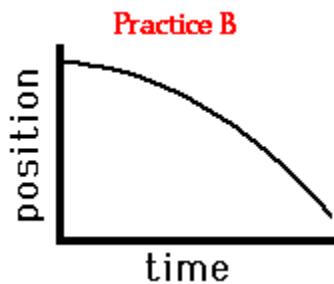
a. Speed b. velocity c. acceleration d. distance e. force

4. Scalars have magnitude, but no direction. Which of these are scalars?

a. Speed b. velocity c. time d. acceleration

5. A net force causes acceleration. A car is moving at 30 m/s . It goes around a curve and maintains the same speed. Did the velocity of the car change? Explain.

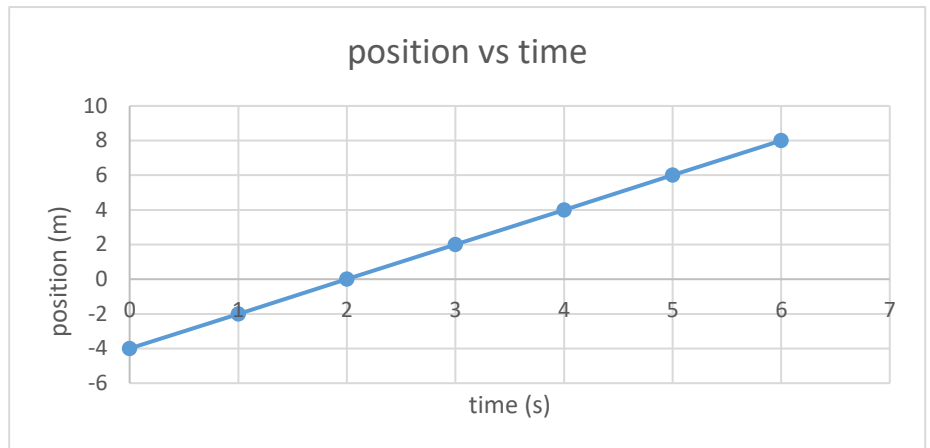
6. Draw velocity time graphs for each of these position time graphs.



7. A car with a leftward velocity and a rightward acceleration is
- a. Speeding up b. slowing down c. maintaining constant velocity
8. A ball with a downward velocity and an upward acceleration is
- a. Speeding up b. slowing down c. maintaining constant velocity
9. A car with a rightward velocity and a rightward acceleration is
- a. Speeding up b. slowing down c. maintaining constant velocity
10. A truck is moving with a velocity of 30 m/s . It slows at a rate of 3 m/s^2 .
- a. What is the direction of the acceleration?
- b. What is the sign of the acceleration?
- c. How long (time) will it take to stop?

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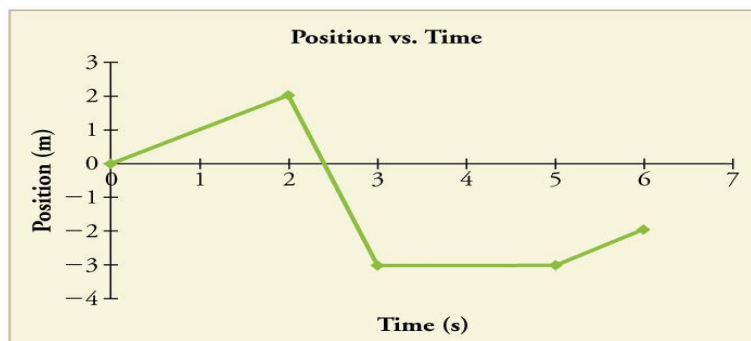
11. Based on the following graph, find the average velocity during the first 5 seconds.



12. A sled moves down a hill with an acceleration of 3 m/s^2 . If it takes 20 seconds to reach the bottom of the hill, how long is the hill? Assume the sled starts from rest.

13. Below is a position time graph of a person walking, they leave their house at zero seconds ($t=0$).

- Describe their motion during the first 2 seconds.
- Describe their motion between 2 and 3 seconds.
- Describe their motion between 3 and 5 seconds.
- Describe their motion between 5 and 6 seconds.



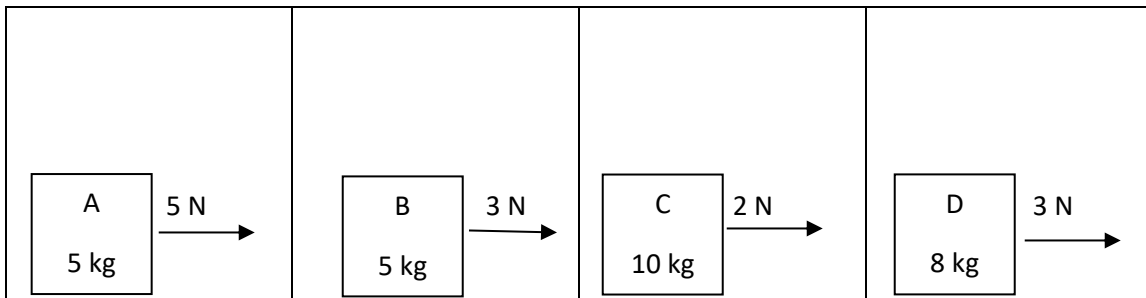
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14. An astronaut releases a ball and it falls to the surface of one of Jupiter's moons. It falls 15 meters in 4 seconds. Find the acceleration due to gravity on this moon.

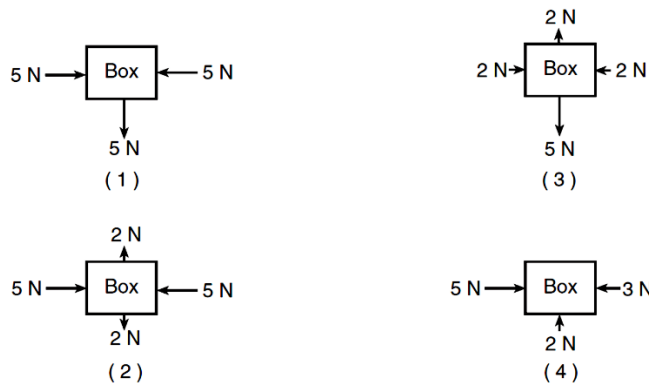
15. Solve for x $a = \frac{x}{d}$

16. Solve for a $\frac{F}{a} = m$

17. In the following boxes, the pulling force and mass of the boxes is shown. There is no friction. Rank the acceleration of each box from greatest to least. Show if any of them are equal if they have the same acceleration.



18. Which of these free body diagrams can be moving at constant velocity?



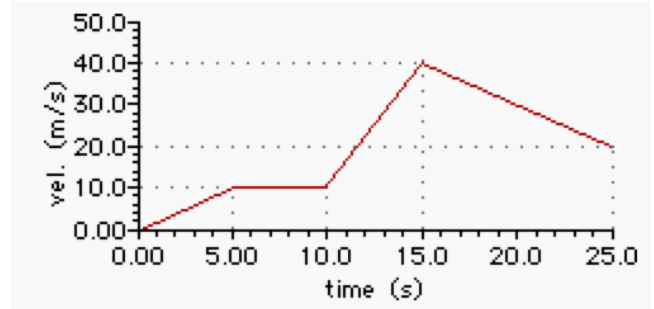
19. Which, if any, of the above free body diagrams is accelerating up? _____
20. Which, if any, of the above free body diagrams is accelerating left? _____
21. Which, if any, of the above free body diagrams is accelerating down? _____
22. Which, if any, of the above free body diagrams is accelerating right? _____

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23. What force is needed to accelerate a 20 kg cart from rest to 4 m/s in 2.2 seconds?

24. The following is a graph of Ms. Nosser picking up her birthday cake.

- a. At what time interval(s) is the net force to the right?
- b. At what time interval(s) is the net force to the left?
- c. At what time interval(s) is there NO net force?



25. The Sears Tower Sky Deck can sustain 4545.5Kg of mass. How much weight can it sustain?

26. In the case of an elastic collision, what situations would allow for the highest velocity of the second object after a collision?

27. A 42 kg alien is standing on a skateboard with a mass of 2 kg. The alien jumps off the hover craft at 0.25m/s. What is the velocity of the alien after he jumps off the hover craft?

28. A bus and a car are moving toward each other, if total momentum is 40kg*m/s before the collisions, what is the momentum after the collision?

29. Rearrange the following equation to solve for v'_b : $(m_a + m_b)v = m_a v'_a + m_b v'_b$

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30. A sea otter is sliding down a hill. If she has an impulse of 20Ns and a change in velocity of 2.0m/s, what is the mass of the sea otter?
31. A 0.145 kg baseball is pitched at 50 m/s. The batter hits it horizontally to the pitcher at 65 m/s. Find the change in momentum of the ball. If the ball was in contact with the bat for 0.00055 seconds, what would the force be while in contact?
32. How much work is done by an applied force to lift a 40-Newton block 6.0 meters vertically at a constant speed?
33. In which situations is work being done (circle ALL that apply)
- a. A teacher applies a force to a wall and becomes exhausted
 - b. A book falls off a table and free falls to the ground
 - c. A waiter carries a tray full of meals above his head by one arm straight across the room at a constant speed.
 - d. A rocket accelerates through space.
34. A 850N mountain climber scales a 125m cliff. How much work is done by the mountain climber?
35. You drop a basketball. What would you call this system?
36. In a collision, how can you determine if energy was transferred?

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Use the following roller coaster to answer the next 6 questions

37. What is the PE of the Roller-coaster car at Position 1?

38. What is the KE of the Roller-coaster at Position 2?

39. What is the total energy at position 4?

40. How fast is the roller coaster moving at position 3?

41. What speed would be possible at position 4?

42. If we were to rebuild this roller coaster, is there enough initial energy to make position 2 higher than position 1? **EXPLAIN!**

