

1 pt If an object moves with constant (non-zero) acceleration, then which of the following statements are true?

▷ The position must be decreasing

1. ☐ A True ☐ B False

▷ The velocity must be increasing

2. ☐ A True ☐ B False

▷ The acceleration may be increasing or decreasing

3. ☐ A True ☐ B False

▷ The velocity must continually change by varying amounts depending on the speed

4. ☐ A True ☐ B False

▷ The velocity must continually change by the same amount each second

5. ☐ A True ☐ B False

1 pt Assume that the brakes in your car create a constant deceleration, independent of how fast you are driving. If you double your driving speed, which of the following statements are true?

▷ Your stopping time will quadruple.

6. ☐ A True ☐ B False

▷ Your stopping distance will not change.

7. ☐ A True ☐ B False

▷ Your stopping time will double.

8. ☐ A True ☐ B False

▷ Your stopping distance will double.

9. ☐ A True ☐ B False

▷ Your stopping distance will quadruple.

10. ☐ A True ☐ B False

▷ Your stopping time will not change.

11. ☐ A True ☐ B False

1 pt You throw a ball straight up in the air. It goes up, and eventually it comes back down. You are fascinated by this amazing experiment, and you ponder the implications on the velocity and acceleration of the ball. Which of the following is a correct interpretation?

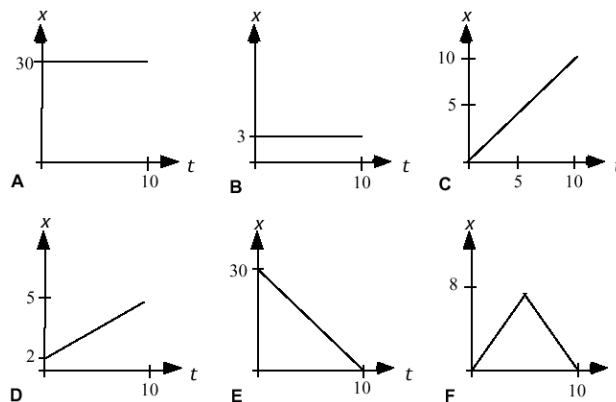
12. ☐ A As the ball rises, its velocity and acceleration point in the same direction.

☐ B At the topmost point, the velocity of the ball is zero and its acceleration is zero.

☐ C As the ball rises, its velocity decreases, but its acceleration remains constant.

☐ D As the ball rises, its velocity decreases but its acceleration increases.

☐ E As the ball rises, its velocity decreases and its acceleration decreases.



1 pt

In the position vs. time graphs above, all times are in seconds and all positions are in meters. Which of the following statements are true about the graphs shown above? Hint: keep in mind that velocity is a vector and speed is a scalar.

▷ The average velocity is constant in Figures C, D and E

13. ☐ A True ☐ B False

▷ The average velocity is negative in Figure E

14. ☐ A True ☐ B False

▷ The net displacement is zero in Figures A and B

15. ☐ A True ☐ B False

▷ The object is at rest all of the time in Figure F

16. ☐ A True ☐ B False

▷ The average velocity is non-zero in Figure F

17. ☐ A True ☐ B False

1 pt A ball is thrown from a point 1.02 m above the ground. The initial velocity is 18.5 m/s at an angle of 26.0° above the horizontal. Find the maximum height of the ball above the ground.

(in m)

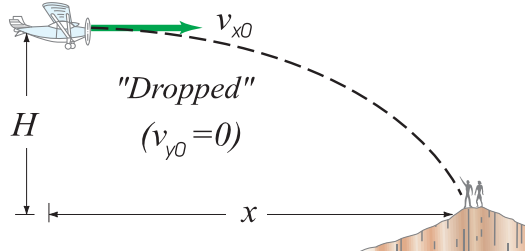
18. A ☐ 2.68 B ☐ 3.03 C ☐ 3.43 D ☐ 3.87
E ☐ 4.38

1 pt Calculate the speed of the ball at the highest point in the trajectory.

(in m/s)

19. A ☐ 1.15×10^1 B ☐ 1.66×10^1 C ☐ 2.41×10^1
D ☐ 3.50×10^1 E ☐ 5.07×10^1

1 pt A rescue plane wants to drop supplies to isolated mountain climbers on a rocky ridge $H = 219$ m below. If the plane is traveling horizontally with a speed of 247 km/hr (68.6 m/s), how far in advance of the recipients (horizontal distance) must the goods be dropped?



(in m)

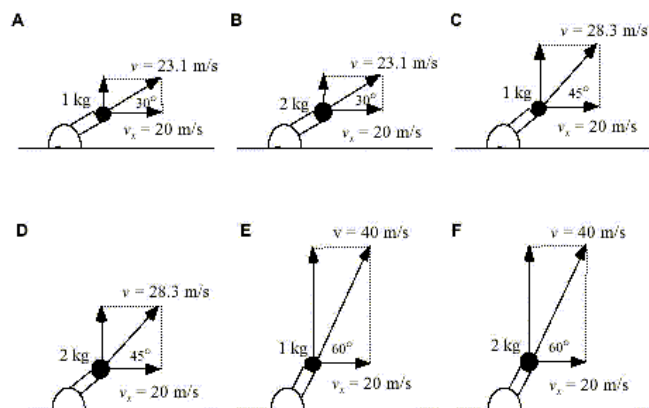
20. A ☐ 406 B ☐ 458 C ☐ 518 D ☐ 585 E ☐ 662

1 pt [Due never] William Tell must split the apple atop his son's head from a distance of 24.4 m. When he aims directly at the apple, the arrow is horizontal. At what angle must he aim it to hit the apple if the arrow travels at a speed of 34.0 m/s?

(in deg)

21. A ☐ 3.06 B ☐ 3.82 C ☐ 4.78 D ☐ 5.97
E ☐ 7.46

1 pt The pictures show cannonballs of two different masses projected upward and forward. The cannonballs are projected at various angles above the horizontal, but all are projected with the same horizontal component of velocity.



Which of the following statements are true about the situations depicted in the figures above?

▷ The highest vertical height reached is in pictures E and F

22. A ☐ True B ☐ False

▷ The longest horizontal distance traveled is in pictures E and F

23. A ☐ True B ☐ False

▷ The flight of the ball is identical in pictures A and B, independent of the fact that the masses are different

24. A ☐ True B ☐ False

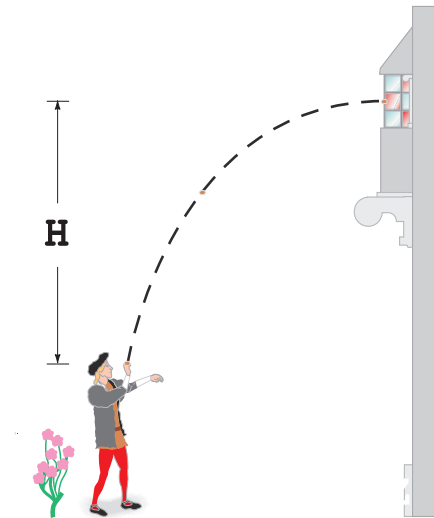
▷ The acceleration of the ball in flight is greater in C and D than it is in A and B

25. A ☐ True B ☐ False

▷ At the top, the horizontal velocity of the cannonball is greatest in pictures A and B

26. A ☐ True B ☐ False

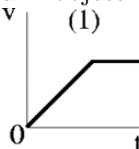
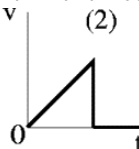
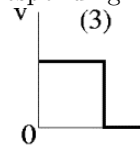
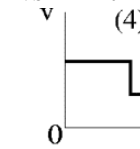
1 pt **Due never** Romeo is chucking pebbles as gently as he can up to Juliet's window. That is, he wants the pebbles to hit the window with the least possible speed as shown in the figure below. He is standing at the edge of a rose garden at $H = 7.80$ m below her window and at $D = 8.70$ m from the base of the wall. How fast are the pebbles going when they hit her window?



(in m/s)

27. A ☐ 6.90 B ☐ 8.07 C ☐ 9.44 D ☐ 11.04
E ☐ 12.92

1 pt Match the verbal description of motion for an object with the corresponding v vs. t graph.

(1)	(2)	(3)	(4)
			

▷ a car is driving along at a constant speed, then suddenly crashes into a solid brick wall

28. A ☐ 1 B ☐ 2 C ☐ 3 D ☐ 4
E ☐ none of the above

▷ a car accelerates away from a STOP sign at a constant rate, then decelerates at a constant rate when approaching the next STOP sign

29. A ☐ 1 B ☐ 2 C ☐ 3 D ☐ 4
E ☐ none of the above

▷ a car is driving along at a constant speed, then decelerates at a constant rate, coming to a stop

30. A ☐ 1 B ☐ 2 C ☐ 3 D ☐ 4
E ☐ none of the above

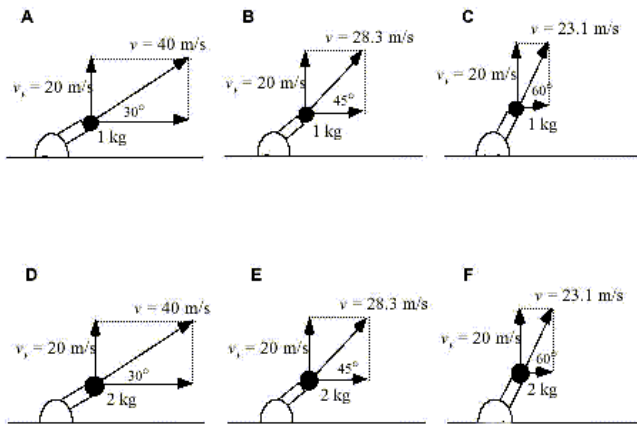
▷ a car is sitting at rest at a red light, then accelerates away when the light turns green

31. A ☐ 1 B ☐ 2 C ☐ 3 D ☐ 4
E ☐ none of the above

▷ a car is accelerating along the freeway on-ramp, then gets on the freeway and continues at a constant speed

32. A ☐ 1 B ☐ 2 C ☐ 3 D ☐ 4
E ☐ none of the above

1 pt The pictures show cannonballs of two different masses projected upward and forward. The cannonballs are projected at various angles above the horizontal, but all are projected with the same vertical component of velocity.



Which of the following statements are true about the situations depicted in the figures above?

▷ The time in the air is the same in all cases

33. A ☐ True B ☐ False

▷ The longest horizontal distance traveled is in pictures A and D

34. A ☐ True B ☐ False

▷ The highest vertical height reached is in pictures C and F

35. A ☐ True B ☐ False

▷ The flight of the ball is identical in pictures A and D, independent of the fact that the masses are different

36. A ☐ True B ☐ False

▷ At the top, the overall velocity of the cannonball is smallest

37. A ☐ True B ☐ False