

HOMEWORK 1

1. A weather balloon travels upward for 6 km while the wind blows it 10 km north and 8 km east. Approximately what is its final displacement from its initial position?
 - A. 7 km
 - B. 10 km
 - C. 14 km
 - D. 20 km

2. Which of the following gives the average velocity of an athlete running on a circular track with a circumference of $\frac{1}{2}$ km, if that athlete runs 1 km in 4 minutes?
 - A. 0 m/s
 - B. 2 m/s
 - C. 4.2 m/s
 - D. 16.8 m/s

3. A man entered a cave and walked 100 m north. He then made a sharp turn 150° to the west and walked 87 m straight ahead. How far is the man from where he entered the cave? (Note: $\sin 30^\circ = 0.50$; $\cos 30^\circ = 0.87$.)
 - A. 25 m
 - B. 50 m
 - C. 100 m
 - D. 150 m

4. The earth moves around the sun at approximately 30 m/s. Is the earth accelerating?
 - A. No, because acceleration is a vector.
 - B. No, because the net displacement is zero.
 - C. Yes, because the speed is not constant.
 - D. Yes, because the velocity is not constant.

5. An airliner flies from Chicago to New York. Due to the shape of the earth, the airliner must follow a curved trajectory. How does the curved trajectory of the airliner affect its final displacement for this trip?
 - A. The displacement is less than it would be if the airliner flew in a straight line to New York.
 - B. The displacement is greater than it would be if the airliner flew in a straight line to New York.
 - C. The displacement is the same as it would be if the airliner flew in a straight line to New York.
 - D. The final displacement of the airliner is zero.

6. An automobile that was moving forward on a highway pulled over onto the exit ramp and slowed to a stop. While the automobile was slowing down, which of the following could be true?
 - A. The velocity was positive and the acceleration was positive.
 - B. The velocity was negative and the acceleration was negative.
 - C. The velocity was positive and the acceleration was negative.
 - D. The velocity and acceleration had the same sign, either positive or negative.

7. All of the following describe the magnitude and direction of a vector EXCEPT:
 - A. 10 m/s West
 - B. 10 m/s in a circle
 - C. 20 m to the left
 - D. 20 m straight up

8. An elephant runs at a speed of 36 km/hour. Based on this information, how far can the elephant run in 10 seconds?
 - A. 10 m
 - B. 50 m
 - C. 100 m
 - D. 200 m

9. Which of the following graphs best represents a particle with constant velocity?

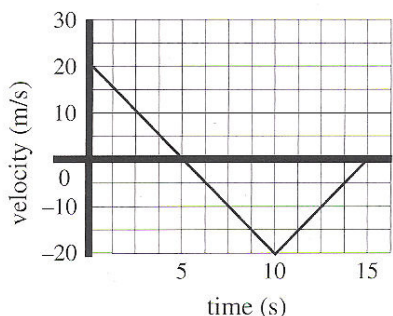
A.

C.

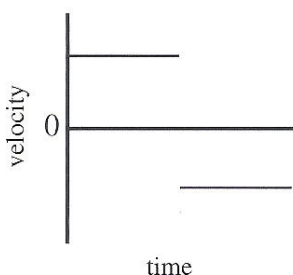
B.

D.

10. The graph below represents a particle moving along a straight line. What is the total distance traveled by the particle from $t = 0$ to $t = 10$ seconds?



- A. 0 m
 B. 50 m
 C. 100 m
 D. 200 m
11. Which of the following is the most probable description of the motion of the object depicted by the graph below?

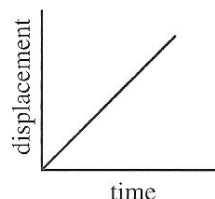


- A. A person on a bike accelerating in a straight line, and then decelerating.
 B. A baseball thrown by a pitcher and hit by a batter.
 C. A planet in orbit.
 D. One swing on a pendulum.
12. A car accelerates at a constant rate from 0 to 25 m/s over a distance of 25 m. Approximately how long does it take the car to reach the velocity of 25 m/s?
- A. 1 s
 B. 2 s
 C. 4 s
 D. 8 s

13. A particle moving in a straight line slows down at a constant rate from 50 m/s to 25 m/s in 2 seconds. What is the acceleration of the particle?

- A. -12.5 m/s^2
 B. -25 m/s^2
 C. -50 m/s^2
 D. -100 m/s^2

14. The graph below shows the displacement of a particle over time.



The particle exhibits increasing:

- I. displacement
 II. velocity
 III. acceleration

- A. I only
 B. II only
 C. I and II only
 D. I and III only

17. If an apple that is dropped from an altitude of 100 m reaches an altitude of 80 m after falling for $t = 2$ seconds, what altitude will it be at in $t = 4$ seconds?

- A. 60 m
 B. 40 m
 C. 20 m
 D. 0 m

18. Two skydivers are playing catch with a ball while they are falling through the air. Ignoring air resistance, in which direction should one skydiver throw the ball relative to the other if the one wants the other to catch it?

- A. above the other since the ball will fall faster
 B. above the other since the ball will fall more slowly
 C. below the other since the ball will fall more slowly
 D. directly at the other since there is no air resistance

19. If an antelope is running at a speed of 10 m/s, and can maintain that horizontal velocity when it jumps, how high must it jump in order to clear a horizontal distance of 20 m?
- A. 5 m
 - B. 10 m
 - C. 20 m
 - D. 45 m
20. Ignoring air resistance, if the initial height of a body in free fall is increased by a factor of 4, the final velocity when it hits the ground will increase by a factor of:
- A. 2
 - B. 4
 - C. It depends upon the value of the initial height.
 - D. The velocity will remain the same.
21. A projectile is launched at an angle of 30° to the horizontal and with a velocity of 100 m/s. How high will the projectile be at its maximum height?
- A. 100 m
 - B. 125 m
 - C. 250 m
 - D. 500 m
22. Two balls are dropped from a tall tower. The balls are the same size, but Ball X has greater mass than Ball Y. When both balls have reached terminal velocity, which of the following is true?
- A. The force of air resistance on either ball is zero.
 - B. Ball X has greater velocity.
 - C. The Ball X has greater acceleration.
 - D. The acceleration of both balls is 9.8 m/s^2 .
23. A hiker throws a rock horizontally off a cliff that is 40 meters above the water below. If the speed of the rock is 30 m/s, how long does it take for the rock to hit the water? (ignore air resistance, $g = 10 \text{ m/s}^2$)
- A. 3 sec
 - B. 4 sec
 - C. 5 sec
 - D. 6 sec
24. A golfer hits a ball with an initial speed of 30 m/s at an angle of 40° to the horizontal. If the ball is in the air for 6 seconds, which of the following expressions will be equal to the horizontal distance traveled by the ball? (Ignore the effects of air resistance.)
- A. $(15)(6)^2(\cos 40^\circ) \text{ m}$
 - B. $(30)(6)(\cos 40^\circ) \text{ m}$
 - C. $(15)(6)^2(\sin 40^\circ) \text{ m}$
 - D. $(30)(6)(\sin 40^\circ) \text{ m}$