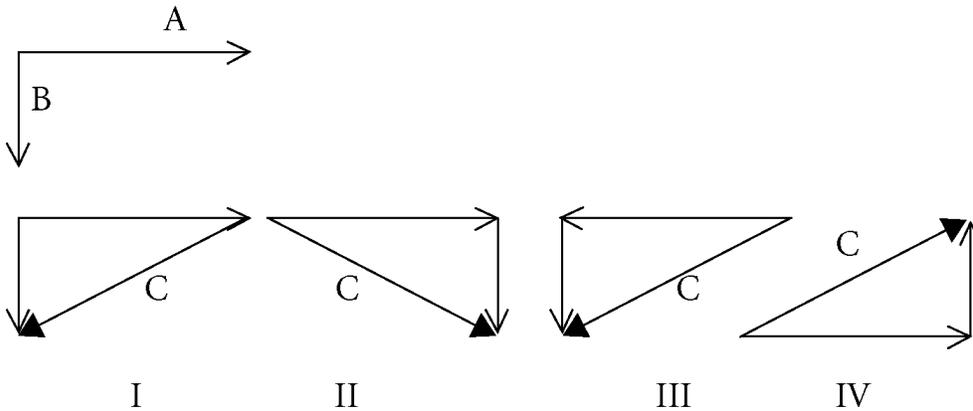


Ph. Q1W3-HW

Multiple Choice

Identify the choice that best completes the statement or answers the question.

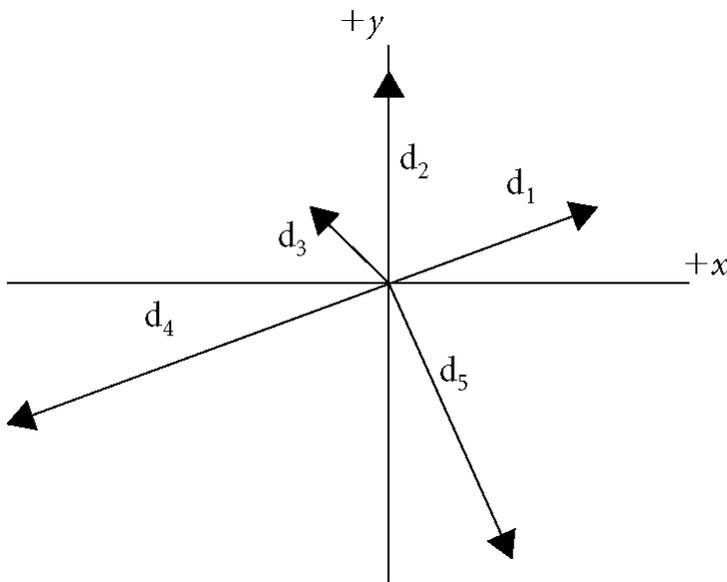
- ___ 1. Which of the following is a physical quantity that has a magnitude but no direction?
 a. vector
 b. scalar
 c. resultant
 d. frame of reference
- ___ 2. Which of the following is a physical quantity that has both magnitude and direction?
 a. vector
 b. scalar
 c. resultant
 d. frame of reference
- ___ 3. Which of the following is an example of a vector quantity?
 a. velocity
 b. temperature
 c. volume
 d. mass
- ___ 4. The written abbreviation, \vec{a} , represents a quantity that has which of the following abbreviations in the text?
 a. a
 b. *a*
 c. **a**
 d. *a*
- ___ 5. Identify the following quantities as scalar or vector: the mass of an object, the number of leaves on a tree, wind velocity.
 a. vector, scalar, scalar
 b. scalar, scalar, vector
 c. scalar, vector, scalar
 d. vector, scalar, vector
- ___ 6. Identify the following quantities as scalar or vector: the speed of a snail, the time it takes to run a mile, the free-fall acceleration.
 a. vector, scalar, scalar
 b. scalar, scalar, vector
 c. vector, scalar, vector
 d. scalar, vector, vector



- ___ 7. In the figure above, which diagram represents the vector addition $\mathbf{C} = \mathbf{A} + \mathbf{B}$?
 a. I
 b. II
 c. III
 d. IV
- ___ 8. In the figure above, which diagram represents the vector subtraction $\mathbf{C} = \mathbf{A} - \mathbf{B}$?
 a. I
 b. II
 c. III
 d. IV
- ___ 9. For the winter, a duck flies 10.0 m/s due south against a gust of wind with a speed of 2.5 m/s. What is the resultant velocity of the duck?

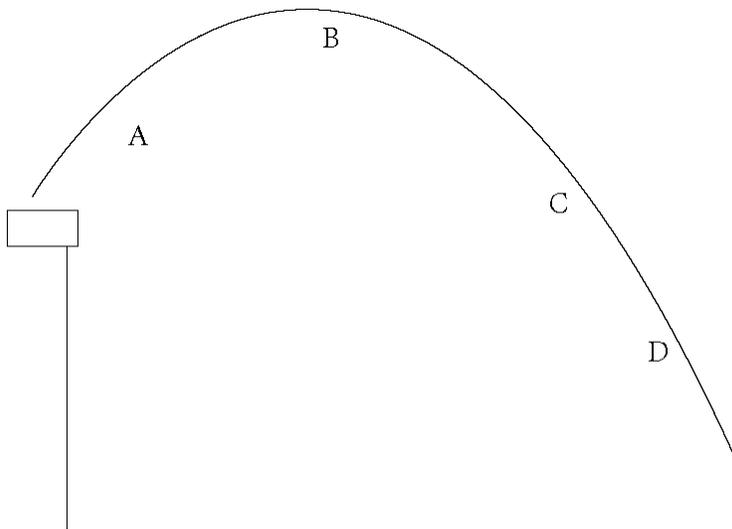
- a. 12.5 m/s south
- b. -12.5 m/s south
- c. 7.5 m/s south
- d. -7.5 m/s south

- ___ 10. Multiplying or dividing vectors by scalars results in
- a. vectors.
 - b. scalars.
 - c. vectors if multiplied or scalars if divided.
 - d. scalars if multiplied or vectors if divided.
- ___ 11. A car travels down a road at a certain velocity, \mathbf{v}_{car} . The driver slows down so that the car is traveling only half as fast as before. Which of the following is the correct expression for the resulting velocity?
- a. $2\mathbf{v}_{\text{car}}$
 - b. $\frac{1}{2}\mathbf{v}_{\text{car}}$
 - c. $-\frac{1}{2}\mathbf{v}_{\text{car}}$
 - d. $-2\mathbf{v}_{\text{car}}$
- ___ 12. A football player runs in one direction to catch a pass, then turns and runs twice as fast in the opposite direction toward the goal line. Which of the following is a correct expression for the original velocity and the resulting velocity?
- a. $-\mathbf{v}_{\text{player}}, -2\mathbf{v}_{\text{player}}$
 - b. $\mathbf{v}_{\text{player}}, 2\mathbf{v}_{\text{player}}$
 - c. $\mathbf{v}_{\text{player}}, -2\mathbf{v}_{\text{player}}$
 - d. $2\mathbf{v}_{\text{player}}, -\mathbf{v}_{\text{player}}$
- ___ 13. Which of the following is the best coordinate system to analyze a painter climbing a ladder at an angle of 60° to the ground?
- a. x -axis: horizontal along the ground; y -axis: along the ladder
 - b. x -axis: along the ladder; y -axis: horizontal along the ground
 - c. x -axis: horizontal along the ground; y -axis: up and down
 - d. x -axis: along the ladder; y -axis: up and down
- ___ 14. An ant on a picnic table travels 3.0×10^1 cm eastward, then 25 cm northward, and finally 15 cm westward. What is the magnitude of the ant's displacement relative to its original position?
- a. 70 cm
 - b. 57 cm
 - c. 52 cm
 - d. 29 cm



- ___ 15. How many displacement vectors shown in the figure above have horizontal components?
- a. 2
 - c. 4

- b. 3
d. 5
- ___ 16. How many displacement vectors shown in the figure above have components that lie along the y -axis and are pointed in the $-y$ direction?
a. 0
b. 2
c. 3
d. 5
- ___ 17. Which displacement vectors shown in the figure above have vertical components that are equal?
a. \mathbf{d}_1 and \mathbf{d}_2
b. \mathbf{d}_1 and \mathbf{d}_3
c. \mathbf{d}_2 and \mathbf{d}_5
d. \mathbf{d}_4 and \mathbf{d}_5
- ___ 18. In a coordinate system, the magnitude of the x component of a vector and θ , the angle between the vector and x -axis, are known. The magnitude of the vector equals the x component
a. divided by the cosine of θ .
b. divided by the sine of θ .
c. multiplied by the cosine of θ .
d. multiplied by the sine of θ .
- ___ 19. Find the resultant of these two vectors: 2.00×10^2 units due east and 4.00×10^2 units 30.0° north of west.
a. 300 units, 29.8° north of west
b. 581 units, 20.1° north of east
c. 546 units, 59.3° north of west
d. 248 units, 53.9° north of west
- ___ 20. Which of the following is the motion of objects moving in two dimensions under the influence of gravity?
a. horizontal velocity
b. directrix
c. vertical velocity
d. projectile motion
- ___ 21. Which of the following is an example of projectile motion?
a. a jet lifting off a runway
b. a thrown baseball
c. an aluminum can dropped straight down into the recycling bin
d. a space shuttle being launched



The figure above shows the path of a ball tossed from a building. Air resistance is ignored.

- ___ 22. In the figure above, the magnitude of the ball's velocity is least at location
a. A.
b. B.
c. C.
d. D.
- ___ 23. In the figure above, the magnitude of the ball's velocity is greatest at location
a. A.
c. C.

Problems

31. A lightning bug flies at a velocity of 0.15 m/s due east toward another lightning bug seen off in the distance. A light easterly breeze blows on the bug at a velocity of 0.15 m/s. What is the resultant velocity of the lightning bug?
- A- 0.00 m/s
 - B- 1.00 m/s
 - C- 2.00 m/s
 - D- 3.00 m/s
32. An airplane flying at 180 km/h due west moves into a region where the wind is blowing at 60 km/h due east. If the plane's original vector velocity is $\mathbf{v}_{\text{plane}}$, what is the expression for the plane's resulting velocity in terms of $\mathbf{v}_{\text{plane}}$?
- A- $\frac{1}{3} \mathbf{v}_{\text{plane}}$
 - B- $\frac{2}{3} \mathbf{v}_{\text{plane}}$
 - C- $13 \mathbf{v}_{\text{plane}}$
 - D- $\frac{4}{3} \mathbf{v}_{\text{plane}}$
33. A dog walks 17 steps north and then walks 51 steps west to bury a bone. If the dog walks back to the starting point in a straight line, how many steps will the dog take? Use the graphical method to find the magnitude of the net displacement.
- A- 34 steps
 - B- 44 steps
 - C- 54 steps
 - D- 64 steps
34. A quarterback takes the ball from the line of scrimmage and runs backward for 1.9×10^1 m. He then runs sideways, parallel to the line of scrimmage, for 17 m. Next, he throws the ball forward 7.8×10^1 m, perpendicular to the line of scrimmage. The receiver is tackled immediately. How far is the football displaced from its original position?
- A- 62.0 m
 - B- 72.0 m
 - C- 82.0 m
 - D- 92.0 m
35. A duck waddles 2.3 m east and 7.0 m north. What are the magnitude and direction of the duck's displacement with respect to its original position?
- A- 4.3 m at 72° north of east
 - B- 5.3 m at 72° north of east
 - C- 6.3 m at 72° north of east
 - D- 7.3 m at 72° north of east

36. A cow ambles through a break in the barnyard fence and wanders 34 m at 60.1° north of east, and then 21 m east. If the cow's wanderings last 3.4 minutes, what is the cow's average velocity?
- A- 0.23 m/s, 37° north of east
 - B- 0.15 m/s, 37° north of east
 - C- 0.103 m/s, 37° north of east
 - D- 0.05 m/s, 37° north of east
37. While grazing, a caribou treks 136 m at 53.0° west of south, and then 129 m west. What is the caribou's resultant displacement?
- A- 1.00×10^2 m, 62.7° west of south
 - B- 1.37×10^2 m, 62.7° west of south
 - C- 2.00×10^2 m, 62.7° west of south
 - D- 2.37×10^2 m, 62.7° west of south
38. A stone is thrown at an angle of 30.0° above the horizontal from the top edge of a cliff with an initial speed of 15 m/s. A stopwatch measures the stone's trajectory time from the top of the cliff to the bottom at 6.30 s. What is the height of the cliff? (Assume no air resistance and that $a_y = -g = -9.81 \text{ m/s}^2$.)
- A- 138 m
 - B- 148 m
 - C- 158 m
 - D- 168 m
39. A model rocket flies horizontally off the edge of a cliff at a velocity of 70.0 m/s. If the canyon below is 110.0 m deep, how far from the edge of the cliff does the model rocket land? ($a_y = -g = -9.81 \text{ m/s}^2$)
- A- 1.31×10^2 m
 - B- 2.31×10^2 m
 - C- 3.31×10^2 m
 - D- 4.31×10^2 m
40. A small airplane flies at a velocity of 106 km/h toward the south as observed by a person on the ground. The airplane pilot measures the velocity of the plane with respect to the air as 129 km/h south. What is the velocity of the wind that affects the plane?
- A- 13 km/h north
 - B- 23 km/h north
 - C- 33 km/h north
 - D- 43 km/h north
- =====