

REVIEW QUESTIONS

- Q2-1** What is the difference between a scalar and a vector?
- Q2-2** How do we represent vectors in writing and in textbooks?
- Q2-3** If \mathbf{A} is parallel to \mathbf{B} , what is the magnitude of $\mathbf{A} + \mathbf{B}$? Of $\mathbf{A} - \mathbf{B}$? Of $2\mathbf{A}$?
- Q2-4** If \mathbf{A} is perpendicular to \mathbf{B} , what is the magnitude of $\mathbf{A} + \mathbf{B}$?
- Q2-5** The average velocity in a plane is the _____ divided by the _____.
- Q2-6** The average acceleration in a plane is the _____ divided by the _____.
- Q2-7** The acceleration is zero when both the _____ and _____ of the velocity are constant.
- Q2-8** Motion in a plane is equivalent to a pair of _____.
- Q2-9** The motion of a projectile is influenced only by the _____ (assuming air resistance is negligible).
- Q2-10** The time when a projectile hits the ground is found from the equations for the _____ motion.
- Q2-11** When a projectile is at its greatest height, the _____ component of the velocity is zero.
- Q2-12** The _____ component of the velocity of a projectile remains constant throughout its motion.
- Q2-13** The vertical component of the acceleration of a projectile is _____, and the horizontal component is _____.

EXERCISES

Section 2.1 | An Introduction to Vectors

- 2-1** Figure 2.18 shows a collection of vectors that can be combined in various ways. For example, $\mathbf{A} + \mathbf{C} = \mathbf{B}$. Find (a) $\mathbf{E} + \mathbf{C}$; (b) $\mathbf{A} + \mathbf{F}$; (c) $\mathbf{A} + \mathbf{D}$; (d) $\mathbf{E} + \mathbf{A}$; (e) $\mathbf{E} + 2\mathbf{A}$; (f) $\mathbf{A} - \mathbf{B}$; (g) $\mathbf{B} - \mathbf{A}$; (h) $\mathbf{C} - \mathbf{A}$.
- 2-2** In Fig. 2.19, for what value of θ will $\mathbf{C} = \mathbf{A} + \mathbf{B}$ have (a) a minimum magnitude, and (b) a maximum magnitude? (c) Find C when $\theta = 90^\circ$.
- 2-3** A vector has an x component of -10 and a y component of $+3$. (a) Draw a set of x - y axes and show the vector. (b) Calculate the magnitude and direction of the vector.

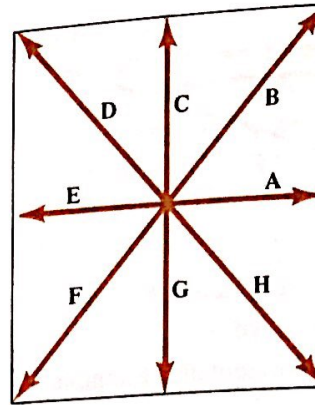


Figure 2.18. Exercise 2-1.

- 2-4** $\mathbf{A} = 3\hat{x} + 2\hat{y}$, and $\mathbf{B} = 4\hat{x} - \hat{y}$. Find the magnitude of (a) $\mathbf{A} + \mathbf{B}$; (b) $\mathbf{A} - \mathbf{B}$; (c) $2\mathbf{B}$.
- 2-5** $\mathbf{A} = 2\hat{x} + 4\hat{y}$. Find the magnitude and direction of (a) \mathbf{A} ; (b) $-\mathbf{A}$.
- 2-6** If $\theta = 72^\circ$ in Fig. 2.19, find (a) the direction and magnitude of $\mathbf{C} = \mathbf{A} + \mathbf{B}$ by constructing a drawing using a ruler and a protractor; (b) the direction and magnitude of \mathbf{C} using the component method.
- 2-7** For the vectors \mathbf{A} and \mathbf{B} in Fig. 2.20, find (a) $\mathbf{A} + \mathbf{B}$; (b) $\mathbf{B} - \mathbf{A}$; (c) $\mathbf{A} - \mathbf{B}$.
- 2-8** Using components for the vectors in Fig. 2.21, find the direction and magnitude of $\mathbf{E} = \mathbf{A} + \mathbf{B} + \mathbf{C} + \mathbf{D}$.
- 2-9** Using components for the vectors in Fig. 2.21, find the direction and magnitude of $\mathbf{F} = \mathbf{A} - \mathbf{C} + \mathbf{B} - 2\mathbf{D}$.
- 2-10** A woman walks 10 km north, turns toward the northwest, and walks 5 km further. What is her final position?
- 2-11** A ship sets out to sail 100 km north but is blown by a severe storm to a point 200 km east of

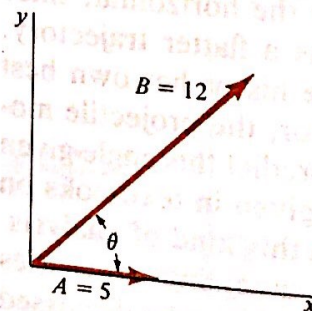


Figure 2.19. Exercises 2-2 and 2-6.