Vectors

Choose one answer per question. Circle A, B, C, or D.

1. Which description is a vector quantity?
   A. A displacement of 5 meters west
   B. A temperature of 20 degrees Celsius
   C. A mass of 5 kilograms
   D. An elapsed time of 5 seconds

2. What movement is described by the component vector (3, −2) on a standard coordinate grid?
   A. Two right and three down
   B. Three left and two up
   C. Three right and two down
   D. Three right and two up

3. What is the magnitude of the vector (3, 4)?
   A. 7
   B. 5
   C. 12
   D. 25

4. What is (2, 5) + (−5, 7)?
   A. (3, −12)
   B. (7, 2)
   C. (−7, 12)
   D. (−3, 12)

5. Multiply the vector (−2, 4) by the scalar 3. What is the result?
   A. (6, 12)
   B. (−6, 12)
   C. (−2, 12)
   D. (1, 7)

6. What is the displacement from (−2, 3) to (5, −1)?
   A. (7, −4)
   B. (3, 2)
   C. (−7, 4)
   D. (7, 2)

7. A person walks 9 meters northeast and then 9 meters southwest along the same line. What is the resultant displacement?

A. 18 meters southwest
B. 18 meters northeast
C. 9 meters southwest
D. The zero vector

8. Which unit vector points in the same direction as $(-6, 8)$?

A. $(-3/4, 1)$
B. $(3/5, -4/5)$
C. $(-3/5, 4/5)$
D. $(-6/5, 8/5)$

9. What is the dot product of $(4, -3)$ and $(2, 5)$?

A. -7
B. 23
C. 7
D. -23

10. A fictional object’s velocity is 7 meters per second east and 24 meters per second north. What is its speed?

A. 24 meters per second
B. 31 meters per second
C. 17 meters per second
D. 25 meters per second

11. For what value of k are the vectors $(6, 2)$ and $(k, -9)$ perpendicular?

A. 9
B. -3
C. 3
D. 1/3

12. Which vector points in the same direction as $(-2, 5)$?

A. $(4, -10)$
B. $(-4, 10)$
C. $(-4, 5)$
D. $(-10, 4)$

13. Let u = (3, −4). Which vector v satisfies 2u + v = (11, −3)?

A. (5, −11)
B. (8, 1)
C. (17, −11)
D. (5, 5)

14. An object moves 3 meters east. A constant force on it has components 12 newtons east and 5 newtons north. How much work does this force do over that displacement?

A. 36 joules
B. 39 joules
C. 51 joules
D. 15 joules

15. Project u = (6, 2) onto v = (1, 1), then subtract that projection from u. What remains?

A. (−2, 2)
B. (4, 4)
C. (2, −2)
D. (6, 2)