1. Which is always true about the dot product of two vectors?
A. It is zero.
C. It is a scalar.
B. It is a vector.
D. None of these.
2. Suppose that $\overrightarrow{\mathbf{u}}$ and $\overrightarrow{\mathbf{v}}$ are vectors. Using the same choices as for the previous exercise, which is true about $\overrightarrow{\mathbf{u}} \times \overrightarrow{\mathbf{v}}$ ?
3. The vectors $\overrightarrow{\mathbf{u}}=\langle 3,1,7\rangle$ and $\overrightarrow{\mathbf{v}}=\langle-5,4,2\rangle$ are perpendicular.
A. true
B. false
4. Let $\overrightarrow{\mathbf{w}}=\overrightarrow{\mathbf{u}} \times \overrightarrow{\mathbf{v}}$. Then $\overrightarrow{\mathbf{u}} \cdot \overrightarrow{\mathbf{w}}$ is
A. perpendicular to $\overrightarrow{\mathbf{u}}$.
B. perpendicular to $\overrightarrow{\mathbf{v}}$.
C. perpendicular to $\stackrel{\rightharpoonup}{\mathbf{w}}$.
D. none of these.
5. Which of the following operations is NOT meaningful? (That is, which is not defined?)
A. subtracting two vectors
B. adding a scalar and a vector
C. multiplying a scalar by a vector
D. none of the above
6. Let $\overrightarrow{\mathbf{w}}=\overrightarrow{\mathbf{u}} \times \overrightarrow{\mathbf{v}}$. Which of the following is NOT true?
A. $\overrightarrow{\mathbf{w}} \perp \overrightarrow{\mathbf{u}}$
B. $\overrightarrow{\mathbf{w}} \perp \overrightarrow{\mathbf{v}}$
C. $\overrightarrow{\mathbf{w}} \cdot \overrightarrow{\mathbf{u}}=0$
D. none of these (that is, all of them ARE true)
7. The vectors $\overrightarrow{\mathbf{u}}$ and $\overrightarrow{\mathbf{v}}$ are shown to the right. For which of the diagrams below does $\overrightarrow{\mathbf{w}}$ represent $\overrightarrow{\mathbf{u}}-\overrightarrow{\mathbf{v}}$ ?

8. Which vector $\overrightarrow{\mathbf{u}}$ represents $\operatorname{proj}_{\overrightarrow{\mathbf{b}}} \stackrel{\rightharpoonup}{\mathbf{v}}$ ?
A.

C.

B.

D.

9. A plane contains three points $P_{1}, \quad P_{2}, \quad P_{3}$. Which vector is perpendicular to the plane?
A. $\overrightarrow{P_{1} P_{2}} \times \overrightarrow{P_{2} P_{3}}$
B. ${\overrightarrow{P_{1} P_{2}}}_{2} \cdot \overrightarrow{P_{1} P_{3}}$
C. $\overrightarrow{P_{1} P_{2}}$
D. none of these
10. Which parametric equations describe the line through $(1,2,3)$ and $(-2,5,4)$ ?
A. $x=1-2 t$,
$y=2+5 t$,
$z=4+3 t$
B. $x=-2+t$,
$y=5+2 t$,
$z=3+4 t$
C. $x=-2+3 t$,
$y=5-3 t$,

$$
z=4-t
$$

D. $x=1-3 t$,
$y=2+3 t$,
$z=3+t$
11. A line in 2-space has the equations $x=3+t, y=2-5 t$. Which of the following is NOT a representation of the same line?
A. $x=3-t, \quad y=2+5 t$
B. $x=3+2 t, \quad y=2-10 t$
C. $x=6+t, \quad y=4-5 t$
D. $y=-5 x+17$
12. Which of the following is the equation of a plane that is perpendicular to the plane with equation $x+y+z=3$ ?
A. $x+2 y-3 z=5$
B. $2 x+2 y+2 z=6$
C. $x+2 y+3 z=-2$
D. none of these
13. Using the same choices as in Exercise 1, which equation represents a plane that is parallel to the plane with equation $x+y+z=3$ ?

Answers:

1. C
2. $B$
3. B
4. D
5. B
6. D
7. B
8. C
9. A
10. D
11. C
12. A
13. D
