

Name: _____ Class: _____ Date: _____

Precalculus-G11-Ch.8-H.W

Indicate the answer choice that best completes the statement or answers the question.

1. Find a unit vector \mathbf{u} with the same direction as $\mathbf{x} = \langle 12, 9 \rangle$.

- a. $\langle \frac{3}{5}, \frac{4}{5} \rangle$ b. $\langle \frac{4}{5}, \frac{3}{5} \rangle$
c. $\langle \frac{5}{13}, \frac{12}{13} \rangle$ d. $\langle \frac{4}{7}, \frac{3}{7} \rangle$

2. Which of the following is the magnitude of $\mathbf{a} = \langle -3, 1 \rangle$? Round to the nearest hundredth if necessary.

- a. -2 b. 3.16
c. 2.45 d. 10

3. Find the dot product of $\mathbf{u} = \langle -7, -6, -4 \rangle$ and $\mathbf{v} = \langle -4, -8, 1 \rangle$. Are \mathbf{u} and \mathbf{v} orthogonal?

- a. 72; orthogonal b. 72; not orthogonal
c. -462; orthogonal d. -462; not orthogonal

4. Find the angle θ between \mathbf{u} and \mathbf{v} if $\mathbf{u} = \langle 5, -1, -2 \rangle$ and $\mathbf{v} = \langle 8, 3, -5 \rangle$.

- a. 60.1° b. 49.1°
c. 150.1° d. 29.9°

5. Consider vectors $\mathbf{u} = \langle 1, 7 \rangle$ and $\mathbf{v} = \langle 3, -4 \rangle$. Write \mathbf{u} as the sum of two orthogonal vectors, one of which is the projection of \mathbf{u} onto \mathbf{v} .

- a. $\langle -3, 4 \rangle$ b. $\langle -3, 4 \rangle, \langle 6, -8 \rangle$
c. $\langle -3, 4 \rangle, \langle 4, 3 \rangle$ d. $\langle 4, 3 \rangle$

6. Find the angle θ between $\mathbf{u} = -\mathbf{i} - \mathbf{j} + 8\mathbf{k}$ and $\mathbf{v} = \mathbf{i} - 5\mathbf{j} + 6\mathbf{k}$.

- a. 35.6° b. 54.4°
c. 144.4° d. 50.9°

7. An airplane is traveling due east with a velocity of 544 miles per hour. The wind blows at 67 miles per hour at an angle of $S74^\circ E$. What is the resultant speed and direction of the plane?

- a. 611.4 miles per hour; $S6.0^\circ E$ b. 608.7 miles per hour; $S88.3^\circ E$
c. 566.1 miles per hour; $S83.5^\circ E$ d. 614.4 miles per hour; $S1.7^\circ E$

8. Find the volume of the parallelepiped with adjacent edges $\mathbf{t} = 9\mathbf{j} - 6\mathbf{j} + 2\mathbf{k}$, $\mathbf{u} = \mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and $\mathbf{v} = -2\mathbf{i} - 10\mathbf{j} + 5\mathbf{k}$.

- a. 209 cubic units b. 53 cubic units
c. 11 cubic units d. 267 cubic units

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9. Find the direction angle of $2\mathbf{i} + 12\mathbf{j}$.

- a. 88.10° b. 260.54°
c. 170.54° d. 80.54°

10. Find the dot product of $\mathbf{u} = \langle -10, -2, 6 \rangle$ and $\mathbf{v} = \langle 6, -4, 7 \rangle$. Are \mathbf{u} and \mathbf{v} orthogonal?

- a. -10 ; not orthogonal b. -10 ; orthogonal
c. 312 ; orthogonal d. 312 ; not orthogonal

11. Find the magnitude of \overrightarrow{AB} with initial point $A(-2, 1)$ and terminal point $B(-1, 6)$.

- a. $\sqrt{22} \approx 3.099$ b. $\sqrt{33} \approx 7.099$
c. $\sqrt{28} \approx 6.099$ d. $\sqrt{26} \approx 5.099$

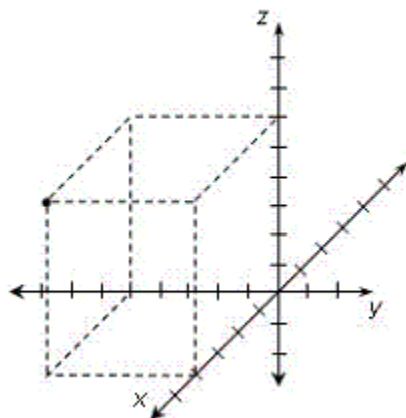
12. Find the component form of \overrightarrow{AB} with initial point $A(-8, -1)$ and terminal point $B(7, 5)$.

- a. $\langle 5, 17 \rangle$ b. $\langle 15, 6 \rangle$
c. $\langle 16, 5 \rangle$ d. $\langle 16, 11 \rangle$

13. Find the magnitude of \overrightarrow{AB} with initial point $A(-1, 1)$ and terminal point $B(1, -1)$.

- a. $\sqrt{8} \approx 2.8284$ b. $\sqrt{4} \approx 0.8284$
c. $\sqrt{15} \approx 4.8284$ d. $\sqrt{10} \approx 3.8284$

14. Which of the following points is shown in the graph below?



- a. $(4, -5, 6)$ b. $(-4, -5, 6)$
c. $(4, -5, -6)$ d. $(4, 5, 6)$

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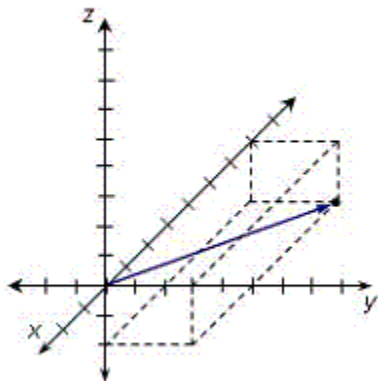
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15. Find the resultant of the pair of vectors shown below. State the magnitude of the resultant in centimeters and its direction relative to the horizontal.



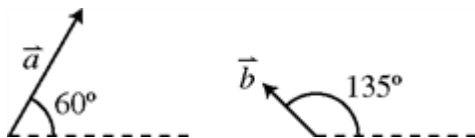
- a. 3.8 cm, 148° b. 4.7 cm, 148°
c. 3.8 cm, 212° d. 3.8 cm, 58°

16. Which of the following vectors is shown in the graph below?



- a. $\langle -7, -3, -2 \rangle$ b. $\langle -7, 3, -2 \rangle$
c. $\langle -7, 3, 2 \rangle$ d. $\langle 7, 3, -2 \rangle$

17. Use a metric ruler and a protractor to find $\vec{a} - \vec{b}$. Then find the magnitude and amplitude of the resultant.

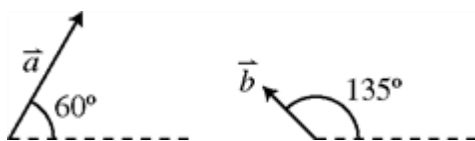


- a. 6 cm, 41° b. 4 cm, 36°
c. 2 cm, 31° d. 7 cm, 38°

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18. Use a metric ruler and a protractor to find $\vec{a} + 2\vec{b}$. Then find the magnitude and amplitude of the resultant.

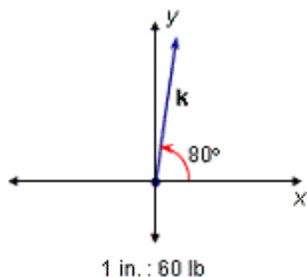


- a. 7.4 cm, 15° b. 4.4 cm, 13°
c. 2.4 cm, 8° d. 6.4 cm, 18°

19. Find the magnitude of \overrightarrow{WX} for $W(-4, 9, -1)$ and $X(9, -8, -2)$.

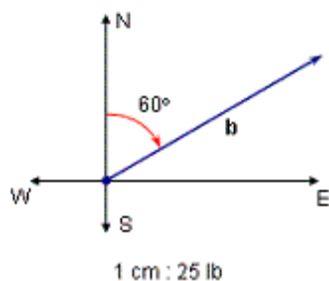
- a. 451 b. $3\sqrt{51}$
c. $\sqrt{451}$ d. 454

20. Use a ruler to determine which of the following descriptions corresponds to the arrow diagram shown below.



- a. $k = 68$ pounds of force at 80° to the horizontal
b. $k = 60$ pounds of force at 80° to the horizontal
c. $k = 68$ pounds of force at a true bearing of 80°
d. $k = 72$ pounds of force at a bearing of 080°

21. Use a ruler to determine which of the following descriptions corresponds to the arrow diagram shown below.



- a. $b = 25$ pounds of force at a bearing of 060°
b. $b = 118$ pounds of force at a bearing of 060°
c. $b = 118$ pounds of force at 60° to the horizontal
d. $b = 25$ pounds of force $N60^\circ E$

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22. Which of the following represents a vector quantity?

- a. an athlete running 5.1 meters per second
- b. a car traveling at a speed of 57 miles per hour
- c. wind blowing at 3 knots
- d. a skydiver falling straight down at 58 kilometers per hour

23. If $\mathbf{u} = \langle 9, -2, -5 \rangle$ and $\mathbf{v} = \langle -2, 5, 5 \rangle$, find $3\mathbf{u} - 2\mathbf{v}$.

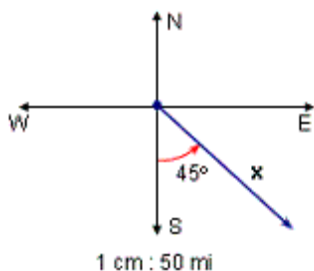
- a. $\langle -21, -10, 36 \rangle$ b. $\langle 36, -27, -10 \rangle$
- c. $\langle 31, -16, -25 \rangle$ d. $\langle 30, -15, -27 \rangle$

24. Find the resultant of the pair of vectors shown below. State the magnitude of the resultant in centimeters and its direction relative to the horizontal.



- a. 4.0 cm, 210° b. 2.3 cm, 98°
- c. 2.3 cm, 30° d. 2.3 cm, 210°

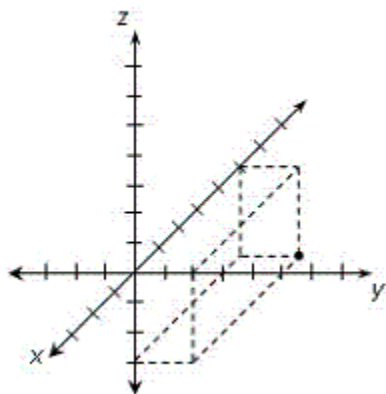
25. Use a ruler to determine which of the following descriptions corresponds to the arrow diagram shown below.



- a. $\mathbf{x} = 50$ miles per hour at a bearing of 045°
- b. $\mathbf{x} = 170$ miles per hour at a bearing of 045°
- c. $\mathbf{x} = 50$ miles per hour at a bearing of $S45^\circ E$
- d. $\mathbf{x} = 170$ miles per hour at a bearing of $S45^\circ E$

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26. Which of the following points is shown in the graph below?



- a. $(-5, 2, 3)$ b. $(-5, 2, -3)$
 c. $(5, 2, -3)$ d. $(-5, -2, -3)$

27. Find the magnitude of the horizontal and vertical components of a velocity of 18 miles per hour at an angle of 42° with the ground. Round to the nearest whole number.

- a. horizontal component: 13 mph, vertical component: 49 mph
 b. horizontal component: 13 mph, vertical component: 12 mph
 c. horizontal component: 12 mph, vertical component: 13 mph
 d. horizontal component: 63 mph, vertical component: 12 mph

28. A commercial passenger jet is flying with an airspeed of 170 miles per hour on a heading of 048° . If a 28-mile-per-hour wind is blowing from a true heading of 134° , determine the velocity and direction of the jet relative to the ground.

- a. 171.3 mph, 039° b. 170.4 mph, 039°
 c. 170.4 mph, 077° d. 174.2 mph, 077°

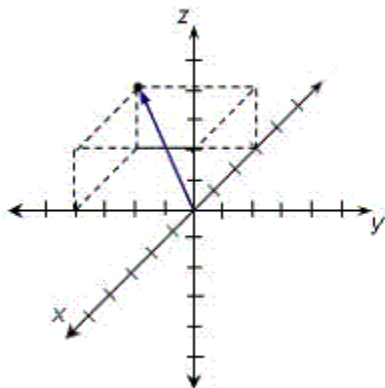
29. A commercial passenger jet is flying with an airspeed of 131 knots on a heading of 050° . If a 92-knot wind is blowing from a true heading of 125° , determine the velocity and direction of the jet relative to the ground.

- a. 139.2 knots, 035° b. 139.2 knots, 010°
 c. 178.5 knots, 035° d. 150 knots, 010°

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30. Which of the following vectors is shown in the graph below?



- a. $\langle -3, -4, 2 \rangle$ b. $\langle -3, -4, -2 \rangle$
c. $\langle -3, 4, 2 \rangle$ d. $\langle 3, -4, 2 \rangle$

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