



2023-2024

9.5 Vectors

SCORE: /

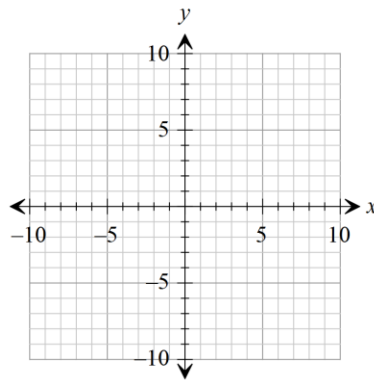
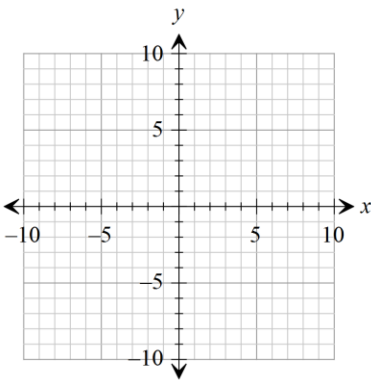
Name _____ Date _____ Period _____

- A _____ quantity involves both magnitude and direction.
- Two vectors with the same magnitude and direction are _____ vectors.
- The angle formed by the positive x-axis and a position vector is the _____ angle.
- If the angle between two vectors is 90° , then the vectors are _____ or _____.

For each problem graph the given vectors **A** and **B**, then graph **A + B** and **A - B** on the same graph.

5. $A = \langle 1, 3 \rangle$ $B = \langle 4, 1 \rangle$

6. $A = \langle -2, 3 \rangle$ $B = \langle 4, 1 \rangle$



Find the magnitude of the horizontal and vertical components for each vector **v** with the given magnitude and given direction angle θ . Round to the nearest tenth.

7. $|v| = 4.5, \theta = 65.2^\circ$

8. $|v| = 8000, \theta = 155.1^\circ$

Find the exact magnitude and direction angle to the nearest tenth of a degree of each vector.

9. $\langle \sqrt{3}, 1 \rangle$

10. $\langle 8, -8\sqrt{3} \rangle$

11. $\langle 5, 0 \rangle$

12. $\langle -3, 2 \rangle$

Find the component form for each vector v with the given magnitude and direction angle θ . Give exact values using radicals when possible. Otherwise round to the nearest tenth.

13. $|v| = 8, \theta = 45^\circ$

14. $|v| = 12, \theta = 120^\circ$

15. $|v| = 18, \theta = 347^\circ$

16. $|v| = 3000, \theta = 209.1^\circ$

Let $r = \langle 3, -2 \rangle$, $s = \langle -1, 5 \rangle$, and $t = \langle 4, -6 \rangle$. Perform the operations indicated. Write the vector answers in the form $\langle a, b \rangle$.

17. $2r + 3t$

18. $r - (s + t)$

19. $s \cdot t$

20. $r \cdot s$

Find the smallest positive angle to the nearest tenth of a degree between each given pair of vectors.

21. $\langle 2, 1 \rangle, \langle 3, 5 \rangle$

22. $\langle -1, 5 \rangle, \langle 2, 7 \rangle$

Determine whether each pair of vectors is parallel, perpendicular, or neither.

23. $\langle -3, 2 \rangle, \langle 6, 9 \rangle$

24. $\langle 1, 7 \rangle, \langle -2, -14 \rangle$

25. $\langle 5, 3 \rangle, \langle 2, 5 \rangle$

Write each vector as a linear combination of the unit vectors i and j .

26. $\langle 2, 1 \rangle$

27. $\langle -7, -1 \rangle$

Given that $A = \langle 3, 1 \rangle$ and $B = \langle -2, 3 \rangle$, find the magnitude and direction angle for each of the following vectors. Give exact answers using radicals when possible. Otherwise round to the nearest tenth.

28. $-3A$

29. $B - A$

30. An airplane with an airspeed of 520 mph is climbing at an angle of 30° from the horizontal. What are the magnitudes of the horizontal and vertical components of the speed vector? Round to the nearest tenth.

Review

Divide using long division.

31.
$$\frac{3x^2 + 11x - 70}{x + 7}$$

Divide using synthetic division.

32. $(x^3 - 8x^2 + 10x - 21) \div (x - 7)$

33. Find all of the real zeros of the function, finding exact values whenever possible. If it does not factor, use the rational zeros theorem (Hint: $\frac{p}{q}$). Identify each zero as rational or irrational.

$$f(x) = x^3 + x^2 - 8x - 6$$