

Precalculus - Vectors in the Plane - Quiz

Common Core N-VM.A.1, N-VM.A.2, N-VM.A.3, N-VM.B.4, N-VM.B.5 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

Pick the best answer for 10 questions on vectors in the plane. Explanations name typical mistakes, such as adding magnitudes instead of components.

Precalculus · Common Core State Standards: **N-VM.A.1, N-VM.A.2, N-VM.A.3, N-VM.B.4, N-VM.B.5**

Questions

Question 1

What is the magnitude of $\langle 3, -4 \rangle$?

- A. 7
- B. 1
- C. 5
- D. 25

Question 2

Find $\langle 2, 5 \rangle + \langle -3, 1 \rangle$.

- A. $\langle 5, 4 \rangle$
- B. $\langle -1, 6 \rangle$
- C. $\langle -1, 4 \rangle$
- D. $\langle 1, 6 \rangle$

Question 3

What is $3\langle 1, -2 \rangle$?

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

Question 4

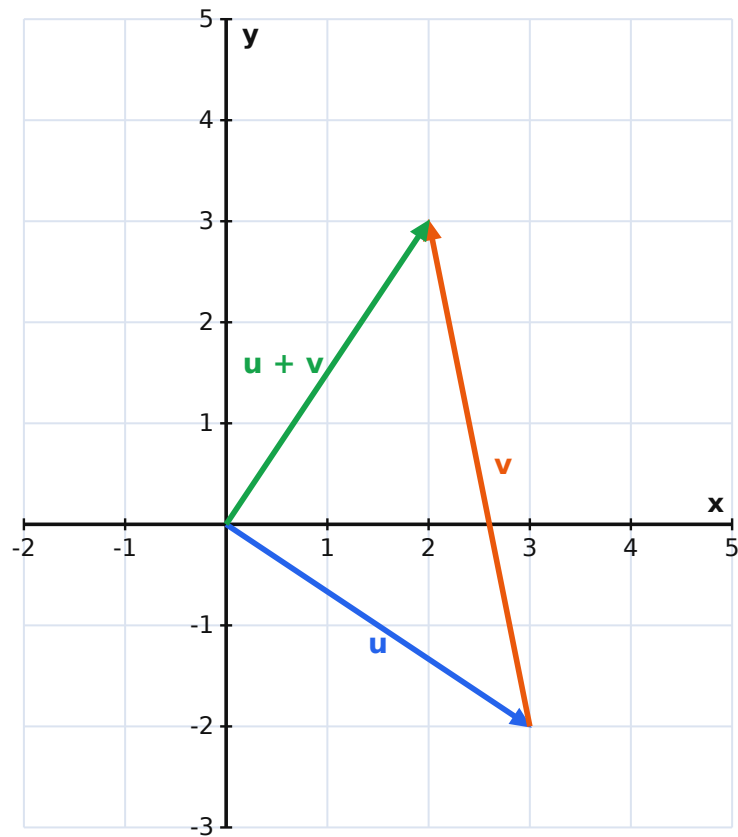
What is the dot product $\langle 1, 4 \rangle \cdot \langle 2, -3 \rangle$?

- A. $\langle 2, -12 \rangle$
- B. 14
- C. -1

D. -10

Question 5

The figure shows head-to-tail addition. Which is the sum?



Vectors u , v and their sum.

- A. $\langle 4, -7 \rangle$
- B. $\langle 3, -2 \rangle$
- C. $\langle -1, 5 \rangle$
- D. $\langle 2, 3 \rangle$

Question 6

What is the unit vector in the direction of $\langle 0, -7 \rangle$?

- A. $\langle 0, 1 \rangle$
- B. $\langle 0, -7 \rangle$
- C. $\langle 0, -1 \rangle$
- D. $\langle -1, 0 \rangle$

Question 7

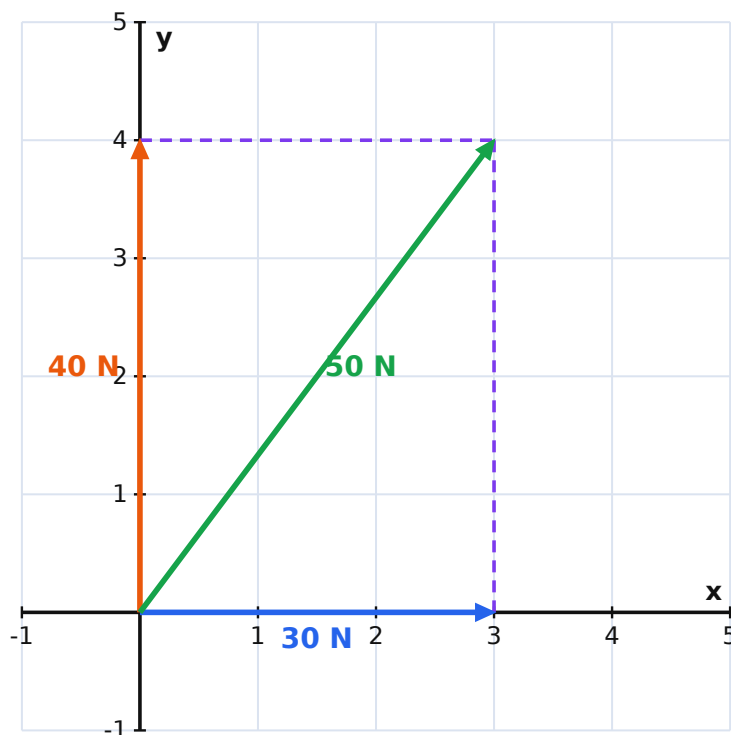
If $\vec{u} \cdot \vec{v} = 0$ for nonzero vectors, the vectors are...

- A. Perpendicular

- B. Parallel
- C. Equal
- D. Opposite

Question 8

A 30 N force east and a 40 N force north act together (see the figure). What is the resultant magnitude?



Resultant of two forces.

- A. 70 N
- B. 50 N
- C. 10 N
- D. 35 N

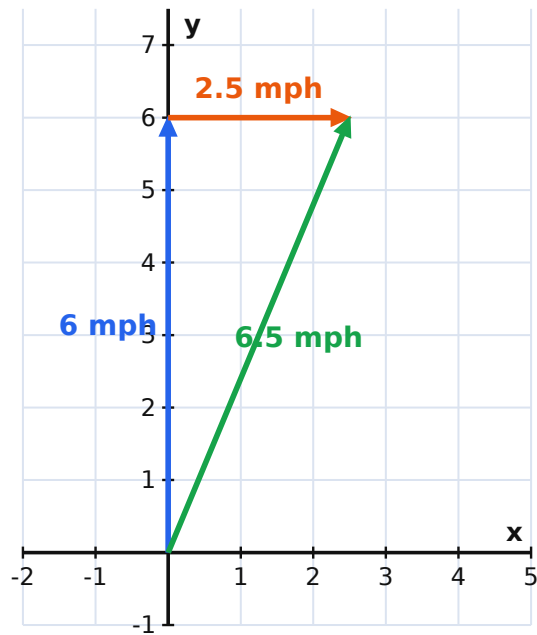
Question 9

What is the vector from $P(1,2)$ to $Q(4,6)$?

- A. $\langle 5, 8 \rangle$
- B. $\langle 3, 4 \rangle$
- C. $\langle -3, -4 \rangle$
- D. $\langle 4, 3 \rangle$

Question 10

A boat crosses a river heading straight across at 6 mph with a current of 2.5 mph (see the figure). What is its speed?



Boat and current.

- A. 6.5 mph
- B. 8.5 mph
- C. 3.5 mph
- D. 6 mph

Answers

1. **C** - $\sqrt{9 + 16} = 5$. Adding $3 + 4$ gives 7, which is not the length.
2. **B** - Add the components: $2 + (-3) = -1$ and $5 + 1 = 6$.
3. **A** - Multiply both components by 3.
4. **D** - $2 + (-12) = -10$. The dot product is a number, not a vector.
5. **D** - $u = \langle 3, -2 \rangle$ and $v = \langle -1, 5 \rangle$, so the sum is $\langle 2, 3 \rangle$.
6. **C** - Divide by the magnitude 7 to get $\langle 0, -1 \rangle$.
7. **A** - $\cos \theta = 0$ means the angle between them is 90 degrees.
8. **B** - $\sqrt{900 + 1600} = 50$. Adding the magnitudes would give 70.
9. **B** - Subtract the start from the end: $\langle 4 - 1, 6 - 2 \rangle$.
10. **A** - $\sqrt{6^2 + 2.5^2} = \sqrt{42.25} = 6.5$.

Remember

- Vector from P to Q: $\langle x_2 - x_1, y_2 - y_1 \rangle$; magnitude $\sqrt{a^2 + b^2}$.
- Components of magnitude r at angle θ : .
- Unit vector in the direction of v : v divided by $|v|$.
- Dot product: $\langle a, b \rangle \cdot \langle c, d \rangle = ac + bd$; zero means perpendicular.
- Resultant force or velocity is the vector sum of the parts.