

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 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus vectors quiz asks 10 multiple-choice questions on vectors in the plane, and each answer comes with a short explanation.

Ten multiple-choice questions on Precalculus vectors: magnitude, component form, direction angles, scalar multiples, unit vectors, dot products, and a river-crossing problem. Pick the one best answer for each question, then read the explanation.

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

Questions

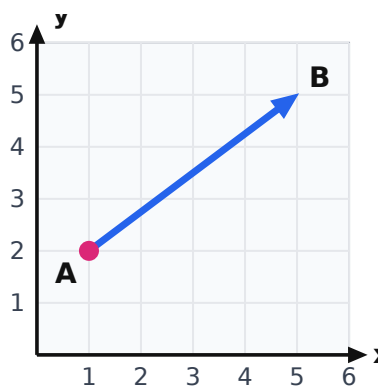
Question 1

Find $|\langle -5, 12 \rangle|$.

- A. 13
- B. 7
- C. 17
- D. 169

Question 2

What is the component form of the vector from $A(1,2)$ to $B(5,5)$ in the figure?



Arrow from A to B.

- A. $\langle 4, 3 \rangle$
- B. $\langle 3, 4 \rangle$
- C. $\langle 6, 7 \rangle$

D. $\langle -4, -3 \rangle$

Question 3

What is the direction angle of $\langle -1, 1 \rangle$?

- A. 45°
- B. 135°
- C. 225°
- D. 315°

Question 4

Simplify $3\langle 2, -1 \rangle - \langle 1, 4 \rangle$.

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

Question 5

Which is the unit vector in the direction of $\langle 6, -8 \rangle$?

- A. $\langle \frac{3}{5}, \frac{4}{5} \rangle$
- B. $\langle \frac{3}{5}, -\frac{4}{5} \rangle$
- C. $\langle -\frac{3}{5}, \frac{4}{5} \rangle$
- D. $\langle \frac{6}{5}, -\frac{8}{5} \rangle$

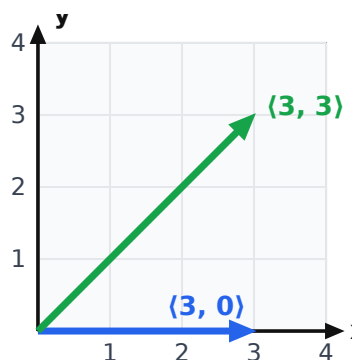
Question 6

Find $\langle 3, -2 \rangle \cdot \langle 4, 5 \rangle$.

- A. 22
- B. 2
- C. -2
- D. 7

Question 7

What is the angle between the two vectors shown?



Two vectors from the origin.

- A. 30°
- B. 60°
- C. 45°
- D. 90°

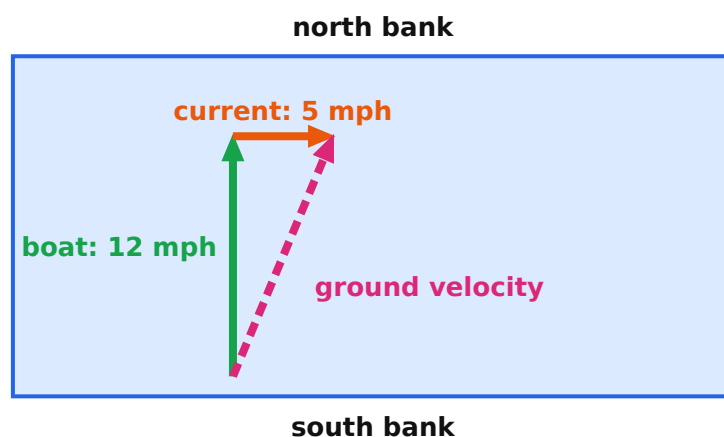
Question 8

Which pair of vectors is perpendicular?

- A. $\langle 2,3 \rangle$ and $\langle 3,2 \rangle$
- B. $\langle 2,3 \rangle$ and $\langle -2,3 \rangle$
- C. $\langle 2,3 \rangle$ and $\langle 3,-2 \rangle$
- D. $\langle 2,3 \rangle$ and $\langle 2,-3 \rangle$

Question 9

The boat in the figure heads straight across at 12 mph and the current is 5 mph. What is its speed relative to the ground?



Boat heading across at 12 mph with a 5 mph current.

- A. 7 mph
- B. 17 mph
- C. 60 mph
- D. 13 mph

Question 10

If $\vec{v} = \langle 3,4 \rangle$, what is $|-3\vec{v}|$?

- A. 5
- B. 21

- C. 15
- D. -15

Answer key

1. **A** - $\sqrt{25+144} = \sqrt{169} = 13$. Leaving the square root off gives 169; subtracting the squares or adding the absolute values gives the other traps.
2. **A** - Terminal point minus initial point: $\langle 5-1, 5-2 \rangle = \langle 4, 3 \rangle$. Reversing the subtraction flips both signs.
3. **B** - The vector points up and left, in quadrant II, with reference angle 45° , so $180^\circ - 45^\circ = 135^\circ$. The calculator value $\tan^{-1}(-1) = -45^\circ$ needs the quadrant adjustment.
4. **D** - $\langle 6, -3 \rangle - \langle 1, 4 \rangle = \langle 5, -7 \rangle$. The wrong options come from sign errors when subtracting the second component.
5. **B** - The magnitude is 10, so divide each component by 10 to get $\langle 0.6, -0.8 \rangle$. Dividing by 5 does not give length 1.
6. **B** - $12 + (-10) = 2$. Adding instead of multiplying components gives 7; ignoring the minus sign gives 22.
7. **C** - $\cos \theta = \frac{9}{3 \cdot 3\sqrt{2}} = \frac{\sqrt{2}}{2}$, so $\theta = 45^\circ$. The second vector rises as much as it runs.
8. **C** - The dot product of the first pair is $6-6=0$. The other pairs give 12, 5 and -5, so they are not perpendicular.
9. **D** - The velocities are perpendicular, so $\sqrt{12^2+5^2} = 13$. Adding the speeds gives 17.
10. **C** - $-3\vec{v} = \langle -9, -12 \rangle$ has magnitude 15. A magnitude is never negative, and $3 \times 7 = 21$ comes from forgetting the square root.

How does this quiz work?

Read each question, choose one answer among A, B, C and D, then check it: a short explanation appears after every answer. Your score out of 10 is shown at the end, and you can restart the quiz as often as you like.

What should you review before the quiz?

Reread the key facts of the lesson and the worked example. If a question is hard, go back to the matching part of the lesson, then try the quiz again. Write your work on scrap paper: most mistakes come from skipping a step, not from the idea itself.

Remember:

- Magnitude of $\langle a, b \rangle$ is $\sqrt{a^2 + b^2}$; direction angle satisfies $\tan \theta = b/a$ in the correct quadrant.
- Add and subtract component by component; the parallelogram rule gives the same sum geometrically.
- Scalar multiplication $k\langle a, b \rangle = \langle ka, kb \rangle$ changes the length by $|k|$ and reverses direction when k is negative.
- A unit vector in the direction of v is $v/|v|$; every vector is $a \cdot i + b \cdot j$.

- $u \cdot v = u_1v_1 + u_2v_2 = |u||v| \cos \theta$, and $u \cdot v = 0$ exactly when u and v are perpendicular.

How to use this precalculus vectors quiz

Retake this precalculus vectors quiz until every answer is right, then move on to the worksheet and the test.

