

Precalculus - Vectors in the Plane - Worksheet

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: ____/____/____

These 20 problems practice vectors in the plane (Common Core N-VM.A.1 to N-VM.A.3 and N-VM.B.4, N-VM.B.5). You will find components and magnitudes, add and scale vectors, use unit vectors and the dot product and solve force and velocity problems.

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**

Exercise 1 - Component form from two points

Write the vector from $A(2,3)$ to $B(7,-1)$ in component form.

Exercise 2 - Magnitude

Find the magnitude of $\langle -5, 12 \rangle$.

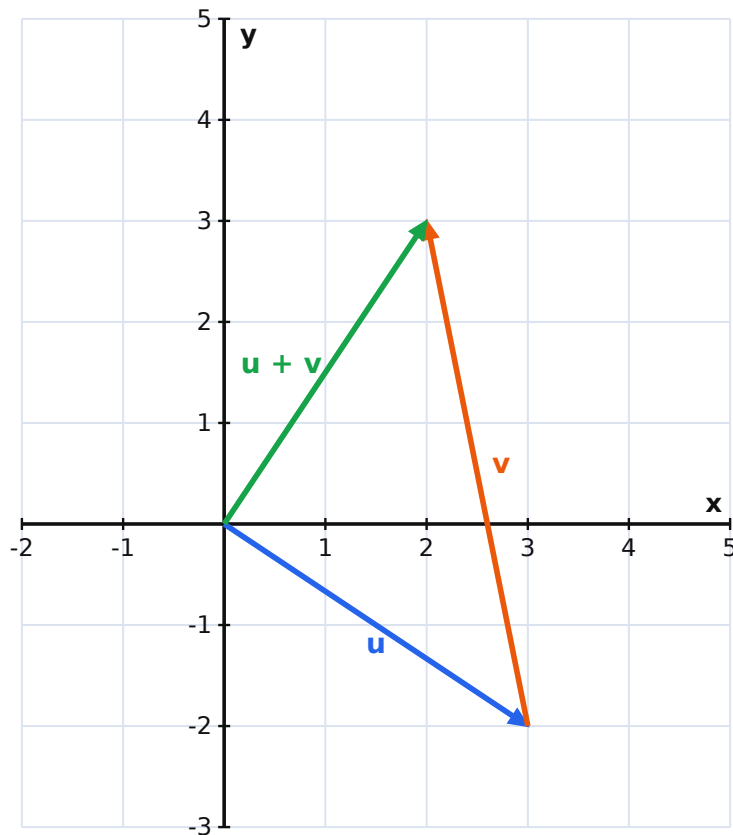
Exercise 3 - Direction angle

Find the magnitude and direction angle of $\langle -2, 2\sqrt{3} \rangle$.

Exercise 4 - Components from magnitude and angle

Write the vector with magnitude 10 and direction 30° in component form.

Exercise 5 - Add vectors



Head-to-tail addition.

Find $\langle 3, -2 \rangle + \langle -1, 5 \rangle$ and explain the picture.

Exercise 6 - Subtract vectors

Find $\langle 6, 4 \rangle - \langle 2, 7 \rangle$.

Exercise 7 - Linear combination

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

Exercise 8 - Unit vector

Find the unit vector in the direction of $\langle 6, 8 \rangle$.

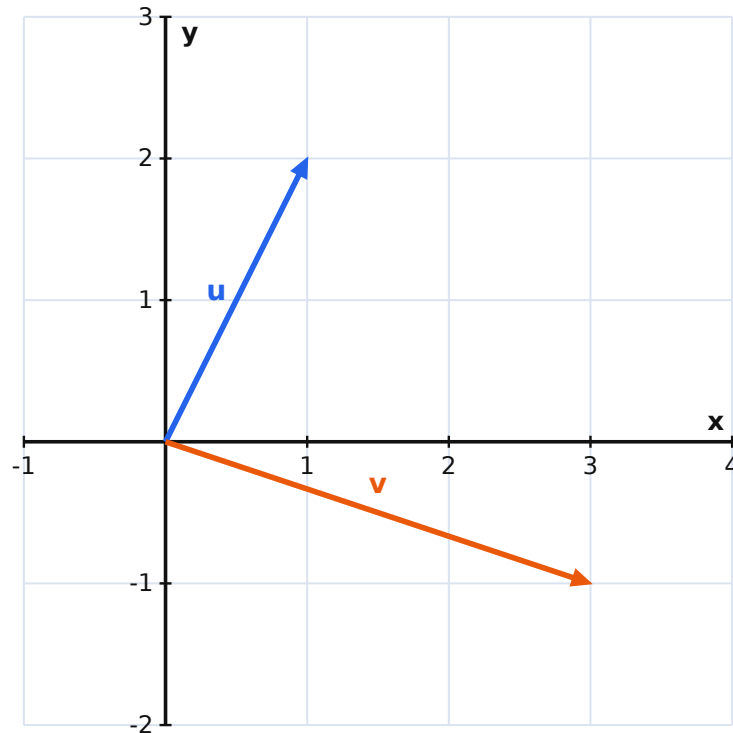
Exercise 9 - i and j form

Write $\langle 4, -3 \rangle$ in the form $a\vec{i} + b\vec{j}$ and find its magnitude.

Exercise 10 - Dot product

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

Exercise 11 - Angle between vectors



Two vectors from the origin.

Find the angle between $\langle 1, 2 \rangle$ and $\langle 3, -1 \rangle$ to the nearest tenth of a degree.

Exercise 12 - Perpendicular check

Are $\langle 5, -2 \rangle$ and $\langle 2, 5 \rangle$ perpendicular?

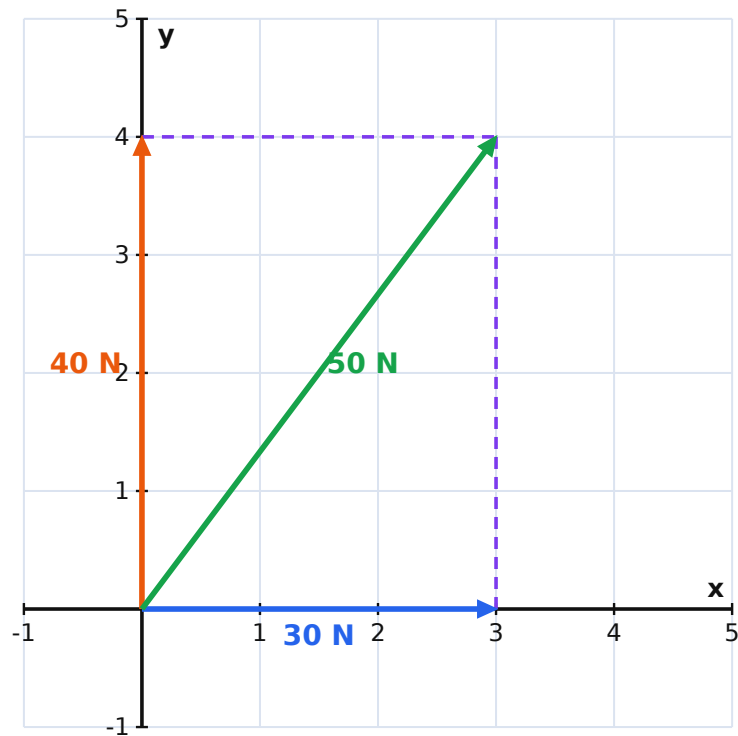
Exercise 13 - Find k

Find k so that $\langle 8, k \rangle$ and $\langle 3, 12 \rangle$ are perpendicular.

Exercise 14 - Parallel vectors

Show that $\langle -9, 6 \rangle$ and $\langle 3, -2 \rangle$ are parallel.

Exercise 15 - Two perpendicular forces



Forces on a crate.

Two forces of 30 N east and 40 N north act on a crate. Find the magnitude of the resultant and its direction north of east, to the nearest hundredth of a degree.

Exercise 16 - Airplane and wind

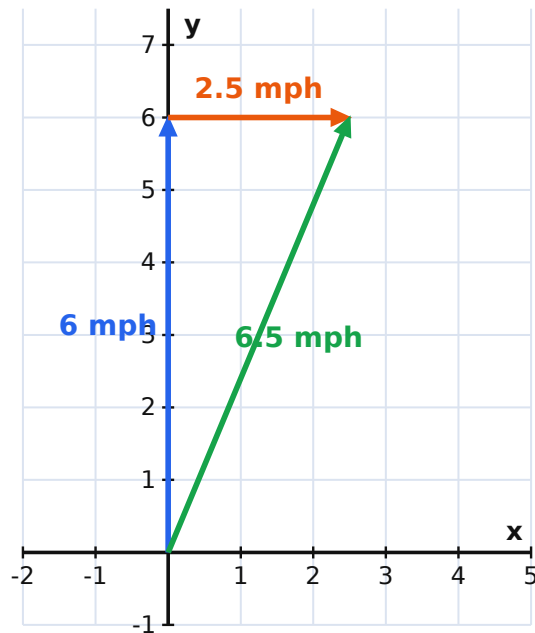


Plane heading north with a crosswind.

An airplane flies due north at 250 mph relative to the air. A wind blows from the west (toward

the east) at 40 mph. Find the ground speed and the angle east of north, to the nearest tenth.

Exercise 17 - Boat in a current



A river crossing.

Liam steers a boat straight across a river at 6 mph. The current flows downstream at 2.5 mph. Find the boat's actual speed and the angle of drift from straight across, to the nearest hundredth of a degree.

Exercise 18 - Work

A force of $\langle 30, 40 \rangle$ pounds moves an object along $\langle 6, 2 \rangle$ feet. Find the work $W = \vec{F} \cdot \vec{d}$.

Exercise 19 - Angle between two forces

Forces $\vec{F}_1 = \langle 5, 0 \rangle$ N and $\vec{F}_2 = \langle 3, 4 \rangle$ N act on a point. Find the angle between them and the magnitude of the resultant.

Exercise 20 - Parallelogram

Show that $A(1,1)$, $B(4,2)$, $C(5,5)$ and $D(2,4)$ form a parallelogram and find the length of diagonal AC .