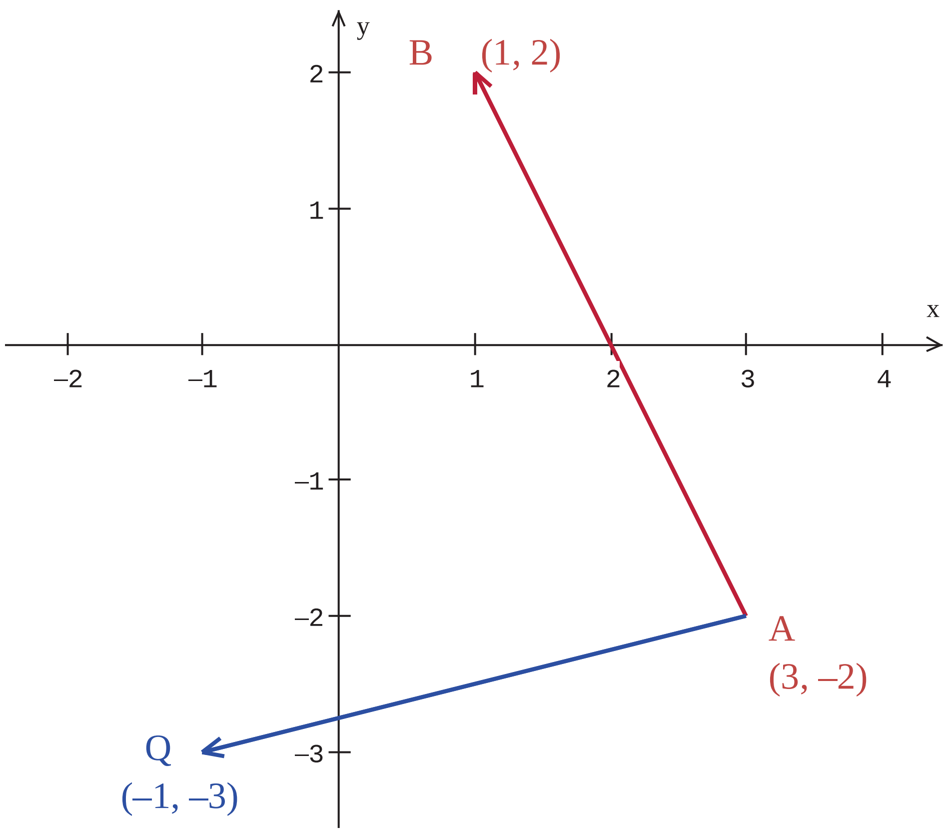
Vectors

Name Solutions



Find the component form and magnitudes for vectors $\overrightarrow{AB}$ and $\overrightarrow{AQ}$

$\overrightarrow{AB} = (1-3)i + (2-(-2))j = -2i + 4j$ or $\langle -2, 4 \rangle$

magnitude $= |\overrightarrow{AB}| = \sqrt{(-2)^2 + (4)^2} = \sqrt{4+16} = \sqrt{20} = \sqrt{4 \cdot 5} = \underline{2\sqrt{5}}$

$\overrightarrow{AQ} = (-1-3)i + (-3-(-2))j = -4i - j$ or $\langle -4, -1 \rangle$

magnitude $= |\overrightarrow{AQ}| = \sqrt{(-4)^2 + (-1)^2} = \sqrt{16+1} = \sqrt{17}$

Sketch and add the following vectors. Find all three vector magnitudes.

1) The vector **v** which is the line segment $\overrightarrow{AB}$ in which point A is (3, 0) and point B is (–5, –4)

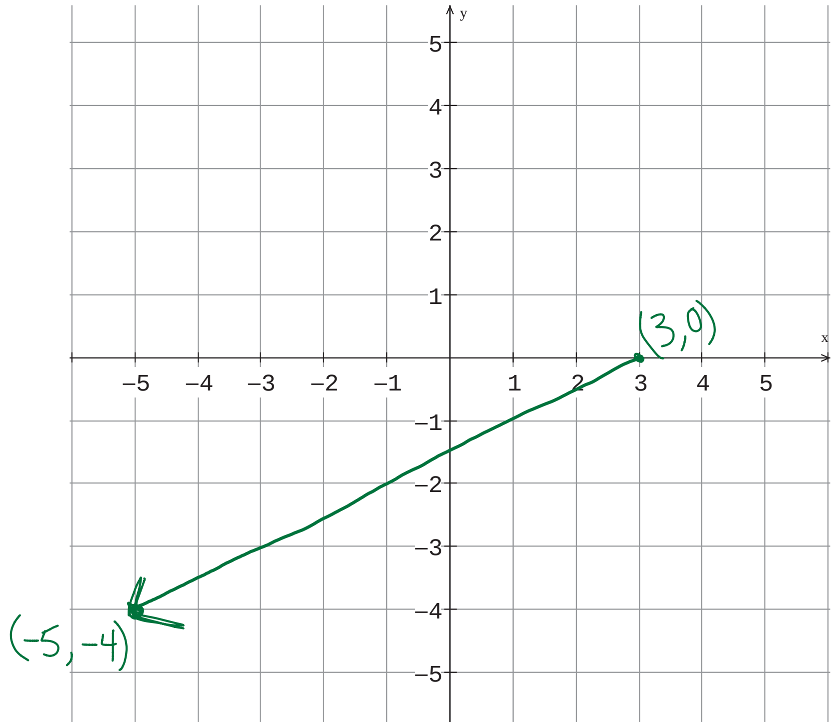
$v = \overrightarrow{AB} = (-5-3)i + (-4-0)j$

$= -8i - 4j = \langle -8, -4 \rangle$

$|v| = |\overrightarrow{AB}| = \sqrt{(-8)^2 + (-4)^2}$

$= \sqrt{64+16} = \sqrt{80}$

$= \sqrt{16 \cdot 5} = 4\sqrt{5}$

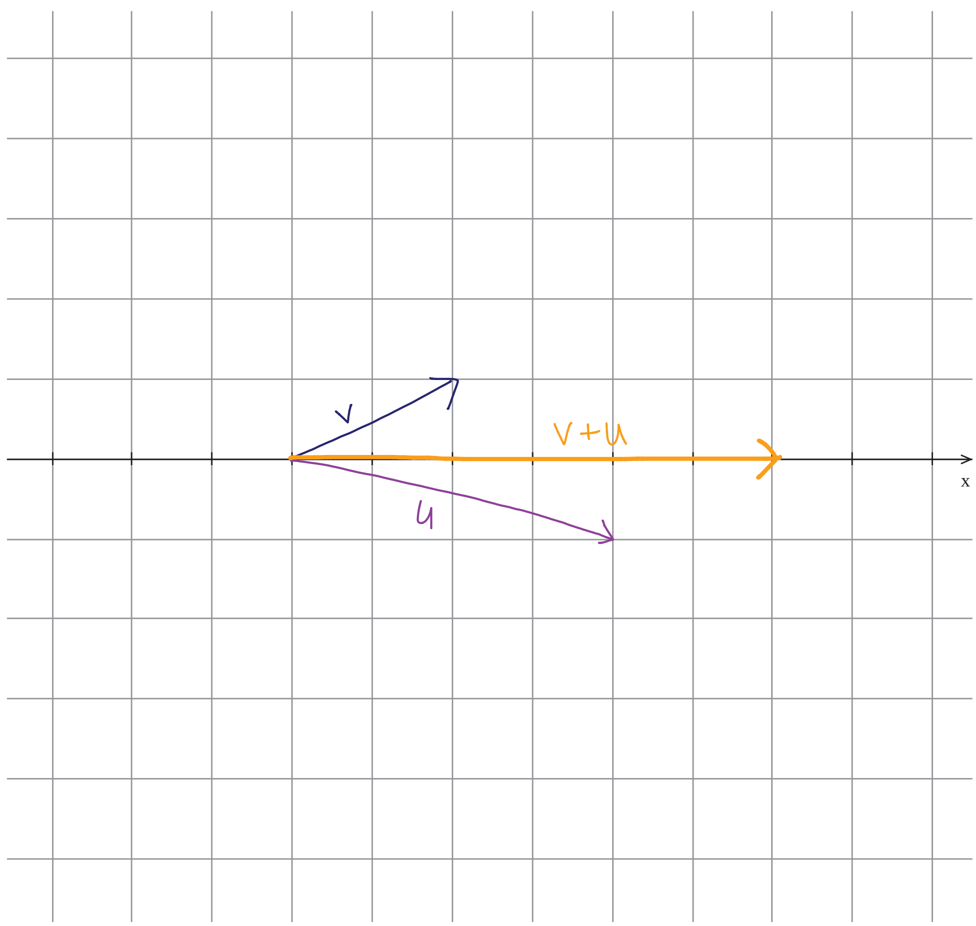


2) $\mathbf{v} = \langle 2, 1 \rangle$ and $\mathbf{u} = \langle 4, -1 \rangle$

$v + u = \langle 2+4, 1-1 \rangle$

$= \langle 6, 0 \rangle$

notice no vertical change so this vector will have a horizontal direction

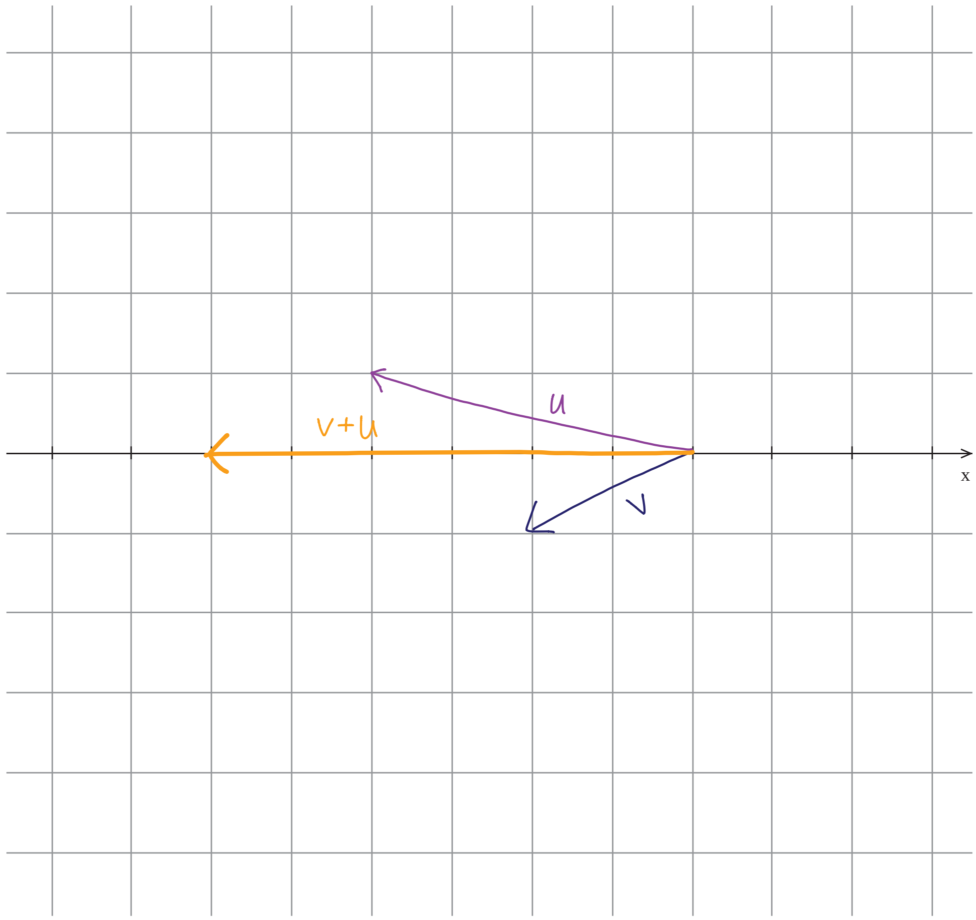


3) $\mathbf{v} = -2i - j$ and $\mathbf{u} = -4i + j$

$v = \langle -2, -1 \rangle \qquad u = \langle -4, 1 \rangle$

$v + u = \langle -2 - 4, -1 + 1 \rangle$

$= \langle -6, 0 \rangle$



Vector Components

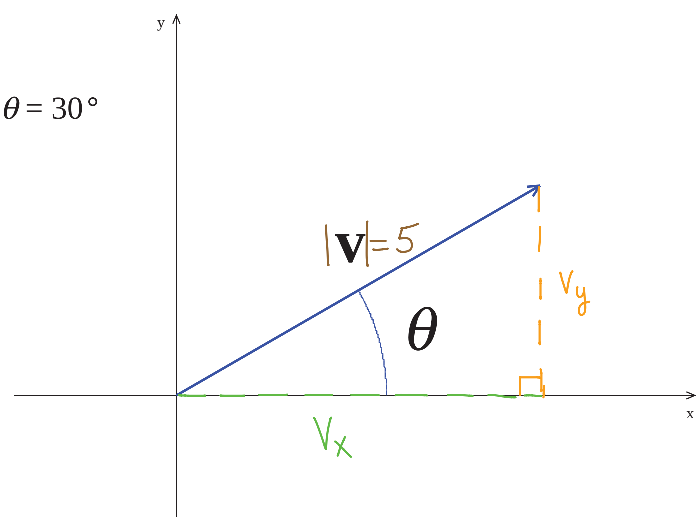
Write the component form of the vector **v** given $|\,v\,| = 5$ and $\theta = 30°$

$\frac{opp}{hyp} = \frac{V_y}{5} = \cos 30°$

$V_y = 5 \cos 30° = \frac{5}{2}$ or 2.5

$\frac{adj}{hyp} = \frac{V_x}{5} = \cos 30°$

$V_x = 5 \cos 30° = \frac{5\sqrt{3}}{2} \approx 4.330$



$v = \langle 2.5, 4.330 \rangle$