

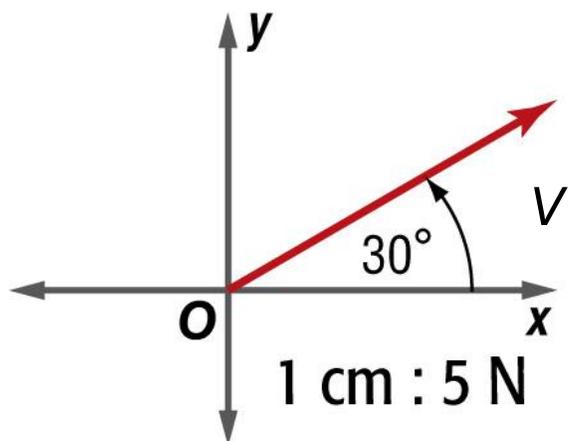
Chapter 8 Vectors Review:

Topics: identify vector quantities (p.482), represent a vector geometrically (p.483), find the resultant of two vectors (p. 434), operations with vectors (p.485), rectangular components of vectors (p. 487), express a vector in component form (p.492, p.495), find direction angle (p.496), magnitude of vectors (p.493), operations with vectors using components (p. 493), find a unit vector with the same direction as a given vector (p.494), write a vector as a linear combination of unit vectors (p. 495), vector application problems (p.486, p.496)

1. State whether each quantity is a vector quantity:

- i. a car driving 50 mph due east
Answer: VECTOR
- ii. a gust of wind blowing 5 mph
Answer: SCALAR
- iii. walking 4km east of west
Answer: VECTOR
- iv. pushing down on an object with 7 Newtons of force
Answer: VECTOR

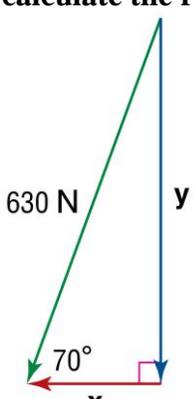
2. Use a ruler and a protractor to draw an arrow diagram for $v = 10$ newtons of force at 30° to the horizontal. Include a scale on the diagram.
Answer:



3. Find the resultant of:
Vector 1: 2 kilometers N30°W
Vector 2: 2 kilometers directly east
 Answer: Can use a ruler and protractor or calculate the components of each vector and add them together. **2 kilometers at a bearing of 30° east of north or N30°E**

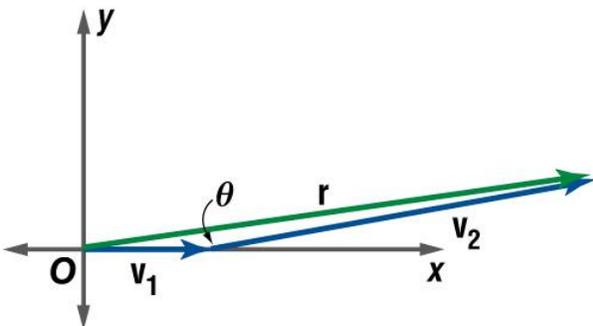
4. **An airplane is flying with an airspeed of 475 miles per hour on a heading of 070°. If an 80-mile-per-hour wind is blowing from a true heading of 120°, determine the velocity and direction of the plane relative to the ground.**
 Answer: Can use a ruler and protractor or calculate the components of each vector and add them together. The velocity of the plane relative to the ground is about 428.0 miles per hour at a bearing of about 061.8°

5. **Will pushes a shovel into the ground with a force of 630 newtons at an angle of 70° with the ground. Draw a diagram that shows the vector and its rectangular components. Then calculate the rectangular components.**



horizontal component ≈ 215.47 Newtons
 vertical component ≈ 592.01 Newtons

6. **A. Find the component form of a vector with an initial point $A(1, -3)$ and terminal point $B(1, 3)$**
 Answer: $\langle 0, 6 \rangle$
B. Find the component form of a vector with an initial point $C(-4, -3)$ and terminal point $D(5, 3)$
 Answer: $\langle 9, 6 \rangle$

<p>7. A. Find the magnitude of a vector with initial point $A(1, -3)$ and terminal point $B(1, 3)$</p> <p>Answer: 6</p> <p>B. Find the magnitude of a vector with initial point $C(4, -2)$ and terminal point $D(-3, -2)$</p> <p>Answer: 7</p>	<p>8. Find $2w + y$ for $w = \langle 2, -5 \rangle$, $y = \langle 2, 0 \rangle$, and $z = \langle -1, -4 \rangle$. Answer:</p> <p>$\langle 6, -10 \rangle$</p>
<p>9. A. Find a unit vector u with the same direction as $v = \langle 4, -2 \rangle$.</p> <p>Answer:</p> $\left\langle \frac{2\sqrt{5}}{5}, -\frac{\sqrt{5}}{5} \right\rangle$ <p>B. Find a unit vector u with the same direction as $w = \langle 5, -3 \rangle$.</p> <p>Answer:</p> $\left\langle \frac{5\sqrt{34}}{34}, -\frac{3\sqrt{34}}{34} \right\rangle$	<p>10. A. A vector has initial point $D(-4, 3)$ and terminal point $E(-1, 5)$. Rewrite the vector as a linear combination of the vectors i and j.</p> <p>Answer:</p> <p>$3i + 2j$</p> <p>B. Vector $= \langle 2, 9 \rangle$ Rewrite the vector as a linear combination of the vectors i and j.</p> <p>Answer:</p> <p>$2i + 9j$</p>
<p>11. Find the component form of the vector v with magnitude 7 and direction angle 60°.</p> $v = \left\langle \frac{7}{2}, \frac{7\sqrt{3}}{2} \right\rangle$	<p>12. A. Find the direction angle of $r = -7i + 2j$ to the nearest tenth of a degree.</p> $\theta \approx -15.9^\circ$ <p>B. Find the direction angle of $p = \langle 2, 9 \rangle$ to the nearest tenth of a degree.</p> $\theta \approx 77.5^\circ$
<p>13. A soccer player running forward at 7 meters per second kicks a soccer ball with a velocity of 30 meters per second at an angle of 10° with the horizontal. What is the resultant speed and direction of the kick?</p>  <p>Note: Not drawn to scale.</p> <p>Answer: 36.9 m/s; 8.1°</p>	