

## Vector Test Question Bank

- Vector  $\vec{a}$  has initial point  $(4, -3)$  and terminal point  $(3, -4)$ . Write the vector in component form and sketch it on the graph paper below.
- Vector  $\vec{v}$  has initial point  $(11, 12)$  and terminal point  $(12, 11)$ . Determine if  $\vec{v}$  and  $\vec{a}$  are equivalent.
- Let  $u = \langle -3, 5 \rangle$  and  $\vec{v} = \langle 1, 4 \rangle$  and  $\vec{w} = \langle 6, -3 \rangle$ . Find
  - $\vec{u} + \vec{v} + \vec{w}$
  - $\vec{u} - 2\vec{v}$
  - $\frac{\vec{v} + \vec{w}}{3}$
  - $\vec{w} - \vec{u} - \vec{v}$
- Given  $\vec{u} = \langle -4, -5 \rangle$ , find
  - $\|\vec{u}\|$
  - $\|3\vec{u}\|$
  - $\| -3\vec{u} \|$
  - $-3\|\vec{u}\|$
- Given  $\vec{u} = \langle -4, -5 \rangle$ ,
  - find a unit vector in the direction of  $\vec{u}$
  - find a vector in the direction  $\vec{u}$  with length 10
  - find a vector parallel to  $\vec{u}$
  - find a vector perpendicular to  $\vec{u}$
- Determine if  $\vec{a}$  and  $\vec{b}$  are parallel, perpendicular, or neither.
  - $\vec{a} = \langle \frac{1}{2}, \frac{2}{3} \rangle$ ,  $\vec{b} = \langle -4, 3 \rangle$
  - $\vec{a} = 3\hat{i} - 10\hat{j}$ ,  $\vec{b} = 10\hat{i} - 3\hat{j}$
  - $\vec{a} = \langle \tan \theta + 1, \sec \theta \rangle$ ,  $\vec{b} = \langle \tan \theta - 1, -\sec \theta \rangle$
- Given vector  $\vec{a} = 5\hat{i} - 10\hat{j}$ , determine the angle  $\vec{a}$  makes with the positive  $x$  axis.
- If vector  $\vec{x}$  has magnitude 12 and makes an angle of  $3\pi/4$  with the positive  $x$  axis, find the components of  $x$  and write as  $a\hat{i} + b\hat{j}$ .
- If vector  $\vec{w}$  has length 20 and makes a  $37.2^\circ$  angle with the positive  $x$  axis, find the  $x$  and  $y$  components of  $w$ .
- If two tugboats pull a ship, one with a force of  $30N$  applied at an angle of  $20^\circ$  N of E, and one with a force of  $40N$  applied at an angle of  $60^\circ$  N of W, find the resultant force vector acting on the cruise ship. Write the vector in component form and also as a magnitude/angle.