1) Express each vector in terms of the unit vectors $\hat{i}$ and $\hat{j}$.

a) [−2, 0]　　　　　　　　**b)** [0, 3]　　　　　　　　**c)** [3, 2]　　　　　　　　**d)** [−1, 6]

2) Express each vector as a position vector [a, b].
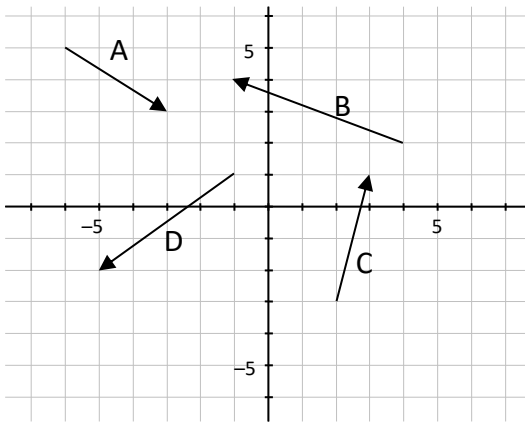
a) $3\hat{i} + 2\hat{j}$　　　　　　　**b)** $4\hat{j}$　　　　　　　**c)** $-7\hat{i} + 3\hat{j}$　　　　　　　**d)** $-9\hat{i}$

3) Write the coordinates of each Cartesian vector and determine the magnitude.

4) Given the vector $\vec{v}$ = [2, -5].

a) State the vertical and horizontal vector components of $\vec{v}$.

b) Find two vectors that are collinear with $\vec{v}$.

5) If $\vec{u}$ = [−3, 5] and $\vec{v}$ = [2, 9].

a) $\vec{u} + \vec{v}$

b) $\hat{u}$

c) $-3\vec{u} + 4\vec{v}$

d) $7\vec{u} + 6\hat{\imath} - 8\hat{\jmath} - 3\vec{v}$

e) $|\vec{v}|$

f) $|-3\vec{u} - 2\vec{v}|$

6. Write each force as a Cartesian vector.

a) 750 N applied 45° to the horizontal

b) 215 N applied 68° to the vertical

c) 450 N applied upwards

**d)** 17 N applied downwards

e) 1000 N east

f) 80 N west

7) An aircraft is travelling at 750 km per hour at an angle of 35° to the level ground below. Find the force in component form as a Cartesian vector.

8) A mom is pulling a sled exerting a force of 220 N along a rope that makes an angle of 20° to the horizontal. Write this force in component form as a Cartesian vector.

9) Let $\vec{a}$ = [−2, 5] and $\vec{b}$ = [5, −7].
   a) Plot the two vectors.
   b) Which is greater: $\left|\vec{a} + \vec{b}\right|$ or $\left|\vec{a}\right| + \left|\vec{b}\right|$?
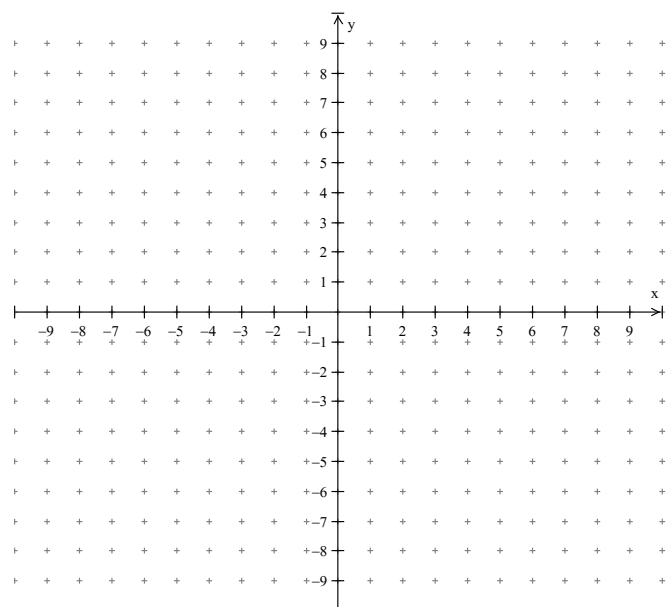
10) Given the points $P(-6,1)$, $Q(-2,-1)$, and $R(-3,4)$, find...

a) $\overrightarrow{QP}$ **b)** $|\overrightarrow{RP}|$ **c)** perimeter of ΔPQR

11) Which vector is NOT colinear with $\vec{a} = [6,-4]$?

$\vec{b} = [3,-2]$, $\vec{c} = [-6,-4]$, $\vec{d} = [-6,4]$, or $\vec{e} = [-9,6]$