Practice 02:

1. What is the difference between an algebraic vector and a geometric vector?

2. Rewrite each of the following vectors in the form $a\hat{i} + b\hat{j}$.

   a. $(-5, 2)$ b. $(0, 6)$ c. $(-1, 6)$

3. Rewrite each of the following vectors as an ordered pair.

   a. $2\hat{i} + \hat{j}$ b. $-3\hat{i}$ c. $5\hat{i} - 5\hat{j}$

6. Express each of the following vectors as an algebraic vector in the form (a, b).

   a. $|\vec{u}| = 12, \theta = 135°$ b. $|\vec{v}| = 36, \theta = 330°$

   c. $|\vec{w}| = 16, \theta = 190°$ d. $|\vec{x}| = 13, \theta = 270°$

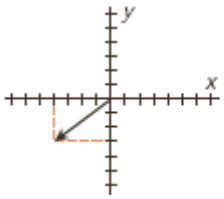
7. Express each of the following vectors as a geometric vector by stating its magnitude and direction.

   a. $\vec{u} = (-6\sqrt{3}, 6)$ b. $\vec{v} = (-4\sqrt{3}, -12)$

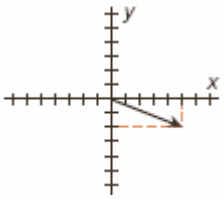
   c. $\vec{w} = (4, 3)$ d. $\vec{x} = (0, 8)$

8. What vector is represented in each of the following diagrams?

   a.



   b.



13. Find the magnitude and the direction of the following vectors.

   a. $\overrightarrow{OE} = (1, 7)$ b. $\overrightarrow{OF} = (0, -6)$

   c. $\overrightarrow{OG} = (-9, 12)$ d. $\overrightarrow{OH} = \left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

   e. $\overrightarrow{OJ} = \left(\frac{2}{\sqrt{5}}, -\frac{\sqrt{6}}{\sqrt{5}}\right)$ f. $\overrightarrow{OK} = (-\sqrt{6}, 0)$

19. Show that any unit vector in two dimensions can be written as $(\cos\theta, \sin\theta)$, where θ is the angle between the vector and the x-axis.

Answers to Practice for geometric and algebraic vectors

1. Geometric gives magnitude and direction explicitly using compass bearings or compass rose, algebraic gives coordinates of head of vector when tail is at origin in coordinate grid (also called component form)

2. -5i +2j, 6j, -1i + 6j (hats on i and j) 3. (2, 1), (-3, 0), (5, -5)

6. a) (-8.5, 8.5) b) (31.2, -18) c) (-15.8, -2.8) d) (0, -13)

7. a) 12 N60°W or 12 300° b) 13.9 S30°W or 13.9 210° c) 5 N53°E or 5 53° d) 8 N or 8 0°

8. a) (-4, -3) b) (5, -2) 13. a) 7.1 N8°E or 7.1 8° b) 6 S or 6 180° c) 15 N37°W or 15 323° d) 1 N30°W or 1 330° e) 1.4 E51°S or 1.4 141° f) 2.5 W or 2.5 270°