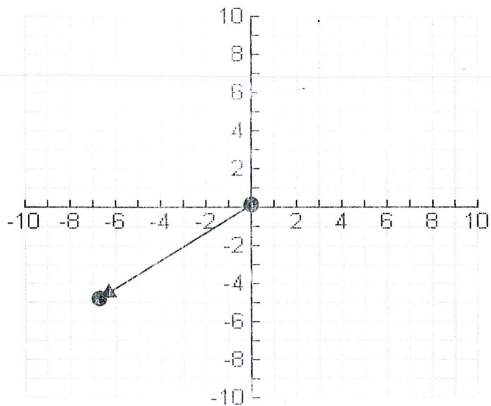


1. Mr. Jones is traveling in his powerboat at 25mph directly west. The current is flowing at 4 mph in the direction of  $N20^{\circ}W$ . There is also a tailwind of 10mph blowing in the direction of  $N5^{\circ}W$ . Find the resulting velocity?
2. An airplane is traveling 335 miles per hour and heading  $N40^{\circ}E$ . The wind is blowing at 20 miles per hour in the direction of  $S20^{\circ}E$ . What is the resulting velocity of the plane?
3. A ship near the coast is going 7 knots at an angle of  $125^{\circ}$ . The current is flowing directly due east at 2 knots. What is the ship's resultant velocity?
4. In a 3-person tug-of-war, three ropes are tied at a point. Adam is pulling east with a force of 600 newtons, Barry is pulling north with a force of 400 newtons, and Cal is pulling the third rope. The knot in the middle is not moving. Find the direction and magnitude of Cal's effort.
5. A motorboat is traveling across a river from one shore to the other in the direction of due east at 5 m/s. The boat encounters a current going due north at 3 m/s. What is the resultant velocity (speed and direction)? If the river is 60 meters wide, how long does it take to get from one shore to the other?

1. Show that vector  $u$  and vector  $v$  are equal  
 Vector  $u$ : initial:  $(2, -5)$ , terminal:  $(-1, 4)$   
 Vector  $v$ : initial:  $(7, 1)$ , terminal:  $(4, 10)$

2. Find the component form and the magnitude of the vector  $v$ .



Find a.)  $u - v$  b.)  $-3u + 2v$  c.)  $-v + 5u$

3.  $u = \langle 2, 3 \rangle$   $v = \langle -3, 0 \rangle$

4.  $u = \langle 2, -1 \rangle$   $v = \langle -4, 7 \rangle$

Find the magnitude and direction of each vector.

5.  $u = \langle 3, -5 \rangle$

6.  $v = \langle -2, 3 \rangle$

Find the component form given magnitude and direction

7.  $\|v\| = 2$   $\theta = -53^\circ$

8.  $\|v\| = 3$   $\theta = 60^\circ$

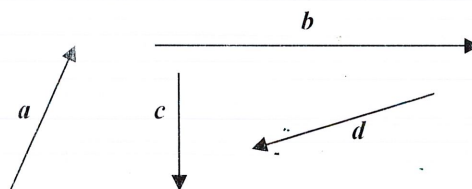
9.  $\|v\| = 4$   $\theta = 110^\circ$

Draw the resulting vector using tip-to-tail or parallelogram method.

10.  $a + c$

11.  $c + d$

12.  $b + c$



**Cumulative Review Questions from Tests 1-6:**

1. Identify the following conics: a.  $\frac{(x-3)^2}{10} - \frac{y^2}{4} = 1$       b.  $(x+1)^2 + y^2 = 16$

2. Multiply the following matrices:  $\begin{bmatrix} 2 & 9 \\ -7 & 3 \end{bmatrix} \cdot \begin{bmatrix} 6 & -4 \\ 0 & 3 \end{bmatrix}$

3. Solve the linear system: 
$$\begin{aligned} 7x + 4y &= -17 \\ 8x + 5y &= -19 \end{aligned}$$

4. Find a positive co-terminal angle to: a.  $\theta = -\frac{2\pi}{5}$       b.  $\theta = \frac{\pi}{7}$

5. If  $\tan \theta = -\frac{5}{4}$  and  $\theta$  is in quadrant 4, what is the exact value of  $\cos \theta$ ?

6. Find the reference angle: a.  $\theta = 210^\circ$       b.  $\theta = 315^\circ$

7. Find the exact value of the following function:  $\sin\left(-\frac{4\pi}{3}\right)$

8. Evaluate  $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$  in degrees and radians

9. Find the amplitude, period, horizontal shift, and vertical shift for  $f(x) = 3\sin\left(x + \frac{\pi}{4}\right) + 7$ .

10. Evaluate  $\arcsin\left(-\frac{1}{2}\right)$

11. Simplify:  $\frac{\sec^2 \theta - 1}{\sin^2 \theta}$

12. Solve for  $x$ :  $2\sin x - \sqrt{3} = 0$

13. Evaluate:  $\sin 105^\circ$  (use  $105^\circ = 45^\circ + 60^\circ$ )       $\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$

14. Given a triangle with  $A = 20^\circ$ ,  $B = 50^\circ$ , and  $a = 5$ , find  $c$ .

15. What is the area of a triangle with sides of 5, 7, and 9. Use  $Area = \sqrt{s(s-a)(s-b)(s-c)}$