

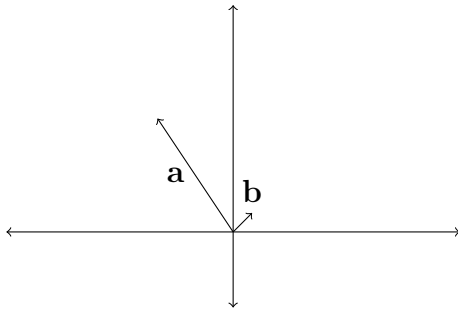


MATH 151- WEEK-IN-REVIEW 1
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PROBLEM STATEMENTS

1. Find each vector \overrightarrow{AB}
 - (a) $A(-3, 4), B(1, -2)$
 - (b) $A(-2, 2), B(-1, 3)$

2. Refer to the given drawing to find $2\mathbf{a} - \mathbf{b}$ and $\mathbf{a} + 4\mathbf{b}$.



3. Given $\mathbf{a} = 3\mathbf{i} - 5\mathbf{j}$ and $\mathbf{b} = -\mathbf{i} + 2\mathbf{j}$:
 - (a) Find $\|\mathbf{a}\|$.
 - (b) Find a unit vector in the direction of \mathbf{a} .
 - (c) Find $2\mathbf{a} + 4\mathbf{b}$.



4. Liam walks due west on the deck of a ship at 3 mph. The ship is moving south at 11 mph. Find the speed and direction of Liam relative to the surface of the water.

5. Suppose a wind is blowing from the direction $N60^\circ W$ at a speed of 35 km/hr. A pilot is steering a plane in the direction $S45^\circ E$ at an airspeed (speed in still air) of 450 km/hr. Find the true course (the direction of the resultant of the velocity vectors of the plane and the wind) and the ground speed (the magnitude of the resultant) of the plane.

6. Find $a \bullet b$ for the following vectors:

(a) $\mathbf{a} = \langle -1, 5 \rangle$, $\mathbf{b} = \langle 6, 2 \rangle$

(b) $\|a\| = 4$, $\|b\| = 5$, and the angle between \mathbf{a} and \mathbf{b} is 30°



7. Find the angle between vectors:

(a) $\mathbf{a} = \mathbf{i} + 3\mathbf{j}$ and $\mathbf{b} = 2\mathbf{i} - 4\mathbf{j}$

(b) $\mathbf{a} = \langle 2, 0 \rangle$ and $\mathbf{b} = \langle 4, 1 \rangle$

8. Given the points $A(1, 0)$, $B(2, 3)$ and $C(-1, 7)$, find the angle $\angle ABC$.

9. Find the value(s) of x that make(s) the vectors $\mathbf{a} = \langle 2x, -1 \rangle$ and $\mathbf{b} = \langle x, 3x - 1 \rangle$ orthogonal.



10. A force $\mathbf{F} = \langle -1, 2 \rangle$ is used to move an object from the point $(3, 0)$ to the point $(-2, 1)$. How much work is done by the force if distance is in meters and force is in Newtons?
11. Find the scalar and vector projection of $\langle 3, 2 \rangle$ onto $\langle -1, 5 \rangle$.
12. Find the distance from the point $(-1, 5)$ to the line $3x + y = 5$.