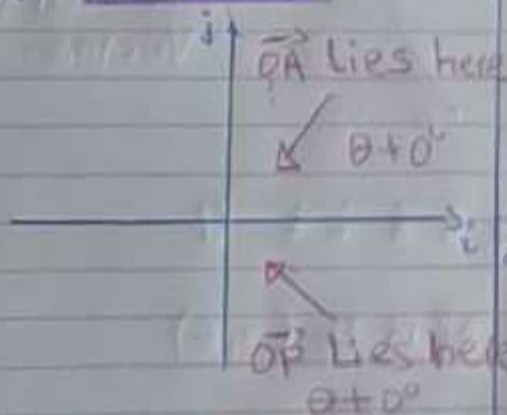


SOLUTIONS TO EXERCISES

$$\vec{OA} = i + 5j, \vec{OB} = 5i - j$$
$$\Rightarrow A(1, 5) \Rightarrow B(5, -1)$$

$$|\vec{OA}| = \sqrt{1^2 + 5^2} = \sqrt{1+25}$$
$$\Rightarrow |\vec{OA}| = \sqrt{26}$$

$$|\vec{OB}| = \sqrt{5^2 + (-1)^2} = \sqrt{25+1}$$
$$\Rightarrow |\vec{OB}| = \sqrt{26}$$



Direction of \vec{OA}

$$\tan \theta = \frac{5}{1}, \theta_A = \tan^{-1}(5)$$

$$\theta_A = 78.69^\circ$$

Direction of \vec{OB}

$$\tan \theta = -\frac{1}{5}, \theta_B = \tan^{-1}\left(-\frac{1}{5}\right)$$

$$\theta_B = -11.31^\circ$$

b.) By inspection if θ is the angle between \vec{OA} and \vec{OB}

$$\Rightarrow \theta = \theta_A - \theta_B$$

$$= 78.69^\circ - (-11.31^\circ)$$
$$= 78.69 + 11.31$$

$$\theta = 90^\circ$$

Since the angle between the vectors is 90° it follows that the vectors \vec{OA} and \vec{OB} are perpendicular.

OR Find the dot product.

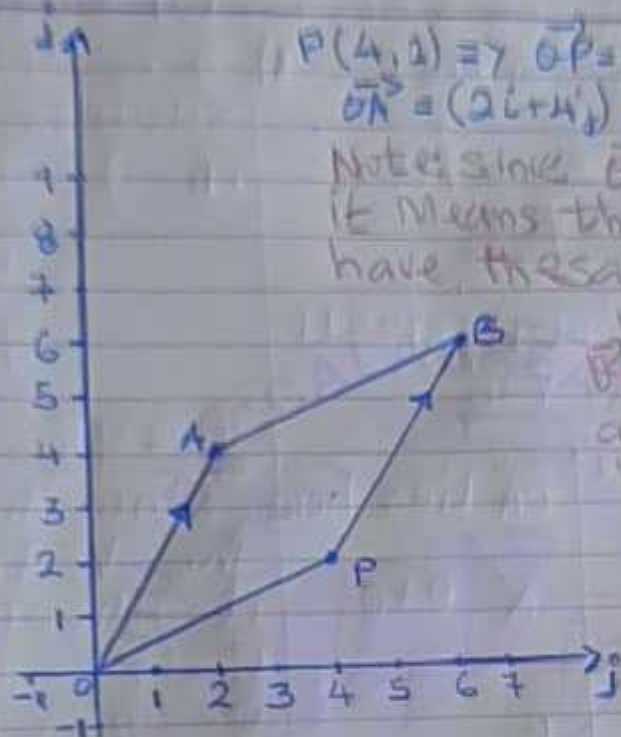
$$A \cdot B = 1 \times 5 + (5) \times (-1)$$
$$= 5 - 5$$

$$A \cdot B = 0$$

Hence \vec{OA} and \vec{OB} are perpendicular.



2.
a)



$$P(4, 2) \Rightarrow \vec{OP} = 4\vec{i} + 2\vec{j}$$

$$\vec{OA} = (2\vec{i} + 4\vec{j}) \Rightarrow A(2, 4)$$

Note: since $\vec{OA} = \vec{PB}$
it means that both vectors
have the same direction

Hence
vector \vec{PA} and \vec{PB}
are parallel
vectors.

b) Coordinates of B is (6, 6)

c) OAPB is a parallelogram.

$$d) \vec{OB} = 6\vec{i} + 6\vec{j}$$

$$|\vec{OB}| = \sqrt{6^2 + 6^2} = \sqrt{36 + 36} = \sqrt{72} \Rightarrow |\vec{OB}| = 6\sqrt{2}$$

[Magnitude]

$$\theta = \tan^{-1}(6/6) \Rightarrow \theta = 45^\circ$$

[Direction]