

ARJUNA

NEET FASTRACK 2024

Lecture No. - 05



Physics

Motion in Straight Line

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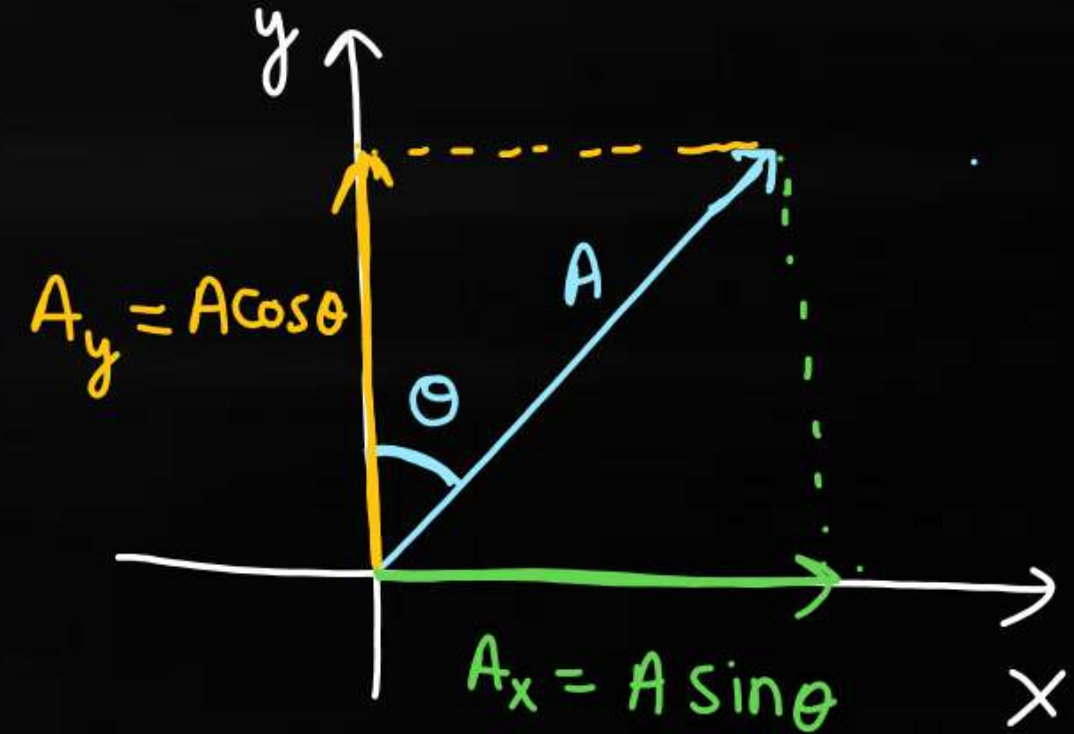
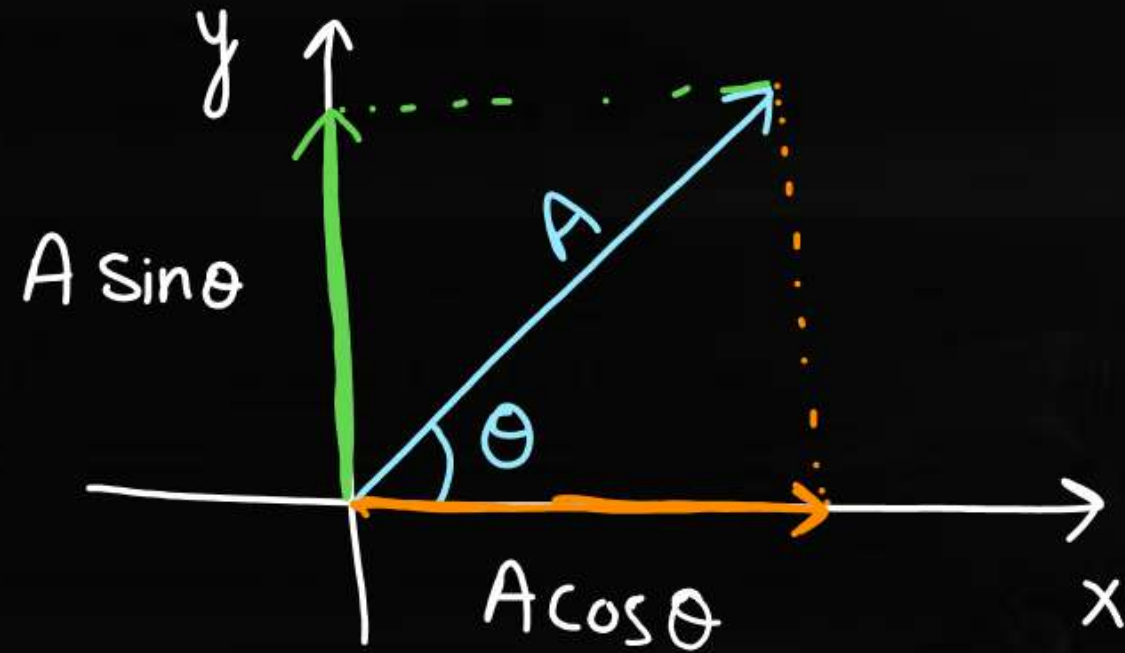


▶▶▶ TODAY'S TARGETS ▶▶▶

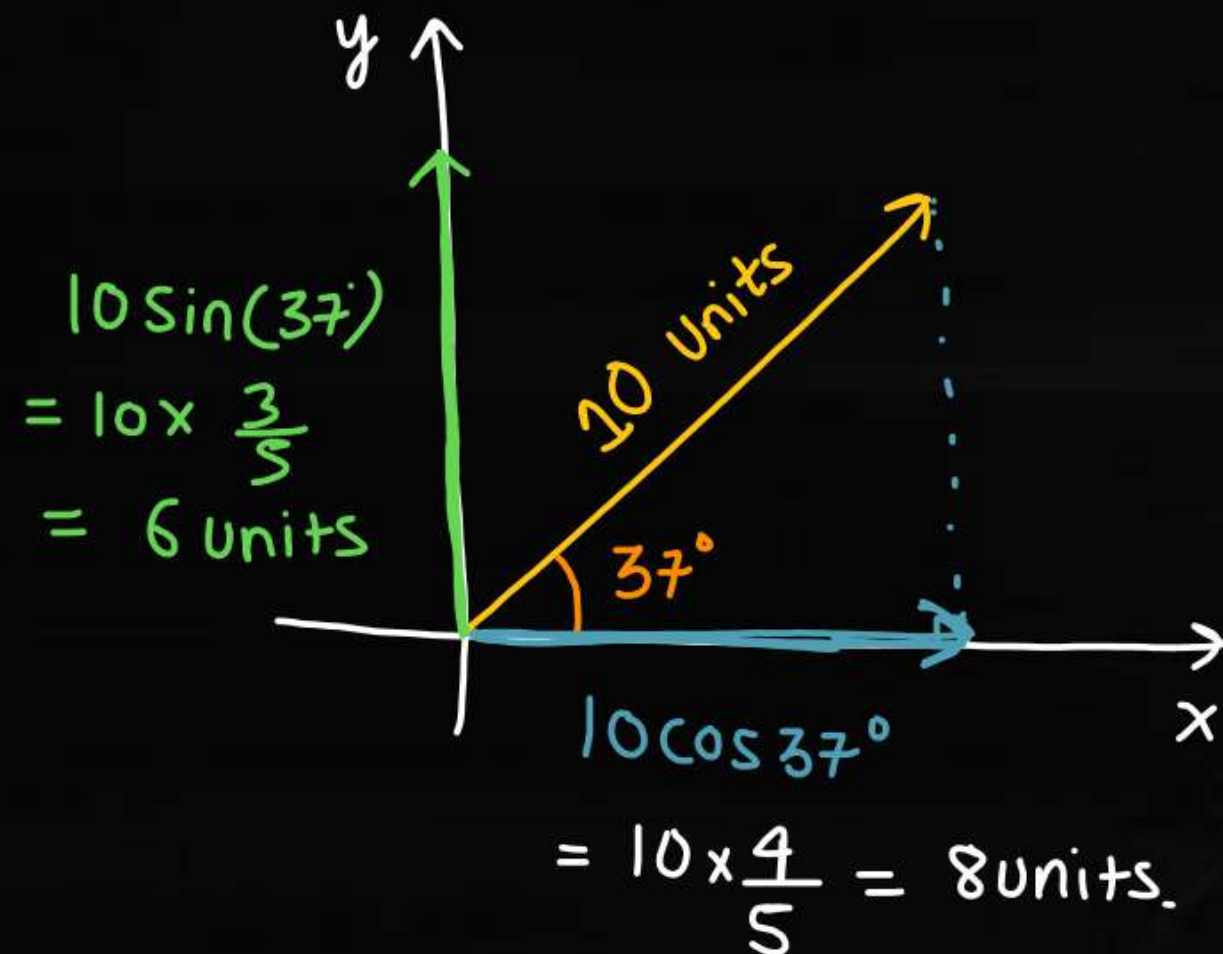
- ① Component of Vector
- ② Representation of Vectors in Unit Vector form.

① Component of Vector:

→

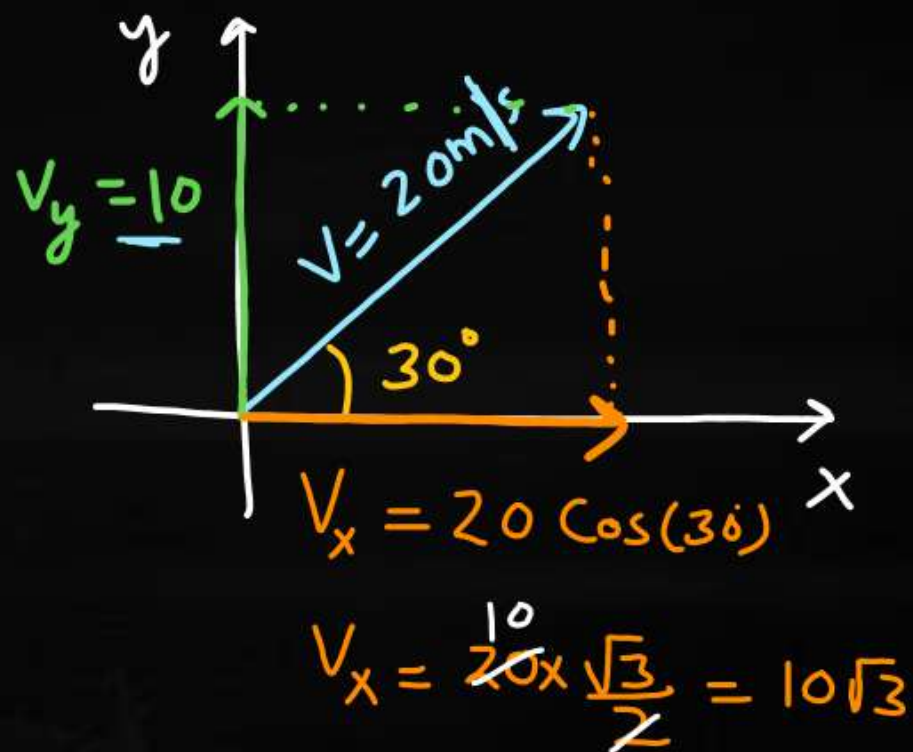


Q:→



$$\vec{A} = 8\hat{i} + 6\hat{j}$$

Q:→



$$V_y = 20 \sin(30^\circ)$$
$$= 20 \times \frac{1}{2} = 10 \text{ m/s}$$

$$V = V_x \hat{i} + V_y \hat{j}$$

$$V = 10\sqrt{3}\hat{i} + 10\hat{j}$$



$$\sin(37^\circ) = \frac{3}{5}$$

$$\cos(37^\circ) = \frac{4}{5}$$

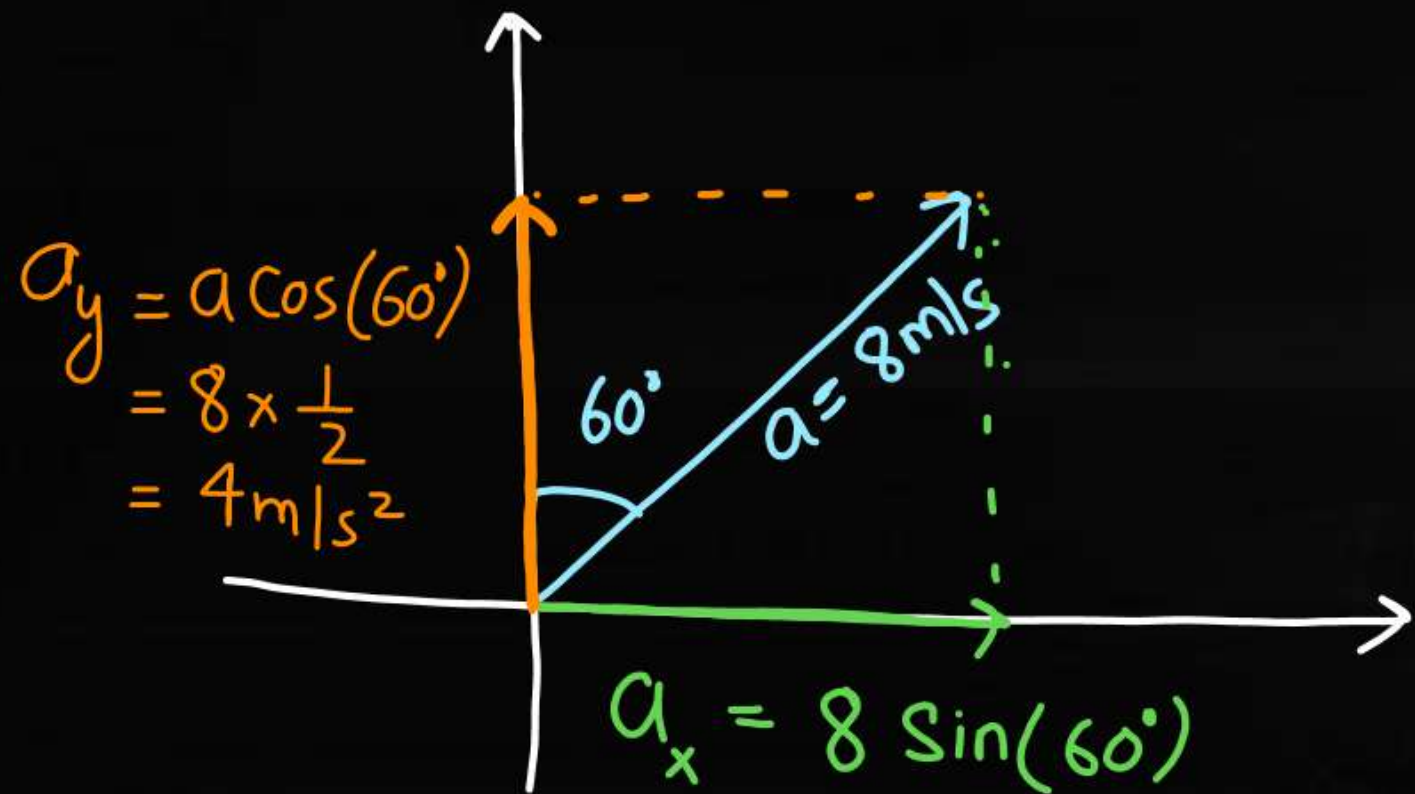
$$\sin(53^\circ) = \frac{4}{5}$$

$$\cos(53^\circ) = \frac{3}{5}$$

$$\tan(37^\circ) = \frac{3}{4}$$

$$\tan(53^\circ) = \frac{4}{3}$$

Q:→



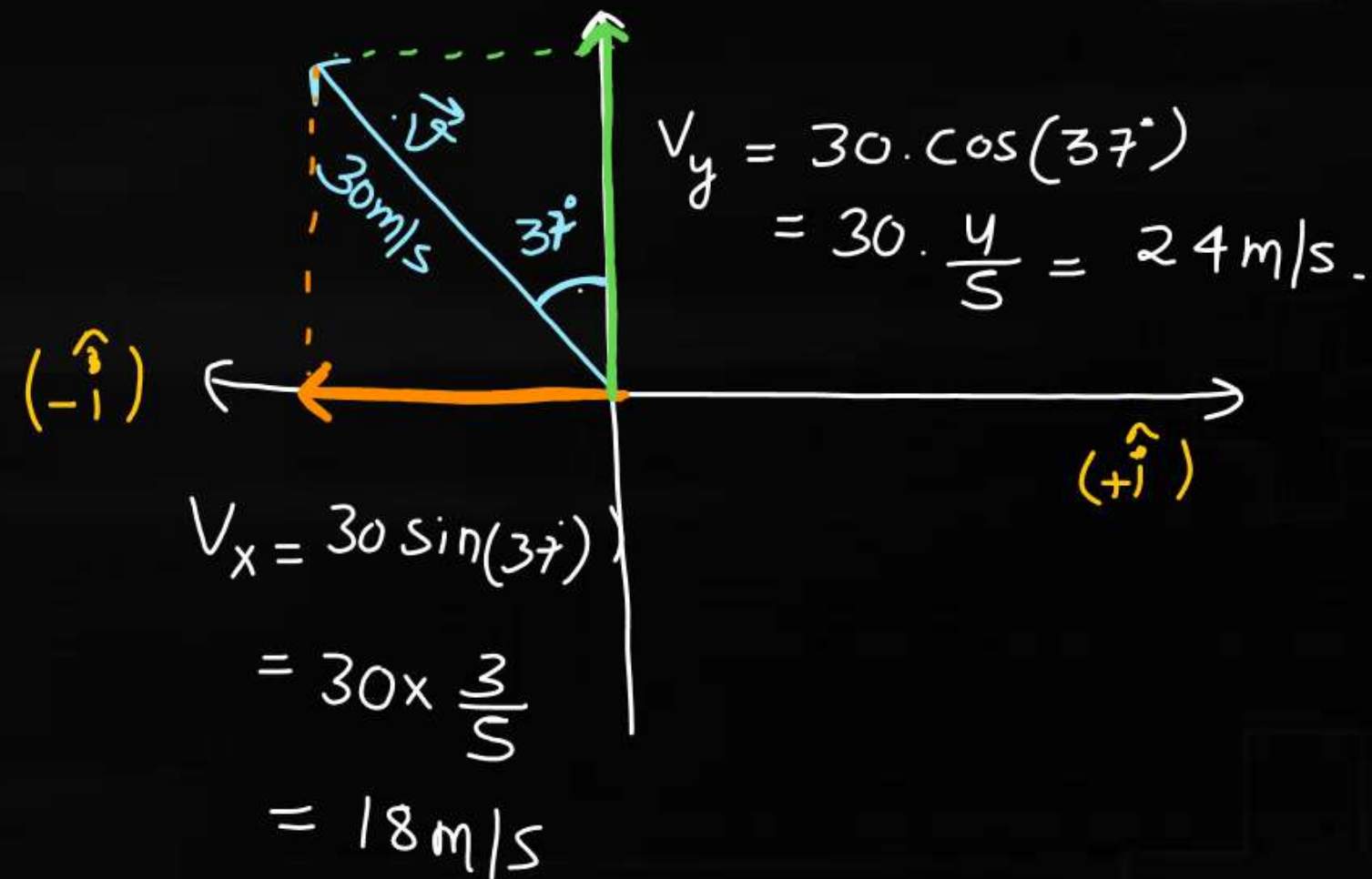
$$\begin{aligned} a_y &= a \cos(60^\circ) \\ &= 8 \times \frac{1}{2} \\ &= 4 \text{ m/s}^2 \end{aligned}$$

$$a_x = 8 \sin(60^\circ)$$

$$a_x = 8 \cdot \frac{\sqrt{3}}{2} = 4\sqrt{3} \text{ m/s}^2$$

$$\vec{a} = 4\sqrt{3}\hat{i} + 4\hat{j}$$

Q:→

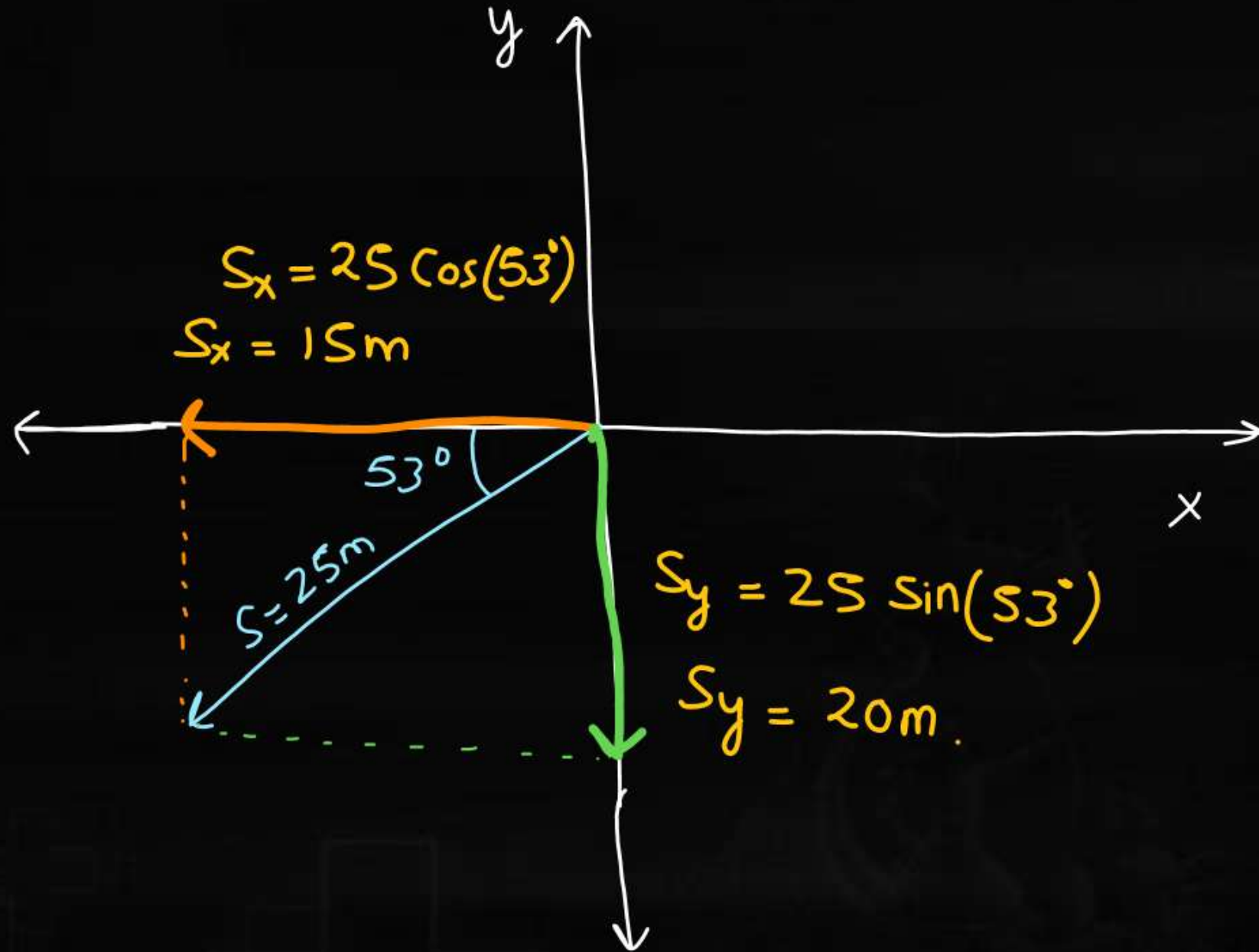


$$\begin{aligned} V_y &= 30 \cdot \cos(37^\circ) \\ &= 30 \cdot \frac{4}{5} = 24 \text{ m/s} \end{aligned}$$

$$\begin{aligned} V_x &= 30 \sin(37^\circ) \\ &= 30 \times \frac{3}{5} \\ &= 18 \text{ m/s} \end{aligned}$$

$$\vec{v} = -18\hat{i} + 24\hat{j}$$

Q:→



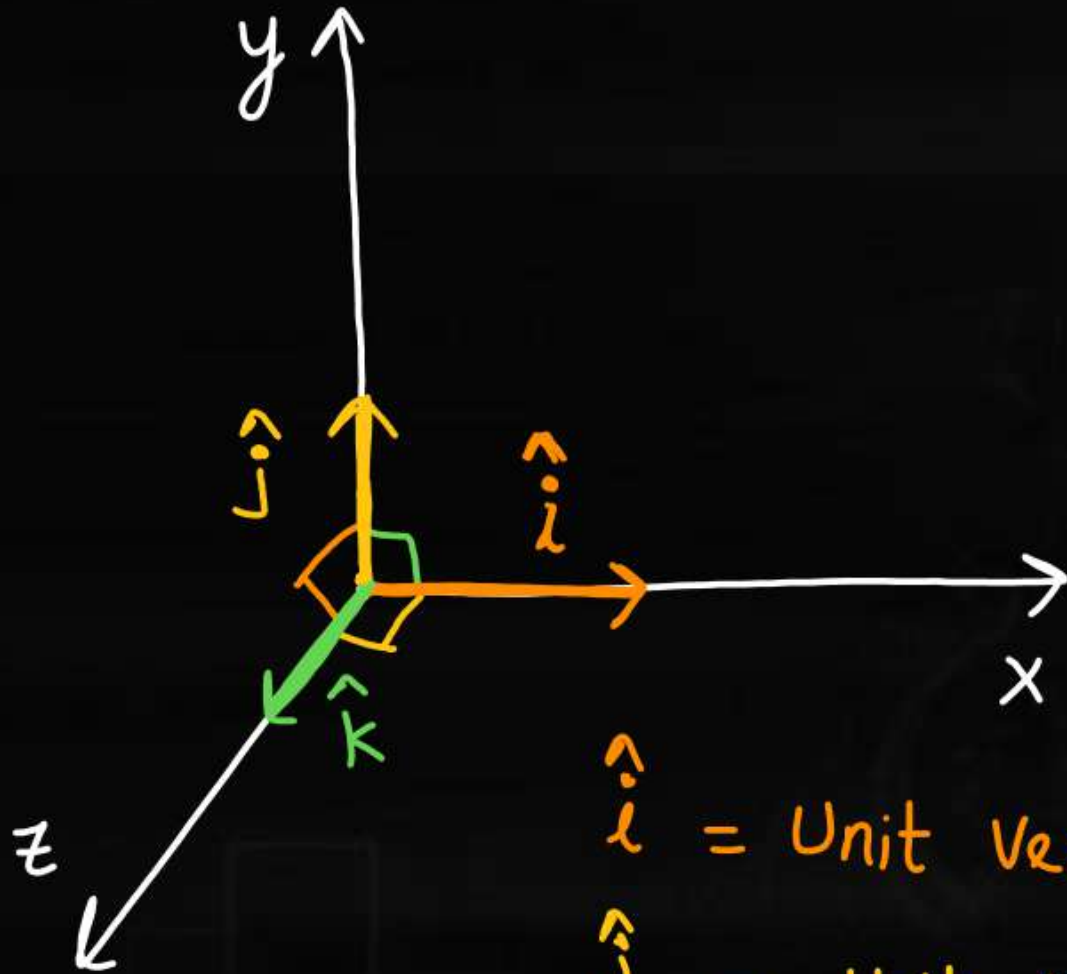
$$\vec{S} = 15(-\hat{i}) + 20(-\hat{j})$$

$$\vec{S} = -15\hat{i} - 20\hat{j}$$

Unit Vector Representation :

Properties of Co-ordinate system.

- All the Axis must be Mutually Perpendicular to each other.
- Intersection of x, y, z axis is called origin



\hat{i} = Unit Vector Along x -axis.

\hat{j} = Unit Vector Along y -axis.

\hat{k} = Unit Vector Along z -axis.

$$5 \times 1 = 5$$

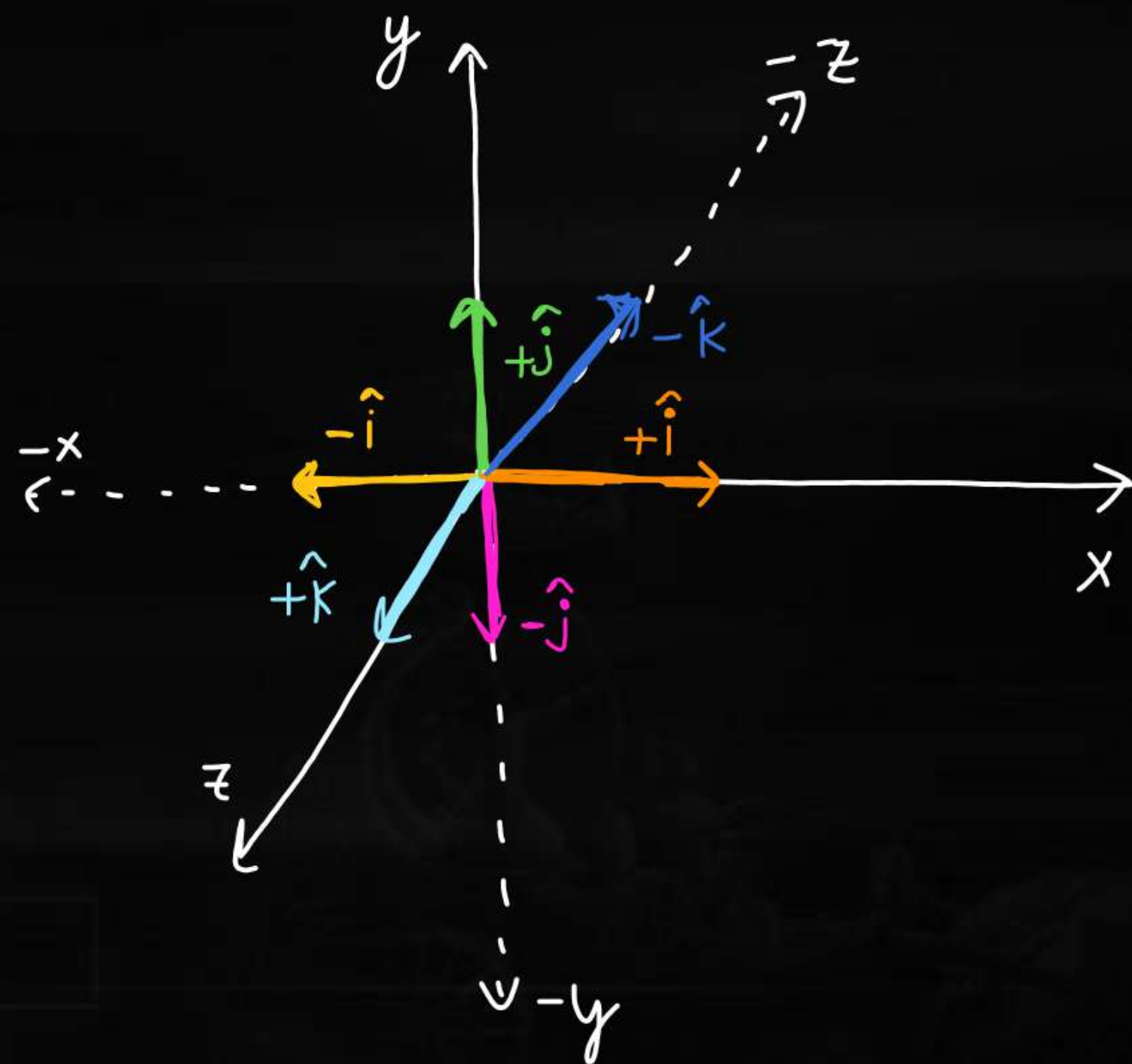
$$10 \times 1 = 10$$

$$18 \times 1 = 18$$

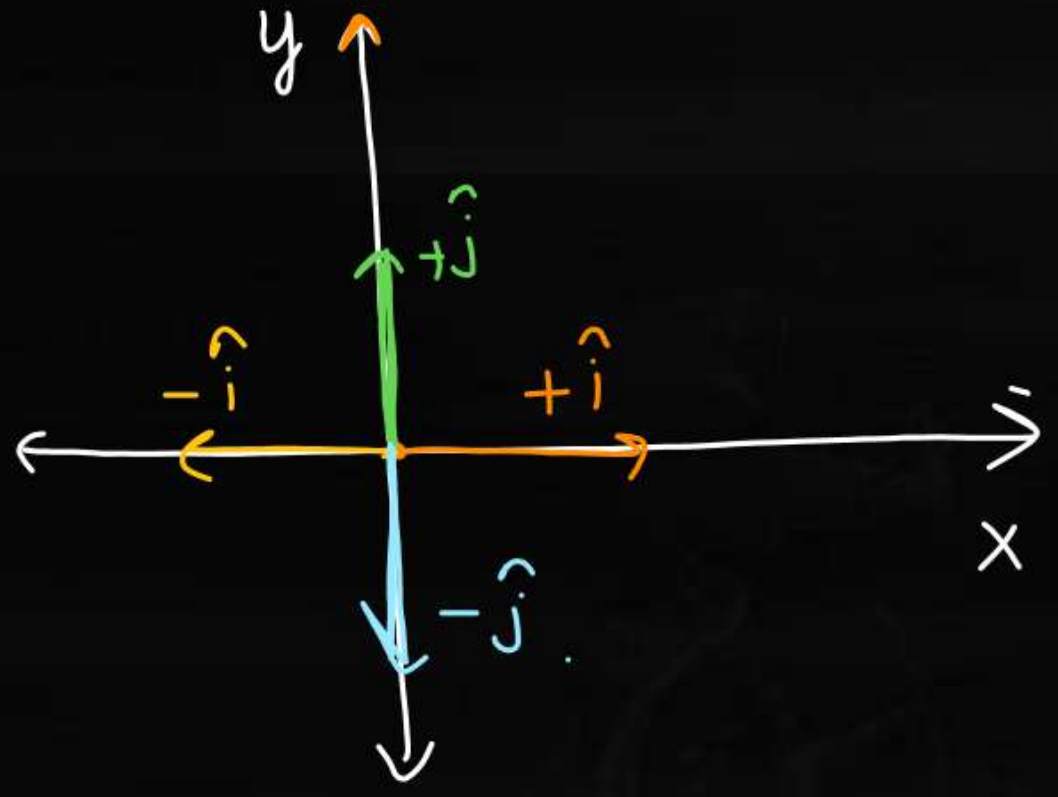
$$26 \times 1 = 26$$

$$525 \times 1 = 525$$

- X-axis ke Along ki Direction ko ' \hat{i} ' kahengey.
- Y-axis ke Along ki direction ko ' \hat{j} ' kahengey.
- Z-axis ke Along ki direction ko ' \hat{k} ' kahengey.



In General (2-D)



Q:→ A man moving with velocity given as following Write-Down its Velocity Vector.

(i) 10m/s in East Direction

$$V = 10 \hat{i} \text{ m/s}$$

(ii) 20m/s in South Direction

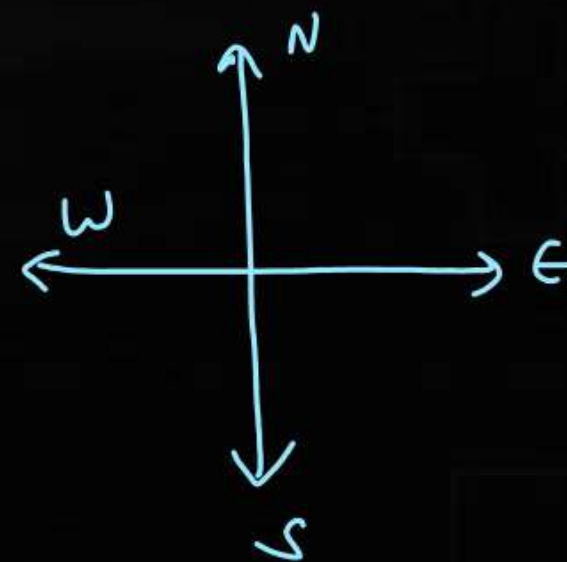
$$V = 20(-\hat{j}) = -20\hat{j} \text{ m/s.}$$

(iii) 12m/s in West Direction

$$V = 12(-\hat{i}) = -12\hat{i}$$

(iv) 20m/s in North Direction.

$$V = 20(+\hat{j}) = +20\hat{j}$$



Real World \rightarrow

$$\text{East} = +\hat{i}$$

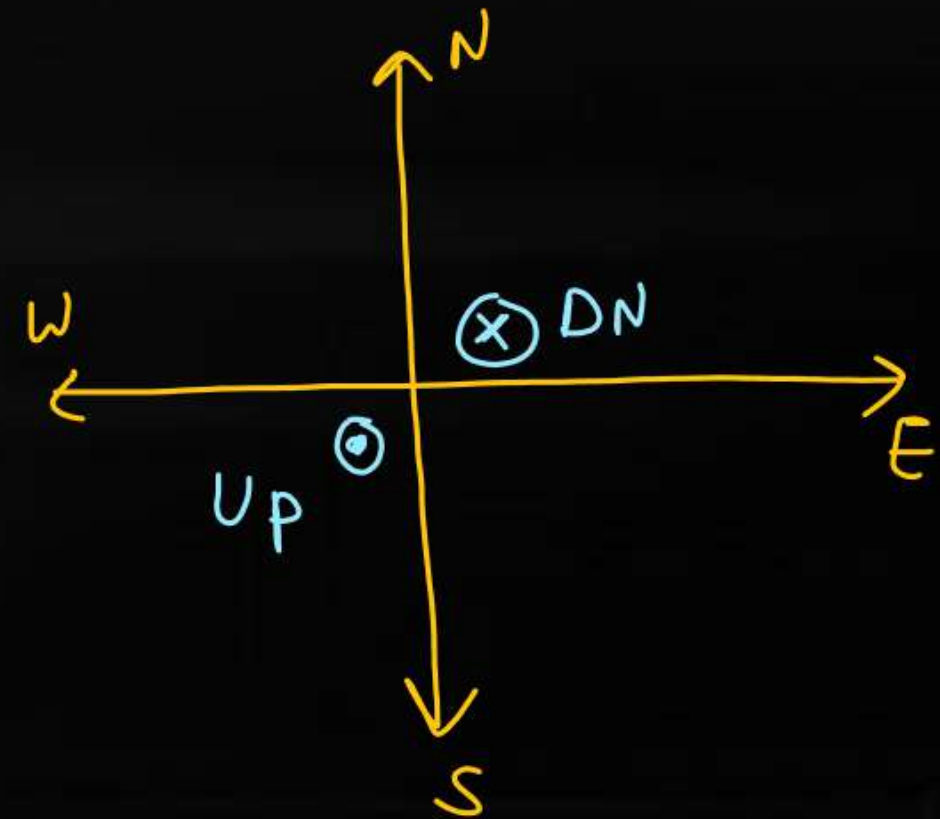
$$\text{West} = -\hat{i}$$

$$\text{North} = +\hat{j}$$

$$\text{South} = -\hat{j}$$

$$\text{Upward} = +\hat{k}$$

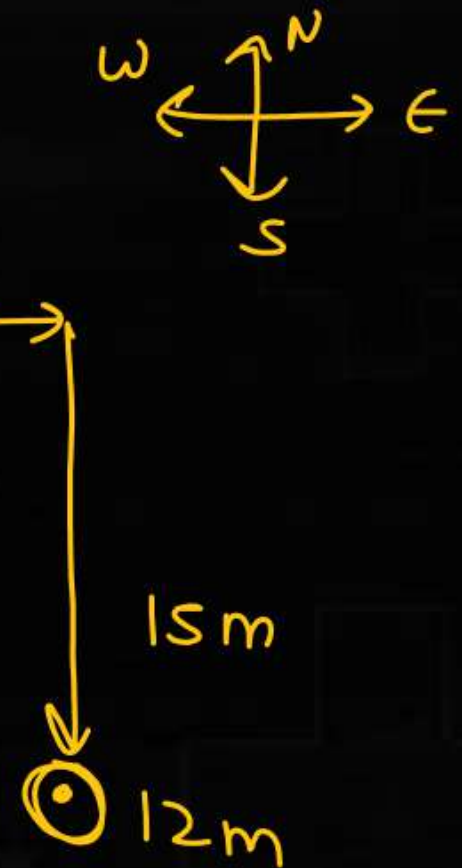
$$\text{Downward} = -\hat{k}$$



Q:→ A monkey moves 10m in East then 15m in South and then
Climb up the Tree 12m. Write Down its Displacement Vector.

$$\vec{S}_{\text{monkey}} = 10(+\hat{i}) + 15(-\hat{j}) + 12(+\hat{k})$$

$$\vec{S}_m = 10\hat{i} - 15\hat{j} + 12\hat{k}$$

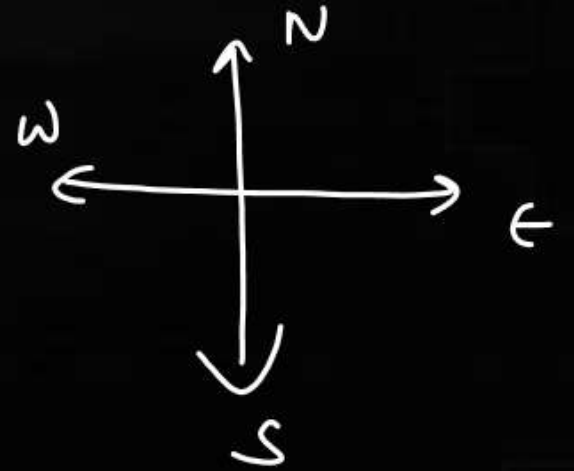


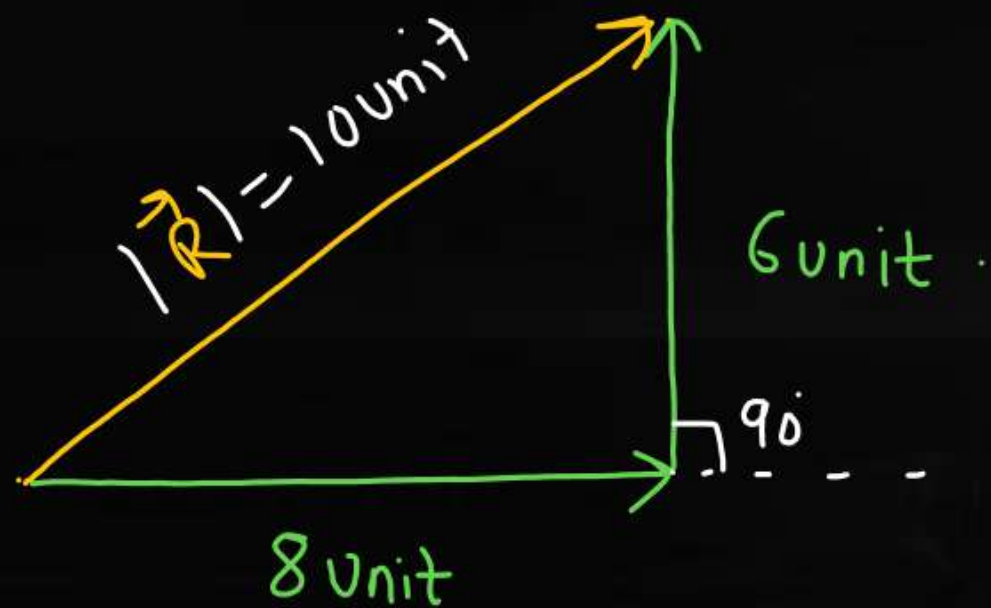
Q:→ A man travelled 10m in West then 12m toward North.

Find its Displacement Vector.

$$\vec{S}_{\text{man}} = 10(-\hat{i}) + 12(+\hat{j})$$

$$\vec{S}_{\text{man}} = -10\hat{i} + 12\hat{j}$$





$$R = \sqrt{A^2 + B^2 + 2AB\cos 0^\circ}$$

$$\cos(90) = 0$$

$$\vec{R} = 8\hat{i} + 6\hat{j}$$

$$R = \sqrt{A^2 + B^2}$$

$$R = \sqrt{8^2 + 6^2} = \sqrt{64 + 36}$$

$$R = \sqrt{100} = 10 \text{ unit.}$$

THANK
THANK You

