

**TOPIC:**

**VECTORS**

# Q7: SECTION A

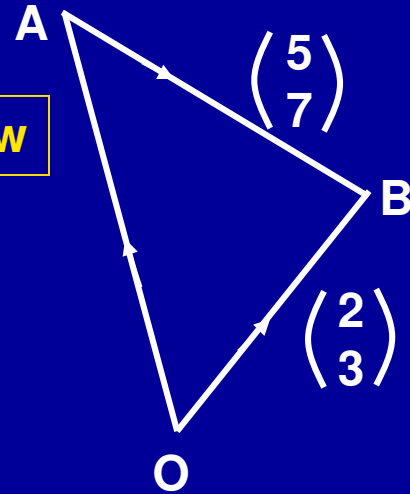
$$(a) \vec{OA} = \vec{OB} - \vec{AB}$$

$$= \begin{pmatrix} 2 \\ 3 \end{pmatrix} - \begin{pmatrix} 5 \\ 7 \end{pmatrix}$$

$$= \begin{pmatrix} -3 \\ -4 \end{pmatrix}$$

$$A (-3, -4)$$

Use triangle law



√M1

√A1

$$(b) |\vec{OA}| = \sqrt{(-3)^2 + (-4)^2} = 5$$

√M1

$$\text{Unit vector } \vec{OA} = \frac{1}{5} \begin{pmatrix} -3 \\ -4 \end{pmatrix}$$

√A1

(c)  $\vec{OA} = \lambda \vec{CD}$  ( when  $\vec{OA}$  and  $\vec{CD}$  are parallel )

$$\begin{pmatrix} -3 \\ -4 \end{pmatrix} = \lambda \begin{pmatrix} k \\ 5 \end{pmatrix}$$

$$-3 = k\lambda$$

✓M1

$$\text{and } -4 = 5\lambda$$

$$k = -3 / (-4/5)$$

$$\lambda = -4/5$$

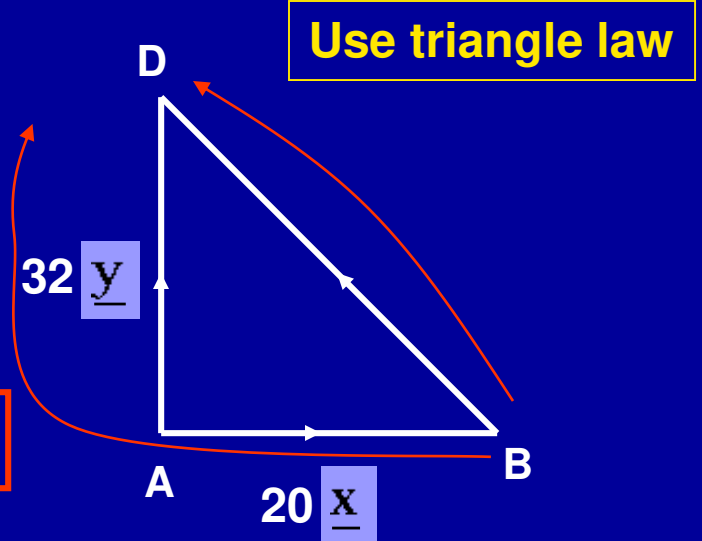
$$= 15/4$$

✓A1

# Q8: SECTION A

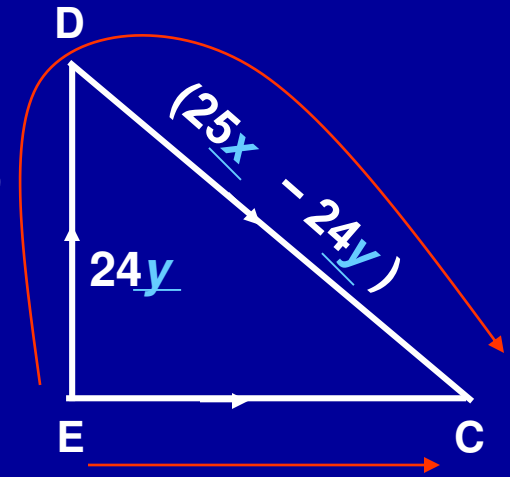
(a) (i)  $\overrightarrow{BD} = -\overline{AB} + \overline{AD}$

$$= -20 \underline{x} + 4 \overline{AE}$$
$$= -20 \underline{x} + 4(8 \underline{y})$$
$$= -20 \underline{x} + 32 \underline{y} \quad \sqrt{A1}$$



(ii)  $\overrightarrow{EC} = \overline{ED} + \overline{DC}$

$$\sqrt{M1} = \frac{3}{4} (32 \underline{y}) + (25 \underline{x} - 24 \underline{y})$$
$$= 25 \underline{x} \quad \sqrt{A1}$$



(b)  $BD = \lambda FD$  (if B, F and D are collinear)

$$-20\underline{x} + 32\underline{y} = \lambda FD$$

$$\begin{aligned} -20\underline{x} + 32\underline{y} &= \lambda(-15\underline{x} + 24\underline{y}) \\ &= -15\lambda\underline{x} + 24\lambda\underline{y} \end{aligned}$$

Compare:

$$20 = 15\lambda \quad \text{or} \quad 32 = 24\lambda$$

$$\lambda = 4/3$$

$$\lambda = 4/3$$

$$BD = 4/3 FD$$

Thus, B, F and D are collinear

$$\begin{aligned} \vec{FD} &= -\vec{EF} + \vec{ED} \\ &= 3/5(-15\underline{x}) + 3/4(32\underline{y}) \\ &= -15\underline{x} + 24\underline{y} \end{aligned}$$



$$(c) \quad \overrightarrow{BD} = -20\underline{x} + 32\underline{y}$$

$$|\overrightarrow{BD}| = \sqrt{(20|x|)^2 + (32|y|)^2}$$

$$= \sqrt{[20(2)]^2 + [32(3)]^2}$$

$$= 104$$

$$\sqrt{A1}$$

$\sqrt{M1}$