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11.4 -

(1) a) $\overrightarrow{OP} = -2i + 3j$ b) $\overrightarrow{OQ} = 7i + 0j$
$= 7i$

c) vector $\overrightarrow{PQ} = \overrightarrow{OQ} + \overrightarrow{OP}$

$= 7i - (-2i + 3j)$
$= 9i - 3j$

(2)
a) $\overrightarrow{OA} = 6i - 2j$

b) $\overrightarrow{BC} = \overrightarrow{OC} - \overrightarrow{OB}$
$= (1i + 3j) - (-1i - 1j)$
$= 2i + 4j$

c) $\overrightarrow{CA} = \overrightarrow{OA} - \overrightarrow{OC}$
$= (6i - 2j) - (1i + 3j)$
$= 5i - 5j$

(3) a) $|\overrightarrow{OD}| = \sqrt{(-6)^2 + 8^2}$
$= 10$

b) $|\overrightarrow{DE}| = \sqrt{(-9)^2 + 3^2}$
$\Rightarrow \sqrt{81 + 9} = 3\sqrt{10}$

c) $|\overrightarrow{OE}| = \overrightarrow{OD} - \overrightarrow{ED}$
$= (-6i + 8j) - (9i + 3j)$
$= 3i + 5j$.

(4) a) Position vector of B

$\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$
$= \begin{pmatrix} -7 \\ -6 \end{pmatrix} + \begin{pmatrix} 3 \\ 11 \end{pmatrix} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$
$= -4i + 5j$

4b) $|\overrightarrow{OB}| = \sqrt{(-4)^2 + 5^2}$

$= \sqrt{41}$

(5) point P lies on → $y = 2x - 3$

$|OP| = \sqrt{53}$

$\sqrt{x^2 + y^2} = \sqrt{53}$

$\sqrt{x^2 + (2x-3)^2} = \sqrt{53}$

$x^2 + 4x^2 - 12x + 9 = 53$

$5x^2 - 12x - 44 = 0$

$$x = \frac{12 \pm \sqrt{(-12)^2 - 4 \times 5 \times (-44)}}{2 \times 5}$$

$x = \frac{22}{5}$ / -2.

$y = 2 \times \frac{22}{5} - 3$

$= \frac{29}{5}$

$y = 2 \times (-2) - 3$

$= -4 - 3$

$= -7$.

possible vectors:

$\frac{22}{5}i + \frac{29}{5}j$ & $-2i - 7j$.