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MATRIC N0: 19/ENG05/016
DEPARTMENT: MECHATRONICS ENGINEERING.
COURSE: MAT 102

COVID-19 HOLIDAY ASSIGNMENT

QUESTION 1

Show that the points A(6, − 5), B(− 2, 1) and C(0, 3) form an isosceles triangle.
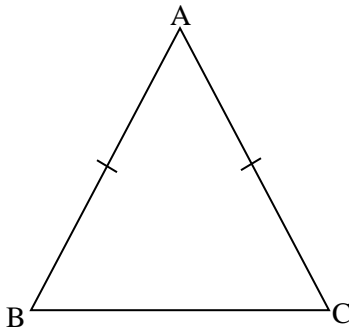
SOLUTION:

$$\overline{AB} = \sqrt{(-2-6)^2 + (1-(-5))^2}$$
$$= \sqrt{(-8)^2 + 6^2}$$
$$= \sqrt{64 + 36}$$
$$= \sqrt{100}$$
$$= 10$$

$$\overline{BC} = \sqrt{(0-(-2))^2 + (3-1)^2}$$
$$= \sqrt{2^2 + 2^2}$$
$$= \sqrt{4 + 4}$$
$$= \sqrt{8}$$
$$= 2\sqrt{2}$$

$$\overline{AC} = \sqrt{(0-6)^2 + (3-(-5))^2}$$
$$= \sqrt{(-6)^2 + 8^2}$$
$$= \sqrt{36 + 64}$$
$$= \sqrt{100}$$
$$= 10$$

$$\therefore \overline{AB} = \overline{AC}$$

Let the triangle be

Since two sides of the triagle $\overline{AB}$ and $\overline{AC}$ are equal, it forms an Isosceles triangle.
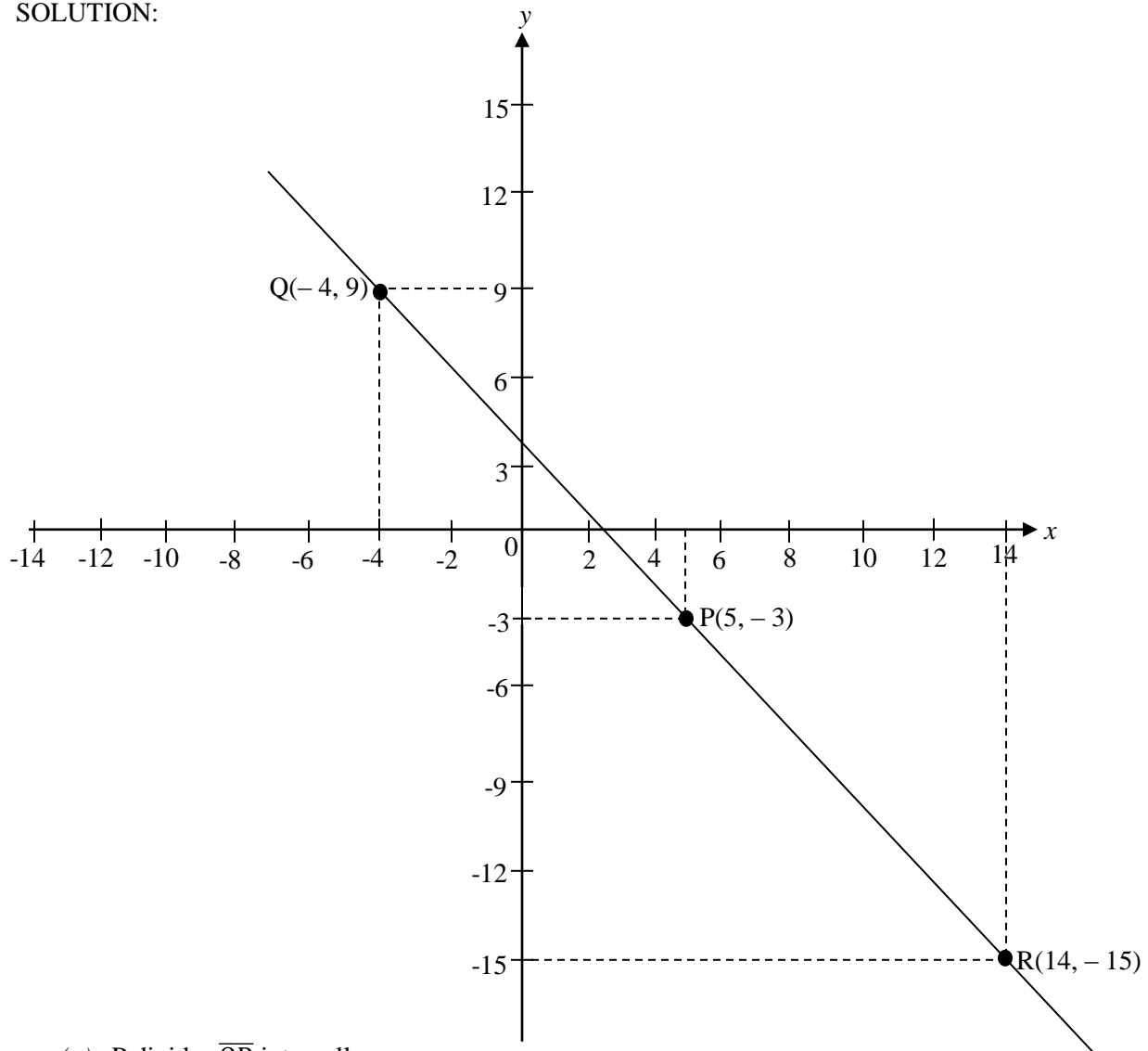
QUESTION 2

If P, Q and R are points $(5, -3)$, $(-4, 9)$ and $(14, -15)$ respectively. Find the ratio in which

    (a) P divides QR

    (b) R divides PQ

SOLUTION:

    (a) P divides $\overline{\text{QR}}$ internally

        From the graph; $(x_1, y_1) = (-4, 9)$

                        $(x_2, y_2) = (14, -15)$

                        $(x, y) = (5, -3)$

      Let $x_1 = -4$

          $x_2 = 14$

          $x = 5$

      But $x = \dfrac{kx_2 + \ell x_1}{k + \ell}$

      $5 = \dfrac{14k - 4\ell}{k + \ell}$

      $5(k + \ell) = 14k - 4\ell$

      $5k + 5\ell = 14k - 4\ell$

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$5k - 14k = -4\ell - 5\ell$

$-9k = -9\ell$

$k = \ell$

$\therefore k : \ell = 1 : 1$

$\therefore$ The ratio in which P divides $\overline{QR}$ is $1 : 1$.

(b) R divides $\overline{PQ}$ externally

From the graph; $(x_1, y_1) = (5, -3)$

$(x_2, y_2) = (-4, 9)$

$(x, y) = (14, -15)$

Let $y_1 = -3$

$y_2 = 9$

$y = -15$

But $y = \dfrac{\ell y_1 - k y_2}{\ell - k}$

$-15 = \dfrac{-3\ell - 9k}{\ell - k}$

$-15(\ell - k) = -3\ell - 9k$

$-15\ell + 15k = -3\ell - 9k$

$15k + 9k = 15\ell - 3\ell$

$24k = 12\ell$

$\dfrac{k}{\ell} = \dfrac{24}{12} = \dfrac{2}{1}$

$\therefore$ The ratio $k : \ell = 2 : 1$

$\therefore$ The ratio in which R divides $\overline{PQ}$ is $2 : 1$.