**15.** A triangle has vertices P$(-2, 2)$, Q$(q, 0)$ and R$(5, 3)$.

(i) The side PQ is twice as long as side QR. Find the possible values of $q$.

(ii) Show that triangle PQR is right-angled when $q = 4$.

$|PQ| = ?$

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$|PQ| = \sqrt{(q+2)^2+(0-2)^2}$

$= \sqrt{q^2+4q+4+4} = \sqrt{q^2+4q+8}$ ①

$|QR| = ?$

$(a+b)^2 = a^2+2ab+b^2$

$|QR| = \sqrt{(5-q)^2+(3-0)^2}$

$= \sqrt{25-10q+q^2+9} = \sqrt{q^2-10q+34}$ ②

$|PQ| = 2|QR|$ (① = 2 × ②)

square

$\Rightarrow \sqrt{q^2+4q+8} = 2\sqrt{q^2-10q+34}$

$q^2+4q+8 = 4(q^2-10q+34)$

$4q^2-40q+136 = q^2+4q+8$

$3q^2-44q+128 = 0$

$128 = (32)(4)$

$(3q-32)(q-4) = 0$

$\Rightarrow q = \frac{32}{3}$ or $q = 4$

**15.** A triangle has vertices P$(-2, 2)$, Q$(q, 0)$ and R$(5, 3)$.

(i) The side PQ is twice as long as side QR. Find the possible values of $q$.

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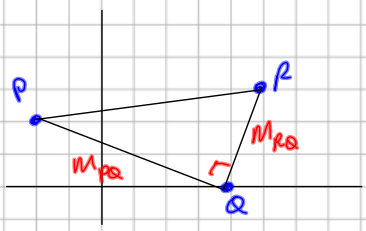
P$(-2, 2)$ Q$(4, 0)$ R$(5, 3)$

$m = \frac{y_2-y_1}{x_2-x_1}$




$m_{PQ} \times m_{RQ} = -1$

$m_{PQ} = \frac{0-2}{4+2} = \frac{-2}{6} = -\frac{1}{3}$

$m_{RQ} = \frac{3-0}{5-4} = \frac{3}{1} = 3$

$m_{PQ} \times m_{RQ} = \left(-\frac{1}{3}\right)(3) = -1$