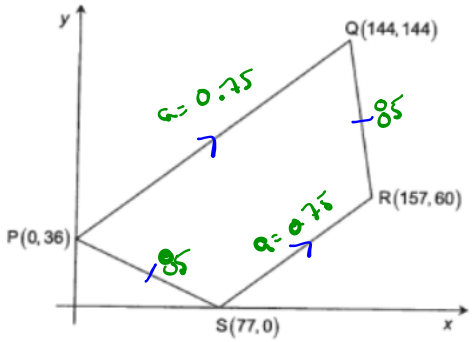
1. **Show that quadrilateral PQRS is an isosceles trapezoid.**




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

$d(Q,R)$

P (0, 36)
Q (144, 144)
R (157, 60)
S (77, 0)

$\overline{PS} = \overline{QR}$

$\overline{PQ} \parallel \overline{SR}$

$\therefore$ PQRS is an isosceles trapezoid

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

(1) $\overline{PQ}$: $m = \frac{144-36}{144-0} = \frac{108}{144} = 0.75$ $\therefore \overline{PQ} \parallel \overline{SR}$

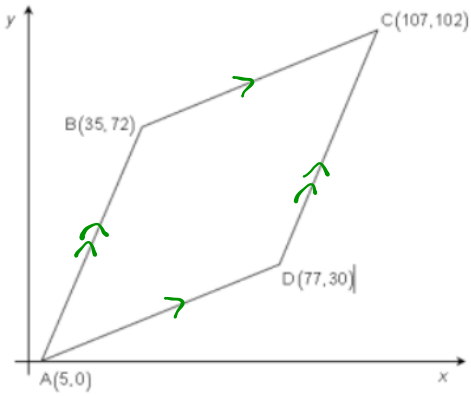
$\overline{SR}$: $m = \frac{60-0}{157-77} = \frac{60}{80} = 0.75$

(2) $d(P,S) = \sqrt{(77-0)^2 + (0-36)^2} = 85$ $\therefore \overline{PS} = \overline{QR}$

$d(Q,R) = \sqrt{(144-60)^2 + (144-157)^2} = 85$

$\therefore$ PQRS is an isosceles trapezoid

2. **Prove that quadrilateral ABCD is a rhombus.**




$\overline{AB} \parallel \overline{DC}$ $\overline{BC} \parallel \overline{AD}$

$\overline{AB} = \overline{BC} = \overline{DC} = \overline{AD}$

$\overline{AB}$ : $a = 2.4$

$\overline{CD}$ : $a = 2.4$

$\therefore \overline{AB} \parallel \overline{CD}$

(1) $\overline{BC}$ • $a = \frac{5}{12}$ $\overline{AB}$ • $a = 2.4$

$\overline{AD}$ : $a = \frac{5}{12}$ $\overline{CD}$ : $a = 2.4$

$\therefore \overline{AB} \parallel \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

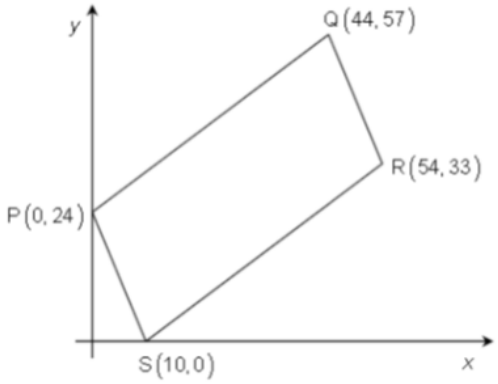
(2) $d(A,B) = 78$ $d(C,D) = 78$

$d(B,C) = 78$ $d(D,A) = 78$

$\therefore \overline{AB} = \overline{BC} = \overline{CD} = \overline{DA}$

$\therefore$ ABCD is a rhombus

3. **Raymond claims quadrilateral PQRS is a parallelogram. Is Raymond right or wrong? Explain.**




$\overline{PQ} \parallel \overline{SR}$

$\overline{PS} \parallel \overline{QR}$

$\overline{PQ} = \overline{SR}$

$\overline{PS} = \overline{QR}$

① $\overline{PQ}$ : $a = 0.75$

$\overline{SR}$ • $a = 0.75$

$\overline{PS}$ • $a = -2.4$

$\overline{QR}$ • $a = -2.4$

$\therefore \overline{PQ} \parallel \overline{SR}$ & $\overline{PS} \parallel \overline{QR}$

② $d(P, Q) = 55$

$d(S, R) = 55$

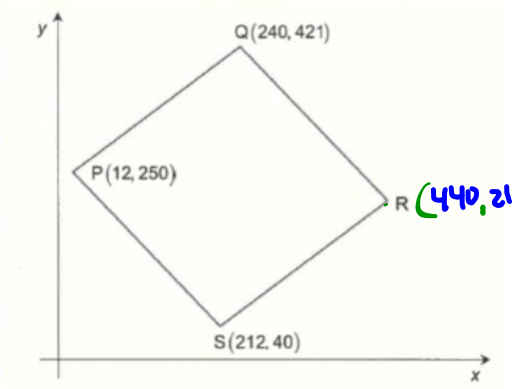
$d(P, S) = 26$

$d(Q, R) = 26$

$\therefore \overline{PQ} = \overline{SR}$ & $\overline{PS} = \overline{QR}$

$\therefore$ Raymond is right

4. Consider quadrilateral PQRS represented in the Cartesian plane below.




(440, 211)

$\overline{PS} \parallel \overline{QR}$
$\overline{RS} \parallel \overline{PQ}$
$\overline{PQ} \neq \overline{QR}$
$\overline{PQ} = \overline{SR}$
$\overline{PS} = \overline{QR}$

- The equation associated with line segment QR is $y = -\frac{21}{20}x + 673$
- The equation associated with line segment SR is $y = \frac{3}{4}x - 119$

**Show that quadrilateral PQRS is a parallelogram, but that it is not a rhombus.**

① R: $-\frac{21}{20}x + 673 = \frac{3}{4}x - 119$ (+ $\frac{21}{20}x$, +119)

$\frac{792}{1.8} = \frac{1.8x}{1.8}$

$440 = x$ → find $y$

$y = \frac{3}{4}(440) - 119 = 211$

$\frac{21}{20} + \frac{3}{4} \times 5$

$\frac{21}{20} + \frac{15}{20} = \frac{36}{20}$

② $\overline{PQ}$: $a = 0.75$ $\overline{QR}$: $a = -1.05$ ∴ $\overline{PQ} \parallel \overline{SR}$

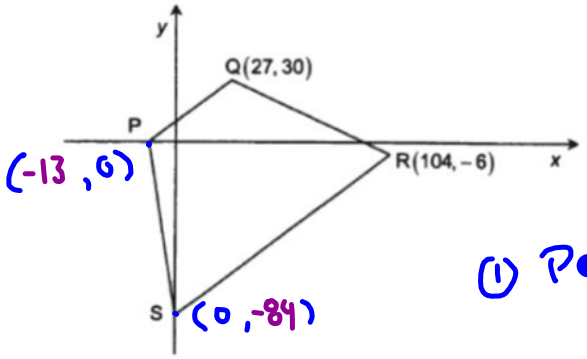
$\overline{SR}$: $a = 0.75$ $\overline{PS}$: $a = -1.05$ $\overline{QR} \parallel \overline{PS}$

③ $d(P,Q) = 285$ $d(Q,R) = 290$ ∴ $\overline{PQ} = \overline{SR}$

$d(S,R) = 285$ $d(P,S) = 290$ $\overline{QR} = \overline{PS}$

but $\overline{PQ} \neq \overline{QR}$

5. Consider quadrilateral PQRS represented in the Cartesian plane below.




(-13, 0)

(0, -84)

$\overline{PQ} \parallel \overline{SR}$

$\overline{PS} = \overline{QR}$

(1) P: $-\frac{1}{13}x - \frac{1}{84}(0) = 1$ S: $-\frac{1}{13}(0) - \frac{1}{84}y = 1$

$-13\left(-\frac{x}{13}\right) = (1)(-13)$ $-84\left(-\frac{y}{84}\right) = (1)(-84)$

$x = -13$ $y = -84$

- Point P is on the x-axis
- Point S is on the y-axis
- The equation associated with line segment PS is $-\frac{1}{13}x - \frac{1}{84}y = 1$

**Show that quadrilateral PQRS is an isosceles trapezoid.**

(2) $\overline{PQ}$: $a = 0.75$

$\overline{SR}$: $a = 0.75$

$\therefore \overline{PQ} \parallel \overline{SR}$

(3) $d(Q,R) = 85$

$d(P,S) = 85$

$\therefore \overline{PS} = \overline{QR}$

$\therefore$ PQRS is an isosceles trapezoid