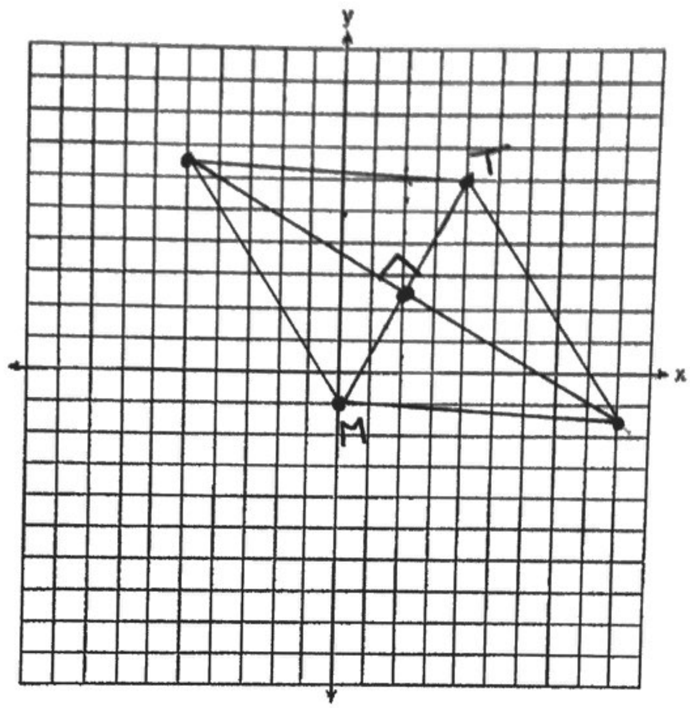
# Regents Questions

1. In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.




midpt $\overline{MT} = \left(\frac{0+4}{2}, \frac{-1+6}{2}\right) = \left(\frac{4}{2}, \frac{5}{2}\right) = (2, 2.5)$

Diagonals of Rhombus are $\perp$ $\therefore$

$m\overline{MT} = \frac{-1-6}{0-4} = \frac{-7}{-4} = \frac{7}{4}$

$m\overline{AH} = -\frac{4}{7}$ & goes through point $(2, 2.5)$

$$\boxed{y - 2.5 = -\frac{4}{7}(x-2)}$$

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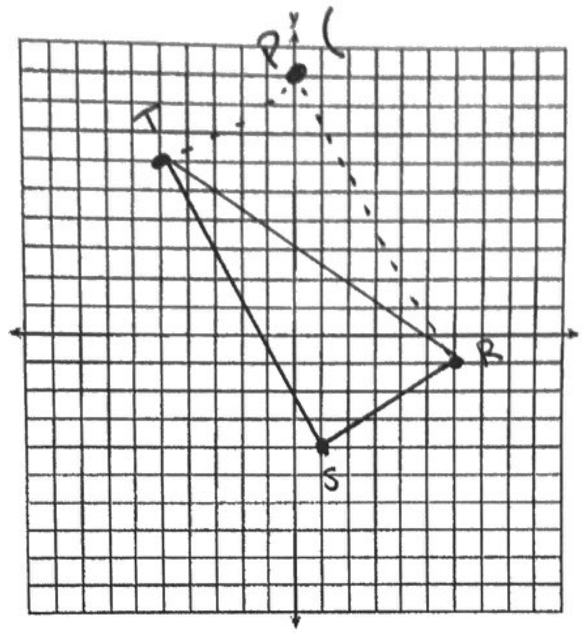
2.In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point $P$ such that quadrilateral $RSTP$ is a rectangle. Prove that your quadrilateral $RSTP$ is a rectangle. [The use of the set of axes below is optional.] — use slope to count!




① $m\overline{TS} = \frac{-4-6}{1--5} = \frac{-10}{6} = -\frac{5}{3}$

$m\overline{RS} = \frac{-1--4}{6-1} = \frac{3}{5}$ $\perp$

Since $m\overline{TS}$ and $m\overline{RS}$ are neg. reciprocals, then $\overline{TS} \perp \overline{RS}$. $\perp$ lines form right ∡s and a triangle with a right ∡ is a right $\Delta$.

P(0,9)

② slope $\overline{TP} = \frac{6-9}{-5-0} = \frac{-3}{-5} = \frac{3}{5}$

$\overline{PR} = \frac{-1-9}{6-0} = \frac{-10}{6} = -\frac{5}{3}$

Since the slopes of $\overline{RS} = \overline{TP}$ and $\overline{TS} = \overline{PR}$, then $\overline{RS} \parallel \overline{TP}$ and $\overline{TS} \parallel \overline{PR}$. Since the slopes of $\overline{TP}$ & $\overline{PR}$ are neg. reciprocals, then $\overline{TP} \perp \overline{PR}$, forming a right ∡.

Quad RSTP is a rectangle because a quad with 2 pairs of $\parallel$ sides & a right ∡ is a rectangle.

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