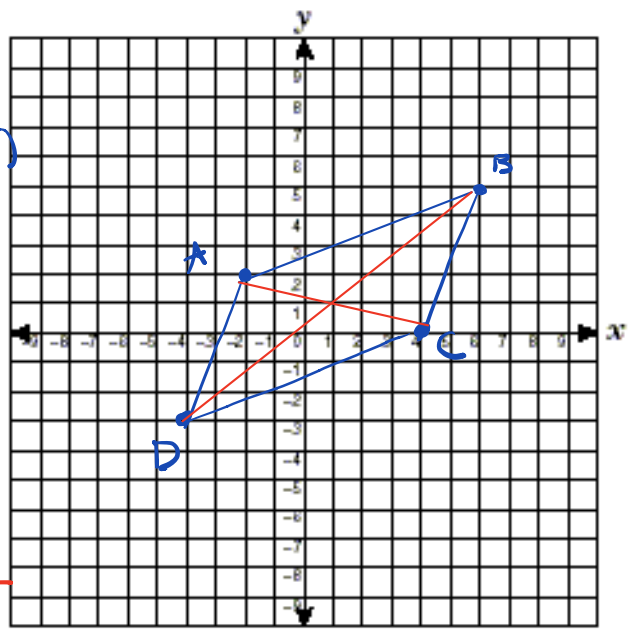
Level 8 Study Guide

Time to put those thinking caps on!

Given: $A(-2,2)$, $B(6,5)$, $C(4,0)$, $D(-4,-3)$
Prove: $ABCD$ is a parallelogram but not a rectangle. [The use of the grid is optional.]



① Prove opp. sides ∥ (slope)

$m_{AD} = \frac{5}{2}$ $\quad m_{AB} = \frac{3}{8}$

$m_{BC} = \frac{5}{2}$ ∥ $\quad m_{DC} = \frac{3}{8}$ ∥

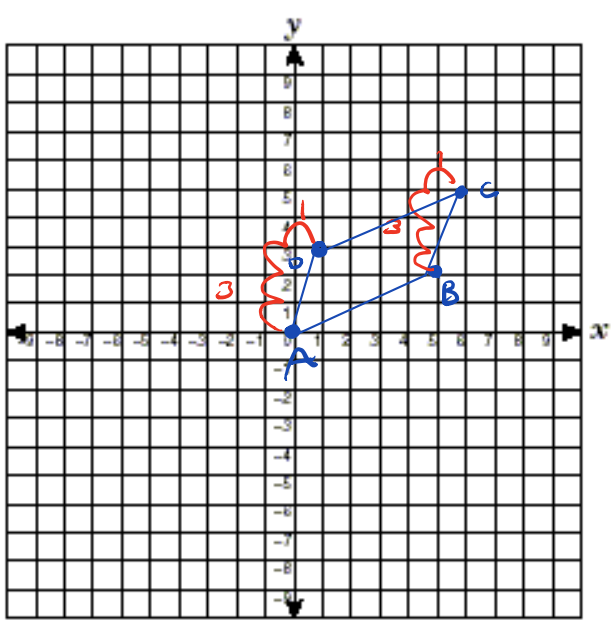
② Prove Diagonals are NOT ≅ (distance)

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

$\overline{AC} = \sqrt{40}$ $\quad \overline{DB} = \sqrt{164}$

③ ABCD is a ▱ b/c opp. sides ∥ and not a rectangle b/c diagonals are not ≅

Ashanti is surveying for a new parking lot shaped like a parallelogram. She knows that three of the vertices of parallelogram $ABCD$ are $A(0,0)$, $B(5,2)$, and $C(6,5)$. Find the coordinates of point D and sketch parallelogram $ABCD$ on the accompanying set of axes. Justify mathematically that the figure you have drawn is a parallelogram.



$m_{AB} = \frac{2}{5}$ $\quad m_{AD} = 3$

$m_{DC} = \frac{2}{5}$ $\quad m_{BC} = 3$

ABCD is a ▱ b/c opp sides ∥.

Quadrilateral *MATH* has coordinates $M(1,1)$, $A(-2,5)$, $T(3,5)$, and $H(6,1)$. Prove that quadrilateral *MATH* is a rhombus and prove that it is *not* a square. [The use of the grid is optional.]

① Prove Opp. Sides are ∥ (slope)

$m_{AB} = -4/3$ $m_{AT} = 0$ ∥

$m_{TH} = -4/3$ $m_{MH} = 0$ ∥

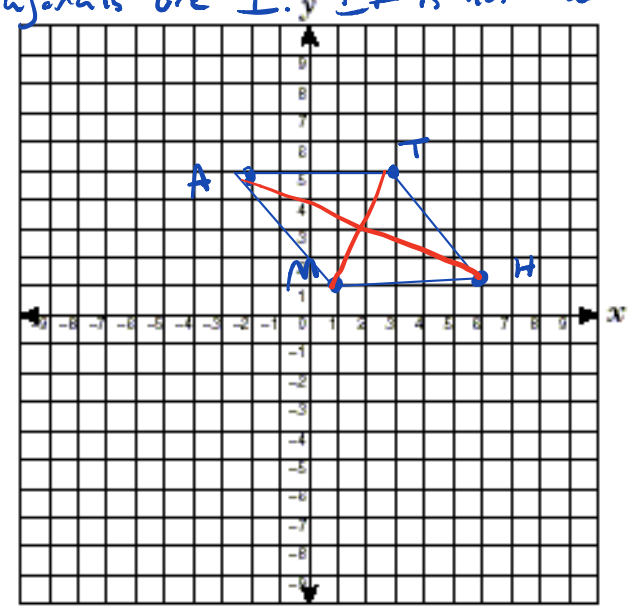
② Prove Diagonals ⊥ (slope)

$m_{AH} = -1/2$ $m_{MT} = 2$

③ Prove Diagonals are ≅ (distance)

$AH = \sqrt{80}$ $MT = \sqrt{20}$

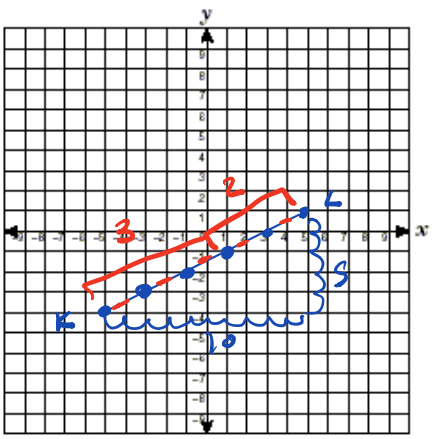
④ ABCD is a rhombus b/c opp. sides ∥ and diagonals are ⊥. It is not a square b/c diagonals are NOT ≅



What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?

(1) $(-3,-3)$
(2) $(-1,-2)$
(3) $(0,-\frac{3}{2})$
(4) $(1,-1)$

$3+2=5$



In the coordinate plane, the vertices of △ABC are A(x,5), B(-2,3) and C(-4,7). Find the value of x that makes △ABC a right triangle. Justify your answer.

$y=5$

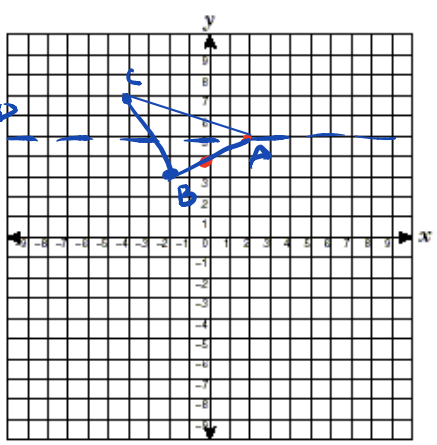
① Plot points / Draw Line

② Find slope of given line

$m_{CB} = -2$

③ $m_{AB} = 1/2$

④ Draw new point!



Which equation represents the perpendicular bisector of $\overline{AB}$ whose endpoints are $A(8,2)$ and $B(0,6)$?

① Find Midpoint → (4, 4)

② Find Slope of Given Line

$m_{AB} = -1/2$

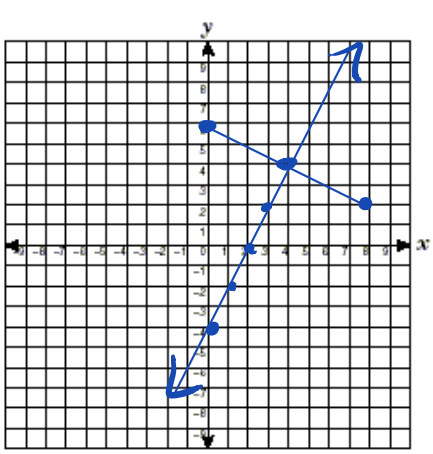
③ $y = mx + b$

$m = 2$ $\quad 4 = (2)(4) + b$

$x = 4$ $\quad 4 = 8 + b$

$y = 4$ $\quad -8 \quad -8$

$-4 = b$



$y = 2x - 4$

In the coordinate plane, the points (2,2) and (2,12) are the endpoints of a diameter of a circle. What is the length of the radius of the circle?

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

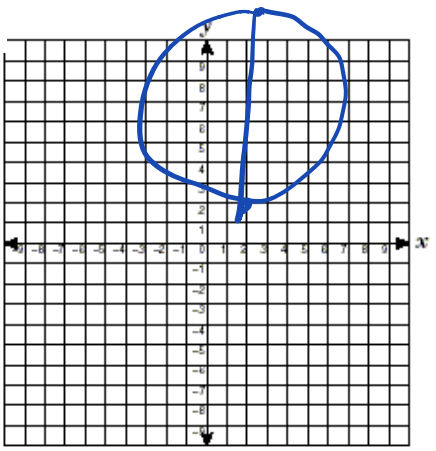
$d = \sqrt{(2-2)^2 + (12-2)^2}$

$d = \sqrt{0 + 10^2}$

$d = \sqrt{100}$

$d = 10$

radius = 5



The vertices of square *RSTV* have coordinates *R*(−1,5), *S*(−3,1), *T*(−7,3), and *V*(−5,7). What is the perimeter of *RSTV*?

1) $\sqrt{20}$
2) $\sqrt{40}$
3) $4\sqrt{20}$
4) $4\sqrt{40}$

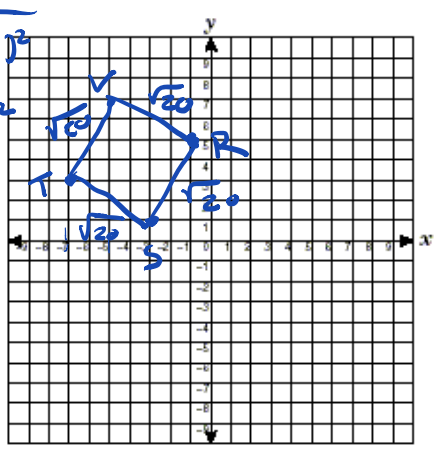
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(-5-(-7))^2 + (7-3)^2}$

$d = \sqrt{2^2 + 4^2}$

$d = \sqrt{20}$

Perimeter $= 4 \times \sqrt{20}$



Given: *J*(−4,1), *E*(−2,−3), *N*(2,−1)
Prove: △*JEN* is an isosceles right triangle.
[The use of the grid is optional.]

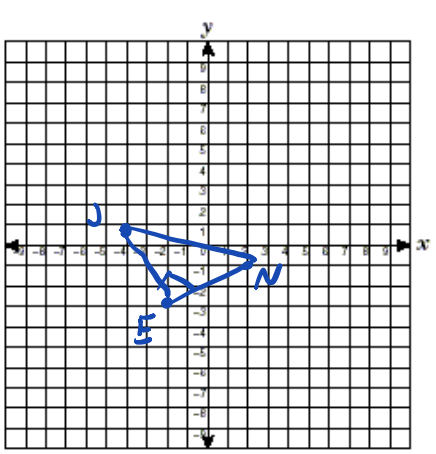
(1) Prove 2 sides ⊥

$m_{JE} = -2$ $m_{EN} = \frac{1}{2}$

$-2 \cdot \frac{1}{2} = -1$

(2) Find length of 2 ≅ sides

$JE = \sqrt{20}$ $EN = \sqrt{20}$



JEN is right b/c JE ⊥ EN and an isos. b/c JE ≅ EN