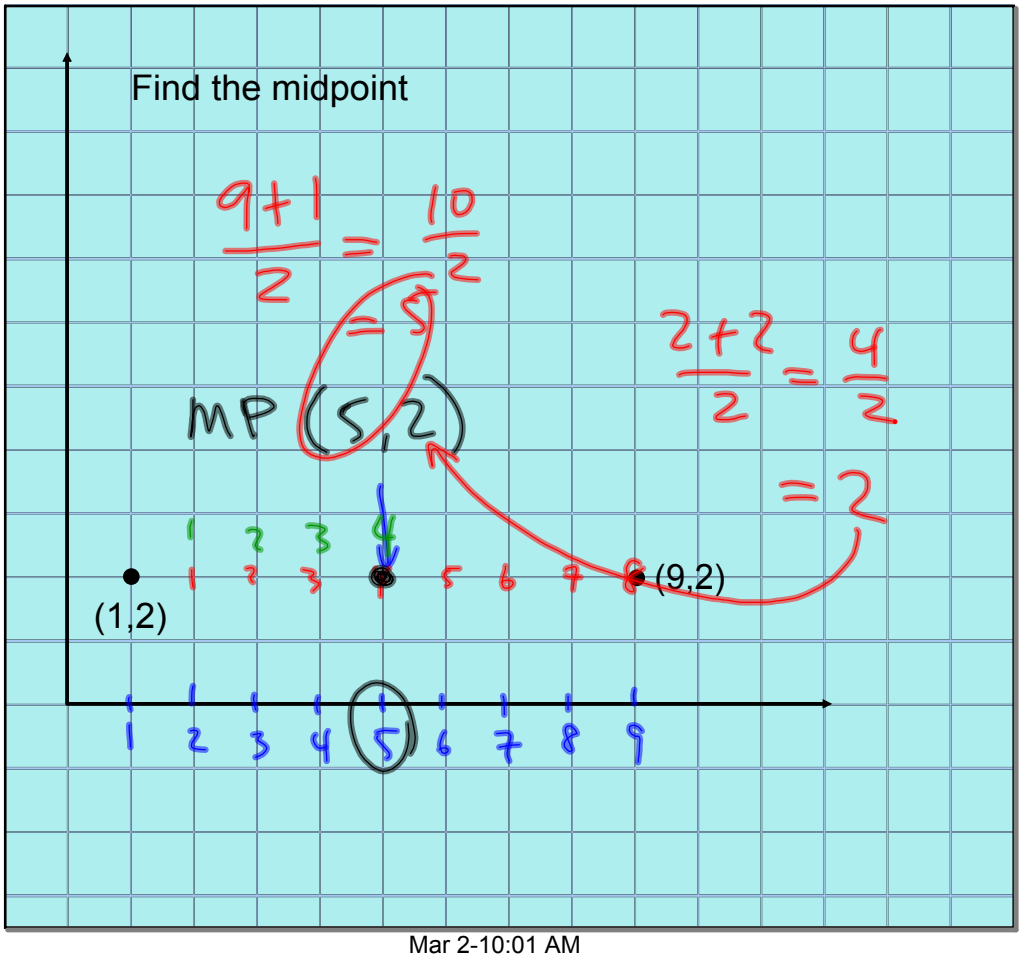

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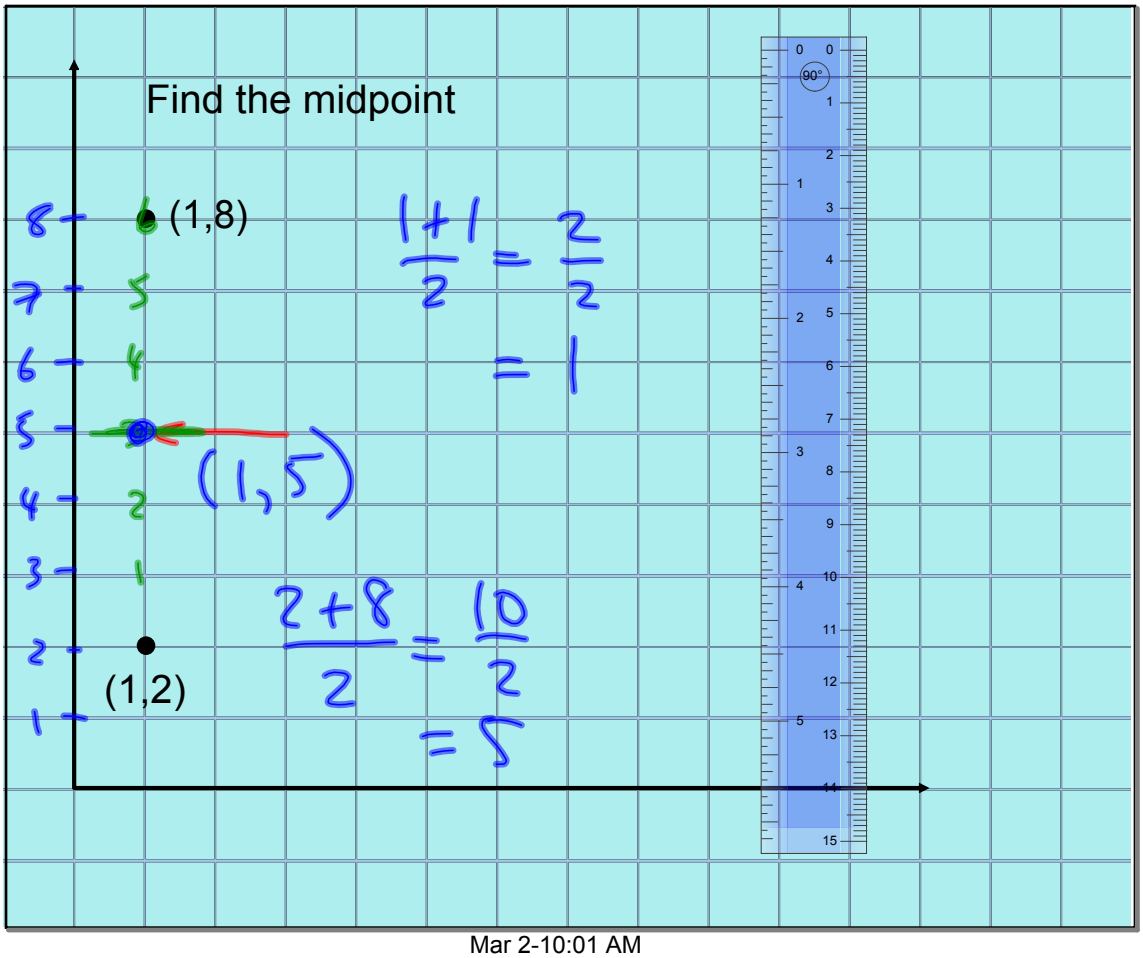

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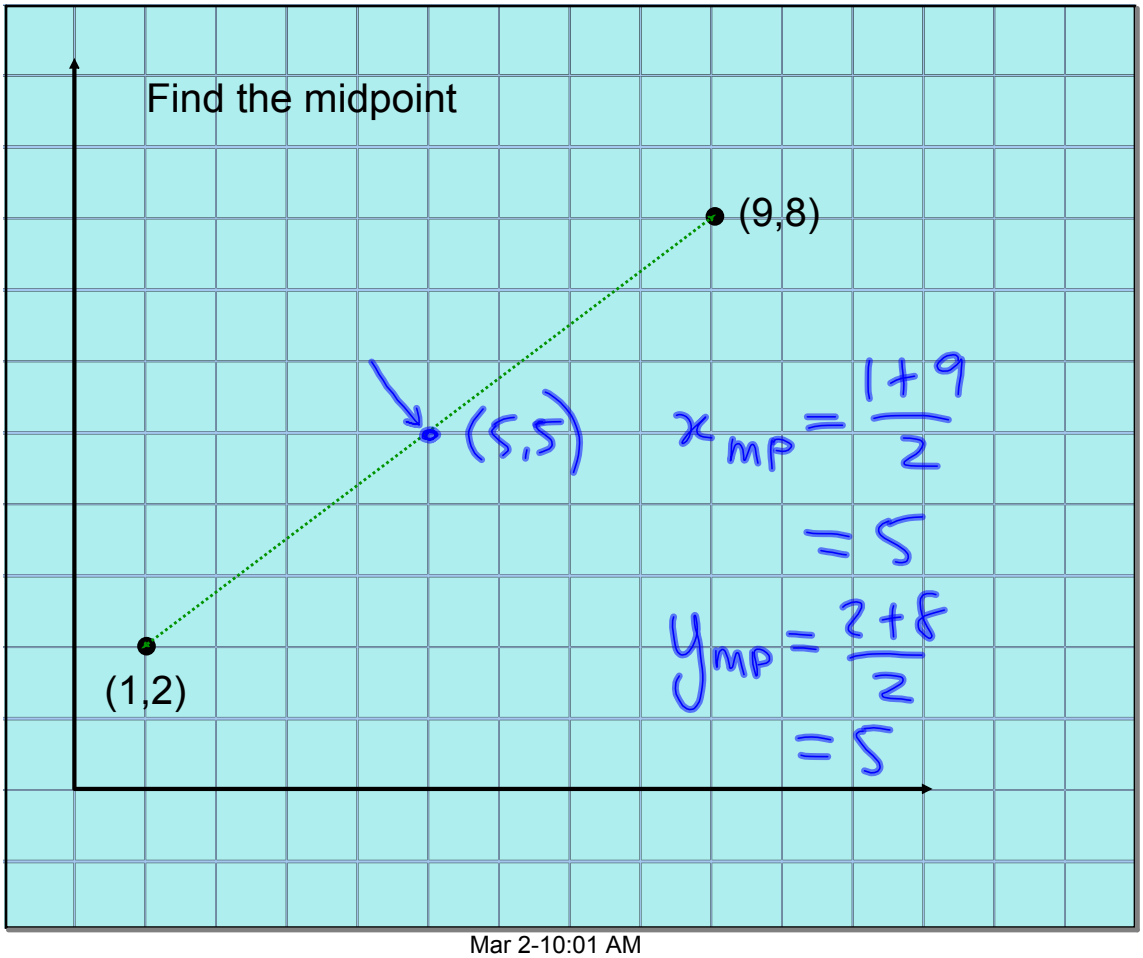

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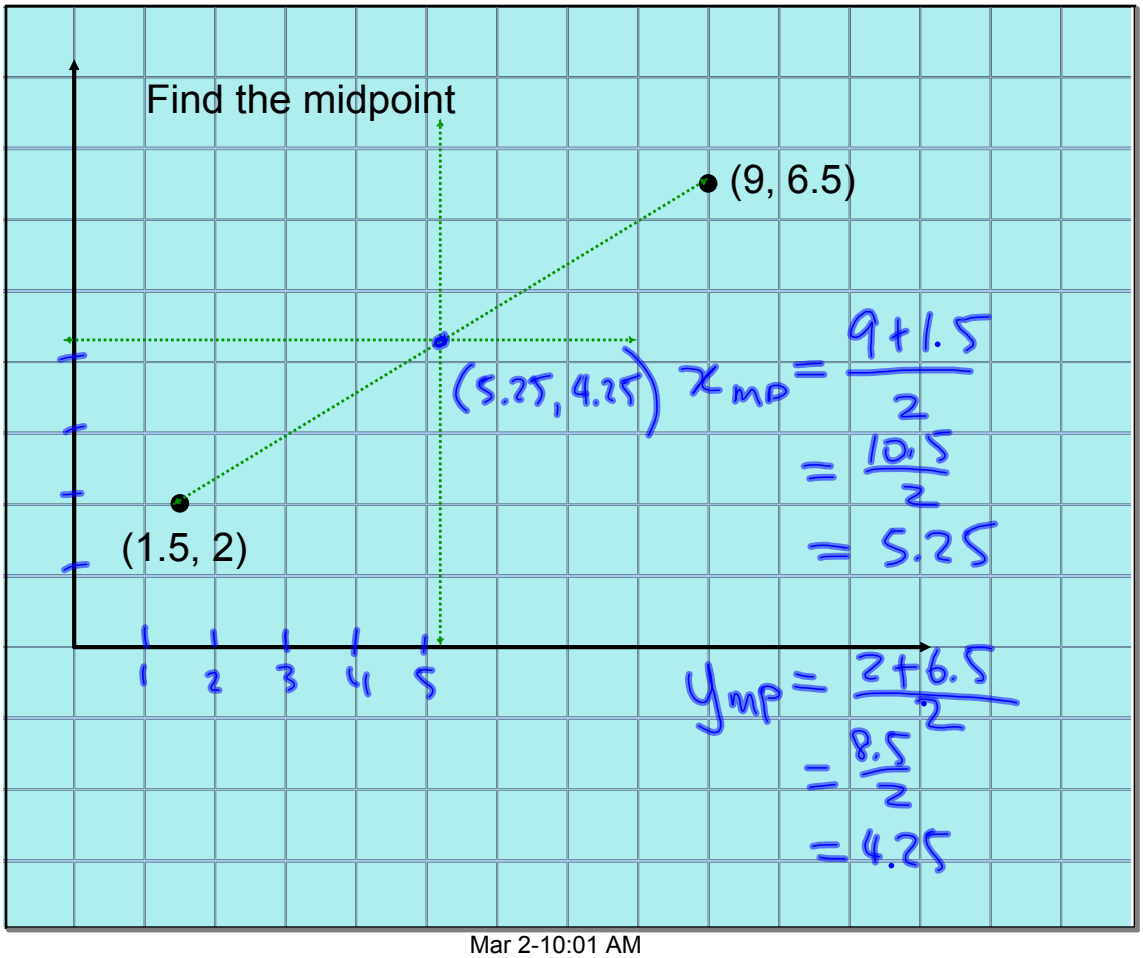

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The Midpoint of a Line Segment

Sept 30/2011

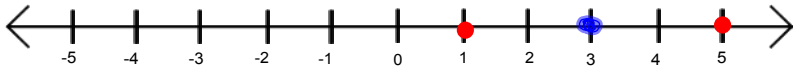
The midpoint of a line segment is the point halfway between the two endpoints.

Algebraically, we can consider the x-coordinates and y-coordinates separately, finding the halfway value for each.

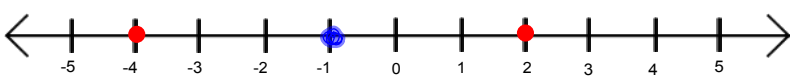
Ex.1. Determine the midpoint.

$\frac{1+5}{2} = 3$

a)



b)



$\frac{-4+2}{2} = \frac{-2}{2}$

$= -1$

Feb 28-11:11 AM

Algebraically, the halfway point between two values is their sum divided by two.

Given two points, (x_1, y_1) and (x_2, y_2), we can write

$$x_{\text{midpoint}} = \frac{x_1 + x_2}{2} \qquad y_{\text{midpoint}} = \frac{y_1 + y_2}{2}$$

In general, the midpoint formula is written

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Note that the midpoint is a point, expressed as (x, y).

Mar 2-10:12 AM

Ex.2. Determine the coordinates of the Midpoint, M, of the line segment with endpoints A(-2, -3) and B(4, 7).

option 1:

$x_{MP} = \frac{x_1 + x_2}{2} = \frac{-2+4}{2} = \frac{2}{2}$

$x_{MP} = 1$

$y_{MP} = \frac{y_1 + y_2}{2} = \frac{-3+7}{2} = \frac{4}{2}$

$y_{MP} = 2$

∴ MP is $(1,2)$, or $M(1,2)$

option 2:

$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= M\left(\frac{-2+4}{2}, \frac{-3+7}{2}\right)$

$= M(1,2)$

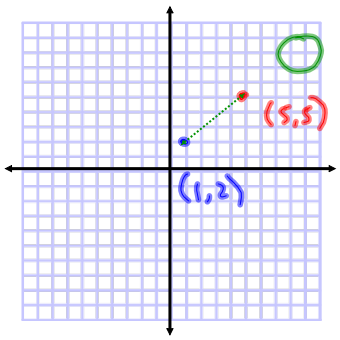
Mar 2-10:19 AM

Ex.3. One endpoint of a line segment is at (1,2) and has a midpoint of (5,5). What is the other endpoint?

$x_{MP} = 5$ $y_{MP} = 5$

$x_1 = 1$ $y_1 = 2$

$x_2 = ?$ $y_2 = ?$



$x_{MP} = \frac{x_1 + x_2}{2}$

$2 \times 5 = \frac{(1 + x_2)}{2} \times 2$

$10 = 1 + x_2$

$9 = x_2$

$y_{MP} = \frac{y_1 + y_2}{2}$

$5 = \frac{2 + y_2}{2}$

$10 = 2 + y_2$

$8 = y_2$

∴ the other endpoint is $(9,8)$

Mar 2-8:32 PM

Assigned Work:

p. 78-80 # 2ac, 3, 4e, 5, 6, 8, 9, 11

Feb 28-12:00 PM

p. 79 #9.

PR

$x_M = \frac{x_1 + x_2}{2}$

$= \frac{x_P + x_R}{2}$

$= \frac{1+8}{2}$

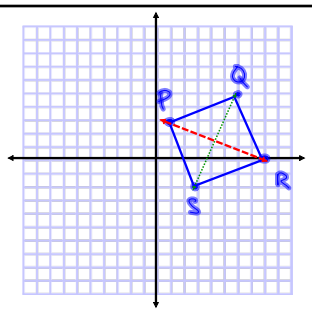
$= \frac{9}{2}$

$y_M = \frac{y_P + y_R}{2}$

$= \frac{3+0}{2}$

$= \frac{3}{2}$

$M_{PR} = \left(\frac{9}{2}, \frac{3}{2}\right)$



QS

$x_M = \frac{x_Q + x_S}{2}$

$= \frac{6+3}{2}$

$= \frac{9}{2}$

$y_M = \frac{y_Q + y_S}{2}$

$= \frac{5+(-2)}{2}$

$M_{QS} = \left(\frac{9}{2}, \frac{3}{2}\right) = \frac{3}{2}$

Oct 3-10:27 AM

4(e). $U\left(\frac{1}{2}, -\frac{3}{2}\right)$ $V\left(-\frac{5}{2}, -\frac{1}{2}\right)$

$x_M = \frac{x_U + x_V}{2}$

$= \frac{\left(\frac{1}{2} + \left(-\frac{5}{2}\right)\right)}{2}$

$= \frac{\left(\frac{-4}{2}\right)}{2}$

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

$= -1$

$y_M = \frac{y_U + y_V}{2}$

$= \frac{\left(-\frac{3}{2} + \left(-\frac{1}{2}\right)\right)}{2}$

$= \frac{\frac{-4}{2}}{2}$

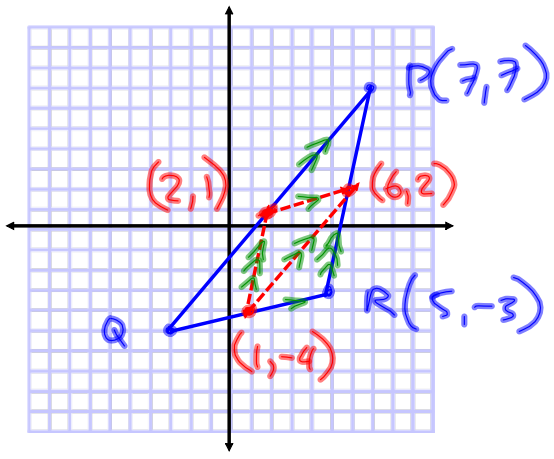
$= \frac{-2}{2}$

$= -1$

$M_{UV} = (-1, -1)$

Oct 3-10:37 AM

11.



Oct 3-10:42 AM