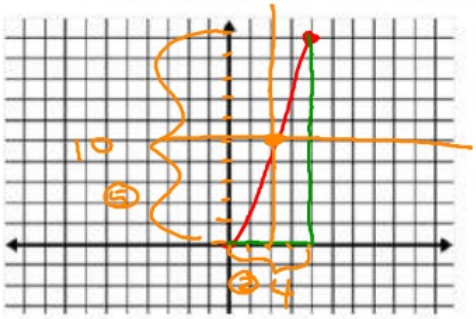
Name:_____ Period:_____

NS & L Day 4 IN CLASS Secondary 2 Honors

**Harry Potter and the Need for Speed!**

Harry Potter and Draco Malfoy are both in the center of downtown London. Draco and Harry are racing to Gringott's. Pretend, like Utah, the streets are on a grid system. They start at the point (0,0). Malfoy is driving his Corvette and Harry breaks the wizarding law and borrows the Weasley's flying car. Since Malfoy is in the car on the ground, he must follow the streets to get to Gringott's (meaning he can only go vertical/horizontal). Harry can fly along a straight line to get there. There is a magical gas station, that always seems to be where they need it to be…how magical!

1. Harry and Draco race from (0,0) to (4,10). Harry had to stop exactly halfway on his path to get gas at the magical gas station. Ron will be waiting for him there.

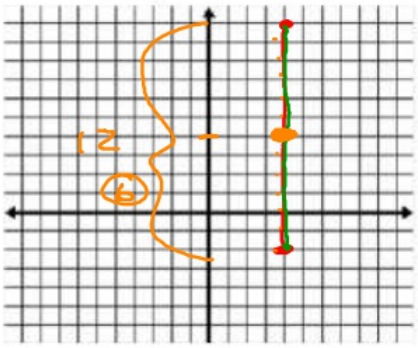



a) On the graph to the left draw Harry's path and Draco's path.

b) Now mark where Ron is, what are Ron's coordinates?

c) Describe your process in finding Ron's coordinates.

2. Now they are racing from (4,10) to (4,-2)? Ron is still waiting for him with more gas (with a gas can this time …. )

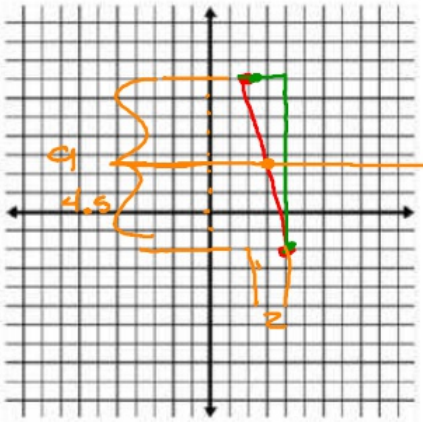



a) On the graph to the left draw Harry's path and Draco's path.

b) Now mark where Ron is, what are Ron's coordinates?

c) Describe your process in finding Ron's coordinates.

3. Now they are racing from (4,-2) to (2,7)? Ron is still halfway.




a) On the graph to the left draw Harry's path and Draco's path.

b) Now mark where Ron is, what are Ron's coordinates?

c) Describe your process in finding Ron's coordinates.

4.

4. Now they are racing from (2,7) to (X,Y).
   a) Write an expression for Draco's TOTAL horizontal distance traveled.

   $x-2$

   b) Write an expression for half of Draco's horizontal distance.

   $\frac{1}{2}(x-2)$

   c) Write an expression for Draco's TOTAL vertical distance traveled.

   $y-7$

   d) Write an expression for half of Draco's vertical distance.

   $\frac{1}{2}(y-7)$

   e) How can we account for the fact that they started at (2,7) and not (0,0)?

   f) Use your above answers to find an expression for the midpoint.

5. Now they are racing from $(X_{start}, Y_{start})$ to $(X_{finish}, Y_{finish})$ (or $x_s$, $y_x$ and $x_f$, $y_f$)
   a. Write an expression for Draco's TOTAL horizontal distance traveled.

   $x_f - x_s$

   b. Write an expression for half of Draco's horizontal distance.

   $\frac{1}{2}(x_f - x_s)$

   c. Write an expression for Draco's TOTAL vertical distance traveled.

   $(y_f - y_s)$

   d. Write an expression for half of Draco's vertical distance.

   $\frac{1}{2}(y_f - y_s)$

   e. How can we account for the fact that they started at $(X_{start}, Y_{start})$ and not (0,0)?

   f. Use your above answers to find an expression for halfway.

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

**MIDOINT FORMULA:**

$\left(\frac{x_s+x_f}{2}, \frac{y_s+y_f}{2}\right)$ $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

Find the midpoint between each of the following pairs of coordinates.

7. (3,-10) & (0,0)

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

$\left(\frac{3+0}{2}, \frac{-10+0}{2}\right)$

$\left(\frac{3}{2}, \frac{-10}{2}\right)$

m. $\left(\frac{3}{2}, -5\right)$

8. (-1,9) & (-3,-5)

$\left(\frac{-1+-3}{2}, \frac{9+-5}{2}\right)$

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

$(-2, 2)$

9. (5,2) & (-3,4)

$\left(\frac{5+-3}{2}, \frac{2+4}{2}\right)$

$\left(\frac{2}{2}, \frac{6}{2}\right)$

$(1, 3)$

For each of the following, find the other endpoint of a line segment with the given endpoint and given midpoint. Graphically AND Algebraically, show your work!!!!

12. Endpoint: (2,0)
Midpoint: (-1,5)

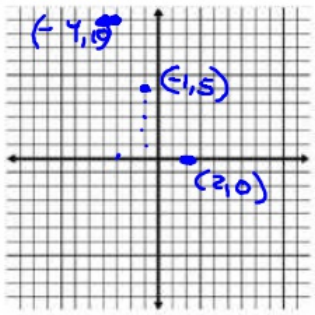
$\left(x_m = \frac{x_1+x_2}{2}, y_m = \frac{y_1+y_2}{2}\right)$

$\left(-1 = \frac{2+x_2}{2}, 5 = \frac{0+y_2}{2}\right)$

$(-2 = 2+x_2, 10 = 0+y_2)$

$(-4 = x_2, 10 = y_2)$

$(x_2, y_2) = (-4, 10)$




13. Endpoint: (-3,5)
Midpoint: (1,-7)

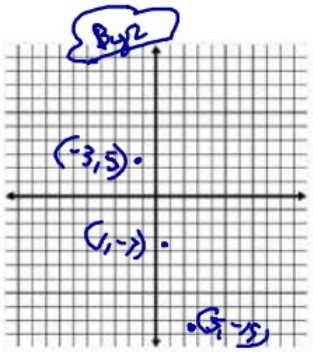
$\left(1 = \frac{-3+x_2}{2}, -7 = \frac{5+y_2}{2}\right)$

$(2 = -3+x_2, -14 = 5+y_2)$

$+3 \quad +3$

$(5 = x_2, -19 = y_2)$

$(x_2, y_2) : (5, -19)$




14. Endpoint: (-1,-2)
Midpoint: (0,3)

$\left(0 = \frac{-1+x_2}{2}, 3 = \frac{-2+y_2}{2}\right)$

$(0 = -1+x_2, 6 = -2+y_2)$

$(1 = x_2, 8 = y_2)$

$(x_2, y_2) = (1, 8)$