

6.7 - Linear Systems

Linear System: A set of two or more linear equations that are considered simultaneously

Point of Intersection: the point where two or more lines intersect

DO IT NOW!

Mike is considering joining a ski club for the winter season. He is considering the following two options:

Standard Rate: \$50 per day and no registration fee

Frequent Skier Pass: \$40 per day and \$100 registration fee

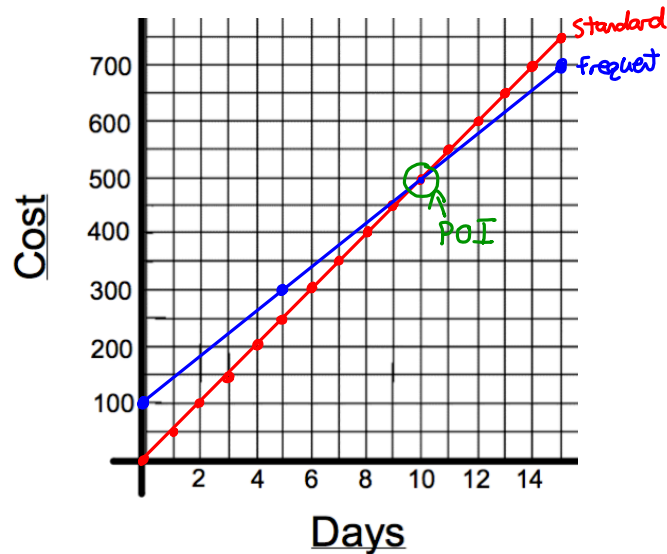
a) Write an equation that relates the total cost, C , in dollars, and the number of days, n , that Mike goes skiing if he chooses the **Standard Rate**:

$$C = 50n$$

b) Write an equation if he chooses the **Frequent Skier Pass** option:

$$C = 40n + 100$$

c) Graph both of the lines on the same graph



d) What is the point of intersection?

(10, 500)
↑ ↑
of days cost

e) What is the cost of both plans at the point of intersection? What does this mean?

\$500 ; if you ski 10 times, it will cost the same for each plan.

f) Look to the right of the point of intersection, which plan is cheaper?

Frequent skier.

g) Look to the left of the point of intersection, which plan is cheaper?

Standard.

h) If Mike is going to go skiing 11 times this winter, which plan would you recommend to him?

Frequent skier.

Example 1: Graph $y = \frac{1}{2}x - 3$ and $x + y = -6$ on the same grid and identify the coordinates of the point of intersection.

Line 1: $y = \frac{1}{2}x - 3$

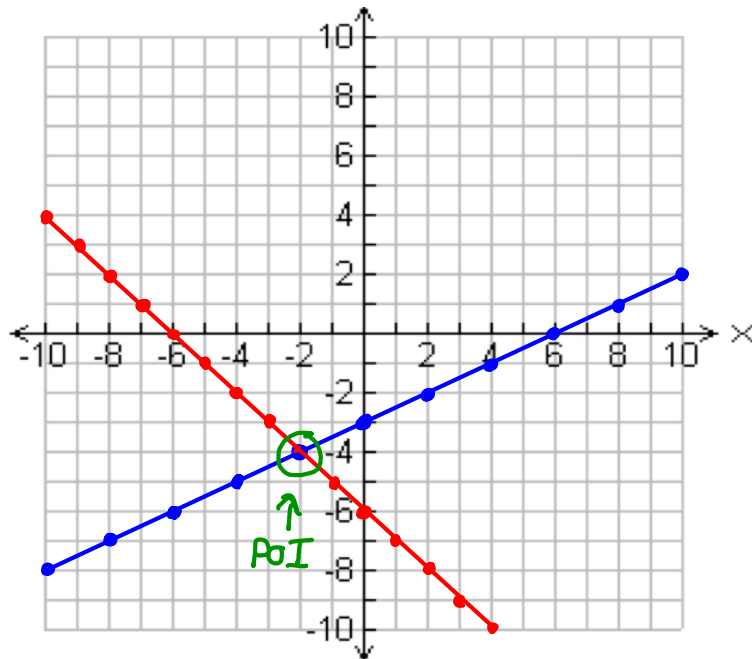
Line 2: $x + y = -6$
 $y = -x - 6$

Slope: $m = \frac{1}{2}$

Slope: $m = -1$

y-intercept: $b = -3$

y-intercept: $b = -6$



Point of Intersection: $(-2, -4)$

Check your answer: To verify the solution, $(-2, -4)$, substitute the coordinates into both equations and check that they hold true. Use the left side/right side method.

Check: $y = \frac{1}{2}x - 3$

L.S.

$$= y$$

$$= -4$$

R.S.

$$= \frac{1}{2}x - 3$$

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

$$= -1 - 3$$

$$= -4$$

$$LS = RS$$

Check: $x + y = -6$

L.S.

$$= x + y$$

$$= -2 + (-4)$$

$$= -2 - 4$$

$$= -6$$

R.S.

$$= -6$$

$$LS = RS$$

Example 2: Graph $y = 2x - 2$ and $y = x + 1$ on the same grid and identify the coordinates of the point of intersection.

Line 1: $y = 2x - 2$

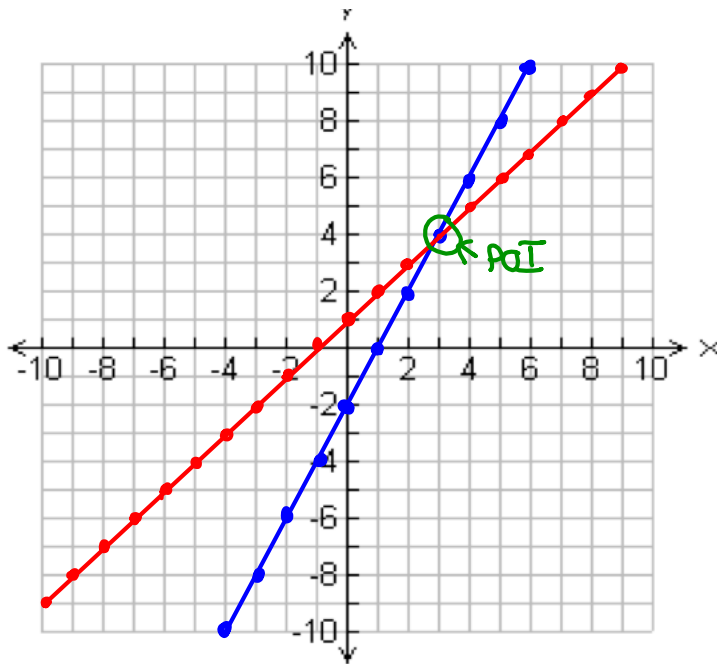
Line 2: $y = x + 1$

Slope: $m = 2$

Slope: $m = 1$

y-intercept: $b = -2$

y-intercept: $b = 1$



Point of Intersection: (3, 4)

Check your answer: To verify the solution, (3,4), substitute the coordinates into both equations and check that they hold true. Use the left side/right side method.

Check: $y = 2x - 2$

L.S.

$$= y$$

$$= 4$$

R.S.

$$= 2x - 2$$

$$= 2(3) - 2$$

$$= 6 - 2$$

$$= 4$$

LS=RS

Check: $y = x + 1$

L.S.

$$= y$$

$$= 4$$

R.S.

$$= x + 1$$

$$= 3 + 1$$

$$= 4$$

LS=RS