Systems of Equations – given 2 rules

3. Jeff and Colin work for two different limousine companies. Each company charges an initial fee for the rental, as well as a fixed amount per kilometer travelled.

Jeff’s Limo service charges $50.00 for the rental and $0.23 per kilometer.
Colin’s Limo charges $72.00 for the rental and $0.15 per kilometer.

Sketch a graph of this situation

a) At what point does it not matter which company is chosen?
b) How much will the rental cost at that point?
3. Jeff and Colin work for two different limousine companies. Each company charges an initial fee for the rental, as well as a fixed amount per kilometer travelled.

Jeff's Limo service charges $50.00 for the rental and $0.23 per kilometer. Colin's Limo charges $72.00 for the rental and $0.15 per kilometer.

Sketch a graph of this situation

\[ x = \text{kilometers driven} \]
\[ y = \text{cost ($)} \text{ of the rental} \]

(a) At what point does it not matter which company is chosen?
(b) How much will the rental cost at that point?

**Step 1:**

Jeff: \[ y = 50 + 0.23 \times \text{km} \]
Colin: \[ y = 72 + 0.15 \times \text{km} \]

**Step 2:**

\[ 0.23 \times + 50 = 0.15 \times + 72 \]
\[ -0.15 \times - 0.15 \times \]
\[ 0.08 \times + 50 = 72 - 50 \]
\[ - 50 - 50 \]
\[ 0.08 \times = 22 \]
\[ \frac{0.08}{0.08} = \frac{22}{0.08} \]
\[ x = 275 \]

**Step 3:**

\[ \text{Answer: Cost is the same when both limos have driven 275 km.} \]

**Step 4:**

\[ y = 0.15 \times + 72 \]
\[ y = 0.15 \times (275) + 72 \]
\[ y = 41.25 + 72 \]
\[ y = 113.25 \]

**Answer:** The cost of the limo rental at that point is $113.25.
4. Luke and Ryan both start off with different bank account balances. They each spend a set amount every week until their bank accounts are empty.

Luke starts off with $750.00 and spends $85.00 a week.
Ryan starts off with $615.00 and spends $58.00 a week.

Sketch a graph of this situation

a) After how much time will the boys have the same account balance at the same moment?
b) What will the account balance be at that point?
4. Luke and Ryan both start off with different bank account balances. They each spend a set amount every week until their bank accounts are empty.

Luke starts off with $750.00 and spends $85.00 a week. Ryan starts off with $615.00 and spends $58.00 a week.

Sketch a graph of this situation

\[ x = \text{weeks} \]
\[ y = \text{account balance ($)} \]

\[ \text{Luke's money starts higher but falls faster.} \]
\[ \text{Ryan's money starts lower but falls more slowly.} \]

a) After how much time will the boys have the same account balance at the same moment?

b) What will the account balance be at that point?

**Step 2**

Luke: \[ y = 750 - 85 (\text{weeks}) \]

\[ y = -85x + 750 \]

Ryan: \[ y = 615 - 58 (\text{weeks}) \]

\[ y = -58x + 615 \]

**Step 3**

\[ -85x + 750 = -58x + 615 \]

\[ +85x \quad +85x \]

\[ 750 = 27x + 615 \]

\[ -615 \quad -615 \]

\[ 135 = 27x \]

\[ \frac{135}{27} = \frac{27x}{27} \]

\[ 5 = x \]

**Answer:** The accounts will be the same after 5 weeks.

**Step 4**

\[ y = -58x + 615 \]

\[ y = -58(5) + 615 \]

\[ y = -290 + 615 \]

\[ y = 325 \]

**Answer:** At 5 weeks, both accounts have $325 in them.
Systems of Equations –Comparison Method

5. Solve the systems of equations below using the *comparison* method

Line 1: \( y = 3x + 8 \)

Line 2: \( y = 2x - 4 \)

Answer: \((\underline{\phantom{1}}, \underline{\phantom{1}})\)

6. Solve the systems of equations below using the *comparison* method

Line 1: \( y = 5x - 52 \)

Line 2: \( y = -3x + 18 \)

Answer: \((\underline{\phantom{1}}, \underline{\phantom{1}})\)
Systems of Equations – Comparison Method

5. Solve the systems of equations below using the comparison method

Line 1: \[ y = 3x + 8 \]
Line 2: \[ y = 2x - 4 \]

\[
\begin{align*}
\text{Step 1} & : \quad 3x + 8 = 2x - 4 \\
& -2x \quad -2x \\
& 1x + 8 = -4 \\
& -8 \quad -8 \\
& 1x = -12 \\
& x = -12
\end{align*}
\]

\[
\begin{align*}
\text{Step 2} & : \quad y = 2x - 4 \\
& y = 2(-12) - 4 \\
& y = -24 - 4 \\
& y = -28
\end{align*}
\]

Answer: \((-12, -28)\)

6. Solve the systems of equations below using the comparison method

Line 1: \[ y = 5x - 52 \]
Line 2: \[ y = -3x + 18 \]

\[
\begin{align*}
\text{Step 1} & : \quad 5x - 52 = -3x + 18 \\
& +3x \quad +3x \\
& 8x - 52 = 18 \\
& +52 \quad +52 \\
& 8x = 70 \\
& \frac{8x}{8} = \frac{70}{8} \\
& x = 8.75
\end{align*}
\]

\[
\begin{align*}
\text{Step 2} & : \quad y = 5x - 52 \\
& y = 5(8.75) - 52 \\
& y = 43.75 - 52 \\
& y = -8.25
\end{align*}
\]

Answer: \((8.75, -8.25)\)
7. What are the coordinates of the point where both lines from the graph below intersect (meet)?

Answer (______, ______)
7. What are the coordinates of the point where both lines from the graph below intersect (meet)?

**Step 1**

For **Line 1**:

\[ \alpha = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-12 - 63}{0 - 30} = -\frac{75}{-30} = 2.5 \]

\[ y = \alpha x + b \]

\[ y = 2.5x + b \]

\[-12 = 2.5(0) + b \]

\[-12 = b \]

\[ y = 2.5x - 12 \]

**Step 2**

For **Line 2**:

\[ \alpha = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 28}{56 - 0} = -\frac{28}{56} = -0.5 \]

\[ y = \alpha x + b \]

\[ y = -0.5x + b \]

\[ 28 = -0.5(0) + b \]

\[ 28 = b \]

\[ y = -0.5x + 28 \]

**Answer** (13.3, 21.3)
8. A spy plane and a re-fuelling plane are travelling along different paths.

The spy plane leaves a secret runway at A (-16 , 28) and heads toward a missile factory at B (48 , -28), but must re-fuel in mid-air.

The refueling plane leaves an aircraft carrier at C (-24 , -13), travelling directly on a path toward an airport at D (56 , 37).

At what coordinates will the two planes meet to re-fuel the spy plane?

Answer: The spy plane will re-fuel at coordinates ( ______ , ______ )
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Answer: The spy plane will re-fuel at coordinates (______, ______)
9. Tiger has been invited to join 2 different golf clubs next summer.

- He can join ‘Angry Birdies’ for a one-time fee of $750, plus an extra $30 every time he plays.
- He might also join at ‘Puff Caddie’s, where they charge $25 per round with a one time membership fee of $825.

a) At what number of visits will the two courses cost the same amount to play?
b) How much will it cost to play at that point?

**Answer:**

a) On the _________ round of play, both clubs will have charged the same amount.

b) The cost of playing after that round of golf will be: $______________
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a) At what number of visits will the two courses cost the same amount to play?

b) How much will it cost to play at that point?

Answer:  

a) On the ________ round of play, both clubs will have charged the same amount.

b) The cost of playing after that round of golf will be: $ __1200_____