

LESSON
12-3

Modeling with Linear Systems

Notes

Reteach

Mrs. Hathaway bought a total of 12 items made up of some sticky notes and some pens. The sticky notes cost \$4 each and the pens cost \$2 each. She spent a total of \$40 on all items. How many pens and how many sticky notes did she buy?

Organize the information.

	Sticky Notes	Pens	Total
Number of Items	n	p	12
Cost	$4n$	$2p$	40

Write two equations. Use the information in each row of the chart.

Number of Items	n	p	12	$\Rightarrow n + p = 12$
Cost	$4n$	$2p$	40	$\Rightarrow 4n + 2p = 40$

Write each equation in slope-intercept form.

$$\begin{aligned}
 n + p &= 12 & 4n + 2p &= 40 \\
 n &= -p + 12 & 4n &= -2p + 40 \\
 & & n &= -\frac{1}{2}p + 10
 \end{aligned}$$

Set the equations equal to each other and solve.

$$\begin{aligned}
 -p + 12 &= -\frac{1}{2}p + 10 & n + p &= 12 \\
 12 &= \frac{1}{2}p + 10 & n + 4 &= 12 \\
 2 &= \frac{1}{2}p & n &= 8 \\
 4 &= p & \text{She bought 8 sticky notes.} \\
 \text{She bought 4 pens.} & & &
 \end{aligned}$$

Solve.

1. Tia has 25 china figures in her collection. The horse figures cost \$2 each, and the cat figures cost \$1 each. She paid \$39 for all the figures in the collection. How many horses and how many cats does she have?

Equations: $h + c = 25$ 11 cats
 Solution: $2h + 1c = 39$ 14 horses

$$\begin{aligned}
 (h + c = 25) \cdot 2 & \\
 2h + 2c &= 50 \\
 2h + 1c &= 39 \\
 \hline
 -2h - 2c &= -50 \\
 2h + 1c &= 39 \\
 \hline
 -1c &= -11 \\
 c &= 11
 \end{aligned}$$

2. Mr. Wallace has 32 models of antique cars. The Hupmobile models cost \$5 each, and the Duesenberg models cost \$18 each. He paid a total of \$264 for all the models. How many Hupmobile models and how many Duesenberg models does he have?

Equations: $H + D = 32$ $5H + 18D = 264$
 Solution: 24 Hump 8 D

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Practice and Problem Solving: A/B

Write a system of equations to solve each problem.

- For a small party of 12 people, the caterer offered a choice of a steak dinner for \$12.00 per meal or a chicken dinner for \$10.50 per meal. The final cost for the meals was \$138.00. How many of each meal was ordered?

Equations: $s + c = 12$
 Solution: $12s + 10.5c = 138$

- A clubhouse was furnished with a total of 9 couches and love seats so that all 23 members of the club could be seated at once. Each couch seats 3 people and each love seat seats 2 people. How many couches and how many love seats are in the clubhouse?

Equations: _____
 Solution: _____

- A small art museum charges \$5 for an adult ticket and \$3 for a student ticket. At the end of the day, the museum had sold 89 tickets and made \$371. How many student tickets and how many adult tickets were sold?

Equations: _____
 Solution: _____

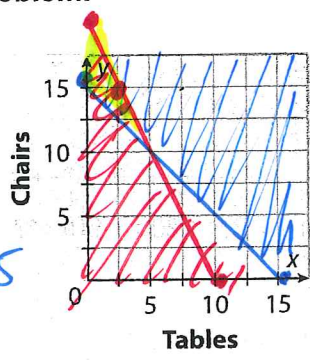
- Cassie has a total of 110 coins in her piggy bank. All the coins are quarters and dimes. The coins have a total value of \$20.30. How many quarters and how many dimes are in the piggy bank?

Equations: _____
 Solution: _____

Write a system of inequalities and graph them to solve the problem.

- Jack is buying tables and chairs for his deck party. Tables cost \$25 and chairs cost \$15. He plans to spend no more than \$285 and buy at least 16 items. Show and describe the solution set, and suggest a reasonable solution to the problem.

Equations: $1t + c \geq 16$ $25t + 15c \leq 285$
 $\frac{16}{1} = 16$ $\frac{16}{1} = 16$ $\frac{285}{25} \approx 11$ $\frac{285}{15} = 19$



2.5 tables
 15 chairs
 (2.5, 15)