

LESSON
12-3**Modeling with Linear Systems****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.

$$n + p = 12$$

$$n = -p + 12$$

$$4n + 2p = 40$$

$$4n = -2p + 40$$

$$n = -\frac{1}{2}p + 10$$

Set the equations equal to each other and solve.

$$-p + 12 = -\frac{1}{2}p + 10$$

$$12 = \frac{1}{2}p + 10$$

$$2 = \frac{1}{2}p$$

$$4 = p$$

She bought 4 pens.

$$n + p = 12$$

$$n + 4 = 12$$

$$n = 8$$

She bought 8 sticky notes.

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: _____

Solution: _____

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: _____

Solution: _____

LESSON
12-3**Modeling with Linear Systems****Practice and Problem Solving: A/B**

Write a system of equations to solve each problem.

1. 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: _____

Solution: _____

2. 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: _____

3. 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: _____

4. 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?

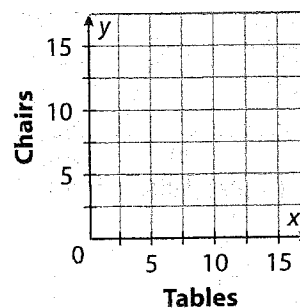
Equations: _____

Solution: _____

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

5. 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: _____



LESSON
12-3

Modeling with Linear Systems

Reteach

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Organize the information.

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Number of Items	n	p	12
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$$\Rightarrow n + p = 12$$

Cost	$4n$	$2p$	40
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$$\Rightarrow 4n + 2p = 40$$

Write each equation in slope-intercept form.

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$$n = -p + 12$$

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$$n = -\frac{1}{2}p + 10$$

Set the equations equal to each other and solve.

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$$12 = \frac{1}{2}p + 10$$

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$$4 = p$$

She bought 4 pens.

$$n + p = 12$$

$$n + 4 = 12$$

$$n = 8$$

She bought 8 sticky notes.

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: _____

Solution: 11 cats and 14 horses

Figurines

$$\begin{cases} h + c = 25 \\ \$ 2h + 1c = 39 \end{cases}$$

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: _____

Solution: 8 D's 24 H's

$$\begin{cases} h + d = 32 \\ \$ 5h + 18d = 264 \end{cases}$$

LESSON
12-3

Modeling with Linear Systems

Practice and Problem Solving: A/B

Write a system of equations to solve each problem.

1. 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?

people
 $s + c = 12$
 \$ $12s + 10.5c = 138$

Equations: _____

Solution: 4 chicken 8 steak

2. 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?

furniture
 $c + L = 9$
 people $3c + 2L = 23$

Equations: _____

Solution: 4 love seats 5 couches

3. 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?

$a + s = 89$
 $5a + 3s = 371$

Equations: _____

Solution: 37 student, 52 adult

4. 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?

coins $q + d = 110$
 \$ $.25q + .10d = 20.30$

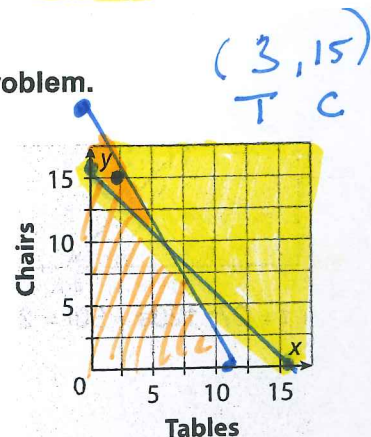
Equations: _____

Solution: _____

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

5. 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: _____



#1

$$\begin{cases} (h + c = 25) \cdot 2 \rightarrow -2h - 2c = -50 \\ 2h + 1c = 39 \rightarrow \underline{2h + 1c = 39} \end{cases}$$

$$h + 11 = 25$$

$$h = 14$$

$$-1c = -11$$

$$c = 11$$

#2

$$\begin{cases} (h + d = 32) \cdot 5 \rightarrow -5h - 5d = -160 \\ 5h + 18d = 264 \rightarrow \underline{5h + 18d = 264} \end{cases}$$

$$\begin{array}{r} 13d = 104 \\ 13 \quad 13 \\ \hline d = 8 \end{array}$$

8 Duesenberg 50
24 Hopmobiles

$$\begin{cases} (s + c = 12) \cdot 12 \rightarrow -12s - 12c = -144 \\ 12s + 10.5c = 138 \rightarrow \underline{12s + 10.5c = 138} \end{cases}$$

$$\begin{array}{r} -1.5c = -6 \\ \hline -1.5 \quad -1.5 \end{array}$$

4 chicken
8 steak

$$c = 4$$

$$\#5 \begin{cases} T + C \geq 16 \\ 25T + 15C \leq 285 \end{cases}$$

$$\begin{array}{cc} T\text{-int} & C\text{-int} \\ 11 & 19 \end{array}$$

Possible Answer
(8, 2)

8 printed paper
2 graphing paper

$$\begin{cases} (c + L = 9) \cdot 3 \rightarrow -3c - 3L = -27 \\ 3c + 2L = 23 \end{cases}$$

$$\begin{array}{r} -3c - 3L = -27 \\ \underline{3c + 2L = 23} \\ -1L = -4 \\ L = 4 \end{array}$$

4 love seats and
5 couches

$$\begin{cases} (a + s = 89) \cdot 5 \rightarrow -5a - 5s = -445 \\ 5a + 3s = 371 \end{cases}$$

~~$$5a + 3s = 371$$~~

$$-2s = -74$$

$$s = 37$$

37 student tickets
and 52 adult tickets

$$\begin{cases} (Q + D = 110) \cdot .25 \rightarrow \cancel{-0.25Q - 0.25D = -27.5} \\ .25Q + .10D = 20.30 \end{cases}$$

~~$$.25Q + .10D = 20.30$$~~

$$-0.15D = -7.2$$

$$D = 48$$

48 Dimes, 62 Quarters