## Lesson 8.4   Real-World Problems: Equations and Inequalities

**Write an algebraic equation for each problem. Then solve.**

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*Example*

Carrie had some hair clips. After she bought 8 more hair clips, she now has 22 hair clips. How many hair clips did Carrie have at first?
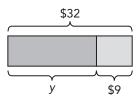
Let *x* represent the number of hair clips that Carrie had at first.

$$\underline{\ x\ } \left(+\right) \underline{\ 8\ } = \underline{\ 22\ }$$

$$\underline{\ x\ } \left(+\right) \underline{\ 8\ } \left(-\right) \underline{\ 8\ } = \underline{\ 22\ } \left(-\right) \underline{\ 8\ }$$

$$\underline{\ x\ } = \underline{\ 14\ }$$

Carrie had ___14___ hair clips at first.

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1.  Jeremy has collected some money for charity. His friends donate $9 more. Now he has $32. How much money did Jeremy collect at first?
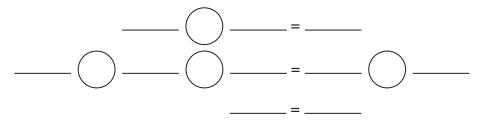
Let *y* represent the amount of money that Jeremy collected at first.

$$\underline{\ \ \ \ } \left(\ \right) \underline{\ \ \ \ } = \underline{\ \ \ \ }$$

$$\underline{\ \ \ \ } \left(\ \right) \underline{\ \ \ \ } \left(\ \right) \underline{\ \ \ \ } = \underline{\ \ \ \ } \left(\ \right) \underline{\ \ \ \ }$$

$$\underline{\ \ \ \ } = \underline{\ \ \ \ }$$

Jeremy collected $_____ at first.

**2.** Wayne had some comic books. After he gave his brother 12 comic books, Wayne had 53 comic books left. How many comic books did Wayne have at first?

Let *b* represent the number of comic books Wayne had at first.

$$\underline{\hspace{2em}} \bigcirc \underline{\hspace{2em}} = \underline{\hspace{2em}}$$

$$\underline{\hspace{2em}} \bigcirc \underline{\hspace{2em}} \bigcirc \underline{\hspace{2em}} = \underline{\hspace{2em}} \bigcirc \underline{\hspace{2em}}$$

$$\underline{\hspace{2em}} = \underline{\hspace{2em}}$$

Wayne had _____ comic books at first.

**3.** Alvin baked some muffins. After selling 72 muffins, he had 36 muffins left. How many muffins did Alvin bake?

Let *g* represent the number of muffins Alvin baked.

**4.** Elena started reading a novel today. She read some pages of the novel in the morning and 24 more pages in the evening. If she has read a total of 92 pages of the novel, how many pages did she read in the morning?

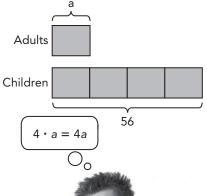Let *k* represent the number of pages of the novel Elena read in the morning.

Name: _____    Date: _____

**Write an algebraic equation for each problem. Then solve.**

*Example*

In a swimming club, there are 4 times as many children as adults.
If there are 56 children, how many adults are there?
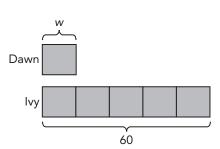
Let *a* represent the number of adults.

$$\underline{4a} = \underline{56}$$

$$\underline{4a} \div \underline{4} = \underline{56} = \div \ \underline{4}$$

$$\underline{a} = \underline{14}$$

There are ____14____ adults.

Adults

Children

$4 \cdot a = 4a$

56

5. Dawn sold some sandwiches during a fair. Ivy sold 5 times as many
sandwiches as Dawn. If Ivy sold 60 sandwiches, how many
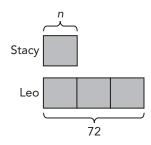sandwiches did Dawn sell?

Let *w* represent the number of sandwiches that Dawn sold.

$$\underline{\phantom{xxxx}} = \underline{\phantom{xxxx}}$$

$$\underline{\phantom{xxxx}} \bigcirc \underline{\phantom{xxxx}} = \underline{\phantom{xxxx}} \bigcirc \underline{\phantom{xxxx}}$$

$$\underline{\phantom{xxxx}} = \underline{\phantom{xxxx}}$$

Dawn sold _____ sandwiches.

Dawn

Ivy

60

**6.** Stacy saved some dimes. Leo saved 3 times as many dimes as Stacy. If Leo saved a total of 72 dimes, how many dimes did Stacy save?

Let *n* represent the number of dimes that Stacy saved.

$n$

Stacy [ ]

Leo [ | | ]

72

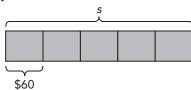## Write an algebraic equation for each problem. Then solve.

*Example*

Grace had some savings. She donated $\frac{1}{5}$ of her savings to a charity.
If she donated $60 to the charity, how much was Grace's savings?

Let *s* represent Grace's savings.

$s$

$60

$$\frac{\frac{s}{5}}{\phantom{x}} = \underline{60}$$

$$\frac{\frac{s}{5}}{\phantom{x}} \bigotimes \frac{5}{\phantom{x}} = \frac{60}{\phantom{x}} \bigotimes \frac{5}{\phantom{x}} \qquad \boxed{\frac{1}{5} \cdot s = \frac{s}{5}}$$

$$\frac{s}{\phantom{x}} = \underline{300}$$

Grace's savings was $ _300_.

**7.** Lester had some marbles. He gave $\frac{1}{8}$ of his marbles to John.
If John received 6 marbles, how many marbles did Lester have at first?

Let *w* represent the number of marbles that Lester
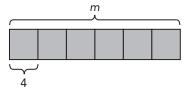had at first.

_____ = _____

\_\_\_\_\_ ◯ \_\_\_\_\_ = \_\_\_\_\_ ◯ \_\_\_\_\_

_____ = _____

Lester had _____ marbles at first.

**8.** There are red tiles and blue tiles in a box. Of the total number of tiles in the
box, $\frac{1}{6}$ are red. If there are 4 red tiles, what is the total number of tiles in
the box?

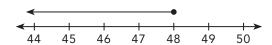Let *m* represent the total number of tiles in the box.

Name: _____    Date: _____

## Solve.

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**Example**

A boat can carry no more than 48 passengers.

**a)** Let $p$ represent the number of passengers that the boat can carry.
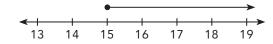Write an inequality to represent this situation.

___$p \le 48$___


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        ←————————————————●
   ←——+——+——+——+——+——+——+——→
     44  45  46  47  48  49  50
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**b)** What is the maximum number of passengers that the boat can carry?

The maximum number of passengers that the boat can carry is ___48___.

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**9.** It takes at least 15 minutes to fill out a form.

**a)** Let $w$ represent the number of minutes needed to fill out the form.
Write an inequality to represent this situation.

_____

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              ●————————————————→
   ←——+——+——+——+——+——+——+——→
     13  14  15  16  17  18  19
```

**b)** What is the minimum number of minutes needed to fill out the form?

The minimum number of minutes needed to fill out the form is _____.

**10.** Mrs. Penn asks her students to write less than 500 words for an essay.

**a)** Let $s$ represent the number of words for the essay. Write an inequality
to represent this situation.

_____

**b)** What is the maximum number of words a student must write for the essay?

_____

**11.** More than 15 of members of a committee must be present before a new head can be elected.

**a)** Let *m* represent the number of committee members. Write an inequality to represent this situation.

_____

**b)** What is the minimum number of committee members that must be present before a new head can be elected?

_____

**12.** At most, there are 19 grammar books on a bookshelf.

**a)** Let *a* represent the number of grammar books. Write an inequality to represent this situation.

_____

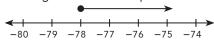**b)** What is the greatest number of grammar books on the bookshelf?

_____

**13.** A movie theatre has a seating capacity of 7,500 people.

**a)** Let *v* represent the number of people. Write an inequality to represent this situation.

_____

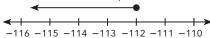**b)** What is the maximum number of people the movie theatre can hold?

_____

**21.** Answers vary. Possible values
of $p$ are $-78$, $-77$, $-10$, and $5$.

The inequality $p \geq -78$ is true for any value of $p$
that is greater than or equal to $-78$.



$$-80 \quad -79 \quad -78 \quad -77 \quad -76 \quad -75 \quad -74$$

**22.** Answers vary. Possible values
of $y$ are $-112$, $-113$, $-120$, and $-200$.

The inequality $y \leq -112$ is true for any value of $y$
that is less than or equal to $-112$.

$$-116 \quad -115 \quad -114 \quad -113 \quad -112 \quad -111 \quad -110$$

## Lesson 8.4

**1.**
$$y \;\textcircled{+}\; \underline{9} = \underline{32}$$
$$\underline{y} \;\textcircled{+}\; \underline{9} \;\textcircled{-}\; \underline{9} = \underline{32} \;\textcircled{-}\; \underline{9}$$
$$y = \underline{23}$$
Jeremy collected $\$\underline{23}$ at first.

**2.**
$$\underline{b} \;\textcircled{-}\; \underline{12} = \underline{53}$$
$$\underline{b} \;\textcircled{-}\; \underline{12} \;\textcircled{+}\; \underline{12} = \underline{53} \;\textcircled{+}\; \underline{12}$$
$$\underline{b} = \underline{65}$$
Wayne had $\underline{65}$ comic books at first.

**3.** $g - 72 = 36$; 108 muffins

**4.** $k + 24 = 92$; 68 pages

**5.**
$$\underline{5w} = \underline{60}$$
$$\underline{5w} \;\textcircled{\div}\; \underline{5} = \underline{60} \;\textcircled{\div}\; \underline{5}$$
$$\underline{w} = 12$$
Dawn sold $\underline{12}$ sandwiches.

**6.** $3n = 72$; 24 dimes

**7.**
$$\frac{w}{8} = \underline{6}$$
$$\frac{w}{8} \;\textcircled{\cdot}\; \underline{8} = \underline{6} \;\textcircled{\cdot}\; \underline{8}$$
$$\underline{w} = \underline{48}$$
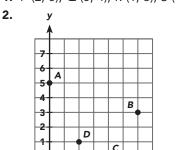Lester had $\underline{48}$ marbles at first.

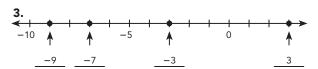**8.** $\frac{m}{6} = 4$; 24 tiles

**9. a)** $w \geq 15$

   **b)** 15

**10. a)** $s < 500$

    **b)** 499 words

**11. a)** $m > 15$

    **b)** 16 members

**12. a)** $a \leq 19$

    **b)** 19 grammar books
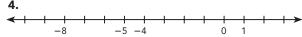
**13. a)** $v \leq 7,500$

    **b)** 7,500 people

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**Chapter 9**

## Lesson 9.1

**1.** $P\,(2, 5)$, $Q\,(5, 4)$, $R\,(1, 3)$, $S\,(4, 2)$

**2.**



**3.**



**4.**



**5.** $M\,(0, -4)$, $N\,(7, -5)$, $P\,(8, 8)$, $Q\,(0, 8)$,
$R\,(-5, 6)$, $S\,(0, 3)$, $T\,(-2, 0)$, $U\,(-6, -3)$,
$V\,(-2, -6)$, $W\,(2, -6)$

**6.** Quadrant III: $A$, $B$, $C$,
Quadrant IV: $D$, $E$, $F$



**7.** $(8, -1)$       **8.** $(6, 4)$

**9.** $(-3, -3)$      **10.** $(-6, 2)$