Name _____

Reteaching
2-1

Understanding Equations

A solution to an equation is a value that makes the equation true. An equation is true if both sides are equal.

To find out if a given value is a solution to an equation, substitute the value for the variable. If both sides of the equation are equal, the value is a solution to the equation. Use this method to solve the following problem.

Kate is going to babysit for 5 hours. She needs to make exactly $20.00 to buy a concert ticket. How much does Kate need to make each hour in order to buy the concert ticket?

The equation for this situation is $5x = \$20.00$, where x is the amount she makes per hour.

Possible Babysitting Rates
$3.00 per hour
$4.00 per hour
$5.00 per hour
$6.00 per hour

To find the solution to $5x = \$20.00$, substitute the different rates for x.

Try $x = \$3.00$:	$5 \times \$3.00 = \$15.00$	Not a solution
Try $x = \$4.00$:	$5 \times \$4.00 = \$20.00$	Solution
Try $x = \$5.00$:	$5 \times \$5.00 = \$25.00$	Not a solution
Try $x = \$6.00$:	$5 \times \$6.00 = \$30.00$	Not a solution

Since the solution is $4.00, Kate needs to make $4.00 per hour in order to earn enough money to buy the concert ticket.

Substitute the different values of the variable to find the solution to each equation.

1. $5 + x = 22$ $x = 7, 12, 17, 20$ **17**

2. $n - 9 = 33$ $n = 14, 24, 32, 42$ **42**

3. $27 \div p = 9$ $p = 3, 4, 6, 7$ **3**

4. $81 = 9y$ $y = 2, 5, 8, 9$ **9**

Tell if each equation is true or false for $k = 4$.

5. $32 \div k = 8$ **True**

6. $k = 31 - 27$ **True**

7. $43.6 - k = 38.6$ **False**

Tell which value of the variable is the solution to the equation.

8. $23.7 = 41.1 - t$ $t = 17.4, 18.4, 27.4, 64.8$ **17.4**

9. $d + 19.6 = 34.5$ $d = 13.1, 13.9, 14.9, 22.9$ **14.9**

10. Reasoning Ada is putting autographed baseballs in a display case. The display case can hold 28 baseballs, and there are already 17 baseballs in the case. Ada thinks that she can display 9 more baseballs and the display case will be full. How can you use the equation $17 + b = 28$ to check if she is right?

Sample answer: Substitute 9 for *b* to see if the equation is true. 17 + 9 = 26, so 9 is not a solution. Ada is incorrect.

Name _____

Practice
2-1

Understanding Equations

Substitute the different values of the variable to find the solution to each equation.

1. $27 - c = 18$ $c = 9, 11, 35, 45$ **9**

2. $q - 19 = 12$ $q = 7, 21, 29, 31$ **31**

3. $8 \times s = 96$ $s = 9, 12, 13, 14$ **12**

4. $56 = 7f$ $f = 6, 7, 8, 9$ **8**

Tell if each equation is true or false for $w = 2.1$.

5. $28.4 - w = 25.3$ **False**

6. $w = 39.2 - 37.1$ **True**

Tell which value of the variable is the solution to the equation.

7. $t + \$13.38 = \$19.00$ $t = \$5.62, \$5.72, \$6.62, \$7.72$ **$5.62**

8. $19.7 = 41.1 - g$ $g = 21.4, 22.4, 30.4, 31.4$ **21.4**

9. $7.7 + r = 8.5$ $r = 0.2, 0.6, 0.8, 1.2$ **0.8**

10. Writing to Explain Lou set up 6 tables for a party. 42 people are coming to the party. Lou is planning to seat 7 people at each table. Use the equation $42 \div p = 6$ to explain whether Lou's plan will work.

Sample answer: Substitute 7 for *p* in the equation to see if 7 people can be seated at each table. $42 \div 7 = 6$, so Lou's plan will work.

11. Reasoning 117 students and teachers participated in a fundraiser. 96 students participated. Did 11, 19, 21, or 29 teachers participate? Use the equation $t + 96 = 117$ to justify your answer.

21 teachers participated. Sample answer: Substitute each number of teachers for *t*. $21 + 96 = 117$, so 21 teachers participated.

12. Geometry Jerry built a table with a square top. The perimeter of the tabletop is 18 feet. He knows that each side of the table is either 3, $3\frac{1}{2}$, 4, or $4\frac{1}{2}$ feet long. Use the equation $18 = 4s$ to help him find which is the length of each side of the tabletop.

$4\frac{1}{2}$ feet. Sample answer: Substitute each side length for *s*. $18 = 4 \times 4\frac{1}{2}$, so each side is $4\frac{1}{2}$ feet long.

Name _____

Enrichment
2-1

Use Your Head!

Calculate the answers to each problem using mental math.

Mental Math

1. Juanita's bakery ordered 48 lb of white flour, 32 lb of wheat flour, 42 lb of butter, and 38 lb of margarine. What was the total number of pounds the bakery ordered?

   $48 + 32 + 42 + 38 = (48 + 38) + (32 + 42) =$
   $(50 + 40) - 4 + (30 + 40) + 4 = (90) - 4 +$
   $(70) + 4 = 160$ lb

2. The bakery usually orders 62 lb of walnuts each week. At the end of this week, there were 14 lb left over. How many pounds of walnuts should be ordered for next week?

   $62 - 14 = (62 - 12) - 2 = 50 - 2 =$
   48 lb of walnuts

3. If the bakers bake 100 loaves of white bread every day, how many loaves do they bake every 4 weeks?

   $100 \times 7 \times 4 = (7 \times 4) \times 100 = 28 \times 100 =$
   2,800 loaves of white bread

4. The bakers at Juanita's bake 12 dozen potato rolls, 15 dozen crescent rolls, and 10 dozen kaiser rolls each day. What is the total number of rolls baked each day?

   $(12 \times 12) + (15 \times 12) + (10 \times 12) =$
   $12(12 + 15 + 10) = 12(37) = 10(37) +$
   $2(37) = 370 + 74 = 444$ rolls

5. A new baker at Juanita's ordered 240 extra pounds of raisins. If $\frac{1}{4}$ lb of raisins are used for every batch of raisin muffins, and there are 10 muffins in each batch, how many muffins will the baker make before the extra pounds of raisins are used?

   $240 \times 4 = 960$ batches $\times$ 10 muffins =
   9,600 muffins

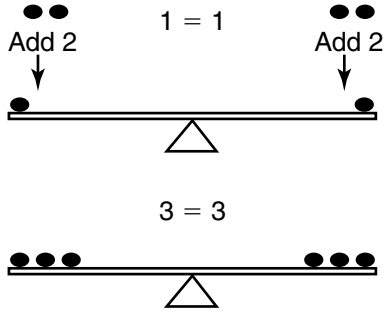
Name _____

Reteaching
2-2

Properties of Equality

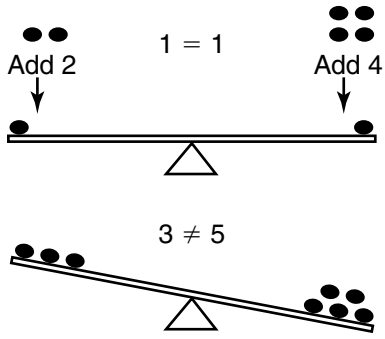
To keep an equation balanced, you must do the same thing to each side.

Balanced Equation



The scale is balanced because both sides **have the same value.** We added the same amount to each side of the equation.

Unbalanced Equation



The equation is not balanced. 3 does not equal 5. We did not add the same amount to both sides of the equation.

Use the Properties of Equality to balance equations.

Add the same number to each side.	$3c = 12$, so $3c + 5 = 12 + 5$
Subtract the same number from each side.	$3c = 12$, so $3c - 3 = 12 - 3$
Multiply each side by the same number.	$3c = 12$, so $3c \times 2 = 12 \times 2$
Divide each side by the same number.	$3c = 12$, so $3c \div 4 = 12 \div 4$

Evaluate the equations.

1. If $16 + 5 = 21$, does $16 + 5 - 4 = 21 - 4$? Why or why not?

Yes, because the same number, 4, is subtracted from each side.

2. If $3p = 27$, does $3p \times 2 = 27 \times 3$? Why or why not?

No, because each side is multiplied by a different number.

3. If $4s - 6 = 18$, does $(4s - 6) \div 2 = 18 \div 2$? Why or why not?

Yes, because each side is divided by the same number, 2.

4. **Reasoning** A pan balance shows $x + 2 = 10$. If you add 5 units to one side, can you balance the scale by adding x units to the other side? Explain.

No, to keep the scale and equation balanced, you have to add the same number of units, 5, to each side.

Name _____

Practice
2-2

Properties of Equality

1. If $16 + 4 = 20$, does $16 + 4 - 4 = 20 - 4$? Why or why not?

Yes, the same number is subtracted from each side.

2. If $2d \div 4 = 5$, does $2d \div 4 + 6 = 5 + 4$? Why or why not?

No, because a different number is added to each side.

3. If $12 - 8 = 4$, does $(12 - 8) \div 2 = 4 \times 2$? Explain.

No, because one side is divided by 2 and the other side is multiplied by 2.

4. If $7t = 70$, does $12 \times 7t = 12 \times 70$? Explain.

Yes, because each side is multiplied by the same number.

5. **Critical Thinking** Emil and Jade have equal amounts of play money in two piles. Emil has $1 and a quarter in his pile. Jade has 5 quarters in her pile. If Emil gives Jade $1 and Jade gives Emil 4 quarters, will the two piles still be equal in value? Explain.

Sample answer: Yes, $1 = 4 quarters, so Emil and Jade subtracted $1 from each pile and then added $1 to each pile. Since they subtracted and added the same amounts to each pile, the piles are still equal in value.

6. Which equation shows the Multiplication Property of Equality if $n + 4 = 11$?

A $(n + 4) \times 2 = 11$

B $(n + 4) \times 2 = 11 \div 2$

C $(n + 4) \times 2 = 11 \times 4$

D $(n + 4) \times 2 = 11 \times 2$

7. **Writing to Explain** Bobbie wrote $y + 6 = 15$. Then she wrote $(y + 6) \div 3 = 15$. Explain why the second equation is not balanced and how to balance it.

To use the Division Property of Equality, you have to divide each side by the same number. Bobbie divided only one side of the second equation by 3. She needs to divide 15 by 3 to balance the equation.

Name _____

Enrichment
2-2

Equation Tables

Reasoning

1. Solve the equation $x - 3 = y$ for the given values of x or y to complete the table.

x	3	6	9
y	0	3	6

2. Examine the completed table from Exercise 1. What would happen to the value of y if the value of x was increased by five?

The value of y would also increase by five.

3. How would the value of y change if the equation was rewritten as $x - y = 3$, the value of x was increased by five, and the equation was still true?

The value of y would also increase by five and the difference would still be three.

4. How would the value of y change if the equation was rewritten as $y + 3 = x$, the value of x was increased by five, and the equation was still true?

The value of y would also increase by five and the difference would still be three.

5. Compare the equations in Exercises 1–4. How are they alike? How are they different?

The equations include the same constants and variables but use different operations.

6. Solve the equation $n \div v = 2$ for the given values of n or v to complete the table.

n	4	10	16
v	2	5	8

7. How would the value of v change if the value of n was doubled and the equation was still true?

The value of v would also be doubled.

Name _____

Reteaching
2-3

Solving Addition and Subtraction Equations

You can use inverse relationships and the properties of equality to get the variable alone to solve an equation. Remember that you need to do the same thing to both sides of the equation to keep the equation equal.

Solve the equation $5 + c = 15$.

To get c alone, undo adding 5 by subtracting 5 from both sides.

$$\begin{aligned} 5 + c &= 15 \\ 5 + c \mathbf{ - 5} &= 15 \mathbf{ - 5} \\ c &= 10 \end{aligned}$$

Check your solution by substituting 10 for c in the equation.

$$\begin{aligned} 5 + c &= 15 \\ 5 + 10 &= 15 \\ 15 &= 15 \quad \text{It checks.} \end{aligned}$$

Solve the equation $x - 20 = 16$.

To get x alone, undo subtracting 20 by adding 20 to both sides.

$$\begin{aligned} x - 20 &= 16 \\ x - 20 \mathbf{ + 20} &= 16 \mathbf{ + 20} \\ x &= 36 \end{aligned}$$

Check your solution by substituting 36 for x in the equation.

$$\begin{aligned} x - 20 &= 16 \\ 36 - 20 &= 16 \\ 16 &= 16 \quad \text{It checks.} \end{aligned}$$

Explain how to get the variable alone in each equation.

1. $x + 13 = 25$
$x + 13 \mathbf{ - 13} = 25 \mathbf{ - 13}$

Subtract 13 from both sides.

2. $n - 30 = 10$
$n - 30 \mathbf{ + 30} = 10 \mathbf{ + ?}$

30; Add 30 to both sides.

Solve each equation and check your answer. Show your work.

3. $g - 100 = 150$

$g - 100 +$ 100 $= 150 +$ 100

$g =$ 250

4. $y + 56 = 63$

$y = 7$

5. The Olympic triathlon is about 51 km. A contestant has completed two of the three legs of the race and has traveled 42 km. Solve $42 + d = 51$ to find the distance of the third leg.

9 km

Name _____

Practice
2-3

Solving Addition and Subtraction Equations

Explain how to get the variable alone in each equation.

1. $n + 10 = 100$
$n + 10 - 10 = 100 - 10$

Subtract 10 from both sides.

2. $x - 75 = 49$
$x - 75 + \_\_ = 49 + \_\_$

Add 75 to both sides.

Solve each equation and check your answer.

3. $g - 8 = 25$

$g = 33$

4. $25 + y = 42$

$y = 17$

5. $r + 82 = 97$

$r = 15$

6. $30 = m - 18$

$m = 48$

7. $150 = e + 42$

$e = 108$

8. $a - 51 = 12$

$a = 63$

9. Jo loaned Al $15. She had $15 left. Solve the equation $15 = s - 15$ to find how much money Jo had before she made the loan.

A $0

B $15

C $30

D $60

10. Critical Thinking If $n + 10 = 40$, then what is the value of the expression $n - 25$?

A 5

B 25

C 30

D 50

11. Writing to Explain Explain how to solve the equation $35 + p = 92$. Then solve.

Subtract 35 from both sides; $p = 57$.

Name _____

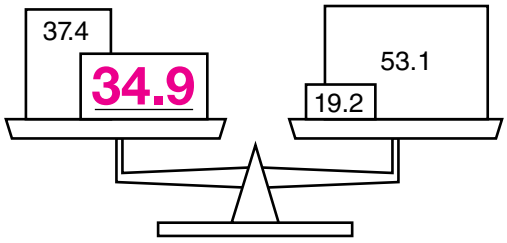
Enrichment
2-3

Balanced Scales

Fill in the boxes so the scales balance.

Algebra

1.



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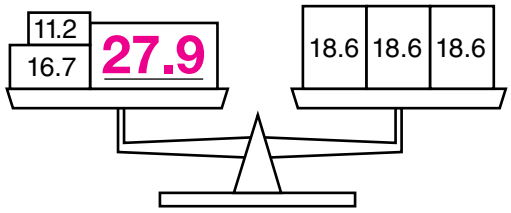

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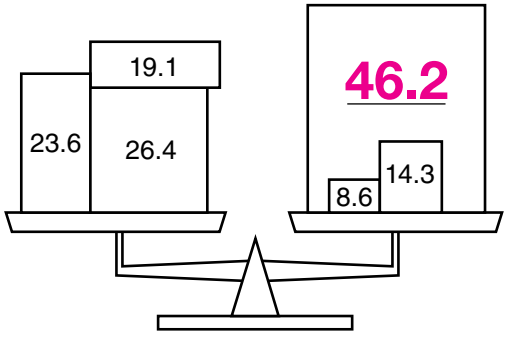

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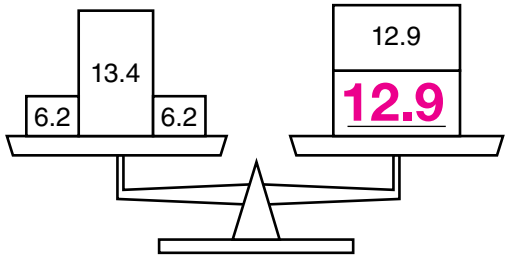

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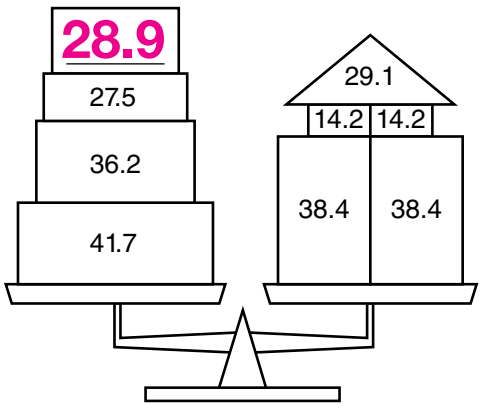
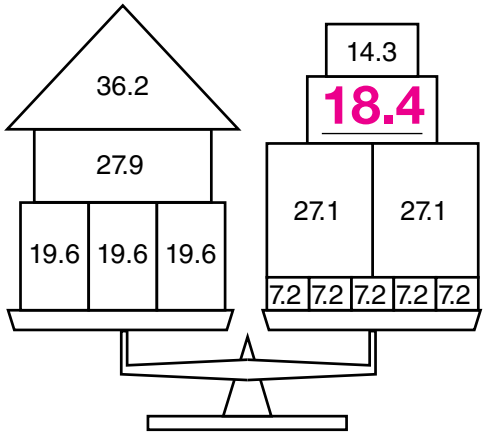


6.

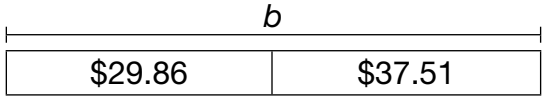


Name _____

Reteaching
2-4

Problem Solving: Draw a Picture and Write an Equation

Tico spent $37.51 at the computer store. Now he has $29.86 left. How much did Tico have before he went to the computer store?

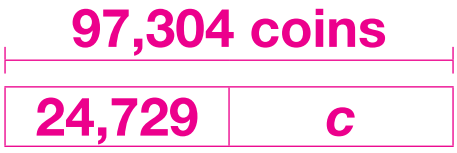
What do you know?	Tico has $29.86 now. He spent $37.51.
What do you need to find out?	How much Tico had before.
1. Assign a variable.	b = how much Tico had before
2. Draw a picture.	
3. Write and solve an equation.	$29.86 + $37.51 = b $67.37 = b
4. Answer the question.	Tico had $67.37 before he went to the store.

Draw a picture and write an equation to solve each problem.

1. Gina's book has 349 fewer pages than Terri's. If Gina's book has 597 pages, how many pages does Terri's book have?

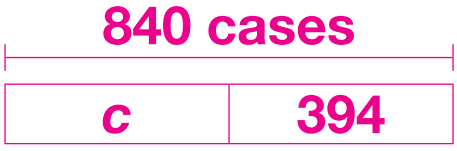
; $t = 597 + 349$; 946

2. Peter played a video game. Before dinner, he had collected 24,729 gold coins. At the end of the game he had collected 97,304 gold coins. How many coins did he collect after dinner?



; $c + 24{,}729 = 97{,}304$; 72,575

3. SaveMart can store 840 cases of canned food in the big warehouse. This is 394 cases more than the number that can be displayed on the shelves. How many cases can be displayed?



; $394 + c = 840$; 446

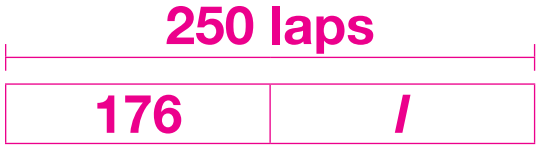
Name _____

Practice
2-4

Problem Solving: Draw a Picture and Write an Equation

Draw a picture and write an equation to solve each problem.

1. Mike has already driven 176 laps. The race is 250 laps long. How many more laps does he have to drive to finish the race?



; $176 + l = 250$; 74

2. Antonio found 133 golf balls in the water. He picked up a total of 527 lost golf balls. How many golf balls did he find in the weeds and bushes?

; $133 + b = 527$; 394

3. A lumber company plants 840 trees. If the company cuts down 560 trees, how many more trees did it plant than it cut down?

; $560 + t = 840$; 280

4. **Writing to Explain** What operation would you use to solve this problem? Why?

Erik wants to buy a new stereo for $359. He has $288 saved already. How much more will he have to save to buy the stereo?

Sample answer: I would use subtraction. I know the whole and one part, so I could subtract to find the difference.

5. **Reasonableness** Write an estimate that will show if 77 is a reasonable solution to the equation $14 + m = 91$.

$90 - 15 = 75$; 75 is close to 77, so the answer is reasonable.

6. Juan brought 87 pounds of recyclables to the recycling center. He brought 54 pounds of glass, and the rest was plastic. Which equation could be used to find p, the number of pounds of plastic Juan recycled?

A $87 + p = 54$

B $54 + p = 87$

C $p - 54 = 87$

D $p + 87 = 54$

Name _____

Enrichment
2-4

Body Facts

Algebra

Solve the following equations that relate to the functions of the human body.

1. In the human body, 1.5 L of blood are supplied to the liver every minute. Solve the following equation to find the number of liters per hour.

$\frac{h}{60} = 1.5$

90 L per hour

2. The length of the small intestine is 640 cm, or 51.2 times the length of the pancreas. Solve the following equation to find the length of the pancreas.

$51.2p = 640$

12.5 cm

3. In the human body, the fastest that a nerve impulse can be transmitted is at a rate of 120.001 $\frac{m}{sec}$. This is 171.43 times faster than the slowest rate that a nerve impulse can be transmitted. Solve the following equation to find the slowest rate at which nerve impulses can be transmitted.

$171.43n = 120.001$

0.7 $\frac{m}{sec}$

4. The widest nerve in the human body is the spinal cord. Its width is 3.8 cm. This is 19 times the width of the narrowest nerve in the body. Solve the following equation to find the width of the narrowest nerve.

$19t = 3.8$

0.2 cm

5. The width of 5,000 human hairs stacked side-by-side is about 19.5 in. Solve the following equation to find the average width of one human hair.

$5{,}000h = 19.5$

0.0039 in.

Name _____

Reteaching
2-5

Solving Multiplication and Division Equations

To solve an equation, make the two sides of the equation equal with the variable alone on one side. You can use inverse operations and properties of equality.

Remember: **Inverse operations** "undo" each other. **Properties of Equality** say that you can multiply or divide both sides of an equation by the same number and the two sides of the equation remain equal.

Use division to "undo" multiplication.

With numbers:
$3 \times 6 = 18$
$3 \times 6 \div \mathbf{6} = 18 \div \mathbf{6}$
$3 = 3$

In algebra:
$m \times 9 = 54$
$m \times 9 \div \mathbf{9} = 54 \div \mathbf{9}$
$m = 6$

Use multiplication to "undo" division.

With numbers:
$24 \div 2 = 12$
$24 \div 2 \times \mathbf{2} = 12 \times \mathbf{2}$
$24 = 24$

In algebra:
$p \div 8 = 7$
$p \div 8 \times \mathbf{8} = 7 \times \mathbf{8}$
$p = 56$

For **1** through **3**, name the inverse operation you will use to get the variable alone on one side of the equation. In **2** and **3**, also fill in the blanks.

1. $5p = 50$
$5p \div 5 = 50 \div 5$

division

2. $n \div 16 = 4$
$n \div 16 \times 16 = 4 \times$ ___

16; multiplication

3. $15 = r \times 3$
$15 \div$ ___ $= r \times 3 \div$ ___

3; 3; division

For **4** through **6** solve the equation.

4. $w \div 5 = 8$

$w = 40$

5. $20y = 100$

$y = 5$

6. $3 = s \div 10$

$s = 30$

7. Writing to Explain Jason solved the equation $r \div 14 = 19$. He got 266. Is his answer correct? Explain how you know.

The answer is correct. When you substitute 266 for r in the equation, $266 \div 14 = 19$.

Name _____

Practice
2-5

Solving Multiplication and Division Equations

For **1** through **3**, explain how to get the variable alone in each equation.

1. $r \times 7 = 42$
$r \times 7 \div 7 = 42 \div 7$

Divide both sides by 7.

2. $m \div 6 = 12$
$m \div 6 \times \_\_ = 12 \times \_\_$

Multiply both sides by 6.

3. $44 = 2k$

Divide both sides by 2.

For **4** through **9**, solve the equation. Check your answer.

4. $9n = 72$

$n = 8$

5. $y \times 5 = 60$

$y = 12$

6. $v \div 13 = 2$

$v = 26$

7. $w \div 7 = 15$

$w = 105$

8. $216 = 36p$

$p = 6$

9. $17 = t \div 3$

$t = 51$

10. Writing to Explain Tell how you would get the variable m alone on one side of the equation $15m = 45$.

$15m$ means 15 times m. To undo multiplying m by 15, divide both sides of the equation by 15.

11. Write a Problem Write a problem that can be solved with the equation $r \div 6 = 14$.

Sample answer: Six friends shared the cost of a boat rental equally. Each friend paid $14. How much did the boat rental cost?

12. Number Sense Which equation can you use to solve this problem?

There are 12 muffins in a package. Will bought 84 muffins. How many packages did he buy?

A $12 \times p = 84$

B $84 \times 12 = p$

C $12 \div p = 84$

D $84 = 12 + p$

Name _____

Enrichment
2-5

That's How the Cookies Crumble

Reasoning

1. Granny's Oatmeal Cookies are $0.33 each or $3.00 per dozen. Is the price per dozen a good buy? Explain why or why not.

   Yes; Sample answer: The price per dozen for the oatmeal cookies is $3.00, which is less than you would pay if you bought 12 individual cookies at $0.33 each, $3.96.

2. About how many dozens of Granny's Oatmeal Cookies could you buy for $20.00?

   About 6 dozen

3. Granny's Low-Fat Oatmeal Cookies are $0.35 each or $4.20 per dozen. Is the price per dozen a good buy? Explain why or why not.

   No; Sample answer: The price per dozen for the low-fat oatmeal cookies is $4.20, which is the same as you would pay if you bought 12 individual cookies at $0.35 each.

4. How many dozens of Granny's Low-Fat Oatmeal Cookies could you buy for $20.00?

   4 dozen

5. Granny's Oatmeal Cookies are on sale for $1.75 for a half dozen. Is this a good price? Explain.

   Yes, 6 individual cookies would cost $1.98, which is more than the sale price.

6. Which would be a better buy, 6 low-fat cookies and 6 sale price oatmeal cookies or a dozen low-fat cookies? Explain how you know.

   6 of each type of cookie is the better buy at $3.85.

Name _____

Reteaching
2-6

Solving Equations with Fractions

You can solve equations with fractions and mixed numbers the same way that you solve equations with whole numbers: using inverse relationships and properties of equality to isolate the variable.

Solve the following problem. Remember to find a common denominator before you add or subtract fractions or mixed numbers.

Jason worked at a car wash for 5 hours. For $3\frac{1}{3}$ hours, he vacuumed the interiors of cars. For the other part of his shift, he collected money from customers. For how many hours did Jason collect money? Use the equation $3\frac{1}{3} + h = 5$ to solve the problem.

$3\frac{1}{3} + h = 5$

$3\frac{1}{3} + h - 3\frac{1}{3} = 5 - 3\frac{1}{3}$ ← Subtract $3\frac{1}{3}$ from both sides of the equation.

$h = 4\frac{3}{3} - 3\frac{1}{3}$ ← Find a common denominator.

$h = 1\frac{2}{3}$

Jason collected money from customers for $1\frac{2}{3}$ hours.

Here is another example. Solve the equation $\frac{5}{9}z = \frac{1}{4}$ by getting the variable alone on one side of the equation.

$\frac{5}{9}z = \frac{1}{4}$

$\frac{5}{9}z \times \frac{9}{5} = \frac{1}{4} \times \frac{9}{5}$ ← Multiply both sides by $\frac{9}{5}$, the reciprocal of $\frac{5}{9}$.

$z = \frac{9}{20}$

Solve each equation.

1. $s + \frac{1}{4} = 12\frac{1}{2}$ **$12\frac{1}{4}$**

2. $2\frac{2}{3} + y = 4\frac{1}{4}$ **$1\frac{7}{12}$**

3. $a - 4\frac{3}{8} = 2\frac{1}{2}$ **$6\frac{7}{8}$**

4. $\frac{2}{7}q = 3\frac{3}{5}$ **$12\frac{3}{5}$**

5. $14\frac{1}{6} - d = 12\frac{3}{4}$ **$1\frac{5}{12}$**

6. $f \times \frac{2}{7} = 5\frac{1}{2}$ **$19\frac{1}{4}$**

Solve.

7. Reasonableness 6 people are seated along a counter that is $11\frac{1}{4}$ feet long. Use the equation $\frac{1}{6} \times 11\frac{1}{4} = p$ to find the amount of counter space for one person. Tell one way you can check the reasonableness of your answer.

Each person has $1\frac{7}{8}$ feet of counter space. Sample explanation: Each person has about 2 feet of counter space, and there are 6 people at the counter. $2 \times 6 = 12$, so the counter should be about 12 feet long. The counter is $11\frac{1}{4}$ feet long, which is close to 12, so the answer is reasonable.

Name _____

Practice
2-6

Solving Equations with Fractions

Solve each equation.

1. $b - 1\frac{1}{3} = 4\frac{4}{9}$ **$5\frac{7}{9}$**
2. $3\frac{2}{9} - k = \frac{1}{5}$ **$3\frac{1}{45}$**
3. $g \times \frac{2}{3} = 6\frac{1}{9}$ **$9\frac{1}{6}$**
4. $t + 1\frac{3}{8} = 2\frac{1}{4}$ **$\frac{7}{8}$**
5. $3\frac{1}{6} + x = 7\frac{5}{12}$ **$4\frac{1}{4}$**
6. $\frac{2}{9} \times y = 4\frac{5}{6}$ **$21\frac{3}{4}$**
7. $p \times \frac{4}{9} = 4\frac{5}{12}$ **$9\frac{15}{16}$**
8. $m + \frac{3}{5} = 8\frac{1}{2}$ **$7\frac{9}{10}$**
9. $a \times \frac{5}{8} = 100$ **160**
10. $5\frac{2}{5} - v = 1\frac{1}{3}$ **$4\frac{1}{15}$**

11. **Geometry** To find the area of a rectangle, multiply the length and width. Write an equation to find the area of rectangle $3\frac{3}{5}$ feet long and $2\frac{1}{6}$ feet wide. Then find the area in square feet.

$a = 3\frac{3}{5} \times 2\frac{1}{6}$; The area is $7\frac{4}{5}$ square feet.

12. **Reasoning** Is the solution of $w \times \frac{11}{12} = 19$ greater than or less than 19? How can you tell without solving the equation?

Greater than 19; Sample explanation: When you multiply by a fraction less than 1, the product is less than the number multiplied. The value for *w* needs to be greater than 19 in order to multiply it by a fraction less than 1 and arrive at 19.

13. **Algebra** Jill cut a $3\frac{1}{2}$-foot chain into 2 pieces in order to hang 2 birdfeeders. The longer piece of chain was $1\frac{5}{6}$ feet long. Tell how to write and solve an equation to find the length of the shorter piece.

The shorter piece was $1\frac{2}{3}$ feet long. Sample explanation: Write the equation $1\frac{5}{6} + c = 3\frac{1}{2}$. To solve, subtract $1\frac{5}{6}$ from both sides of the equation.

14. **Writing to Explain** Antonio is staying in Seattle for the entire month of July. He has been in Seattle for a week and $3\frac{2}{3}$ days. How many more days will he be in Seattle? Explain how you found your answer.

He will be in Seattle for $20\frac{1}{3}$ more days. Sample explanation: He will be staying for the month of July, which has 31 days. He has been there for a week and $3\frac{2}{3}$ days, which is $10\frac{2}{3}$ days. To find the answer, I solved the equation $10\frac{2}{3} + d = 31$.

Name _____

Enrichment
2-6

What's in the Box?

Reasoning

You can use multiplication to find sums and differences of fractions! Each of the examples below shows the same way to find $\frac{4}{5} - \frac{1}{3}$.

Find the cross products. Then write the sum or difference over the product of the denominators.

$$\frac{4}{5} - \frac{1}{3} = \frac{(4 \times 3) - (5 \times 1)}{5 \times 3}$$

$$= \frac{12 - 5}{15} = \frac{7}{15}$$

This can be written algebraically as

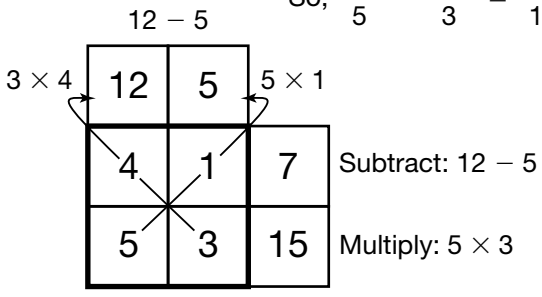
$$\frac{a}{b} - \frac{c}{d} = \frac{(a \times d) - (b \times c)}{b \times d}$$

and

$$\frac{a}{b} + \frac{c}{d} = \frac{(a \times d) + (b \times c)}{b \times d}$$

Write the fractions in the boxes. Multiply the denominators of each fraction by the numerator of the other fraction.

So, $\frac{4}{5} - \frac{1}{3} = \frac{7}{15}$



Subtract (or add) the products to find the numerator of the difference (or sum). Multiply the two denominators to find the denominator of the difference (or sum).

Use cross products or boxes to find each sum or difference. Simplify if necessary.

1. $\frac{7}{8} + \frac{1}{6} =$ $1\frac{1}{24}$

2. $\frac{11}{20} - \frac{1}{8} =$ $\frac{17}{40}$

3. $\frac{15}{16} + \frac{3}{10} =$ $1\frac{19}{80}$

4. $\frac{7}{25} - \frac{1}{12} =$ $\frac{59}{300}$

Complete the boxes and write the answer in the blank. Simplify if necessary.

5. $\frac{4}{7} + \frac{1}{3} =$ $\frac{19}{21}$

12	7	
4	1	19
7	3	21

6. $\frac{2}{9} - \frac{1}{16} =$ $\frac{23}{144}$

32	9	
2	1	23
9	16	144

Name _____

Reteaching
2-7

Writing Inequalities

You can write an inequality to show a relationship in a real-world situation. For example, you could write an inequality to show that there were more than 50 people at a picnic. Or you could write an inequality to show that you can spend up to $15.00 at a store. An inequality is a mathematical sentence that contains an inequality symbol.

Inequality Symbols

Symbol	Meaning
$<$	is less than
$\leq$	is less than or equal to
$>$	is greater than
$\geq$	is greater than or equal to
$\neq$	is not equal to

How can you write an inequality to show that there were more than 50 people at a picnic? Here are some numbers of people that might have been at the picnic:

52, 67, 102, 115

There were more than 50 people at the picnic, so every possible number will be greater than 50. Use the variable p to represent the number of people at the picnic. Use the greater than symbol ($>$) to write the inequality.

$p > 50$

How can you write an inequality to show that there were 50 or more people at a picnic? If there were 50 or more, 50 must be included as a possible answer. For this situation, use the greater than or equal to symbol ($\geq$) to write the inequality.

$p \geq 50$

Write an inequality for each situation.

1. A number, x, is less than 4. $x < 4$
2. A price, p, is at least $10.00. $p \geq 10$
3. The time limit, t, is 55 minutes. $t \leq 55$
4. An age, a, is not 16. $a \neq 16$
5. A height, h, is greater than 2 meters. $h > 2$
6. Amy knitted more than 7 scarves, s. $s > 7$
7. The temperature, t, was not 53°. $t \neq 53$
8. There can be up to 20 dogs, d, at a dog park. $d \leq 20$
9. **Writing to Explain** The Tornadoes baseball team has not won a game this year. Write an inequality to show the number of games that another team would have to win to have a better record than the Tornadoes. Explain your answer.

Sample answers: $g > 0$ or $g \geq 1$. Sample explanation: The Tornadoes haven't won a game, so another team would need to win at least 1 game to have a better record.

Name _____

Practice
2-7

Writing Inequalities

Write an inequality for each situation.

1. A bucket, b, holds up to 3 gallons. $b \leq 3$
2. Chloe's age, a, is under 8. $a < 8$
3. The test score, s, is not 92. $s \neq 92$
4. The temperature, t, is over 80°. $t > 80$
5. The width, w, is at least 10 feet. $w \geq 10$

Solve each problem.

6. The stadium had seating for 40,000 fans, and it was not full. Write an inequality to show the number of fans at the game. $f < 40{,}000$
7. The museum gave a discount to seniors over the age of 65. Write an inequality to represent the age of the seniors who receive a discount. $s > 65$
8. Students may not work in groups of 3. Write an inequality to represent the number of students that may be in a group. $n \neq 3$
9. Campfires must be at least 30 feet from the nearest tent. Write an inequality to show distance from a campfire to the nearest tent. $d \geq 30$
10. Jordan had less than 55 minutes to finish his work. Then he got a phone call that lasted 16 minutes. Write an inequality to show how much time he has left to work. $t < 39$
11. Caroline practices piano as much as 2 hours a day Monday through Thursday, and she practices up to 3 hours on Sunday. Write an inequality to show the number of hours that she practices in one week. $h \leq 11$
12. **Writing to Explain** How do you know when to use the less than symbol and when to use the less than or equal to symbol when writing an inequality for a situation?

    Sample explanation: If possible values for the variable are up to but not including the number, you should use the less than symbol. If the values include the number, you should use the less than or equal to symbol.
13. **Write a Problem** Write a real-world situation that can be represented by $x \leq 5$.

    Sample answer: Students may choose up to 5 photos to display on a poster.

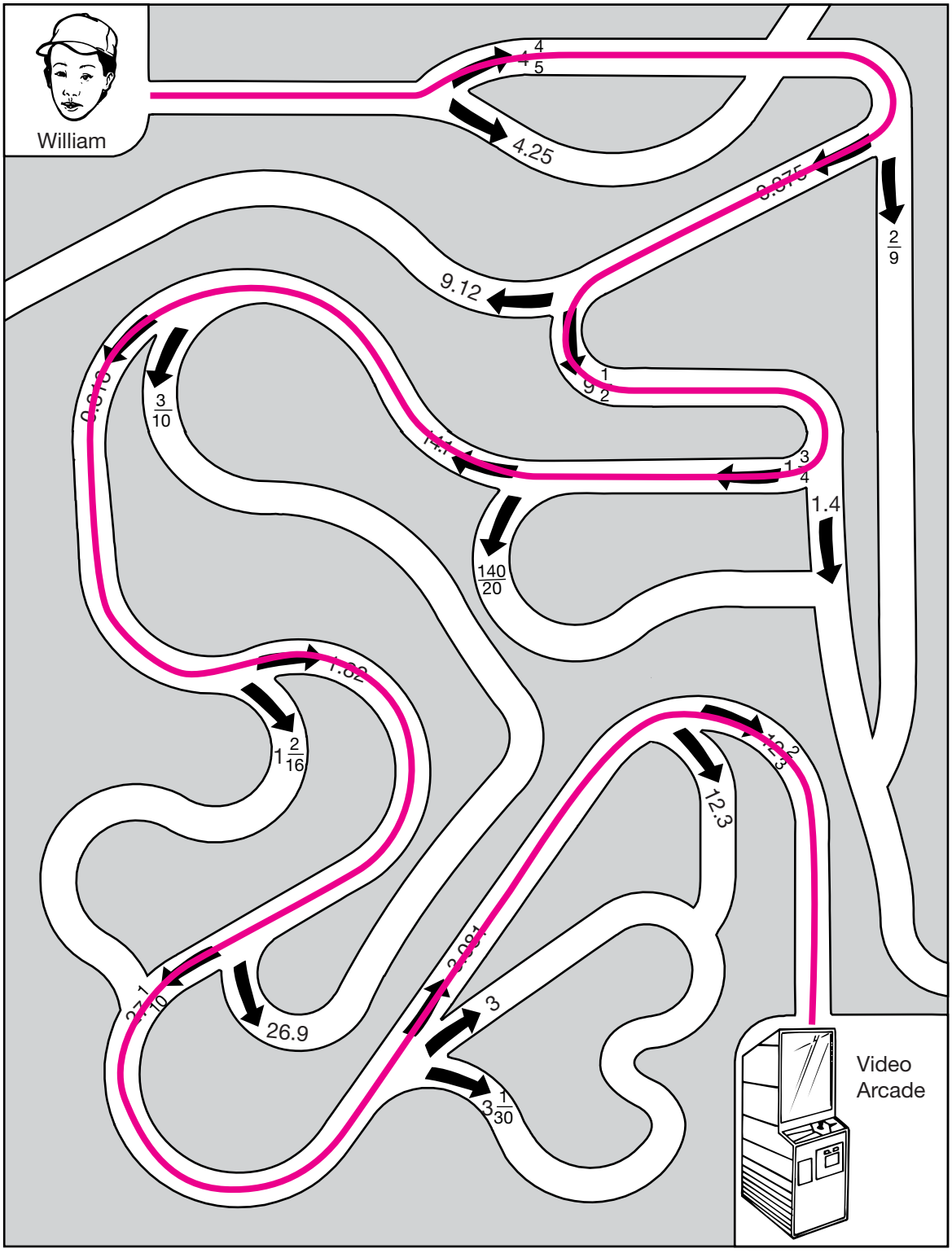
Name _____

Enrichment
2-7

Maze

Number Sense

William wants to go to the video arcade, but he forgot how to get there. Help him through the maze. Whenever William gets to a fork in the road, go the way marked by the greater fraction or decimal.



Name _____

Reteaching
2-8

Solving Inequalities

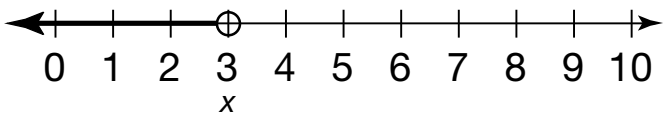
An equation shows when expressions are equal. Equations use equal signs (=). An inequality is a statement that uses the greater-than symbol (>), the less-than symbol (<), the greater-than-or-equal-to symbol (≥), or the less-than-or-equal-to symbol (≤).

Variables can be used with inequalities. A variable in an inequality stands for all numbers that make the inequality true.

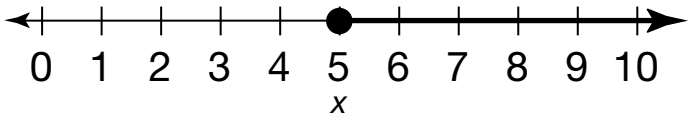
For example, in the inequality $x < 3$, the x stands for all numbers less than 3. So x can be 0, 1, or 2.

The inequality $13 \leq y + 5$ can have solutions $y = 8$, 9, and 10, since $8 + 5 = 13$, $9 + 5 = 14$, and $10 + 5 = 15$.

To graph $x < 3$, first draw an open circle on the number line above 3. Shade a line from the open circle to the left through the arrow. This represents all numbers that are less than 3.



To graph x is greater than or equal to 5, first draw a closed circle on the number line at 5. Then shade a line from the closed circle to the right through the arrow.



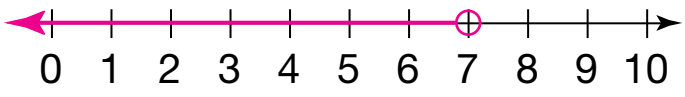
1. Is 0 a solution of $x > 2$? No

2. Is 5 a solution of $y \leq 10$? Yes

3. Name 3 solutions for $z > 5$. Sample answer: 6, 7, 8

4. Name 3 solutions for $x \geq 4$. Sample answer: 4, 5, 6

5. Graph the inequality $x < 7$ on the number line below.



6. Graph the inequality $x \geq 4$ on the number line below.

Name _____

Practice
2-8

Solving Inequalities

Give 3 values that solve the inequality for Exercises **1** through **16**.

Sample answers are given.

1. $x > 0$
1, 2, 3

2. $y > 5$
6, 7, 8

3. $z \leq 10$
7, 8, 9

4. $z < 3$
0, 1, 2

5. $x > 4$
5, 6, 7

6. $x < 4$
1, 2, 3

7. $x > 170$
171, 172, 173

8. $x > 1$
2, 3, 4

9. $x < 9$
6, 7, 8

10. $x < 6$
3, 4, 5

11. $y > 2$
3, 4, 5

12. $y \geq 100$
100, 102, 103

13. $z < 8$
5, 6, 7

14. $x \geq 77$
78, 79, 80

15. $u > 10.9$
11, 12, 13

16. $u \leq 13.99$
11, 12, 13

17. Draw the inequality $x < 7$ on a number line.

18. Draw the inequality $x \geq 7$ on a number line.

19. Which is NOT a solution to $x > 18$?

A 18 **B** 18.000001 **C** 19 **D** 30

20. Writing to Explain Is 0 a solution to $x > 0$? Why or why not?

No, because *x* is greater than 0 and that does not include the number 0.

Name _____

Enrichment
2-8

Common Inequalities

Visual Thinking

Every inequality can be graphed on the number line. So what happens if there are two or more inequalities? Graph the following inequalities on a number line. Find what solutions they have in common. (*Hint:* use the numbers that both inequalities include when graphing.)

1. Suppose you have inequalities $x > 5$ and $x > 7$. What is the graph of the solutions common to both inequalities?

2. Suppose instead the inequalities were $x > 5$ and $x < 7$. What then is the graph of the solutions common to both inequalities?

3. Suppose the inequalities were $x < 5$ and $x > 7$. What is the graph of the solutions common to both inequalities?

No solution; there are no common points.

For **4** and **5**, graph the solutions that are common to both inequalities.

4. $2 < x$ and $x < 10$

5. $5 > x$ and $x > 3$

Name _____

Reteaching
2-9

Problem Solving: Draw a Picture and Write an Equation

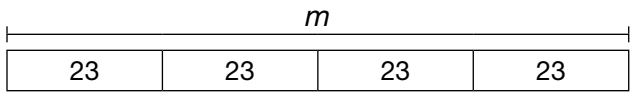
Zoo keepers divided some land into 4 sections for the monkeys at the zoo. Each section has 23 monkeys. How many monkeys are at the zoo?

Read and Understand

Choose a variable for the unknown. The unknown is the total number of monkeys at the zoo.

Let m = the total number of monkeys.

Draw a picture to show that the total number of monkeys is divided into 4 equal sections of 23 monkeys.



Plan and Solve
Write an equation using the variable and the picture.

$m \div 4 = 23 \leftarrow$ Use division.

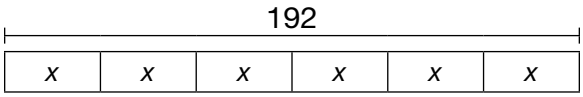
Solve the equation.

$$m \div 4 = 23$$
$$m \div 4 \times 4 = 23 \times 4$$
$$m = 92$$

There are 92 monkeys at the zoo.

Write an equation for **1**. Solve each problem.

1. Juan has 6 times as many basketball cards as Nick. If Juan has 192 basketball cards, how many does Nick have?



$6x = 192; x = 32$

2. Several sixth grade classes are going on a field trip to a planetarium. The teachers divided the classes into 19 groups. There are 7 students in each group. How many students are going to the planetarium? Use the equation $c \div 19 = 7$.

133 students

3. Each bus for a field trip can carry 27 students. If 216 students are going on the field trip, how many buses are needed? Use the equation $27n = 216$.

8 buses

Name _____

Practice
2-9

Problem Solving: Draw a Picture and Write an Equation

Draw a picture and write an equation to solve each problem.

1. Mr. Conover bought 6 boxes of pastels for his art class. He paid $4.50 for each box. What was the total cost of the boxes?

c = total cost

4.50	4.50	4.50	4.50	4.50	4.50

; $27

2. A company charters boats for whale watching. The company chartered 13 boats. There were a total of 325 passengers on the boats. What was the average number of passengers per boat?

325 passengers

x	x	x	x	x	x	x	x	x	x	x	x	x

; $13x = 325$; 25

3. A store sells 5-gallon bottles of water for $8. The store made $288 on Monday selling the water. How many bottles were sold?

$288

x	x	x	x	x	x	x	x

; 36

4. A sign at a recycling center states that 118 pounds of recycled newspapers saves one tree. How many pounds of newspapers will save 3 trees?

p = total pounds of newspapers

118	118	118

; $p \div 118 = 3$; 354

5. **Algebra** Students mailed invitations to a play to 414 parents. Each student mailed 18 invitations. If s equals the number of students who mailed invitations, which equation best shows the number of invitations that were mailed?

A $s + 18 = 414$

B $s \div 18 = 414$

C $18 \div s = 414$

D $18s = 414$

Name _____

Enrichment
2-9

Actual Number Possibility

Algebra

An estimate for each exercise has been given. Write a decimal or whole number not ending in zero to make each exercise true. Different estimating strategies may be used.

Sample answers are given.

1. 6.25 + 32.7 ≈ 39
2. $1,850 − $1,575 ≈ $300
3. 12.4 × 3.7 ≈ 48
4. 2,165 ÷ 313 ≈ 7
5. 87.234 − 36.876 ≈ 50
6. 95.2 ÷ 8.2 ≈ 12
7. 8,812 + 27,149 ≈ 36,000
8. 3.092 × 43.872 ≈ 120
9. 782 − 384 + 2,415 ≈ 2,800
10. (15 × 12) + 4,562 ≈ 4,700
11. 1.586 + 10.96 + 11.21 ≈ 24
12. (978 ÷ 10.17) − 92 ≈ 4
13. 7.5 + 14.4 ≈ 22
14. 807 ÷ 103 ≈ 8
15. 395.5 × 21.34 ≈ 8,000

