Chapter 12

Name _____

Algebra • Expressions

Show What You Know

Evaluating Expressions Find the value of the expression.

1. $19 + 4 =$ _____
2. $36 \div 4 =$ _____
3. $7 \times 5 =$ _____
4. $66 \div 6 =$ _____
5. $37 - 18 =$ _____
6. $27 + 36 =$ _____

Solving Equations Find the missing value.

7. $45 +$ _____ $= 53$
8. $4 \times$ _____ $= 24$
9. _____ $- 15 = 24$
10. $27 \div$ _____ $= 9$
11. _____ $\times 3 = 33$
12. _____ $+ 30 = 42$

Translating Written Descriptions Use the given description to determine the outputs in the table.

13. Add 5, then subtract 8.

Input	Output
4	
11	
23	

14. Multiply by 2, then subtract 3.

Input	Output
5	
8	
12	

MATH in the Real World

Paula has a bag of 36 baby carrots. She wants to split the carrots up evenly among her 3 friends. How many carrots will each of her friends receive? Write an expression that could be used to solve this problem.

Vocabulary Builder

Go Online For more help

Visualize It

Sort the review words into the category of the operation it pertains to.

Addition	Subtraction	Multiplication	Division

Connect to Vocabulary

Review Words
- add
- difference
- divide
- minus
- multiply
- plus
- product
- quotient
- subtract
- sum
- times
- Associative Property
- Commutative Property
- Identity Property

Preview Words
- Distributive Property
- evaluate
- numerical expression
- order of operations

Understand Vocabulary

Write the review and preview words that answer the question "What am I?"

1. I am the property that states the way in which the numbers are grouped in a multiplication problem and the way in which the numbers are grouped in an addition problem does not change the solution.

_____

2. I am a mathematical phrase that has numbers and operation signs but no equal sign.

_____

3. I am the property that states the sum of 0 and a number is that number and the product of 1 and a number is that number.

_____

4. I am the property that states that multiplying a sum by a number is the same as multiplying each addend in the sum by the number and then adding the products.

_____

5. I am the property that states the order in which you multiply numbers in a multiplication problem and the order in which you add numbers in an addition problem does not change the solution.

_____

Name _____

Properties

Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.2.2, 5.AR.2.3
- **Number Sense & Operations** 5.NSO.2.4
- **Mathematical Thinking & Reasoning** MTR.4.1, MTR.5.1

I Can use properties of operations to solve problems.

You can use the properties of operations to help you evaluate numerical expressions more easily.

Properties of Addition

Commutative Property of Addition If the order of addends changes, the sum stays the same.	$12.05 + 7.20 = 7.20 + 12.05$
Associative Property of Addition If the grouping of addends changes, the sum stays the same.	$5 + (8 + 14) = (5 + 8) + 14$
Identity Property of Addition The sum of any number and 0 is that number.	$\frac{1}{3} + 0 = \frac{1}{3}$

Properties of Multiplication

Commutative Property of Multiplication If the order of factors changes, the product stays the same.	$\frac{1}{8} \times \frac{1}{4} = \frac{1}{4} \times \frac{1}{8}$
Associative Property of Multiplication If the grouping of factors changes, the product stays the same.	$11 \times (3 \times 6) = (11 \times 3) \times 6$
Identity Property of Multiplication The product of any number and 1 is that number.	$\frac{1}{2} \times 1 = \frac{1}{2}$

UNLOCK the Problem Real World

The table shows the number of bones in several parts of the human body. What is the total number of bones in the ribs, the skull, and the spine?

Part	Number of Bones
Ankle	7
Ribs	24
Skull	28
Spine	26

To find the sum of addends using mental math, you can use the Commutative and Associative Properties.

Use properties to find 24 + 28 + 26.

$24 + 28 + 26 = 28 + $ _____ $+ 26$ Use the _____ Property to reorder the addends.

$= 28 + (24 +$ _____ $)$ Use the _____ Property to group the addends.

$= 28 +$ _____ Use mental math to add.

$=$ _____

So, there are _____ bones in the ribs, the skull, and the spine.

Math Talk

MTR 5.1 Use patterns and structure.

Explain why grouping 24 and 26 makes the problem easier to solve.

Distributive Property

Multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products. The expression on the left of the equal sign will always be equivalent to the expression on the right. This is true for all the properties of operations, which are also called the ***properties of equality***.

$5.6 \times (7.2 + 9.1) = (5.6 \times 7.2) + (5.6 \times 9.1)$

$5.6 \times (16.3) = (40.32) + (50.96)$

$91.28 = 91.28$

The expressions on both sides of the equal sign are equivalent, so the equation is true.

The Distributive Property can also be used with multiplication and subtraction. For example, $2 \times (10 - 8) = (2 \times 10) - (2 \times 8)$.

Example 1 Use the Distributive Property to find the product.

One Way Use addition.

$8 \times 59 = 8 \times (\_\_\_\_\_ + 9)$ Use a multiple of 10 to write 59 as a sum.

$= (\_\_\_\_\_ \times 50) + (8 \times \_\_\_\_\_)$ Use the Distributive Property.

$= \_\_\_\_\_ + \_\_\_\_\_$ Use mental math to multiply.

$= \_\_\_\_\_$ Use mental math to add.

Another Way Use subtraction.

$8 \times 59 = 8 \times (\_\_\_\_\_ - 1)$ Use a multiple of 10 to write 59 as a difference.

$= (\_\_\_\_\_ \times 60) - (8 \times \_\_\_\_\_)$ Use the Distributive Property.

$= \_\_\_\_\_ - \_\_\_\_\_$ Use mental math to multiply.

$= \_\_\_\_\_$ Use mental math to subtract.

Example 2 Complete the equation, and tell which property you used.

A $\frac{2}{3} \times \_\_\_\_\_ = \frac{2}{3}$

Think: A number times 1 is equal to itself.

Property: _____

_____

B $4.7 \times 1.5 = 1.5 \times \_\_\_\_\_$

Think: Changing the order of factors does not change the product.

Property: _____

_____

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Describe how to use the Distributive Property to find the product 3×29.9.

Name _____

Share and Show

Math Board

1. Use properties to find $4 \times 23 \times 25$.

$23 \times$ _____ $\times 25$ _____ Property of Multiplication

$23 \times ($_____ $\times$ _____$)$ _____ Property of Multiplication

$23 \times$ _____

_____

Use properties to find the sum or product.

2. $\frac{8}{9} + \frac{4}{9} + \frac{1}{9}$

3. 9×52

4. $107 + 0 + 39 + 13$

Complete the equation, and tell which property you used.

5. $9 \times (30 + 0.7) = (9 \times$ _____ $) + (9 \times 0.7)$

6. $0 +$ _____ $= 4.76$

Math Talk

MTR 5.1 Use patterns and structure.

Describe how you can use properties to solve problems more easily.

On Your Own

Use properties to find the sum or product.

7. $3 \times 3\frac{3}{8}$

8. $0.4 \times 0.6 \times 0.5$

9. $21 + 25 + 39 + 5$

Complete the equation, and tell which property you used.

10. $11 + (19 + 6) = (11 +$ _____ $) + 6$

11. $25 + 14 =$ _____ $+ 25$

12. MTR Show how you can use the Distributive Property to rewrite and find $(3.2 \times 0.6) + (3.2 \times 0.4)$.

Problem Solving · Applications

13. Three friends' meals at a restaurant cost $13, $14, and $11. Use parentheses to write two different expressions to show how much the friends spent in all. Which property does your pair of expressions demonstrate?

14. MTR Mito is designing an aquarium for a doctor's office. He plans to buy 6 red blond guppies, 1 blue neon guppy, and 1 yellow guppy. The table shows the price list for the guppies. How much will the guppies for the aquarium cost?

Fancy Guppy Prices	
Blue neon	$11
Red blond	$22
Sunrise	$18
Yellow	$19

15. Sylvia bought 8 tickets to a concert. Each ticket costs $18. To find the total cost in dollars, she added the product 8×10 to the product 8×8, for a total of 144. Which property did Sylvia use?

16. Julie wrote $(15 - 6) - 3 = 15 - (6 - 3)$. Is Julie's equation sense or nonsense? Do you think the Associative Property works for subtraction? Explain.

MATH on the Spot

Show the Math

Demonstrate Your Thinking

17. Find the property that each equation shows.

$14 \times (4 \times 9) = (14 \times 4) \times 9$ •

$1 \times 3 = 3 \times 1$ •

$\frac{1}{6} \times \frac{1}{3} = \frac{1}{3} \times \frac{1}{6}$ •

- Commutative Property of Multiplication
- Associative Property of Multiplication
- Identity Property of Multiplication

Name _____

Properties

Go Online
Interactive Examples

Use properties to find the sum or product.

1. 6×8.9

$6 \times (9 - 0.1)$
$(6 \times 9) - (6 \times 0.1)$
$54 - 0.6$

53.4

2. $93 + (68 + 7)$

3. $\frac{1}{4} \times \frac{2}{3} \times \frac{4}{3}$

4. 8×51

5. $34 + 0 + 18 + 26$

6. 6×107

Complete the equation, and tell which property you used.

7. $(3 \times 10) \times 8 =$ _____ $\times (10 \times 8)$

8. $1.6 + 3.1 = 3.1 +$ _____

Problem Solving Real World

9. The Metro Theater has 20 rows of seats with 18 seats in each row. Tickets cost $5. The theater's income in dollars if all seats are sold is $(20 \times 18) \times 5$. Use properties to find the total income.

10. The numbers of students in the four sixth-grade classes at Northside School are 26, 19, 34, and 21. Use properties to find the total number of students in the four classes.

11. WRITE Math Explain how you could mentally find 8×45 by using the Distributive Property.

Lesson Check

12. To find $\frac{1}{9} + (\frac{3}{9} + \frac{8}{9})$, Lennie added $\frac{1}{9}$ and $\frac{8}{9}$. Then he added $\frac{3}{9}$ to the sum. What properties did he use?

13. Marita did 65 sit-ups each day for one week. Use the Distributive Property to show an expression you can use to find the total number of sit-ups Marita did during the week.

Spiral Review

14. The average sunflower has 34 petals. What is the best estimate of the total number of petals on 57 sunflowers?

15. A golden eagle flies a distance of 290 miles in 5 days. If the eagle flies the same distance each day of its journey, how far does the eagle fly per day?

16. What is the value of the underlined digit in the following number?

2,9<u>8</u>3,785

17. What best describes the number 5? Write *prime, composite, neither prime nor composite, or both prime and composite.*

Name _____

Write Numerical Expressions

I Can use a numerical expression to describe a situation.

Florida's B.E.S.T.
- **Algebraic Reasoning** 5.AR.2.1
- **Mathematical Thinking & Reasoning** MTR.4.1, MTR.6.1, MTR.7.1

UNLOCK the Problem Real World

A **numerical expression** is a mathematical phrase that has numbers and operation signs but does not have an equal sign.

Tyler caught 15 small bass, and his dad caught 12 small bass in the Memorial Bass Tourney in Tidioute, PA. Write a numerical expression to represent how many fish they caught in all.

Choose which operation to use.

You need to join groups of different sizes, so use addition.

Tyler	plus	his dad
↓	↓	↓
15	+	12

So, 15 + 12 represents how many fish they caught in all.

Example 1 Write an expression to match the words.

A Addition

Myleen mixes $\frac{1}{3}$ cup of olive oil and $\frac{1}{3}$ cup of vinegar to make dressing

olive oil	plus	vinegar
↓	↓	↓
$\frac{1}{3}$	+	$\frac{1}{3}$

B Subtraction

Lucia has 128 stamps. She uses 38 stamps on party invitations.

stamps	minus	stamps used
↓	↓	↓
128	−	_____

C Multiplication

Karla buys 5 books. Each book costs $3.

books	times	cost per book
↓	↓	↓
_____	×	_____

D Division

Four friends share 5.2 pounds of carrots.

carrots	divided by	friends
↓	↓	↓
_____	÷	_____

Math Talk

MTR 7.1 Apply mathematics to real-world contexts.

What does the expression model in each example?

Expressions with Parentheses The meaning of the words in a problem will tell you where to place the parentheses in an expression.

Example 2 Which expression matches the meaning of the words?

- Underline the events for each day.
- Circle the number of days these events happened.

Mauris went fishing for 3 days. Each day he put $15 in his pocket. At the end of each day, he had $5 left. How much money did Mauris spend by the end of the trip?

Think: Each day he took $15 and had $5 left. He did this for 3 days.

($15 − $5) ← **Think:** What expression can you write to show how much money Mauris spends in one day?

3 × ($15 − $5) ← **Think:** What expression can you write to show how much money Mauris spends in three days?

Example 3 Which problem matches the expression $20 − ($12 + $3)?

Kim has $20 to spend for her fishing trip. She spends $12 on a fishing pole. Then she finds $3. How much money does Kim have now?

List the events in order.

First: Kim has $20.

Next: _____.

Then: _____.

Do these words match the expression? _____

Kim has $20 to spend for her fishing trip. She spends $12 on a fishing pole and $3 on bait. How much money does Kim have now?

List the events in order.

First: Kim has $20.

Next: _____.

Then: _____.

Do these words match the expression? _____

Math Talk

MTR 6.1 Assess the reasonableness of solutions.

Explain how the expression of what Mauris spent in three days compares to the expression of what he spent in one day?

Share and Show Math Board

Circle the expression that matches the words.

1. Teri had 18 worms. She gave 4 worms to Jada and 3 worms to Dejuan.

$(18 - 4) + 3$ $18 - (4 + 3)$

2. Rick had $188.60. He then worked 4 hours for $15.75 each hour.

$\$188.60 + (4 \times \$15.75)$ $(\$188.60 + 4) \times \$15.75$

Name _____

Write an expression to match the words.

3. Canda runs 2.6 miles on Monday and 9.8 miles on Tuesday.

4. Igor has 27 fish. $\frac{1}{3}$ of his fish are neon tetras.

Write words to match the expression.

5. $\frac{3}{4} - \frac{1}{8}$

6. $6 \times (12 - 4)$

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Is $4 \times 8 = 32$ an expression? Explain why or why not.

On Your Own

Write an expression to match the words.

7. Braden stores $2\frac{1}{2}$ liters of milk in $\frac{1}{2}$-liter bottles.

8. Maya has 14 baseball cards. She finds 5 more baseball cards.

9. Isabelle bought 12 bottles of water at $1.25 each.

10. José had $20. He spent $5 on lunch and $10 at the bookstore.

Write words to match the expression.

11. $3.6 \div 3$

12. $35 - (16 + 11)$

Draw a line to match the expression with the words.

13.

Fred catches 25 fish. Then he releases 10 fish and catches 8 more. •

Aylan has 25 pens. He gives 10 pens to one friend and 8 pens to another friend. •

Jan catches 15 fish and lets 6 fish go. •

Libby catches 15 fish and lets 6 fish go for three days in a row. •

- $3 \times (15 - 6)$
- $15 - 6$
- $25 - (10 + 8)$
- $(25 - 10) + 8$

Problem Solving · Applications (Real World)

Use the rule and the table for 14–15.

14. MTR Write an expression to represent the total number of lemon tetras that could be in a 20-gallon aquarium.

15. There are tiger barbs in a 15-gallon aquarium and giant danios in a 30-gallon aquarium. Write a numerical expression to represent the greatest total number of fish that could be in both aquariums.

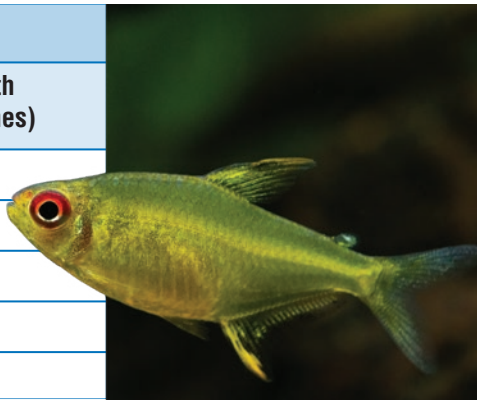
MATH on the Spot

16. Write a word problem for an expression that is three times as much as (3.50 + 0.75). Then write the expression.

17. Payton bought 30 tokens when he arrived at a festival. He won 8 more tokens for getting the highest score at the basketball contest, but lost 6 tokens at the ring toss game. Write an expression to find the number of tokens Payton has left.

Aquarium Fish

Type of Fish	Length (in inches)
Lemon Tetra	2
Strawberry Tetra	3
Giant Danio	5
Tiger Barb	3
Swordtail	5



▲ The rule for the number of fish in an aquarium is to allow 1 gallon of water for each inch of length.

Show the Math

Demonstrate Your Thinking

Name _____

Write Numerical Expressions

Go Online
Interactive Examples

Write an expression to match the words.

1. Ethan collected 16 seashells. He lost 4 of them while walking home.

2. Yasmine bought 4 bracelets. Each bracelet cost $3.65.

3. Amani did 100 jumping jacks. She did $\frac{2}{5}$ as many pushups as jumping jacks.

4. Darryl has a board that is 8.4 feet long. He cuts it into pieces that are each 2 feet long.

Write words to match the expression.

5. $3 + (4 \times 2.25)$

6. $36 \div \frac{1}{4}$

7. $24 - (6 + 3)$

Problem Solving Real World

8. Kylie has 14 polished stones. Her friend has $\frac{1}{2}$ as many stones. Write an expression to match the words.

9. Rashad had 25 stamps. He shared them equally among himself and 4 friends. Then Rashad found 2 more stamps in his pocket. Write an expression to match the words.

10. WRITE Math Write a numerical expression. Then write words to match the expression.

Lesson Check

11. Jenna bought 3 packs of bottled water, with 8 bottles in each pack. Then she gave 6 bottles away. Write an expression to match the words.

12. Stephen had 24 miniature cars. He gave 4 cars to his brother. Then he passed the rest of the cars out equally among 4 of his friends. Which operation would you use to represent the first part of this situation?

Spiral Review

13. To find $36 + 29 + 14$, Joshua rewrote the expression as $36 + 14 + 29$. What property did Joshua use to rewrite the expression?

14. There are 6 baskets on the table. Each basket has 144 crayons in it. How many crayons are there?

15. Mr. Flanbert wrote $7 \times 9 \times 10$ on the board. What is the value of that expression?

16. Barbara mixes 54 ounces of granola and 36 ounces of raisins. She divides the mixture into 6-ounce servings. How many servings does she make?

Name _____

Evaluate Numerical Expressions

Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.2.1, 5.AR.2.2, 5.AR.2.3
- **Mathematical Thinking & Reasoning** MTR.4.1, MTR.6.1, MTR.7.1

I Can apply the order of operations to evaluate numerical expressions.

Remember that a numerical expression is a mathematical phrase that uses only numbers and operation symbols.

$(5 - 2) \times 7$ $\quad 7.2 \div 9 + 16$ $\quad (\frac{2}{4} - \frac{1}{5}) + \frac{1}{20}$

To **evaluate**, or find the value of, a numerical expression with more than one type of operation, you must follow rules called the **order of operations.** The order of operations tells you in what order you should evaluate an expression.

Order of Operations

1. Perform operations in parentheses.
2. Multiply and divide from left to right.
3. Add and subtract from left to right.

UNLOCK the Problem Real World

A bread recipe calls for 4 cups of wheat flour and 2 cups of rye flour. To triple the recipe, how many cups of flour are needed in all?

Evaluate $3 \times 4 + 3 \times 2$ to find the total number of cups.

A Gabriela did not follow the order of operations correctly.

Gabriela

○ 3 x 4 + 3 x 2 First, I added.

3 x 7 x 2 Then, I multiplied.

○

Explain why Gabriela's answer is not correct.

_____

B Follow the order of operations by multiplying first and then adding.

Name_____

○ 3 x 4 + 3 x 2

○

So, _____ cups of flour are needed.

Evaluate Expressions with Parentheses

To evaluate an expression with parentheses, follow the order of operations. Perform the operations in parentheses first. Multiply from left to right. Then add and subtract from left to right.

Example

Each batch of granola Lena makes uses 3 cups of oats, 1 cup of raisins, and 2 cups of nuts. Lena wants to make 5 batches of granola. How many cups of oats, raisins, and nuts will she need in all?

Write the expression. $5 \times (3 + 1 + 2)$

First, perform the operations in parentheses. $5 \times (\_\_\_\_)$

Then multiply. _____

So, Lena will use _____ cups of oats, raisins, and nuts in all.

- MTR What if Lena makes 4 batches? Will this change the numerical expression? Explain.

_____

Try This!

Rewrite the expression with parentheses to equal the given value.

A $6 + 12 \times 8 - 3$; value: 141

- Evaluate the expression without the parentheses. _____
- Try placing the parentheses in the expression so the value is 141.

  Think: Will the placement of the parentheses increase or decrease the value of the expression?

- Use order of operations to check your work.

  $6 + 12 \times 8 - 3$

B $5 + 28 \div 7 - 4$; value: 11

- Evaluate the expression without the parentheses. _____
- Try placing the parentheses in the expression so that the value is 11.

  Think: Will the placement of the parentheses increase or decrease the value of the expression?

- Use order of operations to check your work.

  $5 + 28 \div 7 - 4$

Name _____

Share and Show

Math Board

Evaluate the numerical expression.

1. $10 + 3.6 \div 9$

Think: I need to divide first.

_____

2. $10 + (25 - 10) \div 5$

_____

3. $9 - (3 \times 2) + 8$

_____

Math Talk

MTR 6.1 Assess the reasonableness of solutions.

Raina evaluated the expression $5 \times 2 + 2$ by adding first and then multiplying. Will her answer be correct? Apply the order of operations.

On Your Own

Circle whether the equation is true or false. If the equation is false, rewrite the equation on the right side to make it true.

4. $(4 + 49) - 4 \times 10 = 2 \times (5 + 3)$

true false

_____

5. $36.25 - (7.75 + 5.5) = 5 + 18.25$

true false

_____

6. $(9 \times 10) + (9 \times 5) = 18 \times 15$

true false

_____

Use parentheses to rewrite the equation to make it true.

7. $100 - 30 \div 5 = 14$

_____

8. $12 + 17 - 3 \times 2 = 23$

_____

9. $9 + 5 \div 5 + 2 = 2$

_____

10. Each pitcher of power smoothie that Dominique makes has 2 scoops of pineapple, 3 scoops of strawberries, 1 scoop of spinach, and 1 scoop of kale. If Dominique makes 7 pitchers of power smoothies, how many scoops will he use in all? Write and evaluate a numerical expression containing parentheses.

_____

_____

11. MTR The value of $100 - 30 \div 5$ with parentheses can have a value of 14 or 94. Explain.

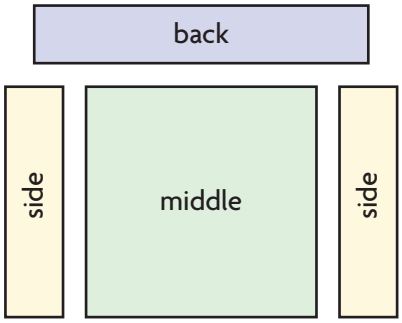
_____

_____

_____

Problem Solving · Applications

12. A movie theater has 4 groups of seats. The largest group of seats, in the middle, has 20 rows, with 20 seats in each row. There are 2 smaller groups of seats on the sides, each with 20 rows and 6 seats in each row. A group of seats in the back has 5 rows, with 30 seats in each row. How many seats are in the movie theater?



a. What do you need to know?

_____

b. What operation can you use to find the number of seats in the back group of seats? Write the expression. _____

c. What operation can you use to find the number of seats in both groups of side seats? Write the expression.

_____

d. What operation can you use to find the number of seats in the middle group? Write the expression.

_____

e. Write an expression to represent the total number of seats in the theater.

_____

_____

f. How many seats are in the theater? Show the steps you use to solve the problem.

_____

_____

13. Write and evaluate two equivalent numerical expressions that show the Distributive Property of Multiplication.

MATH on the Spot

_____

_____

14. Rosalie evaluates the numerical expression $4 + 5 \times 2 - 1$.

Rosalie's first step should be to [add / subtract / multiply].

Name _____

Evaluate Numerical Expressions

Go Online
Interactive Examples

Evaluate the numerical expression.

1. $24 \times 5 - 41$

$120 - 41$

79

2. $(32 - 20) \div 4$

3. $16 \div (2 + 6)$

4. $27 + 36 \times \frac{1}{12}$

Rewrite the expression with parentheses to equal the given value.

5. $3 \times 4 - 1 + 2$

value: 11

6. $2 \times 6 \div 2 + 1$

value: 4

7. $5 + 3 \times 2 - 6$

value: 10

Problem Solving Real World

8. Chase has several pitchers to hold lemonade for the school bake sale. Two pitchers can hold 64 ounces each, and four pitchers can hold 48 ounces each. How many total ounces can Chase's pitchers hold?

9. At the bake sale, Jonah sold 4 cakes for $8.25 each and 36 muffins for $2.50 each. What was the total amount, in dollars, that Jonah received from these sales?

10. WRITE Math Give two examples that show how using parentheses can change the order in which operations are performed in an expression.

Lesson Check

11. What is the value of the expression $4 \times (4 - 2) + 2.2$?

12. Lannie ordered 12 copies of the same book for his book club members. The books cost $19 each, and the order has a $15 shipping charge. What is the total cost of Lannie's order?

Spiral Review

13. A small company packs 12 jars of jelly into each of 110 boxes to bring to the farmers' market. How many jars of jelly does the company pack in all?

14. Destiny has 42 sports books, 85 mystery books, and 69 nature books. She arranges her books equally on 7 shelves. How many books are on each shelf?

15. Last year, a widget factory produced one million, twelve thousand, sixty widgets. What is this number written in standard form?

16. Rio has $\frac{3}{4}$ liter of milk. He uses $\frac{1}{3}$ of the milk to make tea. How much milk does Rio use for the tea?

Name _____

Evaluate Expressions with Grouping Symbols

Florida's B.E.S.T.
- **Algebraic Reasoning** 5.AR.2.1, 5.AR.2.2
- **Mathematical Thinking & Reasoning** MTR.4.1, MTR.6.1, MTR.7.1

I Can evaluate expressions using the order of operations.

UNLOCK the Problem Real World

Nevaeh's weekly allowance is $8 and Audric's weekly allowance is $5. Every week they each spend $2 on lunch. Write a numerical expression to show how many weeks it will take them together to save enough money to buy a video game for $45.

- Underline Nevaeh's weekly allowance and how much she spends.
- Circle Audric's weekly allowance and how much he spends.

Use parentheses to write an expression.

You can use parentheses to group operations that go together. Operations in parentheses are performed first.

STEP 1 Write an expression to represent how much Nevaeh and Audric save each week.

- How much money does Nevaeh save each week?

Think: Each week Nevaeh gets $8 and spends $2.

_____

- How much money does Audric save each week?

Think: Each week Audric gets $5 and spends $2.

_____

- How much money do Nevaeh and Audric save together each week? _____

STEP 2 Write an expression to represent how many weeks it will take Nevaeh and Audric to save enough money for the video game.

- How many weeks will it take Nevaeh and Audric to save enough for a video game?

_____ ÷ (_____)

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain why parentheses are placed around the part of the expression that represents the amount of money Nevaeh and Audric save each week.

Evaluate Expressions with Grouping Symbols

When evaluating an expression with grouping symbols, perform the operation in the grouping symbols first, being sure to apply the order of operations as you do.

Example

Juan gets $6 for his weekly allowance and spends $4 of it. His sister Tina gets $7 for her weekly allowance and spends $3 of it. They want to buy their mother a present in 4 weeks. If they spend the same amount each week, how much money can they save together in that time to buy her a present?

- Write the expression using parentheses. $4 \times (\$6 - \$4 + \$7 - \$3)$
- Perform the operations in the parentheses first. $4 \times (\_\_\_\_\_ + \_\_\_\_\_ - \_\_\_\_\_)$

  Add and subtract from left to right. $4 \times (\_\_\_\_\_ - \_\_\_\_\_)$

  $4 \times \_\_\_\_\_$
- Then multiply. _____

So, Juan and Tina will be able to save _____ for their mother's birthday present.

- MTR What if only Tina saves any money? Will this change the numerical expression? Explain.

_____

Try This! Follow the order of operations.

A $4 \times (3 \times 3 + 6 \times 2)$

- Inside the parentheses, multiply from left to right. $4 \times (\_\_\_\_\_ + \_\_\_\_\_)$
- Inside the parentheses, add . $4 \times \_\_\_\_\_$
- Multiply. _____

B $32 \div (2 \times 3 + 7 - 9)$

- Inside the parentheses, multiply. $32 \div (\_\_\_\_\_ + 7 - 9)$
- Inside the parentheses, add and subtract from left to right. $32 \div (\_\_\_\_\_ - 9)$

  $32 \div \_\_\_\_\_$
- Divide. _____

Name _____

Share and Show

Math Board

Evaluate the numerical expression.

1. $12 + (15 - 5) + (9 - 3)$

$12 + 10 +$ _____

_____ $+ 6$

2. $5 \times (14 - \frac{1}{7} \times 14)$

3. $36 \div (8.6 - 2.6)$

On Your Own

Evaluate the numerical expression.

4. $4 + (16 - 4 + 12 - 9)$

5. $24 - (10 - 7 + 16 - 9)$

6. $3 \times (0.4 \times 0.2 + 0.2 \times 0.3)$

7. MTR Write the expression $2 \times 8 + 20 - 12 \div 6$ with parentheses two different ways so one value is less than 10 and the other value is greater than 50.

8. Wilma works at a bird sanctuary and stores birdseed in plastic containers. She has 3 small containers that hold 8 pounds of birdseed each and 6 large containers that hold 12 pounds of birdseed each. Each container was full until she used 4 pounds of bird seed. She wants to put some of the remaining birdseed into 30 bird feeders that can hold 2 pounds each. How much birdseed does she have left over? Show the expression you used to find your answer.

Problem Solving · Applications

9. Dan has a flower shop. Each day he displays 24 roses. He gives away 10 and sells the rest. Each day he displays 36 carnations. He gives away 12 and sells the rest. What expression can you use to find out how many roses and carnations Dan sells in a week?

MATH on the Spot

a. What information are you given? _____

_____

_____

b. What are you being asked to do? _____

_____

_____

c. What expression shows how many roses Dan sells in one day? _____

d. What expression shows how many carnations Dan sells in one day? _____

e. Write an expression to represent the total number of roses and carnations Dan sells in one day. _____

f. Write the expression that shows how many roses and carnations Dan sells in a week. _____

10. A gift shop had 500 coloring pencils. The shop sold 3 sets of 20 coloring pencils, 6 sets of 12 coloring pencils, and 10 sets of 18 coloring pencils. Write a numerical expression to show how many coloring pencils are left. Evaluate the numerical expression using order of operations. Show your work.

_____

_____

Name _____

Evaluate Expressions with Grouping Symbols

Go Online
Interactive Examples

Evaluate the numerical expression.

1. $5 \times (11 - 3 - 4)$

$5 \times (8 - 4)$

5×4

20

2. $30 - (9 \times 2 - 3 \times 4)$

3. $(25 - 11 + 15 - 9) \div 5$

4. $8 \times (1.1 \times 2 - 0.4 \times 0.4)$

5. $(5 \times 2 + 30 - 5) \div 5$

Problem Solving Real World

Use the information at the right for 6 and 7.

Reza has a cafe. Each day, he bakes 24 muffins. He gives away 3 and sells the rest. Each day, he also bakes 36 bagels. He gives away 4 and sells the rest.

6. Write an expression to represent the total number of muffins and bagels Reza sells in 5 days.

7. Evaluate the expression to find the total number of muffins and bagels Reza sells in 5 days.

8. WRITE Math Explain how to use parentheses to organize information appropriately.

Lesson Check

9. What is the value of the expression?

$30 + (6 \div 3 + 3 + 4)$

10. Find the value of the following expression.

$(\frac{5}{6} - \frac{3}{6}) \times 6 \div 2$

Spiral Review

11. What is $\frac{1}{10}$ of 200?

12. The Park family is staying at a hotel near an amusement park for 3 nights. The hotel costs $129 per night. How much will their 3-night stay in the hotel cost?

13. Vidal bought 2 pizzas and cut each into 8 slices. He and his friends ate 10 slices. Write an expression to match the words.

14. What is the value of the underlined digit in 783,5<u>4</u>9,201?

Name _____

Chapter 12

Chapter Review

1. Find the property that each equation shows. Write the equation in the correct box.

$15 \times (7 \times 9) = (15 \times 7) \times 9$

$23 + 4 + 109 = 4 + 23 + 109$

$13 + (3 + 7) = (13 + 3) + 7$

$87 \times 3 = 3 \times 87$

$1 \times 9 = 9$

$0 + 16 = 16$

Identity Property of Addition	Commutative Property of Multiplication	Identity Property of Multiplication
Associative Property of Multiplication	Commutative Property of Addition	Associative Property of Addition

2. For numbers 2a–2d, select True or False.

2a. $42 - (9 + 6)$, value 27 ○ True ○ False

2b. $18 + (22 - 4) \div 6$, value 6 ○ True ○ False

2c. $35 - (3 + 2) \times 3$, value 20 ○ True ○ False

2d. $(9 - 6) \div 3$, value 1 ○ True ○ False

3. Rich earns $35 per week mowing lawns in his neighborhood. Which expression can be used to show how much money he earns in 8 weeks?

(A) $(8 + 30) + (8 + 5)$

(B) $(8 \times 30) \times (8 \times 5)$

(C) $(8 + 30) \times (8 + 5)$

(D) $(8 \times 30) + (8 \times 5)$

4. Evaluate the numerical expression.

$(57 + 4) \times 4 - 16 =$ _____

5. Valerie earns $24 per hour. Which expression can be used to show how much money she earns in 7 hours?

(A) $(7 + 20) + (7 + 4)$

(B) $(7 \times 20) + (7 \times 4)$

(C) $(7 + 20) \times (7 + 4)$

(D) $(7 \times 20) \times (7 \times 4)$

6. Kara followed these steps to evaluate the expression $22 + (30 - 4) \div 2$.

$30 - 4 = 26$

$26 + 22 = 48$

$48 \div 2 = 24$

George looks at Kara's work and says she made a mistake. He says she should have divided by 2 before she added.

Part A

Which student is correct?

_____

_____

Part B

Evaluate the expression.

_____

Name _____

7. Paul displays his sports trophies on shelves in his room. He has 5 trophies on each of 3 shelves and 2 trophies on another shelf. Write an expression to represent the number of trophies Paul displays.

_____

8. Mariana bought 48 sandwiches that cost $4 each. Which expression can be used to show how much money Mariana spent on sandwiches?

(A) $(4 \times 40) \times (4 \times 8)$

(B) $(4 + 40) \times (4 + 8)$

(C) $(4 \times 40) + (4 \times 8)$

(D) $(4 + 40) + (4 + 8)$

9. Jackie followed these steps to evaluate the expression $15 - (37 + 8) \div 3$.

$37 + 8 = 45$

$45 - 15 = 30$

$30 \div 3 = 10$

Mark looks at Jackie's work and says she made a mistake. He says she should have divided by 3 before she subtracted.

Part A

Which student is correct? Explain how you know.

Part B

Evaluate the expression.

10. Carmine buys 8 plates for $1 each. He also buys 4 bowls. Each bowl costs twice as much as each plate. The store is having a sale that gives Carmine $3 off the bowls. Which numerical expression shows how much he spent?

(A) $(8 \times 1) + (4 \times 16 - 3)$

(B) $(8 \times 1) + 4 \times (16 - 3)$

(C) $(8 \times 1) + (4 \times 2 - 3)$

(D) $(8 \times 4) + (4 \times 2 - 3)$

11. Evaluate the numerical expression.

$2 + (65 + 7) \times 3 =$ ☐

12. An adult elephant eats about 300 pounds of food each day. Write an expression to represent the number of pounds of food a herd of 12 elephants eat in 5 days.

13. Jason is solving a homework problem.

Arianna buys 5 boxes of granola bars. Each box contains 12 granola bars. Arianna eats 4 bars.

Jason writes a numerical expression to represent the situation. His expression, $(12 - 4) \times 5$, has a mistake.

Part A

Explain Jason's mistake.

Part B

Write an expression to show how many granola bars are left, and then solve it.

Name _____

14. Veronica is solving this problem in math class.

Janelle buys 4 cases of water. Each case of water contains 12 bottles. Janelle drinks 3 bottles of water.

Veronica writes a numerical expression to represent the situation. Her expression, $(12 - 3) \times 4$, has a mistake.

Part A

Explain Veronica's mistake.

_____

_____

_____

Part B

Write an expression to find how many bottles of water are left, and then solve it.

_____

15. Fahed buys 12 stickers for $2 each. He also buys 4 sticker albums. Each album costs three times as much as each sticker. Fahed has a coupon that gives him $1 off the stickers. Which numerical expression shows how much he spent?

(A) $(12 \times 2 - 1) + (4 \times 3)$

(B) $(12 \times 2 - 1) + (4 \times 6)$

(C) $(12 \times 6 - 1) + (4 \times 6)$

(D) $(12 \times 6 + 1) + (4 \times 2)$

16. Liam has 9 bags with 11 grapes in each bag. He eats 8 grapes. Write an expression to represent the number of grapes Liam has left.

_____

17. Evaluate the numerical expression.

$(48 - 6) \div 7 - 1 =$ _____

18. Evaluate the numerical expression.

$(149 - 5) \div (5 + 7) =$ _____

19. Belinda drove 42 miles each day for the past 9 days. Which expression can be used to show the total number of miles Belinda drove?

(A) $(9 \times 40) + (9 \times 2)$

(B) $(9 + 40) + (9 + 2)$

(C) $(9 + 40) \times (9 + 2)$

(D) $(9 \times 40) \times (9 \times 2)$

20. For numbers 20a–20b, select True or False.

20a. $55 - (12 + 2)$, value: 41 ○ True ○ False

20b. $25 + (14 - 4) \div 5$, value: 27 ○ True ○ False

21. Tara bought 2 bottles of juice a day for 15 days. On the 16th day, Tara bought 7 bottles of juice.

Write an expression that matches the words.

22. Peter ran 3 miles a day for 17 days.
On the 18th day, Peter ran 2 more miles than he did the other days.

Write an expression that matches the words.

_____