Period \_\_\_\_\_

Date\_\_\_\_\_





### MATHLINKS: GRADE 6 STUDENT PACKET 1 WHOLE NUMBER MULTIPLICATION AND DIVISION

1.1	<ul> <li>Applying Properties of Arithmetic</li> <li>Learn strategies for deriving multiplication facts from simpler facts.</li> <li>Use associative and commutative properties.</li> <li>Use the distributive property.</li> <li>Use expanded notation.</li> <li>Multiply using an area model.</li> </ul>	1
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# WORD BANK

Word or Phrase	Definition or Description	Example or Picture
algorithm		
difference		
dividend		
divisor		
factor		
product		
quotient		
remainder		
sum		

# **APPLYING PROPERTIES OF ARITHMETIC**

Summary	Goals
We will learn and use properties of multiplication. We will learn strategies for recalling multiplication facts. We will use an area model to multiply numbers.	<ul> <li>Learn strategies for deriving multiplication facts from simpler facts.</li> <li>Use associative and commutative properties.</li> <li>Use the distributive property.</li> <li>Use expanded notation.</li> <li>Multiply using an area model.</li> </ul>

#### Warmup

#### **Some Properties of Arithmetic**

The <u>commutative property of addition</u> states that a + b = b + a for any two numbers *a* and *b*. In other words, changing the order of the addends does not change the sum.

Example: 14 + 6 = 6 + 14

The <u>associative property of addition</u> states that a + (b + c) = (a + b) + c for any three numbers *a*, *b*, and *c*. In other words, changing the grouping of addends does not change the sum.

Example: 9 + (2 + 7) = (9 + 2) + 7

State the property of addition illustrated by each equation.

1. 3(4 + 5) = 3(5 + 4) \_\_\_\_\_

2. 12 + (6 + 4) = (12 + 6) + 4 \_\_\_\_\_

3. 8+4=4+8

Write a number sentence that illustrates each property of arithmetic.

4. Commutative property of addition \_\_\_\_\_

5. Associative property of addition

## **PROPERTIES OF MULTIPLICATION**

#### **More Properties of Arithmetic**

The <u>commutative property of multiplication</u> states that  $a \cdot b = b \cdot a$  for any two numbers *a* and *b*. In other words, changing the order of the factors does not change the product.

Example:  $3 \cdot 5 = 5 \cdot 3$ 

The <u>associative property of multiplication</u> states that  $(a \cdot b) \cdot c = a \cdot (b \cdot c)$  for any three numbers *a*, *b*, and *c*. In other words, changing the grouping of the factors does not change the product.

Example:  $(3 \cdot 4) \cdot 5 = 3 \cdot (4 \cdot 5) = 3 \cdot 4 \cdot 5$ 

The <u>distributive property</u> states that a(b + c) = ab + ac and (b + c)a = ba + ca for any three numbers *a*, *b*, and *c*. This property relates multiplication and addition. It is called the "distributive property" because it "distributes" the factor outside the parentheses over the two terms within the parentheses.

Example: 3(4+5) = 3(4) + 3(5) and (4+5)8 = 4(8) + 5(8)

Write the property of arithmetic illustrated by each equation.

1.	$(2 \cdot 5) \cdot 4 = 2 \cdot (5 \cdot 4)$
2.	2(7 + 4) = 2(7) + 2(4)
3.	(4)(2) = (2)(4)
Wr	ite a number sentence that illustrates each property of arithmetic.
4.	Commutative property of multiplication
5	Associative property of multiplication
0.	
6.	Distributive property

## **MULTIPLICATION FACTS**

1.	Many students find these multiplication facts difficult to remember. Circle one of these multiplication facts and explain how you remember it.			hese	
	8 • 7 = 56 6 •	9 = 54		7 • 9 <b>=</b> 63	
	3 • 7 = 21 7 •	6 = 42		6 • 8 = 48	
2	Ricky wrote the following list on his paper	r			
۷.		. 40	40 50	62 70	
	7 14 21 28 35	9 42	49 56	63 70	
	Explain how Ricky might use the list to find 7 • 7.				
	Lies Disku's strategy to find 6 . 0				
	Use Ricky's strategy to find to • 9.				
_		7	7	28	
3.	Randi wrote the following on her paper.	<u>×4</u> 28	<u>×4</u> 28	<u>+28</u> 56	
		20	20	00	
	What multiplication fact do you think she	was derivi	ng?	Explain.	
	Use Randi's strategy to find 8 • 6				

## **MULTIPLYING BY MULTIPLES OF 10**

1. If you know that  $4 \cdot 7 = 28$ , explain how you can find  $4 \cdot 700$ .

Find each product.					
2.	a.	6•8	3.	a.	5•3
	b.	60 • 8		b.	500 • 300
	C.	60 • 80		C.	3•50
	d.	80 • 6		d.	3,000 • 50
4.	a.	9•4	5.	а.	10 • 5
	b.	90 • 40		b.	100 • 50
	C.	400 • 90		C.	10 • 50
	d.	4,000 • 900		d.	500 • 10
6.	a.	8•5	7.	a.	9•10
	b.	8•500		b.	9,000 • 10
	C.	800 • 500		C.	900 • 100
	d.	80 • 5		d.	1000 • 90
8.	a.	12 • 2	9.	a.	25 • 4
	b.	120 • 20		b.	250 • 40
	C.	200 • 1,200		C.	4 • 2,500
	d.	2,000 • 12		d.	25 • 4,000
10. Describe an easy strategy for multiplying by a multiple of 10.					

# MULTIPLICATION USING AN AREA MODEL

The <u>area</u> of a two-dimensional figure is a measure of the size of the figure, expressed in square units. The <u>area of a rectangle</u> is the product of its length and its width.

1.	How many rows of 7 squares are in this rectangle?7
2.	How many columns of 3 squares are in this rectangle? 3
3.	How many square units are in this rectangle?
	Therefore, we write: The area is square units.
F o	or a rectangle's dimensions, we sometimes read $\times$ as "by." The above rectangle is "3 by 7' r "7 by 3." It does not matter which dimension is called "length" and which is called "width."

4. What property of multiplication is illustrated by  $3 \times 7 = 7 \times 3$ ?

Both of these terms describe the length of a side.

5. Here are three rectangles. Write multiplication sentences suggested by the rectangles.



# **MULTIPLICATION USING AN AREA MODEL (Continued)**

6. Are the results of the area calculations equivalent for all three parts of problem 5?

What is the property being applied in parts b and c?

7. Compute  $3 \times 14$  using an area model strategy. (Note that both of these area model diagrams are to scale, but the square units are not shown in the second one.)



8. Compute 7  $\times$  25 using an area model strategy. (Note that this area model is NOT to scale, and each rectangular area is used to record <u>partial products</u>. This is a helpful strategy with larger numbers.)



9. The calculations in problems 7 and 8 are simplified by applying the \_\_\_\_\_\_ property.

State the property of arithmetic illustrated by each number sentence.

10.  $3 \cdot (10 + 4) = 3 \cdot 10 + 3 \cdot 4$ 

- 11.  $3 \cdot 50 = 3 \cdot (5 \cdot 10) = (3 \cdot 5) \cdot 10$
- 12. 3(10 + 4) = 3(4 + 10)

# **MULTIPLICATION USING AN AREA MODEL (Continued)**

Compute each product using an area model. Record the partial products in each smaller section before adding. Show all work. Check using another method. Rectangles on this page are not drawn to scale.

13. Compute  $12 \times 13$ .

10 + 3

14. Find  $18 \times 74$  in two ways.

Check:

Check:



- 15. Do problems 13 and 14 again, each in a different way than above.
  - a. For problem 13:

b. For problem 14:





## **AREA MODEL PRACTICE**

1. Use an area model to compute 22  $\times$  135. Check using another method.



2. Use an area model to compute 95  $\times$  602. Check using another method.

Check:

Check:



3. Use an area model to find the product of 37 and 56. Check using another method.

# **AREA MODEL PRACTICE (Continued)**

4. Use an area model to multiply 612 by 9. Check using another method.

Area Model:	Check:

#### 5. Use an area model to find the product of 415 and 21. Check using another method.

Area Model:	Check:

#### 6. Make up a challenging multiplication problem. Use an area model to multiply the numbers.

Area Model:	Check:

# **DIVISION WITH REMAINDER**

Summary	Goals
We will learn a division algorithm and use it to find quotients of whole numbers. We will solve problems and interpret the meaning of the remainder in the context of the problem.	<ul> <li>Learn strategies for finding quotients of whole numbers.</li> <li>Estimate quotients.</li> <li>Use division vocabulary.</li> <li>Use a variation of the standard division algorithm.</li> <li>Interpret the meaning of remainders in division problems.</li> </ul>

#### Warmup

- 1. Jenna recycles 5 plastic water bottles each week for 12 weeks. Write an equation to represent the total number of bottles she recycles.
- 2. Use the information from problem 1 to write a related division equation.

- 3. How many times can 6 be subtracted from 24 until nothing remains? Continue the work started below.
- 4. What is 24 divided by 6?

 $\begin{array}{c} 24 \\ \underline{-6} & (1) \\ \hline \\ \underline{-6} & (2) \\ \hline \\ \end{array}$ 

# **A CHUNKING DIVISION PROCEDURE**

This division algorithm allows you to use known facts and estimation to "close in" on the quotient in a sense-making way. We will call it the "chunking division procedure."

Divide 850 colored pencils into groups of 24. How many groups of colored pencils can you make? How many colored pencils are left over?

#### Step 1:

• Write the appropriate division problem.



#### Step 2:

• Make a "toolkit" of multiplication facts that might help solve the problem. You do not need to write every multiple of 24. One possible toolkit is:

24 • 1 = 24	24 • 10 =
24 • 2 =	24 • 20 =
24 • 3 =	24 • 30 =
24 • 4 =	24 • 40 =

#### Step 3:

• Without going over, use your toolkit to estimate how many groups of 24 are in 850.



Why is the process not yet complete?

# A CHUNKING DIVISION PROCEDURE (Continued)

#### Repeat step 3 until the remainder is less than the divisor.

Repeat step 3 until the remainder is less than the divisor.	
<ul> <li>Without going over, use your toolkit to estimate how many groups of 24 are in 130.</li> </ul>	24) 8 5 0 <u>- 7 2 0</u> 3 0
The closest fact in your toolkit is 24 • =	130
Record this information and subtract.	$\frac{-90}{34}$
Repeat step 3 until the remainder is less than the divisor.	
<ul> <li>Without going over, use your toolkit to estimate how many groups of 24 are in 34.</li> </ul>	24) 8 5 0 - 7 2 0 3 0
The closest fact in your tool kit is 24 • =	130
Record this information and subtract.	34
The remainder is less than the divisor. We are done.	
Step 4:	
• Add all the numbers to the right of the vertical line to find the q	uotient.
• What is the (remainder)?	
Answer the question.	
This process shows that: $24 )850$ R	
This process also shows that: 850 = $24 \cdot $ + $\bigcirc$	

Answer: There are \_\_\_\_\_ groups of colored pencils. There are \_\_\_\_\_ left over.

# **DIVISION PROBLEMS**

Use the chunking division procedure below. Check your answer using an area model for multiplication.

1.	16) 4 3 2	Check:  (Dividend Area mode	=   = 21:	Divisor	• • Quotient	+ +	Remainder)
Toolkit:		1					



# **DIVISION PROBLEMS (Continued)**

Solve each problem. Be sure to interpret any remainders using the context of the problem. Space for a toolkit is provided below. Use scratch paper if needed to check your work.

3. How many miles per gallon did Mr. Garcia's car get if he drove 594 miles and used 27 gallons of gas?	4. A bus holds 63 students. If 2,442 students are going on a field trip, how many buses are needed?
Solution:	Solution:
Toolkit:	Toolkit:

5. Find the value of points A and B on the number line. All marks on the line are equally spaced. Explain how you found your answers.



# **DIVISION PRACTICE**

Use the chunking division procedure below. Check your answer using an area model for multiplication.

1. 9) 8 5 2	Check: = • + (Dividend = Divisor • Quotient + Remainder) Area model:
Toolkit:	



# **DIVISION PRACTICE (Continued)**

Solve each problem. Be sure to interpret any remainders using the context of the problem. Space for a toolkit is provided below. Use scratch paper if needed to check your work.

<ol> <li>Rose's rectangular backyard has an area of 672 square meters. Find the length of the backyard if the backyard is 7 meters wide.</li> </ol>	4. A softball team earns \$1,200 to purchase uniforms. If a uniform costs \$38, how many uniforms can the team purchase?
Solution:	Solution:
Toolkit:	Toolkit:

5. Find the values of points C and D on the number line. All marks on the line are equally spaced. Explain how you found your answers.



# MULTIPLICATION AND DIVISION: STANDARD ALGORITHMS

Summary	Goals
We will review the standard algorithm for multiplication of whole numbers. Then we will review the standard algorithm for division of whole numbers.	<ul> <li>Multiply multi-digit numbers using the standard algorithm.</li> <li>Divide multi-digit numbers using the standard algorithm.</li> </ul>

#### Warmup

1. Find 57 • 109 using an area model.

2. Divide using the algorithm from the previous lesson.

14)963

3. Write the following as an expression. 4. Wr

 378

 422

 + 79

Toolkit:

4. Write the following as an equation.

422

- 79

343

# **MULTIPLICATION: THREE METHODS**

- 1. Compute 64  $\times$  23
  - a. Area model



a. Area model

- b. Expanded procedure



c. Standard algorithm





b. Expanded procedure



c. Standard Algorithm



# MULTIPLICATION PRACTICE

Use any TWO methods to find each product.

1.	81 • 26	2.	3•127
2	22 - 244	4	250 - 400
3.	32 • 314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32•314	4.	250 • 108
3.	32 • 314	4.	250 • 108
3.	32 • 314	4.	250 • 108

# **DIVISION: THE STANDARD ALGORITHM**

Solve using the standard algorithm.

quotient divisor)dividend	remainder	dividend = (divisor)(quotient) + remainder
) 12) <u>38</u>	R 2	38 = (12)(3) + 2

The standard division algorithm is an efficient process for dividing. It involves a cyclical process: divide, multiply, subtract, "bring down"....until the remainder is less than the divisor.

1 4) <u>9_6</u> _3	Determine where to start	Look at the divisor. Choose digits in the dividend so that the quotient using these digits is between 1 and 9.	
14)963	Divide	How many 14s in 96? Write this number above the 96.	
6 14) 9 6 3	Multiply	Find the product of 6 and 14. Write this below the 96.	
6 14) 9 6 3 - <u>8 4</u>	Subtract	Find the difference between 96 and 84. Write this below the 84.	
$ \begin{array}{r}                                     $	Bring down	Bring down the next digit.	
	Divide		
$- 84 \downarrow$	Multiply	Repeat the divide, multiply, subtract, bring	
1 2 3	Subtract	down (if necessary) process until the remainder is less than the divisor.	
	Bring down (remainder)		
Write the result showing the quotient and		Write the result as an equation:	
1 4)9 6 3		9 6 3 = (1 4)() +	

# PRACTICE: THE STANDARD DIVISION ALGORITHM

Solve using the standard algorithm.

1.	9)875	2. 25 7 9	1		3. 18)1,324
4.	There are 256 students goi trip. Each bus can hold 70 s	ng on the field students.	5.	The Commu blankets for requires 7 for feet of fabrie	unity Service Club is making a charity. Each blanket eet of fabric. They have 450 c.
	a. How many buses are ne	eeded?		a. How ma	ny blankets can they make?
	b. If buses are filled one by many students are in the not full?	y one, how e bus that is		b. How ma	iny feet of fabric are left over?

Whole Number Multiplication and Division 1.3 Multiplication and Division: Standard Algorithms

## **MULTIPLICATION AND DIVISION FLUENCY CHALLENGES**

Gaining fluency with multiplication and division takes practice. Try to complete these challenges without any errors. Use your own paper or blank pages at the end of the packet.

Begin with any small whole number. Multiply your number by 2. Multiply the result by 3. Multiply that result by 4. Multiply that result by 5. Multiply that result by 6. Multiply that result by 7. Multiply that result by 8. Multiply that result by 9. (You should have a <u>big number</u> now!)

- 1. I began with the number . After multiplying, my <u>big number</u> is .
- 2. Challenge A

Start with your <u>big number</u>. Divide it by 2. Divide that result by 3. Divide that result by 4. Divide that result by 5. Divide that result by 6. Divide that result by 7. Divide that result by 8. Divide that result by 9.

After dividing I got \_\_\_\_\_.

3. Challenge B

Start with your same <u>big number</u>. Divide it by 18. Divide that result by 24. Divide that result by 28. Divide that result by 30.

After dividing I got \_\_\_\_\_.

4. Did you get the same results for Challenge A and Challenge B? Explain why you think this happened.

Repeat this problem. Start with another small whole number. Predict the answers to Challenges A and B before computing.

# SKILL BUILDERS, VOCABULARY, AND REVIEW

# **SKILL BUILDER 1**

1. For the number 172,783, name the two places that include the digit 7.

Some Prop	erties of Arithmetic
Commutative property of addition:	Associative property of addition:
For all numbers $a$ and $b$ ,	For all numbers $a$ , $b$ , and $c$ ,
a + b = b + a.	(a + b) + c = a + (b + c).

Complete each equation and write the property of addition illustrated.

2. (8 + 13) + 7 =	3. 45 + 360 =
8 + (13 + 7) =	360 + 45 =
Property:	Property:

Compute.

4. 857 + 603	5. 9500 – 289	6. 40,190 – 3,982

7.	Compute. Then rewrite the original subtraction problem as a subtraction <u>expression</u> .	8.	Compute. Then rewrite the original addition problem, including the sum you find, as an addition <u>equation</u> .
	4,183 <u>-2,851</u>		1,422 806
			+539

9. Create a word problem that can be answered with the calculation in problem 7.

Find each product.

1.	a. 3 × 12	2.	a. 15 × 4
	b. 30 × 12		b. 40 × 15
	c. 120 × 30		c. 40 × 150
	d. 1,200 × 30		d. 150 × 4,000

Find two different ways to derive each multiplication fact.

3. 9 × 8		4. 12 × 6		
Method 1:	Method 2:	Method 1:	Method 2:	

Multiply using an area model. Check your answer using another method.

5.  $25 \times 465$  Check:

The product should contain a 6 as one of its digits. Name the place value of the 6 in the product.

 $302 \times 23$ 6.

Check:

The product should contain a 4 as one of its digits. Name the place value of the 4 in the product.

# Some Properties of ArithmeticCommutative property of multiplication:<br/>For any two numbers a and b, $a \cdot b = b \cdot a$ . In other words, changing the order of the<br/>factors does not change the product.Associative property of multiplication:<br/>For any three numbers, a, b, and c, $(a \cdot b) \cdot c = a \cdot (b \cdot c)$ . In other words, changing<br/>the grouping of the factors does not change the product.Distributive property:<br/>For any three numbers a, b, and c, a(b + c) = ab + ac and (b + c)a = ba + ca.Write the property of arithmetic illustrated by each equation.1.(8 + 9)5 = 8(5) + 9(5)

- 2.  $(12 \cdot 8) \cdot 9 = 12 \cdot (8 \cdot 9)$
- 3. 15 24 = 24 15\_\_\_\_\_
- 4. Tania and Maria were doing their math homework together. Tania had a hard time remembering the multiplication fact 9 4, but remembered that 4 9 = 36. Maria said to her, "you really only have to remember half of the multiplication facts." What do you think Maria was trying to tell Tania?

Multiply using an area model. Check your answer using another method.

5. 27 • 123	6. 201 · 18
Check:	Check:

	0	fan faalleka		مطلم ملمات ومسم						
IJIVIAE	Snace	TOT TOOLKITS	are r	novided he	2101/0/ (	LINECK VOLIN	answer	nusina	militin	lication
Divide.	Opuoc						anower	uonig	manup	noution.

1.	2.
8) 1136	1,650 ÷ 25
Solution:	Solution:
Check:	Check:
Toolkit:	Toolkit:

#### 3. Find the value of points E and F on the number line. All marks are equally spaced.



Divide. Space for toolkits are provided below. Check your answer using multiplication.

1. 1,054 ÷ 7	3. 1,495 divided by 23
Solution	Solution
Charles	Chook
Спеск:	Спеск.
Toolkit:	Toolkit:

3. Name the place value of the 3 in the number 3,479,601.

Solve each problem. Be sure to interpret any remainders using the context of the problem. Use scratch paper to check your work if necessary.

1.	A t-shirt company can make one medium shirt with exactly 30 square inches of fabric. How many medium shirts can they make with 14,000 square inches of fabric?	2.	A softball team has \$700 to purchase uniforms. If each uniform costs \$38, how many uniforms can the team purchase?
3.	Lauren's work for a multiplication problem i Explain how she arrived at the numbers 24	s sh 0, 1	nown to the right. 60, and 1200. 34 $\times$ 48 32 240 160 + 1,200 1,432

Find the perimeter, *P*, of the rectangles below.



If the perimeter of each figure below is 25 units, find the length of the missing side for each figure.



Find the area, A, of the rectangles below.

5. Each small square is unit by unit.



A = \_\_\_\_\_









- 1. Juan wants to build a rectangular pigpen that is 12 feet wide and 20 feet long.
  - a. How much fence will he need in order to build his pigpen?
  - b. Give the dimensions of one more rectangular pigpen he could make (different than in part (a) above) with the same amount of fence.
  - c. Find the area of both pigpens.

For part (a):

For part (b):

2. Maria wanted to divide 52 cards equally between 4 players. Circle ALL of the expressions below that express this situation correctly. Then perform the calculation. Write a complete sentence to express the result.

52 ÷ 4	4 52	4)52
4 ÷ 52	<u>52</u> 4	52)4

1.	<ul> <li>Begin with any two-digit whole number.</li> <li>Multiply your number by 8.</li> <li>Multiply the result by 9.</li> <li>You should have a <b>big number</b> now!</li> </ul>	Show work for problems 1 and 2:
	I began with the number	
	After multiplying, my <b>big number</b> is	
2.	<ul><li>Start with your big number.</li><li>Divide it by 12.</li><li>Divide the result by 6</li></ul>	
	After dividing I got	
3.	Your beginning number in problem 1 and the answer to problem 2 should be the same. If they are not, go back and check your work. Explain why those numbers <b>must be</b> the same.	

4. A soccer field is 180 feet wide and 300 feet long. Find its:

a.	perimeter	b. area				

- 5. A football field is 160 feet wide and 360 feet long including the end zones.
  - a. Without calculating the exact area of the football field, estimate which field you think covers more area (football or soccer). Clearly show the rounded numbers you use to arrive at your estimate.
  - b. Calculate the actual area of the football field. Compare the actual area and your estimated area.

6. \	Write the following division statement as an equation.	8)	640
------	--	----	-----

80

## FOCUS ON VOCABULARY

Match the words and phrases to the clues.

1.	algorithm	а.	A number being multiplied.
2.	difference	b.	The result of addition.
3.	dividend	C.	The number to be divided.
4.	divisor	d.	The result of a division problem.
5.	factor	e.	The result of dividing.
6.	product	f.	The result of multiplying two or more numbers.
7.	quotient	g.	A step-by-step procedure for performing a calculation.
8.	remainder	h.	A whole number smaller than the divisor that is left over at the conclusion of the long division algorithm.
9.	sum	i.	The result of subtraction.

## **SELECTED RESPONSE**

Show your work on a separate sheet of paper.

Sho	ow yo	our work on a sepa	rates	sneet of paper.					
1.	Choose ALL of the true equations that illustrate the commutative property of an operation.								
	A.	3 + 2 = 2 + 3			Β.	3 • 2 = 2 • 3			
	C.	(3 + 2) + 4 = 3 + (	2 + 4	.)	D.	$(3 \cdot 2) \cdot 4 = (2 \cdot 3)$	• 4		
	E.	3(2 + 4) = 3(2) + 3	3(4)		F.	3 – 2 <b>=</b> 2 – 3			
2.	Cor	ompute. 741 – 489.							
	A.	386	B.	368	C.	362	D.	252	
3.	Cho	pose ALL of the exp	oress	ions that have a pr	oduc	t equal to 312.			
	A.	24 • 13	В.	12 • 26	C.	26 • 12	D.	30 • 12	
4.	A la are	arge pizza feeds 12 needed?	stud	ents. If 62 students	are	served at a party, h	now r	nany pizzas	
4.	A la are A.	arge pizza feeds 12 needed? 5	stud B.	ents. If 62 students	are C.	served at a party, h 5 R2	now r D.	nany pizzas 5 <mark>2</mark> 12	
4.	A la are A. Cor	arge pizza feeds 12 needed? 5 mpute 11)684 .	B.	ents. If 62 students	c.	served at a party, h 5 R2	D.	nany pizzas 5 <u>2</u> 12	
4.	A la are A. Cor A.	arge pizza feeds 12 needed? 5 mpute 11)684 . 62 R2	B.	ents. If 62 students 6 63 R2	C.	served at a party, h 5 R2 64	D.	nany pizzas $5\frac{2}{12}$ 622	
4. 5. 6.	A la are A. Cor A.	arge pizza feeds 12 needed? 5 mpute $11\overline{)684}$ . 62 R2 bose ALL of the sta	B.	ents. If 62 students 6 63 R2 ents that illustrate th	C.	served at a party, h 5 R2 64 stributive property.	D.	nany pizzas $5\frac{2}{12}$ 622	
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## **KNOWLEDGE CHECK**

Show your work on a separate sheet of paper and write your answers on this page.

#### **1.1 Applying Properties of Arithmetic**

- 1. Find 78 3 using an area model. Show your work.
- 2. State the property of arithmetic illustrated by the equation 4(3 + 2) = 4(3) + 4(2).
- 3. Is  $3(2 \cdot 5) = 3(2) \cdot 3(5)$ ? If the expressions are equal, state the property of arithmetic illustrated.

#### 1.2 Division with Remainder

- 4. Compute 376 ÷ 12 using the chunking division procedure.
- 5. Sheila received \$80 for her birthday. She wants to buy CDs that cost \$11 each.

How many CDs can she buy?

How much would she need to save to by one more CD?

6. A rectangle has an area of 840 square feet. Find the length of the rectangle, if the width is 8 feet.

#### 1.3 Multiplication and Division: Standard Algorithms

Compute using the standard algorithms.

- 7. 46 37
- 8. 9)766

# **HOME-SCHOOL CONNECTION**

Here are some problems to review with your young mathematician.

- 1. Compute  $64 \times 28$  using both a traditional algorithm and an area model.
- 2. Use a division algorithm to find the quotient when dividing 874 by 17.
- 3. Give an example that illustrates the associative property of addition.

Dear Parent (or Guardian),

This year, your student will be taking a mathematics course that is fully aligned with the Common Core State Standards in Mathematics for Grade 6. The primary topics in this course will center around number sense and proportional reasoning. Students will also study expressions and equations, geometry, and probability and statistics.

We encourage you to join your student's teacher and school as a partner in your young mathematician's progress. A major portion of the work in this course will be the completion of sixteen packets (such as this one) throughout the year. Each packet will take about two weeks to complete. Some of this work will be done in class, and some will be assigned for homework. You can take an active role by reviewing the packet and asking your student to explain some problems to you. This will allow your student to practice communicating about mathematics, and give you an opportunity to find out what is being taught in the classroom. Your signature will indicate to the teacher that you have reviewed the work together.

If you see that your student does not fully understand a concept, please encourage your student to use the Resource Guide that accompanies the program as a reference and to ask the teacher for additional help.

Thank you in advance for your support. We hope you enjoy watching your student grow mathematically this year.

Sincerely,

The Writing Team at the Center for Mathematics and Teaching

Parent (or Guardian) Signature\_\_\_\_\_

Whole Number Multiplication and Division

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Whole Number Multiplication and Division

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# **COMMON CORE STATE STANDARDS – MATHEMATICS**

#### STANDARDS FOR MATHEMATICAL CONTENT

# 4.NBT.B\* Use place value understanding and properties of operations to perform multi-digit arithmetic.

- 4.NBT.5\* Multiply a whole number of up to four digits by a one-digit whole number, and multiply two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculations by using equations, rectangular arrays, and/or area models.
- 4.NBT.6\* Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculations by using equations, rectangular arrays, and/or area models.

#### 5.NBT.A\* Understand the place value system.

- 5.NBT.2\* Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.
- 5.NBT.5\* Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- 5.NBT.6\* Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.
- 6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.
- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.
- 6.EE.2b Write, read, and evaluate expressions in which letters stand for numbers: Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.

\*Review of content essential for success in 6<sup>th</sup> grade.

#### STANDARDS FOR MATHEMATICAL PRACTICE

- MP2 Reason abstractly and quantitatively.
- MP3 Construct viable arguments and critique the reasoning of others.
- MP7 Look for and make use of structure.
- MP8 Look for and express regularity in repeated reasoning.



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