



NUMBERS in BASE TEN 1 STUDENT PACKET

WHOLE NUMBER MULTIPLICATION AND DIVISION

My Wor	d Bank		0
NBT1.0	Opening Problem: How Many Do	You See?	1
NBT1.1	 Exploring Multiplication Use strategies for deriving more difficult simpler facts. Perform multidigit multiplication using the strategies for the strategies for deriving more difficult simpler facts. 		2
NBT1.2	 Exploring Division Represent division as repeated sub Solve division problems by "chunkin Interpret solutions to division problems 	g."	8
NBT1.3	 Multiplication and Division: Stand Multiply multi-digit numbers using the Divide multi-digit numbers using the 	e standard algorithm.	14
NBT1.4	Review		20
NBT1.5	Definitions, Explanations, and Exa	amples	24

Parent (or Guardian) signature

MY WORD BANK

Explain the mathematical meaning of each word or phrase, using pictures and examples when possible. (See section 1.5.) Key mathematical vocabulary is underlined throughout the packet.

possible. (See section 1.5.) Key mathematical vocabulary is underlined throughout the pac		
algorithm	area model for multiplication	
distributive property	dividend	
	uividend	
divisor	factor	
product	quotient	

HOW MANY DO YOU SEE?

Follow your teacher's directions.



7

EXPLORING MULTIPLICATION

We will use strategies to derive more difficult multiplication facts from simpler facts. We will multiply multidigit numbers using an area model.

GETTING STARTED

Fill in the blanks below.

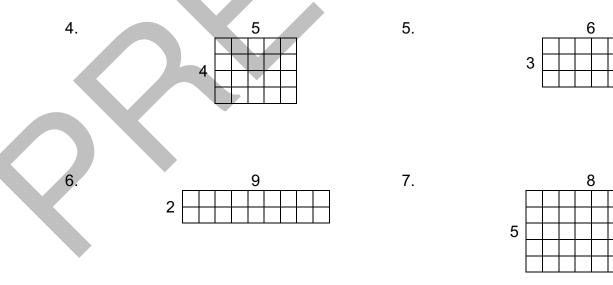
- 1. How many rows of 7 squares are in this rectangle?
- 2. How many columns of 3 squares are in this rectangle?
- 3. How many square units are in this rectangle?

Therefore, the area is _____ square units.

Find <u>area model for multiplication</u> in section 1.5 and record its meaning in My Word Bank.

For a rectangle's dimensions, we sometimes read \times as "by." The above rectangle is "3 by 7" or "7 by 3." It does not matter which dimension is called "length" and which is called "width." Both of these terms describe the length of a side.

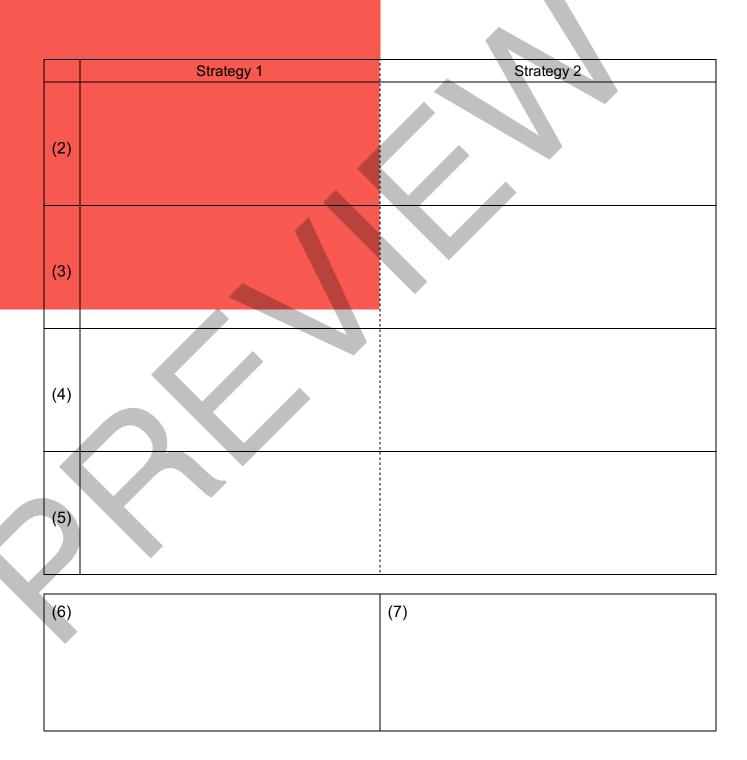
Write a multiplication sentence for the dimensions of each rectangle below and find the area.



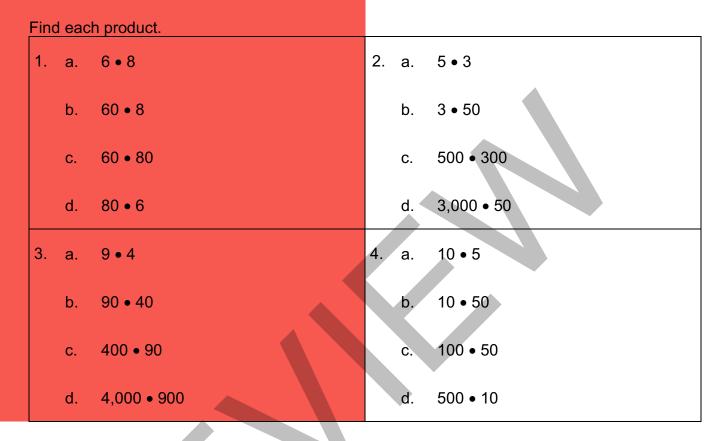
MULTIPLICATION STRATEGIES

Follow your teacher's directions. Find product in section 1.5 and record its meaning in My Word Bank.

(1)



1. Carl multiplied 4×7 . Explain his strategy.	 Grace multiplied 7 • 9. Explain her strategy.
2 • 7 = 14	7(10) = 70
14 • 2 = 28,	7(1) = 7
so 4 × 7 = 28	70 – 7 = 63,
	so 7 × 9 = 63
3. Use two strategies to find 9(4).	4. Use two strategies to find (7)(6).
5. Vikram multiplied 3×7 . Find his error.	6. Taylor multiplied 4(8). Find her error.
3 • 5 = 15	(4)(4) = 16
3 • 3 = 9	16 + 2 = 18, so (4)(8) = 18
15 + 9 = 24,	10 + 2 = 10, 30 (4)(0) = 10
so 3 • 7 = 24	

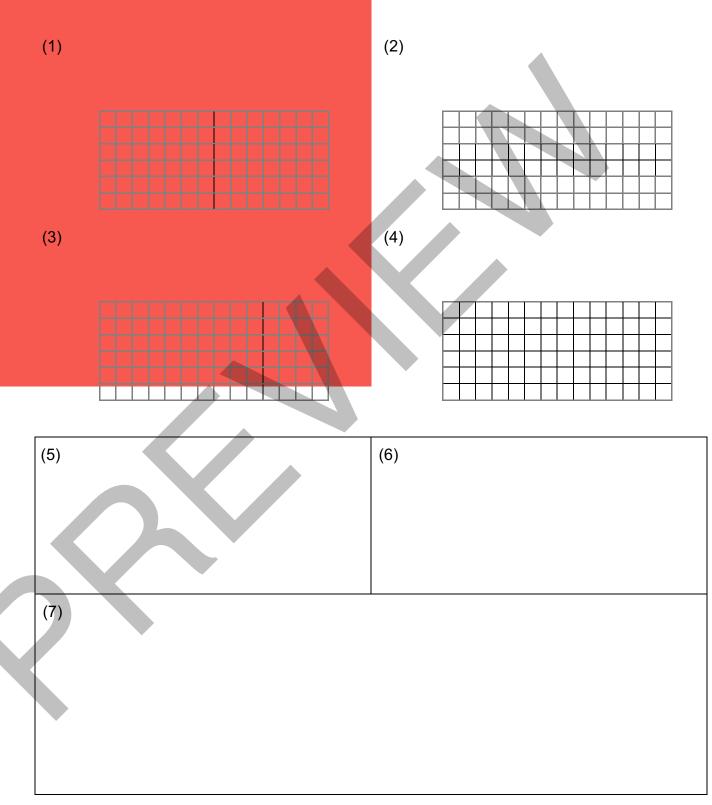


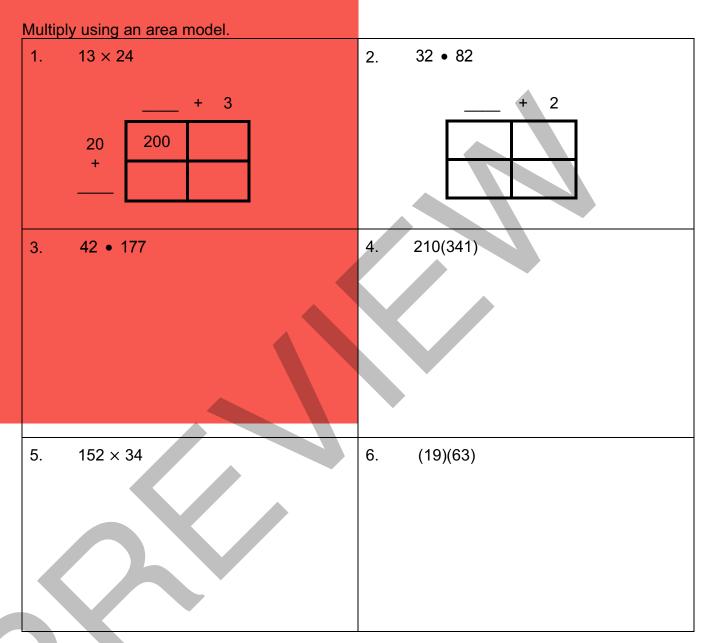
- 5. In a classroom, each student has 10 pencils.
 - a. Each group has 4 students. How many pencils does the group have in all?
 - b. There are 30 students in the classroom. How many pencils are in the entire class?
- 6. Grandma Sullivan has 5 grandchildren. She gave each of them 7 ten-dollar bills.
 - a. How much money did each grandchild get?
 - b. How much money did Grandma Sullivan give to her grandchildren in all?
- 7. The Incredible Charity gave \$500 to each of 3,000 people in need. How much money did the charity give out in all?

Bonus: Write this dollar amount in words.

MULTIPLICATION USING AN AREA MODEL

Follow your teacher's directions.





Find the error in the problem below. Briefly explain the mistake and redo the work correctly.

7.

	4 -	+ 8	-	
90 +	360	720		
4	16	32		
360 + 720 + 16 + 32 = 1,128				

EXPLORING DIVISION

We will solve division problems using repeated subtraction and chunking. We will compare different chunking methods. We will interpret solutions to division problems in context.

GETTING STARTED

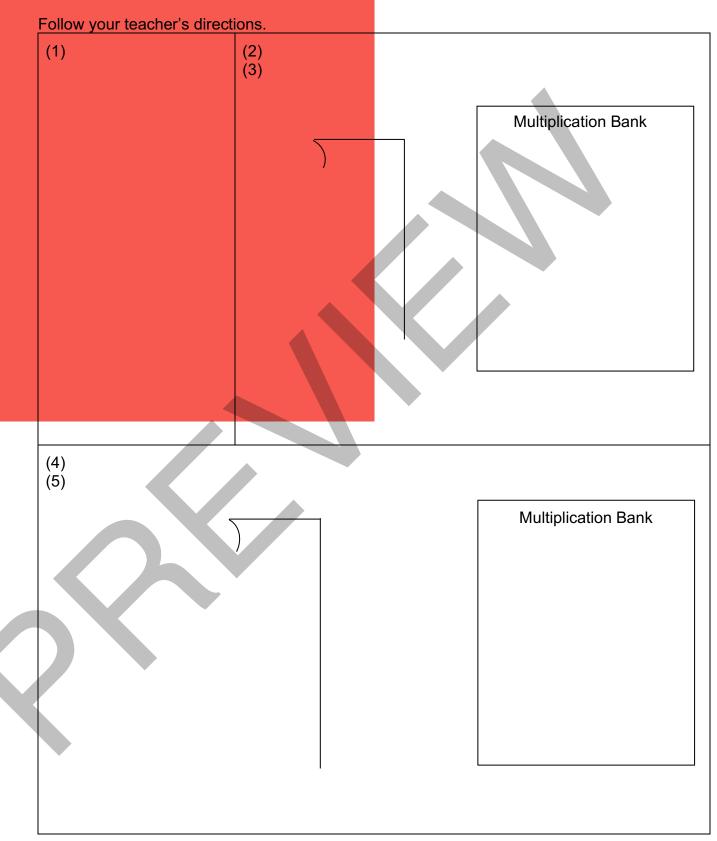
1. Fill in the products. Use strategies from Lesson 1.1 to help you.

15	× 1	15 × 10
15	× 2	15 × 20
15	× 3	15 × 30
15	× 4	15 × 40

2. Show or explain two different ways to find 15×5 .

Method 1:	Method 2:

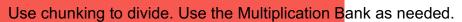
3. Find 15×50 . Try to use the work done above to help you.



DIVISION STRATEGIES

Use chunking to divide. Use the Multiplication Bank as needed.





1. 15) 4575 4575 ÷ 15 =	Multiplication Bank
2. How many miles per gallon did Mr. Garcia's gallons of gas?	
	Multiplication Bank
792 ÷ 22 =	

Follow your teacher's directions. (1) **Multiplication Bank** (3) (2) (4) **Multiplication Bank**

INTERPRETING QUOTIENTS

Multiplication Bank

PRACTICE 6

Show each computation. Explain the meaning of the remainder. Answer the question using the context of the problem.

1. A bus holds 63 students. If 2,842 students are going on a field trip, how many buses are needed?

Solution:

2. A softball team earns \$1,250 to purchase uniforms. If the price of a uniform is \$38, how many uniforms can the team purchase?

	Multiplication Bank
Solution:	

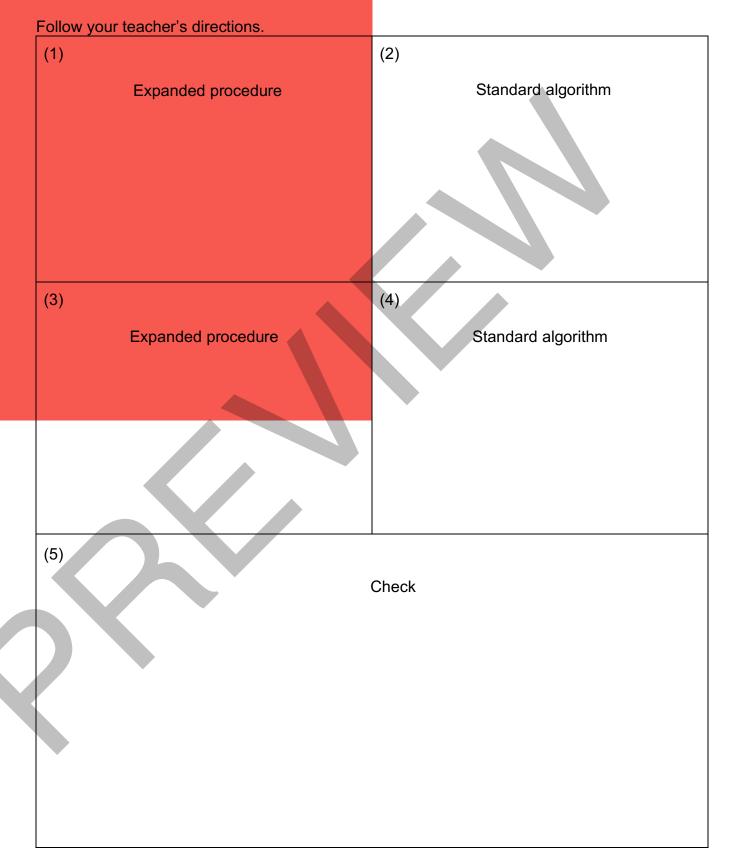
MULTIPLICATION AND DIVISION: STANDARD ALGORITHMS

We will link area model multiplication to an expanded procedure and the standard algorithm. We will link chunking division to the standard algorithm.

GETTING STARTED

Multiply using an area model.		
1. 64 × 23	2.	21(307)

3. Write 24 divided by 6 using a "division house" \int , division symbol (÷), and fraction bar.

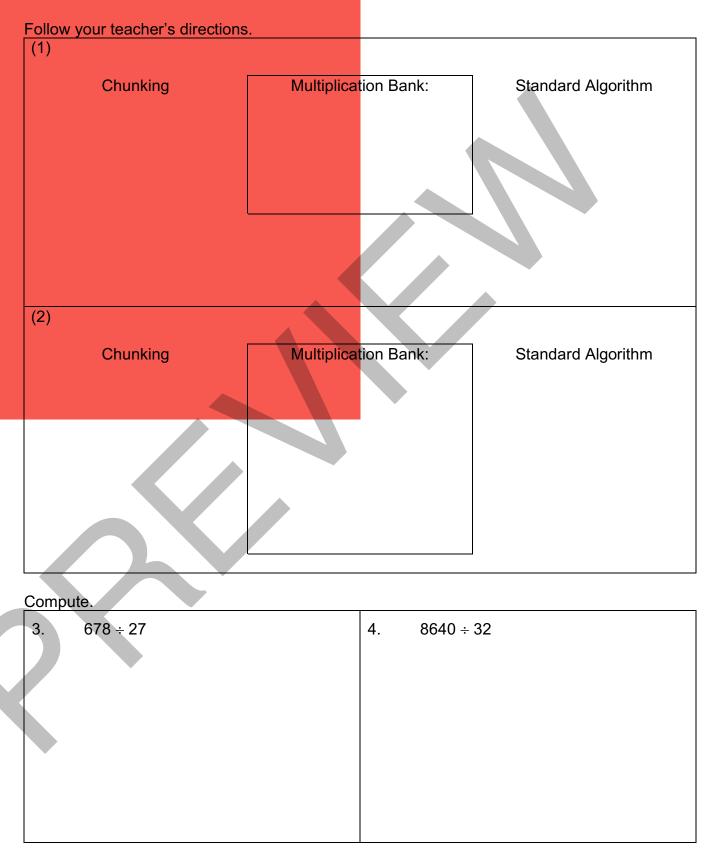


MULTIPLICATION PROCEDURES

Compute using the standard algorithm. Check your work using an expanded procedure or area model.

1. 81 × 26	2. 3 • 127
3. 32(314)	4. 250(108)
5. A camp ordered 27 shipments of 165 blank receive altogether?	ets each. How many blankets will the camp

DIVISION PROCEDURES



FICE 8

Compute using the standard algorithm.

1. 25)791	2. <u>13</u> 1		3. 9856 ÷ 64
4. There are 256 students goin trip. Each bus can hold 70 statea. How many buses are not state	students.	blankets for requires 7 f feet of fabri	unity Service Club is making r a charity. Each blanket feet of fabric. They have 450 ic. any blankets can they make?
b. If buses are filled one by many students are in the not full?		b. How ma	any feet of fabric are left over?
6. Which method do you prefe	er when multiply	ng whole numb	ers? Why?
7. Which method do you prefe	er when dividing	whole numbers	? Why?

	PRACTICE 9
Sol	ve each problem and answer the questions.
1.	A cluster of grapes averages 8 grapes per cluster. Sunshine School has 356 students. If the school ordered a cluster of grapes for each student, about how many grapes will the school receive?
2.	 Murphy picks 8 oranges daily. a. If he picks the same amount of oranges every day, how many oranges will he pick after 6 weeks?
	 b. There are 15 families on Murphy's street. If he shares the oranges equally over the six weeks, how many oranges will he give to each family?
3.	The average school day is 314 minutes. The average school year is 180 days.
	a. If you attend school every day, how many minutes are you in school per school year?
	b. How many hours is this?

REVIEW

MULTIPLICATION AND DIVISION FLUENCY CHALLENGES

Gaining fluency with multiplication and division takes practice. Try to complete these challenges without any errors. Use a separate sheet of paper.

Begin with any single digit 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 big number 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 a different whole number. Predict the answers to Challenges A and B before computing.

POSTER PROBLEM

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____
- Each group will have a different colored marker. Our group marker is

Part 2: Do the problems on the posters by following your teacher's directions.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
Sunny Middle School is visiting the local high school. All 1,155 students and 37 adults will be visiting. Each school bus can carry 72 passengers. How	The after-school program is ordering t-shirts for all the students. A t-shirt cost \$8 and they have \$3,015 to spend. How many t-shirts can they order?	Addie has a collection of 986 buttons. Olivia just gave her 520 more buttons. Addie is packaging them in sets of 12 to sell at the fair. How many complete sets of buttons will Addie have to sell?	The cross-country team collectively ran about 20,160 miles during their season. Each member ran, on average, about 350 miles during the season. How many runners are on the team?

- A. Write a "division house" for the problem and make a multiplication bank.
- B. Solve using chunking division.
- C. Solve using the standard algorithm.
- D. Answer the question. Check the answer using multiplication.

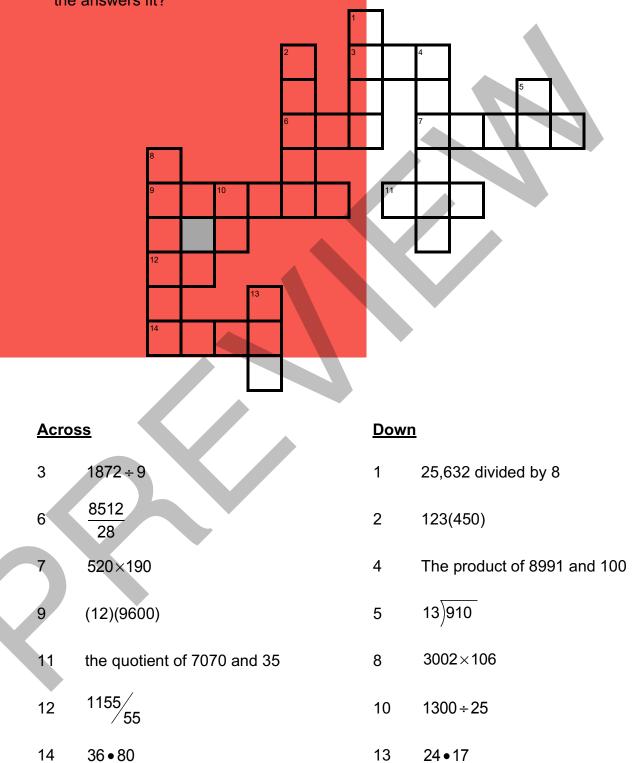
Part 3: Return to your seats and work with your group.

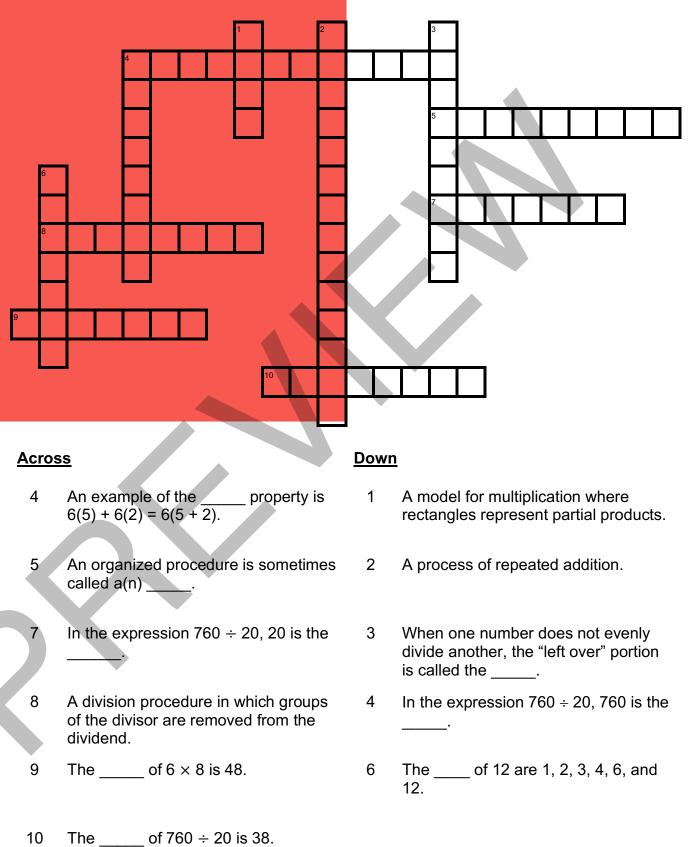
Refer to your "start poster."

- 1. What number is the remainder?
- 2. What does the remainder represent in the context of the problem?
- 3. Explain why the answer had to be rounded, and also why it was rounded up or down to the nearest whole number.

COMPUTATION CRISS CROSS

1. Work with a partner. One student completes the "Across" portion of the puzzle. The other student completes the "Down" portion of the puzzle. When you put them together, do all the answers fit?





VOCABULARY REVIEW

DEFINITIONS, EXPLANATIONS, AND EXAMPLES

[Word or Phrase	Definition				
	algorithm	An <u>algorithm</u> is an organized procedure, or step-by-step recipe, for performing a calculation or finding a solution.				
		The traditional procedure for dividing whole numbers is called the long division algorithm.				
	area	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.				
		Area = (length)(width)				
		length If a rectangle has a length of 12 inches and a width of 5 inches, its area is (5)(12) = 60 square inches.				
	area model for multiplication	An <u>area model for multiplication</u> is a pictorial way of representing multiplication using rectangles. The length and width of a rectangle represent factors, and the area of the rectangle represents their product.				
		(multiplying whole numbers) $13 \bullet 12 = 156$				
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				
	distributive property	The <u>distributive property</u> states that $a(b + c) = ab + ac$ and $(b + c)a = ba + ca$ for any three numbers <i>a</i> , <i>b</i> , and <i>c</i> .				
	dividend	3(4 + 5) = 3(4) + 3(5) and $(4 + 5)8 = 4(8) + 5(8)In a division problem, the dividend is the number being divided. See division.$				
		In $12 \div 3 = 4$, the dividend is 12.				

Word or Phrase	Definition		
division	<u>Division</u> is the mathematical operation that is inverse to multiplication. For $b \neq 0$,		
	$a \div b = a \bullet \frac{1}{b}$ division by <u>b</u> is multiplication by the multiplicative inverse $\frac{1}{b}$ of b,		
	In this division problem, the number a to be divided is the <u>dividend</u> , the number b by which a is divided is the <u>divisor</u> , and the result $a \div b$ of the division is the <u>quotient</u> :		
	dividend \div divisor = quotient $\frac{\text{dividend}}{\text{divisor}}$ = quotient $\frac{\text{quotient}}{\text{divisor}}$		
	"Twelve divided by 2" may be written $12 \div 2$, $\frac{12}{2}$, or $2)12$.		
division with remainder	Division with remainder is a division problem for natural numbers n and d in which n is expressed as $n = qd + r$, where q and r are whole numbers, and $0 \le r < d$. We say that the quotient of n divided by d is q with remainder r . This may be written as:		
	$\frac{q \operatorname{Rr}}{d n} \qquad \qquad \frac{4 \operatorname{R2}}{3 \operatorname{14}}$		
	If 14 objects are separated into 3 equal groups, there are 4 objects in each group, with 2 objects left over. The quotient of 14 divided by 3 is 4 with a remainder of 2.		
divisor	In a division problem, the <u>divisor</u> is the number by which another is divided. See <u>division</u> .		
	In $12 \div 3 = 4$, the divisor is 3.		
factor of a number	A factor of a number is a divisor of the number. See divisor.		
	The factors of 12 are 1, 2, 3, 4, 6, and 12.		
product	A <u>product</u> is the result of multiplying two or more numbers or expressions. The numbers or expressions being multiplied to form the product are <u>factors</u> of the product.		
	factor × factor = product		
	The product of 7 and 8 is 56, written $7 \cdot 8 = 56$. The numbers 7 and 8 are both factors of 56.		
quotient In a division problem, the <u>quotient</u> is the result of the division. See <u>division</u> .			
	In $12 \div 3 = 4$, the quotient is 4.		
remainder	See <u>division with remainder</u> .		

Symbols for Multiplication					
The product of 8 and 4	can be written as:				
8 times 4	8 × 4	8•	4	(8)(4)	8 <u>× 4</u>

In algebra, we generally avoid using the × for multiplication because it could be misinterpreted as the variable *x*, and we cautiously use the symbol • for multiplication because it could be misinterpreted as a decimal point.

Symbols for Division					
The quotient of 8 and 4 of	an be written as:				
8 divided by 4	8÷4	$4\overline{)8}$ $\frac{8}{4}$ $8/4$			
In algebra, the preferred way to show division is with fraction notation.					

Does 14 $ imes$ 3 Really Have	the Same Value as 3×14 ?	
The commutative property of multiplication asserts that the product does not depend on the order of the factors. Each of the products 3×14 and 14×3 is equal to 42. Nonetheless, for some problems, context is important. Although both actions require 42 marbles, the filling of 3 bags with 14 marbles each will require different supplies than the filling of 14 bags with 3 marbles each.	3 or <u>×14</u>	14 □ ×_3

The Distributive Property

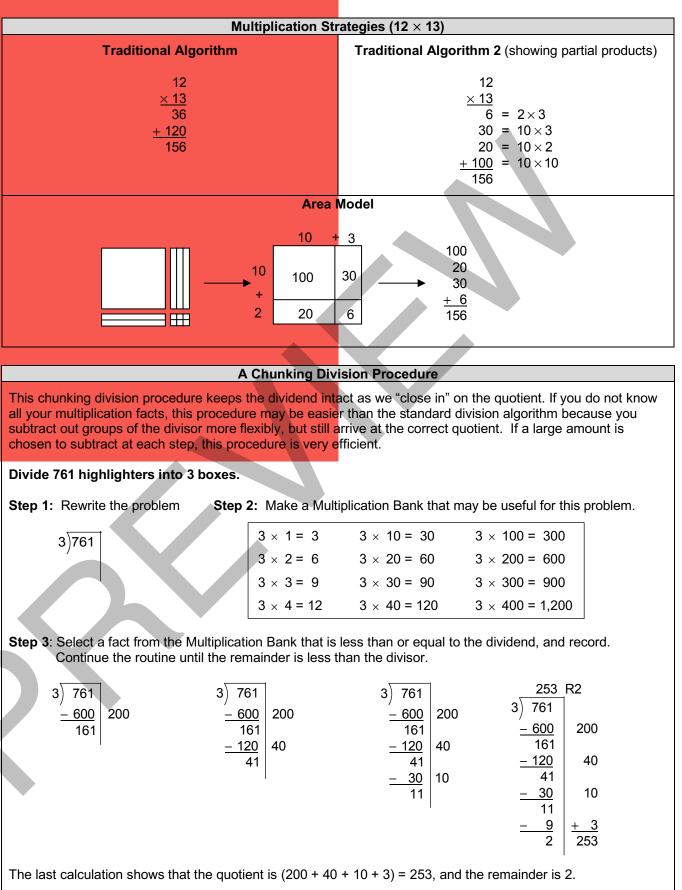
The distributive property relates the operations of multiplication and addition. The term "distributive" arises because the property is used to distribute the factor outside the parentheses over the terms inside the parentheses.

Suppose you earn \$9.00 per hour. If you work 3 hours on Saturday and 4 hours on Sunday, one way to compute your earnings is to compute your wages for each day and then add them. Another way is to multiply the hourly wage by the total number of hours. This example illustrates the distribute property.

$$(9 \times 3) + (9 \times 4) = 9(3 + 4)$$

$$27 + 36 = 9(7)$$

Multiplication Strategies					
Skip Count (3 × 5)	Double (7 × 6)	Halve (5 × 6)	Add On (3 × 7)	Take Away (3 × 9)	
3	3 × 7 = 21,	6 × 10 = 60,	6 × 3 = 18	10 × 3 = 30	
6	SO	so	Think 19, 20, 21	30 – 3 = 27	
9	6 × 7 = 42	6 × 5 = 30	SO	SO	
12	7 × 6 = 42	5 × 6 = 30	7 × 3 = 21	9 × 3 = 27	
15			3 × 7 = 21	3 × 9 = 27	



	The Standard Di	ivision Algorithm			
The standard division algorithm multiply, subtract, "bring down".		or dividing. It involves a cyclical process: divide, less than the divisor.			
14) <u>96</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) 963 <u>-84</u>	Multiply	Find the product of 6 and 14. Write this below the 96.			
6 14) 963 <u>-84</u> 12	Subtract	Find the difference between 96 and 84. Write this below the 84.			
$ \begin{array}{r} 6\\ 14 \overline{\smash{\big)}963}\\ \underline{-84}\downarrow\\ 123 \end{array} $	Bring down	Bring down the next digit.			
$ \begin{array}{r} 68\\ 14 \overline{\smash{\big)}963}\\ \underline{-84} \downarrow\\ 123\\ \underline{-112}\\ 11 \end{array} $	Divide Multiply Subtract Bring down (remainder)	Repeat the divide, multiply, subtract, bring down (if necessary) process until the remainder is less than the divisor.			
Some ways to represent the dividend, divisor, quotient, and remainder:					
divisor)dividend	remainder	dividend = (divisor)(quotient) + remainder			
6 8 R11 14) 9 6 3	14) 9	$\frac{68}{63} \frac{11}{14} \qquad 963 = (14)(68) + 11$			

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