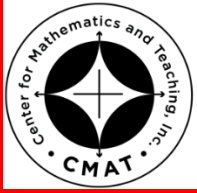Name_____   Period _____   Date _____

MathLinks

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

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

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.

Goals

- Learn strategies for deriving multiplication facts from simpler facts.
- Use associative and commutative properties.
- Use the distributive property.
- Use expanded notation.
- Multiply using an area model.

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 commutative property of multiplication 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 associative property of multiplication 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 distributive property states that $a(b + c) = ab + ac$ and $(b + c)a = ba + ca$ for any three numbers a, b, and c. This property relates two operations (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. $(4)(2) = (2)(4)$ _____

Write a number sentence that illustrates each property of arithmetic.

4. Commutative property of multiplication _____

5. Associative property of multiplication _____

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.

$$8 \cdot 7 = 56 \qquad 6 \cdot 9 = 54 \qquad 7 \cdot 9 = 63$$

$$3 \cdot 7 = 21 \qquad 7 \cdot 6 = 42 \qquad 6 \cdot 8 = 48$$

2. Ricky wrote the following list on his paper.

    7   14   21   28   35   42   49   56   63   70

    Explain how Ricky might use the list to find $7 \cdot 7$.

    Use Ricky's strategy to find $6 \cdot 9$.

3. Randi wrote the following on her paper.

$$\begin{array}{ccc} 7 & 7 & 28 \\ \underline{\times 4} & \underline{\times 4} & \underline{+28} \\ 28 & 28 & 56 \end{array}$$

    What multiplication fact do you think she was deriving? _____ Explain.

    Use Randi's strategy to find $8 \cdot 6$.

MULTIPLYING BY MULTIPLES OF 10

1. If you know that 4 • 7 = 28, explain how you can find 4 • 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. a. 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? _____

2. How many columns of 3 squares are in this rectangle? _____

3. How many square units are in this rectangle?_____
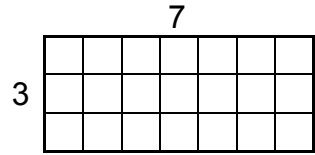
Therefore, we write: The area is _____ square units.

For a rectangle's dimensions, we sometimes read × 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.

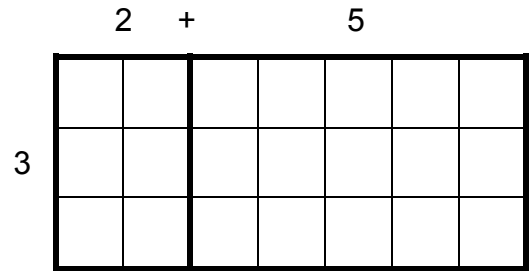4. What property of multiplication is illustrated by 3 × 7 = 7 × 3?_____

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

a.

7

3

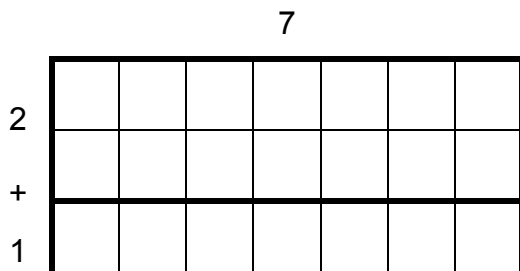3 × _____ = _____

b.

2   +   5

3

3 × (2 + _____)

= 3 × 2 + 3 × _____

= _____ + _____ = _____

c.

7

2

+

1
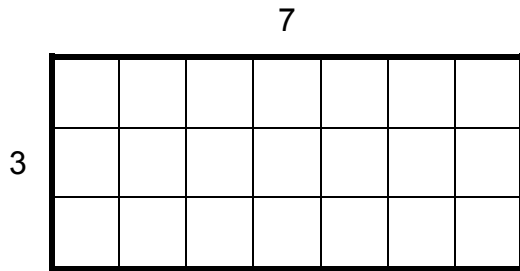
(2 + _____) × _____

= 2 × _____ + _____ × _____

= _____ + _____ = _____

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 × 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.)

14

3

10   +   4

3

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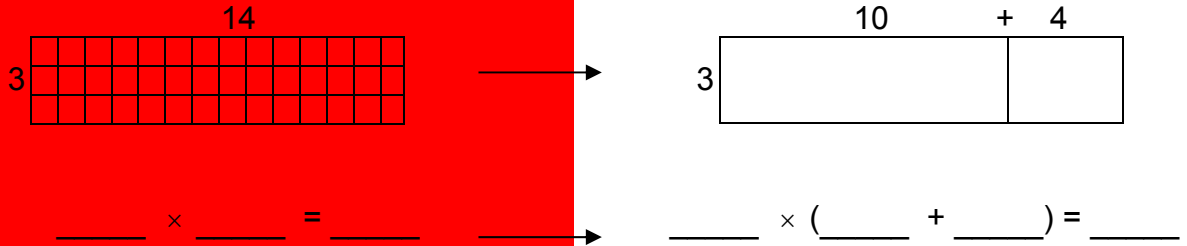
8. Compute 7 × 25 using an area model strategy. (Note that this area model is NOT to scale, and each rectangular area is used to record <u>partial products</u>. This is a helpful strategy with larger numbers.)

20   +   5

7

_____ × _____ = _____   _____ × (_____ + _____) = _____
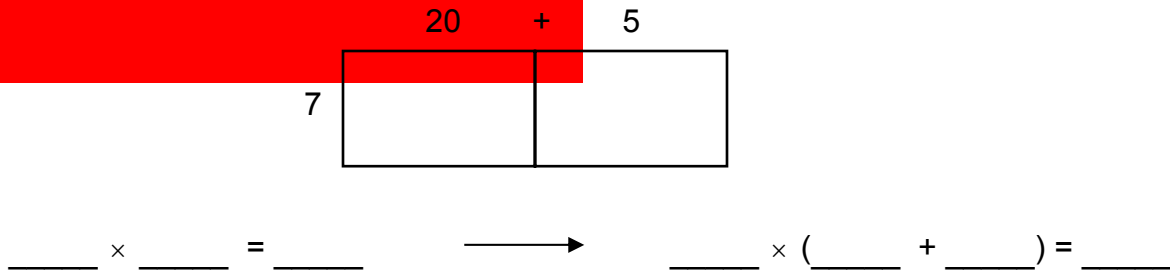
9. The calculations in problems 7 and 8 are made simplified by applying the _____ property.

State the property of arithmetic illustrated by each number sentence.

10.   3 • (10 + 4) = 3 • 10 + 3 • 4

11.   3 • 50 = 3 • (5 • 10) = (3 • 5) • 10

12.   3(10 + 4) = 3(4 + 10)

MULTIPLICATION USING AN AREA MODEL (Continued)

Compute each product using an area model, recording the appropriate partial products in each smaller section before adding. Show all work and check using another method if you know of one. Rectangles on this page are not drawn to scale.
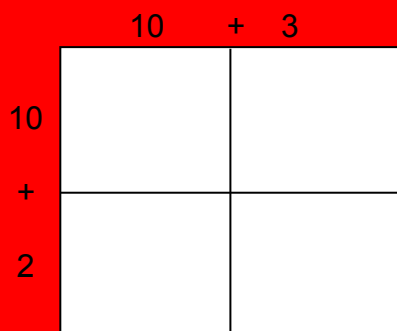
13. Compute 12×13.   Check:

```
        10   +   3
      ┌──────┬──────┐
   10 │      │      │
      ├──────┼──────┤
    + │      │      │
    2 │      │      │
      └──────┴──────┘
```

14. Find 18×74 in two ways.   Check:

```
        70   +    4              50  +  20  +   4
      ┌──────┬──────┐      10 ┌─────┬─────┬─────┐
   10 │      │      │       + │     │     │     │
    + │      │      │       4 ├─────┼─────┼─────┤
      ├──────┼──────┤       + │     │     │     │
    8 │      │      │       4 ├─────┼─────┼─────┤
      └──────┴──────┘         │     │     │     │
                              └─────┴─────┴─────┘
```
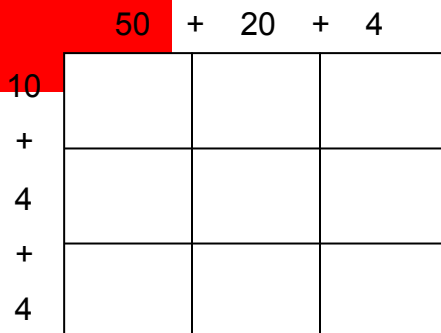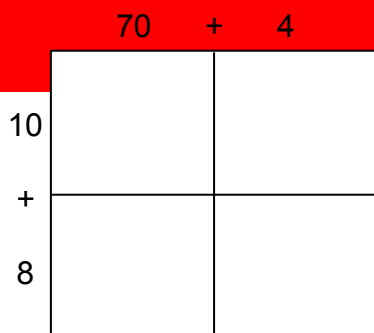
15. Do problems 13 and 14 again, each in a different way than above.

   a. For problem 13:   b. For problem 14:

```
   ┌──────────────────┐          ┌──────────────────┐
   │                  │          │                  │
   │                  │          │                  │
   │                  │          │                  │
   │                  │          │                  │
   └──────────────────┘          └──────────────────┘
```
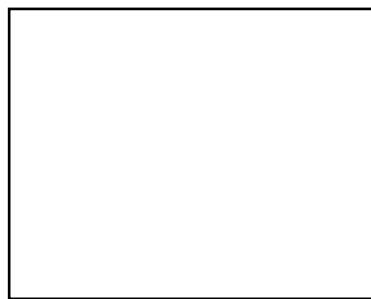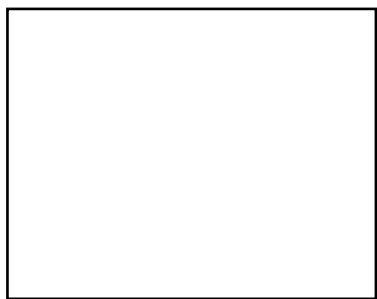
AREA MODEL PRACTICE

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

Check:

$$100 \quad + \quad 30 \quad + \quad \underline{\hspace{1cm}}$$

20

+

$\underline{\hspace{1cm}}$
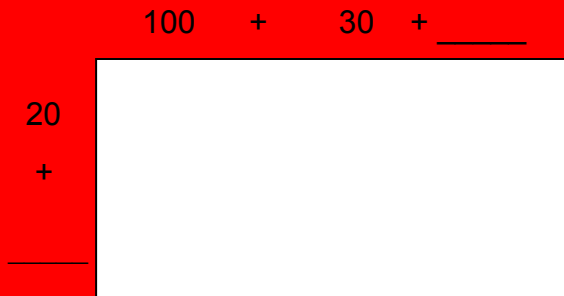
2. Use an area model to compute 95 $\times$ 602. Check using another method.

Check:

$$600 \qquad + \qquad \underline{\hspace{1cm}}$$

50

+

40

+

$\underline{\hspace{1cm}}$
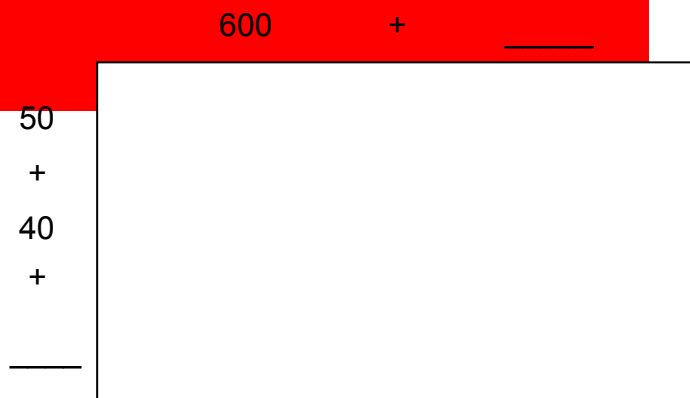
3. Use an area model to find the product of 37 and 56. Check using another method.

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.	• Learn strategies for finding quotients of whole numbers. • Estimate quotients. • Use division vocabulary. • Use a variation of the standard division algorithm. • Interpret the meaning of remainders in division problems.

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.

```
     24
   −  6    (1)
   ┌────┐
   └────┘
   −  6    (2)
   ┌────┐
   └────┘
```

4. What is 24 divided by 6? _____

A DIVISION ALGORITHM

This division algorithm allows you to use known facts and estimation to "close in" on the quotient in a sense-making way.

> 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.

$$24\overline{)}$$

[Total number]

[Number in each group]
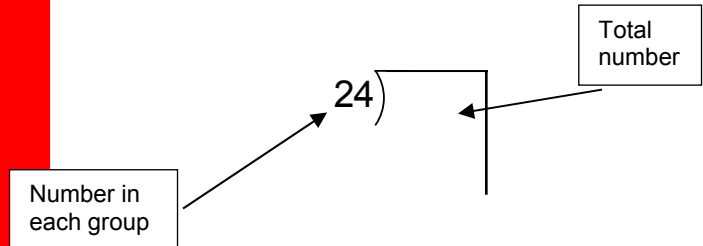
Step 2:

- 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.

  The closest fact in your tool kit is 24 • _____ = _____

- Record this information as follows and subtract.

$$
\begin{array}{r}
24\overline{)850} \\
-720 \quad | \; 30 \\
\hline
130
\end{array}
$$

[Number of groups in this step]

[Number used up in this step]

[Number remaining so far]
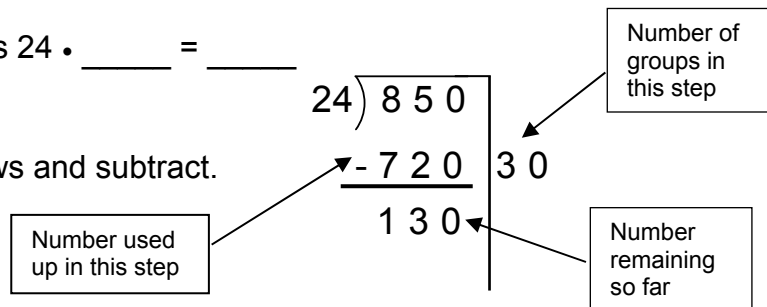
This process illustrates that   850   =   24   •   _____   +   _____

(dividend)   (divisor)   (partial quotient)   (remainder)

Why is the process not yet complete?

A DIVISION ALGORITHM (Continued)

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

- Without going over, use your toolkit to estimate how many groups of 24 are in 130.

  The closest fact in your toolkit is 24 • _____ = _____

- Record this information and subtract.

$$24 \overline{)850}$$
- 7 2 0 | 3 0
130
- 9 6 | 4
3 4

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

- Without going over, use your toolkit to estimate how many groups of 24 are in 34.

  The closest fact in your tool kit is 24 • _____ = _____

- Record this information and subtract.

$$24 \overline{)850}$$
- 7 2 0 | 3 0
130
- 9 6 | 4
3 4

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 | quotient. |

- What is the (remainder) ?

- Answer the question.

This process shows that: $24 \overline{)850}$ [ ] R ( )

This process also shows that: 850 = 24 • [ ] + ( )

Answer: There are _____ groups of colored pencils. There are _____ left over.

DIVISION PROBLEMS

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

1.

16) 4 3 2

Check:

_____ = _____ • _____ + _____

(Dividend = Divisor • Quotient + Remainder)

Area model:

Toolkit:

2.

15) 8 2 6

Check:

_____ = _____ • _____ + _____

(Dividend = Divisor • Quotient + Remainder)

Area model:

Toolkit:

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: Toolkit:	Solution: 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.

| | 20 | | A | | 164 | | B |
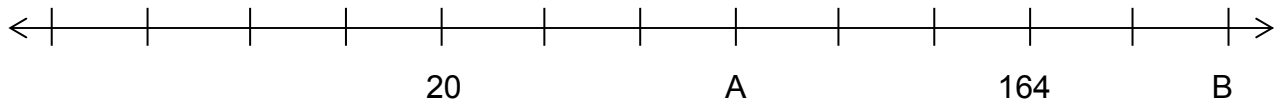
DIVISION PRACTICE

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

1. $9 \overline{)852}$	Check: _____ = _____ • _____ + _____ (Dividend = Divisor • Quotient + Remainder) Area model:
Toolkit:	

2. $27 \overline{)1432}$	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.

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

D   265   C   670
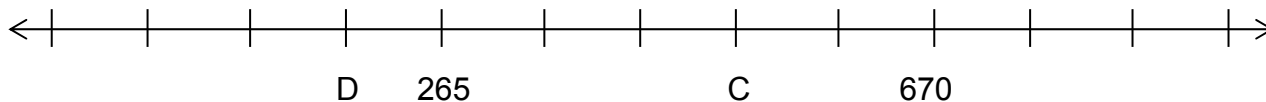
MULTIPLICATION AND DIVISION: STANDARD ALGORITHMS

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.	• Multiply multi-digit numbers using the standard algorithm. • Divide multi-digit numbers using the standard algorithm.

Warmup

1. Find 57 • 109 using an area model.

2. Divide using the algorithm from the previous lesson.

$$14\overline{)963}$$

Toolkit:

3. Write the following as an expression.

$$\begin{array}{r} 378 \\ 422 \\ + 79 \\ \hline \end{array}$$

4. Write the following as an equation.

$$\begin{array}{r} 422 \\ - 79 \\ \hline 343 \end{array}$$

MULTIPLICATION: THREE METHODS

1. Compute 64 × 23

    a. Area model

             60   +   4

   20

   +

   3

    b. Expanded procedure

```
        64      partial
     ×  23      products
                    ↓
             ←  (3 × 4)

             ←  (3 × 60)

             ←  (20 × 4)

             ←  (20 × 60)
     _____

```
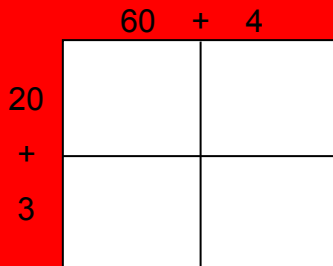
2. Compute 59 × 37

    a. Area model

    b. Expanded procedure

```
        59
     ×  37

             ←

             ←

             ←

             ←
     _____

```

    c. Standard algorithm

```
        64
     ×  23

          ←  3 × 4 ("carry" a ten) and
             3 × 6 tens (+ the carried ten)
     0 ←  2 tens × 4 and 2 tens × 6 tens
     _____

```

    c. Standard Algorithm

```
        59
     ×  37

             ←

             ←
     _____

```
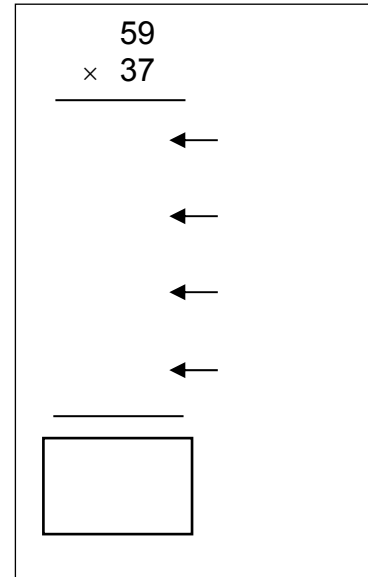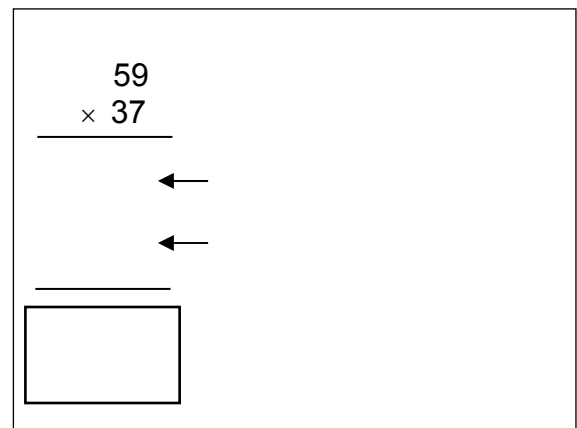
MULTIPLICATION PRACTICE

Use any TWO methods to find each product.

1. 81 • 26	2. 3 • 127
3. 32 • 314	4. 250 • 108

DIVISION: THE STANDARD ALGORITHM

Solve using the standard algorithm.

quotient remainder divisor⟌dividend $\overset{3}{12\overline{)38}}$ R 2	dividend = (divisor)(quotient) + remainder 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.

$14\overline{)9\ 6\ 3}$	Determine where to start	Look at the greatest place(s) in the divisor. Choose digits so that the quotient of these digits and the divisor is between 1 and 9.
$14\overline{)9\ 6\ 3}$	Divide	How many 14s in 96? _____ Write this number above the 96.
$\overset{6}{14\overline{)9\ 6\ 3}}$ □	Multiply	Find the product of 6 and 14. Write this below the 96.
$\overset{6}{14\overline{)9\ 6\ 3}}$ $-\ 8\ 4$ □	Subtract	Find the difference between 96 and 84. Write this below the 84.
$\overset{6}{14\overline{)9\ 6\ 3}}$ $-\ 8\ 4\ ↓$ $1\ 2\ □$	Bring down	Bring down the next digit.
$\overset{6\ □}{14\overline{)9\ 6\ 3}}$ $-\ 8\ 4\ ↓$ $1\ 2\ 3$ □ □	Divide Multiply Subtract Bring down (remainder)	Repeat the divide, multiply, subtract, bring down (if necessary) process until the remainder is less than the divisor.
Write the result showing the quotient and remainder: $14\overline{)9\ 6\ 3}$		Write the result as an equation: 9 6 3 = (1 4)(_____) + ____

PRACTICE: THE STANDARD DIVISION ALGORITHM

Solve using the standard algorithm.

1.	2.	3.
9) 8 7 5	25) 7 9 1	18) 1 , 3 2 4

4. There are 256 students going on the field trip. Each bus can hold 70 students.
 	
   a. How many buses are needed?
 	
   b. If buses are filled one by one, how many students are in the bus that is not full?
	5. The Community Service Club is making blankets for a charity. Each blanket requires 7 feet of fabric. They have 450 feet of fabric.
	
	   a. How many blankets can they make?
	
	   b. How many feet of fabric are left over?

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 big number now!)

1. I began with the number _____. After multiplying, my big number is _____.

2. Challenge A

    Start with your big number. 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 big number. 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 Properties of Arithmetic	
Commutative property of addition: For all numbers a and b , $a + b = b + a.$	Associative property of addition: For all numbers a , b , and c , $(a + b) + c = a + (b + c).$

Complete each equation and write the property of addition illustrated.

2. $(8 + 13) + 7 = $ _____
 	
   $8 + (13 + 7) = $ _____
 	
   Property:
	3. $45 + 360 = $ _____
	
	   $360 + 45 = $ _____
	
	   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>.
 	
   $\begin{array}{r} 4,183 \\ -2,851 \\ \hline \end{array}$
	8. Compute. Then rewrite the original addition problem, including the sum you find, as an addition <u>equation</u>.
	
	   $\begin{array}{r} 1,422 \\ 806 \\ +539 \\ \hline \end{array}$

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

SKILL BUILDER 2

Find each product.

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

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. 25×465	Check:

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

6. 302×23	Check:

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

SKILL BUILDER 3

Some Properties of Arithmetic
<u>Commutative property of multiplication</u>: For any two numbers a and b, $a \cdot b = b \cdot a$. In other words, changing the order of the factors does not change the product. <u>Associative property of multiplication</u>: For any three numbers, a, b, and c, $(a \cdot b) \cdot c = a \cdot (b \cdot c)$. In other words, changing the grouping of the factors does not change the product. <u>Distributive property</u>: 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. $15 \cdot 24 = 24 \cdot 15$_____

4. Tania and Maria were doing their math homework together. Tania had a hard time remembering the multiplication fact $9 \cdot 4$, but remembered that $4 \cdot 9 = 36$. 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. $27 \cdot 123$	6. $201 \cdot 18$
Check:	Check:

SKILL BUILDER 4

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

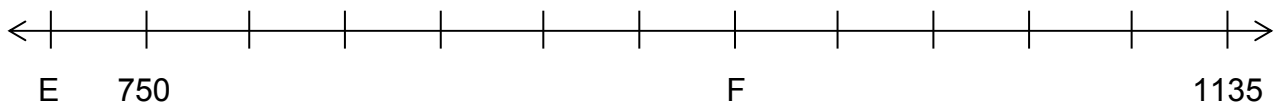| 1.	2.
8)̄ 1 1 3 6	1,650 ÷ 25
Solution:	Solution:
Check:	Check:
Toolkit:	Toolkit:

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

E   750   F   1135

SKILL BUILDER 5

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

1. 1,054 ÷ 7	3. 1,495 divided by 23
Solution:	Solution:
Check:	Check:
Toolkit:	Toolkit:

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

SKILL BUILDER 6

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?
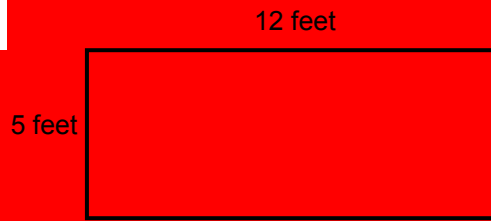
3. Lauren's work for a multiplication problem is shown to the right. Explain how she arrived at the numbers 240, 160, and 1200.

$$
\begin{array}{r}
34 \\
\times\ \ 48 \\
\hline
32 \\
240 \\
160 \\
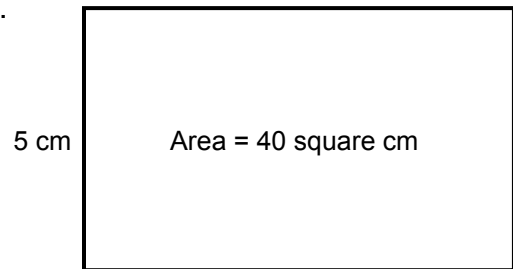+\ 1{,}200 \\
\hline
1{,}432
\end{array}
$$

SKILL BUILDER 7

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

1.

12 feet

5 feet
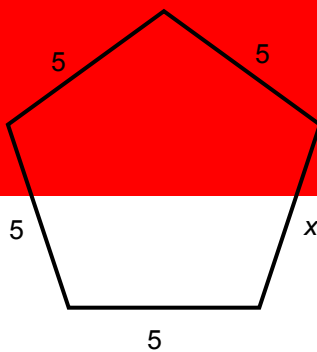
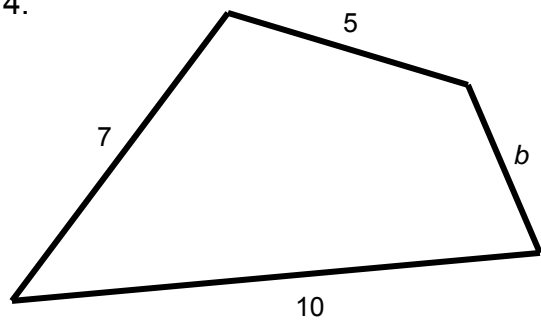$P =$ _____

2.

5 cm   Area = 40 square cm

$P =$ _____

If the perimeter of each figure below is 25 units, find the length of the missing side for each figure.
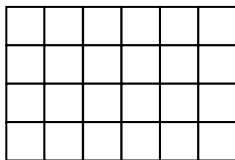
3.

5   5

5   *x*

5

$x =$ _____

4.

5

7

b

10

$b =$ _____

Find the area, *A*, of the rectangles below.

5. Each small square is unit by unit.

$A =$ _____

6.

5 meters

6 meters
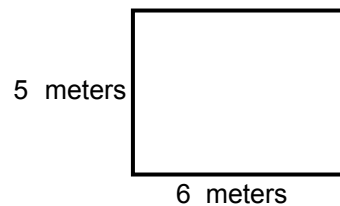
$A =$ _____

SKILL BUILDER 8

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.

$$52 \div 4 \qquad\qquad \frac{4}{52} \qquad\qquad 4\overline{)52}$$

$$4 \div 52 \qquad\qquad \frac{52}{4} \qquad\qquad 52\overline{)4}$$

SKILL BUILDER 9

1. Begin with any two-digit whole number.
    *   Multiply your number by 8.
    *   Multiply the result by 9.
    *   You should have a **big number** now!

    I began with the number _____.

    After multiplying, my **big number** is _____.

2. Start with your **big number**.
    *   Divide it by 12.
    *   Divide the result by 6

    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 **must be** the same.

Show work for problems 1 and 2:

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.

$$8\overline{)640}^{80}$$

FOCUS ON VOCABULARY

Match the words and phrases to the clues.

1. algorithm _____   a.   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 number in which a dividend is divided.

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.

1. Choose ALL of the true equations that illustrate the commutative property of an operation.

   A. $3 + 2 = 2 + 3$

   B. $3 \cdot 2 = 2 \cdot 3$

   C. $(3 + 2) + 4 = 3 + (2 + 4)$

   D. $(3 \cdot 2) \cdot 4 = (2 \cdot 3) \cdot 4$

   E. $3(2 + 4) = 3(2) + 3(4)$

   F. $3 - 2 = 2 - 3$

2. Compute. $741 - 489$.

   A.   386   B.   368   C.   362   D.   252

3. Choose ALL of the expressions that have a product equal to 312.

   A. $24 \cdot 13$ B. $12 \cdot 26$ C. $26 \cdot 12$ D. $30 \cdot 12$

4. A large pizza feeds 12 students. If 62 students are served at a party, how many pizzas are needed?

   A.   5   B.   6   C.   5 R2   D. $5\dfrac{2}{12}$

5. Compute $11\overline{)684}$.

   A.   62 R2   B.   63 R2   C.   64   D.   622

6. Choose ALL of the statements that illustrate the distributive property.

   A. $7 + 5 = 5 + 7$

   B. $3(2 + 8) = 3(2) + 3(8)$

   C. $7 + (2 + 4) = (7 + 2) + 4$

   D. $(2 + 8)3 = 2(3) + 8(3)$

   E. $3(2 + 8) = 3(2) + 8$

   F.   None of the above

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 • 5) = 3(2) • 3(5)? If the expressions are equal, state the property of arithmetic illustrated.

1.2   Division with Remainder

4. Compute 376 ÷ 12 using the alternative division algorithm.

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)‾7‾6‾6‾

HOME-SCHOOL CONNECTION

Here are some problems to review with your young mathematician.

1. Compute 64×28 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_____

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COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT

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.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*	Fluently multiply multi-digit whole numbers using the standard algorithm.
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.2	Fluently divide multi-digit numbers using the standard algorithm.

*Review of content essential for success in 6th 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.