Name _____ Date _____

1. Fill in the blanks using your knowledge of place value units and basic facts.

   a. 23 × 20

      Think: 23 ones × 2 tens = _____ tens

      23 × 20 = _____

   b. 230 × 20

      Think: 23 tens × 2 tens = _____

      230 × 20 = _____

   c. 41 × 4

      41 ones × 4 ones = 164 _____

      41 × 4 = _____

   d. 410 × 400

      41 tens × 4 hundreds = 164 _____

      410 × 400 = _____

   e. 3,310 × 300

      _____ tens × _____hundreds = 993 _____

      3,310 × 300 = _____

   f. 500 × 600

      ____hundreds × _____hundreds = 30 _____

      500 × 600 = _____

2. Determine if these equations are true or false. Defend your answer using your knowledge of place value and the commutative, associative, and/or distributive properties.

   a. 6 tens = 2 tens × 3 tens

   b. 44 × 20 × 10 = 440 × 2

   c. 86 ones × 90 hundreds = 86 ones × 900 tens

   d. 64 × 8 × 100 = 640 × 8 × 10

e. $57 \times 2 \times 10 \times 10 \times 10 = 570 \times 2 \times 10$

3. Find the products. Show your thinking. The first row gives some ideas for showing your thinking.

a.	7×9 $= 63$	7×90 $= 63 \times 10$ $= 630$	70×90 $= (7 \times 10) \times (9 \times 10)$ $= (7 \times 9) \times 100$ $= 6{,}300$	70×900 $= (7 \times 9) \times (10 \times 100)$ $= 63{,}000$
b.	45×3	45×30	450×30	450×300
c.	40×5	40×50	40×500	$400 \times 5{,}000$
d.	718×2	$7{,}180 \times 20$	$7{,}180 \times 200$	$71{,}800 \times 2{,}000$

4. Ripley told his mom that multiplying whole numbers by multiples of 10 was easy because you just count zeros in the factors and put them in the product. He used these two examples to explain his strategy.

7,000	×	600	=	4,200,000	800	×	700	=	560,000
(3 zeros)		(2 zeros)		(5 zeros)	(2 zeros)		(2 zeros)		(4 zeros)

   a. Ripley's mom said his strategy won't always work. Why not? Give an example.

5. The Canadian side of Niagara Falls has a flow rate of 600,000 gallons per second. How many gallons of water flow over the falls in 1 minute?

6. Tickets to a baseball game are $20 for an adult and $15 for a student. A school buys tickets for 45 adults and 600 students. How much money will the school spend for the tickets?

Name _____ Date _____

1. Find the products.

a. 1,900 × 20

b. 6,000 × 50

c. 250 × 300

2. Explain how knowing 50 × 4 = 200 helps you find 500 × 400.

Name _____ Date _____

1. Fill in the blanks using your knowledge of place value units and basic facts.

   a. 43 × 30

      Think: 43 ones × 3 tens = _____ tens

      43 × 30 = _____

   b. 430 × 30

      Think: 43 tens × 3 tens = _____hundreds

      430 × 30 = _____

   c. 830 × 20

      Think: 83 tens × 2 tens = 166_____

      830 × 20 = _____

   d. 4,400 × 400

      _____hundreds × _____ hundreds = 176 _____

      4,400 × 400 = _____

   e. 80 × 5,000

      _____ tens × _____ thousands = 40 _____

      80 × 5,000 = _____

2. Determine if these equations are true or false. Defend your answer using your knowledge of place value and the commutative, associative, and/or distributive properties.

   a. 35 hundreds = 5 tens × 7 tens

   b. 770 × 6 = 77 × 6 × 100

   c. 50 tens × 4 hundreds = 40 tens × 5 hundreds

   d. 24 × 10 × 90 = 90 × 2,400

3. Find the products. Show your thinking. The first row gives some ideas for showing your thinking.

a.	5 × 5 = 25	5 × 50 = 25 × 10 = 250	50 × 50 = (5 × 10) × (5 × 10) = (5 × 5) × 100 = 2,500	50 × 500 = (5 × 5) × (10 × 100) = 25,000
b.	80 × 5	80 × 50	800 × 500	8,000 × 50
c.	637 × 3	6,370 × 30	6,370 × 300	63,700 × 300

4. A concrete stepping stone measures 20 inches square. What is the area of 30 such tiles?

5. A number is 42,300 when multiplied by 10. Find the product of this number and 500.

A # Correct _____

Multiply.

1	9 x 10 =		23	73 x 1,000 =	
2	9 x 100 =		24	60 x 10 =	
3	9 x 1,000 =		25	600 x 10 =	
4	8 x 10 =		26	600 x 100 =	
5	80 x 10 =		27	65 x 100 =	
6	80 x 100 =		28	652 x 100 =	
7	80 x 1,000 =		29	342 x 100 =	
8	7 x 10 =		30	800 x 100 =	
9	70 x 10 =		31	800 x 1,000 =	
10	700 x 10 =		32	860 x 1,000 =	
11	700 x 100 =		33	867 x 1,000 =	
12	700 x 1,000 =		34	492 x 1,000 =	
13	2 x 10 =		35	34 x 10 =	
14	30 x 10 =		36	629 x 10 =	
15	32 x 10 =		37	94 x 100 =	
16	4 x 10 =		38	238 x 100 =	
17	50 x 10 =		39	47 x 1,000 =	
18	54 x 10 =		40	294 x 1,000 =	
19	37 x 10 =		41	174 x 100 =	
20	84 x 10 =		42	285 x 1,000 =	
21	84 x 100 =		43	951 x 100 =	
22	84 x 1,000 =		44	129 x 1,000 =	

B Improvement _____ # Correct _____

Multiply.

1	8 x 10 =		23	37 x 1,000 =	
2	8 x 100 =		24	50 x 10 =	
3	8 x 1,000 =		25	500 x 10 =	
4	7 x 10 =		26	500 x 100 =	
5	70 x 10 =		27	56 x 100 =	
6	70 x 100 =		28	562 x 100 =	
7	70 x 1,000 =		29	432 x 100 =	
8	6 x 10 =		30	700 x 100 =	
9	60 x 10 =		31	700 x 1,000 =	
10	600 x 10 =		32	760 x 1,000 =	
11	600 x 100 =		33	765 x 1,000 =	
12	600 x 1,000 =		34	942 x 1,000 =	
13	3 x 10 =		35	74 x 10 =	
14	20 x 10 =		36	269 x 10 =	
15	23 x 10 =		37	49 x 100 =	
16	5 x 10 =		38	328 x 100 =	
17	40 x 10 =		39	37 x 1,000 =	
18	45 x 10 =		40	924 x 1,000 =	
19	73 x 10 =		41	147 x 100 =	
20	48 x 10 =		42	825 x 1,000 =	
21	48 x 100 =		43	651 x 100 =	
22	48 x 1,000 =		44	192 x 1,000 =	

Name _____ Date _____

1. Round the factors to estimate the products.
   a. 597 × 52 ≈ _____×_____ =_____

   A reasonable estimate for 597 × 52 is _____.

   b. 1,103 × 59 ≈ _____ × _____ =_____

   A reasonable estimate for 1,103 × 59 is _____.

   c. 5,840 × 25 ≈ _____× _____ = _____

   A reasonable estimate for 5,840 × 25 is _____.

2. Complete the table using your understanding of place value and knowledge of rounding to estimate the product.

Factors	Rounded Factors	Estimate
a. 2,809 × 42	3,000 × 40	120,000
b. 28,090 × 420		
c. 8,932 × 59		
d. 89 tens × 63 tens		
e. 398 hundreds × 52 tens		

3. For which of the following expressions would 200,000 be a reasonable estimate? Explain how you know.

   2,146 × 12 21,467 × 121 2,146 × 121 21,477 × 1,217

4. Fill in the missing factors to find the given estimated product.

   a. 571 × 43 ≈ _____×_____= 24,000

   b. 726 × 674 ≈ _____×_____ = 490,000

   c. 8,379 × 541 ≈ _____ × _____= 4,000,000

5. There are 19,763 tickets available for a New York Knicks home game. If there are 41 home games in a season, about how many tickets are available for all the Knicks' home games?

6. Michael saves $423 dollars a month for college.

   a. About how much money will he have saved after 4 years?

   b. Will your estimate be lower or higher than the actual amount Michael will save? How do you know?

Name _____ Date _____

1. Round the factors and estimate the products.

   a. 656 × 106 ≈

   b. 3,108 × 7,942 ≈

   c. 425 × 9,311 ≈

   d. 8,633 × 57,008 ≈

Name _____ Date _____

1. Round the factors to estimate the products.
   a. 697 × 82 ≈ _____×_____ = _____

   A reasonable estimate for 697 × 82 is _____.

   b. 5,897 × 67 ≈ _____ × _____ = _____

   A reasonable estimate for 5,897 × 67 is _____.

   c. 8,840 × 45 ≈ _____× _____ = _____

   A reasonable estimate for 8,840 × 45 is _____.

2. Complete the table using your understanding of place value and knowledge of rounding to estimate the product.

Factors	Rounded Factors	Estimate
a. 3,409 × 73	3,000 × 70	210,000
b. 82,290 × 240		
c. 9,832 × 39		
d. 98 tens × 36 tens		
e. 893 hundreds × 85 tens		

3. The estimated answer to a multiplication problem is 800,000. Which of the following expressions could result in this answer? Explain how you know.

   8,146 × 12 81,467 × 121 8,146 × 121 81,477 × 1,217

4. Fill in the blank with the missing estimate.

   a. 751 × 34 ≈ _____ × _____ = 24,000

   b. 627 × 674 ≈ _____ × _____ = 420,000

   c. 7,939 × 541 ≈ _____ × _____ = 4,000,000

5. In a single season the New York Yankees sell an average of 42,362 tickets for each of their 81 home games. About how many tickets do they sell for an entire season of home games?

6. Raphael wants to buy a new car.

   a. He needs a down payment of $3,000. If he saves $340 each month, about how many months will it take him to save the down payment?

   b. His new car payment will be $288 each month for five years. What is the total of these payments?

Topic B

The Standard Algorithm for Multi-Digit Whole Number Multiplication

5.OA.2, 5.NBT.5, 5.OA.1

Focus Standard:	5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
	5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
Instructional Days:	7	
Coherence -Links from:	G4–M3	Multi-Digit Multiplication and Division
-Links to:	G6–M2	Arithmetic Operations Including Dividing by a Fraction
	G6–M4	Expressions and Equations

In Topic B, place value understanding moves toward understanding the distributive property by using area diagrams to generate and record partial products (**5.OA.1**, **5.OA.2**) which are combined within the standard algorithm (**5.NBT.5**). Writing and interpreting numerical expressions in Lessons 1 and 2, and comparing those expressions using visual models lay the necessary foundation for students to make connections between the distributive property as depicted in area models and the partial products within the standard multiplication algorithm. The algorithm is built over a period of days increasing in complexity as the number of digits in both factors increases. Reasoning about zeros in the multiplier along with considerations about the reasonableness of products also provides opportunities to deepen understanding of the standard algorithm. Although word problems provide context throughout Topic B, the final lesson offers a concentration of multi-step problems that allow students to apply this new knowledge.

A Teaching Sequence Towards Mastery of the Standard Algorithm for Multi-Digit Whole Number Multiplication

Objective 1: Connect visual models and the distributive property to partial products of the standard algorithm without renaming.
(Lesson 3)

Objective 2: Convert numerical expressions into unit form as a mental strategy for multi-digit multiplication.
(Lesson 4)

Objective 3: Connect visual models and the distributive property to partial products of the standard algorithm without renaming.
(Lesson 5)

Objective 4: Connect area diagrams and the distributive property to partial products of the standard algorithm without renaming.
(Lesson 6)

Objective 5: Connect area diagrams and the distributive property to partial products of the standard algorithm with renaming.
(Lesson 7)

Objective 6: Fluently multiply multi-digit whole numbers using the standard algorithm and using estimation to check for reasonableness of the product.
(Lesson 8)

Objective 7: Fluently multiply multi-digit whole numbers using the standard algorithm to solve multi-step word problems.
(Lesson 9)

Name _____ Date _____

1. Draw a model. Then write the numerical expressions.

a. The sum of 8 and 7, doubled	b. 4 times the sum of 14 and 26
c. 3 times the difference between 37.5 and 24.5	d. The sum of 3 sixteens and 2 nines
e. The difference between 4 twenty-fives and 3 twenty-fives	f. Triple the sum of 33 and 27

2. Write the numerical expressions in words.

Expression	Words	The Value of the Expression
a. $12 \times (5 + 25)$		
b. $(62 - 12) \times 11$		
c. $(45 + 55) \times 23$		
d. $(30 \times 2) + (8 \times 2)$		

3. Compare the two expressions using >, <, or =. In the space beneath each pair of expressions, explain how you can compare without calculating. Draw a model if it helps you.

a. $24 \times (20 + 5)$	◯	$(20 + 5) \times 12$
b. 18×27	◯	20 twenty-sevens minus 1 twenty-seven
c. 19×9	◯	3 nineteens, tripled

4. Mr. Huynh wrote *the sum of 7 fifteens and 38 fifteens* on the board.
   a. Draw a model and write the correct expression.

5. Two students wrote the following numerical expressions.
   Angeline: (7 + 15) × (38 + 15)
   MeiLing: 15 × (7 + 38)

   Are the students' answers equivalent to your answer in Problem 4(a)? Explain your answer.

6. A box contains 24 oranges. Mr. Lee ordered 8 boxes for his store and 12 boxes for his restaurant.
   a. Write an expression to show how to find the total number of oranges ordered.

   b. Next week, Mr. Lee will both double the number of boxes he orders. Write a new expression to represent the number of oranges in next week's order.

   c. Evaluate your expression from Part (b) to find the total number of oranges ordered in both weeks.

Name _____ Date _____

1. Draw a model then write the numerical expressions.

a. The difference between 8 forty-sevens and 7 forty-sevens	b. 6 times the sum of 12 and 8

2. Compare the two expressions using >, <, or =.

62 × (70 + 8)	◯	(70 + 8) × 26

Name _____ Date _____

1. Draw a model then write the numerical expressions.

a. The sum of 21 and 4, doubled	b. 5 times the sum of 7 and 23
c. 2 times the difference between 49.5 and 37.5	d. The sum of 3 fifteens and 4 twos
e. The difference between 9 thirty-sevens and 8 thirty-sevens	f. Triple the sum of 45 and 55

2. Write the numerical expressions in words.

Expression	Words	The Value of the Expression
a. $10 \times (2.5 + 13.5)$		
b. $(98 - 78) \times 11$		
c. $(71 + 29) \times 26$		
d. $(50 \times 2) + (15 \times 2)$		

3. Compare the two expressions using >, <, or =. In the space beneath each pair of expressions, explain how you can compare without calculating. Draw a model if it helps you.

a. $93 \times (40 + 2)$	◯	$(40 + 2) \times 39$
b. 61×25	◯	60 twenty-fives minus 1 twenty-five

4. Larry claims that (14 + 12) × (8 + 12) and (14 × 12) + (8 × 12) are equivalent because they have the same digits and the same operations.
   a. Is Larry correct? Explain your thinking.

   b. Which expression is greater? How much greater?

Name _____ Date _____

1. Circle each expression that is not equivalent to the expression in **bold**.

   a. **16 × 29**

   29 sixteens | 16 × (30 – 1) | (15 – 1) × 29 | (10 × 29) – (6 × 29)

   b. **38 × 45**

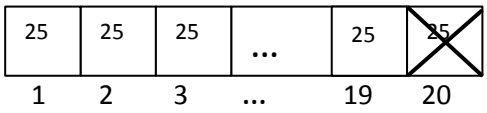
   (38 + 40) × (38 + 5) | (38 × 40) + (38 × 5) | 45 × (40 + 2) | 45 thirty-eights

   c. **74 × 59**

   74 × (50 + 9) | 74 × (60 – 1) | (74 × 5) + (74 × 9) | 59 seventy-fours

2. Solve using mental math. Draw a tape diagram and fill in the blanks to show your thinking. The first one was done for you.

a. 19 × 25 = _____ twenty-fives



Think: 20 twenty-fives – 1 twenty-five.

= (_____× 25) - (_____× 25)

= _____ - _____ = _____

b. 24 × 11 = _____ twenty-fours

Think: _____ twenty fours + ____ twenty four

= (_____ × 24) + (_____ × 24)

= _____ + _____ = _____

c. 79 × 14 = _____ fourteens Think: ____ fourteens – 1 fourteen = (_____ × 14) – (_____ × 14) = _____ - _____ = _____	d. 21 × 75 = _____ seventy-fives Think: ___ seventy-fives + ___seventy-five = (_____ × 75) + (_____ × 75) = _____ + _____ = _____

3. Define the unit in word form and complete the sequence of problems as was done in Problems 3–4 in the lesson.

a. 19 × 15 = 19 _____ Think: 20 _____ – 1 _____ = (20 × _____) – (1 × _____) = _____ – _____ = _____	b. 14 × 15 = 14 _____ Think: 10 _____ + 4 _____ = (10 × ____) + (4 × _____) = _____ + _____ = _____
c. 25 × 12 = 12 _____ Think: 10 _____+ 2 _____ = (10 × _____) + (2 × _____) = _____ + _____ = _____	d. 18 × 17 = 18 _____ Think: 20 _____ – 2 _____ = (20 × _____) – (2 × _____) = _____ – _____ = _____

4. How can 14 × 50 help you find 14 × 49?

5. Solve mentally.

   a. 101 × 15 = _____

   b. 18 × 99 = _____

6. Saleem says 45 × 32 is the same as (45 × 3) + (45 × 2). Explain Saleem's error using words, numbers, and pictures.

7. Juan delivers 174 newspapers every day. Edward delivers 126 more newspapers each day than Juan.
   a. Write an expression to show how many newspapers Edward will deliver in 29 days.

   b. Use mental math to solve. Show your thinking.

Name _____ Date _____

1. Solve using mental math. Draw a tape diagram and fill in the blanks to show your thinking.

a. 49 × 11 = _____elevens Think: 50 elevens – 1 eleven = (_____ × 11) – (_____ × 11) = _____ – _____ = _____	b. 25 × 13 = _____ twenty-fives Think: _____ twenty-fives + ____twenty-fives = (_____ × 25) + (_____ × 25) = _____ + _____ = _____

Name _____ Date _____

1. Circle each expression that is not equivalent to the expression in **bold**.

   a. **37 × 19**

   37 nineteens | (30 × 19) – (7 × 29) | 37 × (20 – 1) | (40 – 2) × 19

   b. **26 × 35**

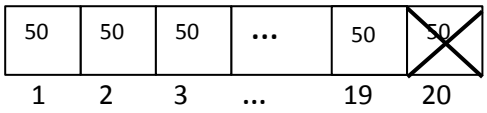
   35 twenty-sixes | (26 + 30) × (26 + 5) | (26 × 30) + (26 × 5) | 35 × (20 + 60)

   c. **34 × 89**

   34 × (80 + 9) | (34 × 8) + (34 × 9) | 34 × (90 – 1) | 89 thirty-fours

2. Solve using mental math. Draw a tape diagram and fill in the blanks to show your thinking. The first one was done for you.

a. 19 × 50 = _____ fifties



Think: 20 fifties – 1 fifties

= (_____ × 50) – (_____ × 50)

= _____ – _____ = _____

b. 11 × 26 = _____ twenty-sixes

Think: _____ twenty-sixes + ____ twenty-sixes

= (_____ × 26) + (_____ × 26)

= _____ + _____ = _____

c. 49 × 12 = _____ twelves Think: ____ twelves – 1 twelves = (_____ × 12) – (_____ × 12) = _____ – _____ = _____	d. 12 × 25 = _____ seventy-fives Think: ___ twenty-fives + ___ twenty-fives = (_____ × 25) + (_____ × 25) = _____ + _____ = _____

3. Define the unit in word form and complete the sequence of problems as was done in Problems 3–4 in the lesson.

a. 29 × 12 = 29 _____ Think: 30 _____ – 1 _____ = 30 × _____) – (1 × _____) = _____ – _____ = _____	b. 11 × 31 = 31 _____ Think: 30 _____ + 1 _____ = (30 × ____) + (1 × _____) = _____ + _____ = _____
c. 19 × 11 = 19 _____ Think: 20 _____– 1 _____ = (20 × _____) – (1 × _____) = _____– _____= _____	d. 50 × 13 = 13 _____ Think: 10 _____+ 3 _____ = (10 × _____) + (3 × _____) = _____– _____= _____

4. How can 12 × 50 help you find 12 × 49?

5. Solve mentally.

   a. 16 × 99 = _____

   b. 20 × 101 = _____

6. Joy is helping her father to build a deck that measures 14 ft by 19 ft. Find the area of the deck using a mental strategy. Explain your thinking.

7. The Lason School turns 101 years old in June. In order to celebrate, they ask each of the 23 classes to collect 101 items and make a collage. How many total items will be in the collage? Use mental math to solve. Explain your thinking.

Estimate and then multiply.

1	29 x 11 ≈		23	801 x 31 ≈	
2	29 x 21 ≈		24	803 x 31 ≈	
3	29 x 31 ≈		25	703 x 31 ≈	
4	23 x 12 ≈		26	43 x 34 ≈	
5	23 x 22 ≈		27	53 x 34 ≈	
6	23 x 32 ≈		28	53 x 31 ≈	
7	23 x 42 ≈		29	53 x 51 ≈	
8	37 x 13 ≈		30	93 x 31 ≈	
9	37 x 23 ≈		31	913 x 31 ≈	
10	36 x 24 ≈		32	73 x 31 ≈	
11	24 x 36 ≈		33	723 x 31 ≈	
12	43 x 11 ≈		34	78 x 34 ≈	
13	43 x 21 ≈		35	798 x 34 ≈	
14	403 x 21 ≈		36	62 x 33 ≈	
15	303 x 21 ≈		37	642 x 33 ≈	
16	203 x 21 ≈		38	374 x 64 ≈	
17	41 x 11 ≈		39	64 x 374 ≈	
18	41 x 21 ≈		40	740 x 36 ≈	
19	41 x 31 ≈		41	750 x 36 ≈	
20	401 x 31 ≈		42	65 x 680 ≈	
21	501 x 31 ≈		43	849 x 84 ≈	
22	601 x 31 ≈		44	85 x 849 ≈	

Name _____ Date _____

1. Draw an area model and then solve using the standard algorithm. Use arrows to match the partial products from the area model to the partial products of the algorithm.

   a. 34 × 21

   3 4

   × 2 1

   b. 434 × 21

   4 3 4

   × 2 1

2. Solve using the standard algorithm.

   a. 431 × 12 = _____ b. 123 × 23 = _____ c. 312 × 32 = _____

3. Betty saves $161 a month. She saved $141 less each month than Jack. How much will Jack save in 2 years?

4. Farmer Brown feeds 12.1 kg of alfalfa to each of his 2 horses daily. How many kilograms of alfalfa will all his horses have eaten after 21 days? Draw an area model to solve.

Name _____ Date _____

1. Complete the area model then solve using the standard algorithm.

a. 21 × 23 = _____

$$\begin{array}{r} 2\,1 \\ \times\ 2\,3 \\ \hline \end{array}$$

b. 143 × 12 = _____

$$\begin{array}{r} 1\,4\,3 \\ \times\ 1\,2 \\ \hline \end{array}$$

Name _____ Date _____

1. Draw an area model then solve using the standard algorithm. Use arrows to match the partial products from the area model to the partial products in the algorithm.

   a. 24 × 21 = _____

   2 4

   × 2 1

   b. 242 × 21 = _____

   2 4 2

   × 2 1

2. Solve using the standard algorithm.

   a. 314 × 22 = _____ b. 413 × 22 = _____ c. 213 × 32 = _____

3. A young snake measures 0.23 m long. During the course of his lifetime, he will grow to be 13 times his current length. What will his length be when he's full grown?

4. Zenin earns $142 per shift at his new job. During a pay period, he works 12 shifts. What would his pay be for that period?

Solve.

1	5 x 100 =		23	5000 - 50 =	
2	500 - 5 =		24	50 x 99 =	
3	5 x 99 =		25	80 x 100 =	
4	3 x 100 =		26	80 x 99 =	
5	300 - 3 =		27	60 x 100 =	
6	3 x 99 =		28	60 x 99 =	
7	2 x 100 =		29	11 x 100 =	
8	200 - 2 =		30	1100 - 11 =	
9	2 x 99 =		31	11 x 99 =	
10	6 x 100 =		32	21 x 100 =	
11	600 - 6 =		33	2100 - 21 =	
12	6 x 99 =		34	21 x 99 =	
13	4 x 100 =		35	31 x 100 =	
14	4 x 99 =		36	31 x 99 =	
15	7 x 100 =		37	71 x 100 =	
16	7 x 99 =		38	71 x 99 =	
17	9 x 100 =		39	42 x 100 =	
18	9 x 99 =		40	42 x 99 =	
19	8 x 100 =		41	53 x 99 =	
20	8 x 99 =		42	64 x 99 =	
21	5 x 100 =		43	75 x 99 =	
22	50 x 100 =		44	97 x 99 =	

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in the algorithm.

   a. 48 × 35

   $$\begin{array}{r} 48 \\ \times\ 35 \\ \hline \end{array}$$

   b. 648 × 35

   $$\begin{array}{r} 648 \\ \times\ 35 \\ \hline \end{array}$$

2. Solve using the standard algorithm.

   a. 758 × 92

   b. 958 × 94

   c. 476 × 65

   d. 547 × 64

3. Carpet costs $16 a square foot. A rectangular floor is 14 feet long by 16 feet wide. How much would it cost to carpet the floor?

4. General admission to The American Museum of Natural History is $19.

   a. If a group of 125 students visits the museum, how much will the group's tickets cost?

   b. If the group also purchases IMAX movie tickets for an additional $4 per student, what is the new total cost of all the tickets? Write an expression that shows how you calculated the new price.

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in the algorithm.

   a. 78 × 42 = _____

   7 8

   × 4 2

   b. 783 × 42 = _____

   7 8 3

   × 4 2

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in the algorithm.

   a. 27 × 36 = _____

   2 7

   × 3 6

   b. 527 × 36 = _____

   5 2 7

   × 3 6

2. Solve using the standard algorithm.

   a. 649 × 53

   b. 496 × 53

   c. 758 × 46

   d. 529 × 48

3. Each of the 25 students in Mr. McDonald's class sold 16 raffle tickets. If each ticket cost $15, how much money did Mr. McDonald's students raise?

4. Jayson buys a car and pays by installments. Each installment is $567 per month. After 48 months, Jayson owes $1250. What was the total price of the vehicle?

A # Correct _____

Multiply.

1	2 x 10 =		23	33 x 20 =	
2	12 x 10 =		24	33 x 200 =	
3	12 x 100 =		25	24 x 10 =	
4	4 x 10 =		26	24 x 20 =	
5	34 x 10 =		27	24 x 100 =	
6	34 x 100 =		28	24 x 200 =	
7	7 x 10 =		29	23 x 30 =	
8	27 x 10 =		30	23 x 300 =	
9	27 x 100 =		31	71 x 2 =	
10	3 x 10 =		32	71 x 20 =	
11	3 x 2 =		33	14 x 2 =	
12	3 x 20 =		34	14 x 3 =	
13	13 x 10 =		35	14 x 30 =	
14	13 x 2 =		36	14 x 300 =	
15	13 x 20 =		37	82 x 20 =	
16	13 x 100 =		38	15 x 300 =	
17	13 x 200 =		39	71 x 600 =	
18	2 x 4 =		40	18 x 40 =	
19	22 x 4 =		41	75 x 30 =	
20	22 x 40 =		42	84 x 300 =	
21	22 x 400 =		43	87 x 60 =	
22	33 x 2 =		44	79 x 800 =	

B Improvement _____ # Correct _____

Multiply.

1	3 x 10 =		23	44 x 20 =	
2	13 x 10 =		24	44 x 200 =	
3	13 x 100 =		25	42 x 10 =	
4	5 x 10 =		26	42 x 20 =	
5	35 x 10 =		27	42 x 100 =	
6	35 x 100 =		28	42 x 200 =	
7	8 x 10 =		29	32 x 30 =	
8	28 x 10 =		30	32 x 300 =	
9	28 x 100 =		31	81 x 2 =	
10	4 x 10 =		32	81 x 20 =	
11	4 x 2 =		33	13 x 3 =	
12	4 x 20 =		34	13 x 4 =	
13	14 x 10 =		35	13 x 40 =	
14	14 x 2 =		36	13 x 400 =	
15	14 x 20 =		37	72 x 30 =	
16	14 x 100 =		38	15 x 300 =	
17	14 x 200 =		39	81 x 600 =	
18	2 x 3 =		40	16 x 40 =	
19	22 x 3 =		41	65 x 30 =	
20	22 x 30 =		42	48 x 300 =	
21	22 x 300 =		43	89 x 60 =	
22	44 x 2 =		44	76 x 800 =	

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm. Use arrows to match the partial products from the area model to the partial products in the algorithm.

   a. 481 × 352

   4 8 1

   × 3 5 2

   b. 481 × 302

   4 8 1

   × 3 0 2

   c. Both 1(a) and 1(b) have three-digit multipliers. Why are there three partial products in 1(a) and only two partial products in 1(b)?

2. Solve by drawing the area model and using the standard algorithm.

   a. 8,401 × 305

   $$\begin{array}{r} 8,401 \\ \times \quad 305 \\ \hline \end{array}$$

   b. 7,481 × 350

   $$\begin{array}{r} 7,481 \\ \times \quad 350 \\ \hline \end{array}$$

3. Solve using the standard algorithm.

   a. 346 × 27

   b. 1,346 × 297

   c. 346 × 207

   d. 1,346 × 207

4. A school district purchased 615 new laptops for their mobile labs. Each computer cost $409. What's the total cost for all of the laptops?

5. A publisher prints 1,512 copies of a book in each print run. If they print 305 runs, how many books will be printed?

6. As of the 2010 census, there were 3,669 people living in Marlboro, New York. Brooklyn, New York, has 681 times as many people. How many more people live in Brooklyn than in Marlboro?

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm.

a. 642 × 257 = _____

$$\begin{array}{r} 642 \\ \times\ 257 \\ \hline \end{array}$$

b. 642 × 207 = _____

$$\begin{array}{r} 642 \\ \times\ 207 \\ \hline \end{array}$$

Name _____ Date _____

1. Draw an area model, and then solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in your algorithm.

   a. 273 × 346 = _____

   2 7 3

   × 3 4 6

   b. 273 × 306 = _____

   2 7 3

   × 3 0 6

   c. Both Parts (a) and (b) have three-digit multipliers. Why are there three partial products in (a) and only two partial products in (b)?

2. Solve by drawing the area model and using the standard algorithm.
   a. 7,481 × 290 = _____
   b. 7,018 × 209 = _____

3. Solve using the standard algorithm.
   a. 426 × 357
   c. 426 × 307
   b. 1,426 × 357
   d. 1,426 × 307

4. The Hudson Valley Renegades Stadium holds a maximum of 4,505 people. During the heights of their popularity, they sold out 219 consecutive games. How many tickets were sold during this time?

5. At the farmer's market, each of the 94 vendors makes $502 in profit each weekend. How much profit will all vendors make on Saturday?

Name _____ Date _____

1. Estimate the product first. Solve by using the standard algorithm. Use your estimate to check the reasonableness of the product.

a. 213 × 328 ≈ 200 × 300 = 60,000 2 1 3 × 3 2 8	b. 662 × 372	c. 739 × 442
d. 807 × 491	e. 3,502 × 656	f. 4,390 × 741
g. 530 × 2,075	h. 4,004 × 603	i. 987 × 3,105

2. Each container holds 1 L 275 mL of water. How much water is in 609 identical containers? Find the difference between your estimated product and precise product.

3. A club had some money to purchase new chairs. After buying 355 chairs at $199 each, there was $1,068 remaining. How much money did the club have at first?

4. So far, Carmella has collected 14 boxes of baseball cards. Each box has 315 cards in it. Carmella estimates that she has about 3,000 cards, so she buys 6 albums that hold 500 cards each.
   a. Will the albums have enough space for all of her cards? Why or why not?

   b. How many cards does Carmella have?

   c. How many albums will she need for all of her baseball cards?

Name _____ Date _____

1. Estimate the product first. Solve by using the standard algorithm. Use your estimate to check the reasonableness of the product.

   a. 283 × 416 = _____

   2 8 3
   × 4 1 6

   ≈ _____ × _____

   = _____

   b. 2,803 × 406 = _____

   2 8 0 3
   × 4 0 6

   ≈ _____ × _____

   = _____

Name _____ Date _____

1. Estimate the product first. Solve by using the standard algorithm. Use your estimate to check the reasonableness of the product.

a. 312 × 149 ≈ 300 × 100 = 30,000 3 1 2 × 1 4 9	b. 743 × 295	c. 428 × 637
d. 691 × 305	e. 4,208 × 606	f. 3,068 × 523
g. 430 × 3,064	h. 3,007 × 502	i. 254 × 6,104

2. When multiplying 1,729 times 308, Clayton got a product of 53,253. Without calculating, does his product seem reasonable? Explain your thinking.

3. A publisher prints 1,912 copies of a book in each print run. If they print 305 runs, the manager wants to know about how many books will be printed. What's a reasonable estimate?

Name _____ Date _____

Solve.

1. An office space in New York City measures 48 feet by 56 feet. If it sells for $565 per square foot, what is the total cost of the office space?

2. Gemma and Leah are both jewelry makers. Gemma made 106 beaded necklaces. Leah made 39 more necklaces than Gemma.
   a. Each necklace they make has exactly 104 beads on it. How many beads did both girls use altogether while making their necklaces?

   b. At a recent craft fair, Gemma sold each of her necklaces for $14. Leah sold each of her necklaces for 10 dollars more. Who made more money at the craft fair? How much more?

3. Peng bought 26 treadmills for her new fitness center at $1,334 each. Then she bought 19 stationary bikes for $749 each. How much did she spend on her new equipment? Write an expression, and then solve.

4. A Hudson Valley farmer has 26 employees. He pays each employee $410 per week. After paying his workers for one week, the farmer has $162 left in his bank account. How much money did he have at to begin with?

5. Frances is sewing a border around 2 rectangular tablecloths that each measure 9 feet long by 6 feet wide. If it takes her 3 minutes to sew on 1 inch of border, how many minutes will it take her to complete her sewing project? Write an expression, and then solve.

6. Each grade level at Hooperville Schools has 298 students.
   a. If there are 13 grade levels, how many students attend Hooperville Schools?

   b. A nearby district, Willington, is much larger. They have 12 times as many students. How many students attend schools in Willington?

Name _____ Date _____

Solve.

1. Juwad picked 30 bags of apples on Monday and sold them at his fruit stand for $3.45 each. The following week he picked and sold 6 bags more.
   a. How much money did Juwad earn in the first week?

   b. How much money did he earn in the second week?

   c. How much did Juwad earn selling bags of apples these two weeks?

   d. (Bonus) Each bag Juwad picked holds 15 apples. How many apples did he pick in two weeks? Write an expression to represent this statement.

Name _____ Date _____

Solve.

1. Jeffery bought 203 sheets of stickers. Each sheet has a dozen stickers. He gave away 907 stickers to his family and friends on Valentine's Day. How many stickers does Jeffery have remaining?

2. During the 2011 season, a quarterback passed for 302 yards per game. He played in all 16 regular season games that year.
   a. How many total yards did the quarterback pass for?

   b. If he matches this passing total for each of the next 13 seasons, how many yards will he pass for in his career?

3. Bao saved $179 a month. He saved $145 less than Ada each month. How much would Ada save in three and a half years?

4. Mrs. Williams is knitting a blanket for her newborn granddaughter. The blanket is 2.25 meters long and 1.8 meters wide. What is the area of the blanket? Write the answer in centimeters.

5. Use the chart to solve.

Soccer Field Dimensions

	FIFA Regulation (in yards)	New York State High Schools (in yards)
Minimum Length	110	100
Maximum Length	120	120
Minimum Width	70	55
Maximum Width	80	80

a. Write an expression to find the difference in the maximum area and minimum area of a NYS high school soccer field. Then evaluate your expression.

b. Would a field with a width of 75 yards and an area of 7,500 square yards be within FIFA regulation? Why or why not?

c. It costs $26 to fertilize, water, mow, and maintain each square yard of a full size FIFA field (with maximum dimensions) before each game. How much will it cost to prepare the field for next week's match?

Topic C

Decimal Multi-Digit Multiplication

5.NBT.7, 5.OA.1, 5.OA.2, 5.NBT.1

Focus Standard:		5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
Instructional Days:		3	
Coherence	**-Links from:**	G5–M1	Place Value and Decimal Fractions
	-Links to:	G5–M4	Multiplication and Division of Fractions and Decimal Fractions
		G6–M2	Arithmetic Operations Including Dividing by a Fraction

Throughout Topic C, students make connections between what they know of whole number multiplication to its parallel role in multiplication with decimals, by using place value to reason and make estimations about products (**5.NBT.7**). Knowledge of multiplicative patterns from Grade 4 experiences, as well as those provided in Module 1, provide support for converting decimal multiplication to whole number multiplication. Students reason about how products of such converted cases must be adjusted through division giving rise to explanations about how the decimal must be placed.

A Teaching Sequence Towards Mastery of Decimal Multi-Digit Multiplication

Objective 1: **Multiply decimal fractions with tenths by multi-digit whole numbers using place value understanding to record partial products.**
(Lesson 10)

Objective 2: **Multiply decimal fractions by multi-digit whole numbers through conversion to a whole number problem and reasoning about the placement of the decimal.**
(Lesson 11)

Objective 3: **Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.**
(Lesson 12)

Name _____ Date _____

1. Estimate the product. Solve using an area model and the standard algorithm. Remember to express your products in standard form.

   a. $22 \times 2.4 \approx$ _____ × _____ = ____

   2 4 (tenths)

   × 2 2

   b. $3.1 \times 33 \approx$ _____ × _____ =_____

   3 1 (tenths)

   × 3 3

2. Estimate, and then use the standard algorithm to solve. Express your products in standard form.

   a. $3.2 \times 47 \approx$ _____ × _____ = _____

   3 2 (tenths)

   × 4 7

   b. $3.2 \times 94 \approx$ _____ × _____ = _____

   3 2 (tenths)

   × 9 4

c. 6.3×44

d. 14.6×17

e. 8.2×34

f. 160.4×17

3. Michelle multiplied 3.4×52. She incorrectly wrote 1,768 as her product. Use words, numbers, and pictures to explain Michelle's mistake.

4. A wire is bent to form a square with a perimeter of 16.4 cm. How much wire would be needed to form 25 such squares? Express your answer in meters.

Name _____ Date _____

1. Find the products using the area model and the standard algorithm.

   a. 33.2 × 21

   b. 1.7 × 55

2. If the product of 485 × 35 is 16,975, what is the product of 485 × 3.5? How do you know?

Name _____ Date _____

1. Estimate the product. Solve using an area model and the standard algorithm. Remember to express your products in standard form.

   a. $53 \times 1.2 \approx$ _____ × _____ =____

   1 2 (tenths)

   × 5 3

   b. $2.1 \times 82 \approx$ _____ × _____ =_____

   2 1 (tenths)

   × 8 2

2. Estimate, and then use the standard algorithm to solve. Express your products in standard form.

   a. $4.2 \times 34 \approx$ _____ × _____ = _____

   4 2 (tenths)

   × 3 4

   b. $65 \times 5.8 \approx$ _____ × _____ = _____

   5 8 (tenths)

   × 6 5

c. 3.3×16

d. 15.6×17

e. 73×2.4

f. 193.5×57

3. Mr. Jansen is building an ice rink in his backyard that will measure 8.4 meters by 22 meters. What is the area of the rink?

4. Rachel runs 3.2 miles each week day and 1.5 miles each day of the weekend. How many miles will she have run in 6 weeks?

A # Correct _____

Multiply.

1	3 x 3 =		23	8 x 5 =	
2	0.3 x 3 =		24	0.8 x 5 =	
3	0.03 x 3 =		25	0.08 x 5 =	
4	3 x 2 =		26	0.06 x 5 =	
5	0.3 x 2 =		27	0.06 x 3 =	
6	0.03 x 2 =		28	0.6 x 5 =	
7	2 x 2 =		29	0.06 x 2 =	
8	0.2 x 2 =		30	0.06 x 7 =	
9	0.02 x 2 =		31	0.9 x 6 =	
10	5 x 3 =		32	0.06 x 9 =	
11	0.5 x 3 =		33	0.09 x 9 =	
12	0.05 x 3 =		34	0.8 x 8 =	
13	0.04 x 3 =		35	0.07 x 7 =	
14	0.4 x 3 =		36	0.6 x 6 =	
15	4 x 3 =		37	0.05 x 5 =	
16	5 x 5 =		38	0.6 x 8 =	
17	0.5 x 5 =		39	0.07 x 9 =	
18	0.05 x 5 =		40	0.8 x 3 =	
19	7 x 4 =		41	0.09 x 6 =	
20	0.7 x 4 =		42	0.5 x 7 =	
21	0.07 x 4 =		43	0.12 x 4 =	
22	0.9 x 4 =		44	0.12 x 9 =	

B Improvement _____ # Correct _____

Multiply.

1	2 x 2 =		23	6 x 5 =	
2	0.2 x 2 =		24	0.6 x 5 =	
3	0.02 x 2 =		25	0.06 x 5 =	
4	4 x 2 =		26	0.08 x 5 =	
5	0.4 x 2 =		27	0.08 x 3 =	
6	0.04 x 2 =		28	0.8 x 5 =	
7	3 x 3 =		29	0.08 x 2 =	
8	0.3 x 3 =		30	0.08 x 7 =	
9	0.03 x 3 =		31	0.9 x 8 =	
10	4 x 3 =		32	0.08 x 9 =	
11	0.4 x 3 =		33	0.9 x 9 =	
12	0.04 x 3 =		34	0.08 x 8 =	
13	0.05 x 3 =		35	0.7 x 7 =	
14	0.5 x 3 =		36	0.06 x 6 =	
15	5 x 3 =		37	0.5 x 5 =	
16	4 x 4 =		38	0.06 x 8 =	
17	0.4 x 4 =		39	0.7 x 9 =	
18	0.04 x 4 =		40	0.08 x 3 =	
19	8 x 4 =		41	0.9 x 6 =	
20	0.8 x 4 =		42	0.05 x 7 =	
21	0.08 x 4 =		43	0.12 x 6 =	
22	0.6 x 4 =		44	0.12 x 8 =	

Name _____ Date _____

1. Estimate the product. Solve using the standard algorithm. Use the thought bubbles to show your thinking. (Draw an area model on a separate sheet if it helps you.)

a. $1.38 \times 32 \approx$ _____ × _____ = _____

Think: 138 (1.38 × 100)

1 .3 8
× 3 2

b. $3.55 \times 89 \approx$ _____ × _____ = _____

3 .5 5
× 8 9

Think! 4416 is 100 times too large! What is the real product?

1.38 × 32 = _____

3.55 × 89 = _____

2. Solve using the standard algorithm.

a. 5.04 × 8

b. 147.83 × 67

c. 83.41 × 504

d. 0.56 × 432

3. Use the whole number product and place value reasoning to place the decimal point in the second product. Explain how you know.
   a. If 98 × 768 = 75,264 then 98 × 7.68 = _____

   b. If 73 × 1,563 = 114,099 then 73 × 15.63 = _____

   c. If 46 × 1,239 = 56,994 then 46 × 123.9 = _____

4. Jenny buys 22 pens that cost $1.15 each and 15 markers that cost $2.05 each. How much will Jenny spend?

5. A living room measures 24 feet by 15 feet. An adjacent square dining room measures 13 feet on each side. If carpet costs $6.98 per square foot, what is the total cost of putting carpet in both rooms?

Name _____ Date _____

Use estimation and place value reasoning to give the missing product. Explain how you know.

1. If 647 × 63 = 40,761 then 6.47 × 63 = _____

2. Solve using the standard algorithm.

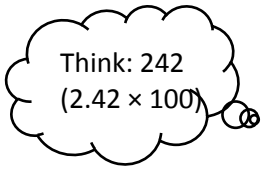
   a. 6.13 × 14

   b. 104.35 × 34

Name _____ Date _____

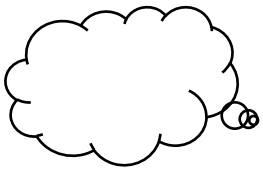
1. Estimate the product. Solve using the standard algorithm. Use the thought bubbles to show your thinking. (Draw an area model on a separate sheet if it helps you.)

a. $2.42 \times 12 \approx$ _____ × _____ = _____

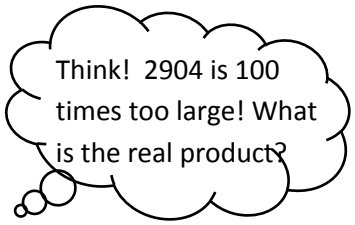


2 .4 2
× 1 2

b. $4.13 \times 37 \approx$ _____ × _____ = _____



4 .1 3
× 3 7



2.42 × 12 = _____

4.13 × 37 = _____

2. Solve using the standard algorithm.

a. 2.03 × 13

c. 371.23 × 53

b. 53.16 × 34

d. 1.57 × 432

3. Use the whole number product and place value reasoning to place the decimal point in the second product. Explain how you know.

   a. If 36 × 134 = 4,824 then 36 × 1.34 = _____

   b. If 84 × 2,674 = 224,616 then 84 × 26.74 = _____

   c. 19 × 3,211 = 61,009 then 321.1 × 19 = _____

4. A slice of pizza costs $1.57. How much does 27 slices cost?

5. A spool of ribbon holds 6.75 meters. If the craft club buys 21 spools:

   a. What is the total cost if the ribbon sells for $2 per meter?

   b. If the club uses 76.54 meters to complete a project, how much ribbon will be left?

Name _____ Date _____

1. Estimate, and then solve using the standard algorithm. You may draw an area model if it helps you.

   a. 1.21 × 14 ≈ _____ × _____ = _____

   b. 2.45 × 305 ≈ _____ × _____ = _____

2. Estimate, and then solve using the standard algorithm. Use a separate sheet to draw the area model if it helps you.

   a. 1.23 × 12

   b. 1.3 × 26

   c. 0.23 × 14

   d. 0.45 × 26

e. 7.06×28

f. 6.32×223

g. 7.06×208

h. 151.46×555

3. Denise walks on the beach every afternoon. In the month of July she walked 3.45 miles each day. How far did Denise walk during the month of July?

4. A gallon of gas costs $4.34. Greg puts 12 gallons of gas in his car. He has a 50-dollar bill. Tell how much money Greg will have left, or how much more money he will need. Show all your calculations.

5. Seth drinks a glass of orange juice every day that contains 0.6 grams of Vitamin C. He eats a serving of strawberries for snack after school every day that contains 0.35 grams of Vitamin C. How many grams of Vitamin C does Seth consume in 3 weeks?

Name _____ Date _____

Find the product using the standard algorithm.

a. 3.03×402

b. 667×1.25

Name _____ Date _____

1. Estimate, and then solve using the standard algorithm. You may draw an area model if it helps you.

   a. $24 \times 2.31 \approx$ _____ × _____ = _____

$$\begin{array}{r} 2.31 \\ \times \quad 24 \\ \hline \end{array}$$

   b. $5.42 \times 305 \approx$ _____ × _____ = _____

$$\begin{array}{r} 5.42 \\ \times 305 \\ \hline \end{array}$$

2. Estimate, and then solve using the standard algorithm. Use a separate sheet to draw the area model if it helps you.

   a. 1.23×21

   b. 3.2×41

   c. 0.32×41

   d. 0.54×62

e. 6.09×28

f. 6.83×683

g. 6.09×208

h. 171.76×555

3. Eric walks 2.75 miles to and from work every day for an entire year. How many miles did he walk?

4. Art galleries often price paintings by the square inch. If a painting measures 22.5 inches by 34 inches and costs $4.15 per square inch, what is the selling price for the painting?

5. Gerry spends $1.25 each day on lunch at school. On Fridays she buys an extra snack for $0.55. How much money will she spend in two weeks?

Topic D

Measurement Word Problems with Whole Number and Decimal Multiplication

5.NBT.5, 5.NBT.7, 5.MD.1, 5.NBT.1, 5.NBT.2

Focus Standard:	5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
	5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
	5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
Instructional Days:	3	
Coherence -Links from:	G4–M2	Unit Conversions and Problem Solving with Metric Measurement
-Links to:	G5–M4	Multiplication and Division of Fractions and Decimal Fractions
	G6–M1	Ratios and Unit Rates

In Topic D, students explore multiplication as a method for expressing equivalent measures. For example, they multiply to convert between meters and centimeters or ounces and cups with measurements in both whole number and decimal form (**5.MD.1**). These conversions offer opportunity for students to not only apply their new found knowledge of multi-digit multiplication of both whole and decimal numbers, but to also reason deeply about the relationships between unit size and quantity—how the choice of one affects the other.

A Teaching Sequence Towards Mastery of Measurement Word Problems with Whole Number and Decimal Multiplication

Objective 1: Use whole number multiplication to express equivalent measurements. (Lesson 13)

Objective 2: Use decimal multiplication to express equivalent measurements. (Lesson 14)

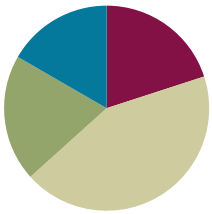
Objective 3: Solve two-step word problems involving measurement and multi-digit multiplication. (Lesson 15)

Lesson 13

Objective: Use whole number multiplication to express equivalent measurements.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(12 minutes)
Concept Development	(26 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



A NOTE ON STANDARDS ALIGNMENT:

While students are asked to generalize an equation to express whole number conversions, it is important to note that Lesson 13 is a review of the concepts of **4.MD.1** and **4.MD.2**. The reasoning required to convert a measurement expressed in a larger unit to an equivalent measure of a smaller unit is a concept that is difficult to master for many students. If students are fluent with these whole number conversions, it may be advisable to combine Lessons 13 and 14 with a heavier emphasis on the decimal multiplication and conversions found in Lesson 14.

Fluency Practice (12 minutes)

- Divide by 10, 100, and 1,000 **5.NBT.2** (2 minutes)
- Multiply Using the Area Model **5.NBT.2** (7 minutes)
- Unit Conversions **5.MD.1** (3 minutes)

Divide by 10, 100, and 1,000 (2 minutes)

Note: This fluency drill will prepare students to use divide by 10 patterns for multi-digit whole numbers in Lesson 16

T: (Write 30 ÷ 10 =_____.) Say the answer.

S: 3.

Repeat the process for the following possible sequence: 300 ÷ 100; 3,000 ÷ 1,000; 5,000 ÷ 1,000; 50 ÷ 10; 500 ÷ 100; 5,000 ÷ 100; 3,000 ÷ 100; 30,000 ÷ 1,000; 50,000 ÷ 1,000; 40 ÷ 10, 400 ÷ 10; 4,000 ÷ 10; 40,000 ÷ 10; 700 ÷ 100; 7,000 ÷ 100; 70,000 ÷ 100; 700,000 ÷ 100; 7,000,000 ÷ 1,000.

Multiply Using the Area Model (7 minutes)

Follow the same process and procedure as G5–M2–Lessons 11 and 12 for the following possible sequence: 5.21 × 34 and 8.35 × 73.

Unit Conversions (3 minutes)

Materials: (S) Personal white boards

Note: Reviewing this fluency will build a foundation for upcoming Module 2 lessons.

T: (Write 1 ft = ___ in.) 1 foot is the same as how many inches?
S: 12 inches.

Repeat the process for the following possible sequence: 2 ft, 3 ft, 4 ft, 10 ft, 5 ft, 7 ft.

T: (Write 100 cm = ___ m.) 100 centimeters is the same as how many meters?
S: 1 meter.

Repeat the process and procedure for 200 cm, 300 cm, 600 cm, 800 cm, 400 cm.

Application Problem (12 minutes)

Preparation: Cuts pieces of string in four different colors. There should be enough pieces so that individual or pairs of students have one string.

- Blue strings—to the nearest foot. Pieces measure 1 ft, 2 ft, 3 ft, and 4 ft.
- Red strings—to the nearest inch. Pieces measure 12 in, 24 in, 36 in, and 48 in.
- Yellow string—to the nearest meter. Pieces measure 1 m, 2 m, 3 m, and 4 m.
- Green string—to the nearest centimeter. Pieces measure 100 cm, 200 cm, 300 cm, and 400 cm.

Procedure: Pass out one piece of string for every one or two students. Tell students that every string has an exact match, and after they measure their string, they will find their string's match. Instruct students to measure their piece of string using the unit specified by the color of their string.

After all pairs have successfully measured, they should find the student(s) who have the different color string with the exact same string length as theirs, such that the student with the blue string measuring 1 foot, should find the student(s) with the red string measuring 12 inches. Students should compare and discuss their measurements. Prompt students to explain how the same sized piece of string could have two different measurements. Record the results.

After results are recorded, discuss. Among the observations students might make, be sure that the following are included:

- There are 12 inches in 1 foot and 100 centimeters in 1 meter, when comparing quantity.
- There are always _____ times as many smaller units as larger units. (A generalized equation such as ____ft × 12 = _____ inches might be recorded.)
- Multiplication converts larger units (feet and meters) to smaller ones (inches and centimeters).

Note: Today's Application Problem provides a practical, hands-on way for students to experience the conversion reasoning necessary for today's lesson.

Concept Development (26 minutes)

Begin lesson by distributing a copy of and posting the appended Grade 5 Math Reference Sheet for all to see. A copy of the Reference Sheet can be found below and on page 14 of the Test Guide at http://www.engageny.org/ sites/default/files/resource/attachments/grade-5-math-guide_0.pdf.

T: Turn and talk with your neighbor. How might this document help us solve problems?

S: (Share.)

T: Today we'll be using this Reference Sheet to help us convert between various units of measure. Discuss with a partner the types of measurement units you see on this sheet?

S: (Should notice the units of length, weight, and volume/capacity.)

T: Divide your white boards into three sections labeled *Length, Weight, and Volume/Capacity*. Talk in groups about which units are used for each type of measurement and record those units in the appropriate section of your white board.

S: (Work and record.)

T: (Circulate and check for accuracy.)

Problem 1

15 feet = _____ inches

T: Post 15 feet = _____ inches on board. How can we use the patterns we just saw in our Application Problem to help us convert from feet to inches? Turn and talk.

S: (Share.)

T: Visualize the tape measure we just used to measure in feet and inches. How many inches did we see in each foot?

S: 12.

T: Let's draw a number line to show what we saw. (Draw the first two or three.) You draw your own number line.

```
      1 ft        2 ft        3 ft        ...15 ft
----------|-----------|-----------|----------------|
      12 in       24  in      36 in       ...180 in
```

S: (Draw.)

T: (Point to the number line.) If one foot, or *one unit*, is equal to 12 inches, how can I find what 15 feet is equal to? Turn and share.

S: I can add 12 inches 15 times. → I can skip count by twelves 15 times. → I'll multiply 12 times 15. If one unit is 12 inches, then 10 units is 120 in, and 5 units more would be 60 in, so that's 180 inches.

T: I heard repeated addition, skip counting, and multiplication. If I wanted to express this conversion as a multiplication equation, what would it look like? Write it down on your board. Would this method work for any situation in which I wanted to name feet as inches?

S: (Write 15 ft × 12 = 120 in.)

T: We just converted from feet to inches. Which unit is larger, feet or inches?

S: Feet.

T: Think back to our Application Problem. Remind me why we need so many inches to make just 15 feet. Tell your neighbor.

S: Inches are a smaller unit; we need more of them to make the larger units, feet.

Repeat the sequence with 150 ft and 152 ft asking students to use what they just found about 150 ft to help them convert 152 ft. (Use 1,800 inches and simply add 24 more inches, or multiply as before.) Then instruction may continue with 21 ft and 210 ft if necessary.

Problem 2

3 tons 140 pounds = _____ pounds.

T: (Post on the board: 3 tons 140 pounds = _____ pounds.) Let's use our thinking about multiplication to solve this one. Tell your neighbor which part of the Reference Sheet will help us solve this one.
S: 1 ton = 2,000 pounds.
T: How is this problem slightly different from the first one we solved?
S: (Should recognize that we are converting tons *and* pounds to pounds.)
T: Let's start with the 3 tons. Work with your partner to draw a double number line showing tons and pounds.
S: (Draw.)
T: Look at your drawing. How many pounds are equal to 3 tons?
S: 6,000 pounds.
T: Are we finished? Have we found a weight equal to what we started with?
S: No.
T: Why not?
S: We have 140 more pounds.
T: Turn and talk. What do we need to do with those 140 pounds?
S: (Share.)
T: 3 tons 140 pounds equals how many pounds altogether?
S: 6,140 pounds.

Repeat with other compound units: 42 ft 9 in, for example.

Problem 3

_____ ounces = 9 pounds 11 ounces.

T: (Post _____ ounces = 9 pounds 11 ounces.) Look at your Reference Sheet. Tell your neighbor the **conversion factor** that you'll be using to solve this problem.
S: (Look and share.)
T: For this problem, work in pairs. One of you should draw a double number line while your partner uses multiplication and addition to solve. Check your partner's work as you go.
S: (Work.)
T: (Circulate and check work.)
T: How many ounces are equal to 9 pounds 11 ounces?
S: 155 ounces.

Problem 4

155 gallons = _____ quarts = _____ pints

T: (Post 155 gallons = _____ quarts = _____ pints on the board.) Use your Reference Sheet to help you solve independently. If you like, you may draw a double number line.

S: (Work.)

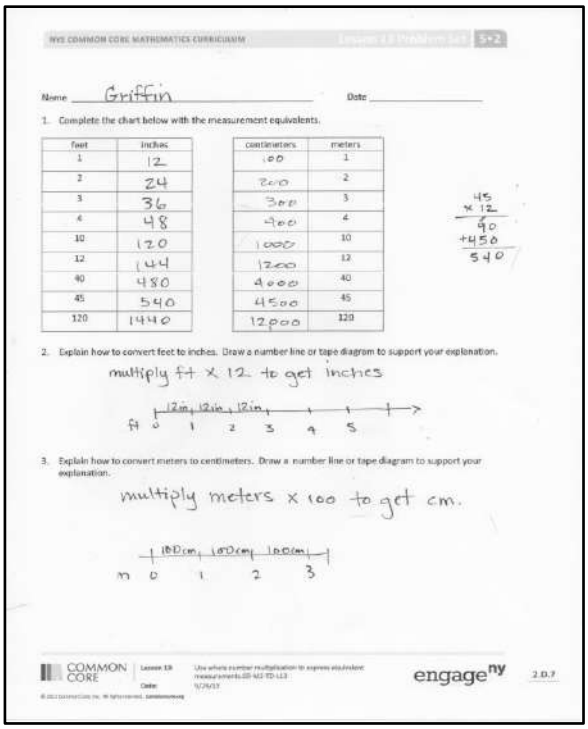
T: 155 gallons equals how many quarts? Find the number of quarts mentally.

S: 100 gallons is 400 quarts, 50 gallons is 200 quarts and 5 gallons is 20 quarts. So, 155 gallons is 620 quarts.

T: Find the number of pints in 620 quarts mentally.

S: There are 2 pints in every quart so just double every place value. 1,240 pints.

Repeat with compound units:
57 gallons 1quarts = _____ quarts
63 quarts 3 pints = _____ pints



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Problem Set 5•2

Name Griffin Date

1. Complete the chart below with the measurement equivalents.

feet	inches
1	12
2	24
3	36
4	48
10	120
12	144
40	480
45	540
120	1440

centimeters	meters
100	1
200	2
300	3
400	4
1000	10
1200	12
4000	40
4500	45
12,000	120

45 × 12 = 90 + 450 = 540

2. Explain how to convert feet to inches. Draw a number line or tape diagram to support your explanation.

multiply ft × 12 to get inches

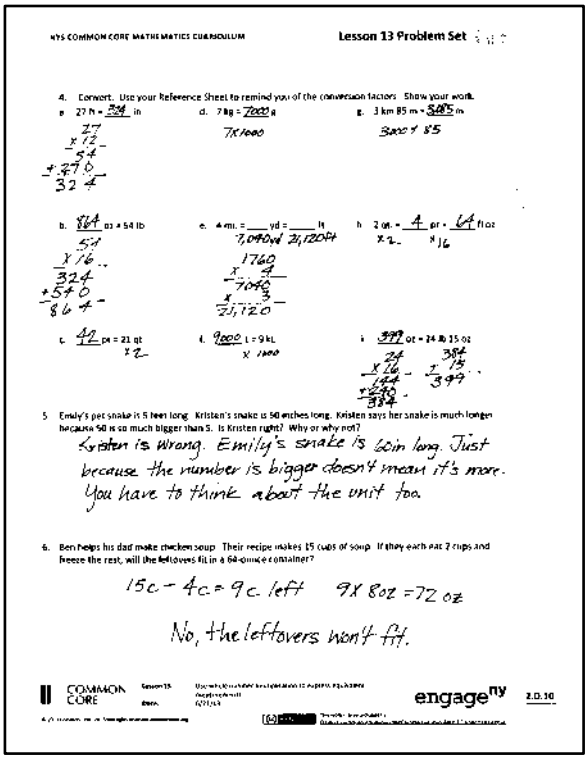
12in, 12in, 12in
ft 0 1 2 3 4 5

3. Explain how to convert meters to centimeters. Draw a number line or tape diagram to support your explanation.

multiply meters × 100 to get cm.

100cm, 100cm, 100cm
m 0 1 2 3

COMMON CORE engage^ny 2.D.7



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Problem Set

4. Convert. Use your Reference Sheet to remind you of the conversion factors. Show your work.

a. 27 ft = 324 in (27 × 12 = 54; 270 + 54 = 324)

d. 7 kg = 7000 g (7 × 1000)

g. 3 km 85 m = 3085 m (3000 + 85)

b. 864 oz = 54 lb (54 × 16 = 324; 540 + 324 = 864)

e. 4 mi = 7,040 yd = 21,120 ft (1760 × 4 = 7040; 7040 × 3 = 21,120)

h. 2 qt = 4 pt = 64 fl oz (× 2, × 16)

c. 42 pt = 21 qt (× 2)

f. 9000 L = 9 kL (× 1000)

i. 399 oz = 24 lb 15 oz (24 × 16 = 384; 384 + 15 = 399)

5. Emily's pet snake is 5 feet long. Kristen's snake is 50 inches long. Kristen says her snake is much longer because 50 is so much bigger than 5. Is Kristen right? Why or why not?

Kristen is wrong. Emily's snake is 60in long. Just because the number is bigger doesn't mean it's more. You have to think about the unit too.

6. Ben helps his dad make chicken soup. Their recipe makes 15 cups of soup. If they each eat 2 cups and freeze the rest, will the leftovers fit in a 64-ounce container?

15c − 4c = 9c left 9 × 8oz = 72 oz

No, the leftovers won't fit.

COMMON CORE engage^ny 2.D.10

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Use whole number multiplication to express equivalent measurements.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief.

Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain the term **conversion factor**.
- In the conversion you completed for Problem 1, explain your thought process as you worked. Why did you choose to multiply when converting these units? How did you decide what to multiply by?
- Convert 15 meters into centimeters. (Students convert to 1500 cm.) Look back at the conversions in Problem 1. 15 feet is equal to 180 inches. Both of these conversions start with 15 units. Explain how 15 units could be equal to two different amounts—180 and 1500.
- How did the Application Problem connect to today's lesson?
- Can you name some real life situations in which measurement conversion might be useful and/or necessary?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name _____ Date _____

1. Complete the chart below with the measurement equivalents.

Feet	Inches
1	
2	
3	
4	
10	
12	
40	
45	
120	

Centimeters	Meters
	1
	2
	3
	4
	10
	12
	40
	45
	120

2. Explain how to convert feet to inches. Draw a number line or tape diagram to support your explanation.

3. Explain how to convert meters to centimeters. Draw a number line or tape diagram to support your explanation.

4. Convert. Use your Reference Sheet to remind you of the conversion factors. Show your work.

a. 27 ft = _____ in

d. 7 kg = _____ g

g. 3 km 85 m = _____ m

b. _____ oz = 54 lb

e. 4 mi = ____ yd = _____ ft

h. 2 qt = _____ pt = _____ fl oz

c. _____pt = 21 qt

f. _____ L = 9 kL

i. _____ oz = 24 lb 15 oz

5. Emily's pet snake is 5 feet long. Kristen's snake is 50 inches long. Kristen says her snake is much longer because 50 is so much bigger than 5. Is Kristen right? Why or why not?

6. Ben helps his dad make chicken soup. Their recipe makes 15 cups of soup. If they each eat 2 cups and freeze the rest, will the leftovers fit in a 64-ounce container?

Name _____ Date _____

1. Convert.
   a. 37 L = _____ mL

   b. _____ qt = 61 gal

   c. 45 kg = _____ g

Name _____ Date _____

1. Complete the chart below with the measurement equivalents.

Liters	Milliliters
1	
2	
3	
4	
10	
15	
30	
100	

Quarts	Gallons
	1
	2
	3
	4
	10
	15
	30
	100

2. Convert.

a. 18 yd = _____ ft

b. _____ oz = 23 lb

c. _____ cm = 64 m

d. 72 kl = _____ L

e. 2 mi = _____ yd = _____ ft

f. _____ g = 35 kg

g. 5 km 14 m = _____ m

h. 31 gal = _____ qt = _____ pt

i. _____ fl oz = 56 c

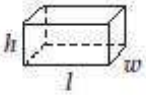
3. Jesse needs 13 gallons of paint to finish painting the exterior of his barn. If he uses 10 quarts of the paint for the doors, how many quarts will be left for the siding on the barn?

4. Ms. Lane's laptop stays on for 6 hours without being plugged in, and Mr. Trevor's laptop stays powered for 400 minutes. Whose laptop lasts longer?

5. The food pantry distributes 10-oz bags of rice. If three 5-lb bags are donated to the pantry, how many 10-ounce bags can be made?

Grade 5 Mathematics Reference Sheet

FORMULAS



Right Rectangular Prism

Volume = lwh
Volume = Bh

CONVERSIONS

1 centimeter = 10 millimeters
1 meter = 100 centimeters = 1,000 millimeters
1 kilometer = 1,000 meters

1 gram = 1,000 milligrams
1 kilogram = 1,000 grams

1 pound = 16 ounces
1 ton = 2,000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

1 liter = 1,000 milliliters
1 kiloliter = 1,000 liters

1 mile = 5,280 feet
1 mile = 1,760 yards

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Name _____ Date _____

Solve.

1. While training for an Ironman competition, Johnson swam 0.86 km, biked for 22.4 km, and ran 4.25 km.
   a. Johnson completed this routine twice a week. How far did Johnson travel in one week while training, in meters?

   b. The following week Johnson decided to work harder. He still trained twice a week, but he doubled the length of his swim and his biking and tripled the amount he ran. How much further did he travel this week than he did in the first week, in meters?

Name _____ Date _____

Solve.

1. Jocelyn borrowed 3.75 kg of flour from her grandmother to bake 3 batches of cookies and 2 cakes. Each cookie recipe called for 225 grams of flour. Each cake recipe needed 1.2 kg of flour. After baking, how much flour was Jocelyn able to return to her grandmother?

2. The new athletic facility on the downtown campus measures 0.74 km by 0.4 km. How many square meters is the facility?

3. It is recommended that athletes drink a minimum of 0.24 L of water for every 20 minutes of athletic activity. John plays tennis for 3 hours. His water bottle holds 1,500 mL. Will he have enough water to meet the minimum requirement? If so, how much water will he have left? If not, what is the least amount of water he will need to put in his bottle when it is empty? Express your answer in liters.

4. A Rottweiler gave birth to 3 puppies. The first puppy weighed 5.1 kg. The second weighed 206 g less than the first. The third puppy weighed 0.2 kg more than the second.
   a. What is the total weight of the litter in grams?

   b. How much more did the heaviest puppy weight than the lightest one?

   c. The mother weighed 4 times the total weight of her litter. What was her weight in kilograms?

5. A courier charges $6.25 to ship a 2 lb-package. For each ounce over 2 lb, they charge an additional $0.35 per ounce.
   a. How much would it cost to ship a package weighing 4 lb 6 oz?

   b. Which would be less expensive? Sending two packages weighing 2 lb 4 oz each, or combining them into one package weighing 4 lb 8 oz? What is the difference in price?

Topic E

Mental Strategies for Multi-Digit Whole Number Division

5.NBT.1, 5.NBT.6, 5.NBT.2

Focus Standard:	5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
	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.
Instructional Days:	3	
Coherence -Links from:	G4–M3	Multi-Digit Multiplication and Division
	G5–M1	Place Value and Decimal Fractions
-Links to:	G5–M4	Multiplication and Division of Fractions and Decimal Fractions
	G6–M2	Arithmetic Operations Including Dividing by a Fraction

Topics E through H provide a parallel sequence for division to that offered in Topics A-D for multiplication. Topic E begins concretely with number disks as an introduction to division with multi-digit whole numbers (**5.NBT.6**). In the same lesson 420 ÷ 60 is interpreted as 420 ÷ 10 ÷ 6. Next, students round dividends and 2-digit divisors to nearby multiples of ten in order to estimate single digit quotients (e.g., 431 ÷ 58 ≈ 420 ÷ 60 = 7) and then multi-digit quotients. This work is done horizontally, outside the context of the written vertical method.

A Teaching Sequence Towards Mastery of Mental Strategies for Multi-Digit Whole Number Division

Objective 1: **Use *divide by 10* patterns for multi-digit whole number division. (Lesson 16)**

Objective 2: **Use basic facts to approximate quotients with two-digit divisors. (Lessons 17–18)**

A # Correct _____

Divide.

1	30 ÷ 10 =	23	480 ÷ 4 =
2	430 ÷ 10 =	24	480 ÷ 40 =
3	4,300 ÷ 10 =	25	6,300 ÷ 3 =
4	4,300 ÷ 100 =	26	6,300 ÷ 30 =
5	43,000 ÷ 100 =	27	6,300 ÷ 300 =
6	50 ÷ 10 =	28	8,400 ÷ 2 =
7	850 ÷ 10 =	29	8,400 ÷ 20 =
8	8,500 ÷ 10 =	30	8,400 ÷ 200 =
9	8,500 ÷ 100 =	31	96,000 ÷ 3 =
10	85,000 ÷ 100 =	32	96,000 ÷ 300 =
11	600 ÷ 10 =	33	96,000 ÷ 30 =
12	60 ÷ 3 =	34	900 ÷ 30 =
13	600 ÷ 30 =	35	1,200 ÷ 30 =
14	4,000 ÷ 100 =	36	1,290 ÷ 30 =
15	40 ÷ 2 =	37	1,800 ÷ 300 =
16	4,000 ÷ 200 =	38	8,000 ÷ 200 =
17	240 ÷ 10 =	39	12,000 ÷ 200 =
18	24 ÷ 2 =	40	12,800 ÷ 200 =
19	240 ÷ 20 =	41	2,240 ÷ 70 =
20	3,600 ÷ 100 =	42	18,400 ÷ 800 =
21	36 ÷ 3 =	43	21,600 ÷ 90 =
22	3,600 ÷ 300 =	44	25,200 ÷ 600 =

B Improvement _____ # Correct _____

Divide.

1	20 ÷ 10 =	23	840 ÷ 4 =
2	420 ÷ 10 =	24	840 ÷ 40 =
3	4,200 ÷ 10 =	25	3,600 ÷ 3 =
4	4,200 ÷ 100 =	26	3,600 ÷ 30 =
5	42,000 ÷ 100 =	27	3,600 ÷ 300 =
6	40 ÷ 10 =	28	4,800 ÷ 2 =
7	840 ÷ 10 =	29	4,800 ÷ 20 =
8	8,400 ÷ 10 =	30	4,800 ÷ 200 =
9	8,400 ÷ 100 =	31	69,000 ÷ 3 =
10	84,000 ÷ 100 =	32	69,000 ÷ 300 =
11	900 ÷ 10 =	33	69,000 ÷ 30 =
12	90 ÷ 3 =	34	800 ÷ 40 =
13	900 ÷ 30 =	35	1,200 ÷ 40 =
14	6,000 ÷ 100 =	36	1,280 ÷ 40 =
15	60 ÷ 2 =	37	1,600 ÷ 400 =
16	6,000 ÷ 200 =	38	8,000 ÷ 200 =
17	240 ÷ 10 =	39	14,000 ÷ 200 =
18	24 ÷ 2 =	40	14,600 ÷ 200 =
19	240 ÷ 20 =	41	2,560 ÷ 80 =
20	6,300 ÷ 100 =	42	16,100 ÷ 700 =
21	63 ÷ 3 =	43	14,400 ÷ 60 =
22	6,300 ÷ 300 =	44	37,800 ÷ 900 =

Name _____ Date _____

1. Divide. Draw number disks to show your thinking for (a) and (c). You may draw disks on your personal white board to solve the others if necessary.

a. 500 ÷ 10	b. 360 ÷ 10
c. 12,000 ÷ 100	d. 450,000 ÷ 100
e. 700,000 ÷ 1,000	f. 530,000 ÷ 100

2. Divide. The first one is done for you.

a. 12,000 ÷ 30 = 12,000 ÷ 10 ÷ 3 = 1,200 ÷ 3 = 400	b. 12,000 ÷ 300	c. 12,000 ÷ 3,000
d. 560,000 ÷ 70	e. 560,000 ÷ 700	f. 560,000 ÷ 7,000

g. 28,000 ÷ 40	h. 450,000 ÷ 500	i. 810,000 ÷ 9,000

3. The floor of a rectangular banquet hall has an area of 3,600 m^2. The length is 90 m.
   a. What is the width of the banquet hall?

   b. A square banquet hall has the same area. What is its length?

   c. A third rectangular banquet hall has a perimeter of 3,600 m. What is the width if the length is 5 times the width?

4. Two fifth graders solved 400,000 divided by 800. Carter said the answer is 500, while Kim said the answer is 5,000.
   a. Who has the correct answer? Explain your thinking.

   b. What if the problem is 4,000,000 divided by 8,000? What is the quotient?

Name _____ Date _____

1. Divide.

a. 17,000 ÷ 100	b. 59,000 ÷ 1,000
c. 12,000 ÷ 40	d. 480,000 ÷ 600

Name _____ Date _____

1. Divide. Draw number disks to show your thinking for (a) and (c). You may draw disks on your personal white board to solve the others if necessary.

a. 300 ÷ 10	b. 450 ÷ 10
c. 18,000 ÷ 100	d. 730,000 ÷ 100
e. 900,000 ÷ 1,000	f. 680,000 ÷ 1,000

2. Divide. The first one is done for you.

a. 18,000 ÷ 20 = 18,000 ÷ 10 ÷ 2 = 1,800 ÷ 2 = 900	b. 18,000 ÷ 200	c. 18,000 ÷ 2,000
d. 420,000 ÷ 60	e. 420,000 ÷ 600	f. 420,000 ÷ 6,000

g. 24,000 ÷ 30	h. 560,000 ÷ 700	i. 450,000 ÷ 9,000

3. A stadium holds 50,000 people. The stadium is divided into 250 different seating sections. How many seats are in each section?

4. Over the course of a year, a tractor-trailer commutes 160,000 miles across America.
   a. Assuming a trucker changes his tires every 40,000 miles, and that he starts with a brand new set of tires, how many sets of tires will he use in a year?

   b. If the trucker changes the oil every 10,000 miles and he starts the year with a fresh oil change, how many times will he change the oil in a year?

Name _____ Date _____

1. Estimate the quotient for the following problems. Round the divisor first.

a. 609 ÷ 21 ≈ 600 ÷ 20 = 30	b. 913 ÷ 29 ≈ _____ ÷ _____ = _____	c. 826 ÷ 37 ≈ _____ ÷ _____ = _____
d. 141 ÷ 73 ≈ _____ ÷ _____ = _____	e. 241 ÷ 58 ≈ _____ ÷ _____ = _____	f. 482 ÷ 62 ≈ _____ ÷ _____ = _____
g. 656 ÷ 81 ≈ _____ ÷ _____ = _____	h. 799 ÷ 99 ≈ _____ ÷ _____ = _____	i. 635 ÷ 95 ≈ _____ ÷ _____ = _____
j. 311 ÷ 76 ≈ _____ ÷ _____ = _____	k. 648 ÷ 83 ≈ _____ ÷ _____ = _____	l. 143 ÷ 35 ≈ _____ ÷ _____ = _____

m. 525 ÷ 25 ≈ _____ ÷ _____ = _____	n. 552 ÷ 85 ≈ _____ ÷ _____ = _____	o. 667 ÷ 11 ≈ _____ ÷ _____ = _____

2. A video game store has a budget of $825 and would like to purchase new video games. If each video game costs $41, estimate the total number of video games the store can purchase with their budget. Explain your thinking.

3. Jackson estimated 637 ÷ 78 as 640 ÷ 80. He reasoned that 64 tens divided by 8 tens should be 8 tens. Is Jackson's reasoning correct? If so, explain why. If not, explain a correct solution.

Name _____ Date _____

1. Estimate the quotient for the following problems.

a. 608 ÷ 23 ≈ _____ ÷ _____ = _____	b. 913 ÷ 31 ≈ _____ ÷ _____ = _____
c. 151 ÷ 39 ≈ _____ ÷ _____ = _____	d. 481 ÷ 68 ≈ _____ ÷ _____ = _____

Name _____ Date _____

1. Estimate the quotient for the following problems. The first one is done for you.

a. 821 ÷ 41 ≈ 800 ÷ 40 = 20	b. 617 ÷ 23 ≈ _____ ÷ _____ = _____	c. 821 ÷ 39 ≈ _____ ÷ _____ = _____
d. 482 ÷ 52 ≈ _____ ÷ _____ = _____	e. 531 ÷ 48 ≈ _____ ÷ _____ = _____	f. 141 ÷ 73 ≈ _____ ÷ _____ = _____
g. 476 ÷ 81 ≈ _____ ÷ _____ = _____	h. 645 ÷ 69 ≈ _____ ÷ _____ = _____	i. 599 ÷ 99 ≈ _____ ÷ _____ = _____
j. 301 ÷ 26 ≈ _____ ÷ _____ = _____	k. 729 ÷ 81 ≈ _____ ÷ _____ = _____	l. 636 ÷ 25 ≈ _____ ÷ _____ = _____

m. 835 ÷ 89 ≈ _____ ÷ _____ = _____	n. 345 ÷ 72 ≈ _____ ÷ _____ = _____	o. 559 ÷ 11 ≈ _____ ÷ _____ = _____

2. Mrs. Johnson spent $611 buying lunch for 78 students. If all of the lunches were the same cost, about how much did she spend on each lunch?

3. An oil well produces 172 gallons of oil every day. A standard oil barrel holds 42 gallons of oil. About how many barrels of oil will the well produce in one day? Explain your thinking.

Name _____ Date _____

1. Estimate the quotient for the following problems. The first one is done for you.

a. 5,738 ÷ 21 ≈ 6,000 ÷ 20 = 300	b. 2,659 ÷ 28 ≈ _____ ÷ _____ = _____	c. 9,155 ÷ 34 ≈ _____ ÷ _____ = _____
d. 1,463 ÷ 53 ≈ _____ ÷ _____ = _____	e. 2,525 ÷ 64 ≈ _____ ÷ _____ = _____	f. 2,271 ÷ 72 ≈ _____ ÷ _____ = _____
g. 4,901 ÷ 75 ≈ _____ ÷ _____ = _____	h. 8,515 ÷ 81 ≈ _____ ÷ _____ = _____	i. 8,515 ÷ 89 ≈ _____ ÷ _____ = _____
j. 3,925 ÷ 68 ≈ _____ ÷ _____ = _____	k. 5,124 ÷ 81 ≈ _____ ÷ _____ = _____	l. 4,945 ÷ 93 ≈ _____ ÷ _____ = _____
m. 5,397 ÷ 94 ≈ _____ ÷ _____ = _____	n. 6,918 ÷ 86 ≈ _____ ÷ _____ = _____	o. 2,806 ÷ 15 ≈ _____ ÷ _____ = _____

2. A swimming pool requires 672 ft^2 of floor space. The length of the swimming pool is 32 ft. Estimate the width of the swimming pool.

3. Janice bought 28 apps for her phone that, altogether, used 1,348 MB of space.
   a. If each app used the same amount of space, about how many MB of memory did each app use? Show how you estimated.

   b. If half of the apps were free and the other half were $1.99 each, about how much did she spend?

4. A quart of paint covers about 85 square feet. About how many quarts would you need to cover a fence with an area of 3,817 square feet?

5. Peggy has saved $9,215. If she is paid $45 an hour, about how many hours did she work?

Name _____ Date _____

1. Estimate the quotient for the following problems.

a. 6,523 ÷ 21 ≈ _____ ÷ _____ = _____	b. 8,491 ÷ 37 ≈ _____ ÷ _____ = _____
c. 3,704 ÷ 53 ≈ _____ ÷ _____ = _____	d. 4,819 ÷ 68 ≈ _____ ÷ _____ = _____

Name _____ Date _____

1. Estimate the quotient for the following problems. The first one is done for you.

a. 8,328 ÷ 41 ≈ 8,000 ÷ 40 = 200	b. 2,109 ÷ 23 ≈ _____ ÷ _____ = _____	c. 8,215 ÷ 38 ≈ _____ ÷ _____ = _____
d. 3,861 ÷ 59 ≈ _____ ÷ _____ = _____	e. 2,899 ÷ 66 ≈ _____ ÷ _____ = _____	f. 5,576 ÷ 92 ≈ _____ ÷ _____ = _____
g. 5,086 ÷ 73 ≈ _____ ÷ _____ = _____	h. 8,432 ÷ 81 ≈ _____ ÷ _____ = _____	i. 9,032 ÷ 89 ≈ _____ ÷ _____ = _____
j. 2,759 ÷ 48 ≈ _____ ÷ _____ = _____	k. 8,194 ÷ 91 ≈ _____ ÷ _____ = _____	l. 4,368 ÷ 63 ≈ _____ ÷ _____ = _____
m. 6,537 ÷ 74 ≈ _____ ÷ _____ = _____	n. 4,998 ÷ 48 ≈ _____ ÷ _____ = _____	o. 6,106 ÷ 25 ≈ _____ ÷ _____ = _____

2. 91 boxes of apples hold a total of 2,605 apples. Assuming each box has about the same number of apples, estimate the number of apples in each box.

3. A wild tiger can eat up to 55 pounds of meat in a day. About how many days would it take for a tiger to eat the following prey?

Prey	Weight of Prey	Number of Days
Eland Antelope	1,754 pounds	
Boar	661 pounds	
Chital Deer	183 pounds	
Water Buffalo	2,322 pounds	

Topic F

Partial Quotients and Multi-Digit Whole Number Division

5.NBT.6

Focus Standard:		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.
Instructional Days:		5	
Coherence	**-Links from:**	G4–M3	Multi-Digit Multiplication and Division
	-Links to:	G6–M2	Arithmetic Operations Including Dividing by a Fraction

The series of lessons in Topic F leads students to divide multi-digit dividends by two-digit divisors using the written vertical method. Each lesson moves to a new level of difficulty with a sequence beginning with divisors that are multiples of 10 to non-multiples of 10. Two instructional days are devoted to single-digit quotients with and without remainders before progressing into two- and three-digit quotients (**5.NBT.6**).

A Teaching Sequence Towards Mastery of Partial Quotients and Multi-Digit Whole Number Division

Objective 1: **Divide two- and three-digit dividends by multiples of 10 with single-digit quotients and make connections to a written method. (Lesson 19)**

Objective 2: **Divide two- and three-digit dividends by two-digit divisors with single-digit quotients and make connections to a written method. (Lessons 20–21)**

Objective 3: **Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients, reasoning about the decomposition of successive remainders in each place value. (Lessons 22–23)**

Name _____ Date _____

1. Divide, then check. The first one is done for you.

a. 41 ÷ 30

$$\begin{array}{r} 1 \text{ R } 11 \\ 30\overline{)41} \\ \underline{30} \\ 11 \end{array}$$

Check:

30 × 1 = 30

30 + 11 = 41

b. 80 ÷ 30

c. 71 ÷ 50

d. 270 ÷ 30

e. 643 ÷ 80

f. 215 ÷ 90

2. Terry says the solution to 299 ÷ 40 is 6 R59. His work is shown below. Explain Terry's error in thinking, and then find the correct quotient using the space on the right.

```
      6
40 | 299
     240
      59
```

```
40 | 299
```

3. A number divided by 80 has a quotient of 7 with 4 as a remainder. Find the number.

4. While swimming a 2 km race, Adam changes from breaststroke to butterfly every 200 m. How many times did he switch strokes during the first half of the race?

Name _____ Date _____

1. Divide, then check using multiplication.

   a. 73 ÷ 20

   b. 291 ÷ 30

Name _____ Date _____

1. Divide, then check using multiplication. The first one is done for you.

a. 71 ÷ 20

$$\begin{array}{r} 3 \text{ R } 11 \\ 20 \overline{)\,71} \\ \underline{60} \\ 11 \end{array}$$

Check:

20 × 3 = 60

60 + 11 = 71

b. 90 ÷ 40

c. 95 ÷ 60

d. 280 ÷ 30

e. 437 ÷ 60

f. 346 ÷ 80

2. A number divided by 40 has a quotient of 6 with a remainder of 16. Find the number.

3. A shipment of 288 textbooks has been delivered. Each of the 10 classrooms will receive an equal share of the books, with any extra books being stored in the bookroom. After the texts have been distributed to the classrooms, how many will be stored in the bookroom?

4. How many sixties are in two hundred forty-four?

Name _____ Date _____

1. Divide, then check with multiplication. The first one is done for you.

a. 65 ÷ 17

$$\begin{array}{r} \quad 3 \text{ R } 14 \\ 17\overline{)65} \\ -\,51 \\ \hline 14 \end{array}$$

Check:
17 × 3 = 51
51 + 14 = 65

b. 49 ÷ 21

c. 78 ÷ 39

d. 84 ÷ 32

e. 77 ÷ 25

f. 68 ÷ 17

2. When dividing 82 by 43, Linda estimated the quotient to be 2. Examine Linda's work and explain what she needs to do next. On the right, show how you would solve the problem.

Linda's estimation:	Linda's work:	Your work:
$40\overline{)80}$ with quotient 2	$43\overline{)82}$ with quotient 2; -86; $??$	$43\overline{)82}$

3. A number divided by 43 has a quotient of 3 with 28 as a remainder. Find the number. Show your work.

4. Write another division problem that has a quotient of 3 and a remainder of 28.

5. Mrs. Silverstein sold 91 cupcakes at a food fair. The cupcakes were sold in boxes of "a baker's dozen," which is 13. She sold all the cupcakes at $15 per box. How much money did she receive?

Name _____ Date _____

1. Divide, then check with multiplication.

   a. 78 ÷ 21

   b. 89 ÷ 37

Name _____ Date _____

1. Divide, then check with multiplication. The first one is done for you.

a. $72 \div 31$

$$\begin{array}{r} 2 \text{ R } 10 \\ 31\overline{)72} \\ -\,62 \\ \hline 10 \end{array}$$

Check:

$31 \times 2 = 62$

$62 + 10 = 72$

b. $89 \div 21$

c. $94 \div 33$

d. $67 \div 19$

e. $79 \div 25$

f. $83 \div 21$

2. A 189-square-foot rectangular office has a length of 21 feet. What is the width of the office?

3. While preparing for a morning conference, Principal Corsetti is laying out 15 dozen bagels on square plates. Each plate can hold 14 bagels.

   a. How many plates of bagels will Mr. Corsetti have?

   b. How many more bagels would be needed to fill the final plate with bagels?

Name ____ Date ______________________

1. Divide, then check using multiplication. The first one is done for you.

a. 258 ÷ 47

				5	R 23
4	7	2	5	8	
	-	2	3	5	
			2	3	

Check:

4 7 × 5 = 235

235 + 23 = 258

b. 148 ÷ 67

c. 591 ÷ 73

d. 759 ÷ 94

e. 653 ÷ 74

f. 257 ÷ 36

2. Generate and solve at least one more division problem with the same quotient and remainder as the one below. Explain your thought process.

				8
5	8	4	7	5
	-	4	6	4
			1	1

3. Assume that Mrs. Giang's car travels 14 miles on each gallon of gas. If she travels to visit her niece who lives 133 miles away, how many gallons of gas will Mrs. Giang need to make the round trip?

4. Louis brings 79 pencils to school. After he gives each of his 15 classmates an equal number of pencils, he will give any leftover pencils to his teacher.

   a. How many pencils will Louis' teacher receive?

   b. If Louis decides instead to take an equal share of the pencils along with his classmates, will his teacher receive more pencils or fewer pencils? Show your thinking.

Name _____ Date _____

1. Divide, then check using multiplication.

   a. 326 ÷ 53

   b. 192 ÷ 38

Name ____ Date ______________________

1. Divide, then check using multiplication. The first one is done for you.

a. 129 ÷ 21

```
        6   R 3
21 | 1 2 9
   - 1 2 6
         3
```

Check:

21 × 6 = 126

126 + 3 = 129

b. 158 ÷ 37

c. 261÷ 49

d. 574 ÷ 82

e. 464 ÷ 58

f. 640 ÷ 9

2. It takes Juwan exactly 35 minutes by car to get to his grandmother's. The nearest parking area is a 4-minute walk from her apartment. One week he visited more often. He realized that he spent 5 hours and 12 minutes traveling to her apartment and then back home. How many round trips did he make to visit his grandmother?

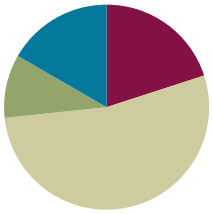
3. How many eighty-fours are in 672?

Lesson 22

Objective: Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients, reasoning about the decomposition of successive remainders in each place value.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Divide Decimals **5.NBT.7** (3 minutes)
- Group Count by Multi-Digit Numbers **5.NBT.6** (4 minutes)
- Divide by Two-Digit Numbers **5.NBT.6** (5 minutes)

Divide Decimals (3 minutes)

Materials: (S) Personal white boards

Note: This drill prepares students for G5–M2–Lesson 24's Concept Development.

T: (Write 6 hundreds ÷ 2 =.) Say the division sentence in unit form.
S: 6 hundreds ÷ 2 = 3 hundreds.

Repeat process with 6 tens ÷ 2 and 6 ones ÷ 2, and 6 tenths ÷ 2.

T: On your boards, write 6 tenths ÷ 2 in decimal form.
S: (Write 0.6 ÷ 2 = 0.3.)

Repeat the process for 6 hundredths ÷ 2, 8 thousands ÷ 2, 8 ones ÷ 2, 8 tenths ÷ 2, and 8 hundredths ÷ 2.

Group Count by Multi-Digit Numbers (4 minutes)

Materials: (S) Paper

Note: This drill will prepare students for this lesson's Content Development.

Repeat the process from G5–M2–Lessons 19 and 21 for 17 and 32.

Divide by Two-Digit Numbers (5 minutes)

Materials: (S) Personal white boards

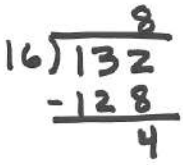
Note: This drill will review G5–M2–Lesson 21 content.

Repeat the process from G5–M2–Lesson 21 for the following possible sequence: 208 ÷ 37, 128 ÷ 57, and 664 ÷ 83.

Application Problem (6 minutes)

Zenin's baby sister weighed 132 ounces at birth. How much did his sister weigh in pounds and ounces?

Note: Depending on the class, you may or may not have to remind students that there are 16 ounces in a pound. Either way, it can be used as an opportunity to interpret the remainder (i.e., what does the remainder of 4 represent in this problem?).



8 lb 4 oz

Concept Development (32 minutes)

Materials: (S) Personal white boards

Problem 1: 590 ÷ 17

T: (Write 590 ÷ 17 on the board.) Can we divide 5 hundreds by 17?

S: Not without regrouping.

T: Let's work with 59 tens, then. We can divide 59 tens into 17 groups or groups of 17. Tell me how to estimate to divide 59 tens by 17.

S: 60 tens ÷ 20 = 3 tens

T: Record 3 tens and find the remainder in the tens place. 3 tens times 17 is?

S: 51 tens.

MP.7

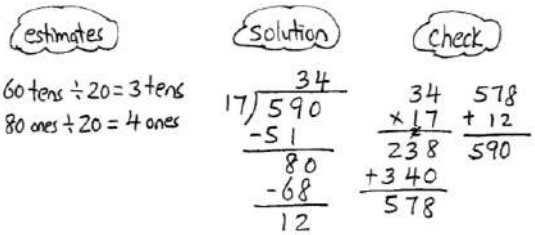
T: (Record 51 tens below 59 tens.) Remind me why we record here. (Point to the algorithm.)

S: We record the 5 in the hundreds place, and the 1 is in the tens place because we know 51 tens is the same as 510.

T: How many tens are remaining?

S: 8 tens.

T: Can we divide 8 tens by 17?



NOTES ON STANDARDS ALIGNMENT:

The standards specifically require students to find quotients "using strategies based on place value" **(5.NBT.6)**. When dividing, students are decomposing units just as they have done when subtracting since Grade 2. "I don't have enough tens to subtract, so I'll change 1 hundred for 10 tens." When dividing, they also change each larger unit that cannot be divided for smaller units. "I'll change 8 remaining tens for 80 ones."

S: Not without regrouping.

T: We need to decompose these 8 tens into 80 ones. There are no ones in the whole to add in. (Point to the zero in the ones place of whole.)

T: Now we have 80 ones divided by 17. Tell me how to divide 80 by 17?

S: 80 ones ÷ 20 = 4 ones.

T: Record 4 ones in the quotient. What is 17 × 4 ones?

S: 68 ones.

T: What is 80 – 68? How many ones remain?

S: 12.

T: Could we make another group of 17?

S: No!

T: What is our quotient?

S: 34.

T: What is 34 units of 17 plus 12 ones?

S: 590.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

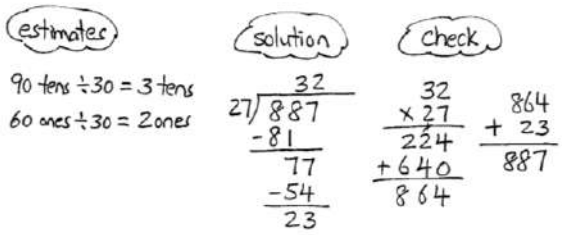
At this point in the module on division, some of your students will be ready for independent practice, while others will clearly need more scaffolding and support. If necessary, allow students who are ready to work on the Problem Set independently, and work in a small group with those who need more help

Problem 2: 887 ÷ 27

T: (Write 887 ÷ 27 on the board.) Let's divide together. Can we divide 8 hundreds by 27? (Point to the first digit of the dividend.)

S: No, we have to change the 8 hundreds to 80 tens. 80 tens and 8 tens, 88 tens. → We have to regroup to have 88 tens.

T: (Point to the first two digits of the dividend.) How would you estimate 88 tens divided by 27. Show me on your personal board.



S: 90 tens ÷ 30 = 3 tens.

T: Record 3 tens in the quotient and find the product of 3 tens and 27.

S: 82 tens.

T: How many tens are remaining?

S: 6 tens.

T: Can we divide 6 tens by 27 or must we regroup? Explain.

S: No, we need to regroup the 6 tens to 60 ones and combine them with the 7 ones in the whole, to make 67 ones.

T: Now, we have 67 ones divided by 27. Show me how you'll estimate.

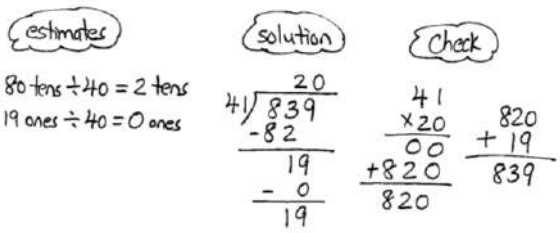
S: 60 ones ÷ 30 = 2 ones.

T: Record 2 ones in the quotient. What is 2 × 27?

S: 54 ones.
T: How many ones remain?
S: 23 ones
T: Can we divide 23 ones by 27?
S: No, 23 is the remainder.
T: How many groups of 27 are in 887?
S: 32 groups.
T: With how many left over?
S: 23 remaining.
T: Complete the two-part check to make sure.

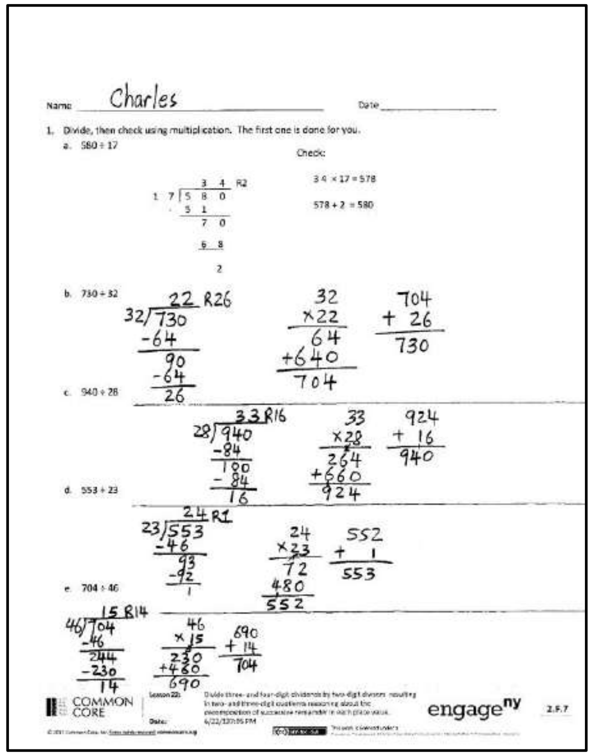
Problem 3: 839 ÷ 41

T: (Write 839 ÷ 41 on the board.) Solve this problem with a partner. As you finish each step share your thinking with your partner.
S: (Work.)
T: OK. Let's share your work. How did you first estimate to begin dividing?
S: 80 tens ÷ 40 = 2 tens.
T: 2 tens times 41 equals?
S: 82 tens.
T: How many tens remain?
S: 1 ten.
T: What did you do next?
S: Regrouped the 1 ten and made 10 ones and combined them with the 9 ones in the whole to make 19 ones.
T: What is 19 ones divided by 41?
S: Zero. It can't be divided.
T: What is the quotient, then?
S: 20 remainder 19.
T: Explain how you knew that the quotient was 20 with a remainder of 19 and not 2 with a remainder of 19. Turn and talk.
S: (Share.)
T: Did you check the answer? Was it correct?
S: Yes.



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.


Name Charles Date

1. Divide, then check using multiplication. The first one is done for you.

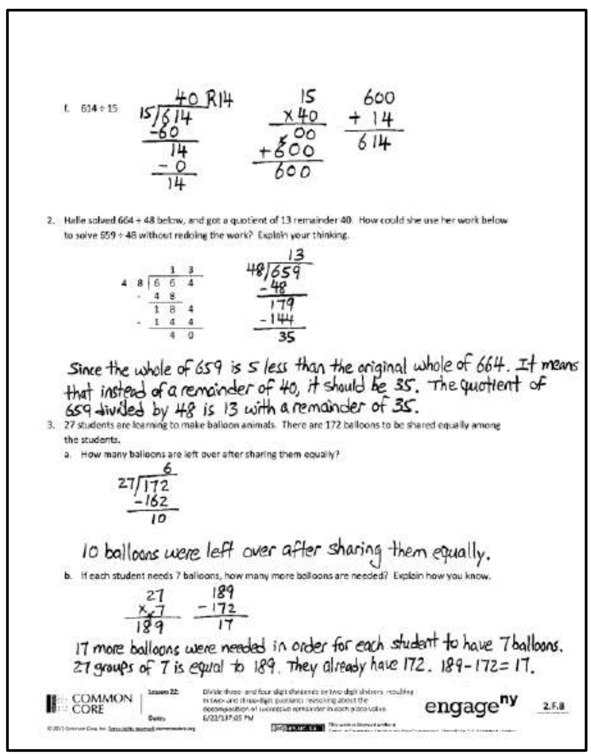
a. 580 ÷ 17 — 34 R2; Check: 34 × 17 = 578; 578 + 2 = 580

b. 730 ÷ 32 — 22 R26; 32 × 22 = 704; 704 + 26 = 730

c. 940 ÷ 28 — 33 R16; 33 × 28 = 924; 924 + 16 = 940

d. 553 ÷ 23 — 24 R1; 24 × 23 = 552; 552 + 1 = 553

e. 704 ÷ 46 — 15 R14; 46 × 15 = 690; 690 + 14 = 704


f. 614 ÷ 15 — 40 R14; 15 × 40 = 600; 600 + 14 = 614

2. Halle solved 664 ÷ 48 below, and got a quotient of 13 remainder 40. How could she use her work below to solve 659 ÷ 48 without redoing the work? Explain your thinking.

Since the whole of 659 is 5 less than the original whole of 664. It means that instead of a remainder of 40, it should be 35. The quotient of 659 divided by 48 is 13 with a remainder of 35.

3. 27 students are learning to make balloon animals. There are 172 balloons to be shared equally among the students.

a. How many balloons are left over after sharing them equally?

10 balloons were left over after sharing them equally.

b. If each student needs 7 balloons, how many more balloons are needed? Explain how you know.

17 more balloons were needed in order for each student to have 7 balloons. 27 groups of 7 is equal to 189. They already have 172. 189 − 172 = 17.

Student Debrief (10 minutes)

Lesson Objective: Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients reasoning about the decomposition of successive remainders in each place value.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- In Problem 1, was it ever necessary to adjust your quotient after estimating? If so, what did you do in order to continue dividing?
- While checking your work today, did anyone discover an error in his or her division? If so, how did you fix it? How did you know what to do?
- Explain your thought process as you solved Problem 1(f). What were you thinking as you recorded a digit in the ones place of your quotient and recorded the remainder? Was anyone tempted to say the answer was 4 with a remainder of 14?

- Talk to your partner about how you set up and solved Problem 2. What was your thinking like? How could you use your thinking to solve 660 ÷ 48 or 661 ÷ 48 or 662 ÷ 48, etc.? What would the total need to be in order to have a quotient of exactly 13?
- What did you have to do in order to solve Problem 3(b)? Talk with a neighbor.
- How did estimation help you to divide today?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name ____ Date ______________________

1. Divide, then check using multiplication. The first one is done for you.

   a. 580 ÷ 17

```
          3   4  R2
1  7 | 5   8   0
   -  5   1
      -------
          7   0
          6   8
          -----
              2
```

Check:

34 × 17 = 578

578 + 2 = 580

   b. 730 ÷ 32

   c. 940 ÷ 28

   d. 553 ÷ 23

   e. 704 ÷ 46

f. 614 ÷ 15

2. Halle solved 664 ÷ 48 below. She got a quotient of 13 with a remainder of 40. How could she use her work below to solve 659 ÷ 48 without redoing the work? Explain your thinking.

$$
\begin{array}{r|rrr}
 & & 1 & 3 \\ \cline{2-4}
48 & 6 & 6 & 4 \\
- & 4 & 8 & \\ \cline{2-3}
 & 1 & 8 & 4 \\
- & 1 & 4 & 4 \\ \cline{2-4}
 & & 4 & 0
\end{array}
$$

3. 27 students are learning to make balloon animals. There are 172 balloons to be shared equally among the students.

   a. How many balloons are left over after sharing them equally?

   b. If each student needs 7 balloons, how many more balloons are needed? Explain how you know.

Name _____ Date _____

1. Divide, then check using multiplication.

   a. 413 ÷ 19

   b. 708 ÷ 67

Name ____ Date ______________________

1. Divide, then check using multiplication. The first one is done for you.

a. 487 ÷ 21

```
        2  3  R4
 2 1 | 4  8  7
   -   4  2
          6  7
          6  3

             4
```

Check:

21 × 23 = 483

483 + 4 = 487

b. 485 ÷ 15

c. 700 ÷ 21

d. 399 ÷ 31

e. 820 ÷ 42

f. 908 ÷ 56

2. When dividing 2,458 by 51, a student finds a quotient of 48 with a remainder of 11. Check the student's work, and use the check to find the error in their solution.

3. A baker was going to arrange 432 desserts into rows of 28. The baker divides 432 by 28 and gets a quotient of 15 with remainder 12. Explain what the quotient and remainder represent.

3. Edward bikes the same route to and from school each day. After 28 school days, he bikes a total distance of 389.2 miles.

   a. Estimate how many miles he bikes in one day.

   b. If Edward continues his routine of biking to school, about how days altogether will it take him to reach a total distance of 500 miles?

4. Xavier goes to the store with $40. He spends $38.60 on 13 bags of popcorn.

   a. About how much does a bag of popcorn cost?

   b. Does he have enough money for another bag? Use your estimate to explain your answer.

Name _____ Date _____

1. Estimate the quotients.

   a. 1.64 ÷ 22 ≈

   b. 123.8 ÷ 62 ≈

   c. 6.15 ÷ 31 ≈

Name _____ Date _____

1. Estimate the quotients.

   a. $3.53 \div 51 \approx$

   b. $24.2 \div 42 \approx$

   c. $9.13 \div 23 \approx$

   d. $79.2 \div 39 \approx$

   e. $7.19 \div 58 \approx$

2. Estimate the quotient in (a). Use your estimated quotient to estimate (b) and (c).

   a. $9.13 \div 42 \approx$

   b. $913 \div 42 \approx$

   c. $91.3 \div 42 \approx$

3. Mrs. Huynh bought a bag of 3 dozen toy animals as party favors for her son's birthday party for $28.97. Estimate the price of each toy animal.

4. Carter drank 15.75 gallons of water in 4 weeks. He drank the same amount of water each day.

   a. Estimate how many gallons he drank in one day.

   b. Estimate how many gallons he drank in one week.

   c. About how many days altogether will it take him to drink 20 gallons?

Name _____ Date _____

1. 156 ÷ 24 and 102 ÷ 15 both have a quotient of 6 and a remainder of 12.

   a. Are the division expressions equivalent to each other? Use your knowledge of decimal division to justify your answer.

   b. Construct your own division problem with a two-digit divisor that has a quotient of 6 and a remainder of 12 but is not equivalent to the problems in 1(a).

2. Divide, then check your work with multiplication.

   a. 36.14 ÷ 13

   b. 62.79 ÷ 23

   c. 12.21 ÷ 11

   d. 6.89 ÷ 13

   e. 249.6 ÷ 52

   f. 24.96 ÷ 52

   g. 300.9 ÷ 59

   h. 30.09÷ 59

3. The weight of 72 identical marbles is 183.6 grams. What is the weight of each marble? Explain how you know the decimal point of your quotient is placed reasonably.

4. Cameron wants to measure the length of his classroom using his foot as a length unit. His teacher tells him the length of the classroom is 23 meters. Cameron steps across the classroom heel to toe and finds that it takes him 92 steps. How long is Cameron's foot in meters?

5. A blue rope is three times as long as a red rope. A green rope is 5 times as long as the blue rope. If the total length of the three ropes is 508.25 meters, what is the length of the blue rope?

Name _____ Date _____

1. Estimate. Then, divide using the standard algorithm and check.

   a. 45.15 ÷ 21

   b. 14.95 ÷ 65

2. We learned today that division expressions that have the same quotient and remainders are not necessarily equal to each other. Explain how this is possible.

Name _____ Date _____

1. Create two whole number division problems that have a quotient of 9 and a remainder of 5. Justify which is greater using decimal division.

2. Divide, then check your work with multiplication.

   a. 75.9 ÷ 22

   b. 97.28 ÷ 19

   c. 77.14 ÷ 38

   d. 12.18 ÷ 29

3. Divide.

   a. 5,224 ÷ 43

   b. 1,908 ÷ 36

Name _____ Date _____

1. Divide. Check your work with multiplication.

a. 5.6 ÷ 16

b. 21 ÷ 14

c. 24 ÷ 48

d. 36 ÷ 24

e. 81 ÷ 54

f. 15.6 ÷ 15

g. 5.4 ÷ 15

h. 16.12 ÷ 52

i. 2.8 ÷ 16

2. 30.48 kg of beef was placed into 24 packages of equal weight. What is the weight of one package of beef?

3. What is the length of a rectangle whose width is 17 inches and whose area is 582.25 in^2?

4. A soccer coach spent $162 dollars on 24 pairs of socks for his players. How much did five pairs of socks cost?

5. A craft club makes 95 identical paperweights to sell. They collect $230.85 from selling all the paperweights. If the profit the club collects on each paperweight is two times as much as the cost to make each one, what does it cost the club to make each paperweight?

Name _____ Date _____

1. Divide
   a. 28 ÷ 32
   b. 1,201.68 ÷ 24

Name _____ Date _____

1. Divide and check.

a. $7 \div 28$

c. $6.5 \div 13$

e. $561.68 \div 28$

b. $51 \div 25$

d. $132.16 \div 16$

f. $604.8 \div 36$

2. In a science class, students water a plant with the same amount of water each day for 28 consecutive days. If the students use a total of 23.8 liters of water over the 28 days, how many liters of water did they use each day? How many milliliters did they use each day?

A # Correct _____

Divide.

1	6 ÷ 10 =	.	23	25 ÷ 50 =	.
2	6 ÷ 20 =	.	24	2.5 ÷ 50 =	.
3	6 ÷ 60 =	.	25	4.5 ÷ 50 =	.
4	8 ÷ 10 =	.	26	4.5 ÷ 90 =	.
5	8 ÷ 40 =	.	27	0.45 ÷ 90 =	.
6	8 ÷ 20 =	.	28	0.45 ÷ 50 =	.
7	4 ÷ 10 =	.	29	0.24 ÷ 60 =	.
8	4 ÷ 20 =	.	30	0.63 ÷ 90 =	.
9	4 ÷ 40 =	.	31	0.48 ÷ 80 =	.
10	9 ÷ 3 =	.	32	0.49 ÷ 70 =	.
11	9 ÷ 30 =	.	33	6 ÷ 30 =	.
12	12 ÷ 3 =	.	34	14 ÷ 70 =	.
13	12 ÷ 30 =	.	35	72 ÷ 90 =	.
14	12 ÷ 40 =	.	36	6.4 ÷ 80 =	.
15	12 ÷ 60 =	.	37	0.48 ÷ 40 =	.
16	12 ÷ 20 =	.	38	0.36 ÷ 30 =	.
17	15 ÷ 3 =	.	39	0.55 ÷ 50 =	.
18	15 ÷ 30 =	.	40	1.36 ÷ 40 =	.
19	15 ÷ 50 =	.	41	2.04 ÷ 60 =	.
20	18 ÷ 30 =	.	42	4.48 ÷ 70 =	.
21	24 ÷ 30 =	.	43	6.16 ÷ 80 =	.
22	16 ÷ 40 =	.	44	5.22 ÷ 90 =	.

B Improvement _____ # Correct _____

Divide.

1	4 ÷ 10 =	.	23	25 ÷ 50 =	.
2	4 ÷ 20 =	.	24	2.5 ÷ 50 =	.
3	4 ÷ 40 =	.	25	3.5 ÷ 50 =	.
4	8 ÷ 10 =	.	26	3.5 ÷ 70 =	.
5	8 ÷ 20 =	.	27	0.35 ÷ 70 =	.
6	8 ÷ 40 =	.	28	0.35 ÷ 50 =	.
7	9 ÷ 10 =	.	29	0.42 ÷ 60 =	.
8	9 ÷ 30 =	.	30	0.54 ÷ 90 =	.
9	9 ÷ 90 =	.	31	0.56 ÷ 80 =	.
10	6 ÷ 2 =	.	32	0.63 ÷ 70 =	.
11	6 ÷ 20 =	.	33	6 ÷ 30 =	.
12	12 ÷ 2 =	.	34	18 ÷ 90 =	.
13	12 ÷ 20 =	.	35	72 ÷ 80 =	.
14	12 ÷ 30 =	.	36	4.8 ÷ 80 =	.
15	12 ÷ 40 =	.	37	0.36 ÷ 30 =	.
16	12 ÷ 60 =	.	38	0.48 ÷ 40 =	.
17	15 ÷ 5 =	.	39	0.65 ÷ 50 =	.
18	15 ÷ 50 =	.	40	1.38 ÷ 30 =	.
19	15 ÷ 30 =	.	41	2.64 ÷ 60 =	.
20	21 ÷ 30 =	.	42	5.18 ÷ 70 =	.
21	27 ÷ 30 =	.	43	6.96 ÷ 80 =	.
22	36 ÷ 60 =	.	44	6.12 ÷ 90 =	.

Name _____ Date _____

1. Ava is saving for a new computer that costs $1,218. She has already saved half of the money. Ava earns $14.00 per hour. How many hours must Ava work in order to save the rest of the money?

2. Michael has a collection of 1,404 sports cards. He hopes to sell the collection in packs of 36 cards and make $633.75 when all the packs are sold. If each pack is priced the same, how much should Michael charge per pack?

3. Jim Nasium is building a tree house for his two daughters. He cuts 12 pieces of wood from a board that is 128 inches long. He cuts 5 pieces that measure 15.75 inches each, and 7 pieces evenly cut from what is left. Jim calculates that due to the width of his cutting blade, he will lose a total of 2 inches of wood after making all of the cuts. What is the length of each of the seven pieces?

4. A load of bricks is twice as heavy as a load of sticks. The total weight of 4 loads of bricks and 4 loads of sticks is 771 kilograms. What is the total weight of 1 load of bricks and 3 loads of sticks?

Name _____ Date _____

Solve this problem and show all your work.

1. Kenny is ordering uniforms for both the girls' and boys' tennis clubs. He is ordering shirts for 43 players and two coaches at a total cost of $658.35. In addition, he is ordering visors for each player at a total cost of $368.51. How much will each player pay for the shirt and visor?

Name _____ Date _____

1. Mr. Rice needs to replace the 166.25 ft of edging on the flower beds in his backyard. The edging is sold in length of 19 ft each. How many lengths of edging will he need to purchase?

2. Olivia is making granola bars and will use 17.9 oz of pistachios, 12.6 oz of almonds, 12.5 oz of sunflower seeds, and 12.5 oz of cashews. This amount makes 25 bars. What is the total amount of nuts in each bar?

3. Adam has 16.45 kg of flour and he uses 6.4 kg to make hot cross buns. The remaining flour is exactly enough to make 15 batches of scones. How much flour will be in each batch?

Name _____ Date _____

1. Lamar has 1,354.5 kilograms of potatoes to deliver to 18 stores. 12 of the stores are in the Bronx. How many kilograms of potatoes will be delivered to stores in the Bronx?

2. Valerie uses 12 oz of detergent each week for her laundry. If there are 75 oz of detergent in the bottle, in how many weeks will she need to buy a new bottle of detergent? Explain how you know.

3. The area of a rectangle is 56.96 m^2. If the length is 16 m, what is its perimeter?

4. A city block is 3 times as long as it is wide. If the distance around the block is 0.48 kilometers, what is the area of the block in square meters?

Name _____ Date _____

Solve.

Hayley borrowed $1,854 from her parents. She agreed to repay them in equal installments over the next 18 months. How much will Hayley still owe her parents after a year?

Name _____ Date _____

Directions: Solve the word problems using the bar model.

1. Michelle wants to save $150 for a trip to Six Flags Amusement Park. If she saves $12 each week, how many weeks will it take her to save enough money for the trip?

2. Karen works for 85 hours over a two week period. She earns $1,891.25 over this period. How much does Karen earn for 8 hours of work?

3. The area of a rectangle is 256.5 m^2. If the length is 18 m, what is the perimeter of the rectangle?

4. Tyler baked 702 cookies. He sold them in boxes of 18. After selling all the boxes of cookies, he earned $136.50. What was the cost of one box of cookies?

5. A park is 4 times as long as it is wide. If the distance around the park is 12.5 kilometers, what is the area of the park?

Name _____ Date _____

1. Fill in the chart.

Words	Expression	The Value of the Expression
a. 50 times the sum of 64 and 36		
b. Divide the difference between 1200 and 700 by 5		
c. The sum of 3 fifteens and 17 fifteens		
d. 15 times the sum of 14 and 6		
e.	10 × (250 + 45)	
f.	(560 + 440) × 14	

2. Compare the two expressions using <, >, or =. Explain how you know in the space below each without calculating.

a. 100 × 8 ◯ 25 × (4 × 9)

b. 48 × 12 ◯ 50 twelves – 3 twelves

c. 24 × 36 ◯ 18 twenty-fours, doubled

3. Solve. Use words, numbers, or pictures to explain how your answers to Parts (a) and (b) are related.

   a. 25 × 30 = _____

   b. 2.5 × 30 = _____ tenths × 30 = _____

4. Multiply using the standard algorithm. Show your work below each problem. Write the product in the blank.

   a. 514 × 33 = _____

   b. 546 × 405 = _____

5. For a field trip, the school bought 47 sandwiches for $4.60 each and 39 bags of chips for $1.25 each. How much did the school spend in all?

Name _____ Date _____

1. Express the missing divisor using a power of 10. Explain your reasoning using a place value model.

   a. 5.2 ÷ _____ = 0.052

   b. 7,650 ÷ _____ = 7.65

2. Estimate the quotient by rounding the equation to relate to a one-digit fact. Explain your thinking in the space below.

   a. 432 ÷ 73 ≈ _____

   b. 1275 ÷ 588 ≈ _____

3. Generate and solve another division problem with the same quotient and remainder as the two problems below. Explain your strategy for creating the new problem.

```
      3
17 | 63
     51
     12
```

```
        3
42 | 138
     126
      12
```

4. Sarah says that 26 ÷ 8 equals 14 ÷ 4 because both are "3 R2." Explain her mistake using decimal division.

5. A rectangular playground has an area of 3,392 square meters. If the width of the rectangle is 32 m, find the length.

6. A baker uses 5.5 lb of flour daily.

   a. How many ounces of flour will he use in two weeks? Use words, numbers, and pictures to explain your thinking. (1 lb = 16 oz)

b. The baker's recipe for a loaf of bread calls for 12 oz of flour. If he uses all of his flour to make loaves of bread, how many full loaves can he bake in two weeks?

c. The baker sends all his bread to one store. If he can pack up to 15 loaves of bread in a box for shipping, what is the minimum number of boxes required to ship all the loaves baked in two weeks. Explain your reasoning.

d. The baker pays $0.80 per pound for sugar and $1.25 per pound for butter. Write an expression that shows how much the baker will spend if he buys 6 pounds of butter and 20 pounds of sugar.

e. Chocolate sprinkles cost 1/10 as much per pound as sugar. Find the baker's total cost for 100 pounds of chocolate sprinkles. Explain the number of zeros and the placement of the decimal in your answer using a place value chart.