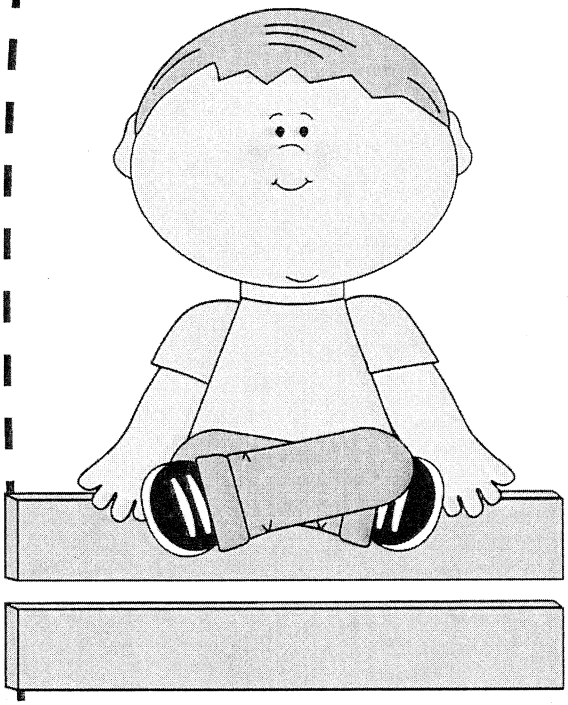
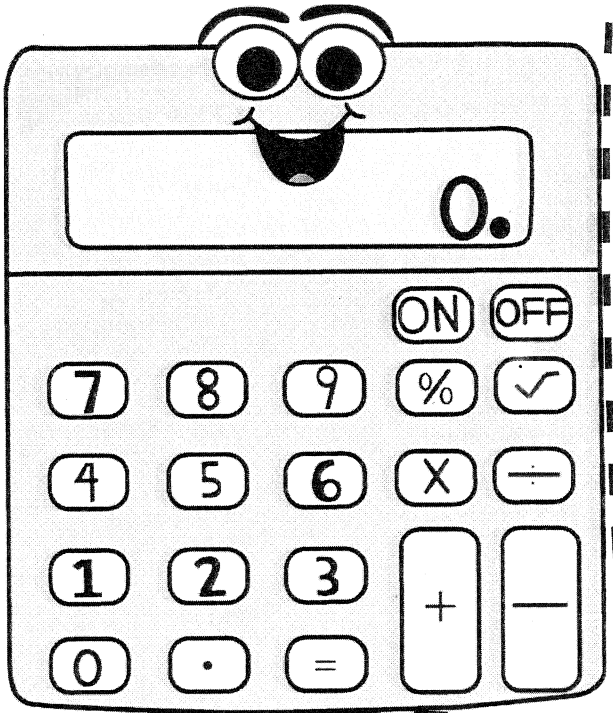
Unit 9

Study Guide

Multidigit Operations





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Name: _____ Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Review: Multidigit Operations

1) For each number sentence, fill in the blank with a factor from 1 to 10 to make it true.

   a. 4 X 8 > 8 X _____

   b. 6 X 7 < 6 X _____

   c. 9 X 3 < _____ X _____

For problems 2-4, write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

2) Six robins each have a mass of about 70 grams.
   What is their total mass?

   _____
   (number model with letter)

   The letter _____ stands for _____.

   Six robins have a total mass of about _____ grams.

   _____
   (number model with answer)

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Unit 9 Review (continued)

3) Together, 40 bald eagles have a mass of about 240 kilograms. One wild turkey has a mass of about 6 kilograms. About how many 6-pound wild turkeys would it take to equal the mass of the group of bald eagles?

_____
(number model with letter)

The letter _____ stands for _____.

It would take _____ wild turkeys to equal the mass of 40 bald eagles.

_____
(number model with answer)

4) About how many 50-gram parrots have a mass equal to one 1,000 pound pheasant?

_____
(number model with letter)

The letter _____ stands for _____.

It would take _____ parrots to equal the mass of one pheasant.

_____
(number model with answer)

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Unit 9 Review (continued)

5) Use the break-apart strategy to solve each problem.
You may use mental math, drawings, number sentences, or words.
Show your thinking.

a. 6 X 73 = _____

b. 4 X 82 = _____

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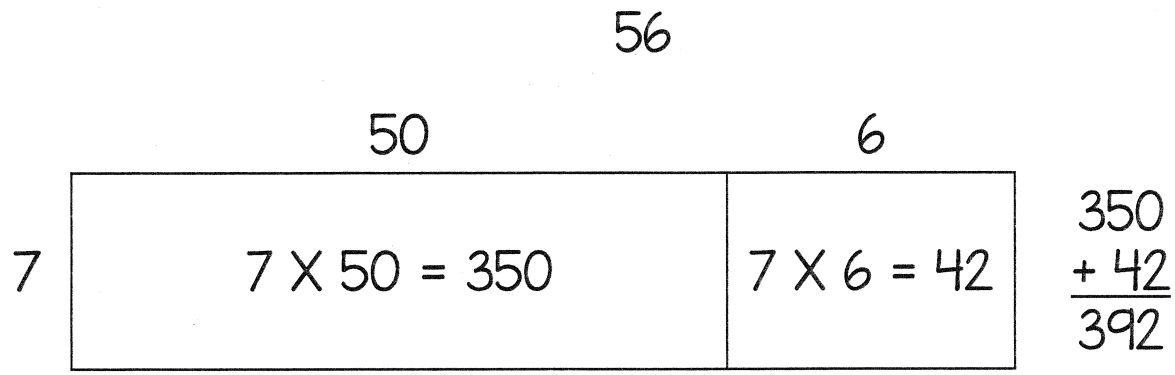
Unit 9 Review (continued)

c. Eduardo drew a rectangle to help solve 7 X 56. Here is his work:



Explain how Eduardo solved the problem.

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Unit 9 Review (continued)

6) It started snowing at 10:20 A.M. and stopped at 12:45 P.M.
How long did it snow?
Show your thinking. You may use an open number line, your toolkit clock, or other representations.

_____ hours _____ minutes

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Name: _____ Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Challenge Review

1) About how many 10-gram canaries would equal the mass of seven 30-gram chipmunks?
Explain your thinking using numbers and words.

About _____ canaries equal the mass of 7 chipmunks.

2) Quinn used the break-apart strategy to solve 7 X 83, but he made a mistake.
Explain Quinn's mistake.

_____

_____

_____

83

	80	3
7	7 X 8 = 56	7 X 3 = 21

56
+ 21
77

Use any strategy to correctly solve 7 X 83. Show your work.

7 X 83 = _____

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Unit 9 Challenge Review (continued)

3) Use the sunrise and sunset information in the chart to figure out the length of day for each city.

City	Sunrise on 4/14/2016	Sunset on 4/14/2016	Length of Day on 4/14/2016
New York City, New York	6:18 A.M.	7:34 P.M.	
Los Angeles, California	6:23 A.M.	7:23 P.M.	

What is the difference between the lengths of day for the two cities?

_____

Name: _____ Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Open Response Review
Factor Patterns

1) Explore what happens to the product when you double a factor. For example, multiply 2 X 3. Then double the 2 and multiply 4 X 3. Then begin with 2 X 3 again, double the 3, and multiply 2 X 6. Show your work.

2) Try doubling one of the factors in other multiplication facts. Show your work. Describe a pattern that you see when you double a factor.

3) Based on your work with doubling factors, predict what will happen when you triple a factor. Explain how you would convince someone that your prediction will always work for any multiplication fact.

Remember...
double = X 2 triple = X 3

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Name: *ANSWER KEY* Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Review: Multidigit Operations

1) For each number sentence, fill in the blank with a factor from 1 to 10 to make it true.

a. $4 \times 8 > 8 \times$ _____ Possible answers: 1, 2, or 3

b. $6 \times 7 < 6 \times$ _____ Possible answers: 8, 9, or 10

c. $9 \times 3 <$ _____ $\times$ _____

Possible answers:
9 X 2; 9 X 1
8 X 3; 8 X 2; 8 X 1
7 X 4; 7 X 3; 7 X 2; 7 X 1
6 X 4; 6 X 3; 6 X 2; 6 X 1
5 X 5; 5 X 4; 5 X 3; 5 X 2; 5 X 1
4 X 4; 4 X 3; 4 X 2; 4 X 1
3 X 1; 3 X 2; 3 X 3
2 X 2; 2 X 1

For problems 2-4, write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

2) Six robins each have a mass of about 70 grams.
What is their total mass?

6 X 70 = M
(number model with letter)

The letter M stands for the mass of 6 robins.

Six robins have a total mass of about 420 grams.

6 X 70 = 420
(number model with answer)

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Unit 9 Review (continued) *ANSWER KEY*

3) Together, 40 bald eagles have a mass of about 240 kilograms. One wild turkey has a mass of about 6 kilograms. About how many 6-pound wild turkeys would it take to equal the mass of the group of bald eagles?

$T \times 6 = 240$ or $240 \div 6 = T$

(number model with letter)

The letter T stands for the number of wild turkeys.

It would take 40 wild turkeys to equal the mass of 40 bald eagles.

$40 \times 6 = 240$ or $240 \div 6 = 40$

(number model with answer)

4) About how many 50-gram parrots have a mass equal to one 1,000 pound pheasant?

$50 \times P = 1{,}000$ or $1{,}000 \div 50 = P$

(number model with letter)

The letter P stands for the number of pheasants.

It would take 20 parrots to equal the mass of one pheasant.

$50 \times 20 = 1{,}000$ or $1{,}000 \div 50 = 20$

(number model with answer)

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Unit 9 Review (continued) *ANSWER KEY*

5) Use the break-apart strategy to solve each problem.
You may use mental math, drawings, number sentences, or words.
Show your thinking.

a. 6 X 73 = 438

73

6	70	3
	6 X 70 = 420	6 X 3 = 18

420
+ 18
438

b. 4 X 82 = 328

82

4	80	2
	4 X 80 = 320	4 X 2 = 8

320
+ 8
328

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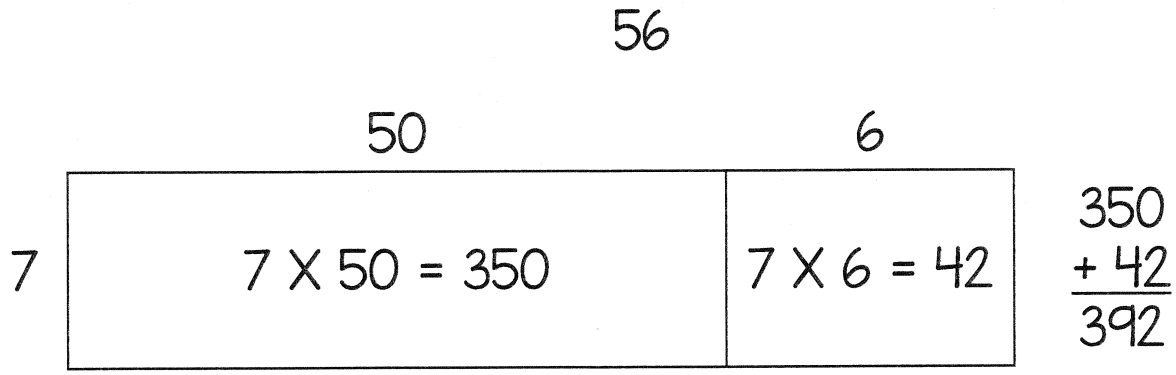
Unit 9 Review (continued) *ANSWER KEY*

c. Eduardo drew a rectangle to help solve 7 X 56. Here is his work:



Explain how Eduardo solved the problem.

Possible answer: He broke 56 into 50 and 6. Then he multiplied 50 X 7 and 6 X 7. He added the two products together to get 392, so 7 X 56 = 392.

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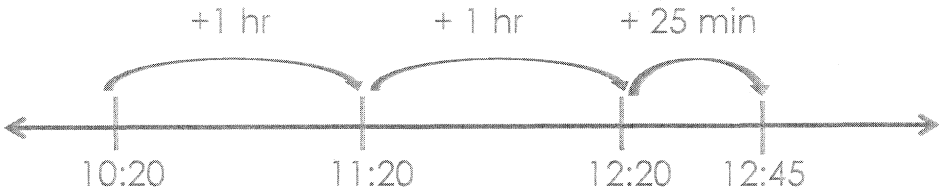
Unit 9 Review (continued) *ANSWER KEY*

6) It started snowing at 10:20 A.M. and stopped at 12:45 P.M.
How long did it snow?
Show your thinking. You may use an open number line, your toolkit clock, or other representations.

Strategies will vary.
Possible answer:



1 hr + 1 hr + 25 min = 2 hr 25 min

__2__ hours __20__ minutes

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Name: *ANSWER KEY* Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Challenge Review

1) About how many 10-gram canaries would equal the mass of seven 30-gram chipmunks?
Explain your thinking using numbers and words.

Possible answer: I multiplied 7 X 30 and got 210, so I knew the mass of 7 chipmunks. Then I had to figure out how many 10s are in 210, so I thought 10 times what is 210 and knew the answer was 21

About 21 canaries equal the mass of 7 chipmunks.

2) Quinn used the break-apart strategy to solve 7 X 83, but he made a mistake.
Explain Quinn's mistake.

Possible answer: Quinn multiplied the basic fact 7 X 8 instead of the extended fact 7 X 80. He should have multiplied 7 X 80, which is 560.

83

7	80	3
	7 X 8 = 56	7 X 3 = 21

56
+ 21
77

Use any strategy to correctly solve 7 X 83. Show your work.

83

7	80	3
	7 X 80 = 560	7 X 3 = 21

560
+ 21
581

7 X 83 = 581

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Unit 9 Challenge Review (continued) *ANSWER KEY*

3) Use the sunrise and sunset information in the chart to figure out the length of day for each city.

City	Sunrise on 4/14/2016	Sunset on 4/14/2016	Length of Day on 4/14/2016
New York City, New York	6:18 A.M.	7:34 P.M.	13 hours 16 minutes
Los Angeles, California	6:23 A.M.	7:23 P.M.	13 hours

What is the difference between the lengths of day for the two cities?

16 minutes

Name: *ANSWER KEY* Date: _____

EVERYDAY MATHEMATICS—3rd Grade
Unit 9 Open Response Review
Factor Patterns

1) Explore what happens to the product when you double a factor. For example, multiply 2 X 3. Then double the 2 and multiply 4 X 3. Then begin with 2 X 3 again, double the 3, and multiply 2 X 6. Show your work.

2 X 3 = 6

4 X 3 = 12

2 X 3 = 6

2 X 6 = 12

When you double a factor, the product doubles too. 12 is twice as much as 6.

2) Try doubling one of the factors in other multiplication facts. Show your work. Describe a pattern that you see when you double a factor.

2 X 4 = 8

4 X 4 = 16

2 X 4 = 8

2 X 8 = 16

Like the last example, when you double a factor, the product doubles.

3 X 5 = 15

6 X 5 = 30

3 X 5 = 15

3 X 10 = 30

3) Based on your work with doubling factors, predict what will happen when you triple a factor. Explain how you would convince someone that your prediction will always work for any multiplication fact.

I predict that the product will triple when you triple a factor. I would convince someone that my prediction is true by showing them these examples. 18 is three times as much as 6, or triple. I tripled both factors and the product tripled.

2 X 3 = 6

6 X 3 = 18

2 X 3 = 6

2 X 9 = 18

Remember...
double = X 2 triple = X 3

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Appendix

"Happy Students Can Explain" Acronym	This acronym will help your students remember effective steps to solve problems.
4 Point Checklist	Use this 4 point checklist to assess students' problem solving skills. Students will also be able to self-assess using this checklist.
Explanation	Guide students to explain their thinking using this lined paper with step numbers.

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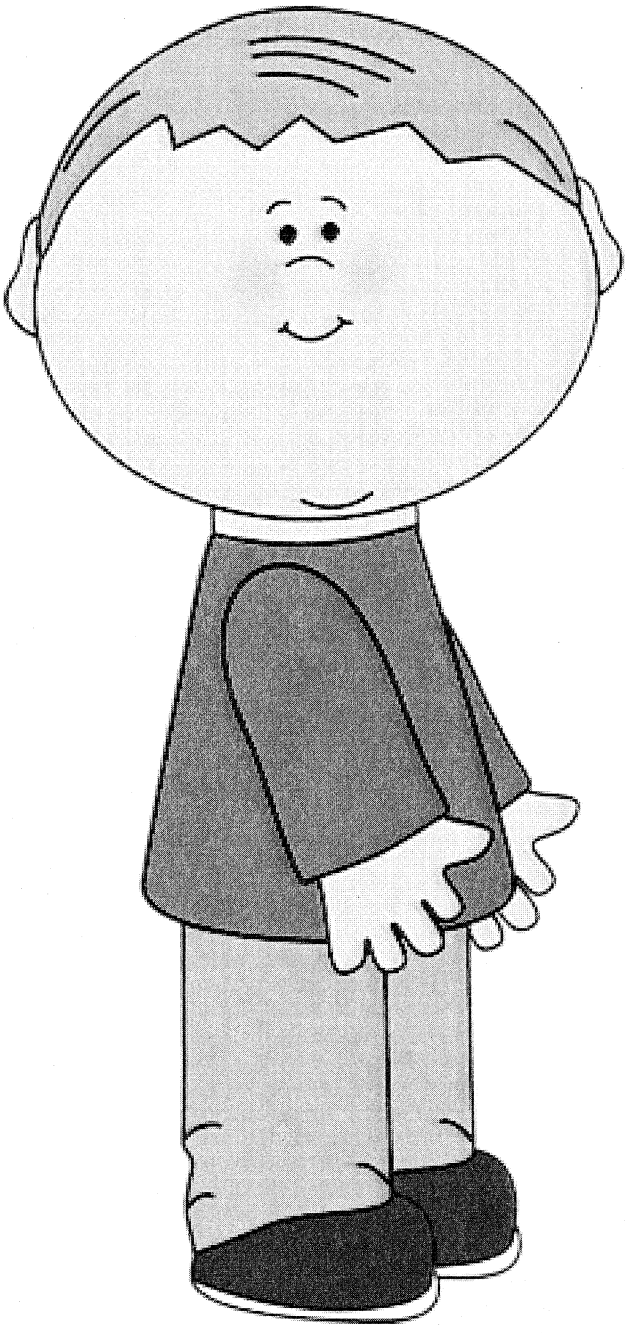
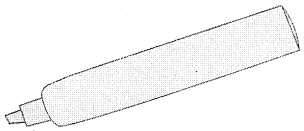
Happy Students Can Explain!



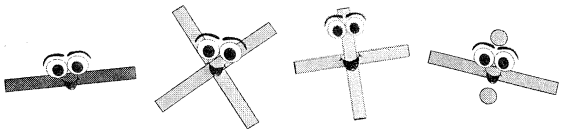


Highlight

Circle important numbers.

Number the parts of the question.

Underline the question.



Solve

Decide how you will solve the problem.

Noah has 72 baseball cards.

Circle

Write your answer in a complete sentence and circle it.

First, I added the number of cards he collected each week. 50 and 32 makes 82.

Explain

Explain how you found your answer.

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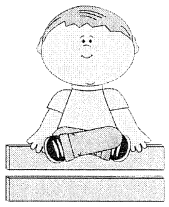
Name:_____ Date:_____

4 Point Checklist

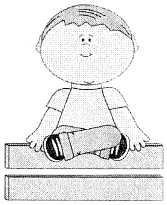


Directions: After you've solved the open response question, use this checklist. Put a check mark in the Student column for each part that you have done. The teacher will put a check mark in the Teacher column.

	Student	Teacher
I showed my work.		
I found the correct answer and checked it.		
I wrote my answer in a complete sentence, with the unit(s), and circled the answer.		
I explained all steps of my thinking.		

Name:_____ Date:_____

4 Point Checklist



Directions: After you've solved the open response question, use this checklist. Put a check mark in the Student column for each part that you have done. The teacher will put a check mark in the Teacher column.

	Student	Teacher
I showed my work.		
I found the correct answer and checked it.		
I wrote my answer in a complete sentence, with the unit(s), and circled the answer.		
I explained all steps of my thinking.		

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Explanation:
This is how I found the answer.

Step 1: _____

_____

_____

Step 2: _____

_____

_____

Step 3: _____

_____

_____

Step 4: _____

_____

_____

Step 5: _____

_____

_____

Step 6: _____

_____

_____

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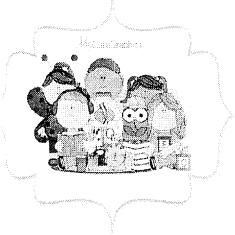

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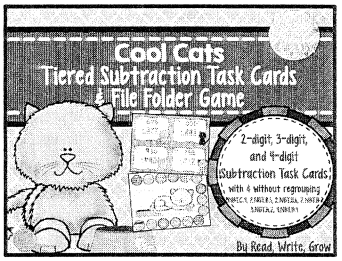

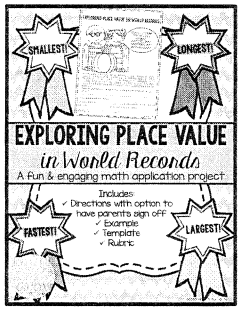

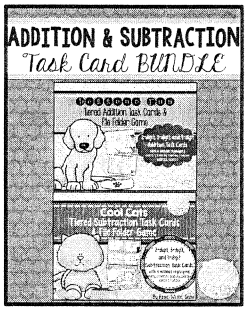

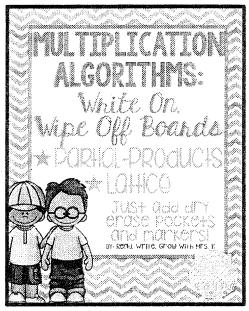

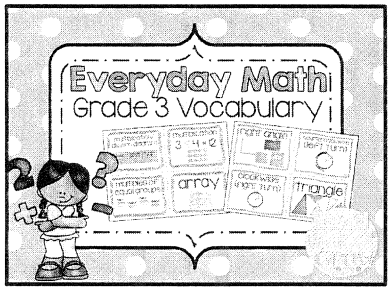

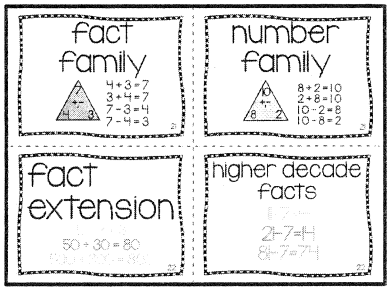

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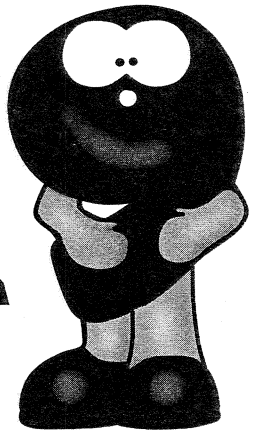
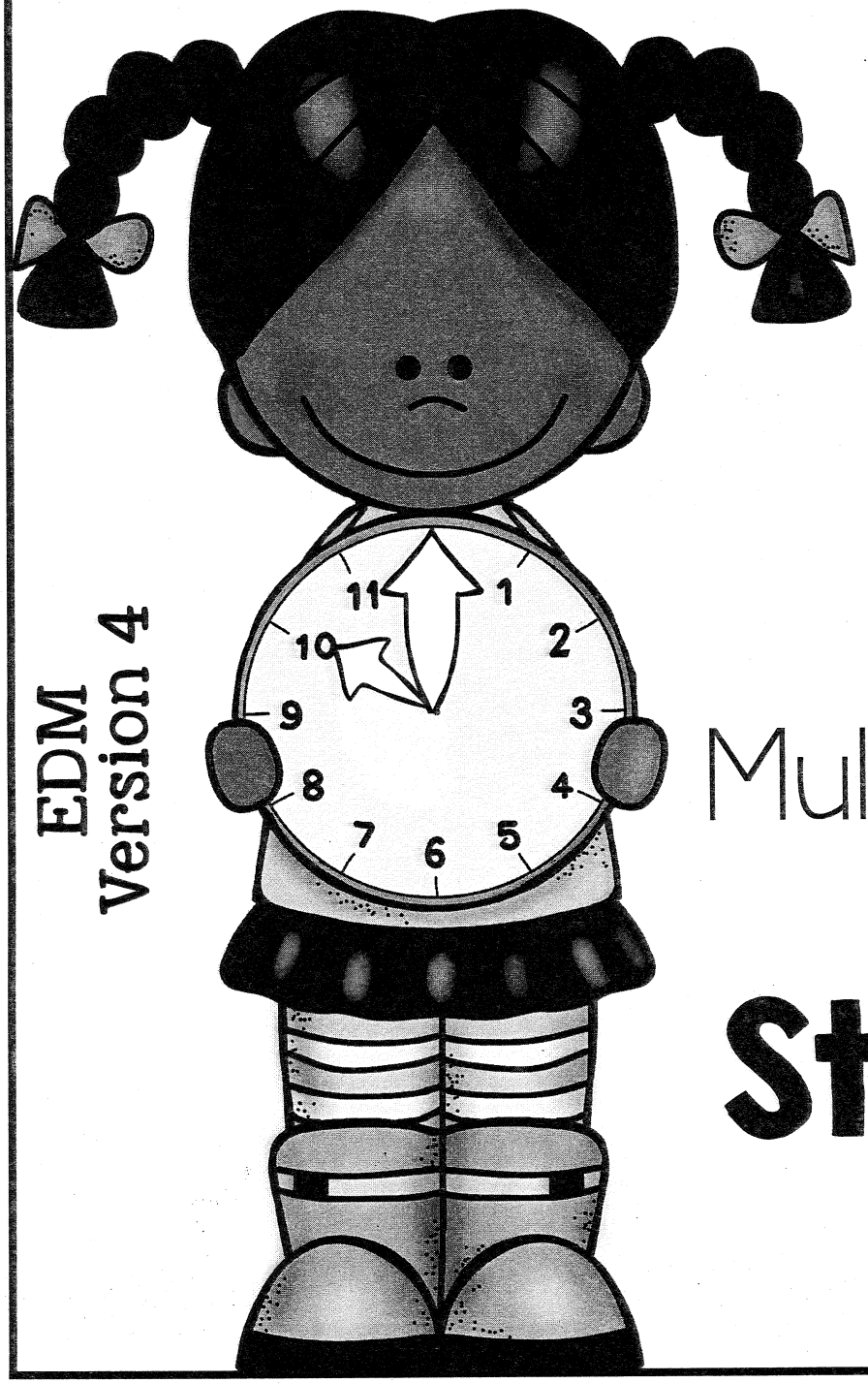
Grade 3

Everyday Math:



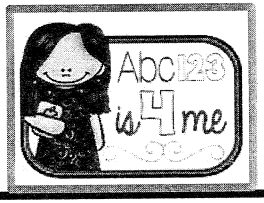
unit



EDM
Version 4

Multidigit Operations

Study Guide



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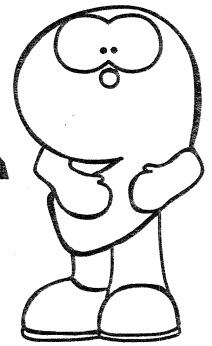
Grade 3

Everyday Math: Unit



Multidigit Operations

Study Guide

Unit Vocabulary:

basic fact, break-apart strategy, decompose, doubling, efficient, elapsed time, extended fact, extended multiplication fact, length of day, multiplication/division diagram, partition

Lesson 9.1:

How do you apply your basic fact knowledge to help you make comparisons between products?

For each number sentence, fill in the blank with a factor from 1 to 10 to make it true.

a. $4 \times 6 < 6 \times \_\_\_\_$ **b.** $5 \times 4 > 5 \times \_\_\_\_$ **c.** $9 \times 7 < \_\_\_\_ \times \_\_\_\_$

Lesson 9.2:

What strategies are applied to solve number stories when the problems involve multiples of 10?

For problems 1-2, write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

1. Eight eggs each have a mass of about 70 grams.
   What is their total mass?

   _____
   (number model with letter)

   The letter _____ stands for _____.

   Eight eggs have a total mass of about _____ grams.

   _____
   (number model with answer)

2. About how many 50-gram boxes have a mass equal to one 600-gram box?

_____
(number model with letter)

The letter _____ stands for _____.

It would take about _____ 50-gram boxes to equal the mass of one 600-gram box.

_____
(number model with answer)

Lesson 9.3:

How do you solve problems involving larger factors using mental strategies?

Write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

Together, 70 rocks have a mass of about 120 kilograms. One cement block has a mass of about 12 kilograms. About how many 12-kilogram cement blocks would it take to equal the mass of the rocks?

_____
(number model with letter)

The letter _____ stands for _____.

It would take about _____ cement blocks to equal the mass of 70 rocks.

_____
(number model with answer)

Lesson 9.4:

Exploration A: How do you solve problems involving elapsed time?

Maria wants to know how long each Fun Day activity lasts. Use the table below to find the length of each activity. You may use open number lines, clocks, or another strategy.

Fun Day Activities		
Activity	**Schedule**	**Length, in minutes**
Relay Races	9:10 A.M.- 10:10 A.M.	
Snack	10:10 A.M.- 10:35 A.M.	
Art	10:35 A.M.- 11:50 A.M.	

Exploration B: How do you use you your understanding of polygons to reassemble a deconstructed shape?

Were you able to put back together the square using all of your pieces? _____

Can you make the larger square by cutting the squares into smaller square? _____

Exploration C: How does the construction of an object affect the amount of mass it is able to support?

Rank, from strongest to weakest, the three bridges you made.

_____ Bridge One

_____ Bridge Two

_____ Bridge Three

Do squares or triangles make stronger bridges? _____

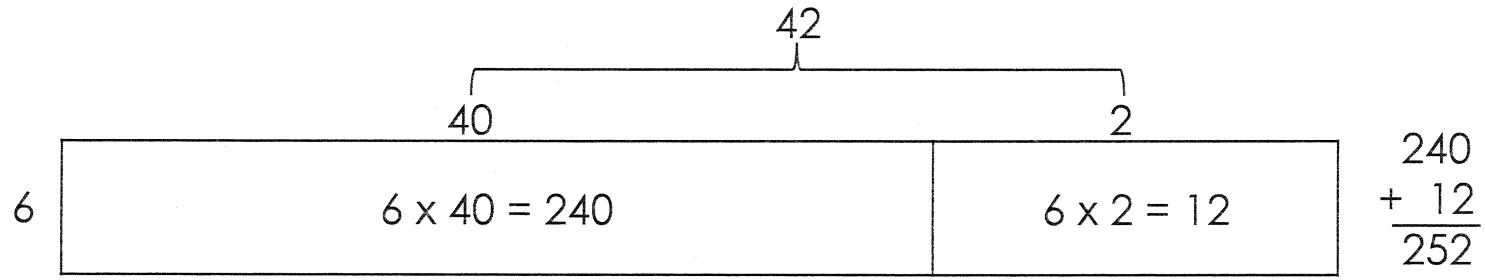
Lesson 9.5:

How do you solve multi-digit multiplication problems?

Use the break-apart strategy to solve the problem. You may use mental math, drawings, number sentences, or words. Show your thinking.

a. 3 x 52 = _____

b. Adalyn drew a rectangle to help solve 6 x 42. Here is her work:



$$\begin{array}{r} 240 \\ +\ 12 \\ \hline 252 \end{array}$$

Explain how Adalyn solved the problem.

_____

_____

_____

Lesson 9.6:

How do you apply your number sense to develop strategies for using a calculator with a broken key?

My teacher is planning to buy doughnut holes as a treat for the class. He will need 120 doughnut holes for the class. Doughnut holes come in boxes of 24. He must find out how many boxes to buy. I want to use my calculator to help him, but the [+] and [÷] keys are both broken. Help me find a way to use my broken calculator to help me solve the problem.

1. Show or tell how to use the broken calculator to find the number of boxes of doughnut holes the teacher needs to buy.

2. Show or tell another way to use the broken calculator to solve the problem.

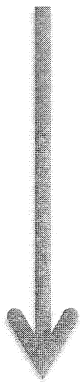
Lesson 9.7:

How do you analyze data in a graph?

It starts snowing at 1:35 P.M. and stops at 4:10 P.M.
How long did it snow?
Show your thinking. You may use an open number line, your toolkit clock, or other representations.

_____ hours _____ minutes

ANSWER KEY



Name: Answer Key Test Date: ___ - ___ - ___

Grade 3

Everyday Math: Unit

Multidigit Operations

Study Guide

Unit Vocabulary:

basic fact, break-apart strategy, decompose, doubling, efficient, elapsed time, extended fact, extended multiplication fact, length of day, multiplication/division diagram, partition

Lesson 9.1:

How do you apply your basic fact knowledge to help you make comparisons between products?

For each number sentence, fill in the blank with a factor from 1 to 10 to make it true.

a. $4 \times 6 < 6 \times \underline{7}$ **b.** $5 \times 4 > 5 \times \underline{3}$ **c.** $9 \times 7 < \underline{10} \times \underline{10}$

Sample answers:

Lesson 9.2:

What strategies are applied to solve number stories when the problems involve multiples of 10?

For problems 1-2, write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

1. Eight eggs each have a mass of about 70 grams.
   What is their total mass?

   $8 \times 70 = M$
   (number model with letter)

   The letter M stands for the mass of 8 eggs.

   Eight eggs have a total mass of about 560 grams.

   $8 \times 70 = 560$
   (number model with answer)

2. About how many 50-gram boxes have a mass equal to one 600-gram box?

$50 \times B = 600$ or $600 \div 50 = B$
(number model with letter)

The letter B stands for the number of boxes.

It would take about 12 50-gram boxes to equal the mass of one 600-gram box.

$50 \times 12 = 600$ or $600 \div 50 = 12$
(number model with answer)

Lesson 9.3:

How do you solve problems involving larger factors using mental strategies?

Write a number model with a letter for the unknown. Then solve the problem and write the answer. Write your number model again with the answer to check that your answer makes sense.

Together, 70 rocks have a mass of about 120 kilograms. One cement block has a mass of about 12 kilograms. About how many 12-kilogram cement blocks would it take to equal the mass of the rocks?

C x 12 = 120 or 120 ÷ 12 = C
(number model with letter)

The letter C stands for the number of cement blocks.

It would take about 10 cement blocks to equal the mass of 70 rocks.

10 x 12 = 120 or 120 ÷ 12 = 10
(number model with answer)

Lesson 9.4:

Exploration A: How do you solve problems involving elapsed time?

Maria wants to know how long each Fun Day activity lasts. Use the table below to find the length of each activity. You may use open number lines, clocks, or another strategy.

Fun Day Activities		
Activity	**Schedule**	**Length, in minutes**
Relay Races	9:10 A.M.- 10:10 A.M.	60
Snack	10:10 A.M.- 10:35 A.M.	25
Art	10:35 A.M.- 11:50 A.M.	75

Exploration B: How do you use you your understanding of polygons to reassemble a deconstructed shape?

Were you able to put back together the square using all of your pieces? Yes or No

Can you make the larger square by cutting the squares into smaller square? No

Exploration C: How does the construction of an object affect the amount of mass it is able to support?

Rank, from strongest to weakest, the three bridges you made.

#3 Bridge One #2 Bridge Two #1 Bridge Three

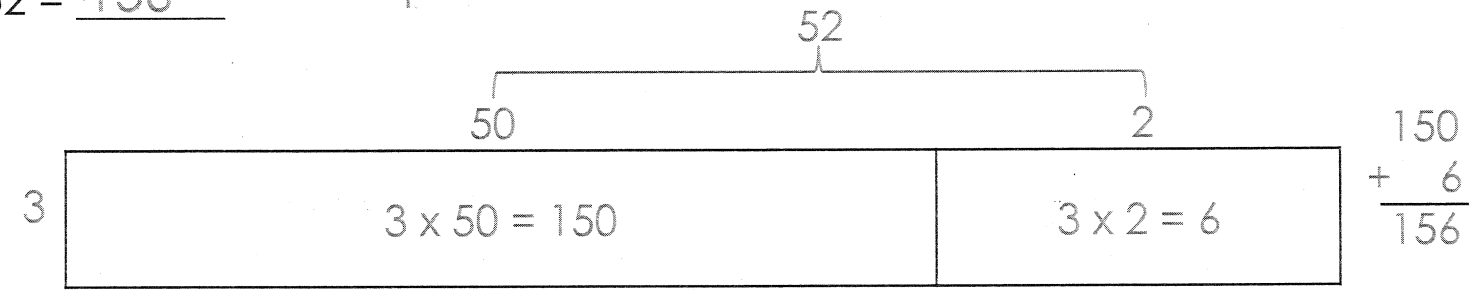
Do squares or triangles make stronger bridges? triangles

Lesson 9.5:

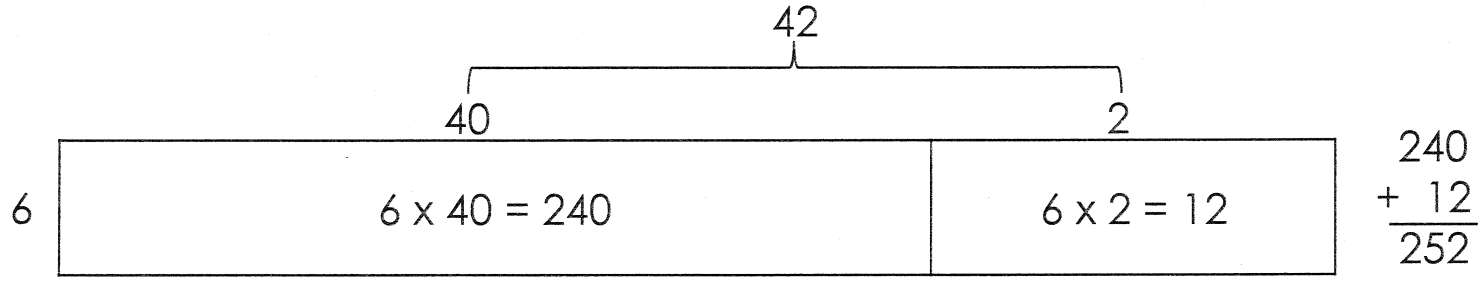
How do you solve multi-digit multiplication problems?

Use the break-apart strategy to solve the problem. You may use mental math, drawings, number sentences, or words. Show your thinking.

a. 3 x 52 = 156 Sample answer:



b. Adalyn drew a rectangle to help solve 6 x 42. Here is her work:



Explain how Adalyn solved the problem.

She broke 42 into 40 and 2. Then she multiplied 6 x 40 and 6 x 2. She added the two products together to get 252, so 6 x 42 = 252.

Lesson 9.6:

How do you apply your number sense to develop strategies for using a calculator with a broken key?

My teacher is planning to buy doughnut holes as a treat for the class. He will need 120 doughnut holes for the class. Doughnut holes come in boxes of 24. He must find out how many boxes to buy. I want to use my calculator to help him, but the [+] and [÷] keys are both broken. Help me find a way to use my broken calculator to help me solve the problem.

1. Show or tell how to use the broken calculator to find the number of boxes of doughnut holes the teacher needs to buy.

Sample answer: I knew the number of cartons needs to be less than 10 because 10 x 24 = 240. I knew that half of 24 is 12, so half of 240 would be 120. So, I tried 5 x 24 on my calculator and got 120. The teacher needs 5 boxes of doughnut holes.

2. Show or tell another way to use the broken calculator to solve the problem.

Sample answer: 1, 2, 0, - 2, 4, =, =, =, =, =; I had to push the equal key 5 times to reach 0, so the number of boxes are 5.

Lesson 9.7:

How do you analyze data in a graph?

It starts snowing at 1:35 P.M. and stops at 4:10 P.M.
How long did it snow?
Show your thinking. You may use an open number line, your toolkit clock, or other representations.

Strategies vary.

__2__ hours __35__ minutes