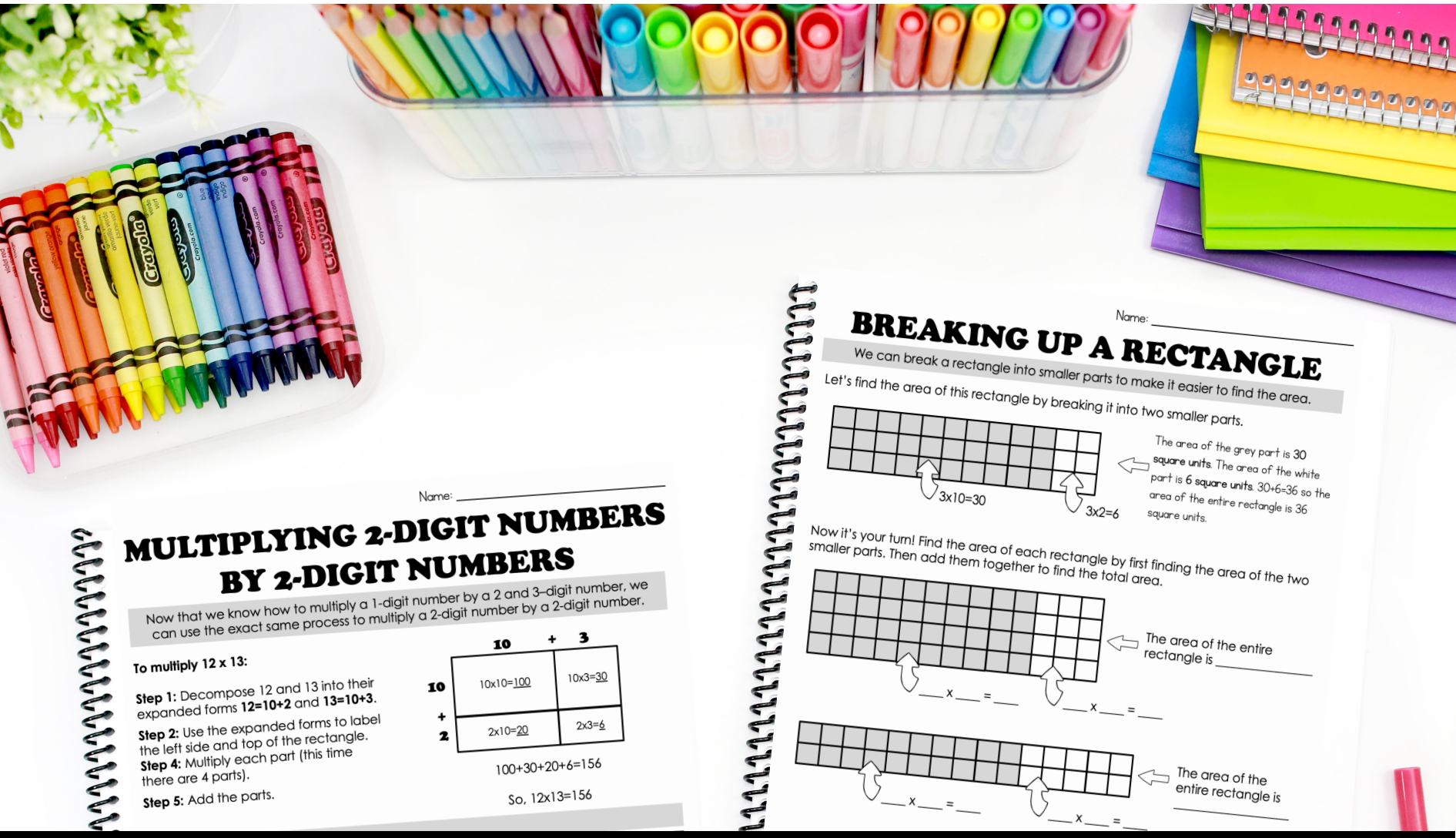
1-DIGIT BY 2-DIGITS • 1-DIGIT BY 3-DIGITS
2-DIGITS BY 2-DIGITS • EXTENDING PAST 2-BY-2

THE AREA MODEL

for multi-digit multiplication



SHELLEY GRAY

About This Resource

The area model for multiplication is a model where the factors are the side lengths of the rectangle, and the product is the area.

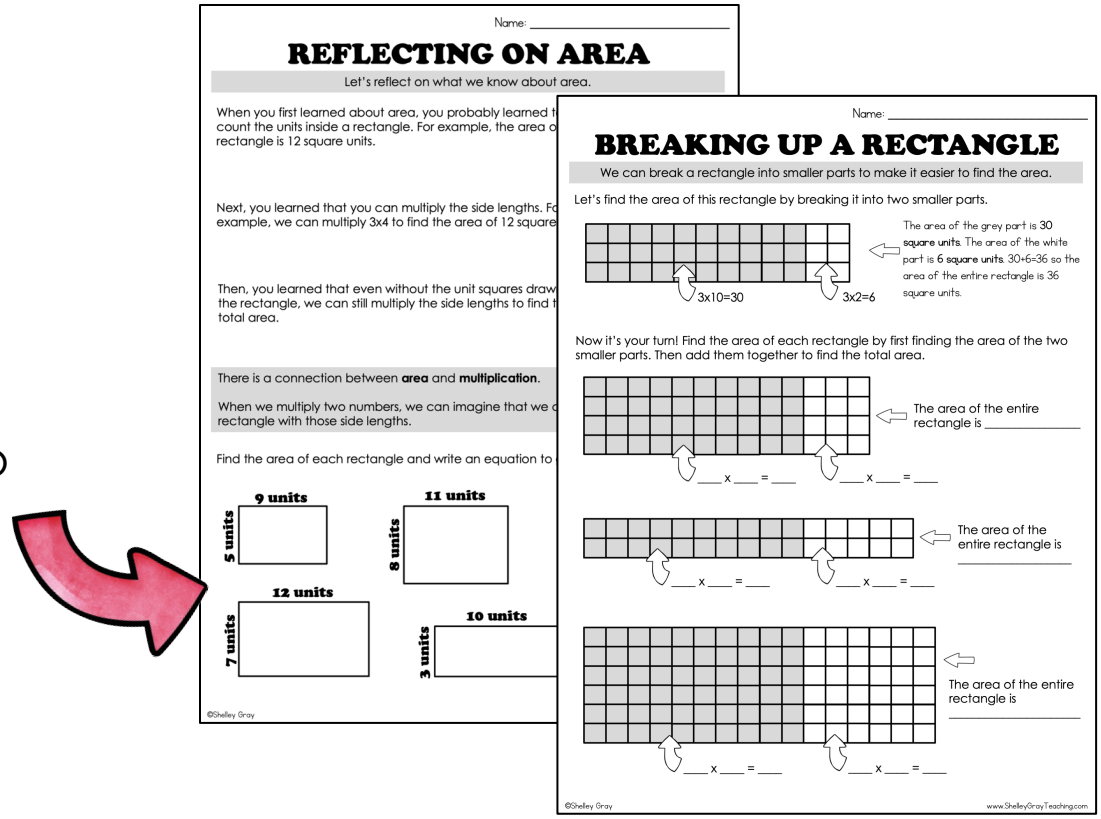
This model helps students **build their understanding** of multiplication and is an effective way to transition to multi-digit multiplication. If you plan to teach the traditional algorithm, the area model can be an excellent way to begin, ensuring that understanding is built along the way.

This **extensive resource** helps students progress from **beginning** to **advanced understanding** of the area model.

Here's what's included:

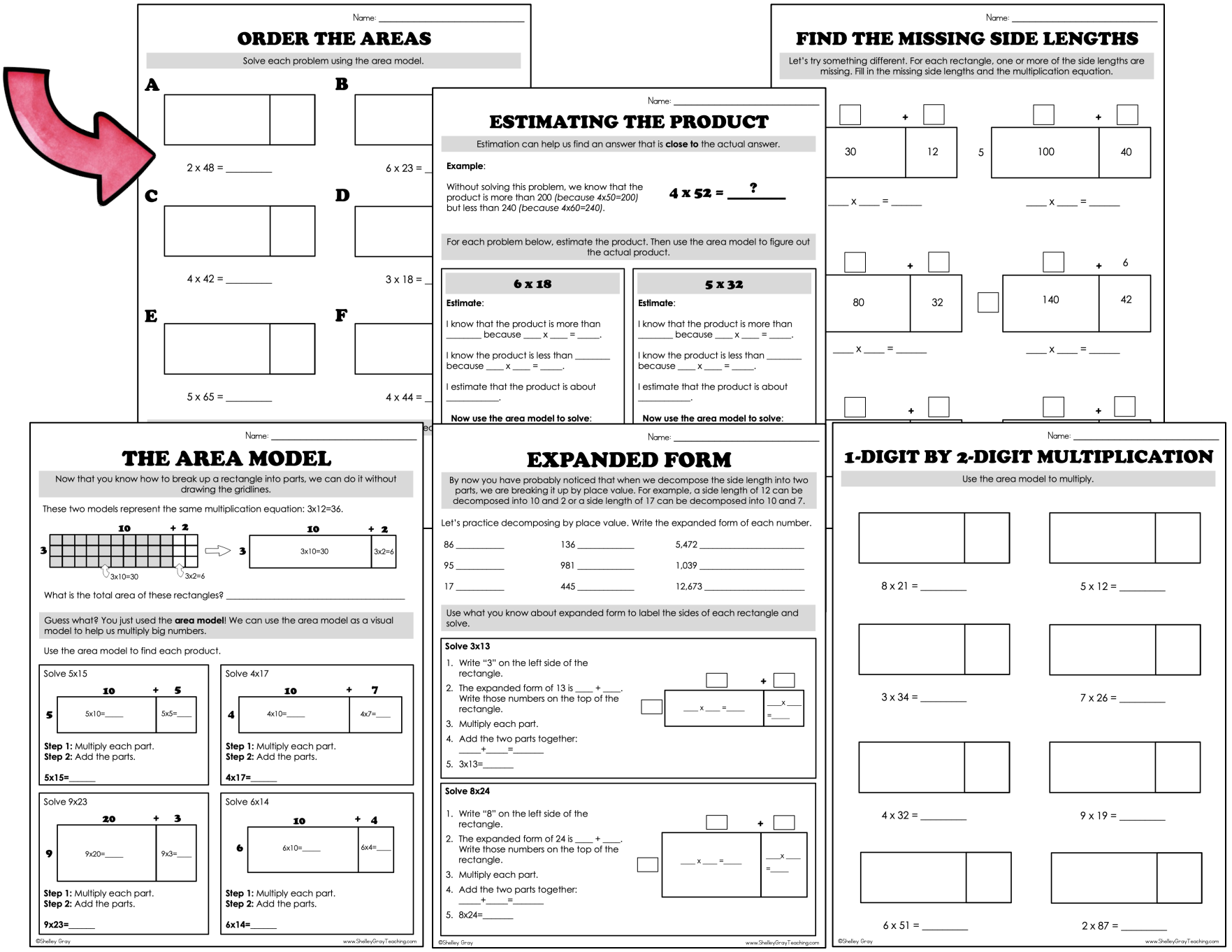
Introductory Activities

Activities to activate prior knowledge of area and decomposing a rectangle into smaller parts.
(2 pages)



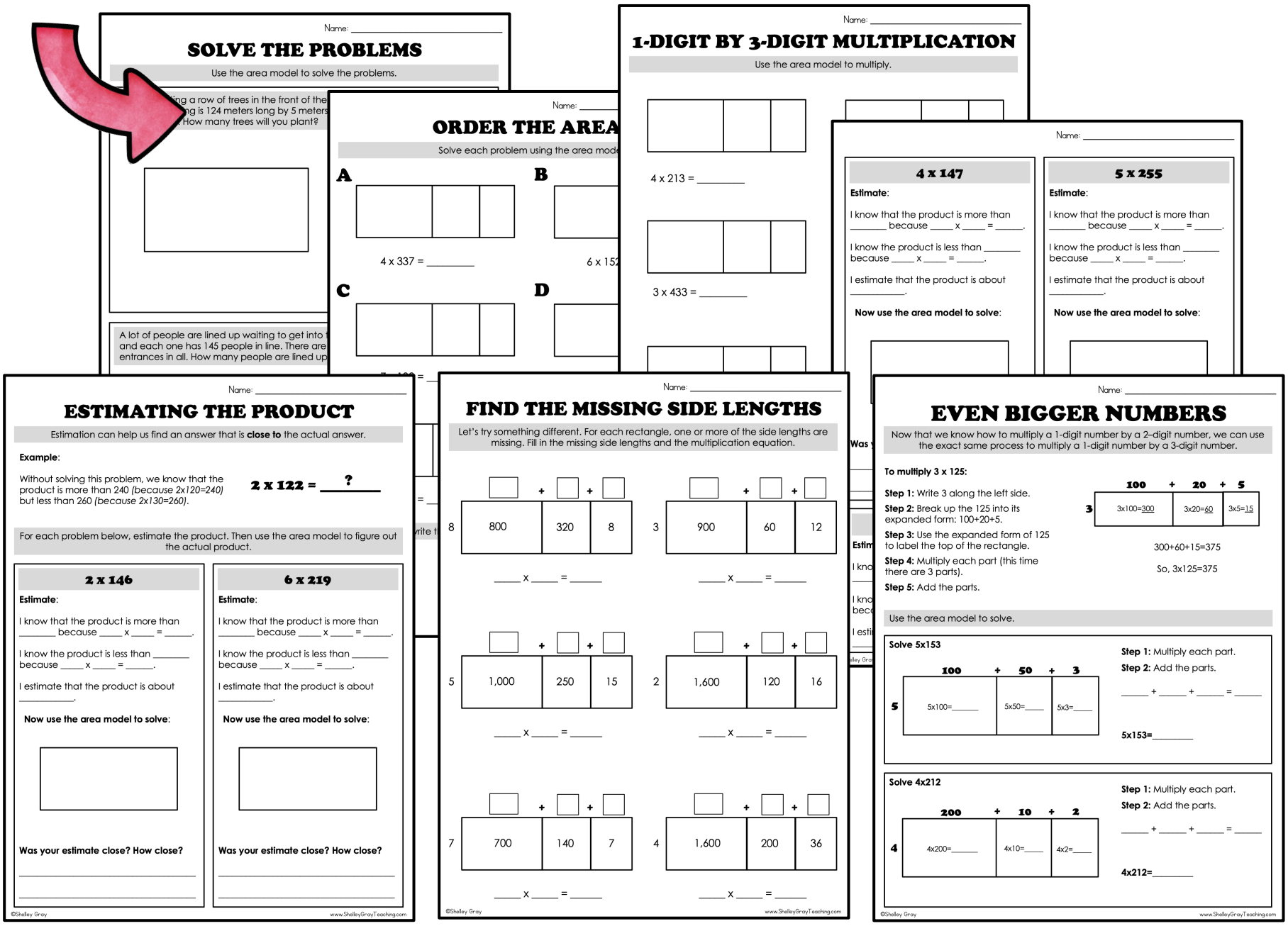
1-DIGIT BY 2-DIGIT MULTIPLICATION

Activities to transition students from an area model with gridlines to a rectangle with side lengths labelled. Students will practice using the expanded form to label the sides. They will also work on using estimation strategies to estimate the product.
(8 pages)



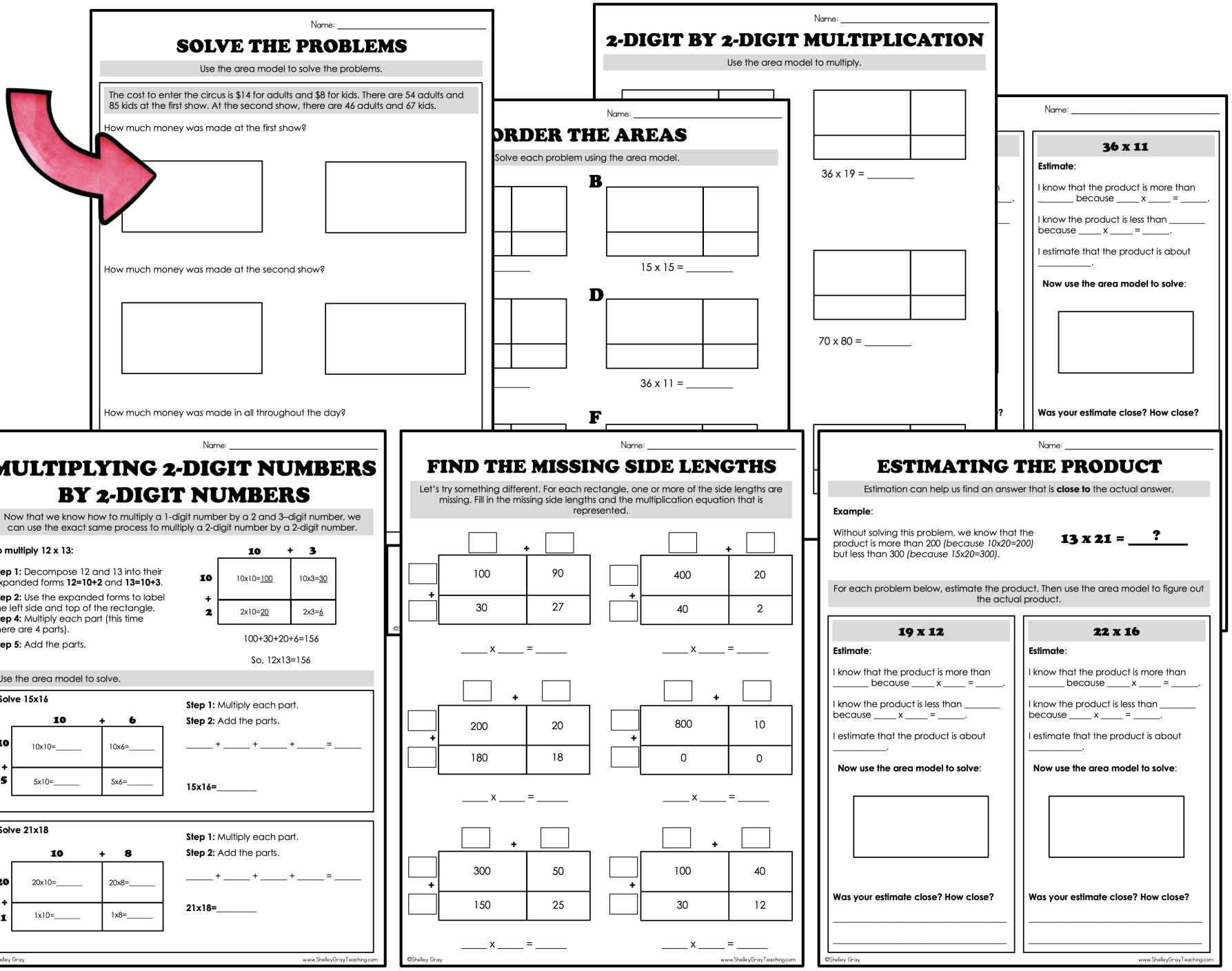
1-DIGIT BY 3-DIGIT MULTIPLICATION

Now that students have learned 1 by 2-digit multiplication, they'll see that it's the same process to multiply a 1-digit number by a 3-digit number.
(7 pages)



2-DIGIT BY 2-DIGIT MULTIPLICATION

Now students will transition to 2-digit by 2-digit multiplication by expanding both factors. Students are scaffolded through this process.
(7 pages)



Name: _____

SOLVE THE PROBLEMS

Use the area model to solve the problems.

The cost to enter the circus is $14 for adults and $8 for kids. There are 54 adults and 85 kids at the first show. At the second show, there are 46 adults and 67 kids.

How much money was made at the first show?

How much money was made at the second show?

How much money was made in all throughout the day?

Name: _____

2-DIGIT BY 2-DIGIT MULTIPLICATION

Use the area model to multiply.

36 x 19 = _____

70 x 80 = _____

Name: _____

ORDER THE AREAS

Solve each problem using the area model.

B

15 x 15 = _____

D

36 x 11 = _____

F

Name: _____

36 x 11

Estimate:

I know that the product is more than _____ because _____ x _____ = _____.

I know the product is less than _____ because _____ x _____ = _____.

I estimate that the product is about _____.

Now use the area model to solve:

Was your estimate close? How close?

Name: _____

MULTIPLYING 2-DIGIT NUMBERS BY 2-DIGIT NUMBERS

Now that we know how to multiply a 1-digit number by a 2 and 3–digit number, we can use the exact same process to multiply a 2-digit number by a 2-digit number.

To multiply 12 x 13:

Step 1: Decompose 12 and 13 into their expanded forms **12=10+2** and **13=10+3**.
Step 2: Use the expanded forms to label the left side and top of the rectangle.
Step 4: Multiply each part (this time there are 4 parts).
Step 5: Add the parts.

	10	+ 3
10	10x10=100	10x3=30
+ 2	2x10=20	2x3=6

100+30+20+6=156

So, 12x13=156

Use the area model to solve.

Solve 15x16

	10	+ 6
10	10x10=_____	10x6=_____
+ 5	5x10=_____	5x6=_____

Step 1: Multiply each part.
Step 2: Add the parts.

_____ + _____ + _____ + _____ = _____

15x16=_____

Solve 21x18

	10	+ 8
20	20x10=_____	20x8=_____
+ 1	1x10=_____	1x8=_____

Step 1: Multiply each part.
Step 2: Add the parts.

_____ + _____ + _____ + _____ = _____

21x18=_____

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Name: _____

FIND THE MISSING SIDE LENGTHS

Let's try something different. For each rectangle, one or more of the side lengths are missing. Fill in the missing side lengths and the multiplication equation that is represented.

+	100	90
+	30	27

_____ x _____ = _____

+	400	20
+	40	2

_____ x _____ = _____

+	200	20
+	180	18

_____ x _____ = _____

+	800	10
+	0	0

_____ x _____ = _____

+	300	50
+	150	25

_____ x _____ = _____

+	100	40
+	30	12

_____ x _____ = _____

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Name: _____

ESTIMATING THE PRODUCT

Estimation can help us find an answer that is **close to** the actual answer.

Example:

Without solving this problem, we know that the product is more than 200 *(because 10x20=200)* but less than 300 *(because 15x20=300)*.

13 x 21 = ?

For each problem below, estimate the product. Then use the area model to figure out the actual product.

19 x 12

Estimate:

I know that the product is more than _____ because _____ x _____ = _____.

I know the product is less than _____ because _____ x _____ = _____.

I estimate that the product is about _____.

Now use the area model to solve:

Was your estimate close? How close?

22 x 16

Estimate:

I know that the product is more than _____ because _____ x _____ = _____.

I know the product is less than _____ because _____ x _____ = _____.

I estimate that the product is about _____.

Now use the area model to solve:

Was your estimate close? How close?

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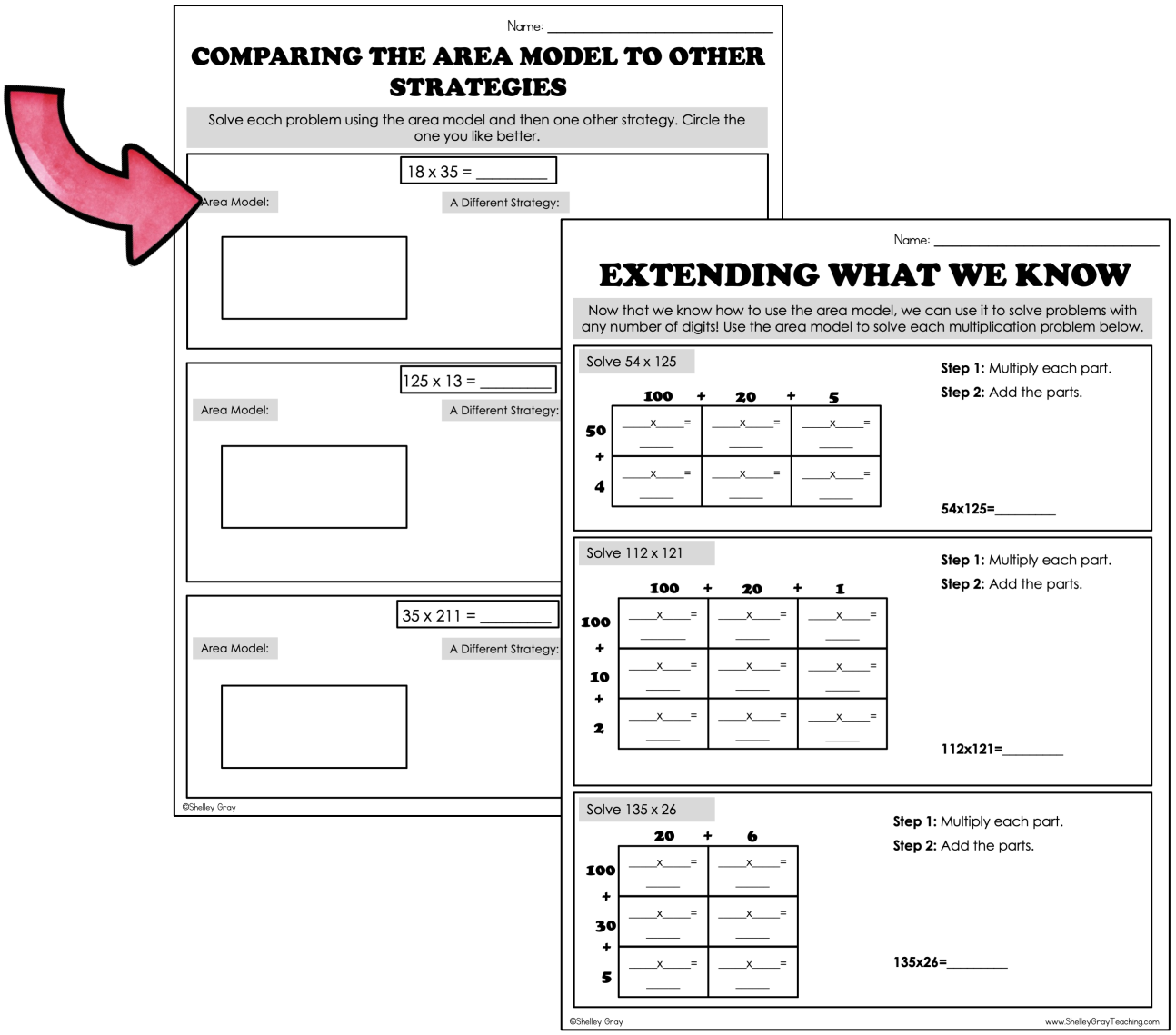
EXTENDING PAST 2-DIGIT BY 2-DIGIT

In this wind-up section, students will understand that this process can be used to multiply factors with any number of digits. They will also compare the area model to other strategies, allowing them to form new connections.
(2 pages)



Name: _____

COMPARING THE AREA MODEL TO OTHER STRATEGIES

Solve each problem using the area model and then one other strategy. Circle the one you like better.

18 x 35 = _____

Area Model: A Different Strategy:

125 x 13 = _____

Area Model: A Different Strategy:

35 x 211 = _____

Area Model: A Different Strategy:

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Name: _____

EXTENDING WHAT WE KNOW

Now that we know how to use the area model, we can use it to solve problems with any number of digits! Use the area model to solve each multiplication problem below.

Solve 54 x 125

	100	+ 20	+ 5
50	____x____= ____	____x____= ____	____x____= ____
+ 4	____x____= ____	____x____= ____	____x____= ____

Step 1: Multiply each part.
Step 2: Add the parts.

54x125=_____

Solve 112 x 121

	100	+ 20	+ 1
100	____x____= ____	____x____= ____	____x____= ____
+ 10	____x____= ____	____x____= ____	____x____= ____
+ 2	____x____= ____	____x____= ____	____x____= ____

Step 1: Multiply each part.
Step 2: Add the parts.

112x121=_____

Solve 135 x 26

	20	+ 6
100	____x____= ____	____x____= ____
+ 30	____x____= ____	____x____= ____
+ 5	____x____= ____	____x____= ____

Step 1: Multiply each part.
Step 2: Add the parts.

135x26=_____

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MORE SUPPORT WITH THE AREA MODEL

Base ten blocks are a fun, conceptual way to introduce your students to the area model before transitioning to a more abstract format.

See more about the entire area model progression here.

https://shelleygrayteaching.com/multiplication-area-model/