Homework Help
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Grades 4-5: Area Model of Multiplication & Division

The **area model** uses the shape of a **rectangle** to **break down problems**. It's especially useful when you are **multiplying** two numbers that have two or more digits. It helps you to see **how numbers break down into ones, tens, hundreds**, etc. and to solve problems.

Let's use the area model to represent the **multiplication** problem **123 x 25**.

- Before we start drawing our rectangle, let's **think about what the digit in each place value means**. In other words, let's think about **how much is in the hundreds place, tens place, ones, place, and so on**. We can write the numbers in **expanded form** to get started with this part:

123 = 100 + 20 + 3

25 = 20 + 5

- Now that we know we can break 123 into three place value amounts and 25 into two place value amounts, we can draw our rectangle like this:

	100	**+**	**20**	**+**	**3**
20	**20 x 100 = 2000**		**20 x 20 = 400**		**20 x 3 = 60**
+					
5	**5 x 100 = 500**		**5 x 20 = 100**		**5 x 3 = 15**

- The **numbers in blue** show that we can break down our big multiplication problem into lots of smaller (and easier) problems. **Inside each smaller box, we find the product of the two numbers that meet at that box.** For example, inside the top left box, we multiply 20 x 100 and write the answer: 2,000.
- The **last step is to add up our answers** from all of the **mini-problems**:

2000
+ 400
+ 60
+ 500
+ 100
+ 15
3, 075

	1	1	
	1	2	3
x		2	5
	1		
	6	1	5
2	4	6	0
3	**0**	**7**	**5**

We can **check** our answer **using the standard algorithm**, and we get the same answer.

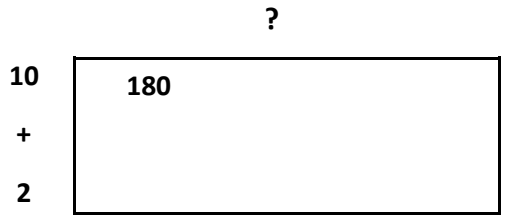
For More on Multiplication Using the Area Model: https://hvparent.com/common-core-math-part-seven

Dividing using the Area Model

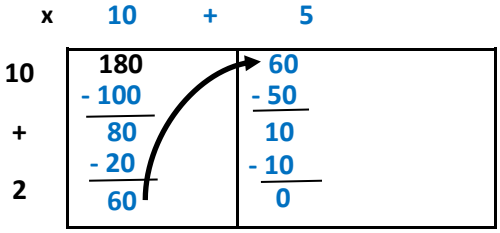
The **area model** can also help us do **division** although it **works a little differently** in this situation.

Let's use the area model to represent the problem **180 ÷ 12**

- **Two sides** of the rectangle, **when multiplied**, will **give us the area of 180** square units. We know that **one side of the rectangle is 12** units, but we need to know the length of another side. In other words, we can think of the problem as **12 x ? = 180**
- We might know our 12 times tables really well, but just to make the problem easier, **let's break 12 down into 10 +2**. After we do that, our rectangle looks like this:

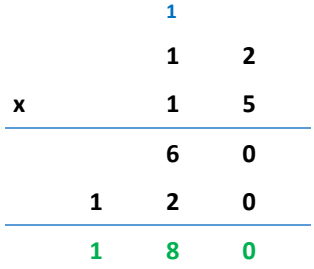


- Now we **go in steps to subtract more and more** from 180 **until we get as close to 0 as we can**. The **steps** are shown **in blue** on the rectangle below.



- Our first step is to think, "**10 x what gives me an answer close-ish to 180?**" **We don't want to get *too* close because we can't forget about our 2**. Let's try 10 X 10. Because 10 x 10 = 100, we subtract 100 from 180.
- Since we multiplied 10 x 10, we **also have to multiply 2 x 10** and **subtract 20**.
- We have **60 left**, so **we can draw a line to make a new rectangle** inside the bigger one to show this.
- Our next question is, "**10 x what gives me an answer close-ish to 60?**" Again, **we don't want to get too close**. Let's do 10 x 5.
- We subtract our answer, 50, from 60. We have **10 left** to get rid of. **2 x what is 10?** 5. After we subtract 5, we get zero, so we have solved the problem.
- The length of the side we didn't know at the beginning is **10 + 5**, so **180 ÷ 12 = 15.**

- We can **use multiplication to check** our answer. If we multiply the two labeled sides, we should get 180. In other words, let's use the vertical algorithm to make sure that **12 x 15 =180**.
- Our answer is correct!



For More on Division Using the Area Model: https://youtu.be/gVXopeiQrSQ