Whole Numbers: Multiplication

Vocabulary

Multiplication	Repeated addition
X or ·	Symbols used to signify multiplication
Product	The result of multiplication
Factors	The whole numbers multiplied together resulting in a product

Example: 3   ·   5   =   15

factor times   factor equals   product

Multiplying 3 times 5, often written as 3 · 5 or 3 x 5, can be thought of as adding three 5's together.

$$3 \cdot 5 = 5 + 5 + 5 = 15$$

NOTE: It is just as important for you to be able to quickly <u>multiply</u> in your mind as it is to be able to add. Practice completing the following chart as quickly as you can. Each cell of the table should be the product of the factor at the top of that cell's column and the factor to the far left on that cell's row. It will be more helpful to skip around the chart randomly than to complete an entire row or column. Some entries have been provided for you.

·	0	1	2	3	4	5	6	7	8	9	10	11	12
0													
1													
2				6									
3													
4													
5													
6									48				
7													
8													
9													108
10													
11													
12													

Properties

Commutative property of Multiplication - The order of two numbers around the multiplication sign does not affect the product.	$a \cdot b = b \cdot a$	$5 \cdot 4 = 4 \cdot 5$
Associative property of Multiplication - The way in which several whole numbers are grouped when they are multiplied, does not affect the final product.	$(ab)c = a(bc)$	$(3 \cdot 4) \cdot 5 = 3 \cdot (4 \cdot 5)$

Identity property of Multiplication - When any number is multiplied by 1, the product is 'identical' to the original number. 1 is the identity element for multiplication. It is also called the multiplicative identity.	$a \cdot 1 = 1 \cdot a = a$	$3 \cdot 1 = 1 \cdot 3 = 3$
Multiplicative Property of Zero - When any number is multiplied by 0, the product is 0.	$a \cdot 0 = 0 \cdot a = 0$	$3 \cdot 0 = 0 \cdot 3 = 0$
Distributive property of Multiplication over Addition - To distribute a factor over a sum of two numbers within parentheses, multiply the factor by each number inside the parentheses then add the products. - The Distributive property also works over Subtraction.	$a(b+c) = ab + ac$ $(b+c)a = ba + ca$ $a(b-c) = ab - ac$ $(b-c)a = ba - ca$	$7(5+3) = 7 \cdot 5 + 7 \cdot 3$ $(7+2)3 = 7 \cdot 3 + 2 \cdot 3$ $7(5-3) = 7 \cdot 5 - 7 \cdot 3$ $(7-2)3 = 7 \cdot 3 - 2 \cdot 3$

When multiplying larger numbers, be sure to "carry" to the next column.	Step 1.
	      6732
	  X 243
	   20,196 ← 6,732 * 3 = 20,196
	  269,280 ← 6,732 * 40 = 269,280
	1,346,400 ← 6,732 * 200 = 1,346,400
	1,635,876 ← Sum of each part

TRY:

17 · 1 = _____   0 · 6 = _____   8 · (3 + 5) = _____
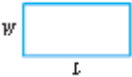

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    4936                7302
x    144            x    768
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Words that Indicate Multiplication	Expression	Product
The product of seven and four	$7 \cdot 4$	28
Three times twenty-two	$3 \cdot 22$	66
Twice the sum of sixteen and four	$2 \cdot (16+4)$	40

TRY:

Words that Indicate Multiplication	Expression	Product
The product of nine and eight		
Fifteen times seven		
Twice the sum of nine and six		

Vocabulary

TYPE	FIGURE	**Area**: The number of <u>square</u> units enclosed within the figure **Area Formulas:**
Rectangle	w ▭ L	$A = lw$

Problems:

JC needs to put wood flooring down on a rectangular living room that is 12 feet wide by 23 feet long. The flooring costs $7 per square foot. How much wood flooring is needed to complete the room? What will it cost for the wood flooring?

Statement: F = 12 feet · 23 feet   Sentence answer: JC needs 276 square feet of wood flooring.

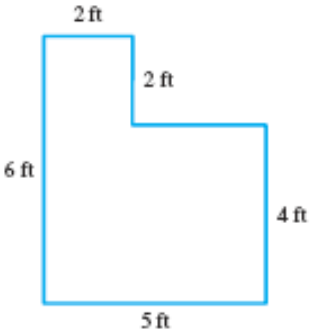Statement: C = 7 · (12 feet · 23 feet)   (also written: 276 ft^2)

C = 7 · 276 ft^2 It will cost $ 1,932 for the wood flooring.

TRY:

Find the area of the following figure: (Hint: Make two small rectangles. Calculate the area of each rectangle. Then, add the two products together.) If a special metallic adhesive costs $5 per square foot, how much will it cost to cover this figure in with the special metallic adhesive?	2 ft 2 ft 6 ft 4 ft 5 ft

Statement: Sentence answer: