

Multiplication Table:

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Terms in Multiplication:

The numbers that are multiplied together are called **FACTORS** and the result is called the **PRODUCT**. Together, **FACTORS** and **PRODUCTS** are called an **EQUATION**.

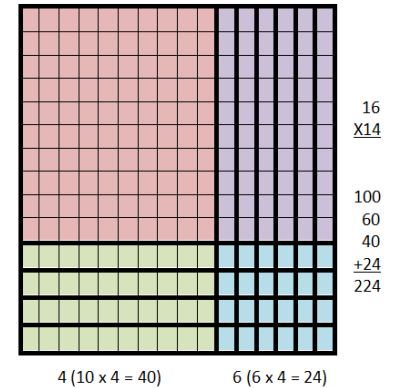
(Standard Algorithm)

$$\begin{array}{r}
 \text{Factor} \quad 16 \\
 \text{Factor} \quad \times 14 \\
 \hline
 \phantom{\text{Factor}} \quad 64 \\
 \phantom{\text{Factor}} \quad +160 \\
 \hline
 \text{Product} \quad 224
 \end{array}$$

Area Model

(Expanded Algorithm)

$$10 (10 \times 10 = 100) \quad 6 (10 \times 6 = 60)$$



Variables:

A **variable** is a symbol or letter that stands for a number.

$$16 \times n = 224 \quad n = 14$$

Properties of Multiplication:

- **Identity Property:** 1 x any number = that same number
- **Zero Property:** 0 x any number = 0
- **Commutative Property:** Multiplication is **Commutative** because changing the order of the numbers being multiplied together does not affect the product. $2 \times 8 = 8 \times 2$
- **Associative Property:** Multiplication is **Associative**, because changing the grouping of factors being multiplied does not affect the product. $2 \times (3 \times 4) = (2 \times 3) \times 4$
- **Distributive Property:** Multiplication is **Distributive**, because two numbers added together then multiplied by another number is the same as those same two numbers multiplied by another number one at a time, then added together. $4 \times (6 + 3) = (4 \times 6) + (4 \times 3)$

Handy Pattern Rules:

- Zero: Any number x 0 is 0
- One: Any number x 1 is that number
- Two: Any number x 2 will always be even
- Five: Skip count by 5s
- Ten: Any number x 10, put a 0 on its end

Pattern of Zeroes:

- 7 X 5 = 35
- 7 X 50 = 350
- 7 X 500 = 3,500
- 7 X 5,000 = 35,000

INPUT/OUTPUT TABLE	Input	Output
	2	4
	3	6
	4	8
	5	10
Rule: x2	6	12