

TOPIC: MULTIPLYING WHOLE NUMBERS

Intro to Multiplication

◆ Multiplication is _____, so $6 + 6 + 6 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$.

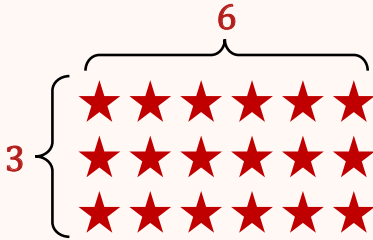
► Multiplication can be represented by different notations: 6×3

New

Multiplication

$$6 \times 3 = 18$$

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$



EXAMPLE

(A) Find the product of $5 \cdot 2 \cdot 4$

(B) Write the expression that represents the array.



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PRACTICE

Rewrite the problem as a multiplication problem and solve.

(A) $3 + 3 + 3 + 3 + 3 + 3 + 3$

(B) $8 + 8 + 8 + 8$

PRACTICE

Answer the following.

(A) Draw an array to represent the expression.

$$5 \times 3$$

(B) Write an expression to represent the array.



PRACTICE

Find the product.

(A) $3 \cdot 3 \cdot 6$

(B) $(10)(3)(2)$

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Properties of Multiplication

Name	Description	Example	Rule
0 Property	The product of 0 and any number is ____.	$5 \cdot 0 = \underline{\hspace{1cm}}$ $0 \cdot 5 = \underline{\hspace{1cm}}$	$a \cdot 0 = 0$ $0 \cdot a = 0$
1 Property	The product of 1 and any number is that ____ number.	$5 \cdot 1 = \underline{\hspace{1cm}}$ $1 \cdot 5 = \underline{\hspace{1cm}}$	$a \cdot 1 = a$ $1 \cdot a = a$
Commutative Property	Changing order of factors does ____ their product.	$5 \cdot 8 = 40 = \underline{\hspace{1cm}}$	$a \cdot b = b \cdot a$
Associative Property	Changing grouping of factors does ____ their product.	$5(8 \cdot 2) = \underline{\hspace{1cm}}$	$a(b \cdot c) = (a \cdot b)c$
Distributive Property	Multiplication distributes over ____.	$5(8 + 2) = \underline{\hspace{1cm}}$	$a(b + c) = a \cdot b + a \cdot c$

EXAMPLE

Rewrite the expression using the stated property, then find the product.

(A)
 $9 \cdot 3$
 | commutative property

(B)
 $(5 \times 1)2$
 | associative property

(C)
 $7(3 + 0)$
 | distributive property

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PRACTICE

State which property of multiplication is being used.

(A) $3(5 \times 2) \cdot 9 = 3 \cdot 5(2 \times 9)$

0 Property
1 Property
COMMUTATIVE
ASSOCIATIVE
DISTRIBUTIVE

(B) $7 \cdot 0 = 0$

0 Property
1 Property
COMMUTATIVE
ASSOCIATIVE
DISTRIBUTIVE

(C) $8 \times 4(2) = 4 \times 2 \cdot 8$

0 Property
1 Property
COMMUTATIVE
ASSOCIATIVE
DISTRIBUTIVE

PRACTICE

Use the properties of multiplication to find the product of each expression.

(A) $3(8 + 1 + 4)$

(B) $(2 \times 4)9$

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Solving Multiplication Problems

◆ When multiplying numbers with multiple digits we need to pay special attention to _____.

Distributive Property	Stacked	
$3 \cdot 28 = 3(20 + 8)$	<i>Partial Products</i> $\begin{array}{r} 28 \\ \times 3 \\ \hline \end{array}$	<i>Carrying</i> $\begin{array}{r} 28 \\ \times 3 \\ \hline \end{array}$

◆ **Partial Products** are _____ of the final product, found by multiplying each place value separately.

EXAMPLE

Find the product.

$$\begin{array}{r} 137 \\ \times 5 \\ \hline \end{array}$$

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PRACTICE

Find the product by rewriting with the distributive property.

(A) 57×6

(B) 384×5

PRACTICE

Find the product.

(A)
$$\begin{array}{r} 48 \\ \times 3 \\ \hline \end{array}$$

(B)
$$\begin{array}{r} 99 \\ \times 7 \\ \hline \end{array}$$

(C)
$$\begin{array}{r} 276 \\ \times 4 \\ \hline \end{array}$$

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Multiplying Large Whole Numbers

◆ To multiply multi-digit numbers with each other, we use **partial products** & **carrying**.

Recall	Single-Digit	New	Multi-Digit
	<i>Partial Products</i> $\begin{array}{r} 28 \\ \times 3 \\ \hline 24 \\ +60 \\ \hline 84 \end{array}$		<i>Carrying</i> $\begin{array}{r} 2 \\ 28 \\ \times 3 \\ \hline 84 \end{array}$
			$\begin{array}{r} 28 \\ \times 53 \\ \hline \end{array}$

EXAMPLE

Find the product.

$$\begin{array}{r} 713 \\ \times 46 \\ \hline \end{array}$$

PRACTICE

Find the product.

(A) $45 \times 23 \times 1$

(B) $811 \times 0 \times 15$

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PRACTICE

Find the product.

$$\begin{array}{r} (A) \quad 70 \\ \times 56 \\ \hline \end{array}$$

$$\begin{array}{r} (B) \quad 324 \\ \times 81 \\ \hline \end{array}$$

EXAMPLE

Find the product.

$$\begin{array}{r} 30,000 \\ \times 14 \\ \hline \end{array}$$

EXAMPLE

Find the product.

$$\begin{array}{r} 4032 \\ \times 125 \\ \hline \end{array}$$

EXAMPLE

Estimate the product by first rounding to the nearest tens place.

$$613 \times 49$$