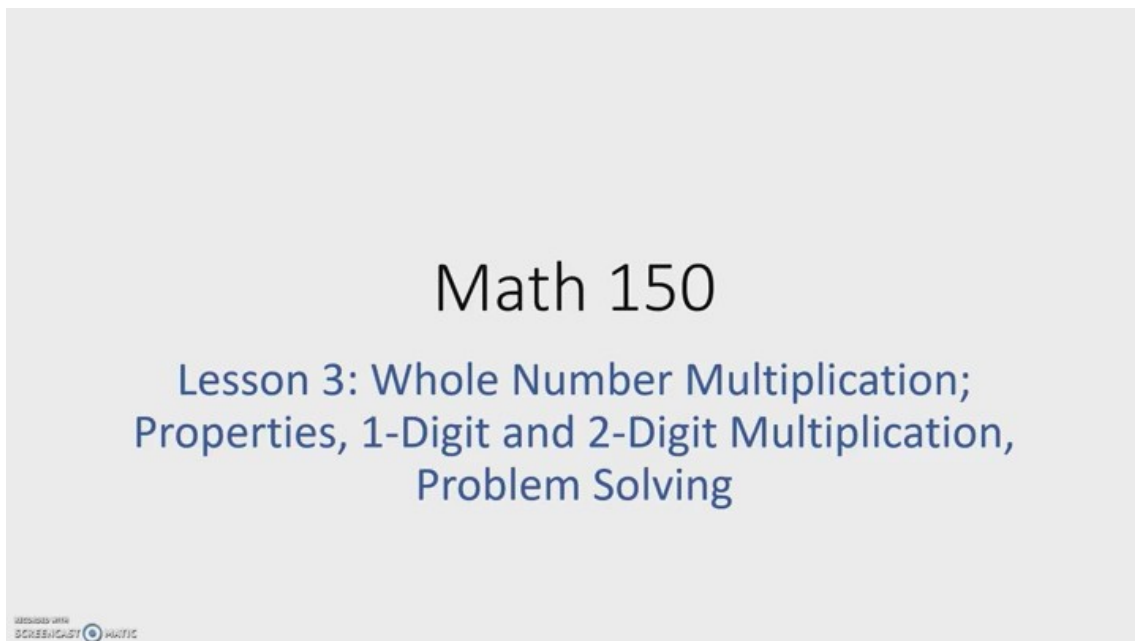# WHOLE NUMBER MULTIPLICATION PROPERTIES, 1-DIGIT AND 2-DIGIT MULTIPLICATION, PROBLEM SOLVING

As in addition, the multiplication properties help organize multi-step math problems. By following the properties, problems may be reordered and regrouped to solve the problem mentally.

The distributive property is used to distribute multiplication over a sum of numbers. We will look at how a multiplication problem can be completed using the distributive property and mental math.

In multiplication, we find the product. First, we'll look at multiplying by multiples of ten and by a single digit. Next, we'll find the product of two numbers where we are multiplying by a 2-digit number.

We will apply multiplication to word problems. Look for key words and read the problem more than once.

Math 150

Lesson 3: Whole Number Multiplication; Properties, 1-Digit and 2-Digit Multiplication, Problem Solving

Multiplication Properties

Commutative, Associative, Identity, Zero

Commutative Property

The numbers may be multiplied in any order giving the same product.

$$8 \times 7 = 7 \times 8$$
$$56 = 56$$

Associative Property

The way the numbers are grouped does not change the product.

$$(3 \times 4) \times 2 = 3 \times (4 \times 2)$$
$$12 \times 2 = 3 \times 8$$
$$24 = 24$$

Identity Property

The product of any number and 1 is equal to the number.

$$1 \times 5 = 5 \qquad 5 \times 1 = 5$$

Zero Property

The product of any number and 0 is equal to 0.

$$0 \times 4 = 0 \qquad 4 \times 0 = 0$$

Use the commutative, associative, identity, and zero properties to simplify.

Example 1

Steps	Reasons
$(2 \times 9) \times 25$	Commutative Property $\quad 2 \times 9 = 9 \times 2$
$(9 \times 2) \times 25$	Associative Property
$9 \times (2 \times 25)$	Multiply 2×25 to get 50
$9 \times 50 = 450$	

Example 2

Steps	Reasons
$7 \times 1 \times 0$	Identity Property $(7 \times 1 = 7)$
7×0	Zero Property $\quad (7 \times 0 = 0)$
0	

Distributive Property

The distributive property is used to distribute multiplication over a sum of numbers. Look to see how a multiplication problem can be completed using the distributive property and mental math.

Study the statements and reasons below to solve the given problem using the distributive property.

<div style="border: 1px solid magenta; padding: 10px;">

$$4 \times 37$$

Statement	Reason
$4 \times 37 = 4 \times (30 + 7)$	write 37 in tens and ones $37 = 30 + 7$
$4 \times 37 = $ four 30's + four 7's	distribute the four over 30 and 7
$4 \times 37 = (4 \times 30) + (4 \times 7)$	multiply four thirties and four sevens
$4 \times 37 = \quad 120 \quad + \quad 28$	compute $4 \times 30 = 120$ $4 \times 7 = 28$
$4 \times 37 = \quad 148$	total 120 and 28 $120 + 28 = 148$

</div>

Whole Number Multiplication – One Digit Numbers

Look at the pattern below.

$8 \times 3 = 24$
$80 \times 3 = 240$
$800 \times 3 = 2400$
$8000 \times 3 = 24{,}000$

Notice that a shortcut would be to multiply the 8×3, then count the number of zeros and add them on.

Estimate the product, then solve: **7342×6**

Estimation:
$$7000 \times 6 = 42{,}000$$
The estimated answer is 42,000.

Solution:
Line up the numbers from right to left.

Multiply the ones	Multiply the tens	Multiply the hundreds	Multiply the thousands
$\overset{1}{7342}$ $\times\ 6$ ——— 2	$\overset{2}{7342}$ $\times\ 6$ ——— 52	$\overset{2}{7342}$ $\times\ 6$ ——— 052	7342 $\times\ 6$ ——— 44,052
12 ones, 6 × 2, makes 1 ten and 2 ones. Carry the 1.	25 tens, 6 × 4 + 1, or 250, makes 2 hundreds and 5 tens. Carry the 2.	20 hundreds, 6 × 3 + 2, or 2000, makes 2 thousand and 0 hundreds. Carry the 2.	44 thousands, 6 × 7+ 2, or 44000, makes 4 ten thousands and 4 thousands.

Answer: **7342 × 6 = 44,052**

Check: *The estimated answer, 42,000, is close to 44.052.*

Whole Number Multiplication – Two Digit Numbers

Estimate the product, then solve: **637 × 48**

Estimation:

$$600 \times 50 = 30,000$$
The estimated answer is 30,000.

Solution:
Line up the numbers from right to left.

Multiply 637 times 8 ones	Multiply 637 times 4 tens		Add
$\overset{25}{637}$ $\times\ 48$ ——— 5096	$\overset{12}{637}$ $\times\ 48$ ——— 5096 25480	4 tens equal 40. Multiply by 40 by placing 0 in ones place, then multiply by 4.	637 $\times\ 48$ ——— 5096 +25480 ——— 30,576

Answer: **637 × 48 = 30,576**

Check: *The estimated answer, 30,000, is close to 30,576.*

Problem Solving - Multiplication

The computer club is planning to attend a baseball game. There are 26 members in the club and each ticket to the game costs $12.50. How much would the tickets cost?

In this problem you know the cost of one and want to find the cost of 26. This is a multiplication problem.

$$26 \times 12.50 = \$325.00$$

 [Multiplication](#)

The BrainPOP Activity login and password may be required for some of the activities.

Login: jcesc   Password: qfaf9361

Below are additional educational resources and activities for this unit.