

## Class 2: Multiplying Integers

Welcome to Class Number 2 of the Algebra Refresher Course where you are going to multiply integers.

### MULTIPLYING INTEGERS

An integer is a whole number that is either positive or negative.

An example of a positive integer is plus 5:  $+5$

An example of a negative integer is minus 4:  $-4$

There is an important rule for multiplying integers. Multiplying two integers with the **same** sign gives you a **positive** integer. Multiplying two integers with **different** signs gives you a **negative** integer.

Multiplying two integers with the **same** sign gives you a **positive** integer.  
Multiplying two integers with **different** signs gives you a **negative** integer.

Example 1: Evaluate or work out plus 2 by minus 3.

**EXAMPLE 1.** Evaluate  $(+2)(-3)$ .

Check out the signs first. They are different so the answer will be negative.

$$(+2)(-3) = -$$

Now multiply the numbers to give 6.

$$(+2)(-3) = -6$$

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Example 2: Evaluate minus 5 by three.

**EXAMPLE 2.** Evaluate  $(-5)(3)$ .

The 3 has no sign in front of it so you can assume it is positive. Check out the signs first. They are different so the answer will be negative.

$$(-5)(+3) = -$$

Now multiply the numbers to give 15.

$$(-5)(+3) = -15$$

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Example 3: Evaluate minus 5 by minus 4.

**EXAMPLE 3.** Evaluate  $(-5)(-4)$ .

Check out the signs first. They are the same so the answer will be positive.

$$(-5)(-4) = +$$

Now multiply the numbers to give 20.

$$(-5)(-4) = +20$$

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Example 4: Evaluate minus 3 by 4 by minus 2.

**EXAMPLE 4.** Evaluate  $(-3)(+4)(-2)$ .

You can do this in stages or all in one go.

Method 1: In stages

Multiply any two integers together, say the first two. Minus 3 by plus 4 gives minus 12.

$$(-3)(+4)(-2) = (-12)(-2)$$

Now multiply the minus 12 by minus 2 to get plus 24.

$$(-3)(+4)(-2) = (-12)(-2) = 24$$

Method 2: In one go

Do the signs first. Count up the minuses. Multiplying an even number of minuses gives a positive answer. Multiplying an odd number of minuses gives a negative answer.

Multiplying an **even** number of minuses gives a **positive** answer.  
Multiplying an **odd** number of minuses gives a **negative** answer.

Look at the signs. There are two minuses. Therefore, the overall answer is positive.

$$(-3)(+4)(-2) = +$$

Now multiply the numbers to give 24.

$$(-3)(+4)(-2) = +24$$

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When playing the animation for Example 4, do method 1 first. After the commentary introducing method 2 the yellow box above should appear. Now carry out the method for Example 4 in the same place as the previous method.

Example 5: Evaluate minus 5 squared.

**EXAMPLE 5.** Evaluate  $(-5)^2$ .

Minus 5 squared means minus 5 multiplied by minus 5.....

$$(-5)^2 = (-5)(-5)$$

...giving an answer of plus 25.

$$(-5)^2 = (-5)(-5) = 25$$

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Being able to competently multiply integers is essential. If you don't master this then there is no point in going on. Here is a little test that gets you ready. In your head do these sums and write the answer in the box provided. When you get 10 in a row correct you can move on. Good luck.

As you can see from the animation page one sum appears each time. If the student puts in the correct answer, a correct mark appears and a score appears to the right. Then the next sum appears. When the student gets 10 in a row correct move on to the last part of the animation after giving a motivational sign of congratulations.

If the student gets one wrong, a wrong mark appears and the score goes back to zero. Now they have to start all over again.

The sums should always follow the pattern shown: First five multiplying a pair of integers, next three multiplying three integers and last 2 squaring negative integers. All the numbers should be single digits so computations can be done in your head.

If the students wants to move on having not succeeded then they can press a move on button and the next example is animated.

### SPECIAL EXERCISE: MULTIPLYING INTEGERS

$(+1)(+6)$	=	$+6$	✓
$(-1)(+8)$	=	$-8$	✓
$(+3)(-6)$	=	$-18$	✓
$(-2)(-9)$	=	$+18$	✓
$(-4)(+7)$	=	$-28$	✓
$(+1)(+7)(-2)$	=	$-14$	✓
$(-2)(+5)(-1)$	=	$+15$	✗
$(-1)(-6)(-2)$	=		
$(-5)^2$	=		
$(-8)^2$	=		

Example 6: Simplify  $2ab$  multiplied by minus  $3b$ .

**EXAMPLE 6.** Simplify  $(2ab)(-3b)$ .

Check the signs out first. The signs are different so the answer is negative.

$$(+2ab)(-3b) = -$$

Multiply the numbers to give 6...

$$(+2ab)(-3b) = -6$$

...multiplied by  $a$ .....

$$(+2ab)(-3b) = -6a$$

... $b$  by  $b$  gives  $b$  squared.

$$(+2ab)(-3b) = -6ab^2$$

Therefore,  $2ab$  by minus  $3b$  equals minus  $6ab$  squared.

$$(+2ab)(-3b) = -6ab^2$$

That's the end of the class. Have a look at the demonstration examples and when you think you are ready do the exercise worksheet.

## DEMONSTRATED EXAMPLES

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simplify  $(7pq)(-5pr)$ .

4

Simplify  $(-4a^2b)(-9b)$ .

5

Simplify  $(-8xy)(-4xy)$ .

6

Simplify  $(-8a^2bc)(3bc)$ .

7

Simplify  $(-4x^2)(3y)(-2y)$ .

8

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**DEMONSTRATED EXAMPLES**

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simpl

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**SOLUTION**

$$(-4xy)(-4zy)(-2xz) = -$$

**SIGNS:**  $(-)(-)(-) = +$

5

Simpl

7

Simplify  $(-4x^2)(3y)(-2y)$ .

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

## DEMONSTRATED EXAMPLES

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simpl

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**SOLUTION**

$$(-4xy)(-4zy)(-2xz) = -32$$

$$\text{NUMBERS: } (4)(4)(2) = 16$$

5

Simpl

7

Simplify  $(-4x^2)(3y)(-2y)$ .

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**DEMONSTRATED EXAMPLES**

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simpl

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**SOLUTION**

$$(-4xy)(-4zy)(-2xz) = -32x^2$$

**x's:**  $x \times x = x^2$

5

Simpl

7

Simplify  $(-4x^2)(3y)(-2y)$ .

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

## DEMONSTRATED EXAMPLES

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simpl

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**SOLUTION**

$$(-4xy)(-4zy)(-2xz) = -32x^2y^2$$

**y's:**  $y \times y = y^2$

5

Simpl

7

Simplify  $(-4x^2)(3y)(-2y)$ .

8

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**DEMONSTRATED EXAMPLES**

1

Simplify  $(2ab)^2$ .

2

Simplify  $(-6ab)^2$ .

3

Simpl

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

**SOLUTION**

$$(-4xy)(-4zy)(-2xz) = -32x^2y^2z^2$$

**z's:**  $z \times z = z^2$

5

Simpl

7

Simplify  $(-4x^2)(3y)(-2y)$ .

Simplify  $(5p)(-3q)(-2pq)$ .

9

Simplify  $(-4xy)(-4zy)(-2xz)$ .

## DEMONSTRATED EXAMPLES

### No. 1

$$(2ab)^2$$

$$(2ab)^2 = (2ab)(2ab)$$

$$(2ab)^2 = (2ab)(2ab) = 4$$

$$(2ab)^2 = (2ab)(2ab) = 4a^2$$

$$(2ab)^2 = (2ab)(2ab) = 4a^2b^2$$

$$(2ab)^2 = (2ab)(2ab) = 4a^2b^2$$

### No. 2

$$(-6ab)^2$$

$$(-6ab)^2 = (-6ab)(-6ab)$$

$$(-6ab)^2 = (-6ab)(-6ab) = +$$

$$(-6ab)^2 = (-6ab)(-6ab) = +36$$

$$(-6ab)^2 = (-6ab)(-6ab) = 36a^2$$

$$(-6ab)^2 = (-6ab)(-6ab) = 36a^2b^2$$

$$(-6ab)^2 = (-6ab)(-6ab) = +36a^2b^2$$

### No. 3

$$(7pq)(-5pr)$$

$$(7pq)(-5pr) = -$$

$$(7pq)(-5pr) = -35$$

$$(7pq)(-5pr) = -35p^2$$

$$(7pq)(-5pr) = -35p^2qr$$

### No. 4

$$(-4a^2b)(-9b)$$

$$(-4a^2b)(-9b) = +$$

$$(-4a^2b)(-9b) = +36$$

$$(-4a^2b)(-9b) = 36a^2b^2$$

$$(-4a^2b)(-9b) = 36a^2b^2$$

### No. 5

$$(-8xy)(-4xy)$$

$$(-8xy)(-4xy) = +$$

$$(-8xy)(-4xy) = +32$$

$$(-8xy)(-4xy) = 32x^2y^2$$

$$(-8xy)(-4xy) = 32x^2y^2$$

### No. 6

$$(-8a^2bc)(3bc)$$

$$(-8a^2bc)(3bc) = -$$

$$(-8a^2bc)(3bc) = -24a^2b^2c^2$$

$$(-8a^2bc)(3bc) = -24a^2b^2c^2$$

$$(-8a^2bc)(3bc) = -24a^2b^2c^2$$

$$(-8a^2bc)(3bc) = -24a^2b^2c^2$$

### No. 7

$$(-4x^2)(3y)(-2y)$$

$$(-4x^2)(3y)(-2y) = +$$

$$(-4x^2)(3y)(-2y) = +24$$

$$(-4x^2)(3y)(-2y) = 24x^2$$

$$(-4x^2)(3y)(-2y) = 24x^2y^2$$

### No. 8

$$(5p)(-3q)(-2pq)$$

$$(5p)(-3q)(-2pq) = +$$

$$(5p)(-3q)(-2pq) = +30$$

$$(5p)(-3q)(-2pq) = +30p^2$$

$$(5p)(-3q)(-2pq) = +30p^2q^2$$

### No. 9

Done