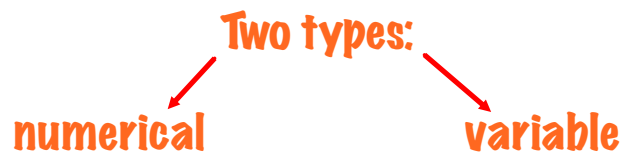


# Expressions

**mathematical expression** - a collection of symbols that jointly express a quantity



Can you translate the following into a mathematical expression?

1. nine more than a number  $y$
2. 4 less than a number  $n$
3. a number  $z$  times three
4. a number  $a$  divided by 12
5. 5 times the quantity 4 plus a number  $c$

### Writing in Math

You can translate many words for operations into operation symbols.

total	+
more than	+
increased by	+
difference	-
fewer than	-
less than	-
decreased by	-
product	$\times$ or $\cdot$ or ( )
times	$\times$ or $\cdot$ or ( )
quotient	$\div$ or $\text{—}$
divided by	$\div$ or $\text{—}$

What did Aunt Sally do exactly?!?

**P****E****M****D****A****S**

**P** - parenthesis (or other grouping symbols)

**E** - exponents

**M & D** - multiplication and division from left to right

**A & S** - addition and subtraction from left to right

Can you follow the rules?

$$[2 + (6 * 8)] - 1$$

$$2 (6) + \frac{7+8}{3}$$

## Evaluating Expressions

To evaluate a variable expression, you first replace each variable with a number. Then, you use the order of operations to simplify.

Evaluate  $4y - 15$  for  $y = 9$ .

$$\begin{aligned} 4y - 15 &= 4(9) - 15 && \text{Replace } y \text{ with } 9. \\ &= 36 - 15 && \text{Multiply.} \\ &= 21 && \text{Subtract.} \end{aligned}$$

Try this example with your table mate:

An online music store charges \$14 for each CD. Shipping costs \$6 per order. Write a variable expression for the cost of ordering CDs. Find the cost of ordering eight CDs.

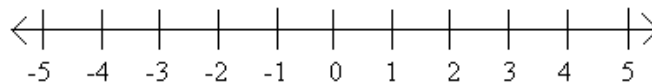
## Absolute Value

**What does absolute value mean?  
How do we know when we're being asked to find absolute value?**

**absolute value - a number's distance from zero on the number line**

**Here are some important examples...**

**Use a number line to find  $|-3|$  and  $|3|$ .**



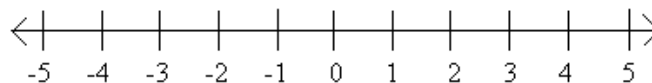
## Integers

**integers - the whole numbers and their opposites**

**Can you think of some real-world ways we see negative numbers?**

**temperatures  
sea level measurements  
debt  
bank balance - eek!**

**Graph these integers on a number line and order them from least to greatest: 0, 2, and -4.**



## Adding Integers

**Let's practice!**

13.  $14 + (-11)$

14.  $0 + (-9)$

15.  $-6 + (-7)$

16.  $-18 + 4$

17.  $-40 + 93$

18.  $-26 + (-39)$

19.  $450 + (-350)$

20.  $100 + (-100)$

21.  $235 + (-420)$

### Key Concepts

#### Adding Integers

**Same Sign** The sum of two positive integers is positive. The sum of two negative integers is negative.

**Different Signs** To add two integers with different signs, find the difference of their absolute values. The sum has the sign of the integer with the greater absolute value.

### Key Concepts

#### Addition of Opposites

The sum of an integer and its opposite is zero.

##### Arithmetic

$$1 + (-1) = 0$$

$$-1 + 1 = 0$$

##### Algebra

$$x + (-x) = 0$$

$$-x + x = 0$$

## Subtracting Integers

Let's practice!

18.  $6 - 2$

19.  $6 - (-2)$

20.  $-6 - 2$

21.  $2 - 6$

22.  $2 - (-6)$

23.  $-2 - 6$

24.  $5 - 11$

25.  $75 - (-25)$

26.  $22 - (-7)$

27.  $87 - (-9)$

28.  $35 - 15$

29.  $100 - (-91)$

### Key Concepts

### Subtracting Integers

To subtract an integer, add its opposite.

#### Arithmetic

$$2 - 5 = 2 + (-5) = -3$$

$$2 - (-5) = 2 + 5 = 7$$

#### Algebra

$$a - b = a + (-b)$$

$$a - (-b) = a + b$$

## Multiplying & Dividing Integers

Give these problems a try...

**Simplify each product.**

5.  $3(-3)$

6.  $4(-11)$

7.  $3(-8)$

8.  $5(-10)$

9.  $6(-3)$

10.  $2(-15)$

11.  $9(-9)$

12.  $3(-24)$

13.  $8(-6)$

14.  $-5(-3)$

15.  $-6 \cdot 10$

16.  $-10 \cdot 0$

17.  $-9(-8)(-5)$

18.  $0(-12) \cdot 4$

19.  $8 \cdot 3(-4)$

**Find each quotient.**

20.  $24 \div (-24)$

21.  $18 \div (-1)$

22.  $-120 \div 12$

23.  $56 \div (-8)$

24.  $-72 \div 12$

25.  $-100 \div (-10)$

26.  $-38 \div (-2)$

27.  $-72 \div 6$

28.  $-33 \div 11$



**Multiplying and dividing integers is easy! There's only one rule to remember (how often does that happen in math?!?).**

**Key Concepts****Multiplying Integers**

The product of two integers with the same sign is positive.  
The product of two integers with different signs is negative.  
The product of zero and any integer is zero.

**Examples**

$$\begin{array}{ll} 3(4) = 12 & 3(-4) = -12 \\ -3(-4) = 12 & -3(4) = -12 \\ 3(0) = 0 & -4(0) = 0 \end{array}$$

**Key Concepts****Dividing Integers**

The quotient of two integers with the same sign is positive.  
The quotient of two integers with different signs is negative.  
Remember that division by zero is undefined.

**Examples**

$$\begin{array}{ll} 12 \div 3 = 4 & 12 \div (-3) = -4 \\ -12 \div (-3) = 4 & -12 \div 3 = -4 \end{array}$$



**QUESTION: what do you notice about your answers when you work the following problems?**

17.  $-9(-8)(-5)$

18.  $0(-12) \cdot 4$

19.  $8 \cdot 3(-4)$

**What conclusion can you draw from your answers?**

**Could you predict which sign your answer will have without working the problem? How?**