

RWM101: Foundations of Real World Math



UNIT 1: NUMBER PROPERTIES

COMMUTATIVE LAW OF ADDITION & MULTIPLICATION

Tells us that the order you use to add or multiply numbers does not matter

if a and b are real numbers, then

$$a + b = b + a$$

$$a \cdot b = b \cdot a$$

When you change order it does not matter

EXAMPLE

$$\begin{array}{r} 5 + 3 = 3 + 5 \\ 8 \qquad \qquad 8 \end{array}$$

$$\begin{array}{r} 5 \cdot 3 = 3 \cdot 5 \\ 15 \qquad \qquad 15 \end{array}$$

ASSOCIATIVE LAW OF ADDITION & MULTIPLICATION

Tell us that no matter how we group or "associate" the numbers we add or multiply, the outcome remains the same

if a, b, c are real numbers, then

$$(a + b) + c = a + (b + c)$$

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

EXAMPLE

$$\begin{array}{r} (7 + 8) + 2 = 7 + (8 + 2) \\ 15 + 2 = 7 + 10 \\ 17 \end{array}$$

$$\begin{array}{r} (5 \cdot \frac{1}{3}) \cdot 3 = 5 \cdot (\frac{1}{3} \cdot 3) \\ (\frac{5}{3}) \cdot 3 = 5 \cdot 1 \\ 5 \end{array}$$

ADDITIVE IDENTITY

Simply states that there is an additive called zero

$$0 + 5 = 5$$

$$0 + (-7) = -7$$

INVERSE PROPERTY OF ADDITION

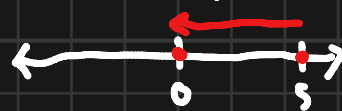
for any real number a ,

"always returns 0"

$$a + (-a) = 0$$

$-a$ is the additive inverse of a

$$5 + (-5) = 0$$



$$-6 + 6 = 0$$



MULTIPLICATIVE IDENTITY PROPERTY

States that if you multiply any number by 1, the answer is simply the number you started with

$$1 \times 3 = 3$$

$$(-5) \times 1 = -5$$

INVERSE PROPERTY OF MULTIPLICATION

for any real number $a \neq 0$

$$a \cdot \frac{1}{a} = 1$$

"always returns 1"

$\frac{1}{a}$ is the multiplicative inverse of a

$$5 \times \frac{1}{5} = 1$$

$$-3 \times \frac{1}{-3} = 1$$

$$\frac{2}{3} \times \frac{3}{2} = 1$$

UNIT 1: NUMBER PROPERTIES

MULTIPLICATION BY ZERO

Multiplying with zero is always zero, why?
One way to consider 5 plates with zero cookies

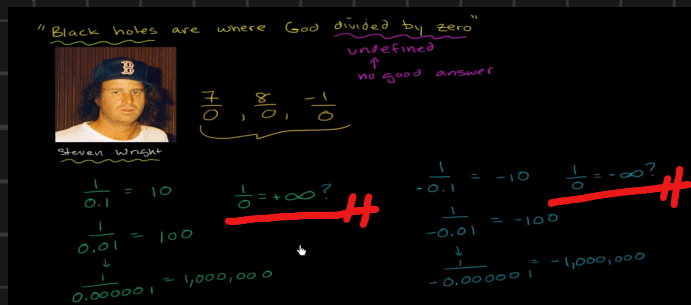
$$0 + 0 + 0 + 0 + 0 = 5, \text{ which is } 5 \times 0 = 0$$

DIVISION BY ZERO IS UNDEFINED

Any number divided by zero, the answer is undefined

$$5/0 = \text{undefined}$$

$$0/5 = 5$$



DISTRIBUTIVE PROPERTY

encoded in the distributed law. This property tells how to distribute a multiplication across a sum (we write the sum in parenthesis)

abstract statement of distributed law:

$$a \times (b + c) = (a \times b) + (a \times c)$$

as its name suggest, we are distributing the multiplied number a to each number in the sum

$$4(8 + 3) \rightarrow 4(11) \rightarrow 44$$

distributive

$$4 \cdot 8 + 4 \cdot 3$$

$$32 + 12$$

$$= 44$$

$$4 \cdot 8 + 4 \cdot 3$$

$$5(9 - 4) \rightarrow 5(25) = 25$$

$$5 \cdot 9 - 5 \cdot 4$$

$$45 - 20$$

$$= 25$$

UNIT 2: COMMON MULTIPLES & COMMON FACTORS

