

Real Numbers	$\mathbb{R}$	
Natural	$\mathbb{N}$	1, 2, 3, 4, 5, ...
Whole	$\mathbb{W}$	0, 1, 2, 3, 4, 5, ...
Integers	$\mathbb{Z}$	... - 5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...
Rational	$\mathbb{Q}$	$\frac{1}{2}, .33\bar{3}$ (fractions and all terminating and repeating decimals)
Irrational	$\mathbb{P} / \mathbb{R} - \mathbb{Q}$	$\pi, \sqrt{2}, .121121112$ (all non – terminating and non – repeating decimals)
Imaginary	$i$	

### Conversions: Fractions to Decimals

$$\frac{1}{2} = .5$$

$$\frac{1}{4} = .25$$

$$\frac{3}{4} = .75$$

$$\frac{1}{5} = .2$$

$$\frac{2}{5} = .4$$

$$\frac{3}{5} = .6$$

$$\frac{4}{5} = .8$$

$$\frac{1}{8} = .125$$

$$\frac{3}{8} = .375$$

$$\frac{5}{8} = .625$$

$$\frac{7}{8} = .875$$

### Conversions

#### Distance

1 foot: 12 inches  
 1 inch: 2.54 centimeters  
 1 yard: 3 feet  
 1 mile: 5280 feet  
 1 mile: 1760 yards  
 1 mile: 1.6 kilometers  
 1 kilometer: 1000 meters  
 1 meter: 100 centimeters  
 1 meter: 39.3701 inches

#### Weight (Mass)

1 kilogram: 1000 grams  
 1 kilogram: 2.2 pounds  
 1 pound: 16 ounces

#### Liquid

2 cups: 1 pint  
 2 pints: 1 quart  
 4 quarts: 1 gallon  
 1 liter ~ 1 quart

#### Computer Storage

1 TB: 1000 GB a lot  
 1 GB: 1000 MB ~25 minute video file  
 1 MB: 1000 KB ~a medium-size .jpeg  
 1 KB: 1000 B a short essay  
 1 B: 8 bits one character

### Properties of Math Operations

#### commutative property of addition

$$a + b = b + a$$

addition may be done in any order and the result will remain the same

#### commutative property of multiplication

$$a(b) = b(a)$$

multiplication may be done in any order and the result will remain the same

#### associative property of addition

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

in addition, numbers may be grouped in any way and the result will remain the same

#### associative property of multiplication

$$(ab)c = a(bc)$$

in multiplication, numbers may be grouped in any way and the result will remain the same

#### distributive property

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

#### additive identity

$$a + 0 = a$$

any number added to zero is the original number

multiplicative identity

$$a(1) = a$$

any number multiplied by 1 is the original number

additive inverse

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

any number added to its opposite is 0

multiplicative inverse

$$a\left(\frac{1}{a}\right) = 1$$

any number multiplied by its reciprocal is 1

Formulas

ratios

$$a:b \text{ or } a \text{ to } b \text{ or } \frac{a}{b}$$

constant of variation (proportionality)

$$y = kx; \text{ also } kx = y \text{ and } k = \frac{y}{x}$$

percent proportion

$$\frac{a}{b} = \frac{p}{100}$$

percent

$$part = percent(whole)$$

percentage change

$$\Delta\% = \frac{new-original}{original} \text{ or } \Delta\% = \frac{V_2-V_1}{V_1}$$

relative error

$$RE = \frac{|EV - AV|}{AV}$$

simple interest formula

$$I = prt$$

factoring (also called distributive property)

$$ax + ay = a(x + y)$$

probability

$$P = \frac{\text{positive outcomes}}{\text{total outcomes}}$$

experimental probability

$$P(event) = \frac{\text{observed outcomes}}{\text{total trials}}$$

compound interest

$$A(t) = Pe^{rt}$$

perimeter of a triangle

$$P = s_1 + s_2 + s_3$$

area of a triangle

$$A = \frac{1}{2}bh$$

circumference of a circle

$$C = 2\pi r \text{ or } C = \pi d$$

area of a circle

$$A = \pi r^2$$

perimeter of a rectangle

$$P = 2b + 2h$$

area of a rectangle

$$A = bh$$

perimeter of a square

$$P = 4s$$

area of a square

$$A = s^2$$

Surface Area of a Prism

$$S.A. = P_B h + 2A_B$$

where  $A_B$  is equal to  $\frac{1}{2}bh$ ,  $s^2$ ,  $bh$ , or  $\frac{1}{2}ap$

Volume of a Prism

$$V = A_B h$$

where  $A_B$  is equal to  $\frac{1}{2}bh$ ,  $s^2$ ,  $bh$ , or  $\frac{1}{2}ap$

Lateral Area of a Cylinder

$$L.A. = 2\pi r h \text{ or } L.A. = \pi d h$$

Surface Area of a Cylinder

$$S.A. = 2\pi r h + 2\pi r^2$$

Volume of a Cylinder

$$V = \pi r^2 h$$

Lateral Area of a Cone

$$L.A. = \pi r l$$

Surface Area of a Cone

$$S.A. = \pi r l + \pi r^2$$

Volume of a Cone

$$V = \frac{1}{3}\pi r^2 h$$

Surface Area of a Sphere

$$S.A. = 4\pi r^2$$

Volume of a Sphere

$$V = \frac{4}{3}\pi r^3$$