

# Arithmetic

the branch of mathematics dealing with properties and manipulation of numbers

## Roman Numerals

I	1	I	1
II	2	V	5
III	3	X	10
IV	4	L	50
V	5	C	100
VI	6	D	500
VII	7	M	1000
VIII	8		
IX	9		
X	10		

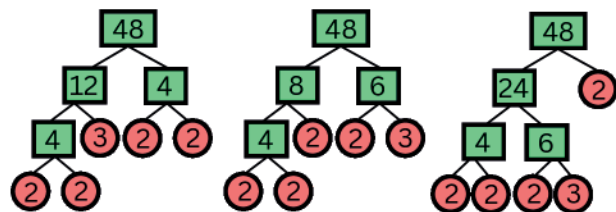
## Time Conversions

60 seconds	1 minute
60 minutes	1 hour
24 hours	1 day
7 days	1 week
12 months	1 year
52 weeks	1 year
365 days	Common year
366 days	Leap Year
10 years	1 decade
100 years	1 century

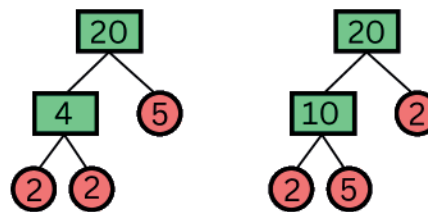
**factor:** the numbers multiplied together to make a product.

**prime number:** has exactly two factors, itself and one.

**composite number:** all numbers that are not prime.



prime factorization =  $2 \times 2 \times 2 \times 2 \times 3 = 2^4 \times 3$







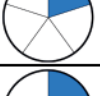
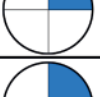



prime factorization =  $2 \times 2 \times 5 = 2^2 \times 5$

## Order of Operations:

We use **operators** (+, -, x, ÷) to perform operations, or calculations, on numbers in order to solve problems. The order in which we must perform them is as follows:

1. **P**arentheses
2. **E**xponents
3. **M**ultiplication and **D**ivision, from left to right
4. **A**ddition and **S**ubtraction, from left to right

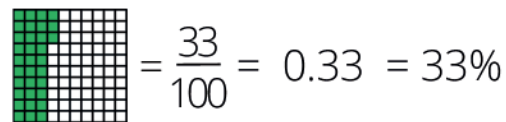
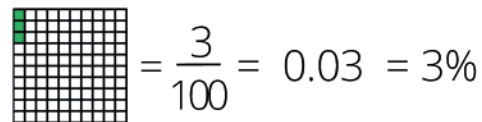
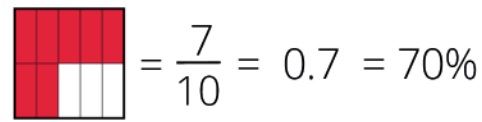
**PEMDAS**

Visual Fraction	Numerical Fraction	Percent	Decimal
	$\frac{1}{12}$	8.3%	0.083
	$\frac{1}{10}$	10%	0.1
	$\frac{1}{8}$	12.5%	0.125
	$\frac{1}{6}$	16.6%	0.166
	$\frac{2}{5}$	40%	0.4
	$\frac{1}{4}$	25%	0.25
	$\frac{2}{3}$	66.6%	0.666
	$\frac{1}{2}$	50%	0.5
	1	100%	1

**fraction:** the denominator is the number of pieces the item is divided into and the numerator is the number of pieces you have.

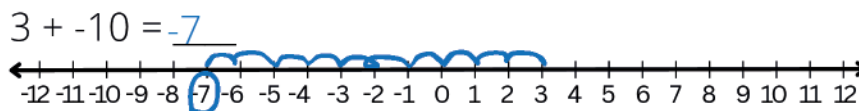
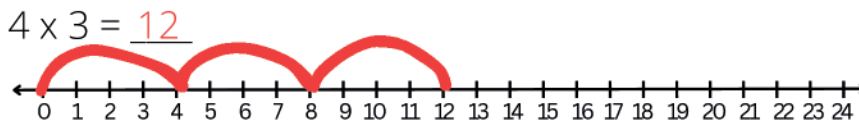
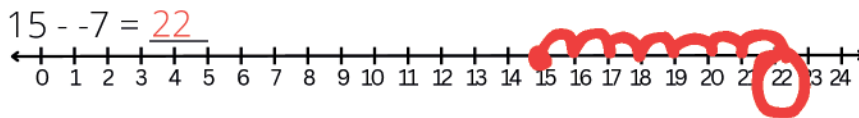
**decimal:** a fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point. To find a decimal, divide the numerator of the fraction by the denominator.

**percent:** per hundred. To find a percentage, move the decimal point of the fraction two places to the left.



When two symbols are together in a number sentence:

- Two positives make a positive.  $++ = +$
- A positive and a negative make a negative.  $+ - = -$
- A negative and a positive make a negative.  $- + = -$
- Two negatives make a positive.  $-- = +$



# Statistics

the science of collecting, analyzing and presenting data

data

set of numbers:

6, 2, 3, 6, 8

**Average:** a calculated “central” value of a set of numbers. We find it by adding up all of the values and then dividing the SUM by the number of addends.

$$\begin{aligned}6 + 2 + 3 + 6 + 8 &= 25 \\ 25/5 &= 5 \\ \text{average} &= 5\end{aligned}$$

**Mean:** another word for average, we find it the same way. Add all of the addends, then divide by the number of addends.

$$\text{mean} = 5$$

**Median:** Order the numbers in the set from least to greatest. The median is the “middle” value.

$$\begin{aligned}\text{middle value} &= 6 \\ 2, 3, (6), 6, 8\end{aligned}$$

**Mode:** the french word for style, the mode is the number that occurs the most frequently.

$$\text{mode} = 6$$

**Range:** the difference between the highest and lowest values in a set.

$$\begin{aligned}8 - 2 &= 6 \\ \text{range} &= 6\end{aligned}$$

## Chance & Probability

We use both CHANCE and PROBABILITY to predict how likely events are to happen, but CHANCE is stated as a percentage and probability is stated as a fraction.

$$\text{probability} = \frac{\text{the number of ways it can happen}}{\text{total possible number of outcomes}}$$

Example: What is the probability of rolling a 4 on a die?

$$\frac{\text{there is only one 4 on a die}}{\text{a die has six sides}} = \frac{1}{6}$$

6 sides of a die:



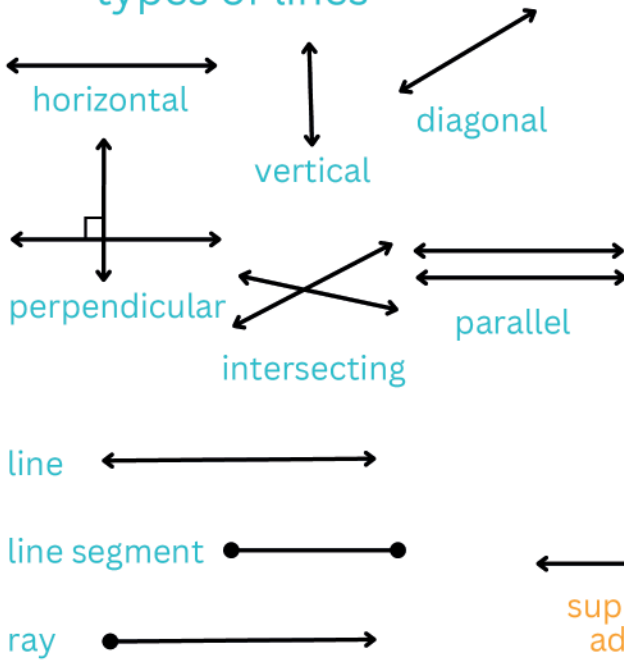
Example: What is the probability of rolling an odd number on a die?

$$\frac{\text{three sides have even numbers}}{\text{a die has six sides}} = \frac{3}{6} = \frac{1}{2} \quad \text{remember to simplify!}$$

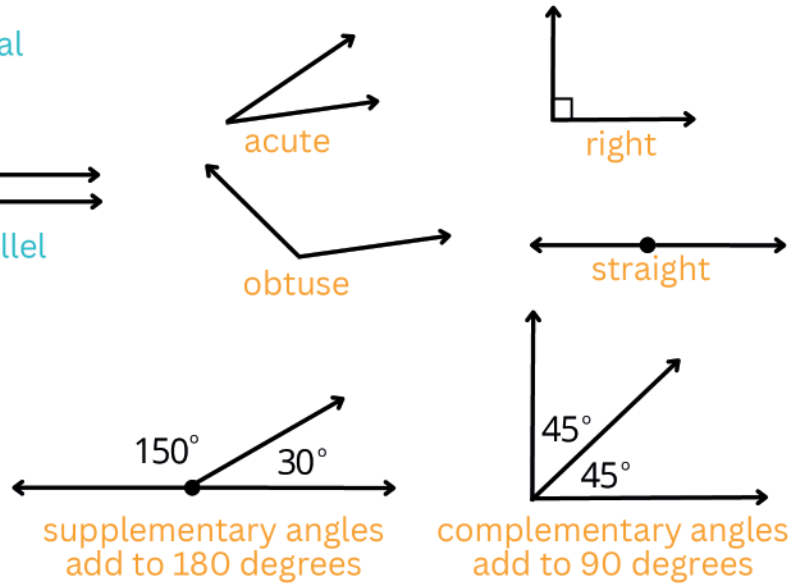
# Geometry

the study of shapes

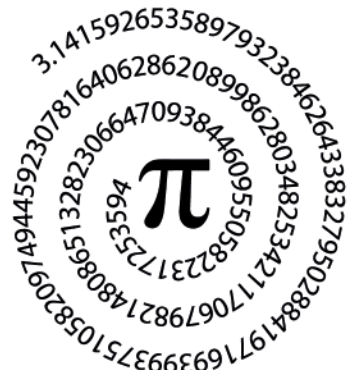
## types of lines



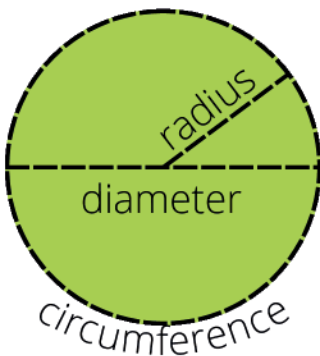
## types of angles



Pi is a number, a mathematical constant, usually rounded to 3.14, which represents the ratio of a circle's circumference to its diameter. We use the greek letter pi, ( $\pi$ ) to represent this value.

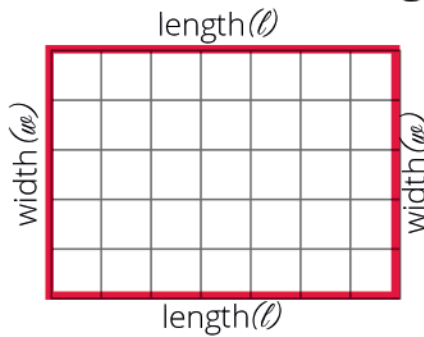


Parts of a circle:

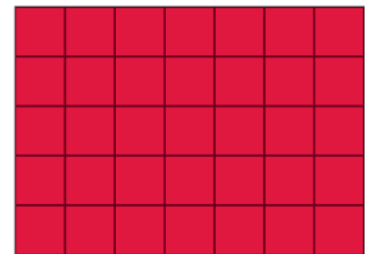


area =  $\pi r^2$   
 circumference =  $2\pi r$

Parts of a rectangle:



perimeter =  $l + w + l + w = 2l + 2w$   
 area = length x width =  $lw$

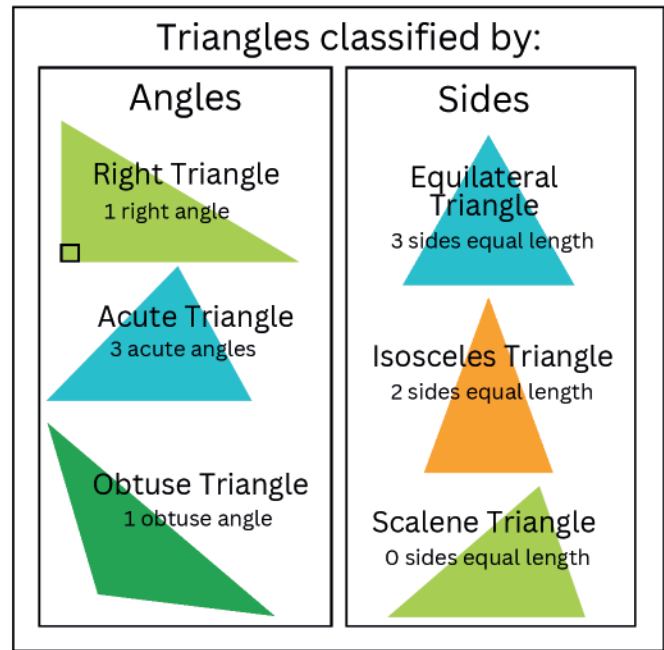
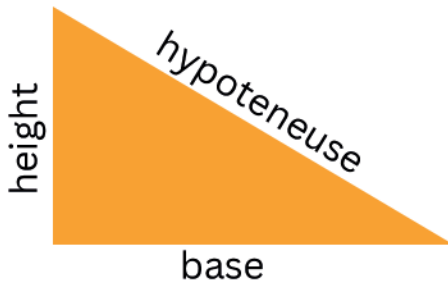


area

Triangles always have 3 sides and 3 angles, which always add up to 180 degrees.

$$\text{area}_{\triangle} = \frac{1}{2}bh$$

b (base) and h (height) must be perpendicular to each other



# of angles	Name of Polygon	Sum of Interior Angles	Each Interior Angle of REGULAR polygons	Sum of Exterior Angles
3	TRIgon	180	60	360
4	TETRAgon	360	90	360
5	PENTAgon	540	108	360
6	HEXAgon	720	120	360
7	SEPTAgon	900	128.6	360
8	OCTAgon	1080	135	360
9	NONAgon	1260	140	360
10	DECAgon	1440	144	360