SQUARE ROOT RULES

$$\sqrt{a}\sqrt{b} := \sqrt{ab}$$

$$\frac{\sqrt{a}}{\sqrt{b}} := \sqrt{\frac{a}{b}}$$

$$\sqrt{2x^2} := x(\sqrt{2})$$

EXPONENTIALS

$$a^2 - b^2 := (a + b)(a - b)$$

$$\left(x^a\right)\left(y^a\right) := (xy)^a$$

$$x^{-a} := \frac{1}{x^a}$$

$$\left(\frac{x}{y}\right)^a := \frac{x^a}{y^a}$$

$$\frac{x^a}{x^b} := x^{a-b}$$

$$\left(x^a\right)^b := x^{ab}$$

$$\left(x^a\right)\left(x^b\right) := x^{a+b}$$

Two variables

First Method

1st $4x + 3y := 13$

$4(2 - 2y) + 3y := 13$

$y := -1$

Substitute y in 2nd

2nd $x + 2y := 2$

$x := 2 - 2y$

$x := 2 - 2(-1)$

$x := 4$

1st $4x + 3y := 13$ Second Method 2nd $x + 2y := 2$

Make the coefficient of one variable the same in both equations and substract one from the other or add if one is negative

Using 2nd equation

$$\begin{array}{rl} & 4x + 3y := 13 \\ - & 4x + 8y := 8 \\ \hline & -5y := 5 \end{array}$$

$y := -1$

Substitute y in either equation

$x + 2(-1) := 2$

$x := 4$

Inequalities

For inequalities; if a negative value is used, the simbol changes direction

$3x + 5 < 7$ by -3 >> $-9x - 15 > -21$

Factorization

% $(4x + 12) := 4(x + 3)$

Salary increase = 1.(% increase) · (BASE SALARY)

S increased 14% = 1.14S, where S is the base salary

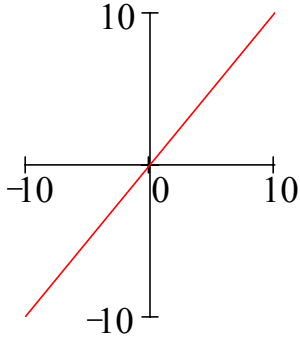
Geometry

$y := mx + b$ linear equation

$m :=$ slope

$b :=$ y_intercept

t



$$\text{Slope} := \frac{y_1 - y_2}{x_1 - x_2}$$

t

x and y are the coordinates

Quadratic Equation

$$ax^2 + bx + c := 0$$

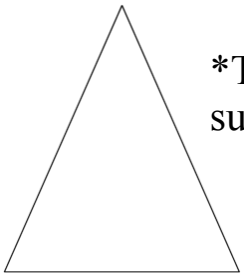
$$x := \frac{-b + -\sqrt{b^2 - 4ac}}{2a}$$

The sum of the interior anles of an n-sided polygon is

$$\boxed{(n-2)(180^{o})}$$

n is the number of sides

A polygon with equal sides has equal angles

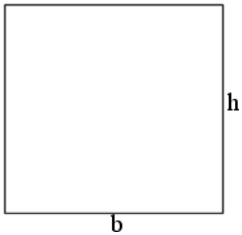


*The length of each side must be shorter than the sum of the length of the other two sides

*Equilateral triangles have equal 60º angles

*Isosceles triangles, both angles opposite to the equal sides are equal, the remaining adds up to 180º

*Area of triangle is $A := \frac{bh}{2}$

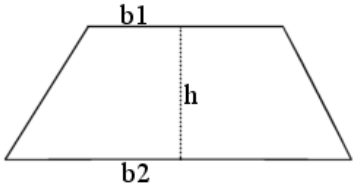


*4 sides and 4 interior angles that equal 360º

*In rectangles and parallelograms the area is given by

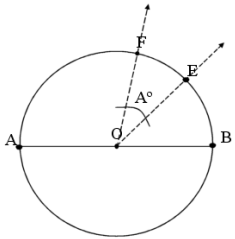
$$A := bh$$

* In trapezoids the area is given by



$$A := \frac{1}{2}\left(b_1 + b_2\right)(h)$$

where b1 and b2 are parallel



Arc: FE
Diameter: AB
Radius: OB and OA
Circle: O
Chord: AB

* Chord; line connecting two points in a circle.
* Diameter; line connecting two points in a circle and pass through the center
* Circumference; distance around circle
* Relationship of Diameter and Circumference

$$\frac{c}{d} := \pi \qquad \boxed{c := 2\pi r}$$

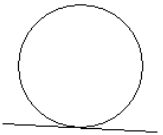
* Arc; set of all points in a circle between two given points

$$\frac{\text{arc\_length}}{\text{Diameter}} := \frac{\text{arc\_angle}}{360}$$

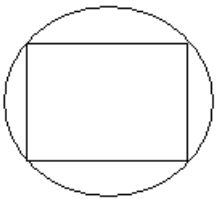
*Area of a circle is given by

$$\boxed{A := \pi r^2}$$

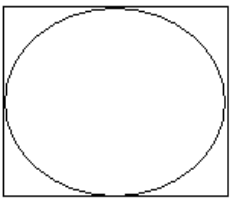
* A tangent passes only through one point fo the circle



* Inscribed polygon



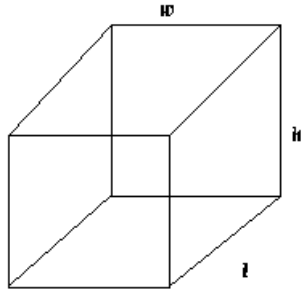
* Circumscribed polygon



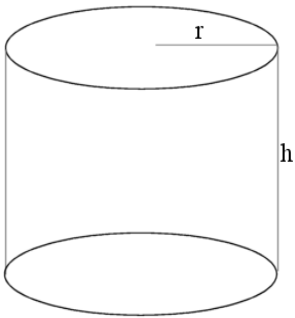
* Rectangular solids (cubes)

$$V := lwh$$

$$A := 2(wl + lh + wh)$$



* Cylinder



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

$$A := 2\left(\pi r^2\right) + 2\pi r h$$

* Arithmetic mean= average

* Median= middle value or the average of the two middle values

* mode= most frequently occuring value

*Standard Deviation

1. Calculate arithmetic mean
2. Find difference between mean and each value
3. square each of the differences
4. summing the square values
5. divide sum by n
6. take non-negative square root of the result of 5

Frequency Distributions

* data shown in a table with x as value and f as the frequency of that value

*Mean is the sum of all (x)(f) divided by n

*Std Deviation is the difference from values to mean, squared, added, divided by n, square rooted

X	F
0	3
1	5
2	7

Counting

* For two tasks, multiply possible outcomes of each to determine the total possible outcomes of all
* Factorials; n! is the multiplication of all integers to the final value
* The number of possible combinations for n elements is n!
* Subsets from a number of objects. The subsets components is r. The available objects to select from is n. Therefore

$r \leq n$

* The total number of combinations is given by

$$\frac{n!}{(n-r)!\,r!}$$

r := subset

n := available_elements

Probability

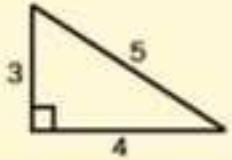
$$P(E) := \frac{outcomes\_involving\_E}{total\_possible\_outcomes}$$

$$P(E \text{ or } F) := P(E) + P(F) - P(E \text{ and } F)$$

* Probability of two independent events is given by P(A)+P(B)-[(P(A)P(B)]
* The probability of A or B from happening being them independent is the addition of both possibilities minus the product of both probabilities
* Probability of mutually exclusive events is given by P(A)+P(B)-0
* In this case, the probability that one happens is 0, therefore, the product of the last part is 0.

In other words, the addittion of both probabilities.

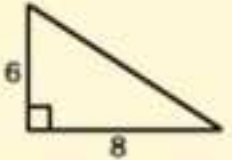
Pythagorean Triplets



Also 5:12:13

Whenever you see a right triangle with legs of 3 and 4, with a leg of 3 and a hypotenuse of 5, or with a leg of 4 and a hypotenuse of 5, you immediately know the length of the remaining side. This is called a Pythagorean triplet.

In addition, any multiple of the 3:4:5 ratio also makes a Pythagorean triplet.



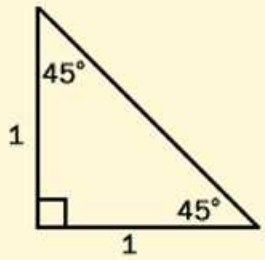
For example, if you are asked to find the length of the hypotenuse in the triangle above, you don't have to use the Pythagorean theorem. Since 6 and 8 are (3 x 2) and (4 x 2), respectively, the hypotenuse will be (5 x 2), or 10.

Another Pythagorean triplet is 5, 12, and 13.

Isosceles Right Triangles — Side Ratio

The ratio of sides in an isosceles right triangle is always 1:1: $\sqrt{2}$.

Look at an isosceles right triangle with a leg of length 1.



Since it's isosceles, the other leg also has a length of 1.

Using the Pythagorean theorem, we can find the hypotenuse:

$$(1)^2 + (1)^2 = (\text{hypotenuse})^2$$

$$2 = (\text{hypotenuse})^2$$

$$\sqrt{2} = \text{hypotenuse}$$

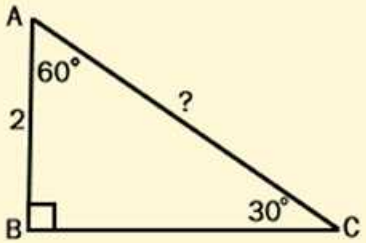
The hypotenuse of any isosceles right triangle is always $\sqrt{2}$ times the length of a leg. So if you're given an isosceles right triangle with side 6, the hypotenuse is $6\sqrt{2}$.

30-60-90 Right Triangles — Side Ratio

The ratios of the sides in a 30-60-90 right triangle is always 1: $\sqrt{3}$:2.

The shorter leg is always opposite the 30° angle, the longer leg is opposite the 60° angle, and the hypotenuse is opposite the right angle.

For instance, if a 30-60-90 triangle has a shorter leg of length 2, what is the length of the hypotenuse?



AB*:*BC*:*AC **= 1: $\sqrt{3}$:2.**

AB **= 2, so *AC* = 2 x 2 = 4**