

Percent of 100
if = $\frac{\%}{100}$

Percent difference = $\frac{\%}{100}$
Change original

milli 0.001

centi 0.01

deci 0.1

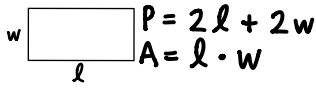
UNIT 1

deca 10

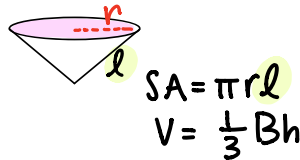
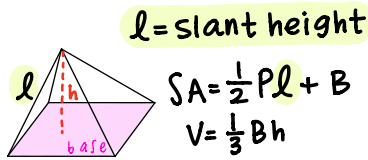
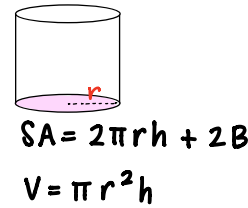
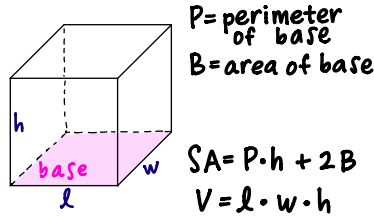
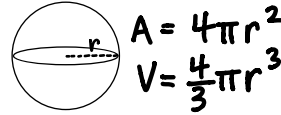
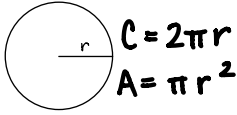
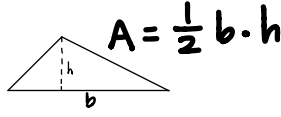
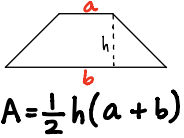
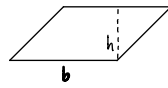
hecto 100

kilo 1,000

Area and Volume



$A = b \cdot h$



Order of Operations

Please **PARENTHESES**
Excuse **EXPONENTS**
My **MULTIPLICATION**
Dear **DIVISION**
Aunt **ADDITION**
Sally **SUBTRACTION**

Multiplication and division are done left to right
Addition and subtraction are done left to right

Conversions

- 1 foot = 12 inches
- 1 yard = 3 feet
- 1 mile = 5,280 feet
- 1 tbs = 3 teaspoons
- 1 pound = 16 ounces
- 1 gallon = 4 quarts
- 1 quart = 2 pints
- 1 pint = 2 cups
- 1 cup = 8 ounces
- 1 kg = 1000g
- 1m = 1000mm
- 1m = 100cm
- 1 kg = 2.205 lbs
- 1 ton = 2,000 lbs

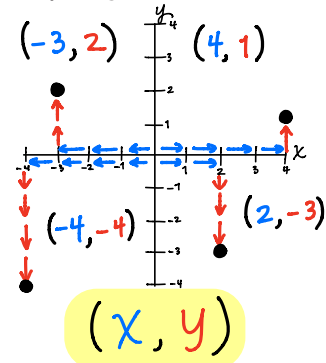
Properties

- Commutative (addition) $a + b = b + a$
- Commutative (multiplication) $a \cdot b = b \cdot a$
- Associative (addition) $a + (b + c) = (a + b) + c$
- Associative (multiplication) $a \cdot (b \cdot c) = (a \cdot b) \cdot c$
- Distributive $a \cdot (b + c) = a \cdot b + a \cdot c$
- Additive $a + 0 = a$
- Multiplicative $a \cdot 1 = a$
- Additive Inverse $a + (-a) = 0$
- Multiplicative Inverse $a + (1/a) = 1, a \neq 0$
- Zero Property $a \cdot 0 = 0$

Parallel examples:
 $y = 4x - 1, y = 4x + 11$
 $y = -1/5x + 3, y = -1/5x$
Perpendicular examples:
 $y = 4x - 1, y = -1/4x + 6$
 $y = -1/5x + 3, y = 5x + 2$

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Graphing

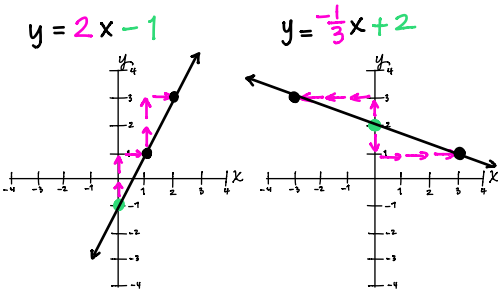


Plotting coordinates
Coordinate pairs are ALWAYS written (x,y). The x value gives how many units to go left (negative) or right (positive). The y value gives how many units to go up (positive) or down (negative).

(x, y)

$y = mx + b$

m = slope
b = y-intercept
Begin by plotting the y-intercept. Then, using the slope (rise/run), count the rise/run values to get to the next point. Repeat from that point to get at least 3 points.



Write the equation given the graph:
Look for the y-intercept, then count how far to rise/run to get to the next point. This graph has a y-intercept of 3 and to get to the next point requires down 3/over 1, meaning the slope is -3/1, or -3 (when simplified).
Now plug in the values: $y = -3x + 3$

Transformations

- Reflection = FLIP (mirror)
- Translation = SLIDE
- Rotation = TURN
- Dilation = GROW/SHRINK

General Quadratic
 $y = ax^2 + bx + c$

Quadratic Formula
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Finding Slope m
 $m = \frac{\text{Difference in y's}}{\text{Difference in x's}}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

Distance Formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
when given two points (x_1, y_1) (x_2, y_2)

Statistics

- Mean = AVERAGE.** Add up all terms and divide by the total number of terms.
- Mode = MOST.** Most often occurring term. There can be more than 1 mode.
- Median = MIDDLE.** Order terms least to greatest and find middle term.
- Range = BIG - SMALL.** Largest term minus smallest.

Slope Intercept Form

$y = mx + b$
m = slope, b = y-intercept

Point Slope Form

$y - y_1 = m(x - x_1)$
 x_1 and y_1 is the point given

Midpoint Formula

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Parallel lines have the exact same slope. For example, $y = -2/3x + 1$ and $y = -2/3x - 8$. Perpendicular lines have the opposite sign, flipped fraction slope. For example $y = -2/3x + 1$ and $y = 3/2x - 5$

Find percentage of a number by multiplying by the decimal version of the percent. Ex: 85% of 900 = 0.85 • 900 = 765

Adding, Subtracting Integers

SAME SIGN ADD (+ means add)

5 + 3 = 8 -5 - 3 = -8 -5 + (-3) = -8 5 - (-3) = 8
 same sign + same sign + same sign + 5 + (+3) same sign +

7 + 2 = 9 -7 - 2 = -9 -7 + (-2) = -9 7 - (-2) = 9
 same sign + same sign + same sign + 7 + (+2) same sign +

DIFFERENT SIGN SUBTRACT (- means subtract)
sign of the larger number is the sign of the answer

-5 + 3 = -2 5 - 3 = 2 5 + (-3) = 2 -5 - (-3) = -2
 diff sign - diff sign - diff sign - -5 + (+3) diff sign -

-7 + 2 = -5 7 - 2 = 5 7 + (-2) = 5 -7 - (-2) = -5
 diff sign - diff sign - diff sign - -7 + (+2) diff sign -

Multiplying, Dividing Integers

SAME SIGN POSITIVE (+ means positive)

5 • 3 = 15 15 ÷ 3 = 5 -5 • (-3) = 15 -15 ÷ (-3) = 5
 same sign + same sign + same sign + same sign +

7 • 2 = 14 14 ÷ 2 = 7 -7 • (-2) = 14 -14 ÷ (-2) = 7
 same sign + same sign + same sign + same sign +

DIFFERENT SIGN NEGATIVE (- means negative)

any combination of a positive and negative = NEGATIVE

5 • (-3) = -15 -15 ÷ 3 = -5 -5 • 3 = -15 15 ÷ (-3) = -5
 diff sign - diff sign - diff sign - diff sign -

7 • (-2) = -14 -14 ÷ 2 = -7 -7 • 2 = -14 14 ÷ (-2) = -7
 diff sign - diff sign - diff sign - diff sign -

Solving Equations

Step 1: distribute if necessary, combine like terms

Step 2: add or subtract terms to get x term alone

Step 3: multiply or divide to get x = answer

If a term that needs to be moved is positive, subtract it from both sides
 If a term that needs to be moved is negative, add it to both sides

$x + 5 = 6$
 $x + 5 = 6$
 $-5 \quad -5$
 $x = 1$

Subtract 5 from both sides.

$8x = 32$

$x = 4$

Divide 8 from both sides.

$x - 12 = -3$
 $x - 12 = -3$
 $+12 \quad +12$
 $x = 9$

Add 12 to both sides.

$\frac{3}{5}x = 9$

$x = \frac{45}{3} = 15$

Multiply by reciprocal (5/3) on both sides.

$4x + 3(2x + 5) = 7x + 9$

$4x + 3(2x + 5) = 7x + 9$

$4x + 6x + 15 = 7x + 9$

$10x + 15 = 7x + 9$

$-7x \quad -7x$

$3x + 15 = 9$

$-15 \quad -15$

$3x = -6$

$x = -2$

1. Distribute 3
2. Combine like terms
3. Subtract 7x
4. Subtract 15
5. Divide by 3

$x + 3 < 5$

$x + 3 < 5$

$-3 \quad -3$

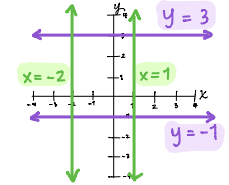
$x < 2$

$-5x > -20$

$-5x > -20$

$-5 \quad -5$

$x < 4$



< > ≤ ≥

SYMBOL SWITCHES DIRECTION when multiplying or dividing by a negative number!

y = number is a **HORIZONTAL LINE** going through the given y-value. This is when the **slope is ZERO**.

x = number is a **VERTICAL LINE** going through the given x-value. This is when the **slope is UNDEFINED**.

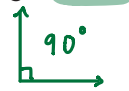
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Angles

Acute < 90°



Right = 90°



Obtuse > 90°



Triangles

Scalene:

no sides equal



Isosceles:

2 sides equal



Equilateral:

3 sides equal



Right:

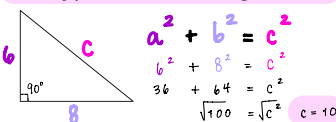
right angle 90°



Pythagorean Theorem

$a^2 + b^2 = c^2$

c is hypotenuse, longest side



Distance = rate • time, **d=rt**

Simple interest **I = prt**

I: interest, p: principle, r: rate

Temperature Conversion

$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$

$^{\circ}\text{F} = 9/5 (^{\circ}\text{C}) + 32$

Evaluating Square Roots

$\sqrt{20}$
 $= \sqrt{4 \cdot 5}$
 $= 2\sqrt{5}$

$\sqrt{45}$
 $= \sqrt{9 \cdot 5}$
 $= 3\sqrt{5}$

Split the radical into two factors, where the first is a perfect square

$\sqrt{75}$
 $= \sqrt{25 \cdot 3}$
 $= 5\sqrt{3}$

$\sqrt{98}$
 $= \sqrt{49 \cdot 2}$
 $= 7\sqrt{2}$

Scientific Notation

First number MUST be a single digit.

2,300

2.3 x 10³

5,678,000

5.678 x 10⁶

0.00417

4.17 x 10⁻³

0.00005

5.0 x 10⁻⁵

Perfect Squares

1² = 1

2² = 4

3² = 9

4² = 16

5² = 25

6² = 36

7² = 49

8² = 64

9² = 81

10² = 100

11² = 121

12² = 144

13² = 169

14² = 196

15² = 225

16² = 256

17² = 289

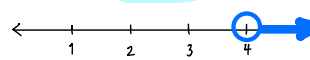
18² = 324

19² = 361

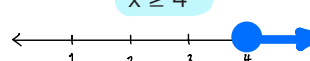
20² = 400

Inequalities

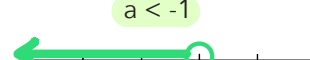
$x > 4$



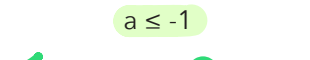
$x \geq 4$



$a < -1$



$a \leq -1$



Absolute Value

Always positive, is the distance of a number from zero.

$|-6| = 6$

$|-20| = 20$

$|6| = 6$

$|20| = 20$

$-|6| = -6$

$-|20| = -20$

$-|-6| = -6$

$-|-20| = -20$

Slope = rise over run

rise/run

change in y/change in x

Slope intercept $y = mx + b$

Point Slope $y - y_1 = m(x - x_1)$