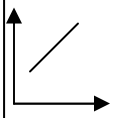
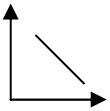
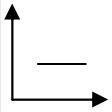
Slopes & Lines



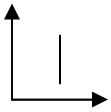
Slope > 1



Slope < 1



Slope = 0
Y = number



Slope undefined
X =number

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

Slope-Intercept Form
y = mx + b
m = slope
b = y-intercept

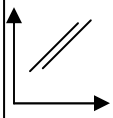
Point-Slope form
$y-y_1 = m(x-x_1)$
(x_1,y_1) = y-intercept

Standard Form
Ax + By = C

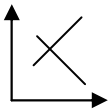
X-intercept
To find x-intercept, y=0

Y-intercept
To find y-intercept, x=0

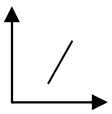
Number of Solutions



Parallel
No solution

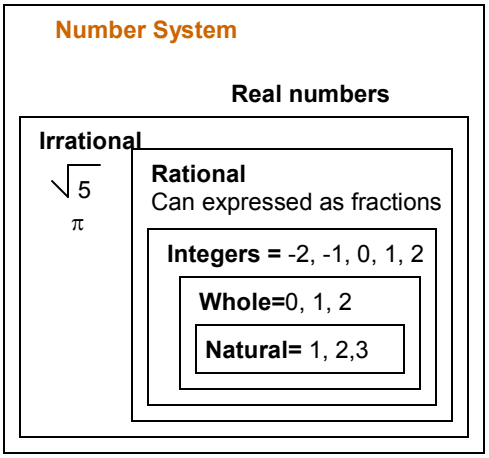


Intersecting
One solution



overlapping
Many solutions

Number System



Properties of Operations

	addition	Multiplication
Commutative	a + b = b + a	a x b = b x a
Associative	(a+b)+c = a+(b+c)	(ab)c = a(bc)
Identity	a+0 = a	a x 1 = a
Inverse	inverse of 5 is -5	inverse of 5 is 1/5
Distributive		a·(b+c)=(a·b)+(a·c)

Properties of Equality & Inequality

	equality	inequality
Reflexive	a = a	
Symmetric	If a = b, then b =a	
Transitive	If a=b & b=c, then a = c	If a<b & b<c, then a<c
Addition	If a=b, then a+c = b+c	If a<b, then a+c < b + c
Subtraction	If a=b, then a – c = b – c	If a<b, then a – c < b – c
Multiplication	If a=b, then a x c = b x c	If a<b, then a x c < b x c
Division	If a=b, then a/c = b/c	If a<b, then a/c < b/c

To find equation of line

through A (3, 7) & B (–3,2)
Note: basic equation is y = mx + b

1) Find slope using A and B

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-2}{3-(-3)} = \frac{5}{6}$$

2) Re-write basic equation with actual m

$$y = \frac{5}{6}x + b$$

3) Pick A or B to substitute in for x & y
In this example we will use B (–3,2)

$$2 = \frac{5}{6}(-3) + b$$

4) Solve for b $\quad b = \frac{9}{2}$

5) Rewrite basic equation with numbers

$$y = \frac{5}{6}x + \frac{9}{2}$$ DONE

Graphing lines

Using y = mx + b
1) Find b on the y-axis
2) Follow the slope by up/down then right/left
3) Connect the points

Using X & Y-Intercept
1) Find x-intercept using y=0
2) Plot the x-intercept
3) Find y-intercept using x=0
4) Plot the y-intercept
5) Connect the points

Exponents

Multiplication – add exponents

$$50^3 \times 50^4 = 50^7$$

Division – subtract exponents

$$\frac{50^6}{50^4} = 50^2$$

Exponent to an exponent – multiply

$$\left(50^6\right)^3 = 50^{18}$$

Exponent to parenthesis

$$(15 \times 8)^3 = 15^3 \times 8^3$$

$$\left(\frac{15}{8}\right)^3 = \frac{15^3}{8^3}$$

Negative Exponent

$$25^{-2} = \frac{1}{25^2} = \frac{1}{625}$$

Zero Exponent - always equals 1
Any number to the zero = 1
for example: $345^0 = 1$

Roots

Addition

$$3\sqrt{5} + 4\sqrt{5} = 7\sqrt{5}$$

Subtraction

$$7\sqrt{5} - 4\sqrt{5} = 3\sqrt{5}$$

Product

$$\sqrt[2]{15 \times 25} = \sqrt[2]{15} \times \sqrt[2]{25}$$

Quotient

$$\sqrt[4]{\frac{15}{25}} = \frac{\sqrt[4]{15}}{\sqrt[4]{25}}$$

Root of a root

$$\sqrt[3]{\sqrt[5]{25}} = \sqrt[3\times5]{25} = \sqrt[15]{25}$$

Factoring

Perfect Squares:
$(a + b)^2 = a^2 + 2ab + b^2$

Difference of Squares:
$(a - b)^2 = a^2 - 2ab + b^2$

Sum of Cubes:
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Difference of Cubes:
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Quadratic Formula

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

Discriminant

$b^2 - 4ac > 0$, two real solutions
$b^2 - 4ac = 0$, one real solution
$b^2 - 4ac < 0$, no real solution

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula

$$x_{mp} = \frac{x_2 + x_1}{2} \quad ; \quad y_{mp} = \frac{y_2 + y_1}{2}$$

Pythagorean Theorem

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

c = hypothenus