

1) laws of exponents

$$x^m x^n = x^{m+n}$$

$$(x^m)^n = x^{mn}$$

$$x^n + x^n = 2x^n$$

$$x^{-m} = + \frac{1}{x^m}$$

$$x^{\frac{1}{m}} = \sqrt[m]{x}$$

$$2^3 \cdot 2^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$$

$$(2^2)^3 = (2 \cdot 2)(2 \cdot 2)(2 \cdot 2) = 2^6$$

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$(16)^{\frac{1}{2}} = \sqrt{16} = 4$$

exp
mult
add
nothing

2) multiplication and division

$$a \div b = a \cdot \frac{1}{b}$$

$$\frac{4}{\frac{2}{3}} = 4 \cdot \frac{3}{2}$$

4) When you are doing any type of factoring, always look for **common factors** first! Do it!

$$6x^2 - 24 \Rightarrow 6(x^2 - 4)$$
$$6(x^2 - 4) \Rightarrow 6((x+2)(x-2))$$

3) % to decimal to %

$$.32 = 32\%$$

$$32\% = .32$$

$$4\% = .04$$

$$.2\% = .002$$

$$(\times 100)$$

$$(\div 100)$$

$$(\div 100)$$

(not .2!)

$$\frac{32}{100}$$

"per-cent"

increase by 20%

$$1.2X$$

$$120\% \text{ of } X$$

$$X + 20\% X$$

"of" means "times"

decrease by 15%

$$.85X$$

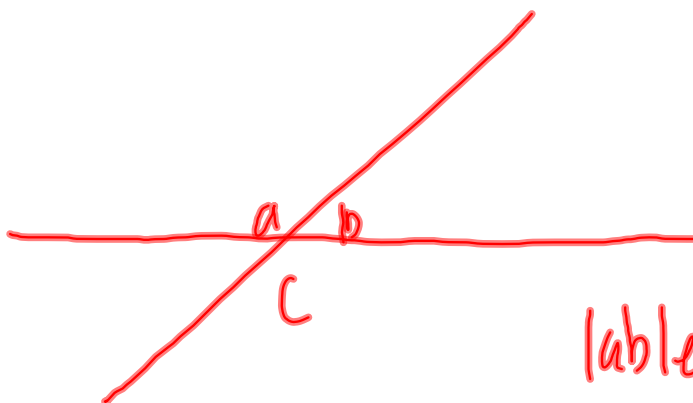
$$85\% \text{ of } X$$

$$X - .15X$$

7) straight angle = 180
vertical angles

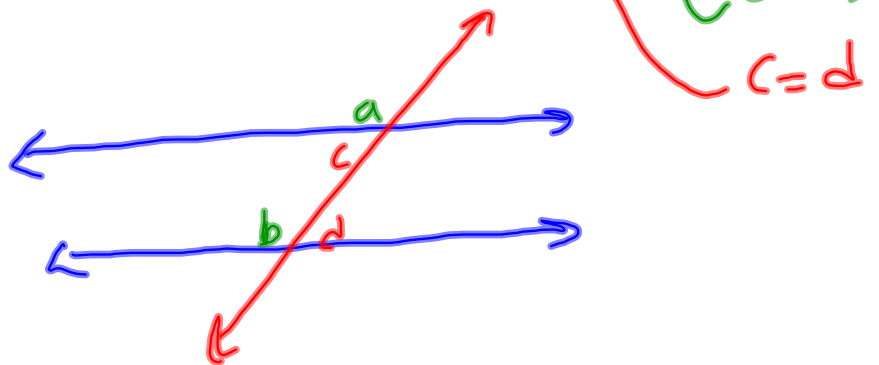
$$a+b=180$$

$$\angle a = \angle c$$



label "blank" angles

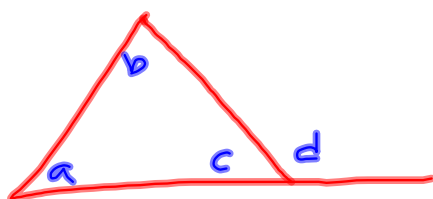
8) If two parallel lines are crossed by a transversal, alternate interior angles are congruent, and corresponding angles are congruent



9) The sum of the angles in a triangle is 180 degrees

make your own triangle
(add a line to figure)

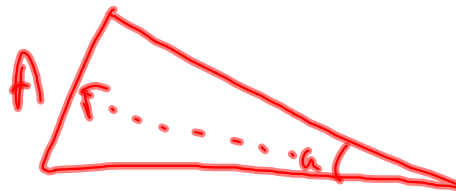
10) the exterior angle of a triangle is equal to the some of the two remote interior angles. Well, duh!



$$a + b + c = 180$$
$$d + c = 180$$

$$a + b = d$$

11) In any triangle, the largest side is opposite the biggest angle, and the smallest side is opposite the smallest angle.



And...

The sum of any 2 sides is greater than the 3rd side.

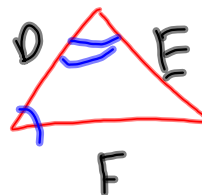
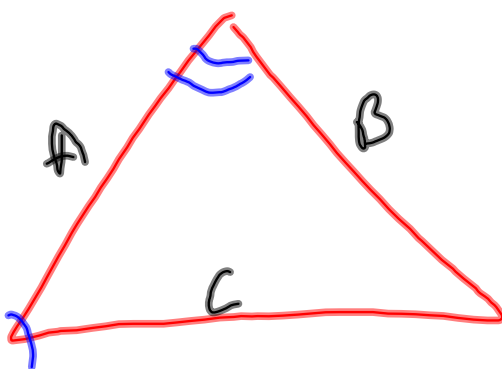


And...

The difference of any 2 sides is less than the third side

12) in an isosceles triangle the base angles are equal. And if the base angles are equal, the triangle is isosceles.

13) if 2 triangles are similar, then all the angles are the same. Also, the corresponding sides are all in the same proportion.



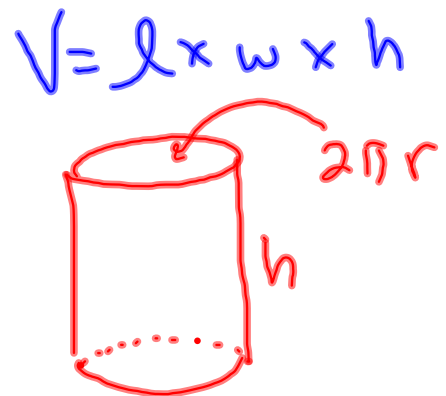
$$\frac{A}{D} = \frac{B}{E}$$

$$\frac{A}{B} = \frac{D}{E}$$

14) volume of a solid

Box = rectangular solid
 general (regular solid)

$$V = A_{\text{base}} \times h$$



15) to find the y-intercept of any graph,
 set $x = 0$. To find the x-intercept, set
 $y = 0$.

$$ax + by = c$$

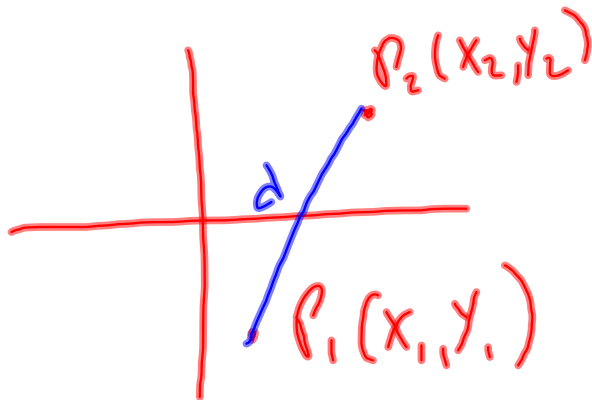
$$y = ax^2 + bx + c$$

(y-int) $0 + by = c$
 $y = \frac{c}{b}$

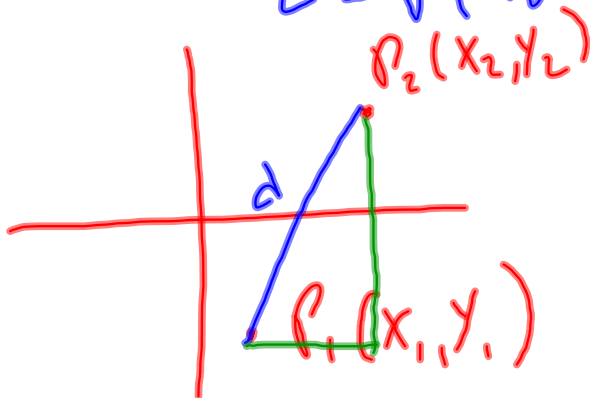
$$0 = ax^2 + bx + c$$

(x-int)

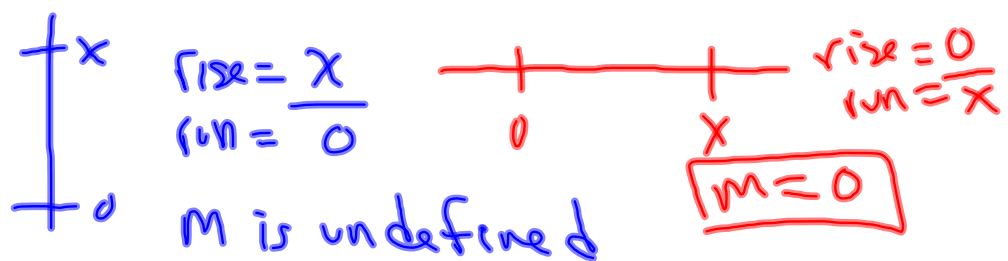
16) distance formula



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



17) a vertical line has no slope (slope is undefined) and a horizontal line has a slope = 0.

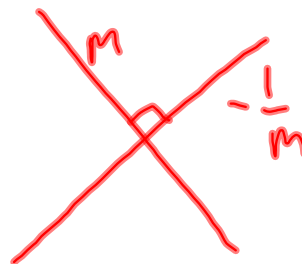


18) Parallel lines have equal slopes.

Perpendicular lines have slopes that are negative reciprocals.

$$\text{Product} = -1$$

$$m \left(-\frac{1}{m} \right) = -1$$



19) Standard form of a parabola:

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

c is y -intercept (let $x=0$)

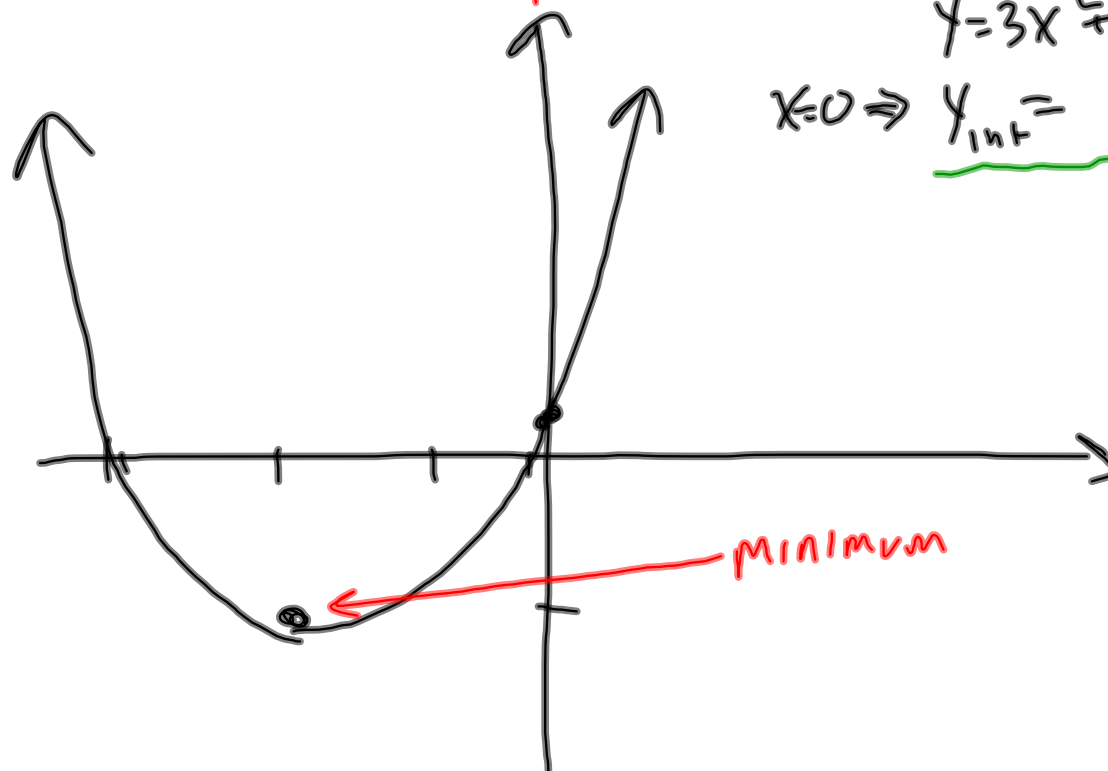
If $a > 0$ parabola is concave up

If $a < 0$ parabola is concave down

If $a = 0$ parabola is flat :)

$$y = 3x^2 + 6x + 1$$

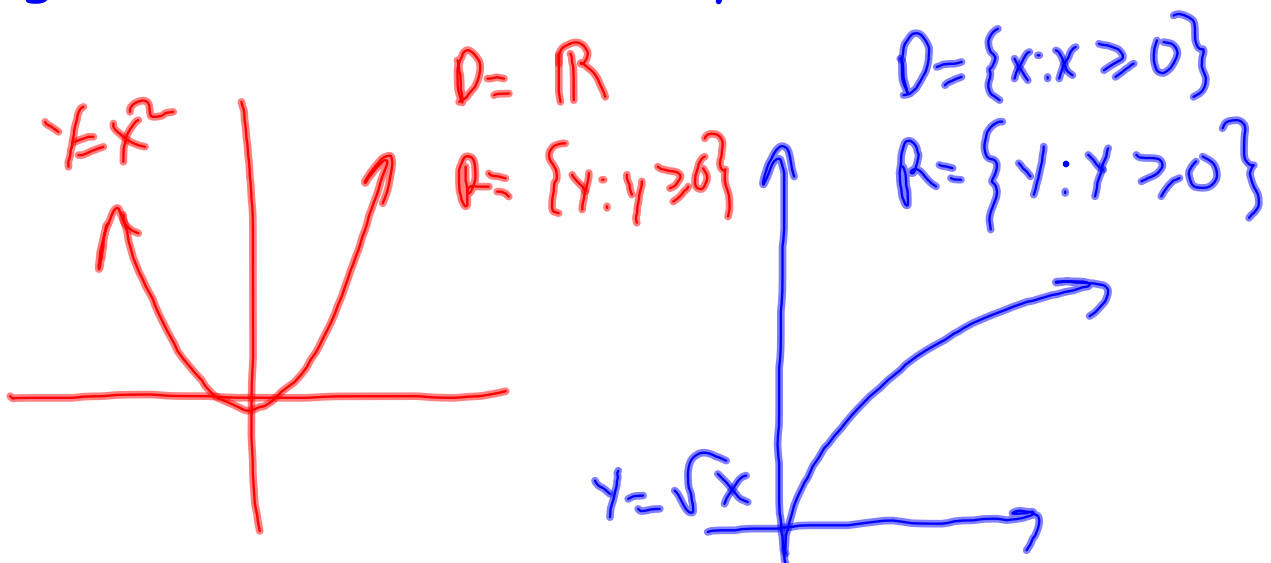
$3 > 0$ concave up



$$y = 3x^2 + 6x + 1$$

$x = 0 \Rightarrow \underline{y_{int} = 1}$

20) The domain of a function is the set of all possible values you can give the function (x coordinates). The range of a function is the set of all values you can get out of the function (y coordinates).



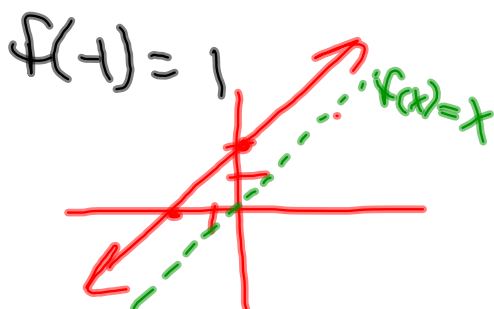
$$21) y=f(x-h)+k$$

$$y=f(x)$$

$$y=f(x-h) \quad h=2$$

translation 2 to the right
on x-axis

$$f(x) = x+2$$



$$f(x) \rightarrow f(x) + k$$

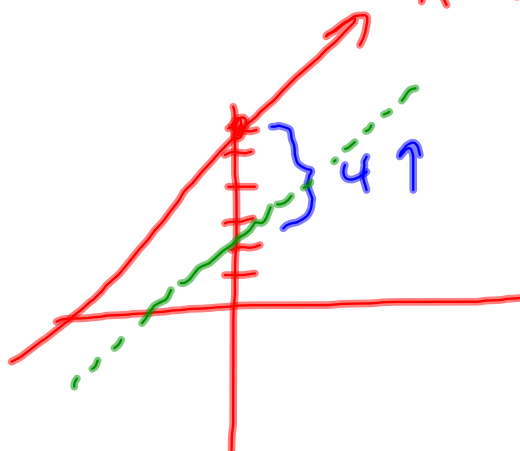
translates k units up

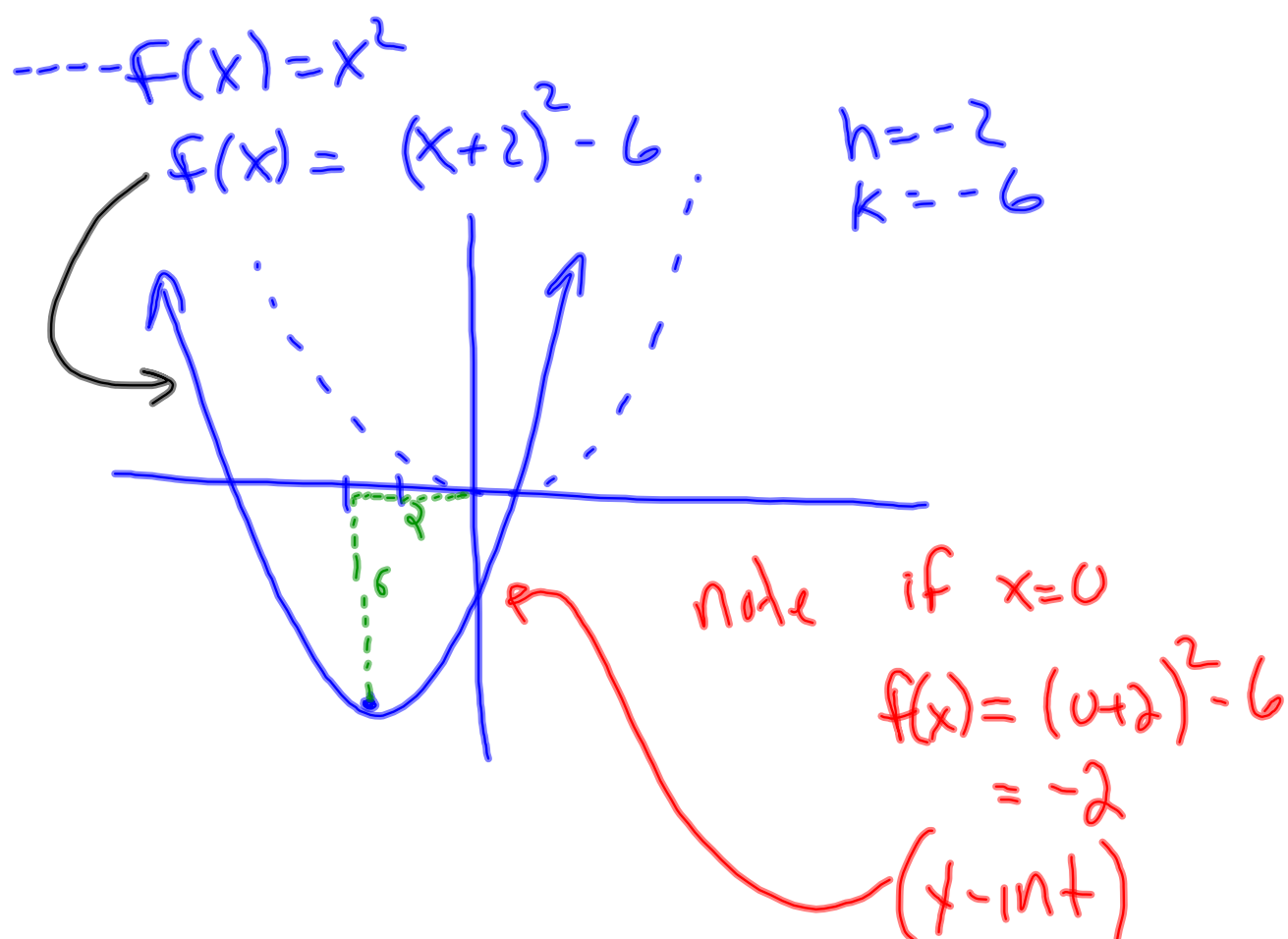
$$f(x) = x + 2$$



$$f(x) + 4 = \underbrace{x + 2} + 4$$

$x + b$





22) If you have n things and m things there are $m \cdot n$ different ways to combine them.

6 kids }
3 shirts } 18 diff poss

23) E - event

$P(E)$ = probability that E occurs

$$P(E) = \frac{\# \text{ ways E can happen}}{\# \text{ possible outcomes}}$$

3 boys
3 girls
3 shirts { red
 green
 blue

E. boy in green shirt
3 ways

6 x 3 possible outcomes

$$P(E) = \frac{3}{18} = \frac{1}{6} = 0.17$$

The stuff on the rest of these pages really won't help much at all on the SAT, but it is related to topics that come up. So, look it over, but don't kill yourself. If time is tight, forget it

an "impossible" event has $P(E)=0$

a "certain" event has $P(E) = 1$

For any number of mutually exclusive outcomes, the sum $P(E)s = 1$

toss a fair coin

$$P(h) = \frac{1}{2}$$

$$P(t) = \frac{1}{2}$$

$$1$$

toss of a fair die

$$P(1) = \frac{1}{6}$$

$$P(2) = \frac{1}{6}$$

⋮

$$P(6) = \frac{1}{6}$$

$$1$$

5) quadratic formula

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

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

2 solutions

$$y = ax^2 + bx + c \quad (\text{parabola})$$

→ solutions = "roots" = x-intercepts

$$\text{discriminant} = b^2 - 4ac$$

 > 0 2 real roots $= 0$ 1 "double" root < 0 2 complex conjugate roots

$$6) \quad ax^2 + bx + c = 0$$

$$\text{sum roots} = -b/a$$

$$\text{product of roots} = c/a$$

19) Standard form of a parabola:

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

the x-coordinate of the vertex is $-b/2a$

the solution to $0 = ax^2 + bx + c$ gives you the x-intercepts.

$$y = 3x^2 + 6x + 1$$

$3 > 0$ concave up ①

$$V_x = -\frac{b}{2a} = -1$$

$$V_y = 3(-1)^2 + 6(-1) + 1 = 3 - 6 + 1 = -2$$

$$V(-1, -2) \text{ ②}$$

$$x = \frac{-6 \pm \sqrt{36 - 4(3)}}{6} = \frac{-6 \pm \sqrt{24}}{6} \approx \frac{-6 \pm 5}{6} = \frac{-6 \pm 5}{6} \text{ ③}$$

$$\approx \frac{-6 + 5}{6} = -\frac{1}{6}$$

$$\approx \frac{-6 - 5}{6} = -\frac{11}{6}$$