PowerScore

ACT Math Flash Cards

Formulas, definitions, and concepts for success on the ACT Mathematics Test

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How to Study Math Flash Cards

Review each card, and remove any formulas that you already know. Study only the cards with formulas that you have not yet memorized. To increase your retention of the formulas, try these study methods:

1. **Write out the formulas and their components.** Transferring the formulas to paper helps transfer the information into your long-term memory.
2. **Group formulas by content area.** By placing the cards in groups, such as "Circles" or "Transformations," you can begin to see connections between formulas that may help with memorization.

(Continued on back of card)

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Order of Operations

A fundamental principle of all math is the order of operations. This rule sets precedence for which operations are preformed first when solving or simplifying expressions and equations. The six operations are addition, subtraction, multiplication, division, exponentiation, and grouping, and their order of precedence is often remembered using the acronym PEMDAS.

Each of the letters in PEMDAS represents an operation and its order of priority:

P arentheses (grouping) *1st*
E xponents *2nd*
M ultiply → *3rd*
D ivide →
A dd → *4th*
S ubtract →

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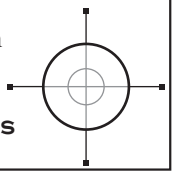
How to Study Math Flash Cards

3. **Write sample questions that require each formula.**
   You can find existing questions from *The Real ACT Prep Guide* grouped by content in the Red Book Database on the book owner's website. Use these questions to write your own example questions, along with detailed solutions to your questions. The most effective strategy for learning information is to teach the information to someone else.
4. **Have someone quiz you.**
   Enlist a family member or friend to quiz you on each flash card. If you correctly identify or explain a formula, place a check mark in the target on the flash card. Once a formula is completely memorized, remove it from your stack of flash cards.



PowerScore
ACT Math Bible Flash Cards

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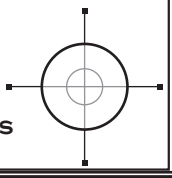

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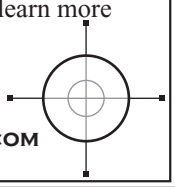


Order of Operations

P E M D A S

Let's look at an example of an expression in which of the order of operations is required:

$$5(1 + 4)^2 - 10$$

Begin with operation in the parentheses (P):

$$5(1 + 4)^2 - 10 = 5(5)^2 - 10$$

Now remove the exponents (E):

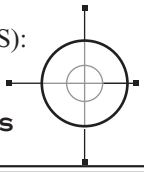
$$5(5)^2 - 10 = 5(25) - 10$$

Multiplication and division are next (M/D):

$$5(25) - 10 = 125 - 10$$

Finally, addition and subtraction are performed (A/S):

$$125 - 10 = 115$$



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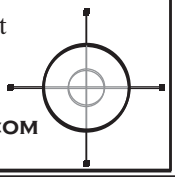

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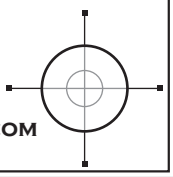
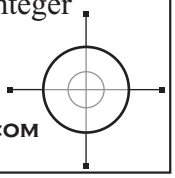


integer

Any number in the set of positive and negative whole numbers and zero:

{…–4, –3, –2, –1, 0, 1, 2, 3, 4…}

- Integers do not include fractions or decimals
- Integers are the most commonly used numbers on the ACT
- It is important to remember that 0 is an integer



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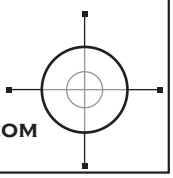
set

A collection of numbers marked by brackets:

{4, 6, 9, 13}

- Sets can contain any amount of numbers
- Sets may have rules, such as "all even integers"



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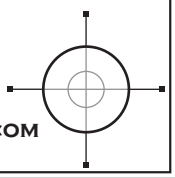
digit

The numbers 0 through 9:

{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

- *Place* is used to represent where in a number a digit occurs
- The ones digit or units digit in 3748 is 8
- The tens digit in 3748 is 4
- The hundreds digit in 3748 is 7



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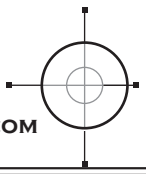
sum

The amount obtained by adding numbers

- The sum of 2, 3, and 4 is 9: (2 + 3 + 4 = 9)
- The sum of x and y is $x + y$



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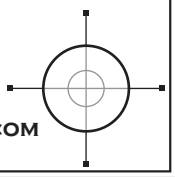
product

The amount obtained by multiplying numbers

- The product of 2, 3, and 4 is 24: (2 × 3 × 4 = 24)
- The product of x and y is xy



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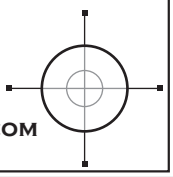
multiple

An integer that is divisible by another integer without a remainder

- Multiples of 3 include {–6, –3, 3, 6, 9, 12}
- Multiples of 4 include {–8, –4, 4, 8, 12, 16}



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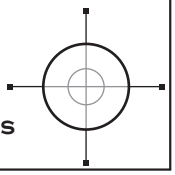
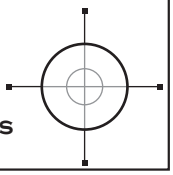
DEFINITION

set



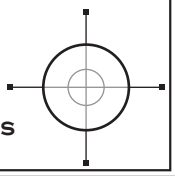
DEFINITION

integer



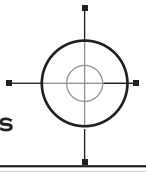
DEFINITION

sum



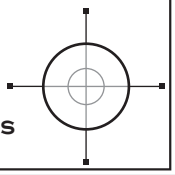
DEFINITION

digit



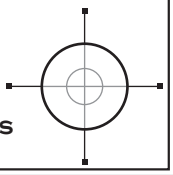
DEFINITION

multiple



DEFINITION

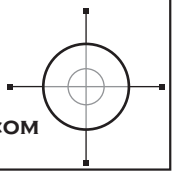
product



divisible

Describes a number capable of being divided without a remainder. A number that is divisible by x is also said to be a multiple of x.

- 18 is divisible by 1, 2, 3, 6, 9, and 18
- xy is divisible by 1, x, y, and xy



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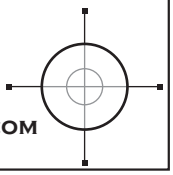
factor

One of two or more numbers that divides into a larger number without a remainder

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6
- Factors of xy include 1 and xy, plus x and y



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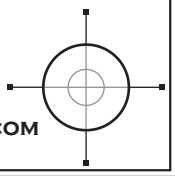
10 prime numbers

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...}

Additional prime numbers under 100:

{31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97}



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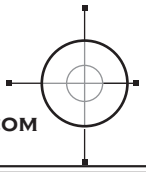
prime number

An integer that does not have any factors besides itself and 1

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...}

- One (1) is not a prime number
- When prime numbers are multiplied together, the product's factors are limited to itself, one, and the prime numbers themselves



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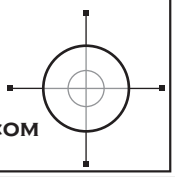
prime factor

Prime numbers that divide into a larger number without a remainder

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6; the prime factors are 2 and 3



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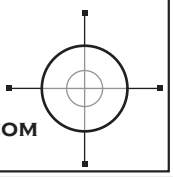
common factor

A factor shared by two numbers

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6.
- Factors of 15 are 1 and 15 and 3 and 5.
- The common factors of 15 and 18 are 1 and 3.



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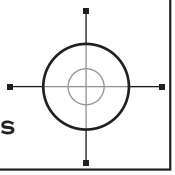
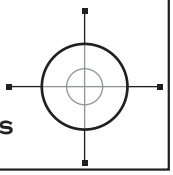
DEFINITION

factor



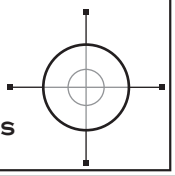
DEFINITION

divisible



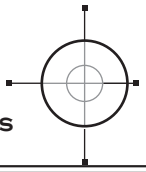
DEFINITION

prime number



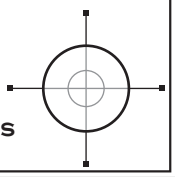
ARITHMETIC

What are the first
10 prime numbers?



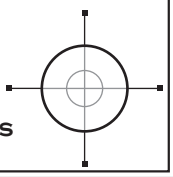
DEFINITION

common factor



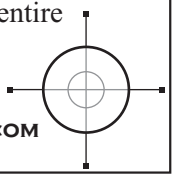
DEFINITION

prime factor



Rules of Divisibility

2: If the last digit of a number is even, it is a multiple of 2.
3: If the sum of the digits is divisible by 3, the entire integer is a multiple of 3.
4: If the last two digits are a multiple of 4, the entire number is a multiple of 4.
5: If the last digit ends in 0 or 5, the entire number is divisible by 5.
6: If the number is both divisible by 2 and 3, it is divisible by 6.
9: If the sum of the digits is divisible by 9, the entire integer is a multiple of 9



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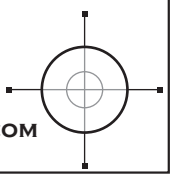
Addition of Integers

even + even = even
odd + odd = even
odd + even = odd

positive + positive = positive
negative + negative = negative
positive + negative = can be either



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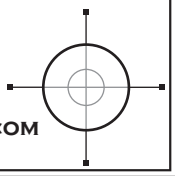
Fraction Equivalent

0.125



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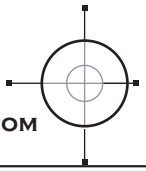
Multiplication of Integers

even × even = even
odd × odd = odd
odd × even = even

positive × positive = positive
negative × negative = positive
positive × negative = negative



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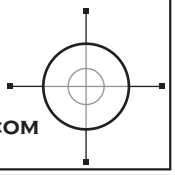
Fraction Equivalent

$0.16\overline{6}$



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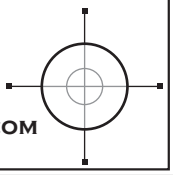
Fraction Equivalent

0.2



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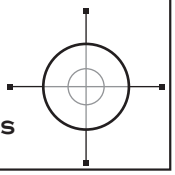
ARITHMETIC

Addition of Integers

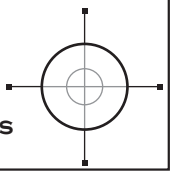
even + even =
odd + odd =
odd + even =

positive + positive =
negative + negative =
positive + negative =



SHORTCUT

Rules of Divisibility

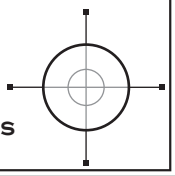


ARITHMETIC

Multiplication of Integers

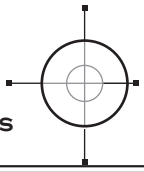
even + even =
odd + odd =
odd + even =

positive + positive =
negative + negative =
positive + negative =



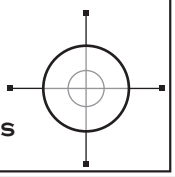
DECIMAL EQUIVALENT

$$\frac{1}{8}$$



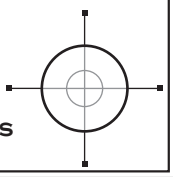
DECIMAL EQUIVALENT

$$\frac{1}{5}$$



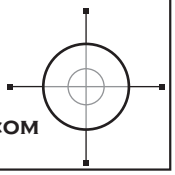
DECIMAL EQUIVALENT

$$\frac{1}{6}$$



Fraction Equivalent

0.25



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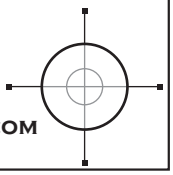
Fraction Equivalent

$0.3\overline{3}$



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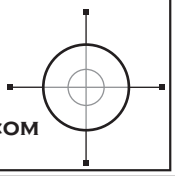
Fraction Equivalent

0.5



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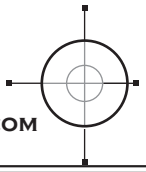
Fraction Equivalent

0.4



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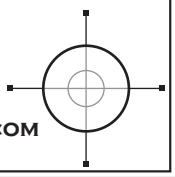
Fraction Equivalent

$0.6\overline{6}$



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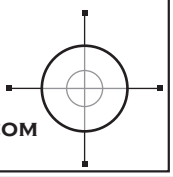
Fraction Equivalent

0.75



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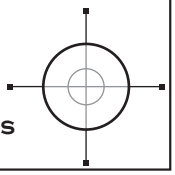
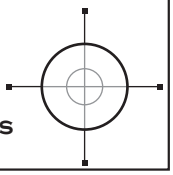
DECIMAL EQUIVALENT

$\frac{1}{3}$



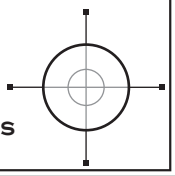
DECIMAL EQUIVALENT

$\frac{1}{4}$



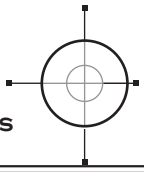
DECIMAL EQUIVALENT

$\frac{2}{5}$



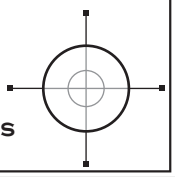
DECIMAL EQUIVALENT

$\frac{1}{2}$



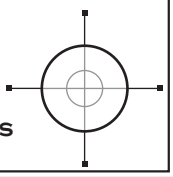
DECIMAL EQUIVALENT

$\frac{3}{4}$



DECIMAL EQUIVALENT

$\frac{2}{3}$



rate formula

$$r = \frac{d}{t}$$

r = rate d = distance t = time

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what percent?

$$\frac{x}{100} \text{ or } \frac{?}{100}$$

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average rate of speed

$$\frac{2 \times \text{rate}_1 \times \text{rate}_2}{\text{rate}_1 + \text{rate}_2}$$

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combined work

$$\frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} = \frac{1}{t_T}$$

t_1 = time of first person
t_2 = time of second person
t_3 = time of third person
t_T = time together

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plus, more than, added to, increased by, sum

$+$

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what? what number?

x, n, ?, or
other variable

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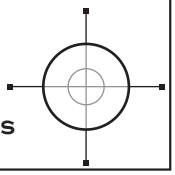
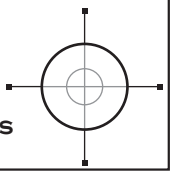
TRANSLATE

How do you represent the phrase “what percent”?



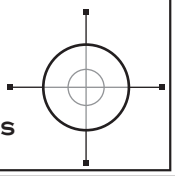
WORK AND RATES

What is the rate formula?



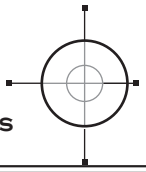
WORk AND RATES

What is the formula for combined work problems?



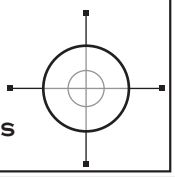
WORk AND RATES

What is the formula for average rate of speed?



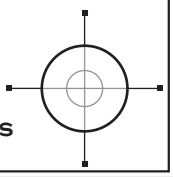
TRANSLATE

How do you represent “what” or “what number?”



TRANSLATE

How do you represent “plus,” “more than,” “added to,” “increased by,” and “sum?”



minus, less than, subtracted from, decreased by, reduced by, difference

$-$

(minus sign)

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of, times, product

$\times$

(multiplication sign)

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per, out of, quotient

$\div$

(division sign)

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is, equals, result

$=$

(equals sign)

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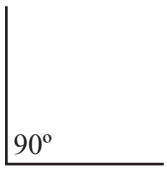
90º angle



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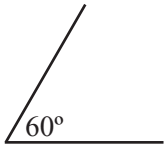
60º angle



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TRANSLATE

How do you represent "of," "times," or "product?"

TRANSLATE

How do you represent "minus," "less than," "subtracted from," "decreased by," "reduced by," and "difference?"

TRANSLATE

How do you represent "is," "equals," or "result?"

TRANSLATE

How do you represent "per," "out of," or "quotient?"

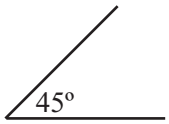
BENCHMARKS

Illustrate a 60º angle.

BENCHMARKS

Illustrate a 90º angle.

45º angle



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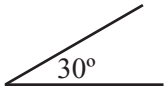
30º angle



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divide by same base

$$x^n \div x^m = x^{n-m}$$

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multiply by same base

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

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multiply by same power

$$(x^n)(y^n) = (xy)^n$$

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divide by same power

$$x^n \div y^n = (x \div y)^n$$

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BENCHMARKS

Illustrate a 30º angle.

BENCHMARKS

Illustrate a 45º angle.

EXPONENTS AND ROOTS

Multiplication of the same base:

$(x^n)(x^m)$

EXPONENTS AND ROOTS

Division of the same base:

$x^n \div x^m$

EXPONENTS AND ROOTS

Division with the same power:

$x^n \div y^n$

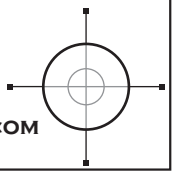
EXPONENTS AND ROOTS

Multiplication with the same power:

$(x^n)(y^n)$

base$^{-\text{negative}}$

$$\frac{1}{x^n}$$



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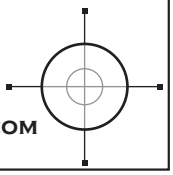
base^0

$$1$$

$$3^0 = 1 \text{ and } x^0 = 1$$



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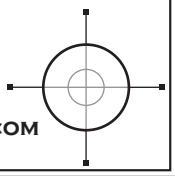
single base with powers

$$(x^n)^m = x^{n \times m}$$



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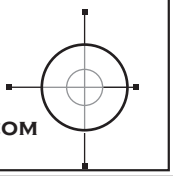
fractional exponents

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

$$x^{\frac{\text{power}}{\text{root}}} = \sqrt[\text{root}]{x^{\text{power}}}$$



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classic form #2

$$(x + y)^2 = x^2 + 2xy + y^2$$

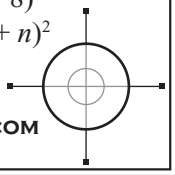
Examples:

$(t + 5)^2 \rightarrow t^2 + 2(t)(5) + 5^2 \rightarrow t^2 + 10t + 25$

$(3a + b)(3a + b) \rightarrow 9a^2 + 6ab + b^2$

$y^2 + 16y + 64 \rightarrow y^2 + 2(y)(8) + 8^2 \rightarrow (y + 8)^2$

$36 + 12n + n^2 \rightarrow 6^2 + 2(n)(6) + n^2 \rightarrow (6 + n)^2$



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classic form #1

$$(x + y)(x - y) = x^2 - y^2$$

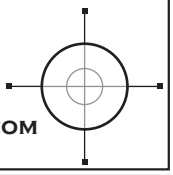
Examples:

$(t - 5)(t + 5) \rightarrow t^2 - 5^2 \rightarrow t^2 - 25$

$(3a + b)(3a - b) \rightarrow (3a)^2 - b^2 \rightarrow 9a^2 - b^2$

$y^2 - 64 \rightarrow y^2 - 8^2 \rightarrow (y + 8)(y - 8)$

$36 - n^2 \rightarrow 36^2 - n^2 \rightarrow (6 + n)(6 - n)$



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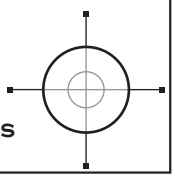
EXPONENTS AND ROOTS

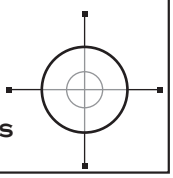
When a base is raised to the power of 0, what is the result?

For example, what is 3^0 or x^0?



EXPONENTS AND ROOTS

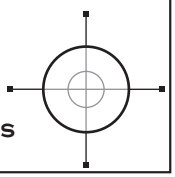
$$x^{-n}$$



EXPONENTS AND ROOTS

Fractional exponents:

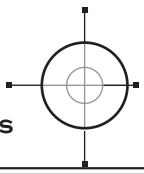
$$x^{\frac{n}{m}}$$



EXPONENTS AND ROOTS

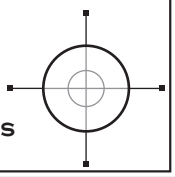
Multiplication of a single base with multiple powers:

$$(x^n)^m$$



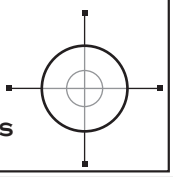
CLASSIC QUADRATIC FORM

$$(x + y)(x - y) =$$



CLASSIC QUADRATIC FORM

$$(x + y)^2 =$$



classic form #3

$$(x - y)^2 = x^2 - 2xy + y^2$$

Examples:

$(t - 5)^2 \rightarrow t^2 - 2(t)(5) + 5^2 \rightarrow t^2 - 10t + 25$

$(3a - b)(3a - b) \rightarrow 9a^2 - 6ab + b^2$

$y^2 - 16y + 64 \rightarrow y^2 - 2(y)(8) + 8^2 \rightarrow (y - 8)^2$

$36 - 12n + n^2 \rightarrow 6^2 - 2(n)(6) + n^2 \rightarrow (6 - n)^2$

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direct variation

$$y = cx$$

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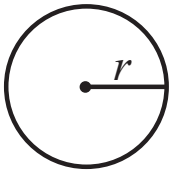
area of a circle

$$A = \pi r^2$$



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indirect variation

$$c = xy$$

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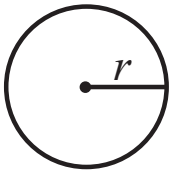
circumference of a circle

$$C = 2\pi r$$



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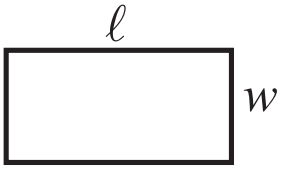
area of a rectangle

$$A = \ell w$$



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DIRECT VARIATION

What is the formula for direct variation?

CLASSIC QUADRATIC FORM

$$(x - y)^2 =$$

INDIRECT VARIATION

What is the formula for indirect variation?

CIRCLES

What is the formula for the area of a circle?

QUADRILATERALS

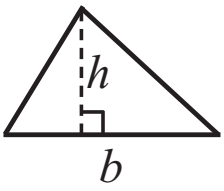
What is the formula for the area of a rectangle?

CIRCLES

What is the formula for the circumference of a circle?

area of a triangle

$$A = \frac{1}{2}bh$$



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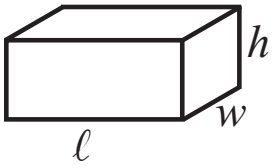
volume of a rectangular solid

$$V = \ell wh$$



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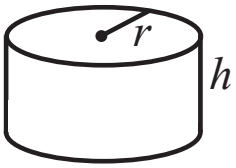
volume of a cylinder

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



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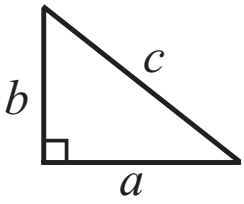
Pythagorean Theorem

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



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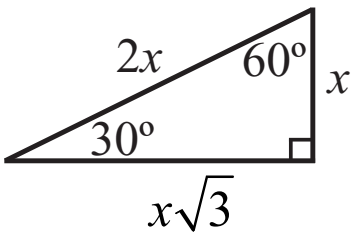
30º:60º:90º triangle



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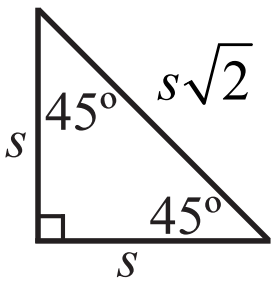
45º:45º:90º triangle



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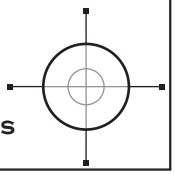
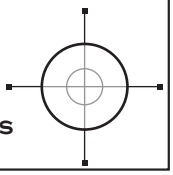
SOLIDS

What is the formula for the volume of a rectangular solid?



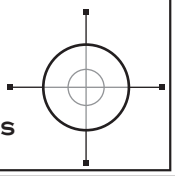
TRIANGLES

What is the formula for the area of a triangle?



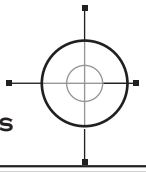
TRIANGLES

What is the Pythagorean Theorem?



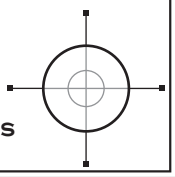
SOLIDS

What is the formula for the volume of a right circular cylinder?



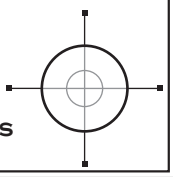
TRIANGLES

What are the assigned side ratios in a 45º:45º:90º triangle?



TRIANGLES

What are the assigned side ratios in a 30º:60º:90º triangle?



degrees of arc in a circle

360º

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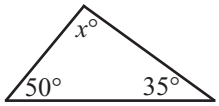
sum of the angles in a triangle

180º



$x° + 50° + 35° = 180°$ $x = 95°$

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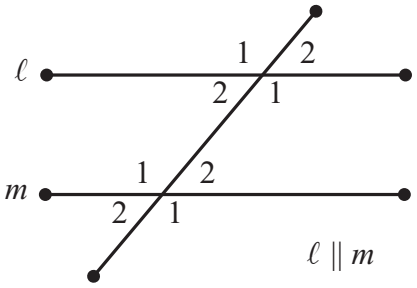
intersected parallel lines



$\ell \parallel m$

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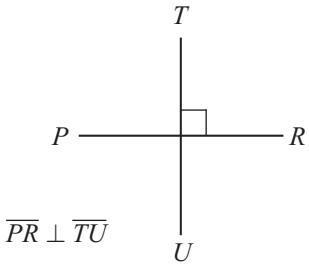
perpendicular lines

right angle



$\overline{PR} \perp \overline{TU}$

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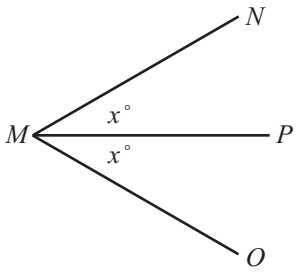
bisect

bisect = to divide in two equal parts



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perimeter of a triangle

perimeter = $s_1 + s_2 + s_3$

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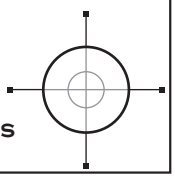
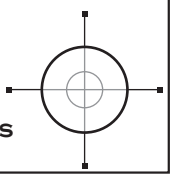
TRIANGLES

What is the sum of of the measures in degrees of the angles of a triangle?



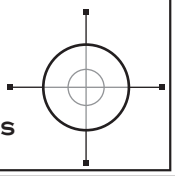
CIRCLES

How many degrees of arc are in a circle?



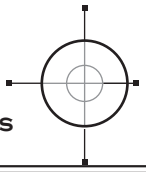
LINES AND ANGLES

What angle is created by the intersection of perpendicular lines?



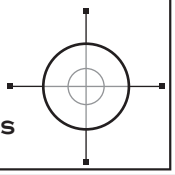
LINES AND ANGLES

What relationship results when two or more parallel lines are intersected by a transversal?



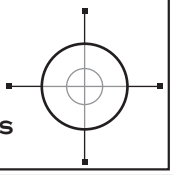
BASIC TRIANGLES

What is the formula for finding the perimeter of a triangle?



LINES AND ANGLES

What is the definition of "bisect?"



sum of the lengths of 2 sides

The sum of the lengths of any two sides of a triangle is always greater than the length of the remaining side.

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sum of the angles in a triangle

180º

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Pythagorean Triples

3 : 4 : 5
5 : 12 : 13
7 : 24 : 25
8 : 15 : 17
9 : 40 : 41
12 : 35 : 37
20 : 21 : 29

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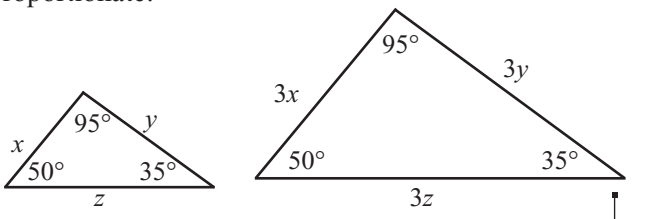
similar triangles

Triangles that have the exact same shape but different area. The corresponding angle measurements of similar triangles are equal, and the corresponding side lengths are proportionate:



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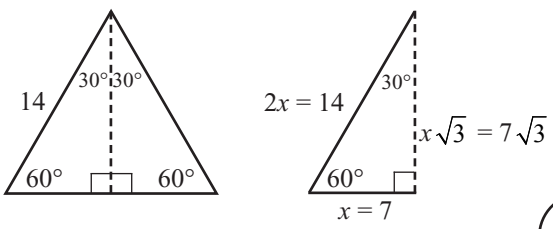
hidden triangles

Two 30º:60º:90º triangles are hidden in every equilateral triangle:



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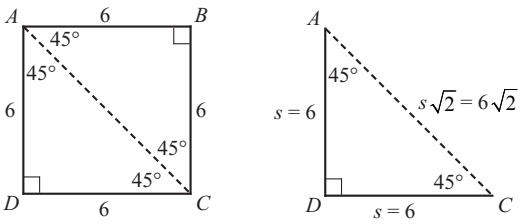
hidden triangles

Two 45º:45º:90º triangles are hidden in every square:



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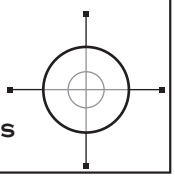
BASIC TRIANGLES

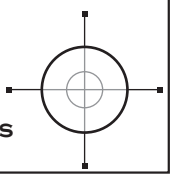
What is the sum of of the measures in degrees of the angles of a triangle?



BASIC TRIANGLES

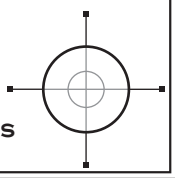
The sum of the lengths of any two sides of a triangle is always greater than

_____.



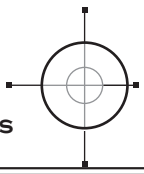
BASIC TRIANGLES

What are similar triangles?



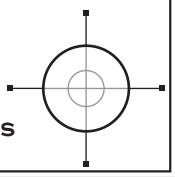
SPECIAL TRIANGLES

Name the most common Pythagorean Triples.



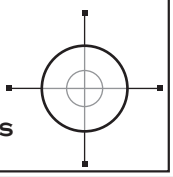
SPECIAL TRIANGLES

What is hidden in a square?



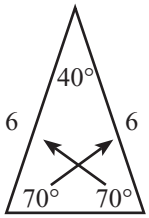
SPECIAL TRIANGLES

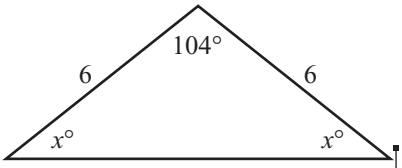
What is hidden in an equilateral triangle?



isosceles triangles

An isosceles triangle has two sides of equal length and two angles of equal size. The two equal angles are opposite the two equal-length sides:





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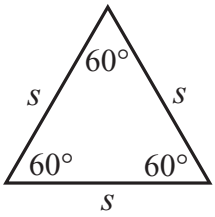
equilateral triangles

Equilateral triangles have equal side lengths and equal angle measurements. Since the interior angles of a triangle add up to 180˚, the three angles of an equilateral triangle must each equal 60°:



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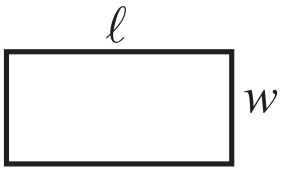
perimeter of a rectangle

$$P = 2\ell + 2w$$



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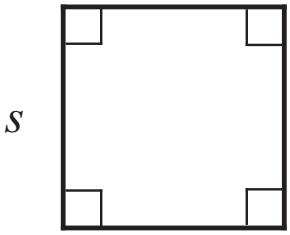
area of a square

$$A = \ell w \text{ or } s^2$$



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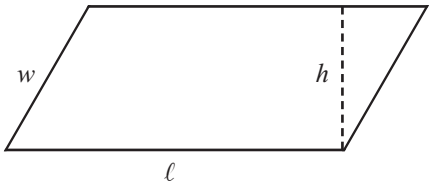
area of a parallelogram

$$A = \ell h$$



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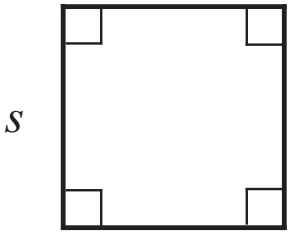
perimeter of a square

$$P = 4s$$



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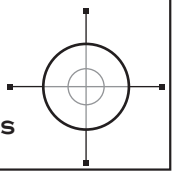
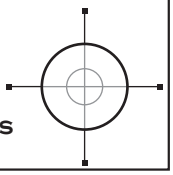
SPECIAL TRIANGLES

What is an equilateral triangle?



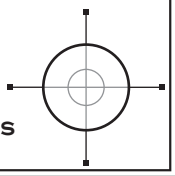
BASIC TRIANGLES

What is an isosceles triangle?



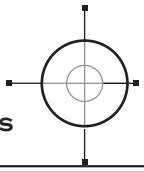
QUADRILATERALS

What is the formula for the area of a square?



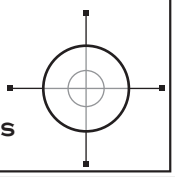
QUADRILATERALS

What is the formula for the perimeter of a rectangle?



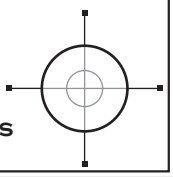
QUADRILATERALS

What is the formula for the perimeter of a square?



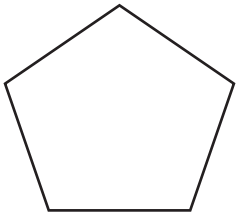
QUADRILATERALS

What is the formula for the area of a parallelogram?

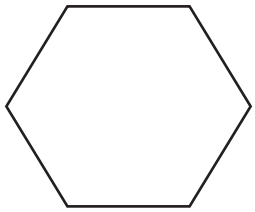


regular polygons

Polygons that have equal side lengths and equal angle measurements are called regular polygons.



Regular Pentagon



Regular Hexagon

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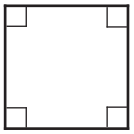
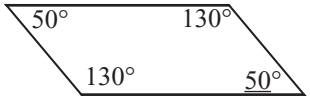
interior angles of a quadrilateral

360°





$90^\circ+90^\circ+90^\circ+90^\circ=360^\circ$

$50^\circ+130^\circ+50^\circ+130^\circ=360^\circ$

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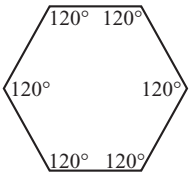
interior angles of a hexagon

720°



$120^\circ + 120^\circ + 120^\circ + 120^\circ + 120^\circ + 120^\circ = 720^\circ$

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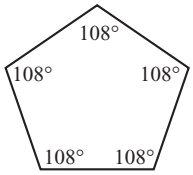
interior angles of a pentagon

540°



$108^\circ + 108^\circ + 108^\circ + 108^\circ + 108^\circ = 540^\circ$

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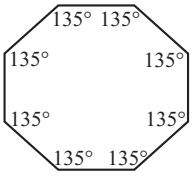
interior angles of a octagon

1080°



$135^\circ+135^\circ+135^\circ+135^\circ+135^\circ+135^\circ+135^\circ+135^\circ = 1080^\circ$

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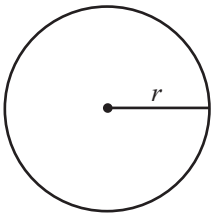
circumference of a circle

$$C = 2\pi r$$



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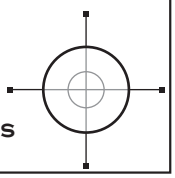
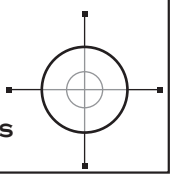
POLYGONS

What is the sum of the interior angles of a quadrilateral?



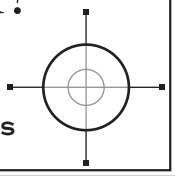
POLYGONS

What is a regular polygon?



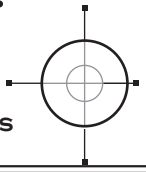
POLYGONS

What is the sum of the interior angles of a pentagon? What is the measure of each angle in a regular pentagon?



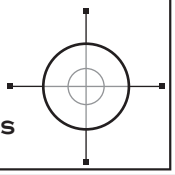
POLYGONS

What is the sum of the interior angles of a hexagon? What is the measure of each angle in a regular hexagon?



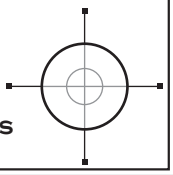
CIRCLES

What is the formula for the circumference of a circle?



POLYGONS

What is the sum of the interior angles of a octagon? What is the measure of each angle in a regular octagon?



tangent

A tangent is a line that touches a circle at only one point. A radius or diameter drawn to that point is perpendicular to the tangent.

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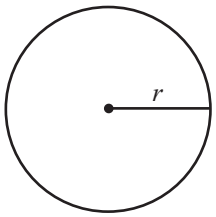
area of a circle

$$A = \pi r^2$$



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length of an arc

The length of an arc = $\frac{x^\circ}{360^\circ}(2\pi r)$

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area of a sector

The area of a sector = $\frac{x^\circ}{360^\circ}(\pi r^2)$

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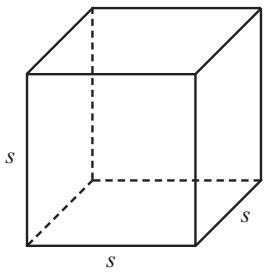
volume of a cube

$$V = s^3$$



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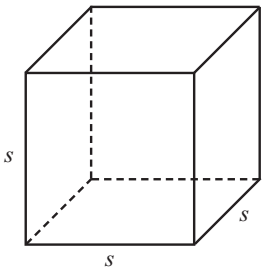
surface area of a cube

$$SA = 6s^2$$



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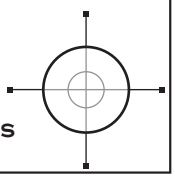
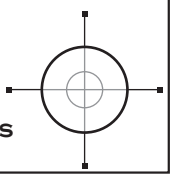
CIRCLES

What is the formula for the area of a circle?



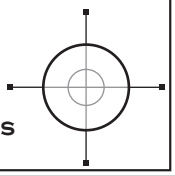
CIRCLES

What is a tangent?



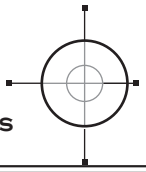
CIRCLES

What is the formula for finding the area of a sector?



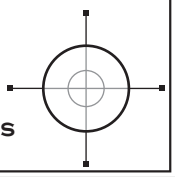
CIRCLES

What is the formula for finding the length of an arc?



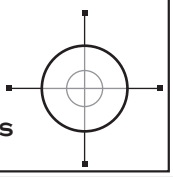
GEOMETRIC SOLIDS

What is the formula for the surface area of a cube?



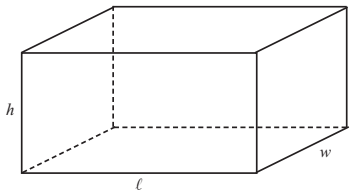
GEOMETRIC SOLIDS

What is the formula for the volume of a cube?



volume of a rectangular solid

$$V = \ell wh$$



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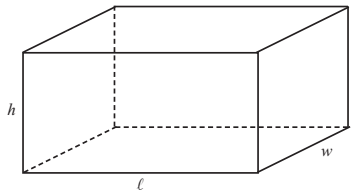
surface area of a rectangular solid

$$SA = 2\ell w + 2\ell h + 2wh$$



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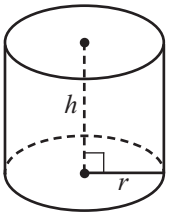
volume of a cylinder

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



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length of a diagonal in a rectangular solid

Length of the diagonal =

$$\sqrt{l^2 + w^2 + h^2}$$

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distance formula

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

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midpoint formula

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

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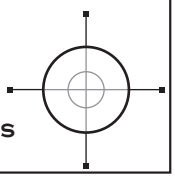
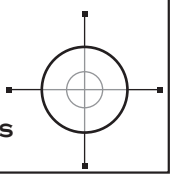
GEOMETRIC SOLIDS

What is the formula for the surface area of a rectangular solid?



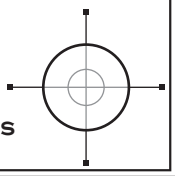
GEOMETRIC SOLIDS

What is the formula for the volume of a rectangular solid?



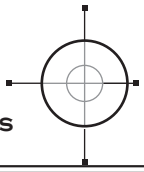
GEOMETRIC SOLIDS

What is the formula for the length of a diagonal in a rectangular solid?



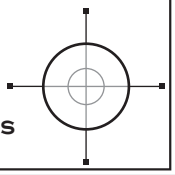
GEOMETRIC SOLIDS

What is the formula for the volume of a right circular cylinder?



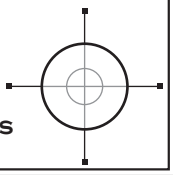
COORDINATE GEOMETRY

What is the Midpoint Formula?



COORDINATE GEOMETRY

What is the Distance Formula?



slope formula

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

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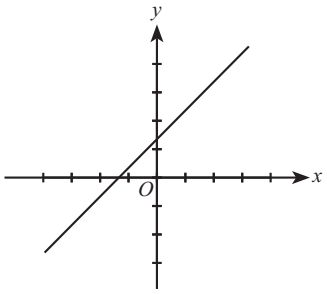
up



Positive Slope

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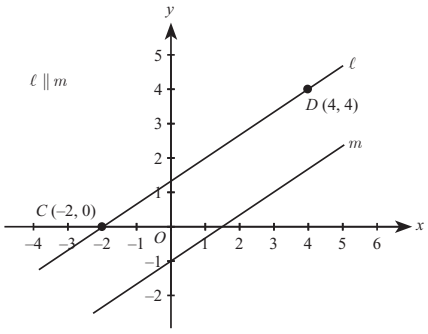
parallel lines have equal slopes



Slope of line $\ell = \frac{2}{3}$

Slope of line $m = \frac{2}{3}$

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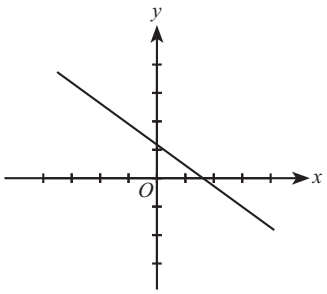
down



Negative Slope

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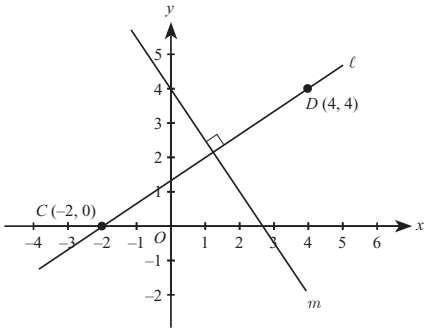
perpendicular lines have slopes that are negative reciprocals



Slope of line $\ell = \frac{2}{3}$

Slope of line $m = \frac{2}{3}$

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equation of a line

Equation of a line: $y = mx + b$

Where:

m = slope
b = y-intercept
x and y = the x- and y-coordinate
(x, y) of any point on the line

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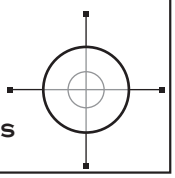
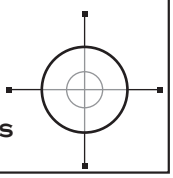
COORDINATE GEOMETRY

Lines with a positive slope tilt _____ when moving from left to right.



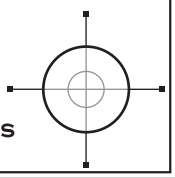
COORDINATE GEOMETRY

What is the Slope Formula?



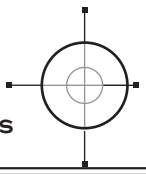
COORDINATE GEOMETRY

Lines with a negative slope tilt _____ when moving from left to right.



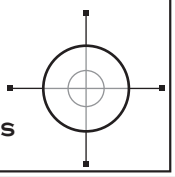
COORDINATE GEOMETRY

How are the slopes of parallel lines related?



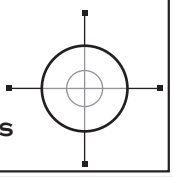
COORDINATE GEOMETRY

What is the equation of a line?



COORDINATE GEOMETRY

How are the slopes of perpendicular lines related?



standard equation of a parabola

Standard equation of a parabola: $y = ax^2 + bx + c$

- a, b, and c are constants
- x and y = the x- and y-coordinate (x, y) of any point on the parabola
- $(0, c)$ is the y-intercept

- When a is positive, the parabola opens upward
- When a is negative, the parabola opens downward
- When $b = 0$, the parabola is centered on the y-axis
- When $b > 0$, the parabola moves to the left of the y-axis
- When $b < 0$, the parabola moves to the right of the y-axis

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vertex equation of a parabola

Vertex equation of a parabola: $y = a(x - h)^2 + k$

- (h, k) is the vertex of the parabola
- x and y = the x- and y-coordinate (x, y) of any point on the parabola

- When a is positive, the parabola opens upward
- When a is negative, the parabola opens downward

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equation of a linear function

Equation of a line: $y = mx + b$
Equation of a linear function: $f(x) = mx + b$

Where:
m = slope
b = y-intercept
x and $f(x)$ = the x- and y-coordinate (x, y) of any point on the line

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standard equation of a quadratic function

Standard equation of a parabola:
$y = ax^2 + bx + c$

Standard equation of a quadratic function:
$f(x) = ax^2 + bx + c$

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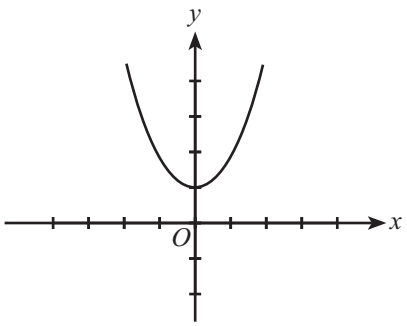
y = f(x) + 1

Shifts up 1 unit



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vertex equation of a quadratic function

Vertex equation of a parabola:
$y = a(x - h)^2 + k$

Vertex equation of a quadratic function:
$f(x) = a(x - h)^2 + k$

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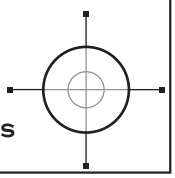
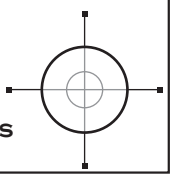
COORDINATE GEOMETRY

Lines with a positive slope tilt _____ when moving from left to right.



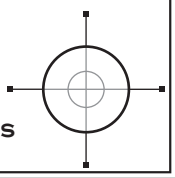
COORDINATE GEOMETRY

What is the standard equation of a parabola?



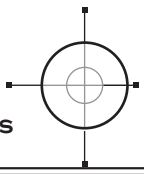
COORDINATE GEOMETRY

What is the standard equation of a quadratic function?



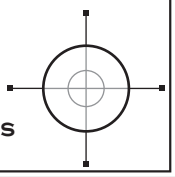
COORDINATE GEOMETRY

What is the equation of a linear function?



COORDINATE GEOMETRY

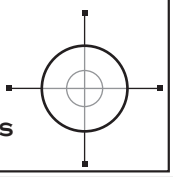
What is the vertex equation of a quadratic function?



COORDINATE GEOMETRY

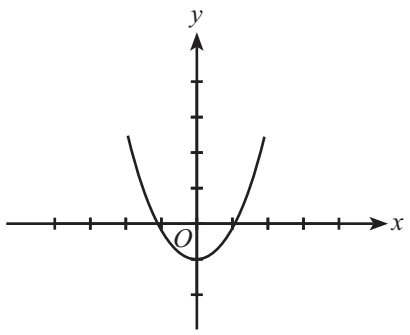
Translation:

$y = f(x) + 1$



y = f(x) – 1

Shifts down 1 unit



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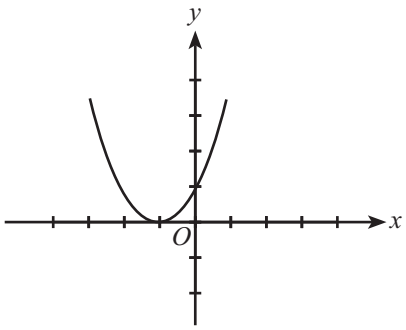
y = f(x + 1)

Shifts left 1 unit



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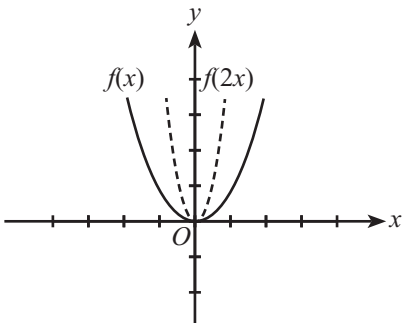
y = f(2x)

The parabola becomes "skinnier"



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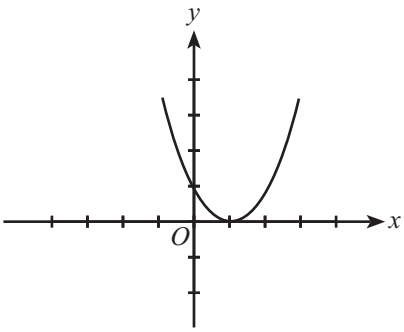
y = f(x – 1)

Shifts right 1 unit



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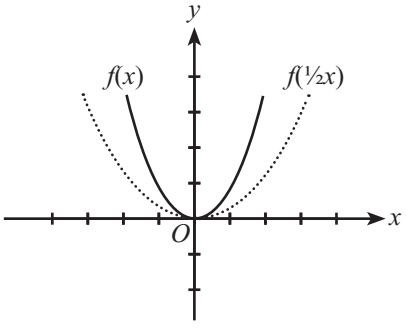
y = f(½x)

The parabola becomes "fatter"



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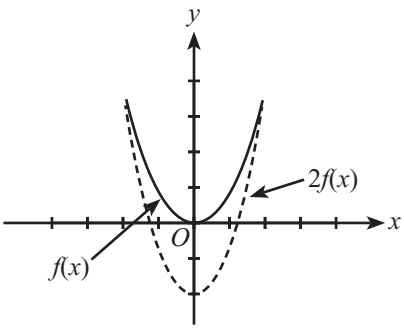
y = 2f(x)

The parabola becomes "longer"



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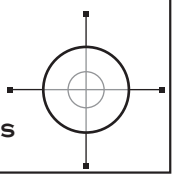
COORDINATE GEOMETRY

Translation:

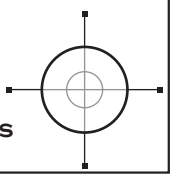
$y = f(x + 1)$



COORDINATE GEOMETRY

Translation:

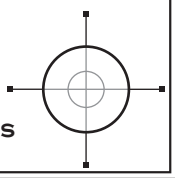
$y = f(x) - 1$



COORDINATE GEOMETRY

Translation:

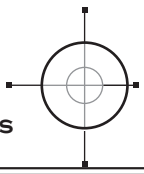
$y = f(x - 1)$



COORDINATE GEOMETRY

Transformation:

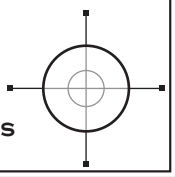
$y = f(2x)$



COORDINATE GEOMETRY

Transformation:

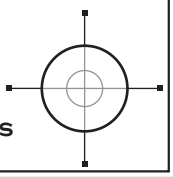
$y = 2f(x)$



COORDINATE GEOMETRY

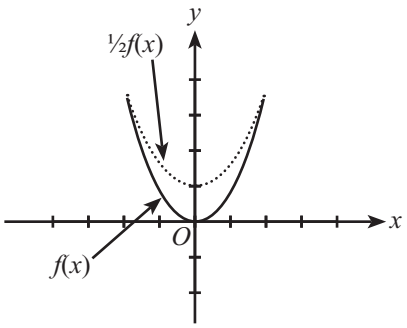
Transformation:

$y = f(\frac{1}{2}x)$



y = ½f(x)

The parabola becomes "shorter"



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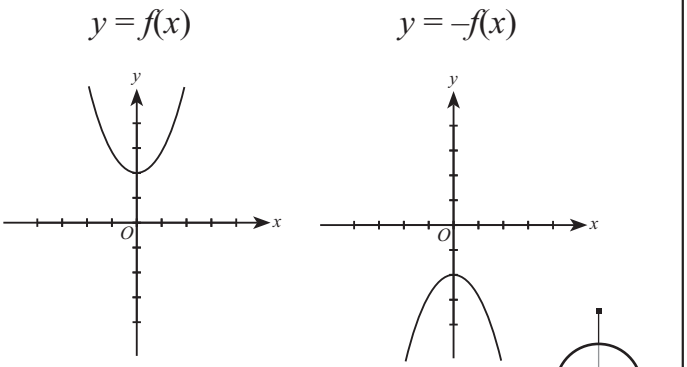
reflection over the x-axis



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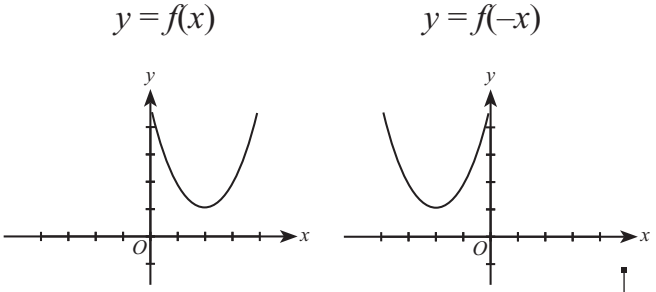
reflection over the y-axis



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average (arithmetic mean)

$$\frac{\text{sum of the numbers}}{\text{number of numbers}} = \text{average}$$

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median

The median is the number that appears in the middle of a set of ascending numbers.

In the following set, the median is 5:
{2, 4, 5, 7, 7}

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mode

The mode is the number that appears most frequently in a set.

In the following set, the mode is 7:
{2, 4, 5, 7, 7}

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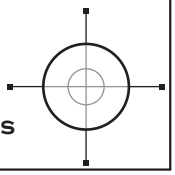
COORDINATE GEOMETRY

Reflection:

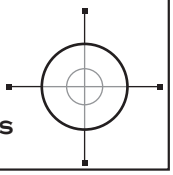
$y = -f(x)$



COORDINATE GEOMETRY

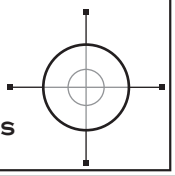
Transformation:

$y = \frac{1}{2} f(x)$



STATISTICS

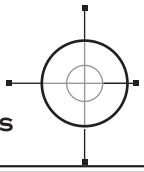
What is the formula for finding the average of a set of numbers?



COORDINATE GEOMETRY

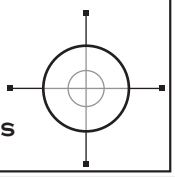
Reflection:

$y = f(-x)$



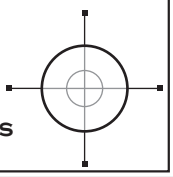
STATISTICS

What is the mode?



STATISTICS

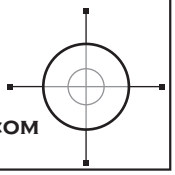
What is the median?



probability formula

Probability =

$$\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$



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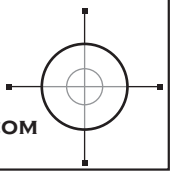
probability of a non-occurrence

Probability of event not occurring =

$$1-\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$



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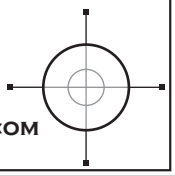
geometric sequence

In a geometric sequence, each term increases by a constant ratio.

$a_n = a_1 \times r^{n-1}$

Where:
a_1 = the first term
n = the number of terms
r = constant ratio



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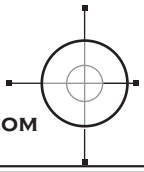
arithmetic sequence

In an arithmetic sequence, each term increases by a constant difference.

$a_n = a_1 + (n-1)d$

Where:
a_1 = the first term
n = the number of terms
d = constant difference



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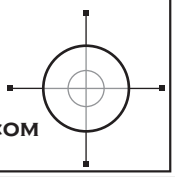
geometric sequence sum

Sum of the first n terms in a geometric sequence =

$$\frac{a_1(1-r^n)}{1-r}$$



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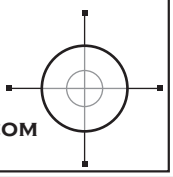
arithmetic sequence sum

Sum of the first n terms in an arithmetic sequence =

$$n\frac{a_1+a_n}{2}$$



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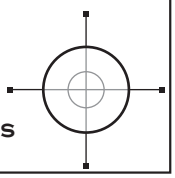
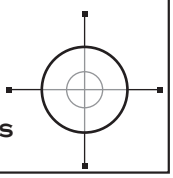
PROBABILITY

What is the formula for the probability of something not happening?



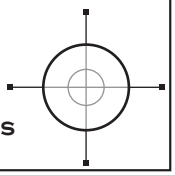
PROBABILITY

What is the formula for probability?



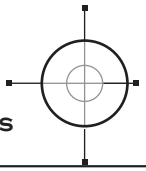
SEQUENCES

What is an arithmetic sequence and how do you find the *n*th term?



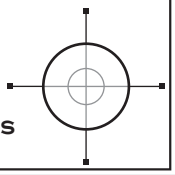
SEQUENCES

What is a geometric sequence and how do you find the *n*th term?



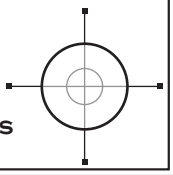
SEQUENCES

How do you find the sum of the first *n* terms in an arithmetic sequence?



SEQUENCES

How do you find the sum of the first *n* terms in a geometric sequence?



geometric probability

Geometric Probability =

$$\frac{\text{shaded area}}{\text{total possible area}}$$

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overlapping groups

Group A
+ Group B
+ Neither Group
– Both Groups
Total

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probability of two events

Find the probability of each independent event and then find their product.

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combinations

Multiply the elements together:

2 shirts × 3 pants × 2 shoes =
12 outfit combinations

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visualization

I will be successful because
I am good at ACT math.

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permutations

Determine the number of elements for each position and then multiply the elements together:

First Place		Second Place		Third Place		Fourth Place	
4	×	3	×	2	×	1	= 24
A, B, C, D		B, C, D		C, D		D	

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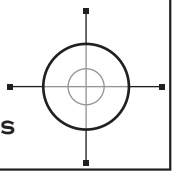
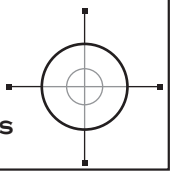
OVERLAPPING GROUPS

What is the formula for finding a population in an overlapping groups question?



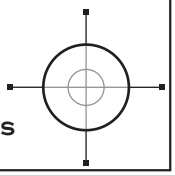
PROBABILITY

What is the formula for geometric probability?



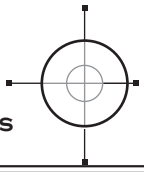
COUNTING PROBLEMS

In a combination, how do you find the total number of arrangements?



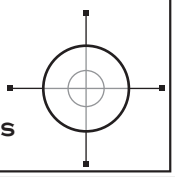
PROBABILITY

How do you find the probability of two independent events both occurring?



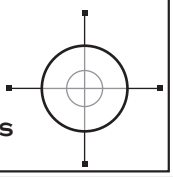
COUNTING PROBLEMS

In a permutation, how do you find the total number of arrangements?



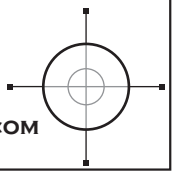
VISUALIZATION

How will I do on the math section of the ACT?



quadratic formula

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



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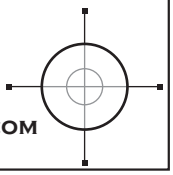
subset combinations

$$\frac{x!}{y!(x-y)!}$$



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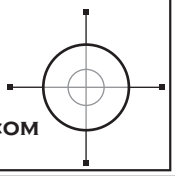
logarithms and exponents

$$\log_a b = c$$

$$where\ a^c = b$$



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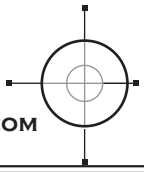
Power Property

$$\log_a M^x = x \log_a M$$



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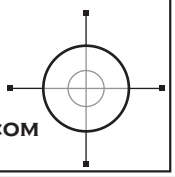
Product Property

$$\log_a MN = \log_a M + \log_a N$$



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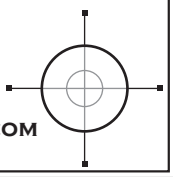
Quotient Property

$$\log_a (M/N) = \log_a M - \log_a N$$



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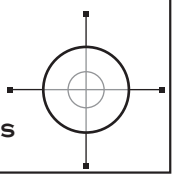
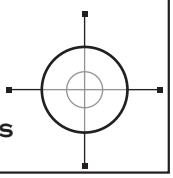
COMBINATIONS

What is the formula for the number of subset combinations?



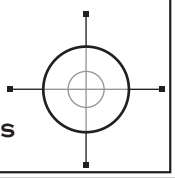
QUADRATIC FORMULA

What is the quadratic formula?



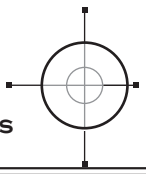
LOGARITHMS

What is the Power Property of Logarithms?



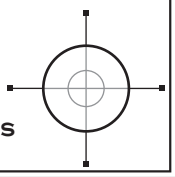
LOGARITHMS

What is the relationshop between logarithms and exponents?



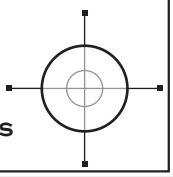
LOGARITHMS

What is the Quotient Property of Logarithms?



LOGARITHMS

What is the Product Property of Logarithms?



rhombus

1. Each side is equal length.
2. Two pairs of parallel sides.
3. Opposite angles are equal.
4. Diagonals bisect each other.
5. Diagonals are perpendicular.

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area of a trapezoid

$$\frac{1}{2}(\text{base 1} + \text{base 2}) \times (\text{height})$$

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volume of a cylinder

$$\frac{4}{3}\pi r^3$$

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surface area of cylinder

$$2(\pi r^2) + (2\pi rh)$$

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volume of a pyramid

$$\frac{1}{3}(\text{area of base}) \times (\text{height})$$

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volume of a cone

$$\frac{1}{3}\pi r^2 h$$

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TRAPEZOID

What is the formula for the area of a trapezoid?

RHOMBUS

What do you know about a rhombus?

CYLINDERS

What is the formula for the surface are of a cylinder?

SPHERE

What is the formula for the volume of a sphere?

CONE

What is the formula for the volume of a cone?

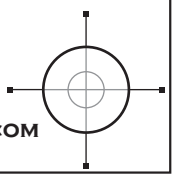
PYRAMID

What is the formula for the volume of a cone?

sine of angle θ

$$\frac{\text{length of side Opposite } \theta}{\text{length of Hypotenuse}}$$

SOH-CAH-TOA



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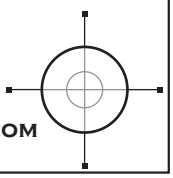
cosine of angle θ

$$\frac{\text{length of side Adjacent to } \theta}{\text{length of Hypotenuse}}$$

SOH-**CAH**-TOA



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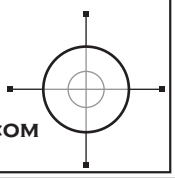
tangent of angle θ

$$\frac{\text{length of side Opposite } \theta}{\text{length of side Adjacen to } \theta}$$

SOH-CAH-**TOA**



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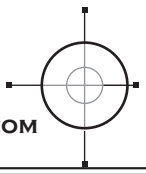
cosecant (csc)

$$\frac{1}{\sin} = \sin^{-1}$$



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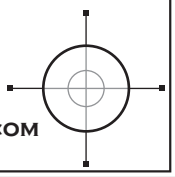
cotangent (cot)

$$\frac{1}{\tan} = \tan^{-1}$$



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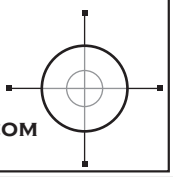
secant (sec)

$$\frac{1}{\cos} = \cos^{-1}$$



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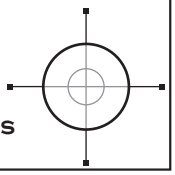
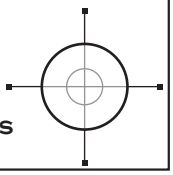
TRIGONOMETRY

What is the formula for cosine?



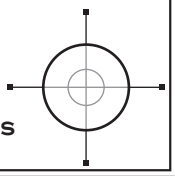
TRIGONOMETRY

What is the formula for sine?



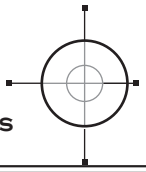
TRIGONOMETRY

What is the formula for the cosecant?



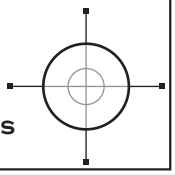
TRIGONOMETRY

What is the formula for tangent?



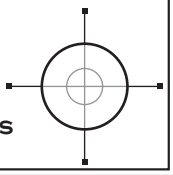
TRIGONOMETRY

What is the formula for the secant?



TRIGONOMETRY

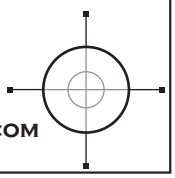
What is the formula for the cotangent?



Pythagorean Identity

$$\sin\theta = \sqrt{1-\cos^2\theta} \text{ and}$$

$$\cos\theta = \sqrt{1-\sin^2\theta}$$



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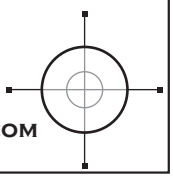
Pythagorean Identity

$$\tan\theta$$



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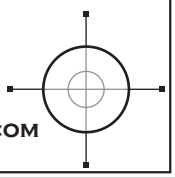
Pythagorean Identity

$$\sec^2\theta$$



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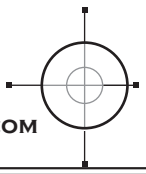
Pythagorean Identity

$$\csc^2\theta$$



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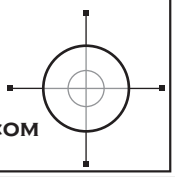
Trigonometric Identities

$$\sin(-\theta) = -\sin\theta \qquad \cos(-\theta) = \cos\theta$$

$$\tan(-\theta) = -\tan\theta \qquad \csc(-\theta) = -\csc\theta$$

$$\sec(-\theta) = \sec\theta \qquad \cot(-\theta) = -\cot\theta$$



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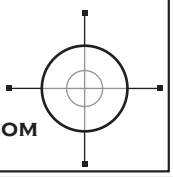
sine and cosine graphs

$$y = a \sin b\theta \text{ and}$$

$$y = a \cos b\theta \text{ and}$$



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TRIGONOMETRY

$$\frac{\sin\theta}{\cos\theta}$$

TRIGONOMETRY

$$\sin^2\theta + \cos^2\theta = 1, \text{ so...}$$

TRIGONOMETRY

$$1 + \cot^2\theta =$$

TRIGONOMETRY

$$1 + \tan^2\theta =$$

TRIGONOMETRY

What are the formulas for sine and cosine graphs?

TRIGONOMETRY

What are the trigonometric identities?