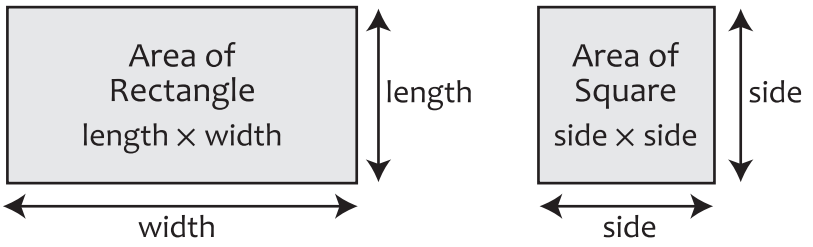
The GED Math Formulas

The GED math test gives you a page of math formulas that you can use on the test, but just seeing the formulas doesn't do you any good. The important thing is understanding what they mean. Here's a breakdown of the GED math formulas. Remember, they're in the GED test booklet to help you out, so you don't need to memorize them. You just need to understand what they mean.

Area

AREA of a:

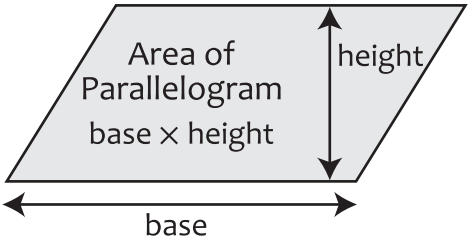
square	Area = side^2
rectangle	Area = length × width



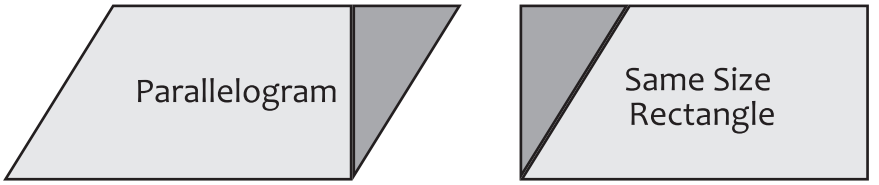
Area is just the amount of space on a surface. That's all. For a square or rectangle, it's just the length of two adjoining sides multiplied by each other. So, if you've got a 6 × 4 room, you need 6 × 4 square feet of carpet, or 24 square feet.

AREA of a:

parallelogram Area = base × height

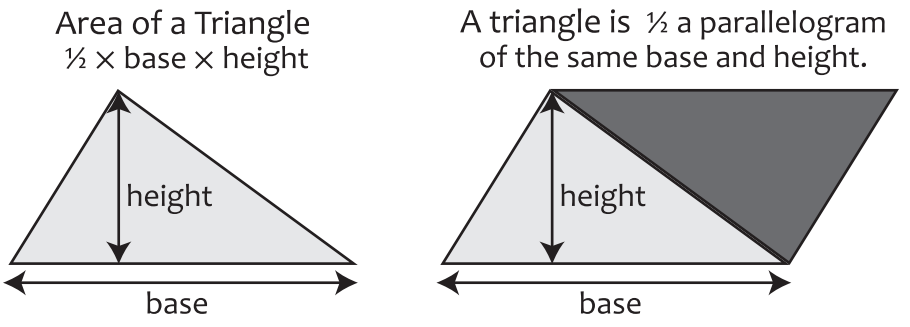


A parallelogram is just a four-sided figure where the opposite sides are parallel, or slanting the same way. It's like a rectangle, but instead of measuring the length of the sides, you measure one flat side, and then the height, straight up. Multiply them together to get area. The reason this works is because a parallelogram is the same area as a rectangle of the same height and width. You could cut off one side, and move it to the other side, to make a rectangle.



AREA of a:

triangle Area = $\frac{1}{2}$ × base × height



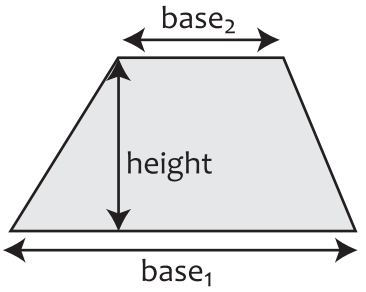
A triangle is half a parallelogram, so you get the area by multiplying ½ times base (bottom) times height (straight up).

AREA of a:

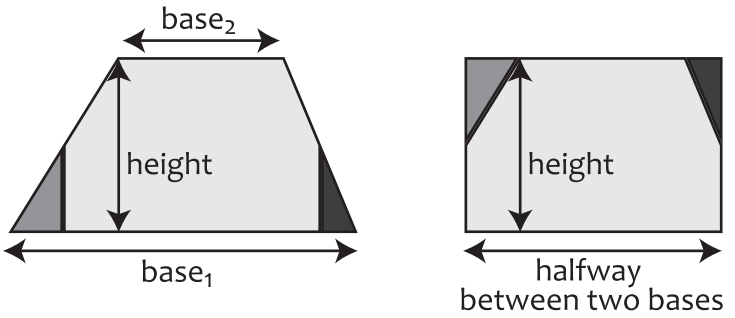
trapezoid $\text{Area} = \frac{1}{2} \times (\text{base}_1 + \text{base}_2) \times \text{height}$

Area of a Trapezoid

$\frac{1}{2} \times (\text{base}_1 + \text{base}_2) \times \text{height}$



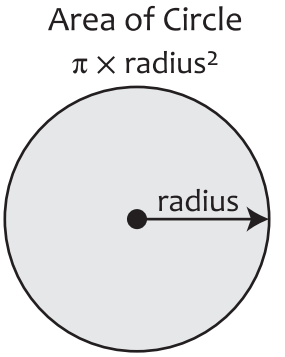
A trapezoid is the same size as a rectangle with the same height and a width the average of its bases.



A trapezoid is a 4-sided figure with two parallel sides. The sides that run parallel to each other are different lengths. Add them together and divide by two to get an average, and then multiply by the height (straight up).

AREA of a:

circle	Area = $\pi \times \text{radius}^2$; π is approximately equal to 3.14



A circle is a little different. You need to use "pi." That's that funny-looking figure. Just think of it as 3.14. To get the area (flat surface) of a circle, multiply 3.14 times the radius squared. The radius is the distance from the center of the circle to the edge, and squared just means multiply it by itself. So, if the circle is 4 inches across, the radius is 2 inches, and the area is $3.14 \times 2 \times 2$, or just over 12. (Approximating can be very helpful!)

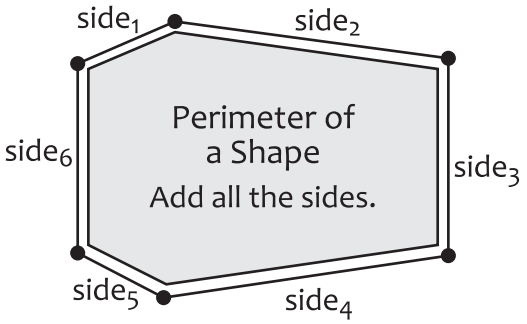
What is pi?

Pi is the number that you get when you divide the circumference of a circle (the distance around the outside) by its diameter (the distance across the center). Pi is the same for all circles, so it can be handy in doing math with circles. The decimals of the number pi go on and on forever, without repeating, making pi an *irrational number*. 3.14 is a very rough idea of the number pi. Here's a bit more of the number: 3.14159265358979323846...

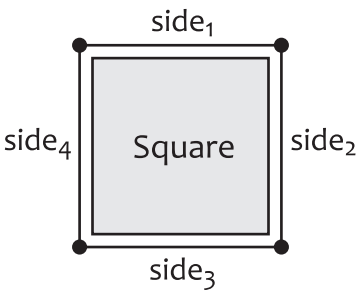
Perimeter and Circumference

PERIMETER of a:

square	Perimeter = 4 × side
rectangle	Perimeter = 2 × length + 2 × width
triangle	Perimeter = $side_1 + side_2 + side_3$



$side_1 + side_2 + side_3 + side_4 + side_5 + side_6$



$side_1 + side_2 + side_3 + side_4$

is the same as

4 × side

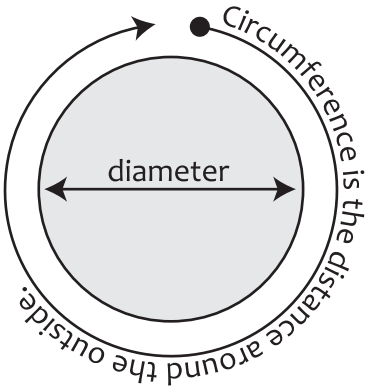
because all the sides
are the same length

Perimeter is just how long the outside lines of a shape are… so, how much fence you'd need to put around a pasture, or how much framing you'd need to frame a picture. On the square, rectangle, or triangle, or any figure with straight sides, it's just the length of all the sides added together. Easy.

CIRCUMFERENCE of a:

circle	Circumference = π × diameter; π is approximately equal to 3.14

Circumference of Circle
π × diameter



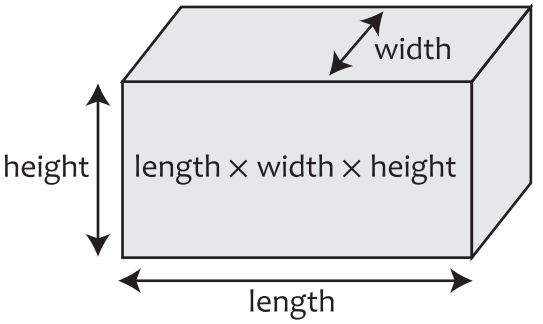
On a circle, you've got to use pi again… so it's approximately 3.14 × diameter—that's the length across the center of a circle. For a 5-inch across circle, the circumference is about 3.14 × 5, or just over 15 inches.

Volume

VOLUME of a:

cube	Volume = edge^3
rectangular solid	Volume = length × width × height

Volume of Rectangular Solid or Cube

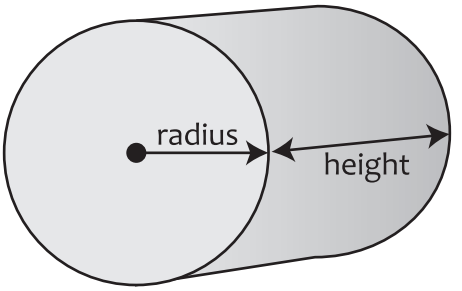


Volume is like area, except it's three dimensional. It's all the space inside something. For area, you multiplied one side times another, right? Well, for volume, you're just adding a third side… so for a cube or a rectangular solid (like a box) you multiply length × width × height.

VOLUME of a:

cylinder	Volume = $\pi \times \text{radius}^2 \times \text{height}$; π is approximately equal to 3.14

Volume of a Cylinder
$\pi \times \text{radius}^2 \times \text{height}$



A cylinder is like a circle that's got height. So, for the cylinder, you find the area of the circle at the bottom (pi times radius

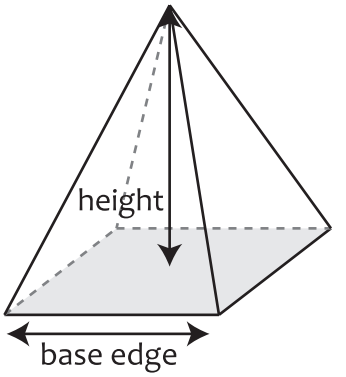
squared, the same as for area), and then multiply it by the height of the cylinder.

VOLUME of a:

square pyramid	Volume = $\frac{1}{3} \times (\text{base edge})^2 \times \text{height}$
cone	Volume = $\frac{1}{3} \times \pi \times \text{radius}^2 \times \text{height}$; π is approximately equal to 3.14

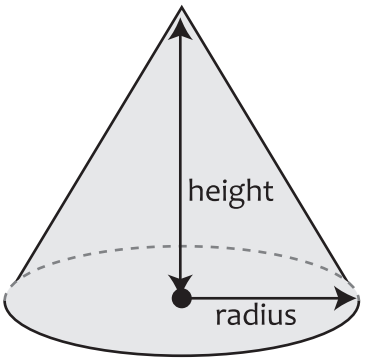
Volume of Square Pyramid

$\frac{1}{3} \times (\text{base edge})^2 \times \text{height}$



Volume of Cone

$\frac{1}{3} \times \pi \times \text{radius}^2 \times \text{height}$



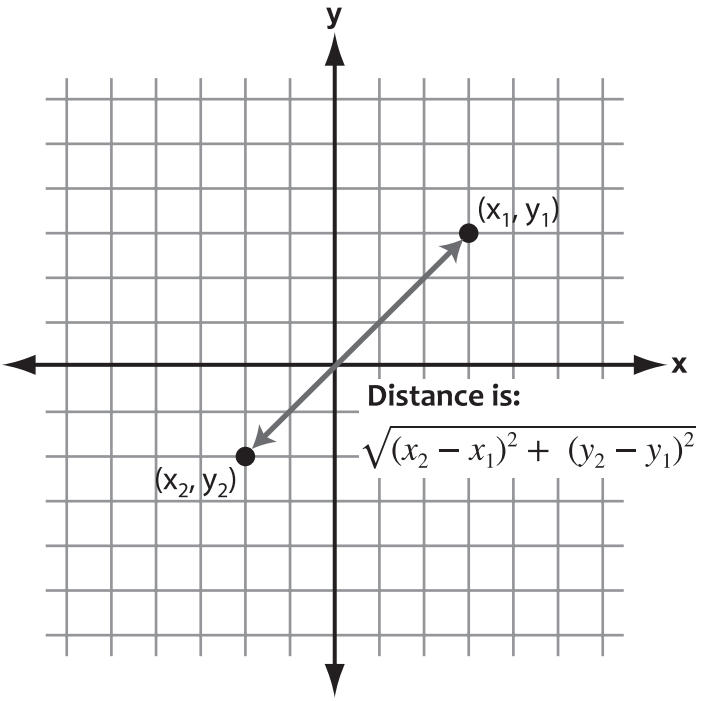
Cones and square pyramids have a circle or a square at the bottom, and they come to a point on the opposite side, instead of having a similar shape at the other side. So, they're smaller in volume than a cylinder or rectangular solid. Turns out, they're exactly ⅓ the volume. So, just find the volume of a cylinder or rectangular solid with the same size end, and divide that number by three. That's all the formulas mean.

Coordinate Geometry

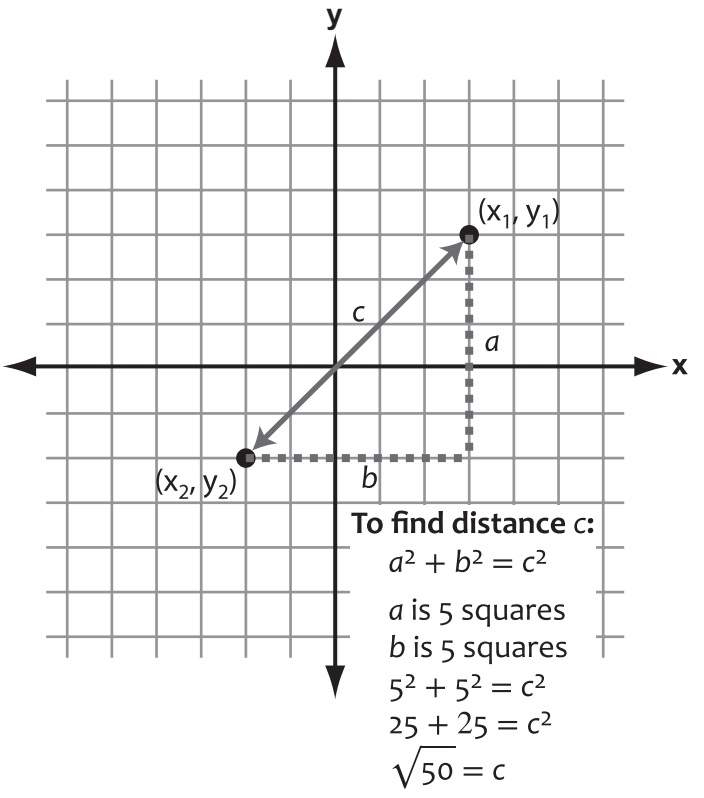
COORDINATE GEOMETRY

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

where (x_1, y_1) and (x_2, y_2) are two points in a plane.



Sounds confusing! But it's not so bad, really. Points on a graph are shown by an *x* and *y* number, like this: (2, 3). The *x* number is the first number, and the *y* number is the second number. The numbers tell you where to find the points on the graph. To find the distance between two points, you basically make a right triangle on the graph, by connecting the points. Then, you can use the Pythagorean relationship to find the distance.



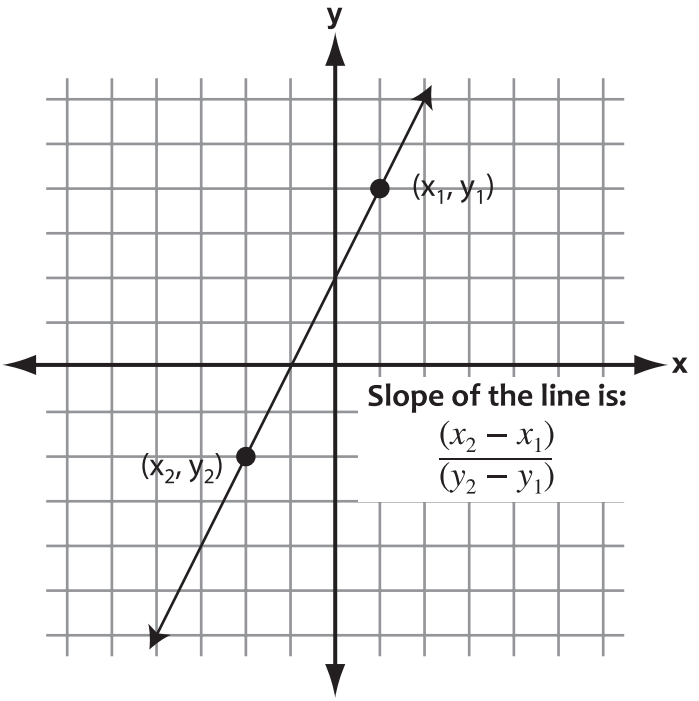
The Pythagorean Theorem is that, in a right triangle, the length of one (short) side squared plus the length of the other (short) side squared equals the length of the long side squared. That's what you're doing here. The distance between the *x*'s is the length of one short side, and the distance between the *y*'s is the length of the other short side.

Find the distances, square them, add them together. Then, find the square root. That's all you need. You know the distance between the two points.

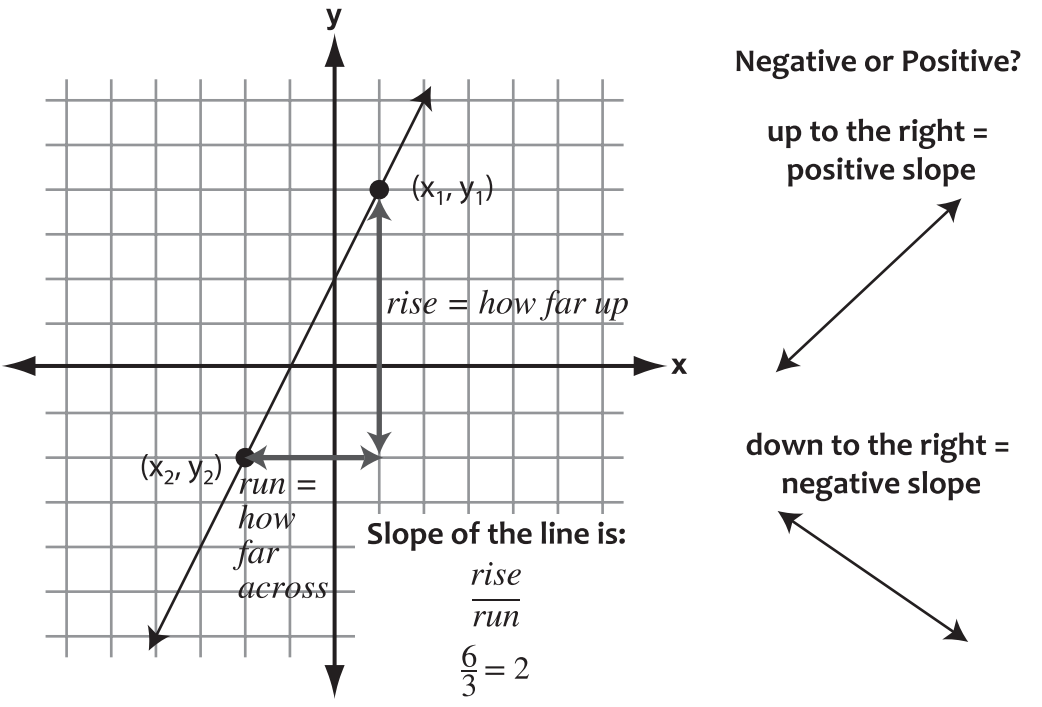
COORDINATE GEOMETRY

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

(x_1, y_1) and (x_2, y_2) are two points on the line.



The formula for slope of a line sounds confusing, too. But basically, it's ***rise*** over ***run***. That is, it's how far it is up and down from one point on a line to another, over how far it is across between the same two points.

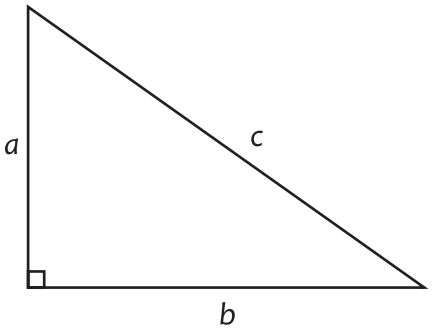


You also need to know if the slope is positive or negative. A positive or negative slope tells you, not how steep the line is, but which direction it goes. If the line is going up to the right, the slope is positive. If the line is going down to the right, the slope is negative.

Pythagorean Relationship

PYTHAGOREAN RELATIONSHIP

$a^2 + b^2 = c^2$; a and b are legs and c the hypotenuse of a right triangle.



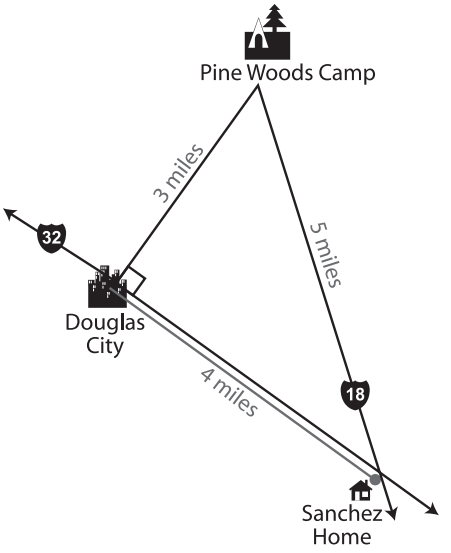
$a^2 + b^2 = c^2$

The Pythagorean relationship is exactly the same formula that's used to find the distance between two points, except it's stated in a different way.

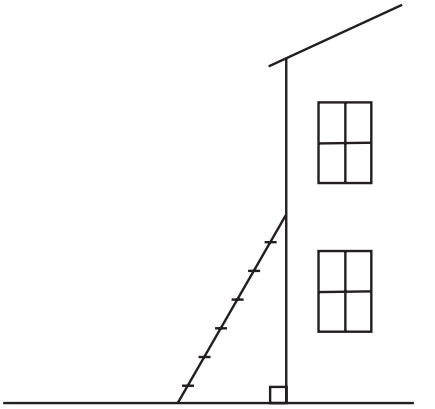
In this formula, a and b are the two short sides of a right triangle (legs), and c is the long side (hypotenuse). You'll use this formula whenever you know the lengths of two sides of a right triangle and want to know the third.

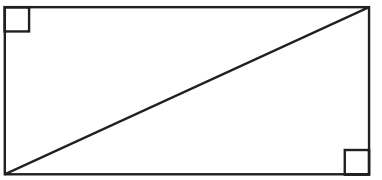
This is an important one to watch for, because you'll find right triangles in a lot of different illustrations. Wherever two lines meet at a right angle, or square corner, you can make a right triangle.

Right Triangle on a Map

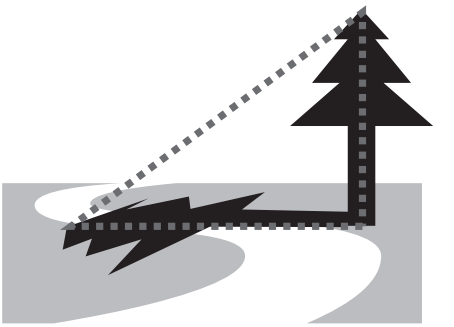


Right Triangle in a Ladder Leaning Against a House





Any Rectangle Makes Two Right Triangles When Split in Half on a Diagonal.



Right Triangle in a Tree Casting a Shadow

What are some other real-life right triangles you can think of?

Measures of Central Tendency

MEASURES OF CENTRAL TENDENCY

$$\textbf{mean} = \frac{x_1 + x_2 + \ldots + x_n}{n}$$

where the *x*'s are the values for which a mean is desired, and *n* is the total number of values for *x*.

"Mean" is what we usually think of as an "average." In plain English, add up all the numbers you've got, and divide by however many numbers you added together. Here's an example:

The **mean** of 5, 4, 9, 3, 12, and 15 is:

$$(5 + 4 + 9 + 3 + 12 + 15) \div 6 = 48 \div 6 = 8$$

The six comes from the fact that there are 6 numbers to add together.

MEASURES OF CENTRAL TENDENCY

median = the middle value of an odd number of <u>*ordered*</u> scores, and halfway between the two middle values of an even number of <u>*ordered*</u> scores

"Median" is just the middle number, if you put a group of numbers in order from smallest to largest (that's what it means by 'ordered scores'). If there are an even amount of numbers, there won't be a middle number, so you use the number halfway between the two middle numbers.

To get the **median** of 5, 4, 9, 3, 12, and 15, first you have to put them in order:

3 4 5 9 12 15

The median is in the middle. Since there are an even number of numbers, the median is halfway between 5 and 9. The median is 5 + 9 divided by 2, or 7.

Simple Interest

SIMPLE INTEREST

interest = principal × rate × time

When you come across interest problems on the GED, they'll typically be simple interest problems. So if the GED asks you about interest on a loan, you'll calculate interest by multiplying the principal (amount borrowed) by the interest rate and multiplying that by the amount of time of the loan (usually in years).

Distance

DISTANCE

distance = rate × time

The formula for distance has to do with how far you can go, how fast. So, if you're traveling at 30 miles per hour for 6 hours, you'll go 30 × 6 miles, or 180 miles.

Total Cost

TOTAL COST

total cost = (number of units) × (price per unit)

The formula for total cost is something you use every day. If you're buying 5 bananas, and bananas cost 20 cents each, how much is the total cost? It's the number of bananas times the price per banana… or 5 × 20 cents, or 100 cents, or $1.

Don't let the formulas confuse you! Most of it is pretty straightforward, if you understand the meaning behind the formulas.