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QUADRILATERALS

Let's observe some things about quadrilaterals!
Match all that apply from the right-hand column to the left-hand column.

quadrilateral _____

square _____

rectangle _____

parallelogram _____

trapezoid _____

a. Each internal angle measures 90°.
b. All interior angles add up to 360°.
c. All sides are straight.
d. Opposite sides are parallel.
e. All sides have the same length.
f. Opposite sides have the same length.
g. Opposite angles have the same measure.
h. There are no 90-degree angles.
i. Has one pair of parallel sides that are not the same length, and they are the "legs."
j. Has a pair of sides that will eventually intersect in space.
k. A plane figure that has four sides and four angles.

You might draw each figure on graph paper to help you experience their characteristics!

Perimeter of Quadrilaterals

As we've seen before, the **perimeter** of any plane figure is the total distance around its outside edges.
Go ahead and calculate the perimeter of each quadrilateral on the sheet called, "Quadrilateral—Perimeter."

On the same sheet, "Quadrilateral—Perimeter," label these figures:

- the two **squares**
- the two **rectangles**
- the two **parallelograms**
- the two **trapezoids**

There are also two **kites**. I bet you can label them as well.

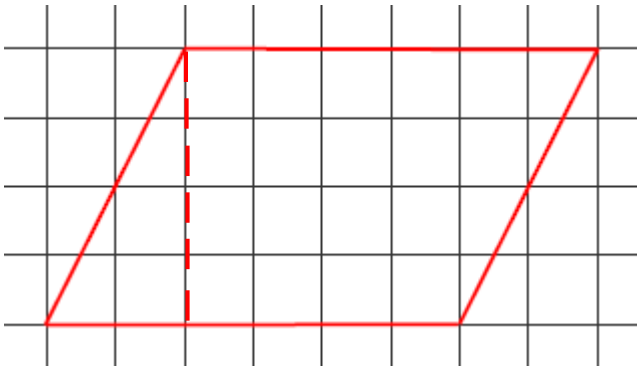
There are two figures that look like slanted squares. They are called rhombuses. Go ahead and label each **rhombus**.

Area of Parallelograms

Indeed, a parallelogram looks like a rectangle that is leaning to the side. We cannot assume though that the measure of the slanted sides is a parallelogram's height.

A parallelogram's height is often indicated with a dotted line.

If you use a ruler to measure the height of the parallelogram to the right, will that measurement be the same as the measurement of one of those slanted sides?



The GED 2014 Formula Sheet tells us the formula for area of a parallelogram. Write it here:

_____

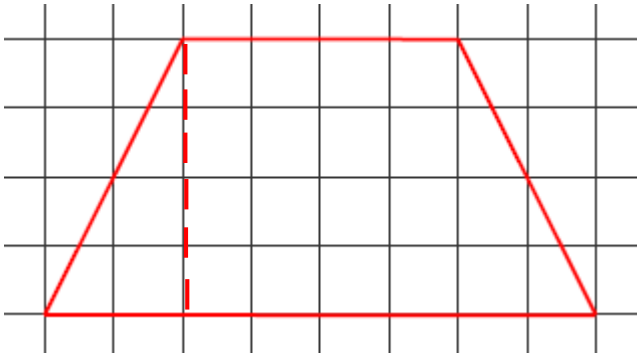
If you are noticing that this formula is quite like the formula for area of rectangle, you are observing well! Whereas with a rectangle we use the terms ***length*** and ***height***, we use the terms ***base*** and ***height*** for a parallelogram.

Using the graph paper our parallelogram above is on, we can see that its base measures 6, and its height measures 4. That means its area is 24 (6 x 4 = 24).

Go ahead and determine the area of each parallelogram on the sheet called, "Parallelogram—Area."

If one knows the area of a parallegoram, one can then solve for its base or height. Go ahead and complete the sheet called, "Parallelogram—Finding Base/Height."

Area of Trapezoids



Just like a parallelogram, the height of a trapezoid is usually indicated with a dotted line. We cannot assume that the measure of one of the slanted sides is the same as the height. The height of the trapezoid to the left is 4.

A trapezoid has two bases. The pair of parallel sides creates the two bases. One of the bases of this trapezoid measures 4, and the other measures 8.

The GED 2014 Formula Sheet tells us the formula for area of a parallelogram. Write it here:

_____

Another way to look at this formula is this:

$$\frac{a+b}{2}h$$

The letters *a* and *b* refer to the two bases. For our trapezoid, 4 + 8 = 12. That 12 divided by 2 is 6. We should now take that 6 and multiply it by the height of 4. This gives us 24. The area of our trapezoid is then 24.

Let's make a connection…

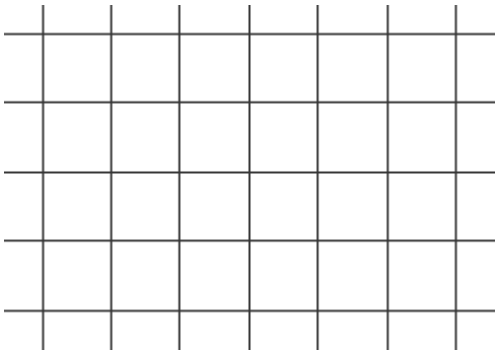
On the graph paper to the right, draw a rectangle whose width, or height, is 4 and its area is 24. What must the length of this rectangle be?

_____

Go ahead and calculate the area of this rectangle:

_____

What does this rectangle have in common with our trapezoid above?



To get some practice calculating the area of a trapezoid, go ahead and complete the sheet called, "Area of a Trapezoid."

Now, if one knows the area of a trapezoid, one can then solve for its base or height. Go ahead and complete the sheet called, "Height of Trapezoid."

Back to Quadrilaterals

Remember, the sum of all four angles in a quadrilateral is 360 even if the quadrilateral does not have and 90-degree angles.

Have a look at the example on the sheet called, "Angles in a Quadrilateral." Since we know that the sum of all the angles will be 360, we then know that 85 + 105 + X + 85 = 360. Thinking more about this, 85 + 105 + 85 = 275. I can subtract 275 from 360, and I will get 85. The measure of the unknown angle is 85. Go ahead and complete the sheet.

Feel free to try out these sheets:

- "Unknown Angles in a Quadrilateral"
- "Unknown Sides Quadrilateral—Perimeter"

Make sure to call on your teacher for guidance!