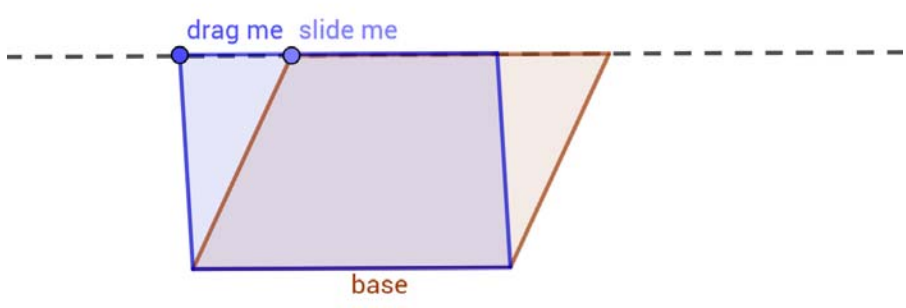


On computer: areas of parallelograms, triangles and circles. name: _____

class time: _____

To keep the areas of parallelograms or triangles the same, keep the base and height the same (think of sliding along a line parallel to a side).

1. Check out the parallelogram tool at <https://ggbm.at/zTFd2bvF>



a. When you use **slide me** to slide the top side of the parallelogram parallel to the base, what happens to the area?

b. Draw on the picture above another parallelogram you can get by using **slide me** to slide the side. **Label it b**, and **label its area** (see Geogebra page for area)

c. When you use **drag me** to drag the top side of the parallelogram so it doesn't stay on the line parallel to the base, what happens to the area?

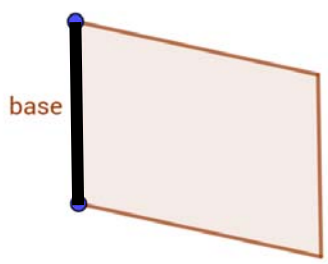
d. Draw on the picture above, another parallelogram you can get by using **drag me** to move the opposite side (off of the line parallel to the base). **Label it d**, and **label its area**.

3. Draw on each picture:

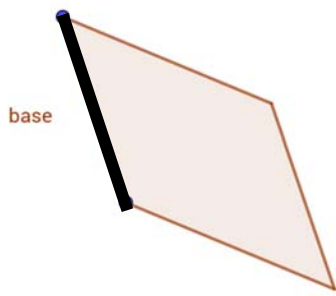
- The **dashed line** (along the opposite side, parallel to the base)
- **Another parallelogram** you could get by **sliding** (slide me) the opposite side along a line parallel to the base.

Note: by checking the boxes, and moving the control points in the Geogebra page, the computer can show you this.

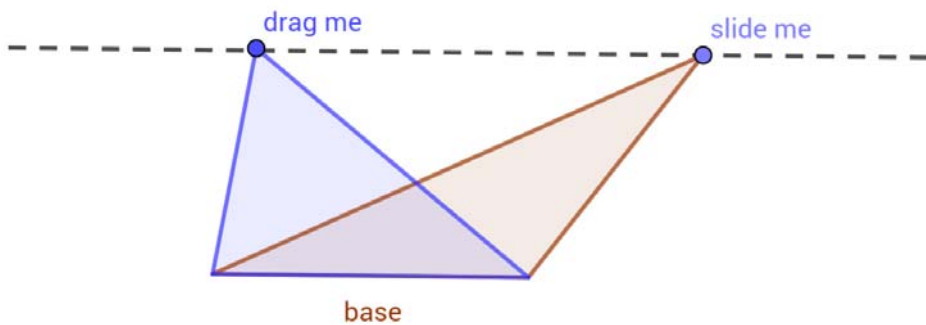
a.



b.



3. Check out the area tool at <https://ggbm.at/nueehVjR>



a. When you use **slide me** to slide the top vertex of the triangle parallel to the base, what happens to the area?

b. Draw on the picture above another triangle you can get by using **slide me** to slide. **Label it b**, **label its area**, and **draw in its height**. (Note, if you check the box in the Geogebra page, the computer can show you the height)

c. When you use **drag me** to drag the top vertex of the triangle so it doesn't stay on the line parallel to the base, what happens to the area?

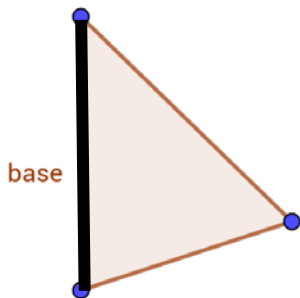
d. Draw on the picture above, another triangle you can get by using **drag me** to drag the opposite vertex (off of the line parallel to the base). **Label it d**, **label its area**, and **draw in its height**.

4. Draw on each picture:

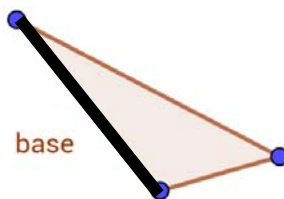
- The **dashed line** (through the opposite vertex and parallel to the base)
- **Another triangle** you could get by **sliding** the opposite vertex along the line parallel to the base.
- **Draw a height line** for each triangle.

Note: by checking the boxes, and moving the control points in the Geogebra page, the computer can show you this.

a.



b.



You can find the area of a parallelogram or triangle on a grid either by finding the base and height or by subtracting from a rectangle.

3. Check out this parallelogram web site: <https://www.geogebra.org/m/mjkYXyRc>

Drag the size of the base to get a parallelogram with 4 colors:

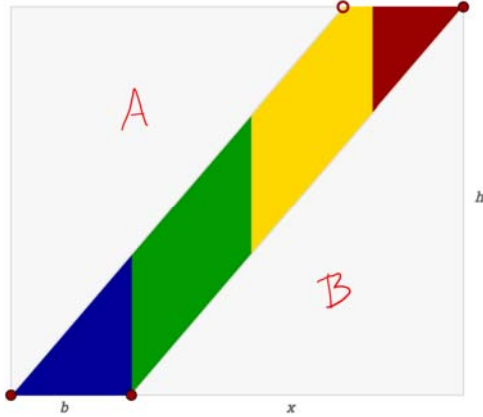
Notice that the big rectangle that contains the parallelogram.

I have labelled the big light gray triangle A, and the big light gray triangle B (see picture below)

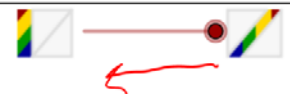
Area parallelogram = blue + green + yellow + red

Also

Area parallelogram = big rectangle - A - B



Drag the slider bar at the top all the way to the left to make the rectangle:



Sketch the result below. Label A and B

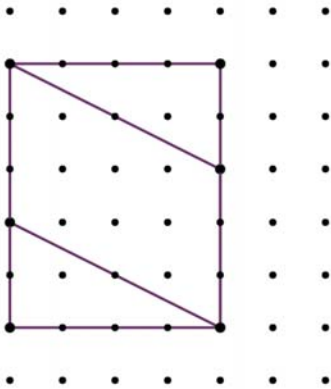
Is it true

Area rectangle = blue + green + yellow + red?

Area rectangle = big rectangle - A - B?

Use the geoboard tool: <https://www.mathplayground.com/geoboard.html> to make parallelograms and triangles

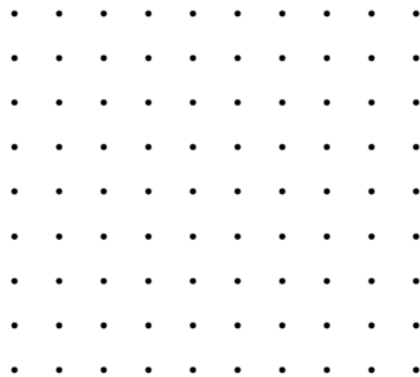
4. Make this parallelogram in a large rectangle



a. Find the area of the parallelogram by subtracting the areas of the two triangles from the area of the large rectangle that contains it:

b. Show and label the base and the height of the parallelogram. Find the area by multiplying base \times height

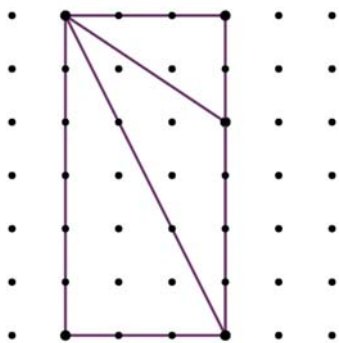
5. Make another parallelogram in a large rectangle



a. Show how to find the area of the parallelogram by subtracting.

b. Show and label the base and the height of the parallelogram, and find the area by multiplying

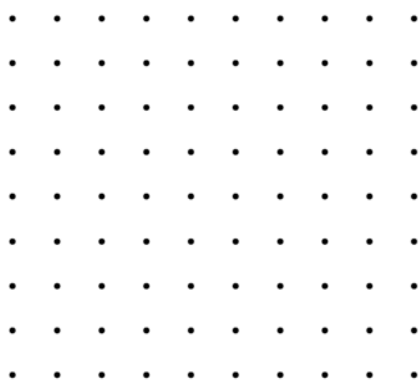
4. Make this triangle in a large rectangle



a. Find the area of the triangle in the middle by subtracting the areas of the two right triangles from the area of the large rectangle that contains it:

b. Show and label the base and the height of the triangle. Find the area by multiplying $(1/2) \times \text{base} \times \text{height}$

5. Make another triangle in a large rectangle



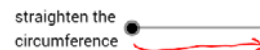
a. Show how to find the area of the triangle by subtracting.

b. Show and label the base and the height of the triangle, and find the area by multiplying

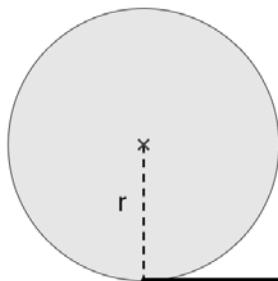
The area of a circle can be compared to the area of a rectangle.

6. Check out this circle tool: <https://www.geogebra.org/m/fyqAUV22>

a. Drag the slider to the right to straighten the circumference, and show how long it is:



b. Check the **circumference** box and the **dissect** box, and slide the **red dissect slider** to make the circle into 8 parts. Draw the 8 parts on the circle below:



c. Drag the rearrange slider all the way to the right end. Draw what it looks like when it's rearranged:

d. Drag the red dissect slider to make the circle into at least 100 parts, so that when it is rearranged it looks a lot like a rectangle.

What is the length of that rectangle?

What is the height of that rectangle?

What is the area of that rectangle (by multiplying)?