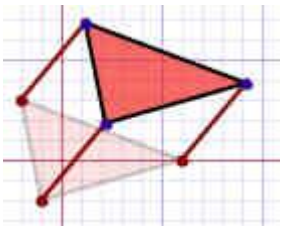
Demonstrate Congruency through Translations (Slides)

TAKS obj. #3 the student will demonstrate an understanding of geometry and special reasoning.
(5.8A) sketch the results of translations, rotations, and reflections

4.9B. 4.9C. 3.9C

***Congruent**: If one shape can become another using Turns (rotations), Flips (reflections) and/or Slides (translations) then the two shapes are called congruent.
After any of transformation (turn, flip or slide), the shape still has the same size, area, angles and line lengths. Taken from: http://www.mathsisfun.com/geometry/congruent.html

Translation  **Slide!**

In Geometry, "Translation" simply means moving or sliding without rotating, resizing or anything else, just moving.

Every point of the shape must move the same distance in the same direction. Click here to demonstrate translation.

Today you will draw a polygon and demonstrate a translation (slide) to show shapes are *congruent.

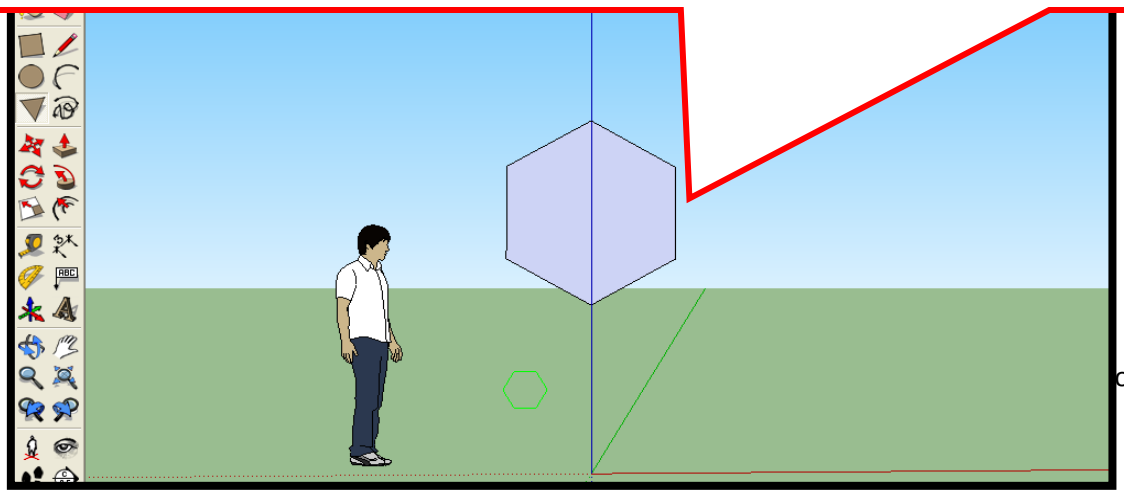
Open Google Sketch up from the desktop. Click on Start using Sketch up.

Step 1: Use the orbit tool to rotate all three axis points so that the blue and red axis lines form a right angle as shown below. So now you should have two congruent angles since they are both 90°

Step 2: Now let's draw a hexagon. Choose the **polygon tool** – (*by default it will have 6 sides which is a hexagon unless you less change the number of sides by typing 3s, 5s… and press the enter key before you draw the shape.)*

Now click right on the blue axis line and drag your mouse up or down to create your hexagon.

You will notice that it has a vertical line of symmetry; one side is an exact mirror image of the other.



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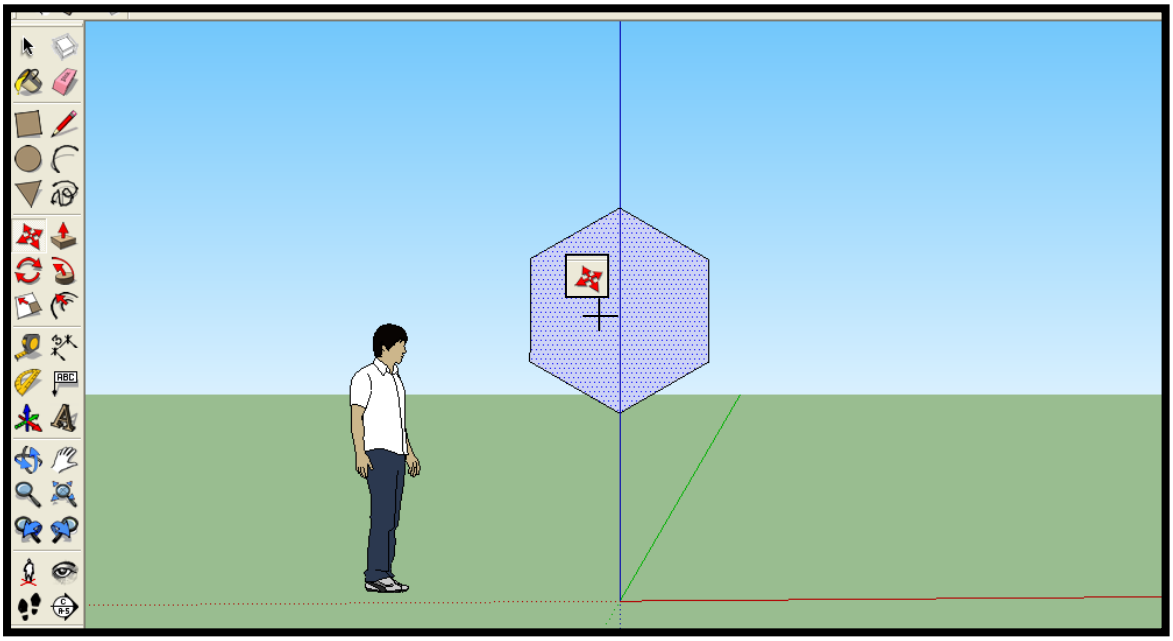
Step 3: click on the **Move tool** 

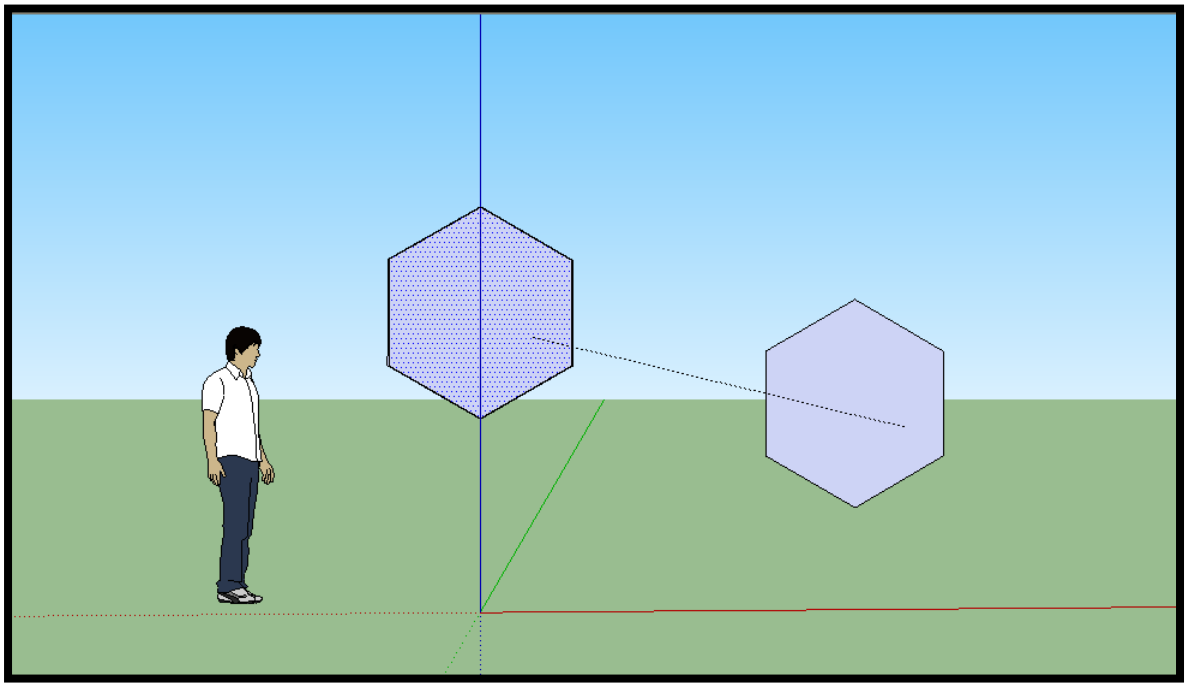
Step 4: Click on the face of the surface. *It become shaded when selected.*

Step 5: Hold the Control key down with your left hand while your right hand stays on the mouse. (*you will see 4 arrows and a tiny plus sign on the hexagon*.)

Your screen should look something like this below.



Step 6: Drag your mouse away from the hexagon to the right and down as shown below.



Notice how it made an exact copy of your shape (see above) which makes it congruent.

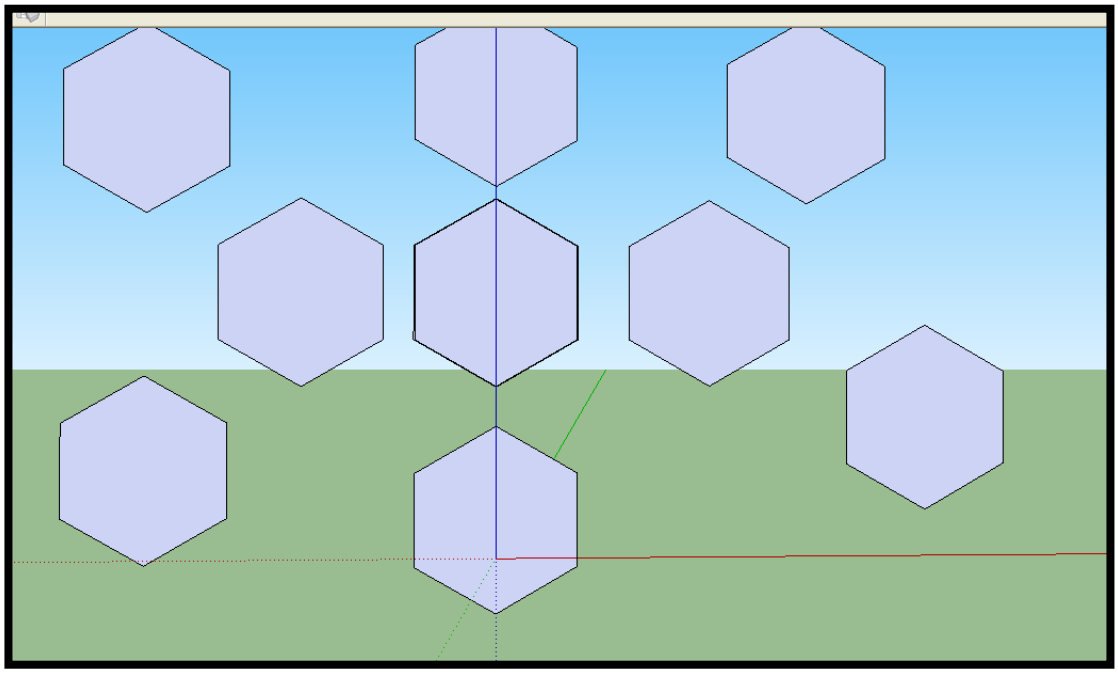
As you moved it you demonstrated a translation since you slid the copy from one part of the screen to another, but all the other properties of the hexagon remained the **same**. It still has the same size, area, angles and line lengths.

Step 7: Your Task:

See how many more congruent hexagons you can create and translate (slide) them to another part of your screen. Remember, you can slide left, right, up, down or diagonal position as in this example below.

If Nick gets in your way- just press the space bar, click on him and press the delete key.

When you are finished, your screen should look something like this below.



We have just proved that when you translate an object or an exact copy of an object - it remains congruent since only its position changed and not any of its properties.

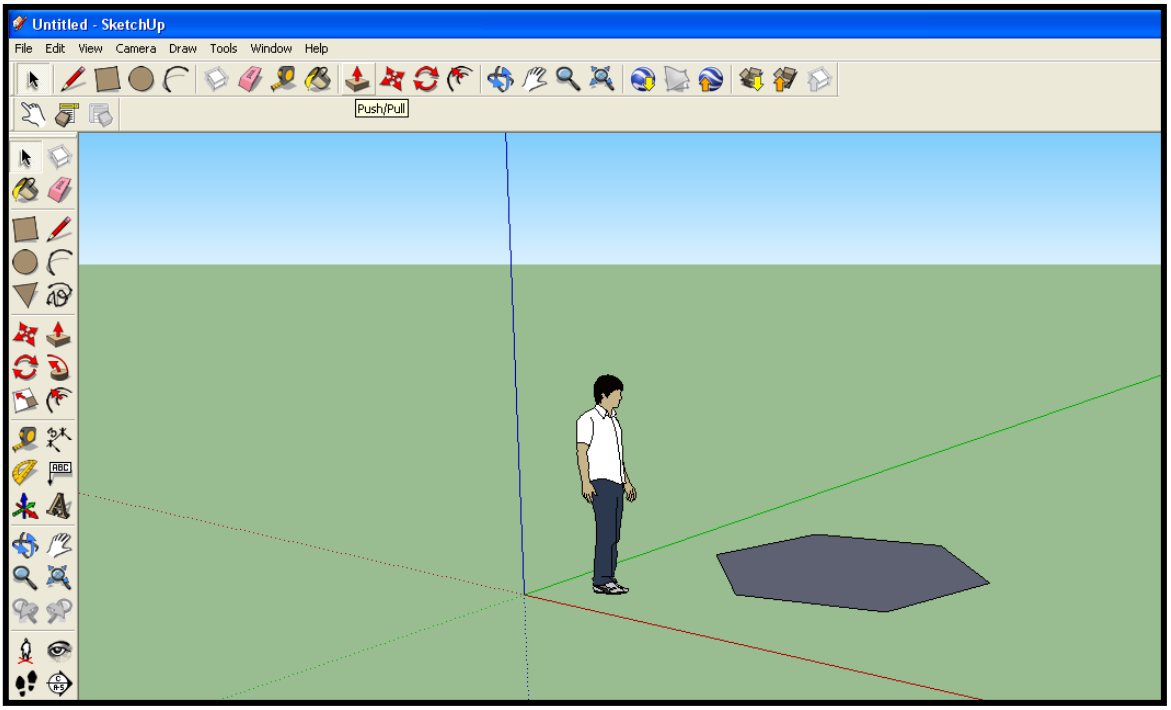
Part II

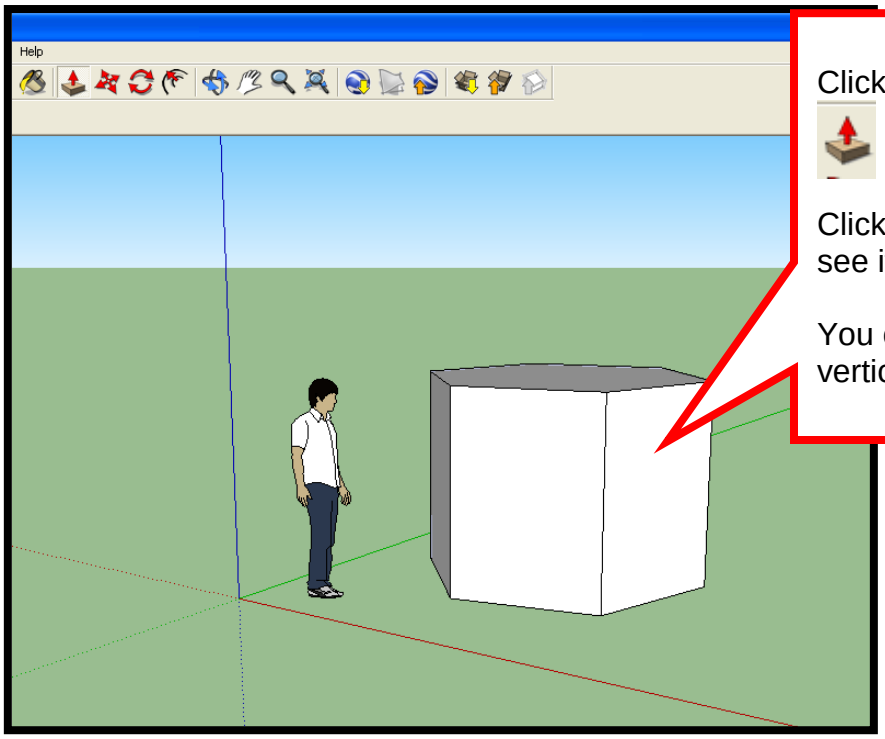
Let's prove that both bases of a 3D object are congruent.

Click on **File**>**New**

Click on the **Polygon tool** and draw a hexagon (six sides.)

Make sure you have your screen rotated like below so that the hexagon has a dark gray surface.





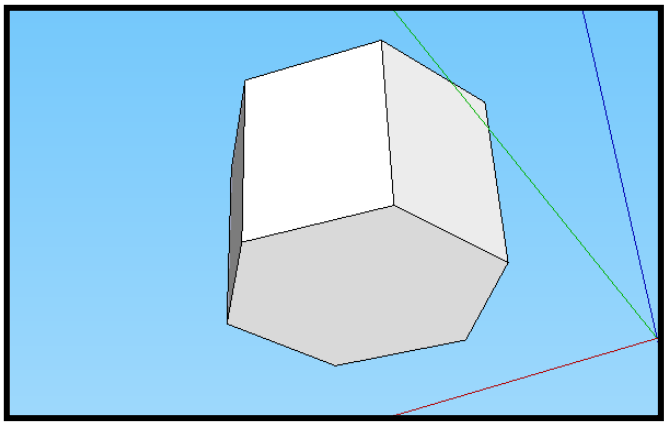
Click on the Push>Pull tool

Click on the surface and pull it up so you can see it as a 3 dimensional object.

You can see it now has faces, edges & vertices.

Also notice how it now has 2 bases- the top and the bottom.

Click on the **Orbit** tool to rotate your object so you can see the bottom base.



Now let's find out if these two bases are congruent to each other.

- To do this, we are going to erase all of the side faces first.
- Click on the arrow tool or press the space bar.

- Click on a side face, and then press the delete key. Use the orbit tool to turn your object and delete the other remaining faces except for the top and bottom.
- Now you can see all the exposed edges and vertices.
- You can also see that both the top and bottom face are congruent. We pulled to get a 2nd face (an automatic translation) but we didn't change any of its properties.
- Bases on a 3D object are always congruent.