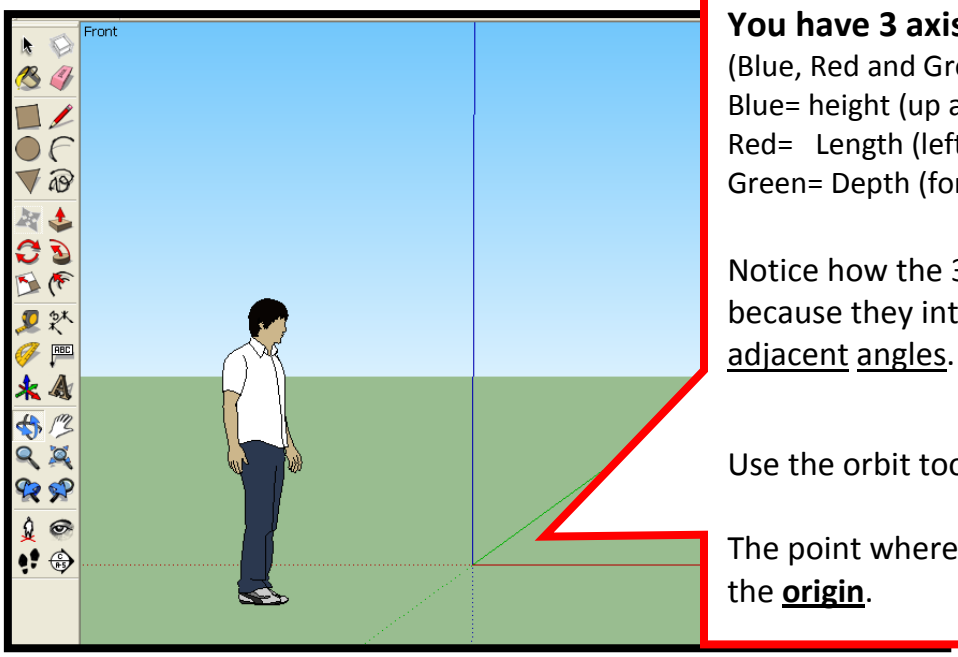
Perpendicular/Parallel lines and Parallelograms

Google Sketch up

4.8B identify and describe parallel and intersecting (including perpendicular) lines using concrete objects and pictorial models.
5.7A Identify essential attributes including parallel and perpendicular, and congruent parts of two- and three- dimensional geometric figures.



You have 3 axis lines in sketch up.
(Blue, Red and Green)
Blue= height (up and down)
Red= Length (left and right from regular view like this)
Green= Depth (forwards and backwards in reg. view)

Notice how the 3 axis lines are **perpendicular** because they intersect and form congruent adjacent angles.

Use the orbit tool  to look to find the angles.

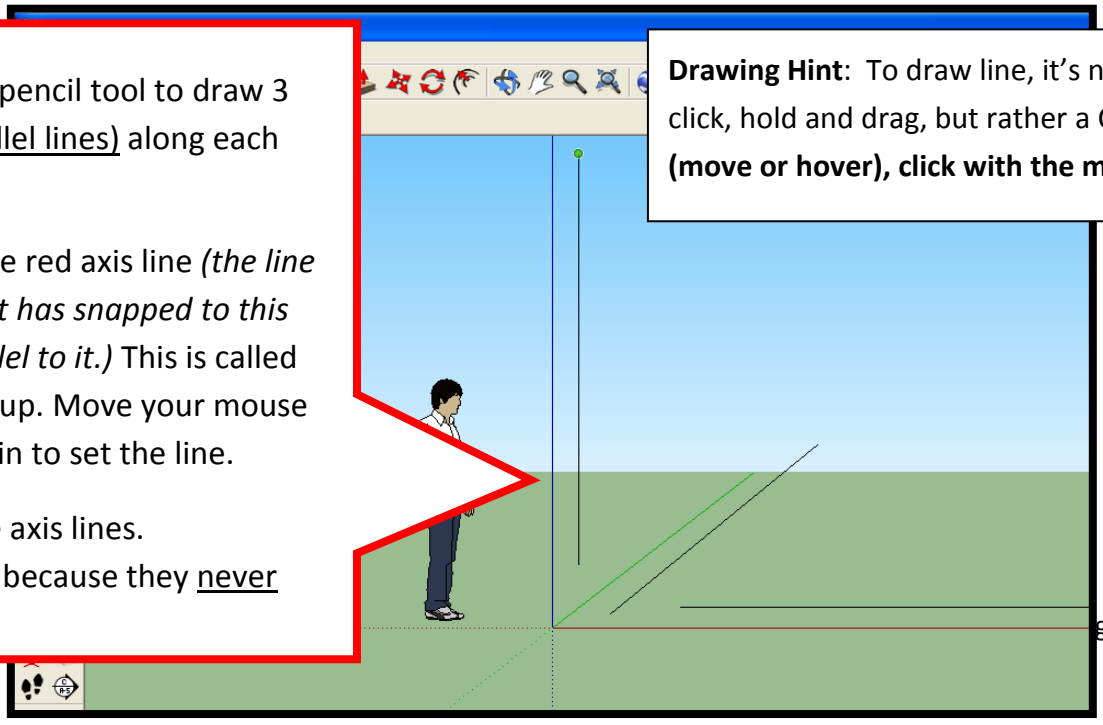
The point where they meet in the center is called the **origin**.

Inferencing in Sketch up: Draw some parallel lines along each axis.

2. Click on the pencil tool to draw 3 separate edges (parallel lines) along each colored axis line.

To start: Click near the red axis line *(the line will turn to red once it has snapped to this axis line and be parallel to it.)* This is called inferencing in sketch up. Move your mouse to the right. Click again to set the line.

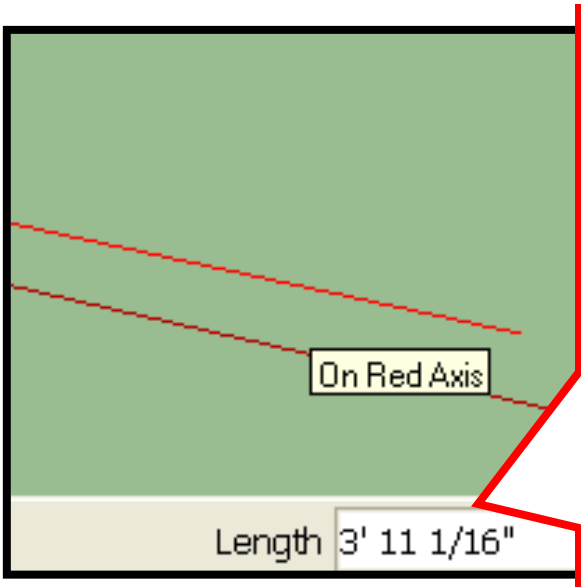
Repeat with all three axis lines.
The lines are **parallel** because they never intersect.



Drawing Hint: To draw line, it's not a click, hold and drag, but rather a Click, **(move or hover), click with the mouse.**

Click on the eraser tool  then click on each line to erase it.
***Helpful Tip:** You can also select all the lines by dragging your mouse around all of them at one time. Once selected, press the delete key.

Determine the length of your lines- Introducing the **Value Control Box**.



Begin drawing another line, but <u>do not click</u> at the end to set yet.

<u>Take your hand off of the mouse.</u>

*Notice at the bottom it gives you the current line measurement inside a box that says **<u>length</u>** (this is the <u>value control box</u>.)*

Since you didn't click to set the line, you can type in a specific length into this window for your line or anything else you draw.

- Type in the length you want.
- <u>Press the enter key</u>.

(3'= 3 feet- use the apostrophe for feet)
(3= inches- no symbol defaults to inches or you can press".)

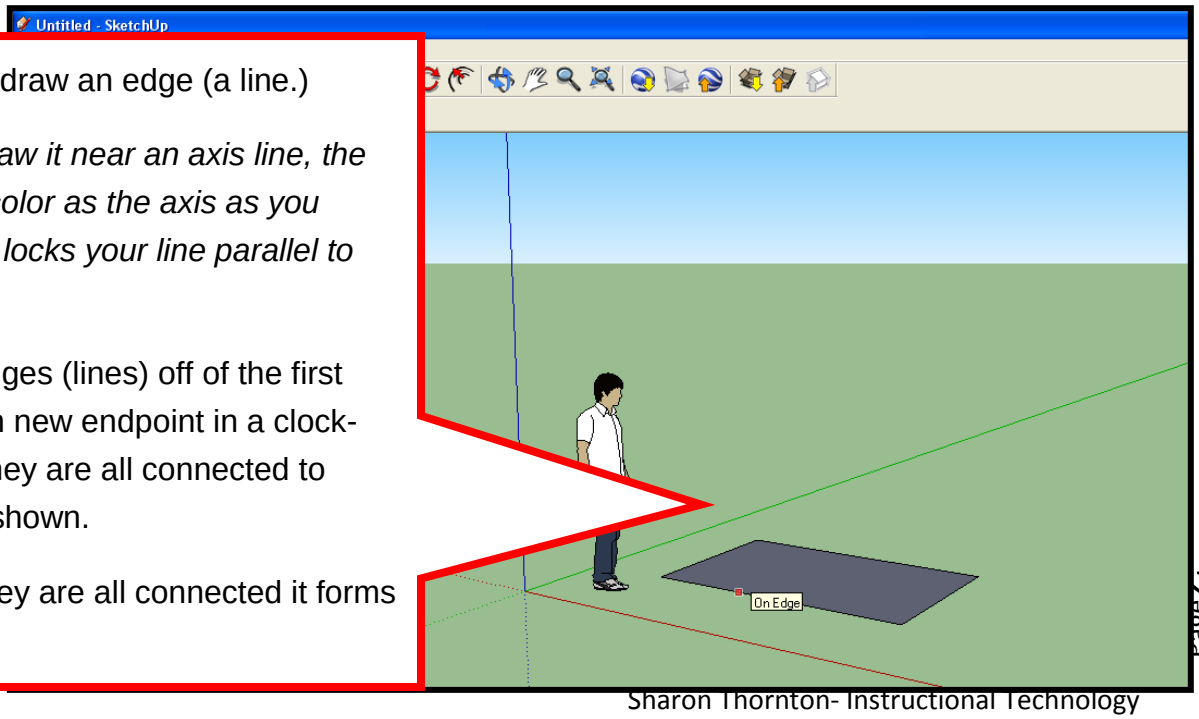
Now erase your line. We will use the pencil (line too) to draw a rectangle and look some more at lines.

Click pencil tool and draw an edge (a line.)

Remember, if you draw it near an axis line, the line turns the same color as the axis as you draw and it snaps or locks your line parallel to that axis.

Now draw 3 more edges (lines) off of the first one, clicking on each new endpoint in a clock-wise direction until they are all connected to form a rectangle as shown.

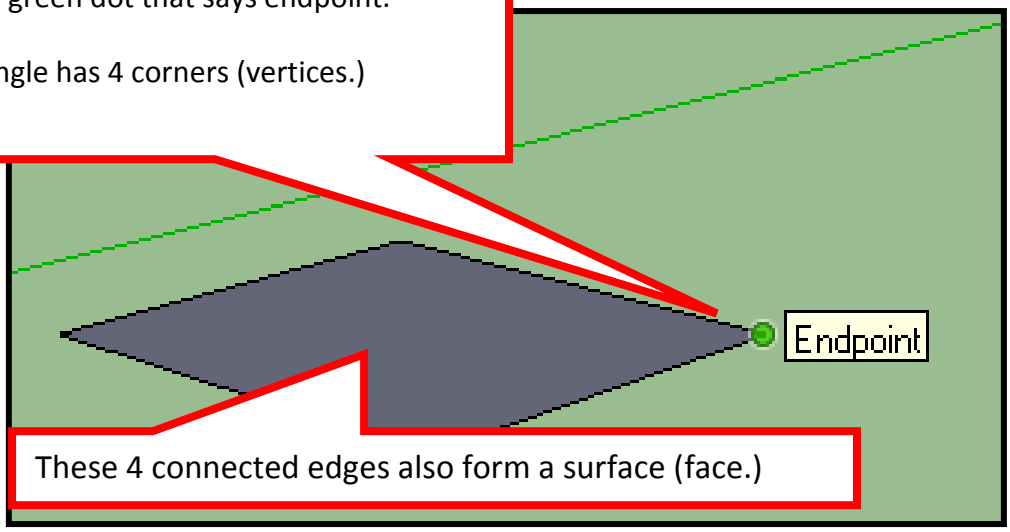
Notice as soon as they are all connected it forms a surface (face.)



We can see our rectangle has <u>4 edges (line segments)</u> because the lines do **<u>not</u>** extend forever, but have two distinct endpoints. *Also notice how a line can be parallel to one axis and perpendicular to another.*

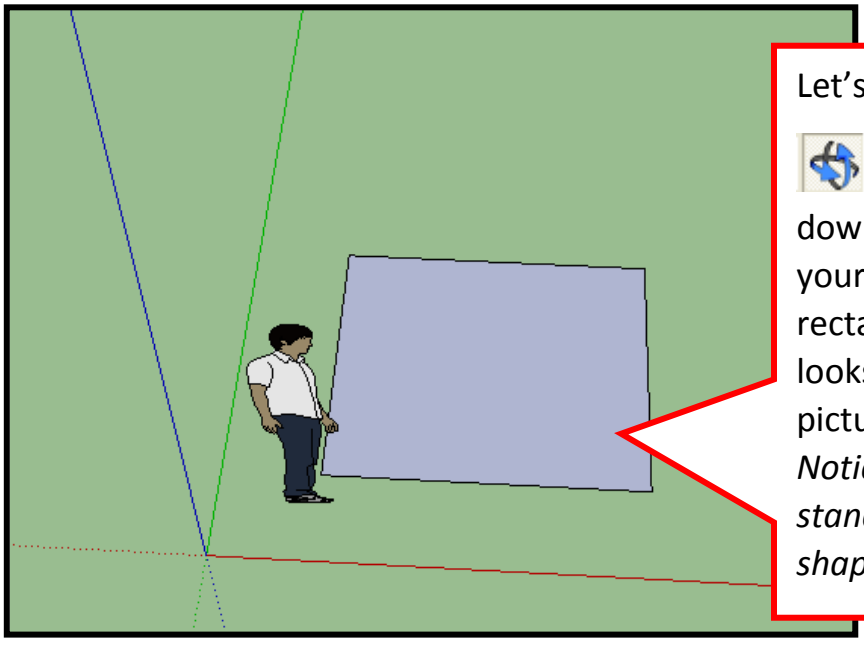
Hover your mouse over each corner (vertex) and you will see a green dot that says endpoint.

S o this rectangle has 4 corners (vertices.)



These 4 connected edges also form a surface (face.)

Could this rectangle be considered a Parallelogram? If so, can we prove it?
Remember, a Parallelogram has <u>2 sets of parallel sides that **never** intersect</u>.



Let's investigate:

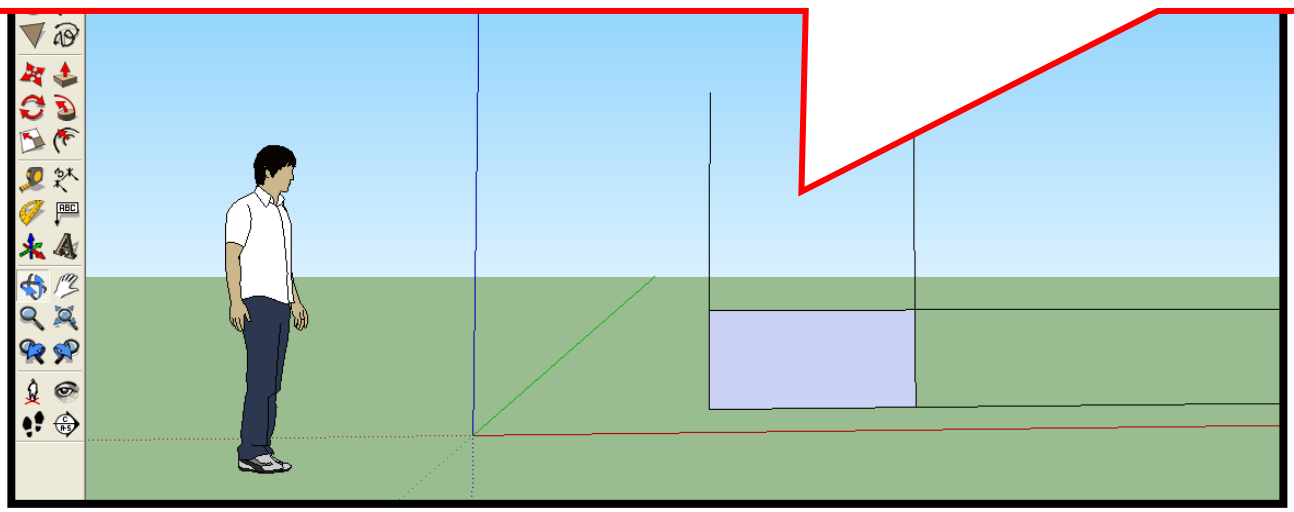
Click on the orbit tool (or press down on the middle scroll wheel of your mouse) and drag to rotate your rectangle in a downward motion until it looks like it's standing on its side as pictured.
Notice how the ground looks like it's standing up as well (making an L shape.)

Click on the Pencil tool 

Now click on one Endpoint of your rectangle *(you will see a green dot with the word endpoint.)*
Hover you mouse and move your hand up- click where you want the line to end.
Press the spacebar to exit the line tool.
Repeat on the other side. Now you can see you do have parallel lines

Repeat this on the other two sides.

Now you have 2 sets of parallel lines!



Mystery solved:
We proved a rectangle or any shape with 2 sets of parallel lines can also be called a parallelogram.