



A scale drawing is an enlarged or reduced drawing that is similar to an actual object or place. Blueprints and maps are examples of scale drawings. The ratio of a distance in the drawing to the actual distance is the scale of the drawing.

Problem 1 – Verifying that a drawing is to scale

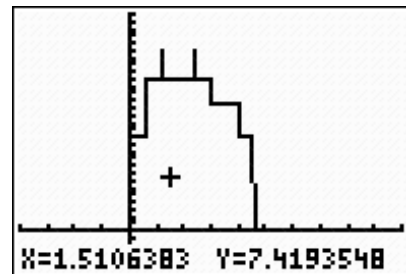
In this problem, you will view and measure a scale drawing on your calculator. Press **PRGM** to access the **Program** menu.

Choose the **SKYSCRAP** program.

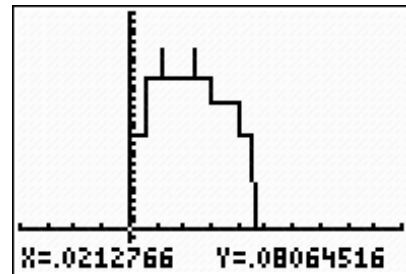
Choose **1:Sears Tower**.



The program displays a scale drawing of the Sears Tower, the tallest building in the United States. You are going to use the graph's axes to measure the height of the building in the scale drawing.



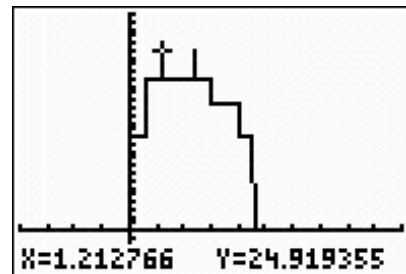
Now measure the figure. Press one of the arrow keys to display the cursor. The bottom of the screen shows the cursor's coordinates.



Move the cursor to find the coordinates of the bottom left corner of the building. What are the cursor's coordinates?

- $x = \underline{\hspace{1cm}}$ $y = \underline{\hspace{1cm}}$

The actual coordinates of the bottom left corner of the building are (0, 0). The size of the pixels on the calculator screen causes the coordinates to be close to but not exactly (0, 0).

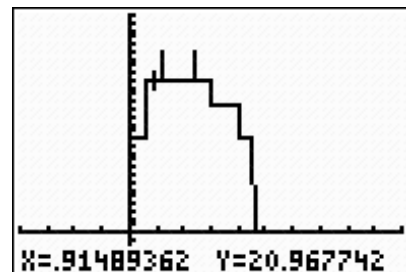


Since the bottom of the building is at $y = 0$, you can use the y -coordinate of the points at the top of the building to find the height.

- Find the tip height of the model Sears Tower. The tip height is the height to the top of the antennae.

model tip height = _____ units

Because the antennae are not a structural part of the Sears Tower building, they are not included in its official height measurement. The official height is the roof height, without the antennae.



- Find the roof height of the model Sears Tower.

model roof height = _____ units



Supertall Skyscrapers

- The actual tip height of the Sears Tower is 572 meters, and the actual roof height is 442 meters. Substitute these facts and the measurements you found into the proportion:

$$\frac{\text{actual1}}{\text{model1}} = \frac{\text{actual2}}{\text{model2}} \rightarrow \text{_____} = \text{_____}$$

- Cross-multiply. Do these expressions do form a proportion.
- Is the drawing to scale? How do you know?
- What is the scale of the drawing?

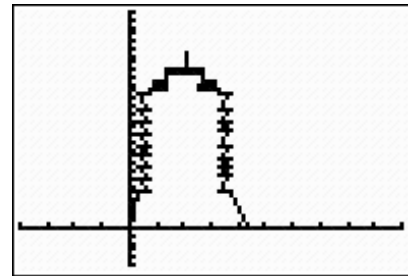
$$1 \text{ unit} = \text{_____} \text{ meters}$$

Problem 2 – Finding the height of other skyscrapers

Run the **SKYSCRAP** program again. This time select **2:Taipei 101**.

The program displays a scale drawing of the Taipei 101, currently the tallest building in the world. Adjust your window settings if necessary to see the entire drawing.

The spire at the top of the Taipei 101 is considered part of the structure, so it is included in its official height measurement.



In the scale drawing, the bottom of the building is at $y = 0$.

- Find the official height of the model Taipei 101.

$$\text{model official height} = \text{_____} \text{ units}$$

This drawing uses the same scale as the Sears Tower drawing, so the ratio of the actual height to the model heights of both buildings forms a proportion.

- Substitute the facts from Problem 1 and your measurement into the proportion below:

$$\frac{\text{actual1}}{\text{model1}} = \frac{\text{actual3}}{\text{model3}} \rightarrow \text{_____} = \text{_____}$$

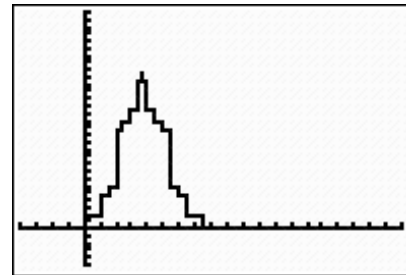
- Solve the proportion to find the actual height of the Taipei 101.

$$\text{actual height} = \text{_____} \text{ meters}$$

Run the **SKYSCRAP** program again and choose **3:Empire State**. This drawing uses the same scale as the Sears Tower and Taipei 101 drawings.

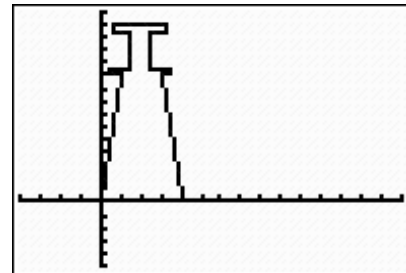
- Write and solve a proportion to find the actual height of the Empire State Building.

actual height = _____ meters



Problem 3 – Are you to scale?

Run the **SKYSCRAP** program again and choose **4:Lighthouse**. This program displays a drawing of a lighthouse. This drawing does **not** have the same scale as the skyscraper drawings. The actual height of the lighthouse is 10 meters. What would you look like standing next to this lighthouse? To find out, add a scale drawing of yourself to this figure.



- Find your actual height in meters. First, write your height in feet as a decimal. For example, 5 foot 3 inches = 5.25 feet. Then write and solve a proportion to find your height in meters. (1 meter = 3.281 feet.)

your height: ____ feet ____ inches = _____ feet = _____ meters

- Use the cursor to find the height of the model lighthouse.

lighthouse height = _____ units

- What is the scale of this drawing?

1 unit = _____ meters

- Write and solve a proportion to find your model height.

your model height: _____ units

Now you are ready to add a picture of yourself to the scale drawing. Start from the graph screen.

Press **[2nd]** **[DRAW]** to access the draw menu and choose **Line(**.

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DRAW POINTS STO
1:ClrDraw
2:Line(
3:Horizontal
4:Vertical
5:Tangent(
6:DrawF
7↓Shade(
    
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Move your cursor to a point on the x-axis. Press **[ENTER]** to turn the pen on and set the starting point for the line. Use the up arrow to draw a vertical line. When the y-coordinate is close as possible to your model height, press **[ENTER]** to turn the pen off. If you wish, you can continue to use the pen to make your scale model look more like you.

