Architecture 5: **Isometric Drawings** Name:

GOAL: Create a three-dimensional looking drawing of your team's tiny house or apartment.

Architects use isometric paper. An isometric drawing is a view seen from above that represents the three dimensions of the space.

- Get one centimeter cube
- Place the cube on the table so that one of the edges is facing toward you (not one of the sides).
- Place a dot on your isometric paper to represent the one vertex pointing out toward you.
- From this vertex, draw the three edges that shoot out from it. One goes straight down, one goes up to the left, and one goes up to the right.
- Draw the final two lines to create the left face, then the right face and top face.
- With the light in the room, the sides all look like slightly different colors. Leave one of your sides blank, lightly shade in one side, and shade in one side dark. This makes the cube look three dimensional.

- Complete the same task with 3 cubes. Add one cube on top of the original and one cube in front of the right face (pointing toward you). Make a brand new drawing of the new shape.

- Optional: Create a third drawing using either 4 or 5 cubes.

Now you are ready to draw your 3-D house isometrically.

- Use a ruler for this drawing.
- Every two squares on your actual house will equal one square on your isometric drawing. So if your house is 24 lines long, it will be drawn as 12 lines long on the isometric paper. If an item is an odd number, use your best judgment as to whether rounding up or down looks better.
- Draw all windows (at least 2) and the door.
- Shade the house appropriately.
- If time allows, you may wish to try drawing some items around your home as well (walkway, pool, etc.)

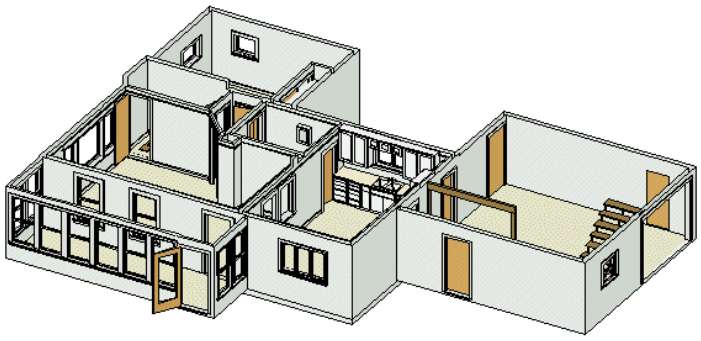
Your homework for Architecture Day 5:

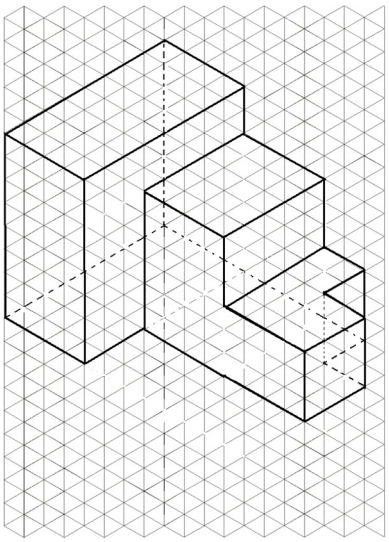
- Each person in your group should complete one of the two different linear equations pages: Skyscrapers or Grapevine Home Prices

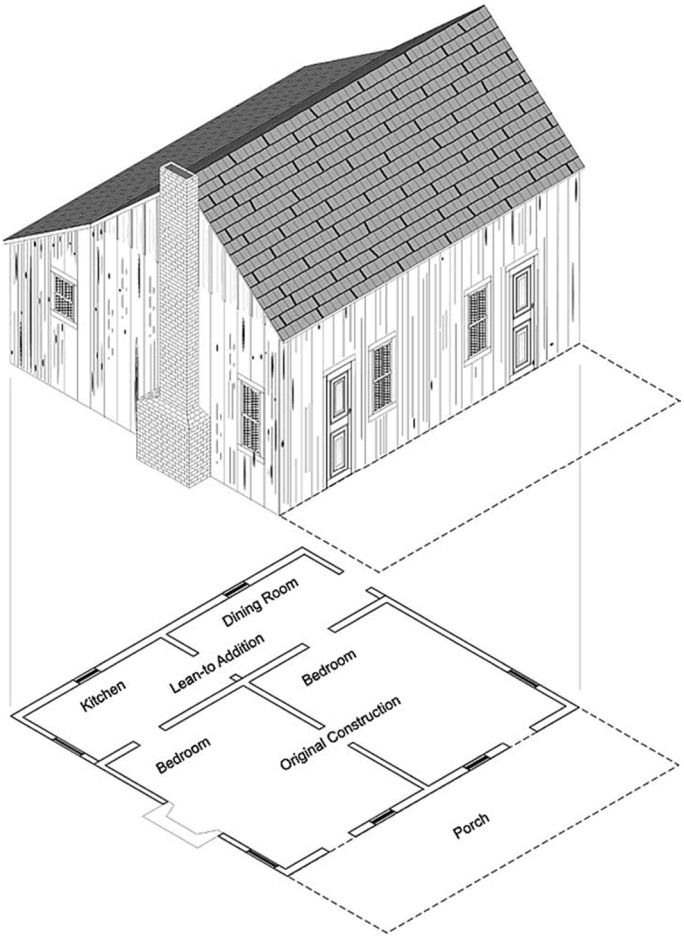
Architecture 5: **Isometric Drawing Examples** Name:

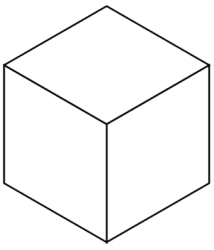
Do you want to draw isometrically on your computer? http://illuminations.nctm.org/ActivitySearch.aspx
In the Advanced Options box type “isometric”. Then choose the Isometric Drawing Tool.

Do you want to print out some isometric paper? http://www.waterproof-paper.com/graph-paper/

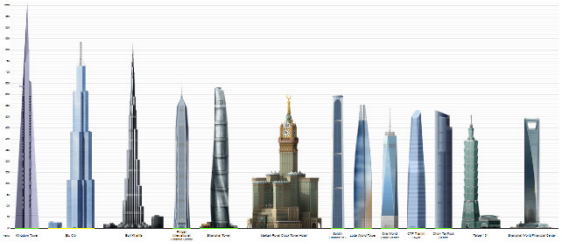








Skyscrapers of the World



Mr. Underwood wanted to know if there is a linear, proportional relationship between the number of floors in skyscrapers and the height of skyscrapers.

1.	Do you think that there is a proportional relationship between the number of floors in a skyscraper and the height? Explain.	

Mr. Underwood then searched and found information about some of the tallest buildings in the world.

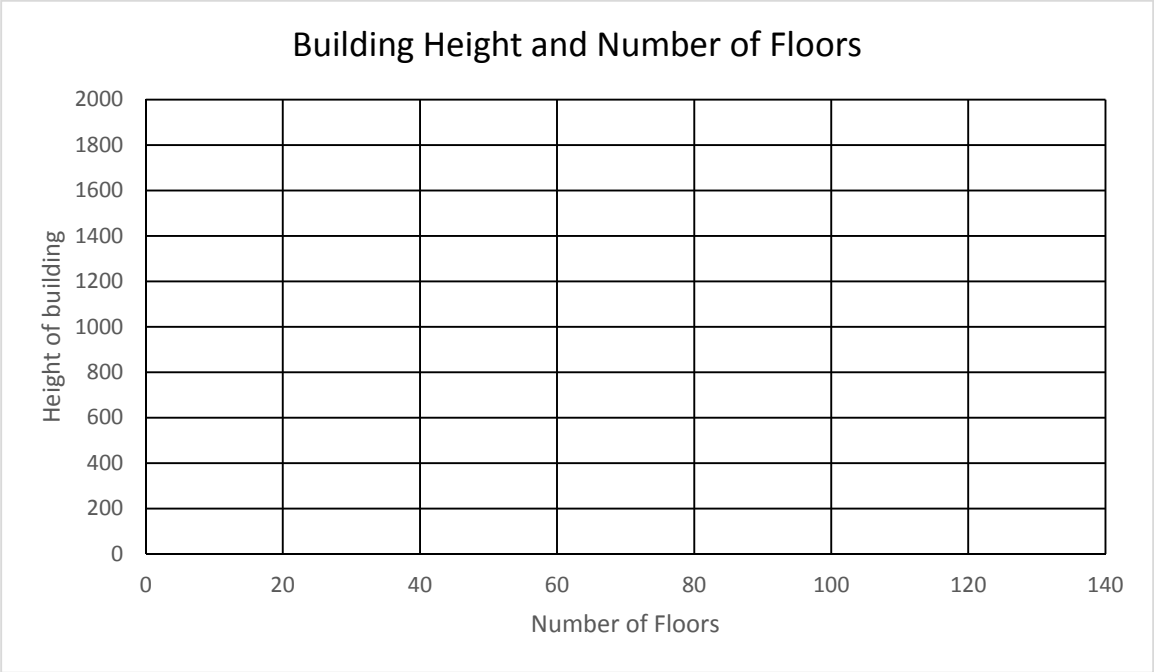
Structure	**Country**	**Number of Floors, *x***	**Height, *y***
Intl' Commerce Center	Hong Kong	118	1588 ft
Wills Tower	United States	108	1450 ft
One World Trade Center	United States	104	1368 ft
Princess Tower	United Arab Emirates	101	1286 ft
Q1	Australia	80	1058 ft

Using a calculator, determine the constant of proportionality for each structure. As a reminder, the constant of proportionality is $k = \frac{y}{x}$.

Structure	***k*** *(nearest tenth)*
Intl' Commerce Center	
Wills Tower	
One World Trade Center	
Princess Tower	
Q1	
Average	

2.	Based on your results in the table above, would you say the relationship between floors and height is close to being proportional? Why?	
3.	The constant of proportionality is *k*. What does *k* mean is this particular situation regarding building height and number of floors?	

Create a scatter plot the points of the 5 buildings on the graph.



A line of best fit, or trend line, is a straight line that best represents the data in a scatter plot. The line may pass through some points, none of the points, or all of the points. Using a ruler, draw a line of best fit for the data on your graph above. Extend your line so it covers from 0 floors to 140 floors.

4.	Approximately what is the *y*-intercept of your line? What does this mean?	
5.	Use your graph and line of best fit to predict the height of a 50 story building.	
6.	Use your graph and line of best fit to predict the height of a 130 story building.	
7.	Use your graph and line of best fit to predict how many floors would be on a 675 ft tall building.	
8.	Use your graph and line of best fit to predict how many floors would be on a 1800 ft tall building.	

Summary Table

In words explain the relationship between the number of stories and the height of skyscrapers. Use numbers to be specific.	Write an equation in the form of $y = kx$ to describe the relationship between the number of stories and the height of skyscrapers.

Home Prices in Grapevine, TX

Mr. Mangham is looking for a new house in Grapevine. He starts researching the prices of different homes. He knows the price of a home is a combination of the price of the land (vacant lot) plus the cost of the home. After analyzing many homes he determines that the following equation provides a pretty good estimate of home prices in Grapevine:

$$y = 125x + 18000$$

x represents the size of the home (square feet) and y represents the price of the home (dollars)

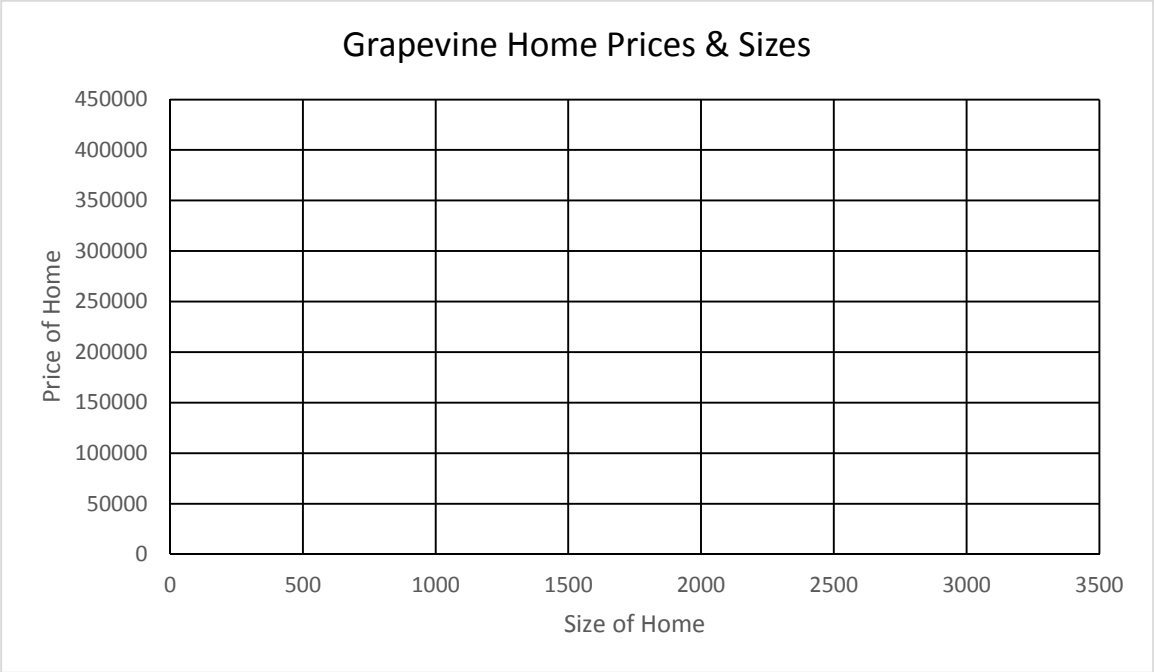
1.	What does the number 125 mean in the equation?	
2.	What does the number 18,000 mean in the equation?	
3.	Is this linear relationship proportional or non-proportional? How do you know?	

Using a calculator, complete the table below to give Mr. Mangham estimates of the home sizes and prices in Grapevine.

House	**City**	**Size (ft^2), x**	**Price, y**
House 1	Grapevine	1600	
House 2	Grapevine	2400	
House 3	Grapevine	3200	
House 4	Grapevine		$175,000
House 5	Grapevine		$275,000
House 6	Grapevine		$360,000

4.	How much would you expect a vacant lot to sell for if it followed the same equation?	
5.	Would you expect $y = 125x + 18000$ to be a good estimate for home prices in cities surrounding Grapevine? Why or not?	
6.	Would you expect $y = 125x + 18000$ to be a good estimate for home prices in New York City? Why or why not?	

Plot the six homes from the previous page on the graph below.



Using a ruler, draw a line to connect your points. Extend your line so it covers from 0 to 3500 square feet.

7.	Does the *y*-intercept appear to match the *y*-intercept listed in the $y = mx + b$ equation?	
8.	How does the graph confirm your answer to #3 on the previous page?	
9.	What is the slope of your line?	
10.	Use your graph to predict the price of an 1800 square foot home.	
11.	Use your graph to predict the price of a 3100 square foot home.	
12.	Use your graph to predict the square footage of a $250,000 home.	

Summary Table

In words describe/explain the relationship between the square footage and price of a house in Grapevine to someone just moving to Grapevine. Use numbers as well to be specific.