Name: _____
Date: _____

Civil Engineering Unit Test

1. Identify the type of force being described (forces may be used more than once or not at all)
   a. A stack of books is placed on a shelf and the shelf begins to bow under the pressure

   Force:

   b. A 5 pound weight is placed directly on top of a structure

   Force:

   c. Two dogs tugging on a rope

   Force:

   d. While attempting to unscrew a screw, the screw snaps

   Force:

2. Convert the following scales to unitless scales
   a) $\frac{1}{3} in = 10\ ft$

   b) $1\ cm = 20\ cm$

   c) $2\ cm = 10\ meter$

   d) $2\ inch = 1\ mile$

3. The scale of a drawing is 1 cm = 15 meters. Find the length each measurement would be on a scale drawing.

a) 200 m b) 30 m c) 5 m d) 260 m

4. The scale of a drawing is ½ in = 20 feet. Find the actual measurement.

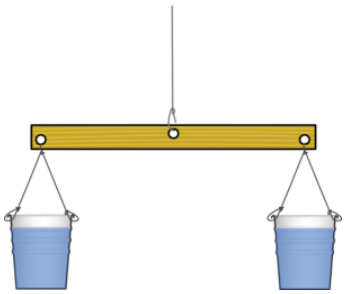
a) 1 in b) 3.5 in c) 1/8 in d) 3 in

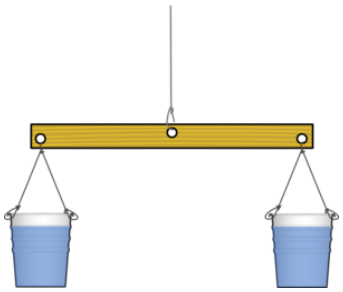
Name: _____
Date: _____

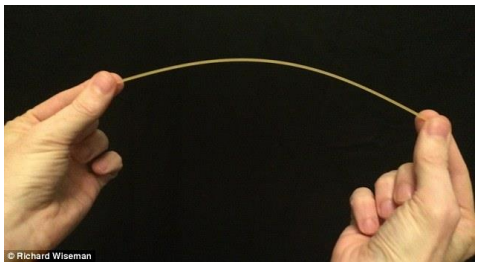
Civil Engineering Unit Test

5. Identify the force shown in each picture (forces may be used more than once or not at all)

Force in: a:_____ b:_____ c:_____ d:_____ e:_____ f:_____

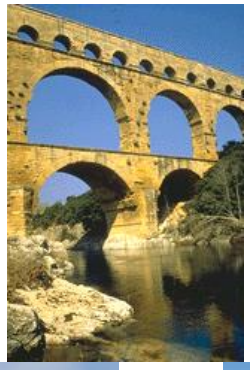


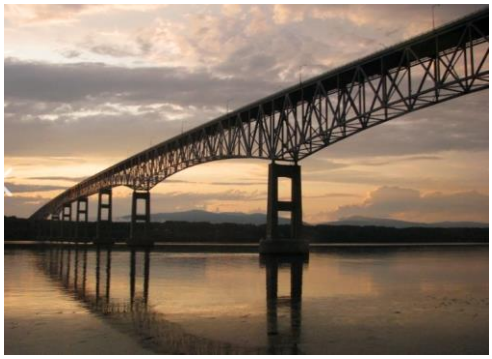




6. Identify the type of bridge in each picture below

Force in: a:_____ b:_____ c:_____ d:_____ e:_____



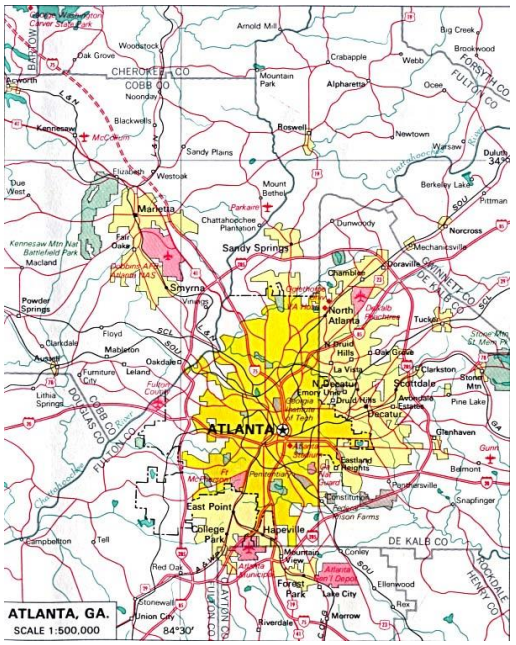


Name: _____
Date: _____

Civil Engineering Unit Test

7. The distance between Houston and Atlanta is about 702 miles (as the crow flies, not driving distance). If I were to draw a map of the US with a 1 in = 120 miles scale, what would be the distance between these two cities be on a map?

8. Never one to trust Google Maps, Susie has purchased herself a Georgia Atlas and Gazetteer. Unfortunately, no one has seen/used one of these in 10 years, so she and all her friends are utterly confused. This is where you come in. On the map below, if she wishes to travel from Marietta to Stone Mountain how far will she have to travel? Make your best estimate and include all measurements which you need. **Bonus: If here average speed is 25 mph (b/c I-285), then how long would this drive take her?**



9. A map scale is 1 in = 75 mi. The map distance between the two towns is 3.5 in. Find the actual distance between the towns.

10. A bridge consisting of 5000-pounds of steel and 12-tons of cement can carry up to 50 3000-pound cars, or 3 25-ton semi-trucks. What is the live load, dead load and structural efficiency?

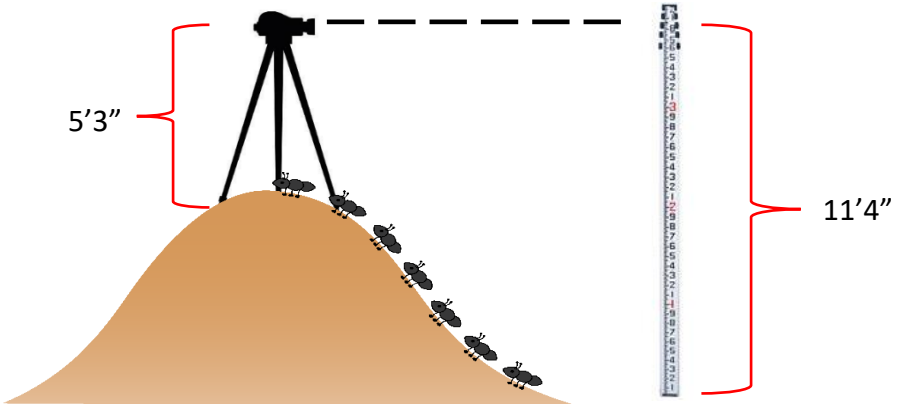
11. A bridge is made of three 4 gram sticks of balsa wood and 9 grams of hot glue. If the bridge holds 10 pounds, what is the live load, dead load and structural efficiency?

Name: _____
Date: _____

Civil Engineering Unit Test

12. Gandalf is leading a fellowship of himself and 8 travelers (4 hobbits weighing an average of 40 kilograms and 4 various other members weighing an average of 90 kilograms. You approach a very suspicious-looking suspension bridge which Gandalf's magical powers of accurate structural analysis perceives to weigh 5500 kilograms and have a structural efficiency of .1. If the 8 other travelers are already on this bridge, is it safe for Gandalf to climb on as well or should he just call his eagle?

13. How tall is the ant hill below?



14. A surveyor is trying to determine the grade of a ramp which spans a horizontal distance of 50 feet. A transit level is set to exactly 5 feet tall at the bottom of the ramp and reads 1 feet 6 inches on a surveying rod at the top of the ramp, then what is the grade of the ramp?

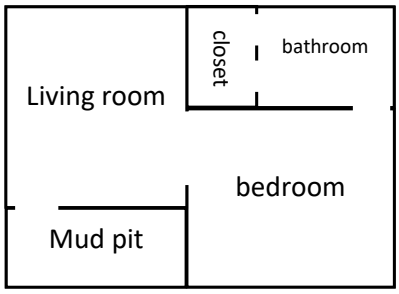
15. Florida man is concerned that his beach-side home may become flooded during the upcoming hurricane season. To determine how many feet of storm water his home can withstand, he sets a transit-level on his front door and a surveying rod at sea level 200 feet away. If the transit level is 4 feet and 8 inches tall and he reads 12 feet and 4 inches on the surveying rod, then how many feet of a storm surge can his home withstand before flooding?

Name: _____
Date: _____

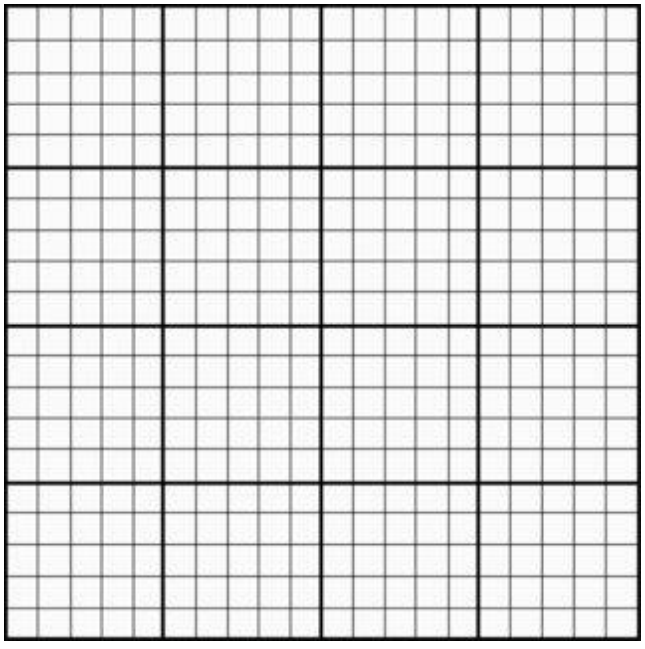
Civil Engineering Unit Test

16. Amblessed has recently purchased a 5-acre plot of land upon which he wishes to build his home. He stands on the North side of his property with a transit-level whose scope is 3'11" high. If his good friend (*your name here)* is holding a surveying rod on the South side of the property and Amblessed reads 12' on this surveying rod through his transit level. Which side of his property should Amblessed build his home and **Why?** (include all measurements/calculations which help you make this determination)

17. Mr. Little-Pig is a simple Pig with a simple house. In a sudden tragic act, a big bad wolf came and blew down his house. Fortunately, Mr. Little-Pig is a diligent civil engineer and measured the following dimensions of his house. Mr. Little-Pig took these blueprints to a construction company to recreate his home, but they did not believe his big bad wolf story and are now accusing him of insurance fraud. Mr. Little-Pig must now recreate his home on his own with off-the grid with the help of his two brothers. Help Mr. Little-Pig avoid insurance fraud by first coming up with an appropriate scale to represent a scaled down version of his home and then recreate this scaled home on the following grid.



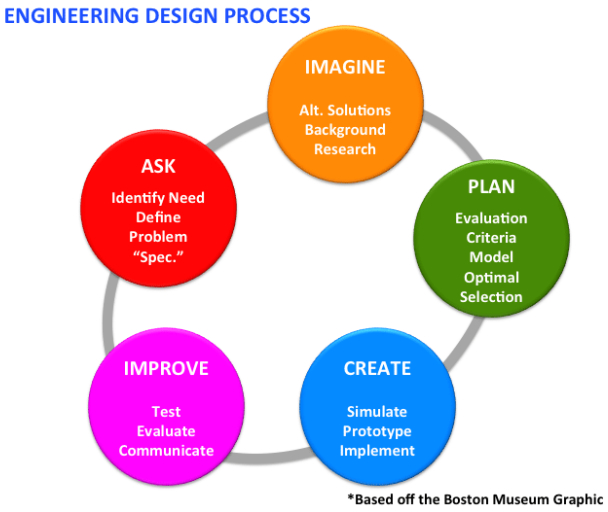
your scale:



Name: _____
Date: _____

Civil Engineering Unit Test

18. You are tasked with creating a bridge with the greatest structural efficiency possible out of no materials other than glue and up to 3' of balsa wood. Your bridge must span a 9" gap and will need to have a truss design. After testing your first bridge you will get a second chance to redesign/rebuild your bridge (does this sound familiar yet?) Based on the graphic below, describe a "story" of your steps through the Engineering Design Process as you design/redesign truss bridge.



19. Setting up the surveying tools: When it is your turn you will be given the yellow box containing a transit-level and a tripod. You will then need to set up and fully level the transit level, at which time I will check your masterpiece. Then all you need to do is return the transit-level to its box and fold up the tripod and you are all set. (there's nothing you need to write for this question, I just wanted to have a space on the test where I can write your points)