Name:

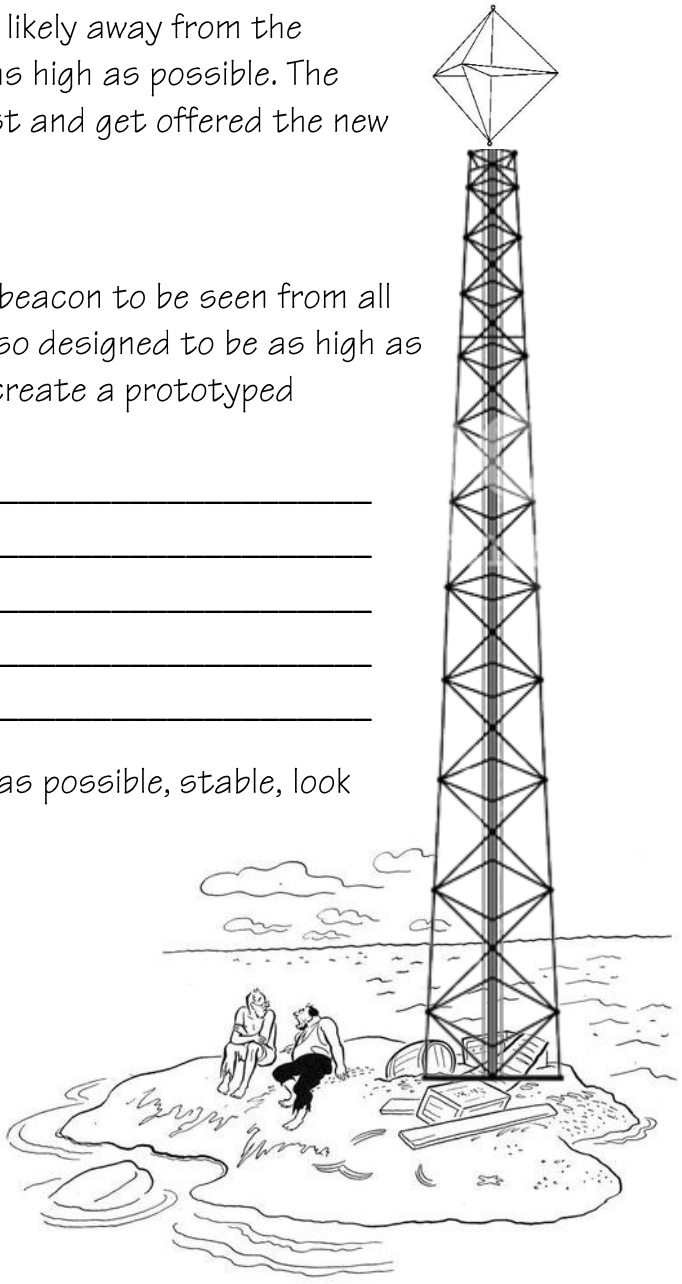
Date: Section:

FAULTY TOWERS

Situation

A manager is looking for a couple of engineers to promote to a new position in the company for a tower project, but are not sure which ones can be promoted. You and your partner are going to compete with the rest of the engineers in a simulated challenge.

It involves being ship wrecked on a small deserted island and you and your partner need to be saved as you have limited food, island resources, and know you need to be rescued to get back to civilization. As your position is likely away from the shipping lanes your best hope is a radar beacon held as high as possible. The highest tower will be the team that will be rescued first and get offered the new positions.



Problem/Challenge:

You and your partner must design a prototype radar beacon to be seen from all directions and must be mounted on top of a tower, also designed to be as high as possible with island available equivalent materials to create a prototyped solution which will include:

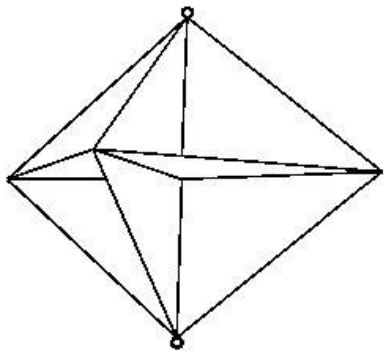
- 3 sheets of composite board _____
- 1 old saw _____
- 1 meter of seaweed _____
- 2 meters of rope _____
- 1 sheet of shiny aluminum _____

The prototype tower design build must be; as high as possible, stable, look like it will work, have great joints, securely hold the radar beacon, and with-stand those tropical storms.

Ideas/Investigation:

As your position is likely away from the shipping lanes your best hope is to design and create a radar beacon, held as high as possible. Two important facts shown in the diagrams below will help you understand why this is important.

A high reflective return radar shape that has 90-degree surfaces in all directions will have better possibility to be picked up by local ships with radar emitters. Also true is the higher you can locate the beacon, the further distance away, the ship can then pick-up your signal. Below is the formula to calculate how far that is.

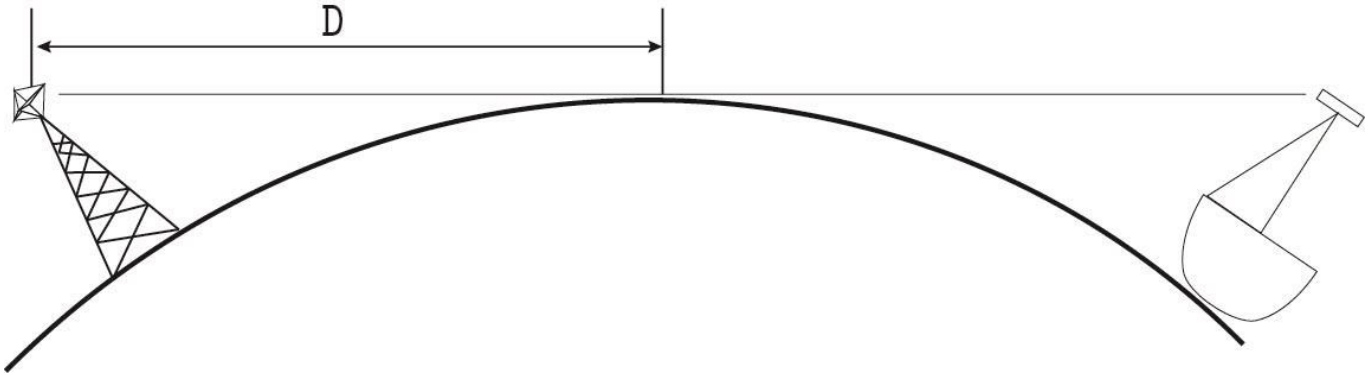


- $1.17 * \sqrt{H \quad ft.} \quad = \quad D \; nm$ Where the H is the height in feet and the D is the distance in nautical miles to the horizon

Problem:

Let's apply this formula to a realistic example for our possible tower heights. If you were to have made your tower 89 centimeters high and for simplification assume the ship's radar is the same height off of the water, what would be the maximum distance/range of the beacon/tower?

Show all steps including formula, substitution, units, calculations and circle final answer.



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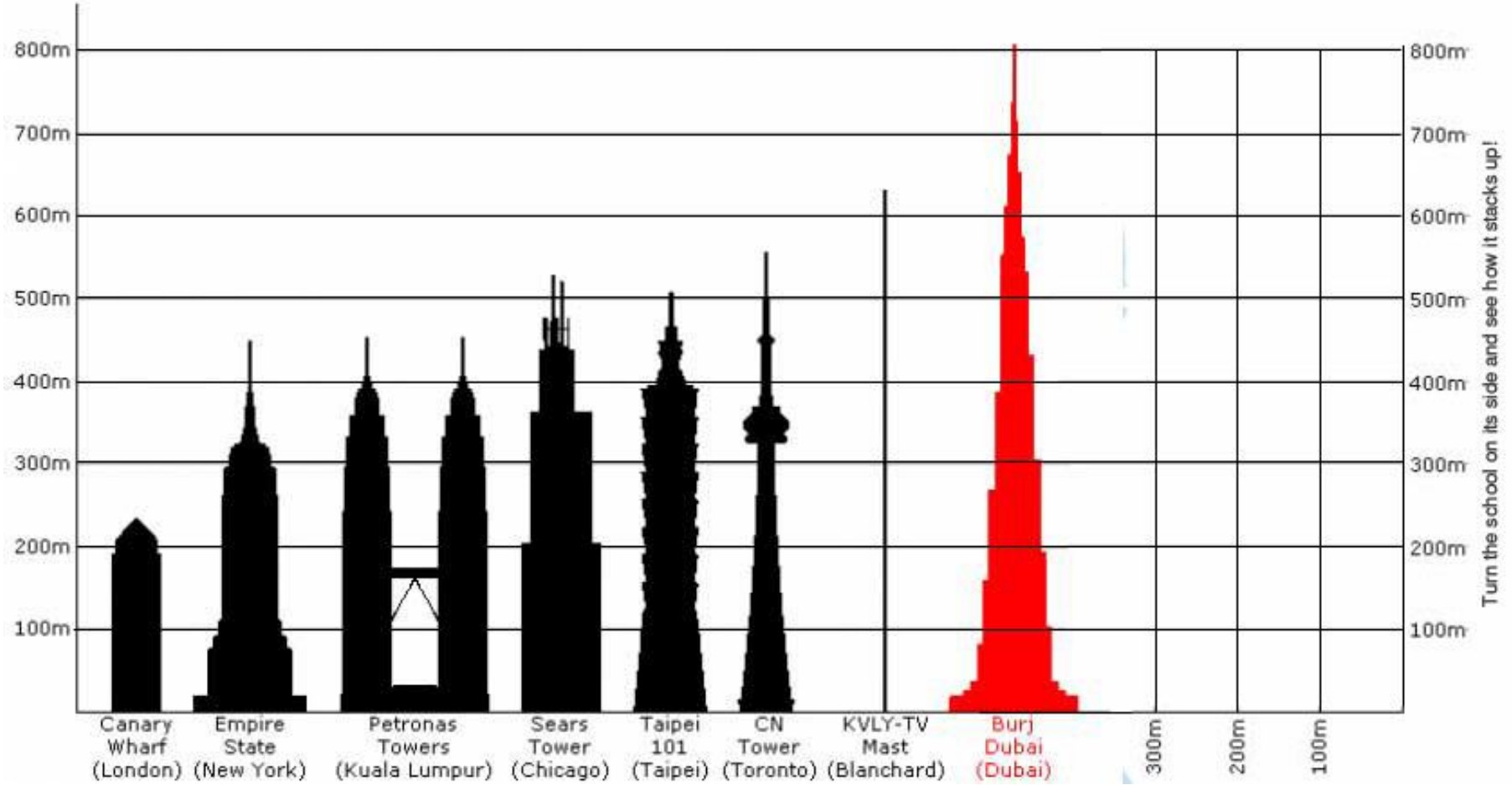
Tower Comparison Exercise

Below is a chart of common towers. Measure the school property and see how it compares to our CN Tower and the Burj Tower. Sketch in approximately how long and wide our school is in the space below:



Tip: See how far your stride is by walking on the floor for 20 tiles (1'square each) then divide by the number of steps into (1' * 20) to get your stride distance. Use the stride distance to walk the school sidewalk to find the length and width.

Name:

Date: Section:

Your Design and build Ideas:

_____

_____

_____

_____

Your Final Choice and Construction Process:

_____

_____

_____

Evaluation:

Height 1 point/centimeter _____

Stability

1 weeping willow — 2 rock & rolls — 3 teeters — 4 sways — 5 hurricane proof _____

Ingenuity of joinery

1 tape all over — 2 will it hold — 3 it works! — 4 no tape? — 5 super lock _____

Aesthetics (Does it look like it will work?)

1 lover of sea & sand — 2 is it sculptural? — 3 possible — 4 works well — 5 excellent structural use of materials _____

Radar reflector

1 stealth — 2 floating drum — 3 what's that? — 4 check it out — 5 747 ! _____

Team work

1 what partner? — 2 what's his name? — 3 some work done? — 4 a lot done! — 5 hardcore! _____

Total up your points and put in hand-in bin for marks ------→

Total Points _____

Bonus: If a ship has a 3-meter-high radar, figure out how far your beacon range will be?