

QUESTIONS FOR STUDENTS:

1) If you were hired to find the height of the tower without climbing to the top to measure it, what suggestions would you give to the mayor to figure it out?

Solve the following.

$$2) \frac{2}{5} = \frac{x}{10}$$

$$3) \frac{7}{28} = \frac{4}{x}$$

The following are two examples of ratios that can be used to compare the differences between two skateboards.

$$A) \frac{\text{Wheel size of 1}^{\text{st}} \text{ skateboard}}{\text{Length of 1}^{\text{st}} \text{ skateboard}} = \frac{\text{Wheel size of 2}^{\text{nd}} \text{ skateboard}}{\text{Length of 2}^{\text{nd}} \text{ skateboard}}$$

$$B) \frac{\text{Wheel size of 1}^{\text{st}} \text{ skateboard}}{\text{Wheel size of 2}^{\text{nd}} \text{ skateboard}} = \frac{\text{Length of 1}^{\text{st}} \text{ skateboard}}{\text{Length of 2}^{\text{nd}} \text{ skateboard}}$$

4) What two things could you compare to figure out the height of the tower?
(Hint: one was given to you in the wording of this problem)

5) The man who solved this problem for the mayor compared the height of the tower and the height of himself and the length of his shadow to the shadow of the tower. Using the skateboard example from above, can you write an equation that would compare the length and shadow?

6) Which of the four parts of the equation is the unknown? Which one of these four parts cannot be measured without leaving the ground?

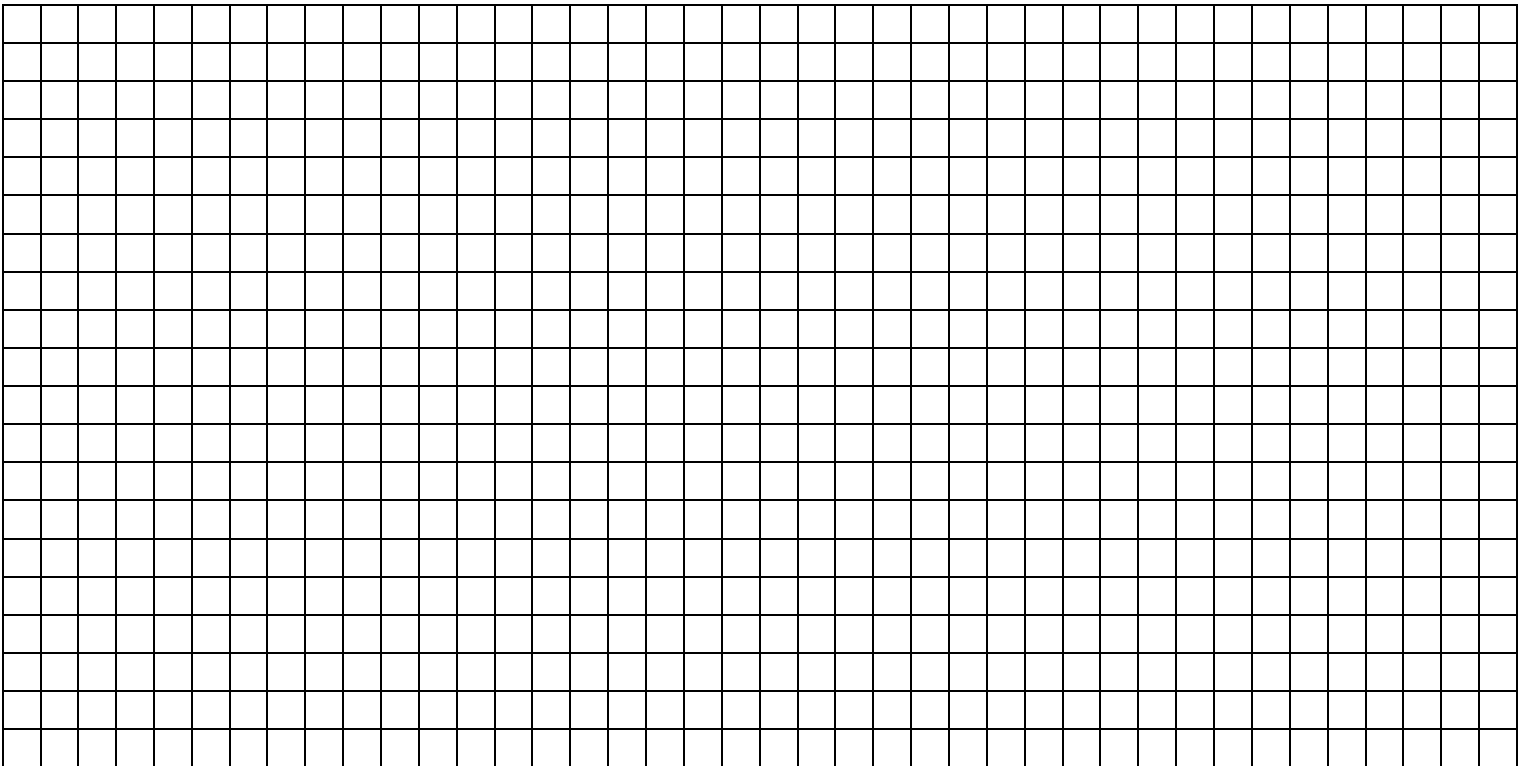
7) How can we solve the part of the equation that we do not know (i.e. the height of the tower?)

8) What is the height of the tower if:
height of man = 6feet
shadow of man = 18 feet long
shadow of tower = 36 feet long
height of tower = x (the unknown)
Set up a proportion and solve the equation.

9) Can you reduce the $\frac{6}{18}$ before solving the equation and still get the correct result?

Graphing:

- 10) On a piece of graph paper, create a graph where the x-axis is the shadow length and the y-axis is the height.



11) Plot the point that represents the length of the shadow of the man (18 feet), and the length of his height (6 feet). Draw the line from the origin (0,0) through this point (18,6). Extend the line through the point. Then, mark the shadow of the tower on the x-axis (36). With your pencil on 36, follow in a vertical line up to the point where it would intersect the line. What is the y-value or height at this point?

12) Using this line, predict the height of an object with a shadow of the following measurements:

- A) 26 feet long B) 30 feet long C) 34 feet long

13) How is graphing and predicting similar to setting up an equation with ratios to solve for the height of the tower?

14) Now complete this process and find the height of your house.

ASSESSMENT OPTIONS (constructed response)

Suppose you own a hotel along a beachfront. You don't want your hotel to create a shadow over the beach and block the sun from your guests. If you knew the height of the hotel, how could you figure out how far the shadow reaches at a give time of the day without measuring the distance from the hotel to the end of the shadow?

EXTENSIONS:

If the man in the problem waited a day after measuring his shadow and the shadow of the tower, why would this be a bad idea?

If a man waited 10 minutes instead of a day, why might his finding be a bit different?