



Outdoor Triangle Proportions



Photo Credit: Alexander Kovalev

Goal:

By the end of this unit students will be able to understand similar triangles and proportions. Students will do this through measuring a tree shadow and using their own height and shadow length to set up a proportion. By finishing the calculation, the students will find the height of the tree or building. Activity designed for grades 5-9 but can be modified higher or lower.

Materials:

- tape measure
- pencil
- calculator
- paper/clipboard
- sidewalk chalk
- a tall object outside like a tree or a building.

Activity:

1. Discuss similar triangles and how their side lengths are proportional. This can be done in the classroom or outside under the trees.
2. Demonstrate how to measure someone's height accurately. One way would be to use the chalk and have students lie down and mark the top of their head and the bottom of their feet.
3. Have students pair up and measure each other's heights as accurately as possible.



4. Student pairs identify a tall object outside such as a tree or building.
5. Students measure their shadow and the shadow of the tree
6. Set up proportion on sidewalk with chalk

Example: student height 1.5 meters, shadow length 1.2 meters, tree shadow length 30 meters therefore:

$$\frac{1.5}{1.2} = \frac{X}{30} \quad (\text{Set up ratio with shadow length on bottom})$$

$$(1.5)(30) = 1.2(X) \quad (\text{Cross multiply})$$

$$45 = 1.2(X) \quad (\text{Simplify})$$

$$X = 37.5 \text{ meters} \quad (\text{Divide by 1.2 and solve for } x)$$

7. Repeat with other buildings and trees

This can be tied to other outdoor lessons, such as tree identification, photosynthesis, poetry about trees or nature.