Tree Trigonometry
GRADE 10

LESSON DESCRIPTION

Concepts in mathematics can be taught outside to bring out a sense of curiosity and confidence. This activity can be used with Grade 6 and up to build understanding of measurement of triangles, angles and understanding of similar triangles.

SUGGESTED CURRICULUM LINKS

Mathematics: Grade 10 - Trigonometry

LESSON

Students will calculate the height of trees in their backyard or neighbourhood using simple trigonometry ideas, a stick, their bodies, and a measuring tape.

Materials:

- Tree
- Narrow stick (roughly 75cm long)
- Measuring tape
- Calculator
- Paper to write calculations

Instructions:

1. Get a stick that is equal in length to the dis-tance from your eye (cheekbone) to your fist when your arm is fully extended in front of your face. Break off part of the stick or mark it at the correct length if you don't find one that is exactly the right length.

2. Grasp the stick with a closed hand and hold it out in front of you with your arm fully extended. The stick must be held vertically.

3. Walk toward or away from the tree until the tip of the stick is visually lined up with the top of the tree and the bottom of the stick is lined up with the bottom of the tree. Your line of sight to the tree base should be as close as possible to horizontal. In sighting to the top and bottom of the stick rotate your eye rather than tilting your head.

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Instructions (cont.)

4. Take one giant step back to account for your height to lessen the scientific error in the height of the tree.

5. The distance from your feet to the base of the tree is equal to the height of the tree. Measure this distance with a measuring tape.

This worksheet includes step by step instructions as well as a diagram of how to measure the tree height, and also includes a calculation of tree volume.

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How do you say "tree" or "wood" in Anishinaabe?

Mitig - Tree
Misan - Wood

Discussion

1. How would you adapt this to a 30-60-90° triangle?

2. What if the tree is leaning toward or away from you or to one side?

3. What are the possible sources of error?

4. Should everyone doing this end up the same distance from the tree , or will it depend on their height or the length of their stick?

5. What if you can't get level with the base of the tree?

6. What else could you measure the height of using this technique and how?

7. Could you measure width?