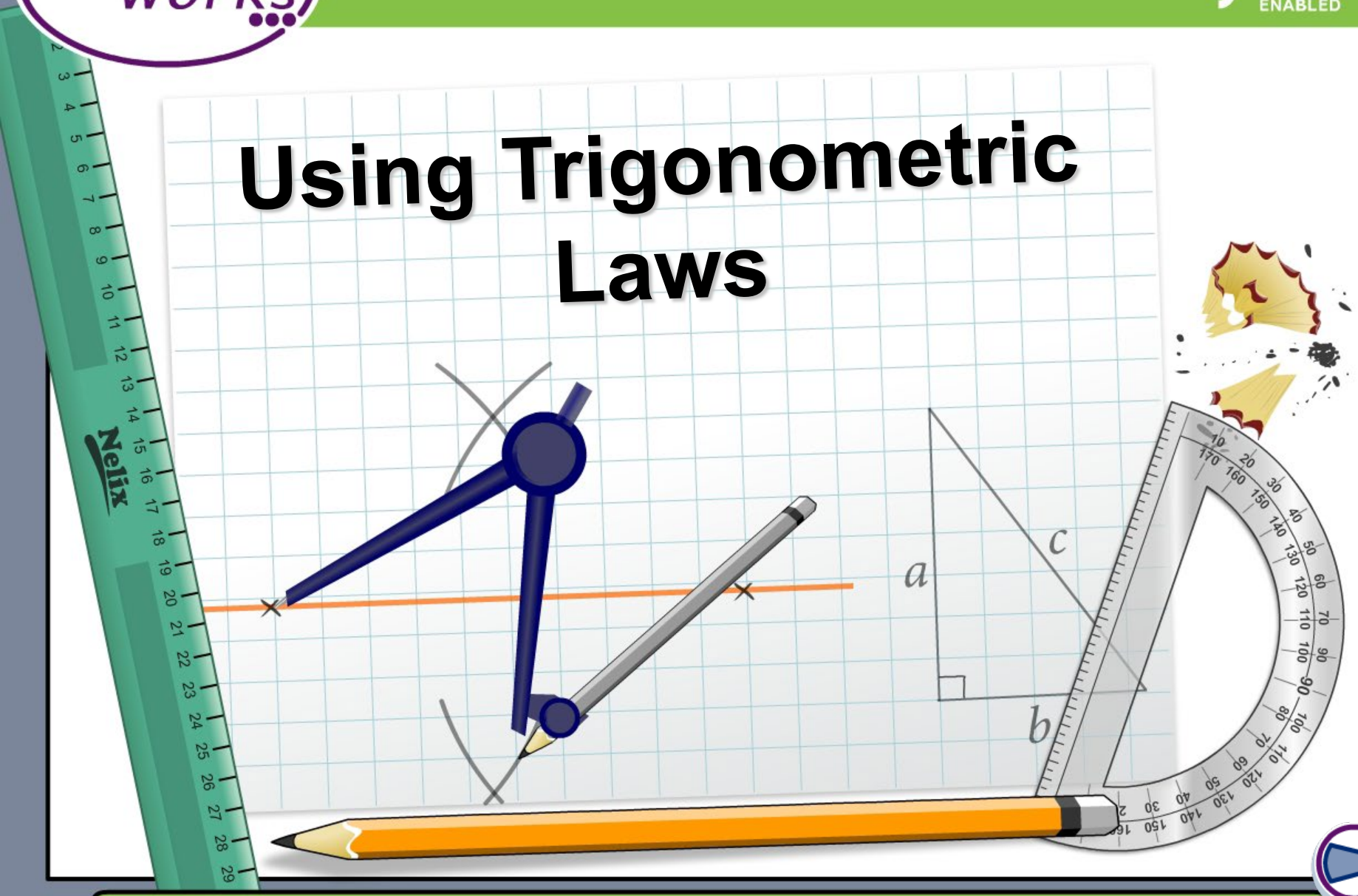
Using Trigonometric Laws



Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Lost campers

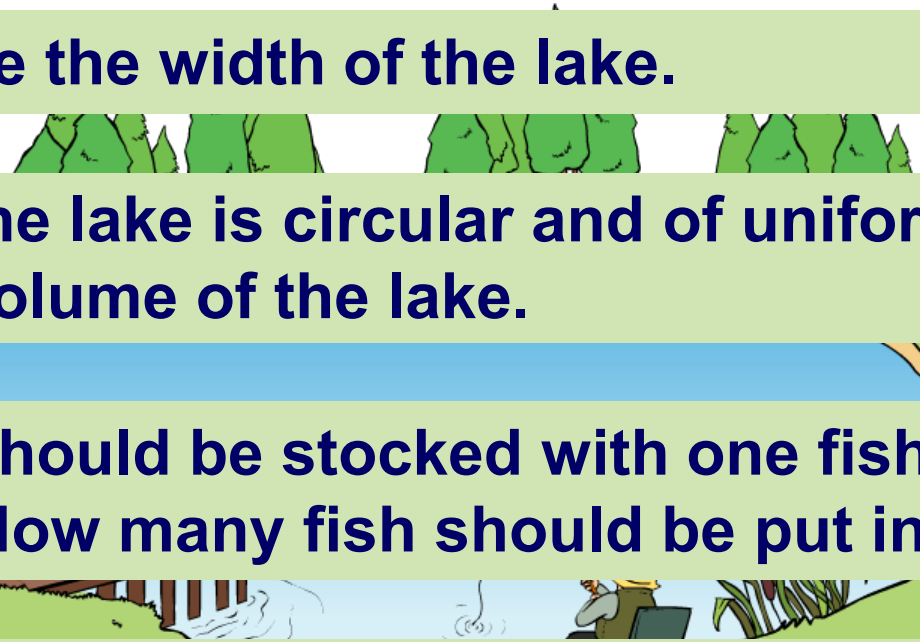
Press the **start** button to work through the explanation one step at a time. Use the forward and backward arrows to move through the activity.

This problem uses **bearings**.
Press the info symbol to learn more about bearings.

start

Fishing lake

This fishing lake needs to be stocked with fish for the season.



a) Determine the width of the lake.

b) Assume the lake is circular and of uniform depth 4.5 ft. Find the volume of the lake.

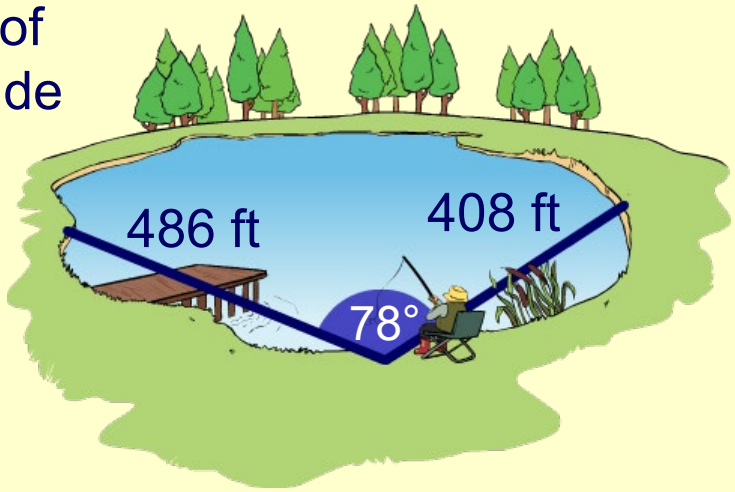
c) The lake should be stocked with one fish per 1000 ft^3 of water. How many fish should be put in the lake?

d) 15% of the fish should be left in the pond after fishing season closes. If there is a per person maximum catch of 20, what is the maximum number of fishing licenses that can be sold?

Finding a length

This fishing lake needs to be stocked with fish for the fishing season. a) Determine the width of the lake.

The distance from the fisherman to one side of the lake is 486 ft. The distance to the other side is 408 ft. The angle between these distances is 78°.



determine which law to use: Law of Cosines

write the law: $a^2 = b^2 + c^2 - 2bc\cos A$

substitute for the given values: $a^2 = 486^2 + 408^2 - 2 \cdot 486 \cdot 408 \cdot \cos(78°)$

evaluate: $a = \sqrt{486^2 + 408^2 - 2 \cdot 486 \cdot 408 \cdot \cos(78°)}$

a **= 566 ft** (to the nearest foot)

Finding the volume

b) Assume the lake is circular and of uniform depth 4.5 ft. Find the volume of the lake.

identify which 3D object should be used to model the lake:

The lake is assumed to be circular with uniform depth, so it can be modeled as a cylinder.

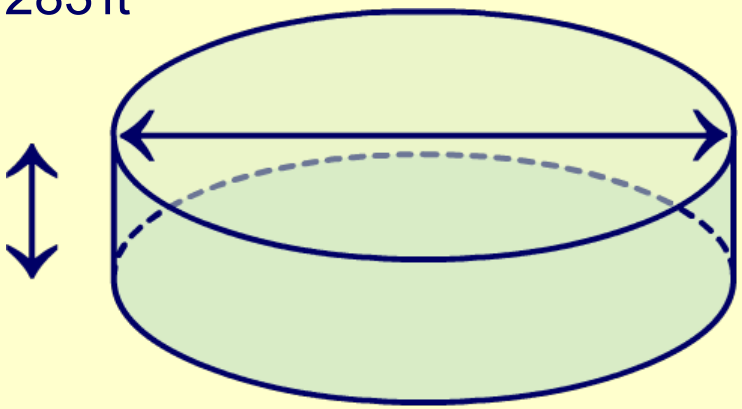
determine the height and radius of the cylinder:

height, $h = 4.5$ ft

radius, $r = \frac{566}{2} = 283$ ft

write the formula for the volume, V, of a cylinder:

$V = \pi r^2 h$



substitute:

$V = \pi(283^2)(4.5)$

evaluate:

$V = 1132232$ cubic feet

The solution

c) The lake should be stocked with one fish per 1000 ft^3 of water. How many fish should be put in the lake?

divide the volume by 1000: $\frac{1132232}{1000} = 1132.232$

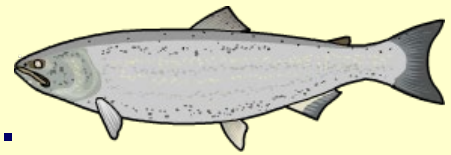
The lake should be stocked with 1132 fish before the fishing season.

d) 15% of the fish should be left in the lake after fishing season closes. If there is a per person maximum catch of 20, how many fishing licenses can be sold?

For 15% of the fish to be left, a maximum of 85% can be caught.

find 85% of 1132, to the nearest whole fish: $0.85 \times 1132 = 962$ fish

divide this number of fish by the maximum catch: $\frac{962}{20} = 48.1$

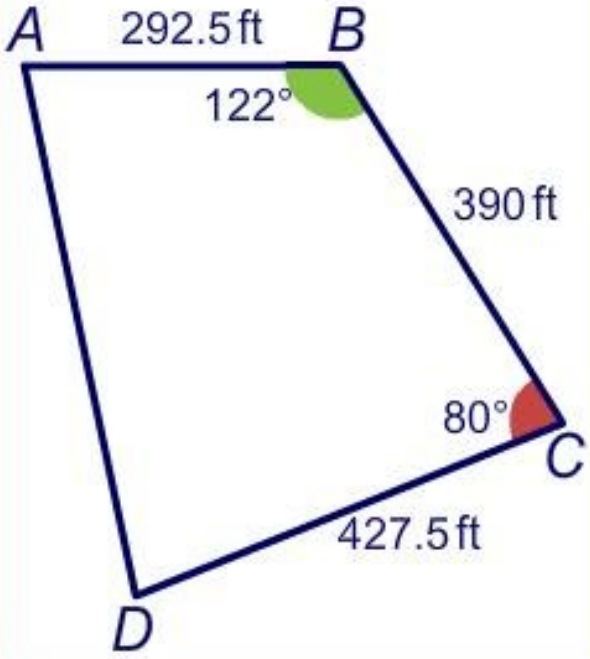


Therefore, no more than 48 licenses should be sold.

Surveying Problem

The Mendez family buys a plot of land. They must pay tax at $1275 per acre. Determine the tax for the Mendez's area of land.

Part 1/6 Plan how to solve the problem.



Press the "=" button to show the calculations step-by-step.