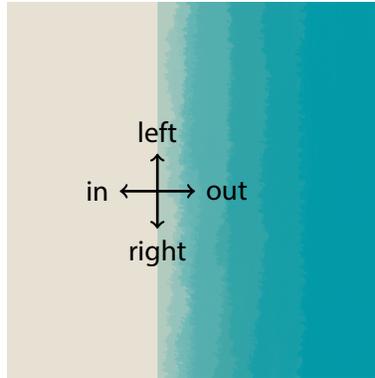# Unit 5: Measurement Geometry

Activity 5.1

You want to lay a net in a straight line from where you are on the water's edge to a point that is 15 feet straight out and 8 feet to that position's right. How long a net do you need?
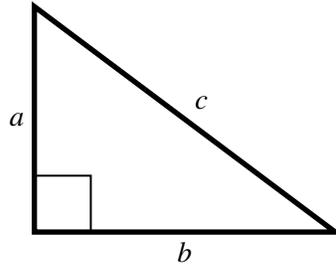
Activity 5.2

Ancient Hawaiians didn't use fishing reels—not even when catching *ulua* (a large predatory reef fish). Instead, Hawaiians used a traditional method was called *kau lā'au* "hang stick". Check out this YouTube video on Hawaiian ulua fishing: `http://bit.ly/2pTqTs2`.

Kau lā'au involves using a long stick with a rope at the end, which hangs a bait directly below it. Below is an image of a modern pole, represented by the line segment AB and its fishing line represented by BD. The pole used in the kau lā'au is represented by AC and it's line CD. Find the angles x, y, and z.
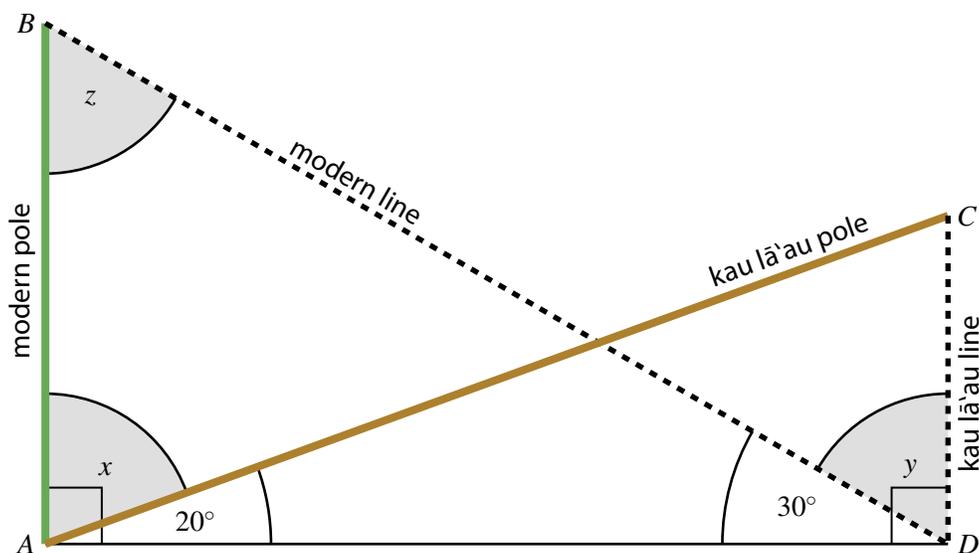
Activity 5.3

When constructing a speargun, it is easiest to start with a block of wood that is a rectangular prism, like a long shoe box. Every angle of a rectangular prism is perpendicular, and you can check your angles with a special tool called a *square*. If you do not have a square, then you can make one with Pythagorean triples. We just need to get 3 pieces of wood each cut to a length of a, b, and c, such that $a^2 + b^2 = c^2$.

Find *two* sets of numbers (measurements) that our a, b, and c sticks might have to make our square tool.

Activity 5.4

1. Fishing gear takes up a lot of room and organization really helps with getting your fishing set up ready. One common item among all fishermen is a tackle box. It is a box used to organize fishing gear such as hooks, swivels, lead, etc. Say you wanted to make your own tackle box which has a square bottom, a height of 1 inch, and a volume of 64 cubic inches. What should the dimensions of your final tackle box be?

2. Say you wanted a tackle box for your lures, which are quite big, and you wanted your box to be a cube with a volume of 1,000 cubic inches. What should the dimensions of the lure tackle box be?

Activity 5.5

You are looking online to buy a new cooler for your fishing trip. The website you are looking at has the following description of their coolers:

"These new *cube* coolers are perfect for fishing trips!. Get your coolers with the following volumes: 1 ft^3, 64 in^3, 96 in^3, 125 in^3, 200 in^3, 256 in^3, 333 in^3, 361 in^3!"

You want a cooler that has *integer dimensions*. Sort the coolers out in the following table to help you decide which cooler to get.

A. Perfect square volumes (not perfect cubes)	B. Both perfect square and perfect cube volumes	C. Perfect cube volumes (not perfect squares)	D. Neither perfect cube nor perfect square volumes

Activity 5.6

It is illegal to catch papio that are too small. In order to figure out how long it takes papio to grow to a legal catching size, you decide to raise some baby papio. To raise baby papio, you need to make a *cylindrical* tank with a volume between 100 and 120 cubic feet. Find 3 different possible configurations that will give you your desired tank size.

	Tank #1	Tank #2	Tank #3
Radius (feet)			
Height (feet)			
Volume (feet^3)			

Activity 5.7

Native Hawaiians have always been excellent at building ponds for farming fish. In modern times, many societies raise fish in large cages or nets in ocean. When fish farming, it is important to consider the volumes of the cages. If we had a cone cage with a height of 27 feet and a base diameter of 32 feet but wanted a sphere cage with the *same volume*, then what should the radius of the sphere be?

Activity 5.8

Floaters are often used in fishing to keep baits and lures off of the ground. Some floaters float better than others and *how much something tends to float* is called *buoyancy*. The more volume an object has, the more buoyancy it also has. Suppose that you have two floaters: one is a sphere with radius of r, and the other is a right cylinder with a radius of r and a height of $\frac{4}{3}r$. Does the sphere have a greater volume, the cylinder have a greater volume, or do they both have the same volume?

Activity 5.9

While out on a fishing and camping trip with your friends, a storm began to approach. So you and your friends rush to make a frame for your shelter. Between you and your friends, you have sticks of lengths x, y, and z inches, such that $x < y < z$. You also notice that $x^2 + y^2 < z^2$.

One of your friends say that this is perfect and that you can create a right triangle to build part of your frame for your shelter. You, on the other hand, think that this is not correct and that you will have an obtuse triangle, which won't be good for your shelter since it won't be standing properly. Come up with a reasoning to justify who is right.