Connecting Math to Our Lives and Communities

Water Race

Introduction:

Now that we know the importance of soil when gardening, we can look at the importance of gardening itself. Gardens were a necessity for most households, because supporting farms did not exist and a market was not always an option. Gardens can and have produced food, medicine, flavourings, cosmetics, insect repellent, air fresheners and pain killers. Gardens have a story to tell, and they can bring up many questions. Questions in relation to the owners of the garden, like what kind of food did they eat? What medicines did they need? From what ailments were they suffering? What fashion of the time dictated the use of cosmetics? What repellents did they use to ward off insects? What insects were they trying to combat? There is a great history aspect to gardens, as well as a brings up a variety of questions.

Math Connections:

- Rate of Flow
- Timing
- Measuring
- Comparisons
- Patterns

Materials:

- Timer (stopwatch)
- Tack
- 2 plastic water bottles with caps (same size bottles)
- Water

Activity:

For this activity, you will be determining which of the watering cans that you construct will let the water drain out the fastest. We will be comparing the difference between a lot of small holes and a few large holes. You will need to create these two different watering cans to race the water in.

1) Take one of the plastic bottles and remove any of the labelling on it. Place the cap on a table or a flat surface and use a tack to create roughly 10 smaller holes in the cap of the bottle.
2) Take the other plastic bottle, and again, remove any of the labelling in it. Place the cap on a table or a flat surface and use a tack to create roughly 3 larger holes in the cap of the bottle.

   Think about it: Predict which watering can will have the fastest rate of flow, or in other words, which bottle do you think will drain the water the fastest?

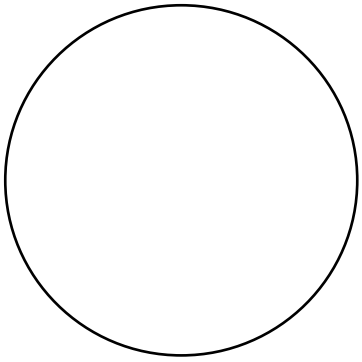
3) Fill both of the water bottles, which are now watering cans, up with water. It is important to use the same amount of water in both so that we have a fair race.
4) Outside, or over a sink, take the first watering can, the one with a lot of small holes, and start your timer as soon as the water starts to drain. Stop the timer once all of the water is drained from the water bottle.
5) Repeat step 4 but with the second watering can, the one with a few large holes.
   *** It is important to note to apply the same amount of pressure on both watering cans so that our times are not influenced by other variables.
6) Decide which watering can you want to use for when you are maintaining your garden. Why?

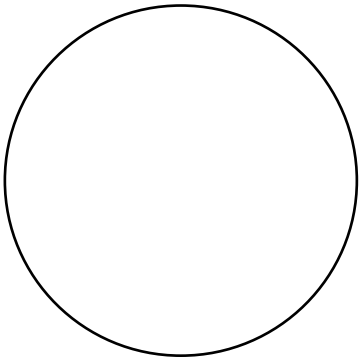
Questions:

Were your predictions correct? Which watering can had the fastest rate of water flow?

Are there any other alterations we could make to increase or decrease the rate of flow?

How did you set up your holes? Was there a pattern or placed at random? Draw it out!





Where do we see rate of flow in our everyday lives?

OPTIONAL:

Q = Flow Rate
V = Volume
t = Time (in seconds)

$$Q = \frac{V}{t}$$

Calculate the flow rate for the amount of water you put in the water bottle (Ex. 500 mL is how much water is in a general plastic water bottle). Calculate the rate of flow for both of your watering cans. What do you notice?

Can you convert the mL/s to m^3/s? (1 m^3 = 1 000 000 mL)

Send us a photo of your watering can at Connecting Math To Our Lives and Communities email (*cmtolcstfx@gmail.com*)! ☺