Connecting Math to Our Lives and Communities

Map it Out

Introduction

We have been exploring the importance of navigation and how people throughout history have travelled great distances without the use of a GPS or smart phone. Have you ever thought about how we show areas or locations to others? If you have ever used a GPS or smart phone you may already be familiar with an important tool that is used to show locations and determine directions. This useful tool is over 3000 years old, and it is called a map! A map is a tool that uses symbols to show the relationship between landmarks and objects on Earth. In this activity we will explore how we can create a map of our own!
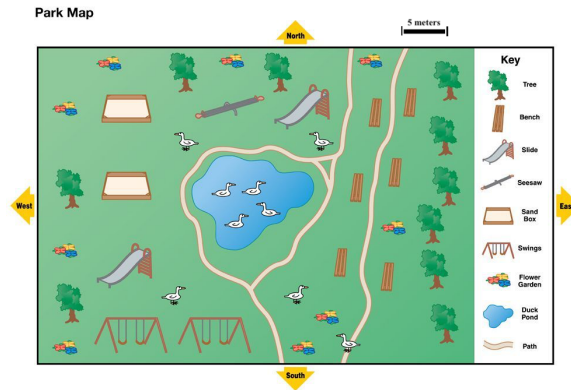
Math Connections

- Measurements
- Geometry
- Spatial reasoning and logic
- Perimeter and area
- Scale

Materials

- Compass
- 5m Measuring tape
- Graph paper
- Colored pencils

Activity

Two important pieces of creating a map is being able to measure distances and direction. To measure direction there is a compass included in your CMTOLC kit. For tips on how to measure directions using a compass go to our CMTOLC site and click on the video link under the Wayfinding section. Distance is shown in maps by including a scale bar, or scale. A map scale shows how far apart things really are from each other.

The above park map includes both features. Direction in shown in the arrows that are labelled north (oqwatnuk), east (wjipnuk), west (tkɨsnuk), and south (pkɨteʼsnk). Distance is shown in the scale bar in the top right-hand corner. The scale bar length on the map is equal to 5m in the real-life park.

Part 1: Measuring Distances

For this activity we will be measuring distances using pacing. If you have already completed the Estimating Dandelions activity, then you are familiar with measuring distances using pacing and your pacing factor! If this is all new to you, your pacing factor is the number of steps (or paces) it takes you to walk a certain distance. (In this case we will figure out how many steps it takes you to walk 5m). We can use our pacing factors to estimate long distances without the use of a measuring device! Follow the directions below and determine your pacing factor!

1. Using the measuring tape included in your kit measure out a 5m straight line.
2. Mark both the beginning and end of the 5m distance (you can use a pile of rocks, a stick, or any toys that you have lying around).
3. Next practice walking the 5m distance with a consistent sized step (this means that every step you take should be roughly the same distance)
4. Once you feel comfortable with your walking, count how many steps it takes you to walk the 5m distance. Enter this number into the equation below.

$$\textbf{Avg. Steps per 5m} = \frac{\textbf{steps} + \textbf{steps} + \textbf{steps}}{3} = \qquad \textbf{steps}$$

5. Now enter your average step number per 5m into the equation below to determine your pacing factor:

$$\textbf{Pacing Factor} = \frac{\textbf{5m}}{\textbf{Avg. steps per 5m}}$$
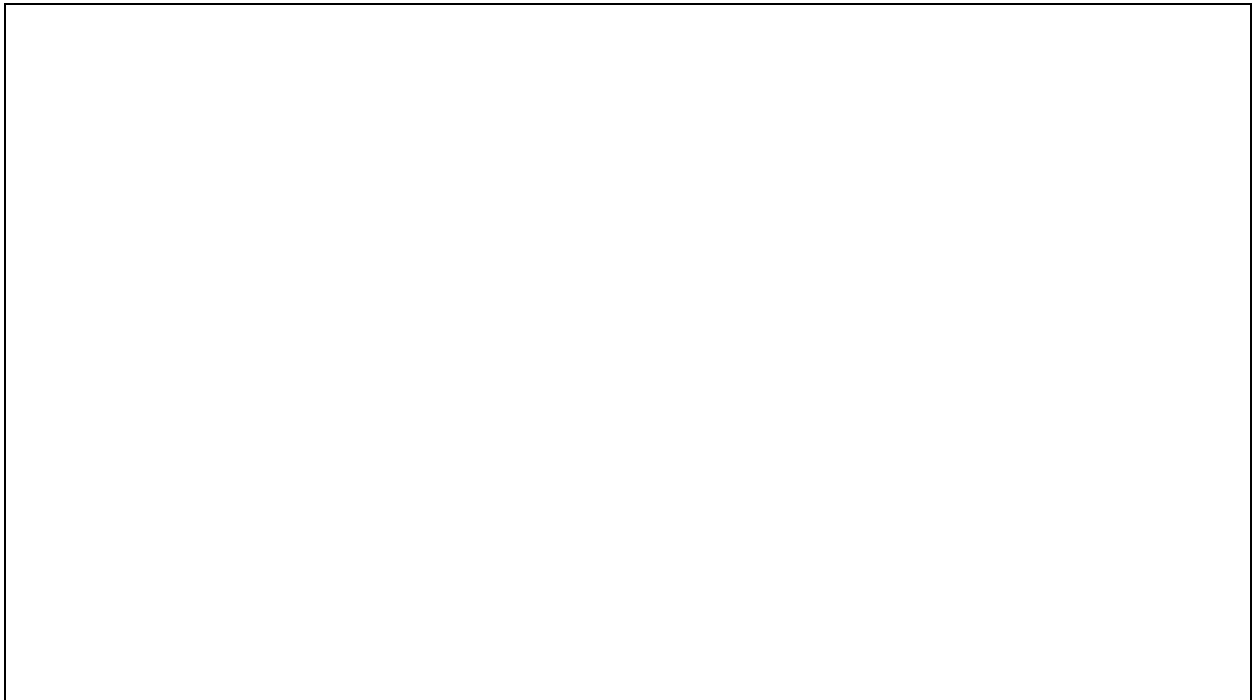
$$\textbf{Pacing Factor} = \frac{\textbf{5m}}{\textbf{Steps}} = \qquad \textbf{m/step}$$

Awesome! Now that we have our pacing factor, we can use this to determine distances.

Part 2: Choosing a Map Area

Now that we have our pacing factor it is time to start building our map. First, decide what area you would like to create a map for, we will refer to this as our "map area". The easiest areas to map are areas that have a roughly rectangular or square shape. Examples of good map areas include your bedroom, your yard, or a local park.

Once you have chosen your map area draw a rough sketch of the area below. In your rough sketch include the general shape of the area and the items that you wish to have shown in your final map (like trees or furniture).

Part 3: Measuring the Map Distances

Now that you have your rough sketch completed, measure the perimeter of the area using your steps to pace out the length of each side of your map. To do this you will walk along the outside of your map area counting your steps as you go.

For example, if your map area was the area below shown in the dotted square you would walk around the outside of the square and count how many steps (or paces) it takes you to walk each length.
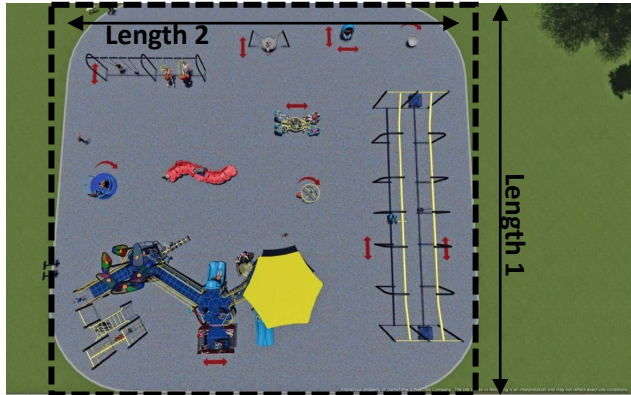

Say that we had determined that our pacing factor was 0.67 meters/step and it took us 30 steps to walk Length 1 and 35 steps to walk Length 2 the measurements of Length 1 and 2 would be as follows:

| Distance to measure	=	# of	steps	x	Pacing factor	(meters / step)	=	# of	meters
Length 1	=	30	steps	x	0.67	$\frac{meters}{step}$	=	20.1	meters
Length 2	=	35	steps	x	0.67	$\frac{meters}{step}$	=	23.5	meters
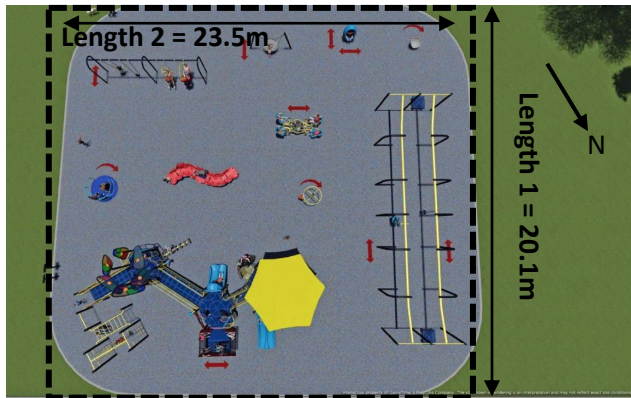
Once you have the perimeter of your map area add those distances onto your sketch.
Now using your compass determine what direction north (oqwatnuk) is in and draw an arrow
pointing to north on your sketch. For an example of this there is a north (oqwatnuk) arrow drawn
on the previous image.

Using the same pacing technique as above, measure the distance between the objects that you
will be including in your final map. Looking at our park example, if we decide to include the
jungle gym, monkey bars, and swing set in our map we will measure the following distances:
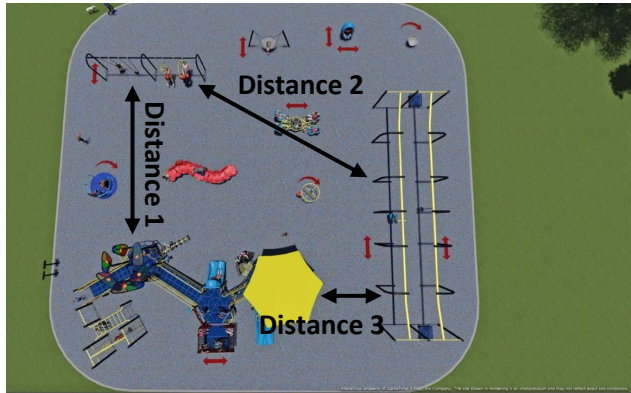

Part 4: Drawing the Map
Now we have all the information necessary to draw our map! We will draw our final map using
the graph paper that was provided in the kit. First, we must draw the outline of our map, or the
perimeter of the map area. To do this we must first determine what scale we will use for our
map! Continuing to use the park example, if we decided that every square on graph paper will be
equal to 1 meter, we will draw a square that is 23.5 squares x 20.1 squares (as shown in the
example below). Once you have your outline drawn be sure to write somewhere beside the map
outline the scale you have chosen (5 squares = 5 meters) and draw in your north arrow.
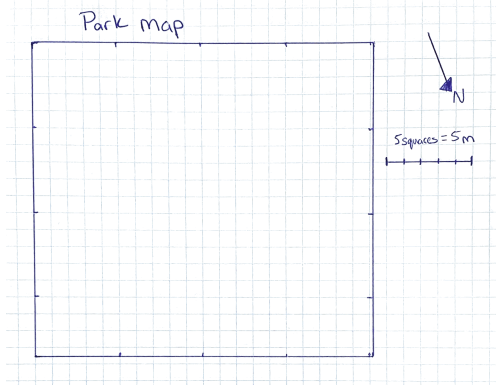
Now draw in the objects that you are choosing to include in the map. When you are drawing
these remember the distances that you measured between each object and the scale of your map!
In the example below the swings and jungle gym are drawn 7.5 squares apart which means that
in real-life they would be 7.5 meters apart because each square is equal to 1 meter! The monkey
bars are drawn 2.5 squares away from the jungle gym which means that they are 2.5 meters apart
in real life!

Park map

swings

jungle gym

Monkey bars

5 squares = 5 m

N
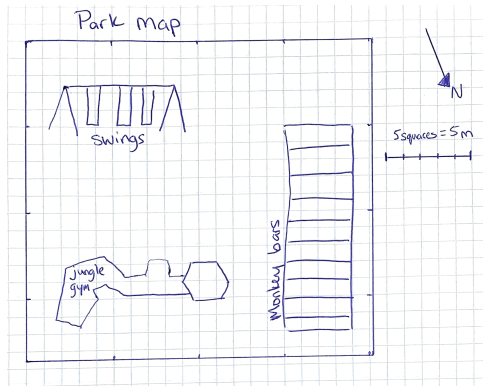
Awesome job drawing your map! Now that everything is measured and drawn out you can decorate or colour your map however you choose.

PRINCE EDWARD ISLAND

NEW BRUNSWICK

Wagmatcook   Membertou

We'koqma'q

Pictou Landing   Eskasoni

Potlotek

Paqtnkek

Glooscap

Annapolis Valley   Millbrook

Sipekne'katik

Bear River

NOVA SCOTIA

Acadia

Nova Scotia Mi'kmaq First Nations

Send us a photo of your map to Connecting Math to Our Lives and Communities email (cmtolcstfx@gmail.com)! ☺