

# HOW DO SHADOWS CHANGE THROUGHOUT THE DAY?

Topic: Shadows, Day and Night

Activity: Build a structure and track the change to its shadow throughout the day.

Location: Outside

## Materials

- Sidewalk chalk OR large piece of paper and pencil
- Centimeter tape measure or ruler
- Loose parts (Legos, blocks, rocks, etc.)
- Data recording page (can be printed or drawn)

## Preparation

- Pick a sunny day to begin this activity. Start in the morning and keep track of your changing shadows all day long.
- Gather materials.

## Overview

Day	Activity Overview	Time Needed
1	Build a structure and place it outside. Trace its shadow throughout the day and collect data.	20-30 minutes and a few minutes throughout the day
2	Graph and analyze data. Draw conclusions.	20 minutes
3	Choice Activity	20 minutes



You can choose to use sidewalk chalk or paper and pencil.



# DAY 1

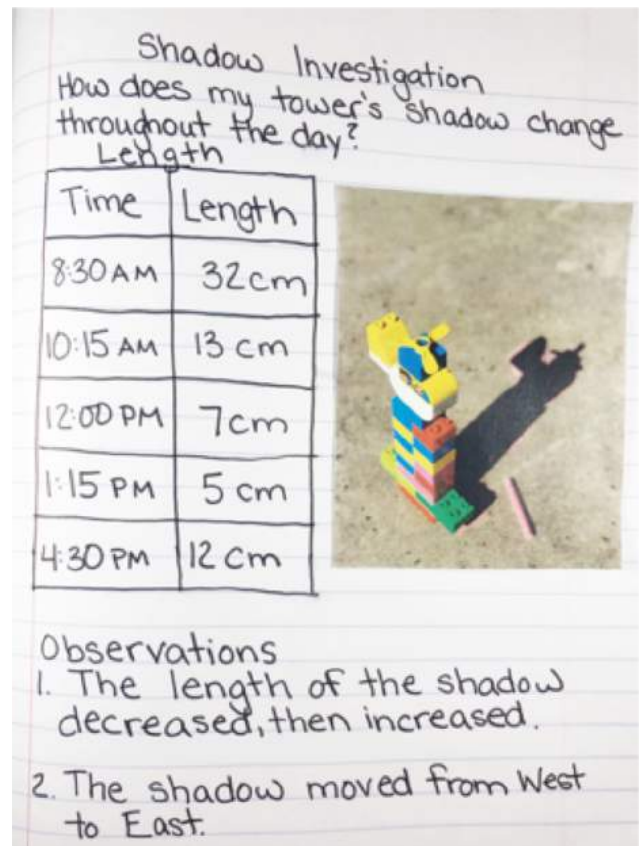
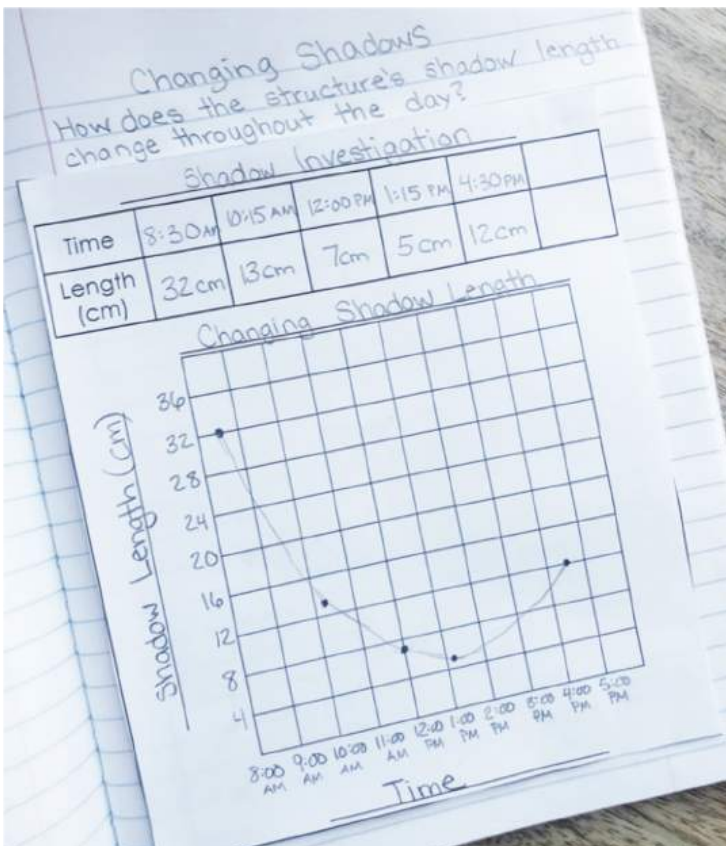
Let's answer the following question:

How does a structure's shadow change throughout the day?

1. Take a few minutes to build a structure. The structure must be:
  - 6-12 inches tall (about 15-30 cm)
  - stable
2. Place the structure outside. Place a piece of paper under it if you will be using a pencil to record changes. You can use sidewalk chalk instead of pencil and paper. (See previous page for example photos.)
3. Trace the area around the structure's shadow and label the time. Go outside 3-5 more times throughout the day to trace the shadow and record data (time and shadow length in centimeters) on the table provided or draw your own data table. Be sure your data table has a title. Be sure your data table has a title.
4. On the next day, you will graph and analyze data.

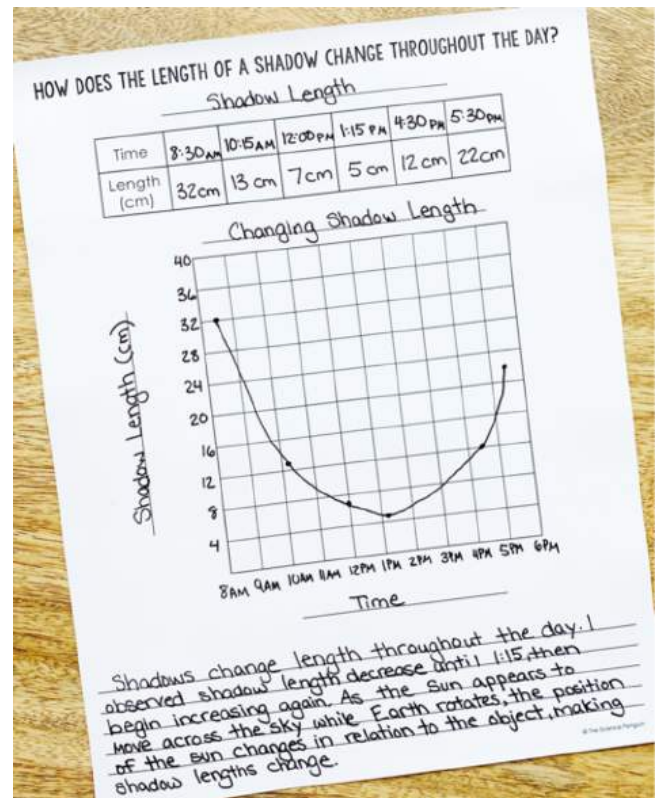
**OPTION:** Take a photograph at the end of the day and print.

**OPTION:** If you can safely set up a camera, you can record time-lapse photos throughout the day.



# DAY 2

1. Look at the data you recorded yesterday.
2. Title your graph "Changing Shadow Length".
3. Construct a line graph. Across the bottom on the x-axis, label the hours and write "Time" as shown in the example.
4. Write "Shadow Length (cm)" as shown in the example. Along the vertical y-axis, write numbers in equal intervals, being sure to include the longest shadow measured. For example, if your longest shadow was 32 cm, you might use intervals of 4 or 5. If your longest shadow was shorter than that, perhaps 18 cm, then you could use intervals of 2. If you aren't sure what to use, using intervals of 5 cm should be safe.
5. Plot the points for the time and the length of the shadow at that time. Use the example for guidance.
6. Discuss 3 observations based on your drawings of the shadow on the previous day or the graph you just made.
7. Write several sentences to answer the question: How does a shadow's length change throughout the day?



# DAY 3

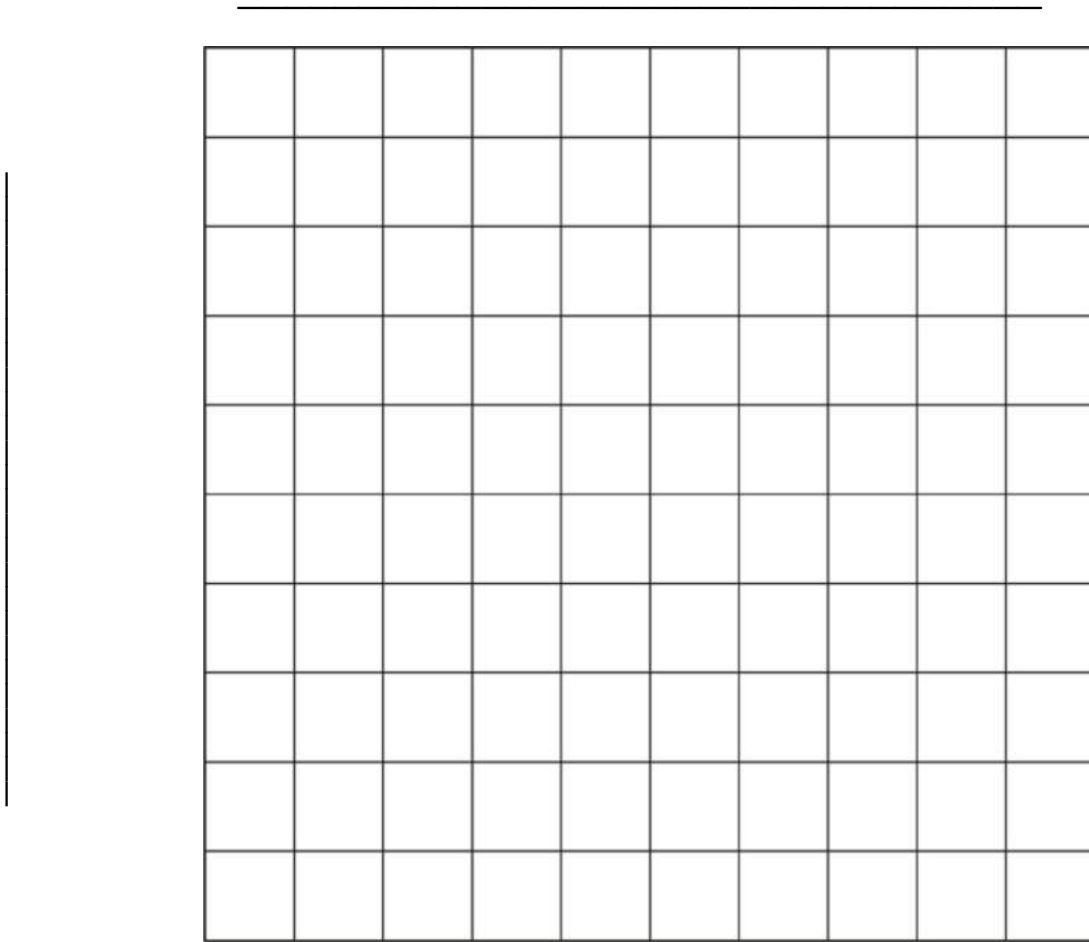
Choose one of the following activities:

1. Watch the video and write about what you learned.  
<http://bit.ly/shadowvideoclip>
2. Complete the interactive activity and write about what you learned.  
<http://bit.ly/shadowinteractive>
3. Draw a detailed diagram of your shadow investigation and write about what you learned.

# HOW DOES THE LENGTH OF A SHADOW CHANGE THROUGHOUT THE DAY?

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Time						
Length (cm)						



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