WHAT MAKES A CLOCK TICK:

Pendulums

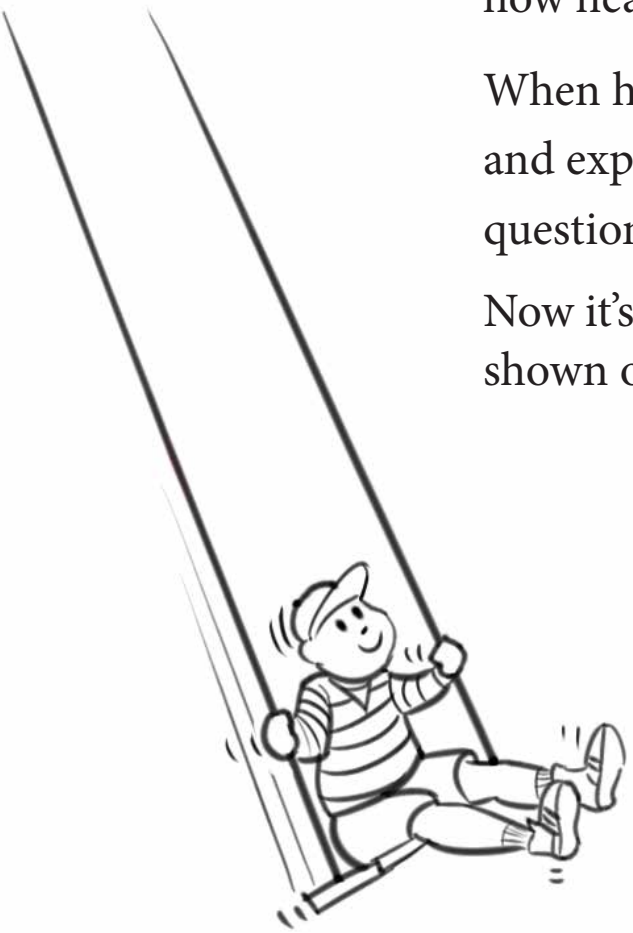
For Students in Grades 3-8

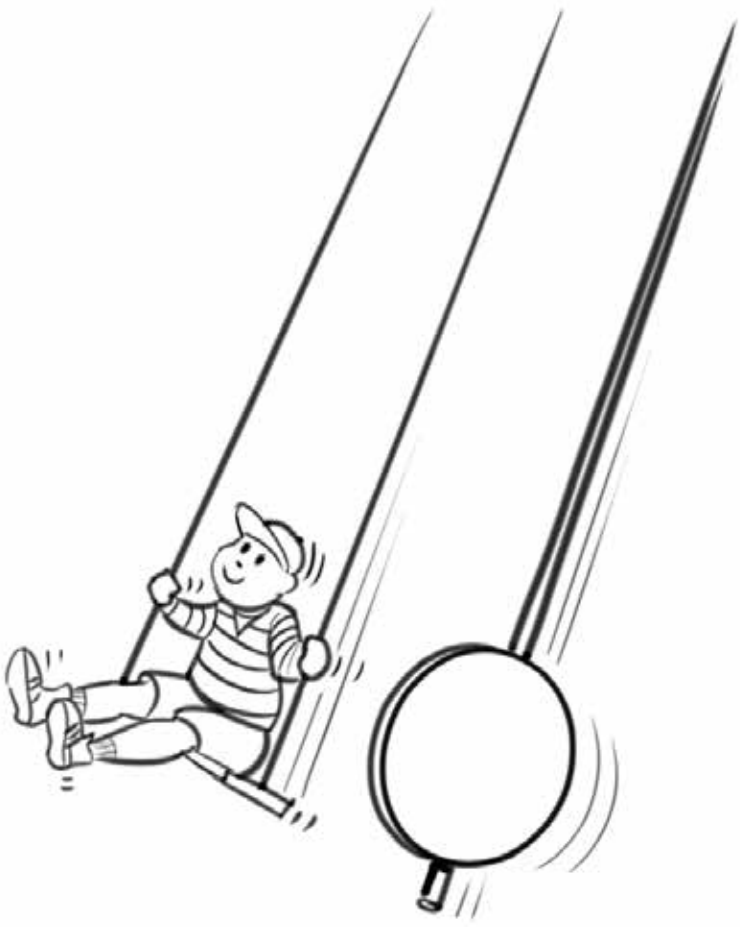
"Sam was so excited! Today they were going to Willard House and Clock Museum. When they arrived, the tour guide showed them a tall clock (grandfather clock) with a pendulum. Sam thought the pendulum was pretty neat, but how did it work?"

On the way home, Sam passed a playground where some kids were swinging on a swing set. Wow! Thought Sam, swings are kind of like giant pendulums! I wonder what makes a pendulum swing faster or slower? Is it how long it is? Is it how heavy the weight is? Or is it something else?

When he got home Sam gathered some materials and experimented to find the answers to his questions.

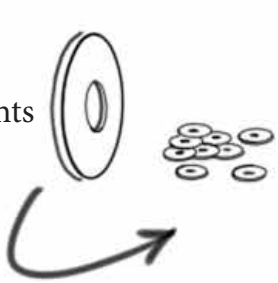
Now it's your turn! First, gather the materials shown on the next page:

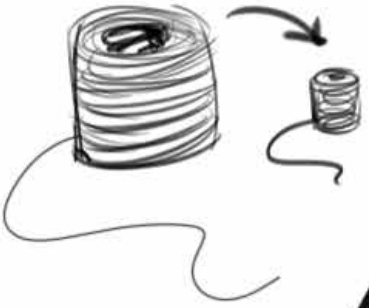




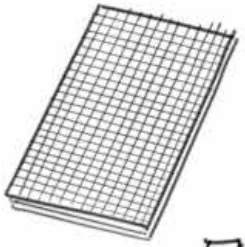
Now it's your turn! First, gather the materials shown here.

Metal washers to use as weights





String



Graph paper or grid

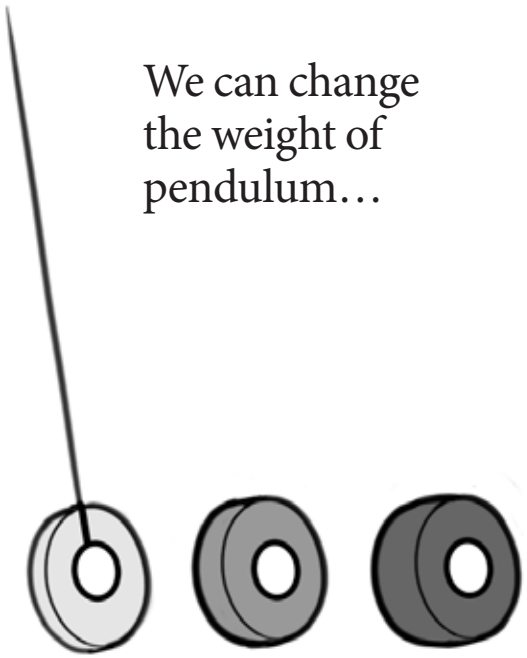
Data collection sheets or science journal.

Meter or yard sticks to measure starting position of pendulum

Timer, handheld stopwatch or online equivalent

Now, set up your pendulum by securing your meter stick to a table or counter and tying string to the end that hangs off the edge. Tie some metal washers to the other end of the string.

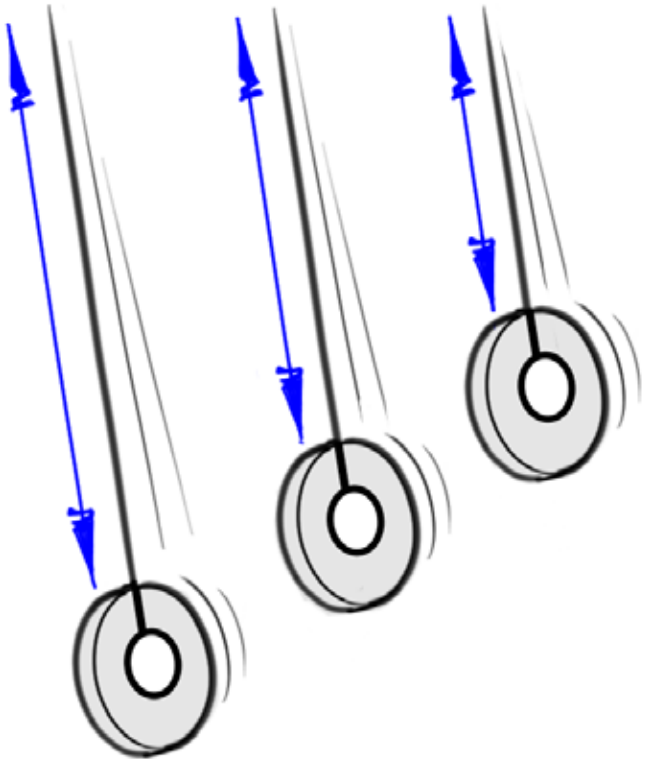
We can change the weight of pendulum…

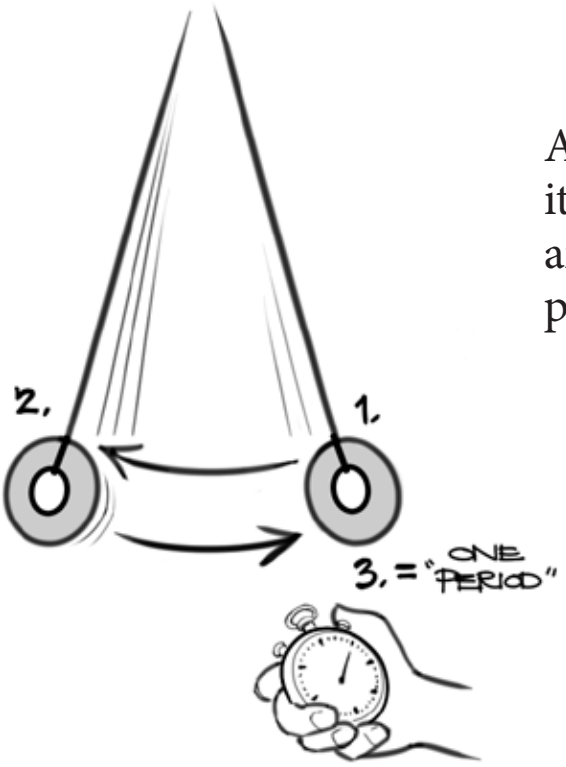


...if the length of the pendulum increases, the time period increases.

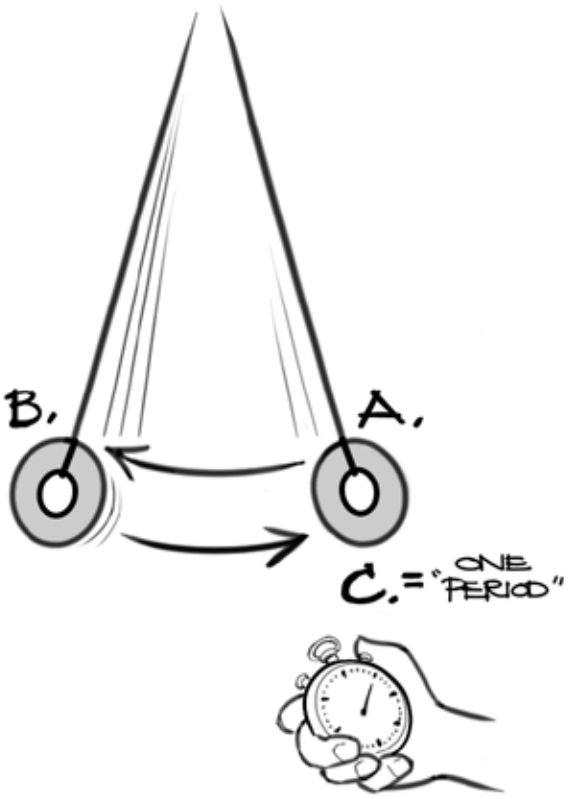
If the length of the pendulum decreases, the time period decreases.

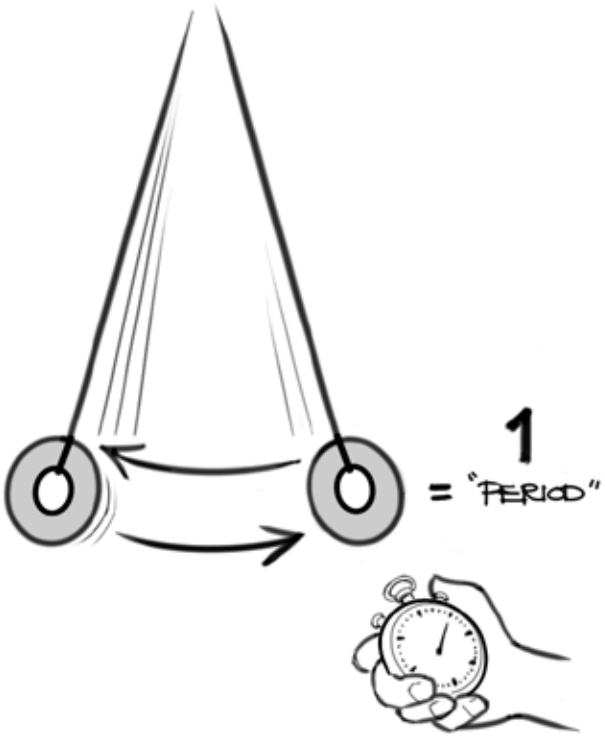
The length of the pendulum is the distance from the point of suspension to the center of the weight.





A pendulum's period is the time it takes to make a full swing out and full return back to its original position.

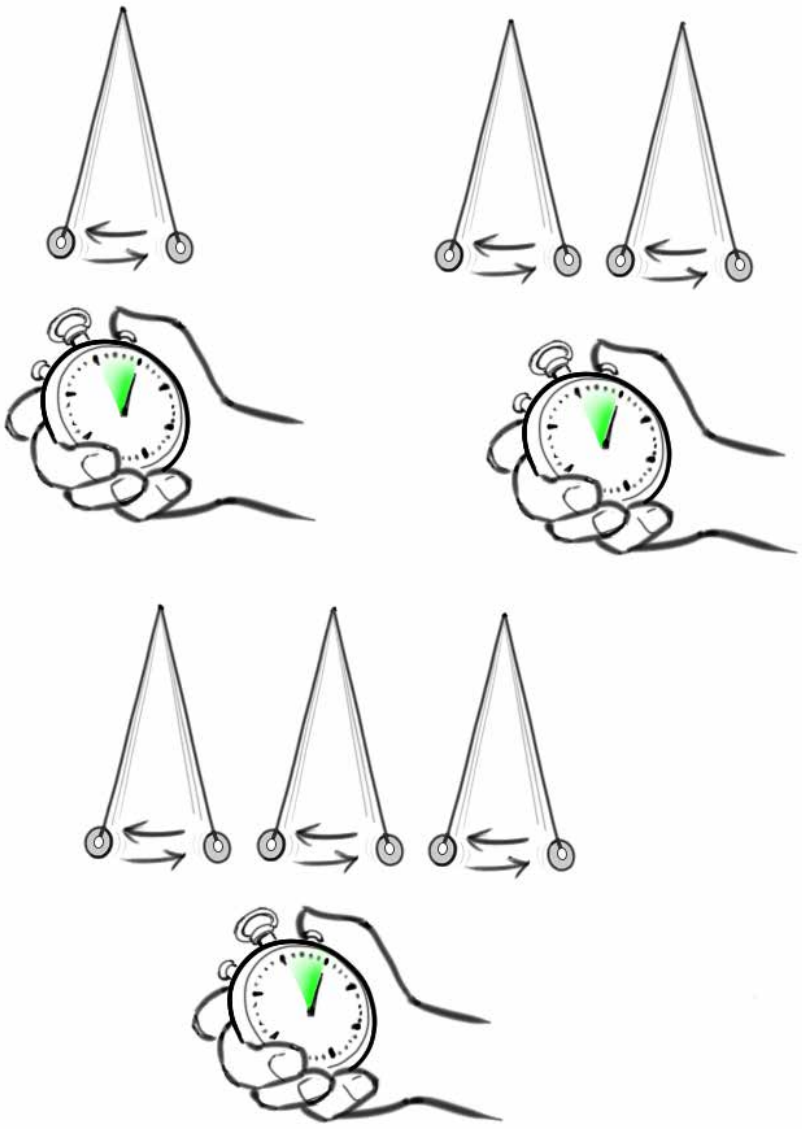




Frequency is the number of periods that happen during the same amount of time.

Measure the frequency of your pendulum with different lengths of string. (Hint: Try counting the number of periods in one minute.)

Then, measure the frequency of your pendulum with **different weights** (washers).



Be sure to record your results!

Share what you learned about pendulums with a friend.

References

A Framework for K-12 Science Education.

National Research Council. (2012). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. (pp. 45, 103-138). Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Illustrations by Lou Genatossio