Wave Lab

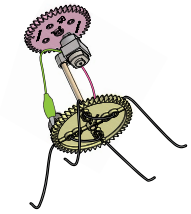
Wiggle-Bot

Name: _____ Set: _____ Date: _____

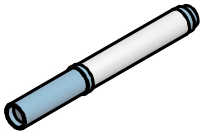
You will convert your built Wiggle-Bot or Super Wiggle-Bot into a Scribble-Bot for this activity.
It does not need to look like the one in the pictures below. It's better if it is your own unique design.

The Lab

Here's what you'll need to complete this part of the activity:

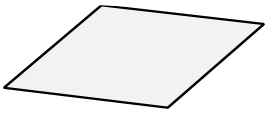


Built Wiggle-Bot



Marker

Tape



Large Paper
or **Poster Board**

AA Battery

Scissors

Glue
(optional)

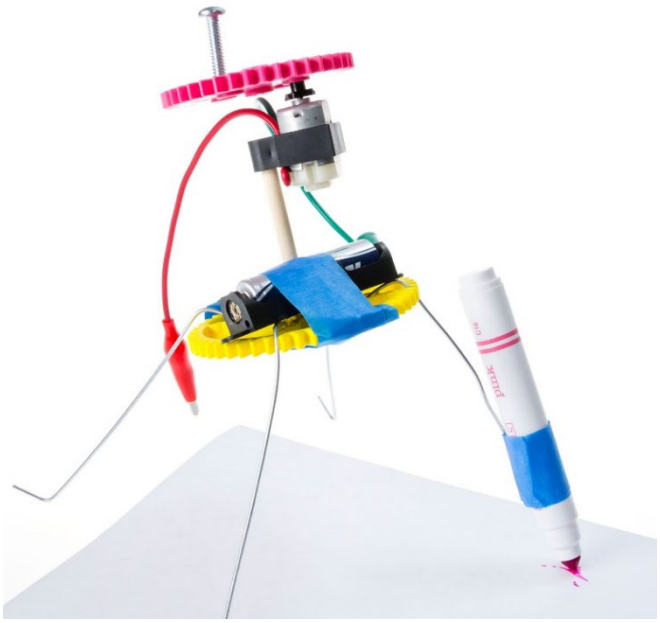
Stopwatch

Let's Get Started

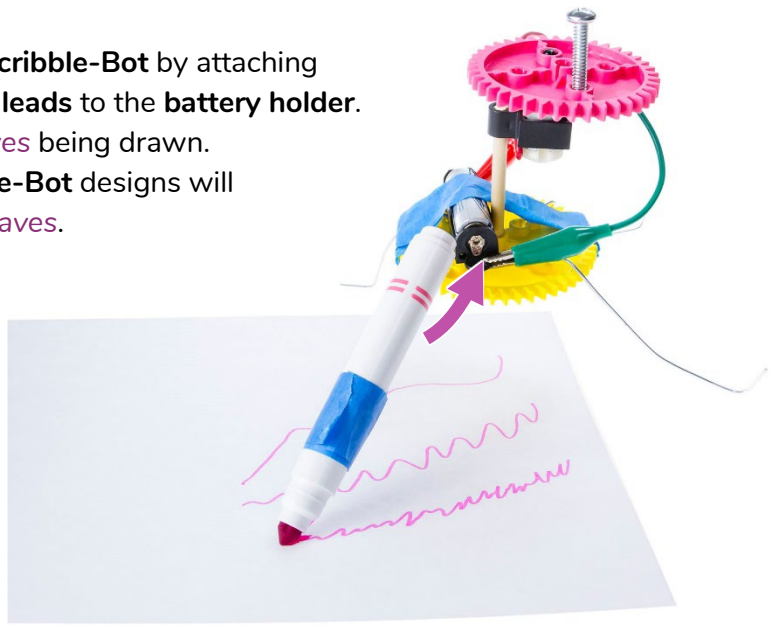
1 Turn your **Wiggle-Bot** into a **Scribble-Bot**. Using **tape**, attach a **marker** to your **Wiggle-Bot**.

Wire legs work well, but they're just one way to build a Scribble-Bot. What will yours look like?

2 Uncap the **marker** and place on top of a **large piece of paper** or **poster board**.



3 Power on your **Scribble-Bot** by attaching the **alligator clip leads** to the **battery holder**. Observe the waves being drawn. Different **Scribble-Bot** designs will draw different waves.



Do The Wave

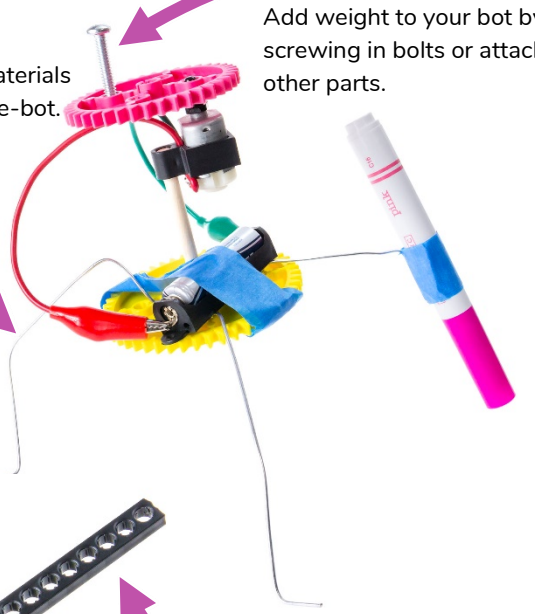
Changes in your Scribble-Bot will result in changes to the wave frequency and amplitude.

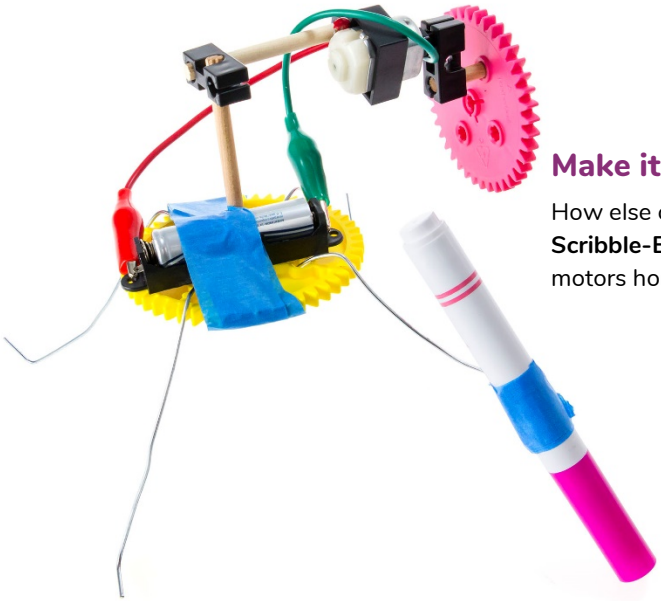
Change the Height

Use wire, dowels, and recyclable materials to change the height of your scribble-bot. Different heights will make different waves.

Make it Heavy

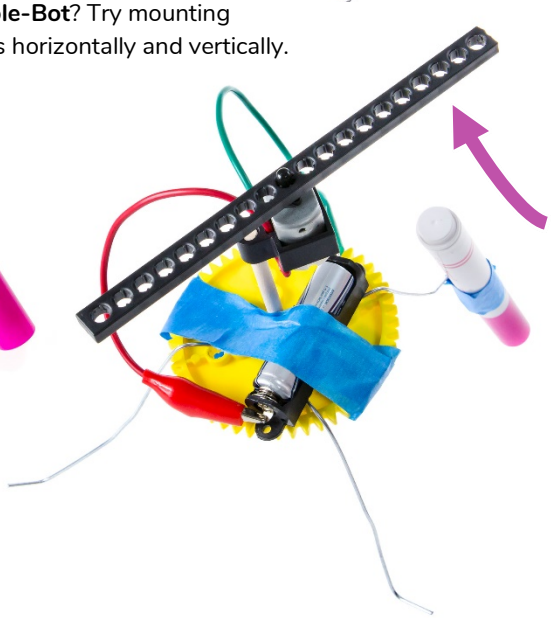
Add weight to your bot by screwing in bolts or attaching other parts.





Make it Again

How else could you construct your **Scribble-Bot**? Try mounting motors horizontally and vertically.



Add & Replace

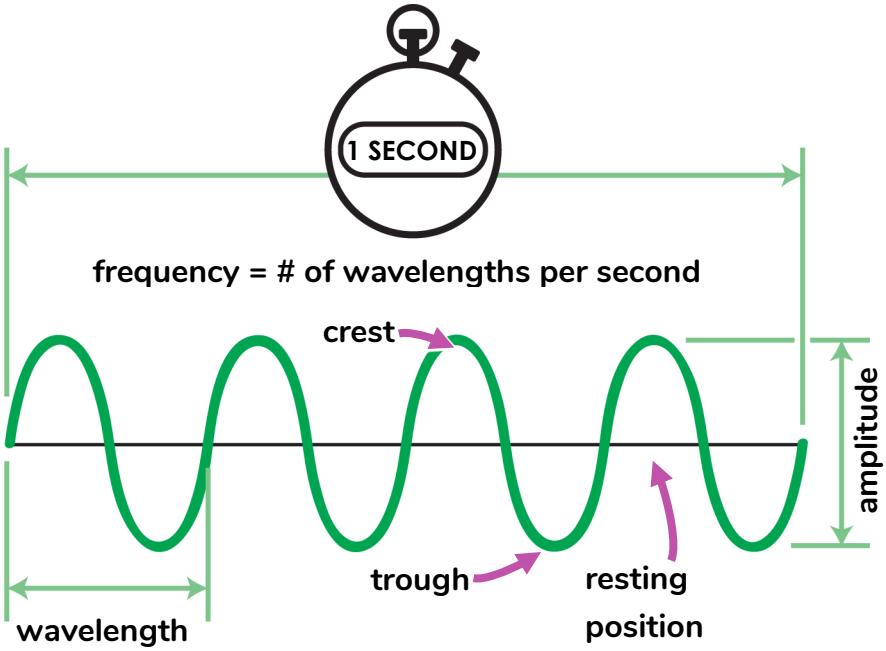
Change your Scribble-Bot design using other TeacherGeek components or recycling materials.

Better Marks

Does the marker come off the paper? Are the scribbles short or small? Try making your Scribble-Bot heavier and wider. Add weight to it or change what is spinning.

What is a wave?

A wave is a regular pattern of motion. You can find waves all around you! Ripples in a pond, ocean waves crashing along a beach, even light and sound travel in waves.



Crest

The crest is the highest point, or peak, of a wave.

Trough

The trough is the lowest point, or valley, of a wave.

Resting Position

The resting position is the midline, center or middle of a wave (shown as a dotted line).

Wavelength (λ)

Wavelength is the distance a wave travels from a complete cycle: one full crest and one full trough. Wavelength is shown as λ.

Frequency (f)

Frequency is the number of wavelengths per second. The illustration above shows the number of waves passing in one second.

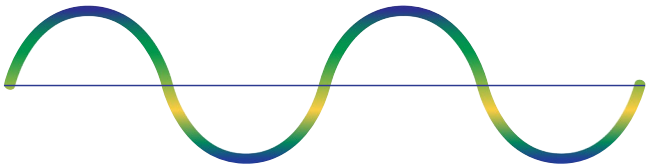
1. How many wavelengths are shown above? _____

2. What is the frequency of the wave shown above? _____

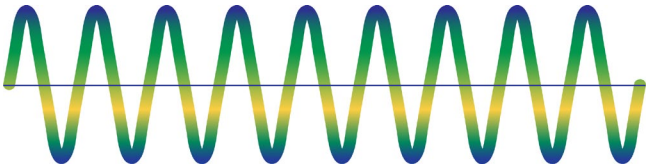
Amplitude (a)

Amplitude is the height of a full wave: from the peak of the crest to the valley of the trough. The greater the amplitude of a wave, then more energy it is carrying. The lower the amplitude, the lower the energy wave. Amplitude is measured in meters.

Change the Frequency



Low *Frequency*



High *Frequency*

3. Re-Design your **Scribble-Bot** to draw the **lowest frequency** wave. How low can you go?

My **Scribble-Bot's** – Lowest *Frequency Wave*

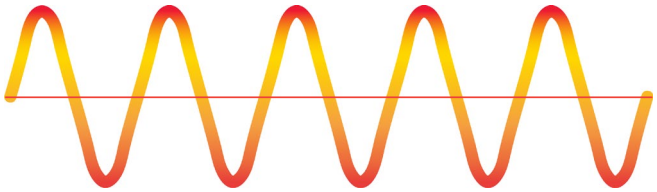
Cut and paste (or tape) a paper with your Wiggle-Bots lowest frequency scribbled wave.

4. Re-Design your **Scribble-Bot** to draw the **highest frequency** wave.

My **Scribble-Bot's** – Highest *Frequency Wave*

Cut and paste (or tape) a paper with your Wiggle-Bots highest frequency scribbled wave.

Get "Amped"



High *Amplitude*

Low *Amplitude*

5. Re-Design your **Scribble-Bot** to draw the **highest amplitude** *wave*.

My **Scribble-Bot's** – Highest *Amplitude Wave*

Cut and paste (or tape) a paper with your Wiggle-Bots highest amplitude scribbled wave.

6. Re-Design your **Scribble-Bot** to draw the **lowest amplitude** *wave*. How low can you go?

My **Scribble-Bot's** – Lowest *Amplitude Wave*

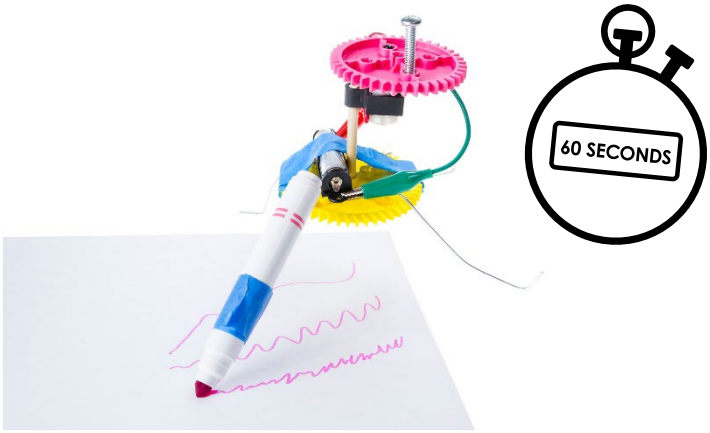
Cut and paste (or tape) a paper with your Wiggle-Bots lowest amplitude scribbled wave.

Calculate the Frequency of your Scribble-Bot

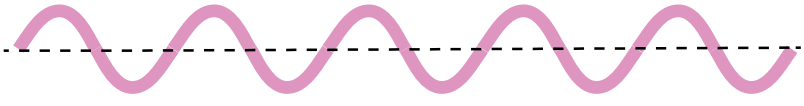
Cut and paste (or tape) a paper with your Wiggle-Bots 60 second scribbled wave.

If it is too big to put here, attach it to this packet.

7. Get your **Scribble-Bot** so it makes a good looking wave (a wave that looks a little bit like the one below). Time it, so that it scribbles for 60 seconds. Cut the 60 second scribble and paste it at the bottom of this page.



8. Draw the *resting position* of your wave with a dotted line (in the center of the wave) and count the number of *wavelengths* (scribbles) it drew. Remember, one wavelength is one full *crest* and one full *trough*.



This example has wavelengths: 5

9. How many *waves*, did your **Scribble-Bot** draw in 60 seconds:

_____

10. Calculate the *Frequency* of your **Scribble-Bot**.

_____/ 60 = _____

11. Measure the *amplitude* of the **Scribble-Bot** *wave* above

_____ millimeters

12. Label the *crest* of the **Scribble-Bot** *wave* above.

13. Label the *trough* of the **Scribble-Bot** *wave* above.

14. Name your **Scribble/Wiggle-Bot**

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