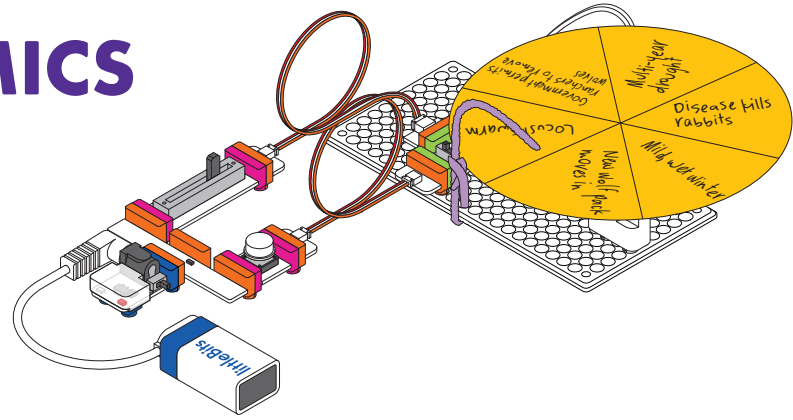# littleBits
ECOSYSTEM DYNAMICS

GUIDED

DESIGN CHALLENGE
Build a randomized ecosystem "wheel of change" spinner!
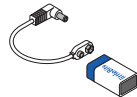
EXPLORE

WRITE

• Complete Writing Box #1 in your guided handout.

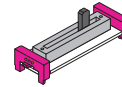## Let's build our circuit!

CREATE
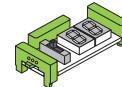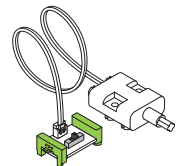
CREATE

1. Gather your invention tools.

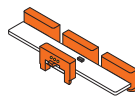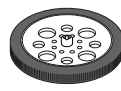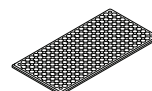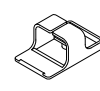| a1 battery & cable | p4 power | i3 button | i5 slide dimmer | o21 number | o25 DC motor |

| w1 wire (2) | w17 fork | a25 wheel | a30 mounting board | a31 battery clip |
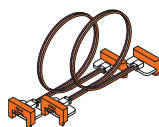
Other materials:
• Pipe cleaner
• Ruler
• Scissors
• Deck of cards
• Construction paper
• Tape
• Markers
• Optional: Timer or phone with timer

2. Attach the battery cable to the battery.
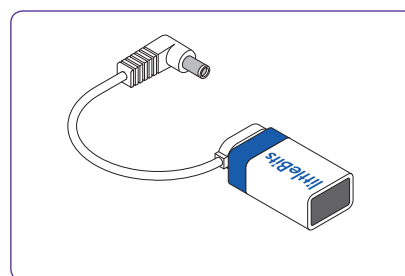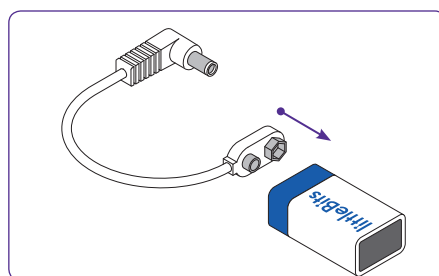
3. Attach the power Bit to the battery cable assembly.
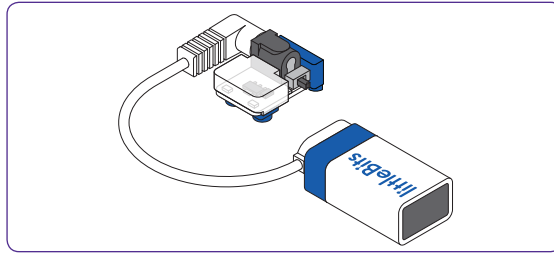
4. Snap this circuit together.
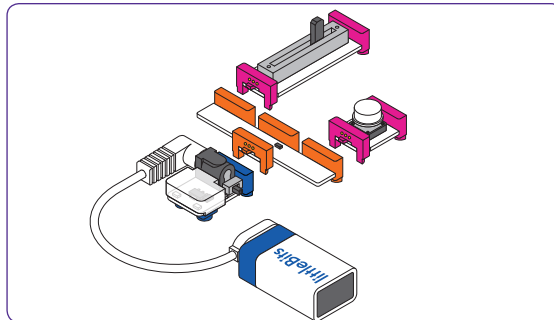
5. Attach one wire to the end of the slide dimmer. Make sure your slide dimmer is set all the way to the left.
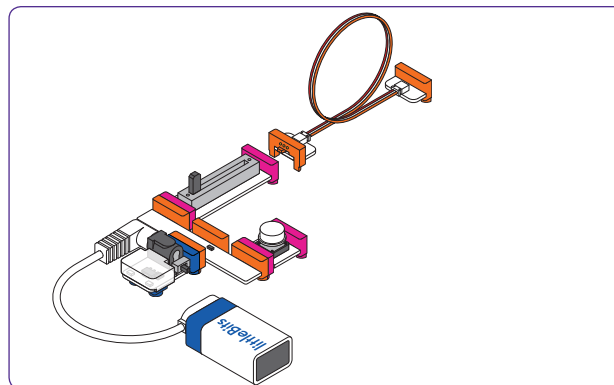
6. To the end of the button, attach a wire + number Bit + DC motor.
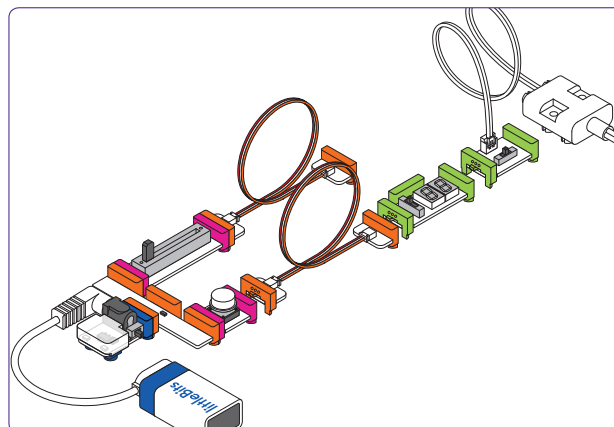
7. Switch the number Bit to "count up."

COUNT: up
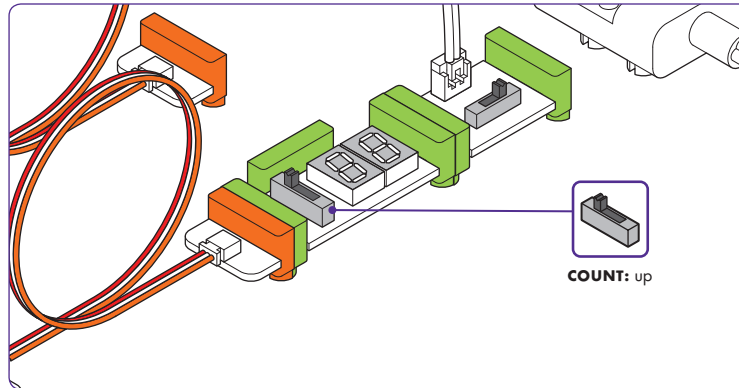
8. Switch the DC motor to "CW" (clockwise).

MODE: CW
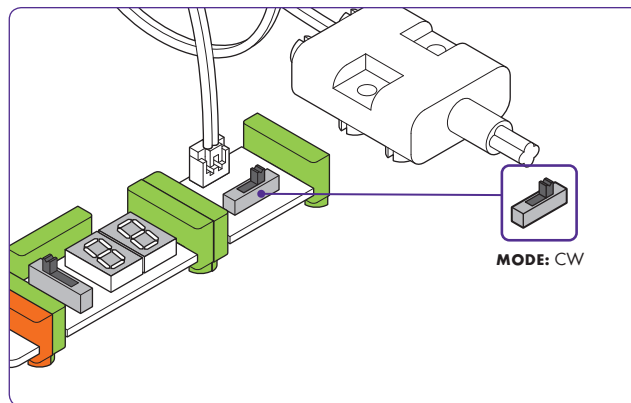
9. Let's connect the circuit together! Attach the wire from the slide dimmer to the 3rd bitsnap as shown.
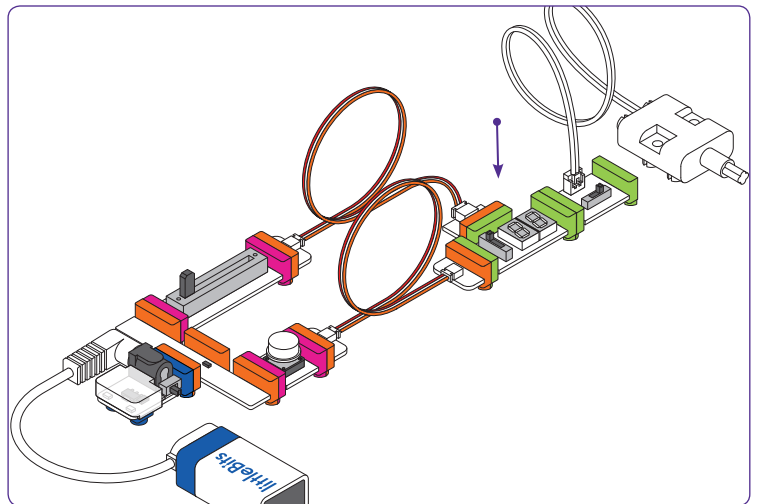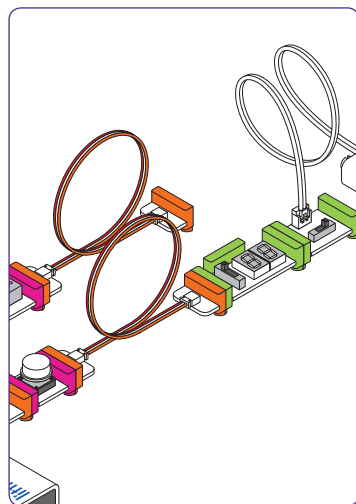
10. Press the circuit onto the mounting board as shown. Be sure that the DC motor upright is standing upright.
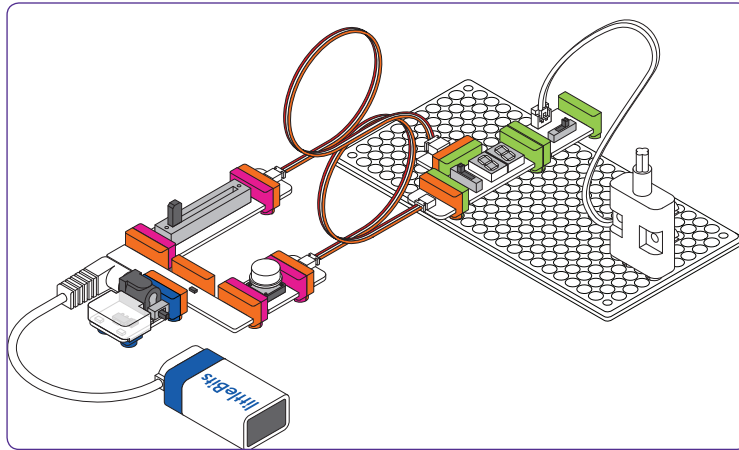
11. Now pick up a wheel with the longer axle side facing down. Line up the DC motor cross axle with the cross hole of the wheel and gently press the two together.
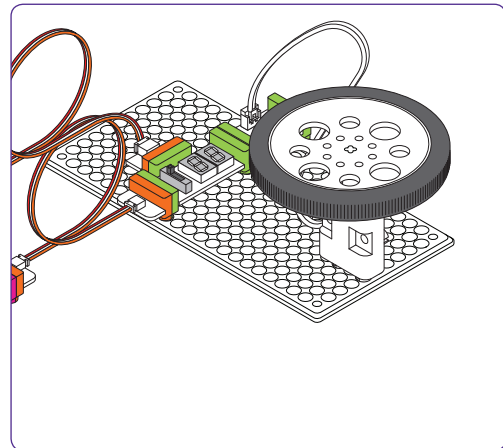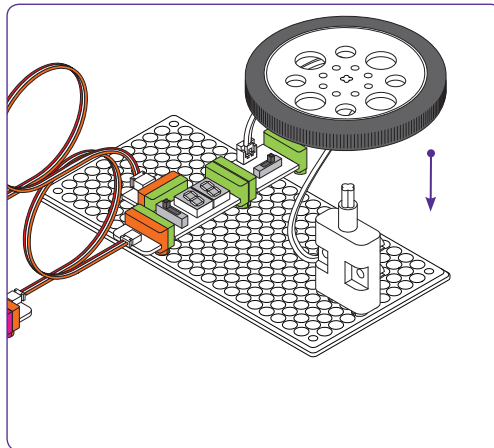
12. Let's test that your circuit works! Power on your circuit.

MODE: on
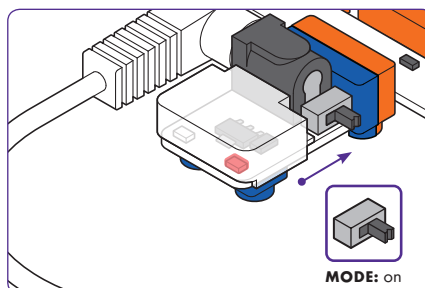
13. When the button is pushed, the number Bit should count up. As the counter nears ten, the wheel should begin revolving slowly. As the wheel revolves, move the slide dimmer all the way to the right and then all the way back to the left to stop the revolutions and re-set the number bit.
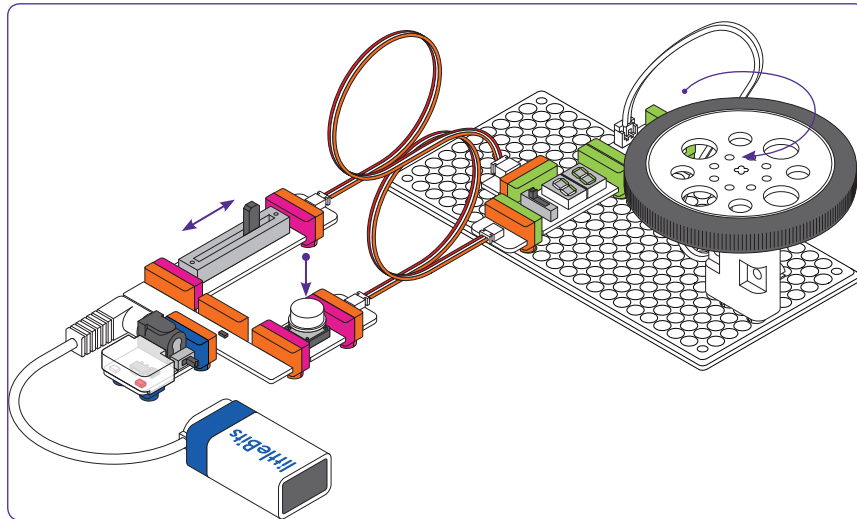
14. Power off your circuit.

MODE: off
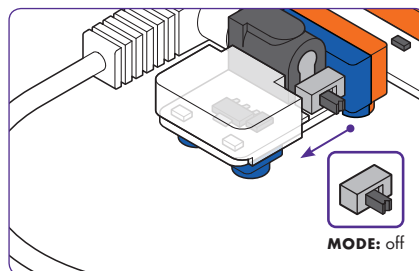
Let's Design our Wheel!

15. If you haven't yet done so, cut out a 5 inch diameter circle from a piece of construction paper.
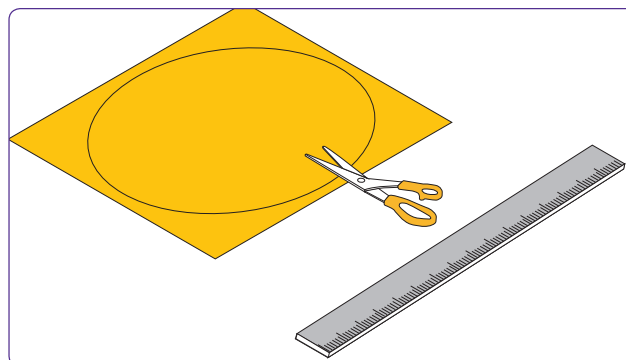
16. Divide your circle into sixths using a marker or pen.
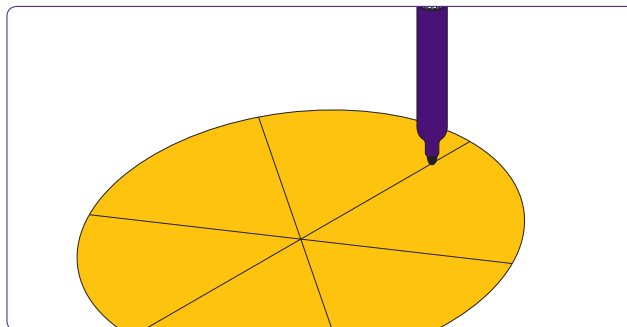
17. Unless your teacher gives you different instructions, in each sixth, write these following ecosystem events:

- Disease kills rabbits

- Mild, wet winter

- New wolf pack moves in

- Locust swarm

- Government permits ranchers to remove wolves

- Multi-year drought
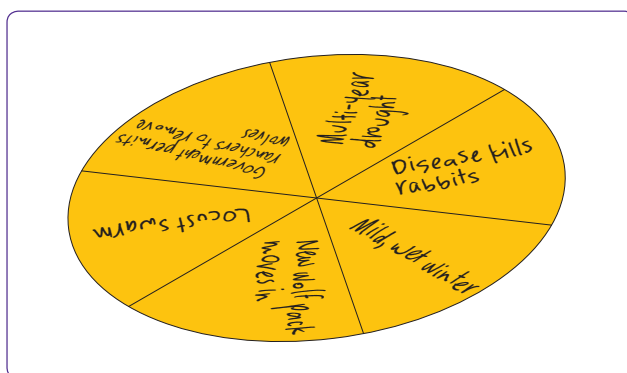
18. Using a piece of tape doubled-over, tape the circle to the top of the wheel.
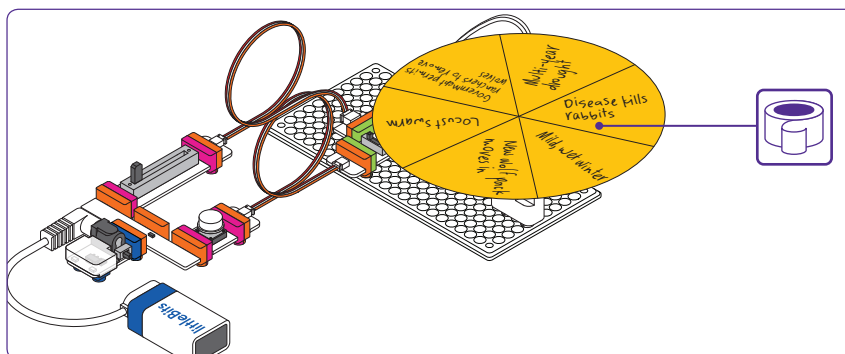
19. Thread one end of the pipe cleaner through a hole in the mounting board, aligning it so that the pipe cleaner touches the edge of your paper wheel. Pull your pipe cleaner through, making the ends equal in height.
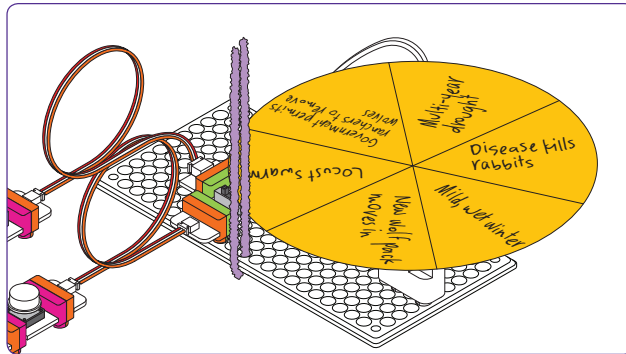
20. Twist the pipe cleaner ends tightly together so it stands up straight next to the wheel. You can bend the end of the pipe cleaner so that it gently touches the wheel.
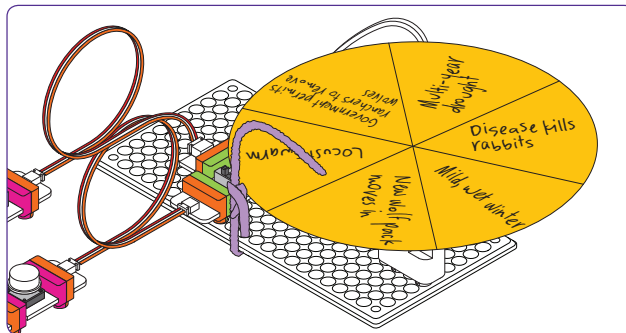
21. Your "wheel of change" invention can now be powered on and ready to play!
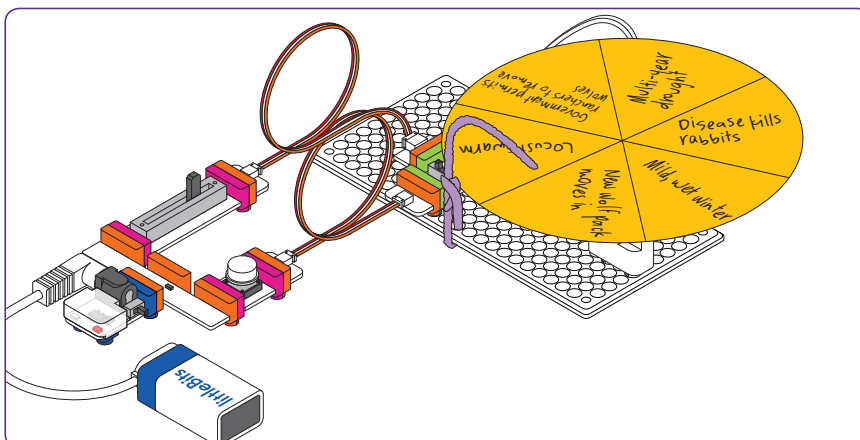
PLAY

PLAY

- Follow the "Wheel of Change" game rules below:

  1. From a complete deck of cards, create your playing deck by keeping only the cards numbered 4–10; you'll remove all aces, 2's, 3's, and face cards.

  2. The **Multiplier** will choose two cards at random, and multiply the values together. For example, a 4 and an 8 would equal 32.

  3. The **Operator** will press the button as many times as the product of the two cards. For example, the button would be pushed 32 times. This determines how long the wheel is allowed to spin!

  4. As soon as this number is reached, the **Operator** slides the slide dimmer to the right, then left, to reset the number Bit and stop the spinning. Whichever section the pipe cleaner is touching when the wheel stops is the event that has occurred.

  5. The **Timer** reads the phenomena aloud for the two **Forecasters**, starting the timer for one minute.

  6. The **Forecasters** must ideate what changes might be affected by this phenomena.

  7. The **Timer** calls "time!" at the end, and everyone rotates roles.

- Continue playing the game until everyone in the group has had two turns being the Forecaster.

SHARE

SHARE **WRITE**

- Complete Writing Box #2 in your guided handout.

CLEAN UP

CLEAN

- **Until next time, littleBits!** Place the Bits gently back in the box according to the diagram on the back of the Bit Index; return classroom materials to their proper place and check the area around your workstation.

littleBits
ECOSYSTEM DYNAMICS

Name:

CHALLENGE OVERVIEW

Let's build a "Wheel of Change" to forecast how changes will affect an ecosystem!

GUIDING QUESTIONS TO REACH LEARNING OBJECTIVES

How does one change in an ecosystem's environment affect the populations of living things in ecosystem?

CREATE

1. Record your group's thoughts of what would happen if this food web suddenly lost all wolves.
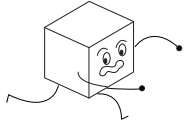
- What's a likely scenario that would cause all wolves to disappear from the food web?

- What would happen to the rabbit population?

- What would happen to the plants?

- Can you think of any other changes that might occur?

2. Think back on the "Wheel of Change" ecosystem game and record:

• The most interesting, correct change that one of your teammates forecasted:

_____

_____

_____

_____

• The change that was the hardest to forecast:

_____

_____

_____

_____

_____