

Daisy STEM



Badge in a Box

How Robots Move (Robotics 2)

Overview for	These kits are designed to allow a leader to conduct a Daisy meeting with less planning, less effort, and less cost.
Leauers	Most activities will try to minimize the amount of reading required because Kindergarteners aren't ready for it.
	In the kit, there are activities and supplies. Many supplies are provided, but not all. Make sure to look at the Materials list for the activities so that you have some lead time to order or shop. Normal troop supplies, such as scissors and markers, will be needed. Those are specified. Copies may need to be made.
	Materials or game pieces for each activity are designed so that 12 girls can do the activity at a time. Near the end of this Leader Guide, there are ideas for other activities that either take more preparation, more lead time, or more supplies and money. If something catches your fancy, you can pursue it. However, the supplies will not be in this kit and will need to be acquired.
	Please be a sister to the next troop when using these materials. Put them away in the same manner as you received them and report any broken/missing items when returning the box to Badgerland.
This Activity Matches These Badge Requirements	 Learn about the parts of a robot Find out how robots move Make a robot move
Outcomes	 Overall Strong sense of self: Girls have confidence in themselves and their abilities, and form positive identities. Positive values: Girls act ethically, honestly, and responsibly, and show concern for others. Challenge seeking: Girls take appropriate risks, try things even if they might fail, and learn from their mistakes. Healthy relationships: Girls develop and maintain healthy relationships by communicating their feelings directly and resolving conflicts constructively.
	 STEM STEM Interest: Girls are excited about STEM subjects and want to learn more about them. STEM Confidence: Girls have confidence in their STEM skills and abilities. STEM Competence: Girls think scientifically to solve problems. STEM Value: Girls learn the importance and relevance of STEM to people and society.

Materials Troop Needs to Supply and Preparation Actions	 Make copies of DAY-ZEE activity grids from the master. Depending on your copier, you may be able to leave the master in the sleeve and just lay it on the copier bed. (Activity #2) Pencils with erasers Blank white paper (such as printer paper) (Each Girl Scout will probably need at least 2-3 sheets) (Activity #3) Optionally, prizes for Bingo winners (Activity #1) As explained in Activity #3 on p. 7, prior to the meeting: Charge the Ozobots. Calibrate the Ozobots. Practice with the Ozobots in advance.
Contents in the Box	 Master set of activity sheets Leader's Guide Robot Bingo cards (12) (Activity #1) Bingo caller cards (1 set) (Activity #1) Bowls for bingo markers (i.e. dried beans) (12) plus a larger bowl for the caller cards (Activity #1) Bingo card markers (dried beans) - 10 to 20 per girl (Activity #1) Small dry erase whiteboard (1) (Activity #2) Dry erase markers (2-3) (Activity #2) DAY-ZEE activity examples, laminated (Activity #2) DAY-ZEE activity grids, master, to be copied (Activity #2) Ozobot robots (6) (Activity #3) Felt tip markers (6 green, 6 red, 6 black, 6 blue) (Activity #3) Power strip and charging cords for Ozobots (1 each) (Activity #3) Ozobots coding guide (6) (Activity #3)
#1: Game: Robot Bingo	 Materials: Robot Bingo cards (1 per girl) (12 are provided) Bingo card markers: dried beans (10-20 per girl) (provided) Bingo caller cards (provided) Bowl: 1 per Girl Scout for Bingo markers plus a larger one for Bingo caller cards (provided) Optionally, prizes for Bingo winners (troop provides) Preparation: Place all bingo caller cards into the larger bowl and mix them up. Gather bingo card markers (i.e. dried beans) and put some in a bowl for each player.

Activity:
1. Give each girl a bingo card and ensure she has a bowl of markers
for her card. Instruct her to cover the "Free Space" (in the middle of
the card) with one of her markers.
2. Explain the rules of Bingo:
a. The caller will hold up a card drawn from the hat. The picture
on the card will match a picture on the bingo card.
b. Place a marker over the picture on your card. Not all cards
have every picture! It's okay if you don't have that picture.
c. The caller will read the words on the card that was called
(such as "keypad"). Each card/picture represents a part of a
robot.
a. Giris can raise their hands if they have ever seen that part on
a robot OR the caller/leader can explain why that part is
When a girl gets either 5 pictures herizentally (across) or
e. When a gin gets either 5 pictures honzontally (across) of vertically (up and down a row), she can shout "BINGO" and
wins the round Explain this to the Girl Scouts in advance so
that they know what it takes to win.
i. You may wish to include '4 corners' if that is the
custom in your area.
3. Award prizes if choose.
4. Continue playing for as many rounds as you like.
Bingo Pictures Explained:
• Blower: This could be a picture of a blowing or sucking mechanism.
It could be used to blow away objects or suck them up.
 Switch: Switches are often used to turn something on or off.
 LED light: LED lights use very little power but are very bright. They
are used to demonstrate that something is happening.
Language: Robots can understand instructions using computer
code, like this example of "binary" code.
Circuit: A circuit moves energy through the robot. It takes the power
trom a battery or wall plug and pushes it through the robot's body.
 Spring: Springs can neip parts inside the robot move, such as buttons loss or whools. Springs protect the robot from demonstration
when moving
Gear belt: Belts are used to move several parts at once, such as
• Seal bell. Dells are used to move several parts at once, such as inside a car. Sometimes items travel on a belt, and sometimes the
helt keens several nieces working together
 Wires: Wires are part of a circuit. They are the piece of the circuit.
that carries the energy.
 Power button: The power button turns the robot on and off.
Battery: A battery provides energy to a robot. Batteries do not need
to be plugged into an outlet, so the robot can travel far away from a
wall.

	 Gears: Gears move things inside a machine. Their "teeth" fit together like puzzle pieces. Remote control: A remote can be used to switch on components of the robot without touching it. Computer chip: A computer chip acts like a robot's brain. It speaks the language or code and tells the robot what to do. Hook or Pulley: Hooks and pulleys can be helpful for moving things around or grabbing items. Sound: Sound might be really important for a robot. It may make noise to communicate with its user. Track: A robot might follow a specific track. The track might be a physical track or it may be a programmed track that exists in the robot's brain. Sensor: A sensor is like a robot's eye or ear. It can "see" or "hear" clues that help it understand how to do its work. Wheel: Wheels are helpful for robots moving from place to place. Lock: To remain secure, a robot may have a lock to keep unwanted people out or keep important contents in. Propeller (or Turbine): A propeller can help with keeping the circuits or computer chips cool, because energy can sometimes be very hot! Handle: A handle may be helpful for getting into a part of the robot or for using it to do its work. Keypad: A keypad may help the robot's user to give the robot information. Steering wheel: An autonomous robot, like a self-driving car, might need a steering wheel for the user, in case it makes a mistake. Power cord: A power cord gives energy to the robot, either by charging a rechargeable battery or by providing continuous power. Radar: Radar helps a robot see something that may be far away. It may help the robot move in an area when it doesn't have a track or could encounter obstacles.
#2:	Materials:
Activity: DAY-ZEE waters the garden (Paired "Coding")	 DAY-ZEE activity examples (1 per girl, 12 total) (provided) DAY-ZEE activity grids (1 double-sided or 2 single sided per girl) (troop makes copies) Pencils with erasers (1 per girl) (troop provides) 1 Dry erase board (provided) 2-3 Dry erase markers (provided) 1 extra adult (to demonstrate paired coding) (troop provides) Preparation: Copy an activity sheet for every girl from the master set. Make sure every girl has a pencil.

	Activity:
	1. Gather all the girls together in a circle or group to explain the
	activity.
	2. On your white board, draw a 3x3 grid. In the upper left square, draw
	a robot (see activity examples) and in the lower right square, draw a
	plant.
	3. Explain the story: "This is my robot DAY-ZEE. Her job is to water
	the garden. DAY-ZEE is a robot, so she cannot think for herself.
	She needs our help to get to the garden so she can do her job.
	(Extra adult) is going to be the Navigator and will give me the
	directions for DAY-ZEE by telling me to draw an up arrow, a down
	arrow, a left arrow, or a right arrow. I will be the Driver and write
	each arrow so we can get DAY-ZEE to the garden."
	a. Right and Left are very important for this activity. On the top
	of the example sheet, girls can reference the left and right
	hand pictures and arrows.
	4. (Extra adult) will state each
	direction out loud and you (Leader)
	will write each arrow on the grid.
	5. After you have finished drawing,
	say again that (extra adult) was the
	Navigator. The navigator helps find
	directions. You (leader) were the
	Driver . The driver follows the
	directions and writes them down.
	Both jobs are very important to get
	vour friend DAY-ZEE to the garden.
	6. Erase the grid and draw another,
	adding DAY-ZEE and the garden again. This time, ask the girls to
	raise their hands and navigate the directions while you draw them.
	7. Ask the girls one more time who was the navigator (they were) and
	who was the driver (you were).
	8. Break girls out into pairs. If necessary, you can also have a group
	of three (but they may take longer to finish the activity). Explain that
	they are now going to make their own maps for DAY-ZEE and her
	garden.
	9. Remind the girls that each time they draw a map, they will need one
	girl to be the navigator and the other to be the driver . When they
	finish the map, they can switch.
	10. Let the girls make as many maps as they like! You can print many
	grids or let them draw their own.
#3:	Materials:
	 6 Ozobots (7 are provided so there is a spare)
Activity: Make an	Power strip (provided)
Ozobot Move	 Round charging hub with 6 USB outlets and 1 power cord

(provided)

 6 mini USB-to-micro USB charging cords (provided)
 Ozobot coding cards (6) (provided)
 Blank white paper (such as printer paper) (Each Girl Scout will
probably need at least 2-3 sheets) (troop provides)
• Black, green, red, blue felt tip markers (1 of each color per pair of
girls)
Preparation: Review the following sets of
instructions to prepare for this activity.
Charging Ozobots:
1. Charge the Ozobots in advance of
your activity. To charge the robots
plug the power strip into an outlet
plug the power strip into an outlet.
2 Attach the power cord to the round
base. Make sure each outlet on the
base has a short micro USB cord
sticking out of it. There are six of
those short cords in your kit
2 Plug apph Ozobat into its short
5. Flug each Ozobot linto its short
Crobet is leasted on the "back" of charging port
Ozobol is located on the back of
the robot.
4. If the Orchest is champing, it will fleeh ansay If
4. If the Ozobot is charging, it will flash green. If
the Ozobot is done charging, it will glow
green (not flashing).
I urning Ozobot On:
5. On the left side of the Ozobot, you will find a
power switch. It is very small and shaped
like a circle. To power on the Ozobot, briefly
press the power button (about as long as
you'd push a door bell). Pressing the button
a second time will turn Ozobot off.
Calibrating Ozobot:
6. To prepare the Ozobot to understand the instructions that girls will
create in this activity, the Ozobots will need to be calibrated. You
will teach your girls how to do this too, so it is important to try it on
your own first.
7. Draw a large black circle on a sheet of blank paper. Color it in so
that it is completely black.

 Turn on a charged Ozobot and place it on the circle. The Ozobot will follow the edge of the circle, demonstrating that it understands the "code" you have made. Watch how the Ozobot calibrates itself here: <u>https://tinyurl.com/4mw4nkvy</u> The Ozobot will need to be calibrated whenever it is turned on for a new activity. If the Ozobot is having difficulty reading code, such as a track drawn with markers, try turning it off and turning it back on, then calibrating it again.
How Ozobots Work:
 10. Ozobots are designed to follow a "program" or track drawn with colored markers. Ozobot can read and interpret the track, following it until it reaches an end-point (where the track stops). 11. Special tracks can be drawn with colored markers (blue, red, green). These special tracks will make the Ozobot perform special functions, such as a U-turn, moving faster, zig-zagging, and etc. Each special track is indicated on the Ozobot Code Cards included in your kit.
Troubleshooting:
12. Ozobots will not move if they are not on a track. They will only respond to marker-drawn lines.
13. Thin felt-tip marker lines may confuse the Ozobot. If using a chisel- tip marker, turn the chisel-tip sideways to create a thick marker line. If not using a chisel-tip marker, ensure that the line is approximately ¼" thick.
14. Very thick felt-tip marker lines may confuse the Ozobot. If the line is the width of an adult finger, it may be too wide for the Ozobot's sensor. Try making a thinner line, about ¼" thick.
15. If Ozobot is not responding to the drawn line, try turning it off, waiting about 15 seconds, and turning it back on again. Recalibrate using the big black circle. Place it back on the track.
16. If the Ozobot is still not working, tape a note to the non-working robot and return it to the box.
Activity:
 Gather all Girl Scouts in a circle or group to demonstrate operation of the Ozobot. For your demonstration, you will need one black, one green, one red, and one blue marker, a blank sheet of paper, and an Ozobot Coding Card.
 2. Show the girls the Ozobot and explain that this small device is a robot. Like many of the robots you have already seen, it has a body, special LED lights, and wheels. Ask the girls: a. What do you think the lights do?
b. What do you think the wheels do?
is very important to pay attention. Tell the girls how the Ozobot

works: "The Ozobot follows a special path or track made with
colored markers. Different marker colors give different types of
directions to the Ozobot "
4 Show the airls how to turn on the Ozobot by showing them the "On"
button on the dovice. Explain that to turn on the Ozebet hold down
the On butten fer just a few assends and then let go. To turn off the
the On button for just a few seconds and then let go. To turn off the
Ozobot, do the same thing.
5. Show the girls how to "set up" (calibrate) the Ozobot and get it
ready for reading its track. Draw a black circle on your blank sheet
of paper and color it in. Make sure the circle is colored in
completely with no white remaining.
6 Turn on the Ozobot and calibrate it using the instructions from the
Dropprotion spectron of this activity. Exploin to the girls that this stop
Preparation section of this activity. Explain to the girls that this step
is very important because it neips the Ozobot get ready to work.
7. Draw a thick black line on your blank sheet of paper, using the
chisel tip of a marker or making a line about 1/4" thick. Explain to the
girls that the lines for the Ozobot should be thick, but not wider than
their pinky finger.
8. Set the Ozobot (turned on) on the line. The
Ozobot will follow the line to its end and
stop. Explain that this simple track helps $\rightarrow \rightarrow \rightarrow \rightarrow$
the Ozehot move around. It follows the line
and stops when the line stops.
9. Add the ZigZag color code to your black B BK G R
line. Bring the Ozobot back to the beginning
of your black line and release it. The
Ozobot will complete the track normally until it reaches the ZigZag
code, which will cause it to move in a zigzag pattern until it reaches
the end of the line
10 Demonstrate one or two more code examples to the group. Ask if
there are any questions and ensuer them
there are any questions and answer them.
11. Next, split the girls up into pairs. Ask one girl to be the Navigator .
This time, she will draw the track for the Ozobot to follow. Ask the
other girl to be the Driver . She will operate the Ozobot. Remind the
girls to switch roles each time they try a new drawing/track.
12. Give each pair of girls one Ozobot and one Ozobot Code Card, as
well as several sheets of blank drawing paper
won de eevelal eneete et blank drawing paper.
Suggested Tracks/Challenges:
Juggesieu Hauns/Ullalleliges.
To make this activity more challenging as the girls become comfortable
using their Ozobots and codes, suggest some of these tracks:
A. Create a track that looks like your troop number. How can you keep
the Ozobot going across all of the numbers?
B. Create two race tracks using different codes and race another
team's Ozobot. What makes your Ozobot go faster than its
competitor?

	C. What happens if you use marker colors that are not black, green,
	red, or blue? Try it and tell your leader what happens!
	D. Create a maze for an Ozobot with dead-ends and only one way out.
	How can Ozobot solve the maze?
Optional:	Bonus activity: no materials provided in the kit but the details are
Activity: Build a	here.
Doodle Bot	
	Materials:
	 Pool noodles (1 noodle makes 2-4 bots, depending on the size of
	the brush)
	• Simple electric toothbrush (battery operated, not rechargeable)
	 Googly eyes (2 per bot)
	 Pipe cleaners (1-3 per bot)
	 Rubber bands (2 per bot) Markers (2 non hot)
	• Markers (3 per bot)
	 Glue dots (for eyes) Stickers to describe the bet (optional)
	 Slickers to decorate the bot (optional) Drawing paper or poster board
	 Drawing paper of poster board Sorrated knife (1, for adult use only)
	• Senaled Kille (1, 101 adult use only)
	Preparation:
	1 Using the serrated knife, cut the pool
	noodle to the length of the toothbrush.
	You will need one section of noodle for
	each brush.
	Activity:
	1. Insert the electric toothbrush into the
	hollow middle of the pool noodle.
	Use glue dots to attach the googly eyes.
	Roll the rubber bands onto the pool
	noodle. Put some space between them so they can firmly hold the
	markers in place.
	4. Add pipe cleaners to the rubber bands to serve as arms, hair,
	faces, or other features for the doodle bot (decorative only).
	5. Add optional stickers to the noodle to
	decorate the bot's body.
	6. Insert uncapped markers into the rubber
	bands, making sure the up of the marker is
	hot's body. The markers should lock
	something like lags in a tripod formation
	7 Make sure one of the leas sticks out further
	from the body and the other two leas are parallel in length and
	relatively short (about 1-2 inches longer than the end of the pool
	noodle).

	 8. Turn on the brush and set it on the paper. 9. The bot should dance or bound around on the marker tips, making fun patterns!
Optional:	Did you know that Ozobots can also be used to learn computer coding?
Combine Robotics	Check out the Coding for Good 1 Badge in a Box to learn about algorithms
with Coding!	and the coding language, Blockly.
End	Great! You have completed the Daisy How Robots Move badge.
	Hope you had fun!
Supplies	Consumables to be replenished by Badgerland
	 Felt-tip markers (as needed)
	 Dry erase markers (as needed)