Learning Resources®

LER 3119

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grades K+

STEM

COOPER™
the STEM Robot

Cooper™, el robot para aprender a codificar
Robot de programmation Cooper™
Cooper™, der programmierbare Roboter

Activity Guide

Guía de actividades • Guide d'activités
Spielvorschläge

⚠ WARNING:
CHOKING HAZARD - Small parts.
Not for children under 3 years.
0-3

Meet Cooper™, the friendly and resourceful STEM robot!

Starting your coding journey with Cooper may sound challenging, but this guide will help you along the way. For starters, think of coding as a language. Cooper understands simple commands—move forward and back; turn left and right. Of course, you will learn other “words” together while coding with Cooper, but these are the basics. When you enter a code sequence, you expand Cooper’s language database, training the robot using a series of commands. In turn, Cooper’s capabilities and talents emerge as you train and build up the robot’s memory. Are you prepared to teach Cooper and become an expert coder? Let’s get started!

<u>Note for parents and educators:</u>

Coding is fun, of course—but it’s also a great way to learn and reinforce the following STEM-related concepts:

1. Basic coding
2. Critical thinking
3. Spatial concepts
4. Sequential logic
5. Collaboration and teamwork

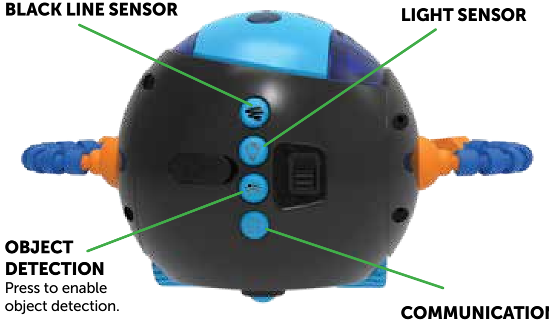
Cooper keeps your child engaged while they learn the fundamentals of coding!

This set includes:

- 1 Cooper
- 1 Play ball
- 1 Charging cable
- 40 Coding cards

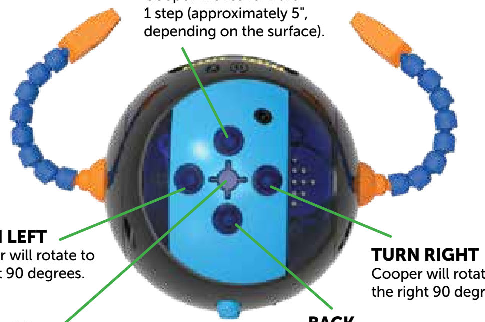
Basic Operation

Power—Slide this switch to toggle between **OFF** and **ON**.



Coding Cooper

You can program your Cooper using the following buttons. Press these buttons to enter commands, then press **GO**.



Cooper has sensors for seeing objects ahead, lighting up in the dark, and even following a black line that you draw!

***Note:** When low on power, Cooper will beep repeatedly and functionality will be limited. Please recharge Cooper using the included USB-C cable.*

Getting Started

Let’s start coding with Cooper! On top of Cooper, you’ll see four different directional buttons. Each directional button you press represents a step in your code. Together, multiple steps represent a *code sequence*. When you press **GO**, you are telling Cooper to follow the steps you just programmed, and Cooper will now execute all the steps in order. Cooper will stop and make a sound when it completes the code sequence.

Start with a simple code sequence. Try this:

1. Slide the POWER switch on the back of Cooper to ON.
2. Place Cooper on the floor (smooth, hard surfaces work best!).
3. Press the FORWARD directional button two times.
4. Now, press the GO button.
5. Cooper will now move forward two steps.

Congratulations! You just built your first code sequence!

Clearing a Code

To clear the code and start again, press and hold **GO** for two seconds. You will hear a confirmation tone, indicating the code has cleared. Be sure to do this before entering any new code sequences!

***Note:** If you hear a negative sound, or Cooper doesn’t follow directions, please check the following:*

- Press GO again. (Do not re-enter your code sequence—Cooper will retain it until cleared.)
- Check that the POWER switch on Cooper’s back is in the ON position.
- Check the lighting in your surroundings. Bright light can affect Cooper’s functionality.
- Be sure Cooper’s battery is charged. Use the included cable to fully charge Cooper.
- Clear the previous code (see above). Press and hold GO to clear it and start again.

Now, try a longer program. Try this:

1. Press and hold GO to delete the old program.
2. Enter the following sequence: FORWARD, FORWARD, RIGHT, RIGHT, FORWARD.
3. Press GO and Cooper will follow the code sequence.
4. Always be sure to clear any old codes before entering a new sequence.

***Note:** Cooper can perform sequences of up to 100 steps! If you enter a sequence that exceeds 100 steps, you’ll hear a sound indicating that Cooper has reached the step limit.*

Sensor Buttons

On Cooper’s reverse side are four buttons. The top three are SENSOR buttons. Pressing each button activates one of Cooper’s special sensors: **Object Detection**, **Light Sensor**, and **Black-Line Following**. On the bottom is the **Communication** button—it allows Cooper to “talk” and engage with other Coopers! (More on that later.) You can toggle the first three sensors on/off and use multiple sensors at once.

Object Detection allows Cooper to “see” objects ahead and helps teach concepts of “if/then” logic. Perform the following steps to engage this sensor:

1. Enter a code sequence. Then, press the OBJECT DETECTION button. Cooper’s eyes will light up green, indicating that the sensor is engaged.
2. Now, enter commands to inform Cooper’s reaction when “seeing” an object (for example, RIGHT, FORWARD, RIGHT, FORWARD).
3. Press GO. Cooper will execute the initial sequence, from step 1. If Cooper sees an object in the way (from 4 inches or closer), it will revert to the object-detection sequence, from step 2, before finishing the initial sequence.
4. To turn off OBJECT DETECTION, simply press the button again. Cooper’s eyes will return to their original color.

The **Light Sensor** causes Cooper’s eyes to light up when entering a dark area or when the button is covered. Press once to engage the sensor; press again to turn it off.

Pressing the **Black-Line Following** button allows Cooper to detect and follow a drawn or printed black line, even when executing a code sequence. Cooper moves forward along the line—singing, talking, or whistling all the while!—until it no longer detects the line or the power is turned off. If Cooper runs off the line, it will spin in place until finding the line again, or it will revert to a prior code sequence. Press the button again to turn off black-line following.

Note: *You can engage all three sensors individually (one at a time) or all at once! Try different commands for Cooper and experiment with multi-sensor navigation!*

Communication Mode

Cooper can “talk” and engage with other Coopers. Just like in the real world, communication and collaboration are important to finishing tasks and achieving goals. Press the bottom button on the back of one or more Cooper robots to enter Communication Mode. Now the robots can communicate with each other!

Here are a few special codes to try. Each one will let Cooper 1 (the first robot) talk to other Coopers. The codes only need to be entered on Cooper 1. If both robots are in communication mode and facing each other (less than 12" away), they will begin to talk, dance, giggle, play catch, or even follow commands!

Enter this code*	Press GO**	Cooper action
B, B, B, B	Pets	Cats and dogs. Watch Cooper bark and chase friends!
B,B,B,F	Music	Cooper and friends play a silly symphony.
R, L, R, L	Move!	Enter any code into Cooper and it will be transmitted to all other Coopers nearby. Press start and watch them go!
F,B,F,B	Comical Cooper	Cooper loves to tell jokes, and his friends love to giggle!
L,R,R,L	Sports	Have Coopers face each other and play catch with the play ball!

*B=Back, F=Forward, R= Right, L = Left

**Always press GO to start and stop Cooper’s actions; press and hold GO to clear out any commands.

Look for other fun, hidden codes and features! Cooper is full of surprises! When finished with Communication Mode, press GO again to toggle this mode OFF.

Coding Cards

Use the coding cards to track each step in your code. Each card features a direction or “step” to program into Cooper. These cards are color-coordinated to represent each direction or action, and fit together for a visual representation of the code sequence.

For even more tips and tricks, please visit:
http://learningresources.com/Cooper.

Troubleshooting

If you hear a negative sound after pressing the GO button, try the following:

- Check the lighting. Bright light can affect the way Cooper works.
- Each Cooper can be programmed a maximum of 100 steps. Be sure a programmed sequence is 100 steps or fewer.
- Your Cooper will get sleepy after 5 minutes if left idle. Slide the POWER switch to OFF, then ON to wake it up. (Your Cooper may try to get your attention a few times before it goes to sleep.)
- Check the SENSOR buttons. Press them to toggle ON/OFF.

Cooper Movement

If Cooper isn’t moving properly, check the following:

- Be sure Cooper’s wheels can move freely and that nothing is blocking their movement.
- Cooper can move on a variety of surfaces but works best on smooth, flat surfaces like wood or flat tile.
- Do not use Cooper in sand or water.

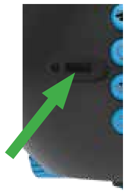
Sensors

If Cooper’s sensors are not working properly:

- Double check that the sensor button has been pressed and is in the ON position.
- Check to see if something is blocking the sensor in Cooper’s face. Some actions use this sensor.
- Other sensors cannot be programmed and will not function while Cooper is in Communication Mode.

To Charge

Plug the provided USB-C cord into Cooper.
A sound effect will play when the robot is fully charged. The eyes will light red when the robot needs to recharge.



Lithium Ion Battery Information

• Do NOT charge at or below freezing (32°F/0°C). • Do not allow charger or battery pack to overheat. If they seem warm, allow to cool down. Charge only at room temperature.• Battery pack should not be disassembled, crushed, punctured, opened or otherwise mutilated.

CONTAINS LITHIUM ION BATTERY PACK. BATTERIES MUST BE RECYCLED

• Retain these instructions for future reference. • For household use under adult supervision.

• Keep cord away from children. • Only use with a reliable and proper charging source.

• Turn off or unplug when not in use. • Do not attempt to disassemble or modify this product, or remove the battery as it could void the user’s ability to operate the product properly.

• Do not crush this product by dropping, hammering, or stepping on it. If product shows signs of breakage, dispose of properly. • Do not expose to high temperatures or place near a heat source. Do not place in direct sunlight for any length of time. When not in use, store at room temperature. • Do not dispose product in fire. • If the product is working erratically, or the time between charges is shortened, the battery could be nearing the end of its life. The battery life may vary depending on storage, operating conditions, and environment. • Examine the charging cord periodically for conditions that may results in the risk of fire, electric shock or injury. If the cord is damaged, the cord should not be used until properly repaired or replaced. • Wipe product with a damp cloth to clean. • Do not submerge in water. • Keep the supply terminals clean and do not short circuit. • Ensure that USB is plugged in properly and into appropriate charging ports.

Product Disposal: This product contains a 500mAH Lithium Ion rechargeable battery non-replaceable. Discarding batteries in your general household waste can be harmful to the environment. When disposing of the product, follow appropriate local guidelines and regulations. For further information, contact your local solid waste authority.

READ INFORMATION REGARDING FCC:

Changes or modifications not expressly approved by Learning Resources® could void the user’s authority to operate this device.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This toy is only to be connected to equipment bearing either of the following symbols:

COOPER'S FUNCTIONS & SENSORS

MATERIALS NEEDED

- Cooper Robot
- Grid
- Coding Cards
- Activity Recording Sheet (optional)

40 minutes

Objective

Learn functions and sensors.

Scenario

Think about when you push buttons on an elevator. Each button has an action: doors close, the car moves up and down, and so on.

Challenge

How can we determine the functions of different buttons?

Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate the setup on right; have the coding cards nearby.
3. ASK: "What do you observe? What do you infer this block of code means?"

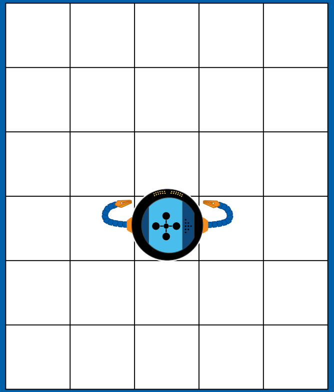
Try it!

Record your observations. Ask: "How did your observations support your inference?" Use the activity recording sheet to record the function of each sensor. Look at the sensor buttons on the back of Cooper. Ask for each sensor: "What do you observe? What do you infer this button means? What action do you expect to happen?"

Conclusion

Label the functions and the coding cards. Ask: "How did your observations help determine the function of the buttons on the robot? How do the coding cards relate to the buttons on the robot? What do you want to try with the robot? What questions do you have?"

Setup:



Personalize Learning: Create your own programs by putting code blocks together.

Discuss: How can you determine the distance of each movement? Why would that be important in writing a program?

AUTONOMOUS CARS

MATERIALS NEEDED

- Team of Cooper Robots (or individual)
- Coding Cards
- Activity Recording Sheet (optional)

40-60 minutes

Objective

Determine the functionality of the line detection sensor.

Scenario

Autonomous cars are vehicles that can travel without a driver, making the car a robot. These cars were first used as self-driving taxis in areas that did not have drivers.

Challenge

Design a program to allow Cooper to "drive" along a road.

Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate road conditions by drawing a black line map for cooper to follow.
3. ASK: "What functions of the Cooper robot would be most helpful in the creation of an autonomous car? What programming considerations must your team make to allow Cooper to drive safely on a road?"

Try it!

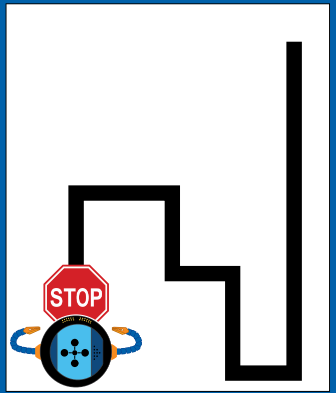
Place a Cooper at the stop sign on the road. Determine what sensor or ability Cooper will need to complete the task. Write a program to move Cooper to the end of the road. Record observational data. Draw a picture of the movement of Cooper. Ask: "What was the most efficient program to move Cooper?" Create a new road and run your program. What needs to change in your program for the new road?

Conclusion

Ask: "What would you change about the program? If you did use the sensor, what do you think would happen if you tried another color road?"

Scan here for additional resources, or visit Learningresources.com/cooper.

Setup:



Personalize Learning: Create your own testing procedures and determine what makes a solution efficient.

Real-World Connections: Find videos and images of autonomous cars.

Discuss: How is this model of Cooper's movement like the autonomous cars?

COOPER'S MEASUREMENTS

MATERIALS NEEDED
- Cooper Robot
- Ruler, tape measure, nonstandard measurement
- Painter's tape (start line)
- Activity Recording Sheet (optional)

40-60 minutes

Objective
Determine the distance of one movement for Cooper and use these measurements to move Cooper through a maze.

Scenario
When writing an algorithm or program, you will need to know how far Cooper moves with each code block.

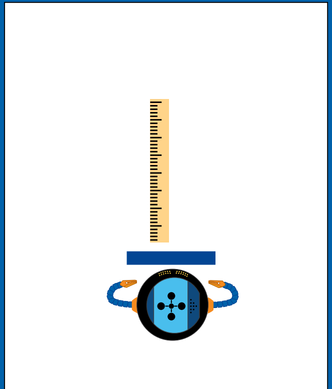
Challenge
Write a program to test the distance of each of Cooper's movements.

Plan
1. RECORD: Write the problem in your own words or draw pictures.
2. DISCUSS: Replicate the setup using a ruler or tape measure and painter's tape. Discuss the testing procedures and measurement procedures.
3. ASK: "Is there only one right solution? What do you need to consider to ensure accurate measurements?"
4. THINK: Determine what sensor or ability Cooper needs to complete the task. Write an algorithm or program to test the distance of each movement.

Try it!
Write your program. Place Cooper at the starting line. Enter your program and press GO. Record your observations. Repeat the procedure with each of Cooper's directional movements.

Conclusion
Ask: "How does knowing the distance of each movement help you write programs or algorithms?"

Setup:



Personalize Learning: Create a maze for other engineers. Program using only the measurement tools.

Discuss: How is this an effective practice for programming?

Scan here for additional resources, or visit Learningresources.com/cooper.

SIMON SAYS

MATERIALS NEEDED
- Team of Cooper Robots (or individual)
- Coding Cards
- Activity Recording Sheet (optional)

40-60 minutes

Objective
Interpret algorithms and pseudocode to replicate Cooper's action.

Scenario
"Simon Says" is a game in which players must obey the leader's (Simon's) directions. Sometimes the leader may speak in codes that must be interpreted. This game of Simon Says will be a game of communicating algorithms through pseudocode. Can you replicate the program?

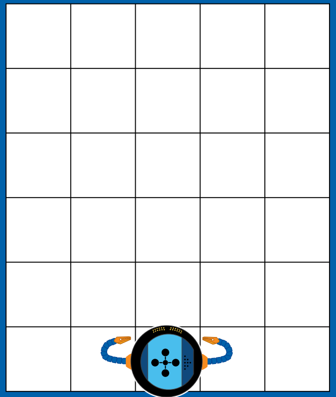
Challenge
Use the verbal pseudocode to program Cooper with the correct algorithm.

Plan
Simon (or a player that is providing the pseudocode) will pull a coding card from the stack. The player will read the program in human language (the pseudocode). Players will code their Cooper robot to match the program on the cards.

Try it!
Draw or write down the code you hear. Predict where on the mat Cooper will land. Program the Cooper(s) and press GO. Make observations. Do the codes match? What successes can you celebrate? Where is there an opportunity to grow or make changes? Continue the game using different "callers" reading the code and different programmers.

Conclusion
Ask: "How did you determine the order of the code blocks? Did your picture match your observations? What challenges did you face? What programs or capabilities does the Cooper robot have to support the replication of a program?"

Setup:



Personalize Learning: Create your own cards and share them as the caller.

Real-World Connections: Computers only do what a programmer "tells" them to do. How can robots or computers make errors then?

Discuss: How is this a simulation for a computer and a programmer? What intelligence does a robot have without the programmer? What common language can we add so that the caller is consistent?

Scan here for additional resources, or visit Learningresources.com/cooper.

TRACTOR PULL

MATERIALS NEEDED

- Cooper Robot
- Assorted recycled materials
- Mat, painter's tape
- Mass weights to represent the hay
- Activity Recording Sheet (optional)

40-60 minutes

Objective

Design the best solution for pulling the greatest mass of "hay."

Scenario

Tractors are used on farms to move heavy materials. Tractors must pull hay from one field to another.

Challenge

Design a solution that allows Cooper to be the tractor and pull the most hay from the field to the barn.

Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate the setup of the field. Cooper will have to pull the hay represented by different masses.
3. ASK: "What considerations must you make in your design solution and your program to be successful?" Use assorted recycled materials. Draw a brainstorm blueprint.
4. THINK: Determine what sensor or ability Cooper will need to complete the task. Write a program to move the robot to pull the greatest mass of hay.

Try it!

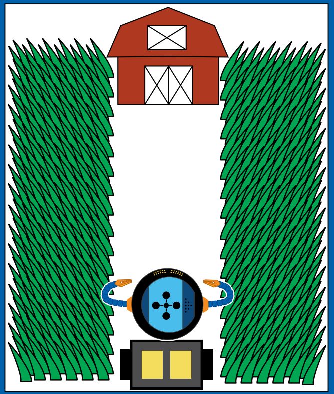
Construct your solution to pull the hay. Place the modified Cooper with mass on it at the hay field. Determine how Cooper will use the design solution and program to move from the hay field to the barn. Press GO and record observations and mass. Repeat the trials with increased amounts of mass. Ask: "Did the programming need to change with increased amounts of hay (mass)? What considerations must you make? What do you observe as you increase the mass?"

Conclusion

Ask: "How would you change the design solution? What considerations did you need to make in your design solution? Would that change your program? How did the increased mass change your program or design?"

Scan here for additional resources, or visit Learningresources.com/cooper.

Setup:



Personalize Learning: Create your own testing procedures. Determine what makes a design solution the "best."

Real-world connections: Find videos and images of tractors pulling hay.

Discuss: How would the movement change on the grass field?

AVOIDING OBSTACLES

MATERIALS NEEDED

- Cooper Robot
- Grid/poster board
- Assorted blocks or obstacles
- Activity Recording Sheet (optional)

40-60 minutes

Objective

Write algorithms to move Cooper through a path and around obstacles.

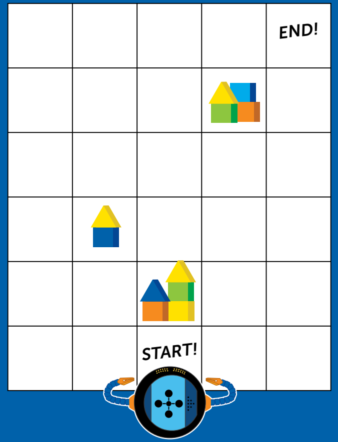
Scenario

The GPS app on a phone helps you navigate from one place to another. It gives you directions to avoid obstacles to help you reach your destination.

Challenge

Write an algorithm to get from one location to another by avoiding obstacles in the path.

Setup:



Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Create an obstacle course (shown on right) on a gridded mat.
3. ASK: "Is there only one correct solution? What should you consider to avoid obstacles?"
4. THINK: Decide what sensor or ability Cooper needs to complete the task. Then, write an algorithm to move Cooper through the path.

Try it!

Place Cooper on Start, press GO, and record observations. Repeat the path; debug if necessary. Ask, "How would the program change if we moved the obstacles?"

Conclusion

Ask: "What programming challenges did you encounter? Could you make the program more efficient?"

Personalize Learning: Physically "walk the code" and lay out the coding cards to match the program.

Real-World Connections: Investigate pictures of GPS maps and examples of where traffic has been rerouted due to obstacles.

Discuss: How does GPS program the most efficient route?

ROBOT VACUUM

Objective
Design a program for a robotic vacuum using the object detection sensor.

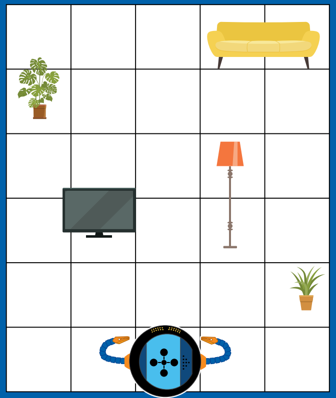
Scenario
Robots have been designed to help with chores. Engineers have built robotic vacuums to help keep houses clean.

Challenge
Design a program so that Cooper models a robotic vacuum. Cooper needs to move throughout the house without knocking down furniture.

MATERIALS NEEDED
- Cooper Robots
- Map of the house
- Items to represent furniture
- Activity Recording Sheet (optional)

40 minutes

Setup:



Plan
1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate the design of a room in your house. Use blocks or other items to represent furniture that Cooper must detect.
3. ASK: "How can you write a program or algorithm to ensure that Cooper moves throughout the room without knocking down furniture?"
4. THINK: Are there any functions or sensors that will support the development of your program?

Try it!
Program Cooper and start at the door of the room. Ask, "Was your program accurate? What needs to change for the next attempt? How would the programming change or use of sensors change if there was more than one Cooper in the room? What considerations must you make?"

Conclusion
How could you change the programming? How does the use of a sensor help this robot?

Personalize Learning: Create your own testing procedures and determine what makes a solution efficient. Compare data with other attempts. Try to create another room in your home. Test the program.

Real-World Connections: Find videos and images of a robot vacuum or lawn mower. Discuss the movement of the robot. What does it do when it encounters an object?

Discuss: How is the Cooper model similar to the use of the robotic vacuums and lawn mowers?

Scan here for additional resources, or visit Learningresources.com/cooper.

CAVE EXPLORATION

Objective
Design a program for the robot to explore caves and make observations about how light behaves in a dark location.

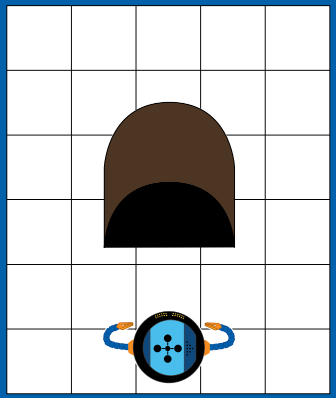
Scenario
Robots have been designed to explore locations that humans do not or can not travel to, such as caves.

MATERIALS NEEDED
- Cooper Robot
- Grid/poster board with "caves" made from books, cardboard, etc.
- Assorted recycled materials
- Activity Recording Sheet (optional)

40 minutes

Challenge
Design a program so that Cooper travels through dark caves. What do you notice about Cooper's eyes? How does the light sensor help Cooper in dark locations?

Setup:



Plan
1. RECORD: Write the problem in your own words or draw pictures.
2. Create caves (shown at right) using books, cardboard, and other materials on a gridded mat.
3. ASK: "How can you write a program or algorithm to ensure that Cooper moves through the dark cave successfully? Are there any functions or sensors that will support the development of your program?"
4. THINK: Decide what sensor or ability Cooper needs to complete the task. Then, write an algorithm to move Cooper through the cave.

Try it!
Enter your program into Cooper. Start Cooper at one side of the grid. Record observational data. Draw a picture of the movement and record observations of Cooper's eyes. Ask: "How would the programming or use of sensors change if there was more than one Cooper? What considerations must you make? How would the use of the sensors change or the program change if there were additional caves to explore?"

Redesign the grid with additional caves. Rewrite the program so that Cooper uses the light sensor in each cave exploration.

Conclusion
Ask: "How could you change the programming? How does the use of a sensor help this robot?"

Personalize Learning: Create their own testing procedures. Determine what makes a solution efficient. Create caves and new programs to show the light sensor.

Real-World Connections: When and why are light sensors used in the real world? Many bathrooms and classrooms have motion lights.

DOT to DOT: MAKING SHAPES

Objective

Design a program to make different shapes using repeated codes (loops) and sequences.

Scenario

Shapes are made from a series of lines and dots. Programmers use repeated commands or codes to create shapes.

Challenge

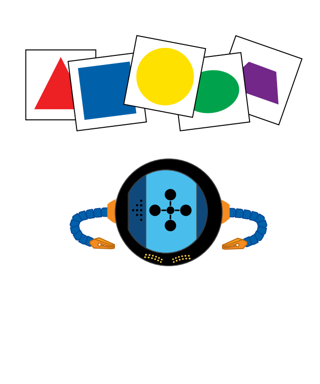
Design a program so that Cooper can travel or create different shapes. Use repeated coding blocks to create loops and sequences.

MATERIALS NEEDED

- Cooper Robot
- Poster board or grid
- Shape cards
- Cooper Coding Cards
- Activity Recording Sheet (optional)

40 minutes

Setup:



Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate the setup on right using the shape cards and poster board.
3. ASK: "How can you write a program or algorithm to show repeated movement blocks? What does it mean to loop or create a sequence? Are there any functions or sensors that will support the development of your program?"
4. THINK: Determine what sequences or loops Cooper will need to complete the task. Write an algorithm or program to allow the robots to make different shapes.

Try it!

Select a shape card. Program Cooper according to the shape selected. Execute the program. Record observational data. Draw a picture of the program and the shape created. Ask: "How would the programming or use of sensors change if more than one Cooper had to create the shape? What considerations must you make? Where does your program demonstrate a loop? What would happen if you continued to press GO?"

Conclusion

Ask: "How could you change the programming? How does the use of a sensor help this robot? If you change the size of the shape, how would the program change?"

Personalize Learning: Create your own testing procedures. Determine what makes a solution efficient. Create your own shape cards or create different-size shapes. Engineer a solution so that Cooper holds a writing utensil and draws a shape.

OVER/UNDER/ AROUND/THROUGH

Objective

Design a mat to show positional words (over, under, around and through) and create programs to move Cooper and demonstrate understanding of vocabulary.

Scenario

Squirrels survive in the wild. They must be able to move quickly through obstacles, going over, under, around and through different parts of their environment.

MATERIALS NEEDED

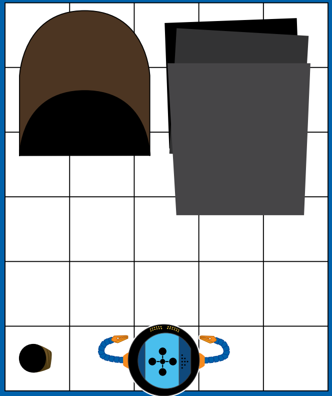
- Cooper Robot
- Code Mat
- Coding Cards
- Assorted recycled materials
- Activity Recording Sheet (optional)

40-60 minutes

Challenge

Create a mat to allow Cooper to go over, under, around and through objects. Write a program that also uses sensors to show Cooper's movement through the environment.

Setup:



Plan

1. RECORD: Write the problem in your own words or draw pictures.
2. Replicate the setup on the right.
3. ASK: "Is there only one right solution? What do you need to consider to build a model of the environment?"
4. THINK: Determine what sensor or ability Cooper will need to complete the task. Write a program to move Cooper through the environment. Use recycled material to create the environment.

Try it!

Write your program. Place Cooper at the starting position. Press GO and record your observations. Repeat the trial by debugging the program. Ask: "What did you notice? How can the use of sensors help complete this task? What sensors or functions would be most helpful?"

Conclusion

Ask: "What challenges did you encounter having to program before you pressed GO? Could you make the program more efficient? How can you program two robots to go through the environment?"

Personalize Learning: Physically "walk the code." Lay out the coding cards to support their program.

Real-World Connections: Look at images of the squirrel Olympics.