

Your Guide to Getting Started with STEM, Robotics, and Coding

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TEACHERS

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Supply Ideas We Love for Play, Inspiration, and Innovation

Design Thinking Station

Who doesn't love solving a design problem creatively? Young creators and makers love to see their ideas become a reality. Get a basic maker foundation going! Engage their minds in design, coding, and robotics with hardware store faves (and odd kitchen drawer finds). This is a GREAT area to enlist the help of student families for donation and support! Here are some basic ideas:

- ✓ Nuts and bolts (literally)
- ✓ Painter's tape
- ✓ Big red Solo cups
- ✓ Rubber bands
- ✓ Paper clips
- ✓ Locks and keys
- ✓ Corks (wine bottle or board, both full of possibility!)
- ✓ Cardboard boxes and tubes (watch this video for the ultimate use of cardboard:
<https://www.youtube.com/watch?v=falFNkdq96U>)
- ✓ Old cords (phone, cable)
- ✓ Magnets
- ✓ Aluminum products, like paper and pans
- ✓ Plastic bottles, lids
- ✓ Wire
- ✓ Old CDs and DVDs
- ✓ Popsicle sticks, pipe cleaners
- ✓ Googly eyes, pom-poms, glitter (how could we forget?)
- ✓ ... and SO MUCH MORE! Your Design Thinking Station should be open to materials, endless ideas, and imagination!
- ✓ [Go here](#) for more ideas on setting up a robotics station.

Supply Ideas We Love for Play, Inspiration, and Innovation

Coding and Robot-Ready Wish List

Ready for the next chapter in creating thinkers and innovators? The world of coding and robotics may be new or recent to your teaching résumé, but it doesn't have to be daunting. Start here to get things moving right along.

- ✓ ***Web-based or app code-learning tools:** [Code.org](#) curates free resources for games and lessons.
- ✓ ***Block-based programming tools:** [Scratch by MIT](#), the original block-based coding tool for kids; [Blockly for Dash and Dot](#), which controls robots by Wonder Workshop; and [Kodable](#), which makes coding concepts approachable for kids as young as 5. All offer free and paid resources to suit your learning needs.
- ✓ ***Text-based programs for coding:** Free sites, like [Code Monkey](#), [Codesters](#), and the free app [Grasshopper: Learn to Code](#) deepen students' understanding of the fundamental principles of computer science and allow them to create, tweak, and experiment with coding.
- ✓ ***Grade-based curriculum:** Whether you're learning to code (K–5) or diving in deeper with robotic concepts (6–8), check out [Wonder Workshop's comprehensive lessons and resources](#). No coding experience required (student OR teacher)!
- ✓ ***Kid-friendly robots:** Robots like Dash, Dot, and Cue from Wonder Workshop are fun and are great teachers for quick lessons on cause and effect and basic coding.

Ideas for Expectation Setting and Goals

There's a lot that will be thrown at you along your STEM teaching journey, but nothing you can't handle—we promise. You got this!

- ✓ Start by collaborating on a Classroom Expectations Poster. Set reasonable, realistic expectations for collaboration, design, and building. Road maps are great, but you'll need flexibility at times.
- ✓ Set ground rules for handling the materials. Care and maintenance are key whether you're storing nuts & bolts or robots. Create a charging station for your robots and make sure kids know to carry them with two hands, for example.
- ✓ Learn the Design Thinking Process and integrate the steps into the projects you assign. Create a rubric for projects that evaluate students on how they proceed through all of the steps rather than only evaluating them on the final outcome. [Here's a crash course in Design Thinking from Stanford University.](#)
- ✓ Teach the 4Cs: critical thinking, communication, collaboration, and creativity. These go hand in hand. Consider them your building blocks for successful STEM instruction—and for what your students will learn along the way!
- ✓ Find balance between teamwork and independent work. Take time to assess who works well together and what parts of a project require a group effort. Determine which elements of projects make the most sense for independent work, too. Leave time for trial and error.
- ✓ Keep an open mind. A positive attitude is key to a successful coding and robotics teaching unit. Lessons from failure are invaluable! Always consider the long game.
- ✓ Teach safety precautions. Ensure your students understand the power of tools and materials—not just what awesome things they can do, but how to use them safely and respectfully.
- ✓ Find a teacher friend willing to go on this journey with you. Not required, but it will increase the fun!
- ✓ Teach yourself at the same time as your students. Push yourself with self-paced online learning tools, like Code.org, [Teach Wonder](#), or Skillcrush.
- ✓ Seek out inspiration. There are plenty of STEM teacher bloggers! Search, follow, subscribe, learn.

Free Activities

Up for a Challenge?

Grades 2-5

Robot Race!

MATERIALS:

- Dash robot
- Blockly app
- Painter's tape
- Dash Challenge Card (see Challenge Card below)



STEPS:

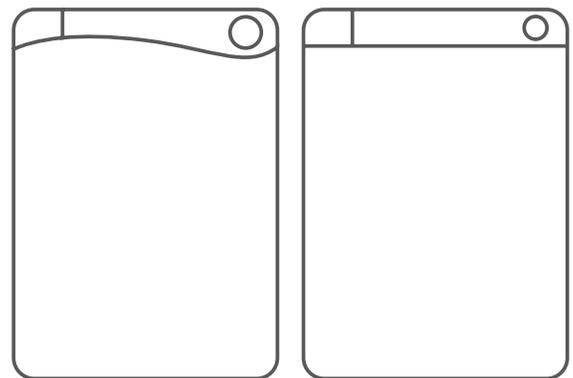
1. Use the "On Your Mark" Dash Challenge Card to create a sequence of commands for Dash.
2. Use painter's tape to create a starting line and a finish line for Dash.
3. Open Blockly on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and create a new program.
4. Follow the instructions on the Challenge Card by dragging the block commands onto your screen. Connect them in order below the START block.
5. Press the green PLAY button to test your program.

Grades 6-8

What Can You Do with Cue?

MATERIALS:

- Cue robot
- Cue app
- Painter's tape
- Blank Challenge Card (see Challenge Card below)



STEPS:

1. Take a look at the "On Your Mark" Dash Challenge Card.
2. Create your own Challenge Card outlining a similar robot race using events for Cue. Some ideas may include using a "hear voice" command to start the race.
3. On the front side, add an image with a title and problem statement. On the back, outline your challenge in simple steps.
4. Open the Cue app on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and test your challenge.
5. Share away!

Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter @WonderWorkshop with the hashtag #FunWithWonder.

Challenge Cards

3.1 | Events 



On Your Mark!

Dash wants to race with friends!
Dash is waiting for the race to start.



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3.1 | Events 

1. Have Dash **wait** until you press the **Top Button** to begin racing.

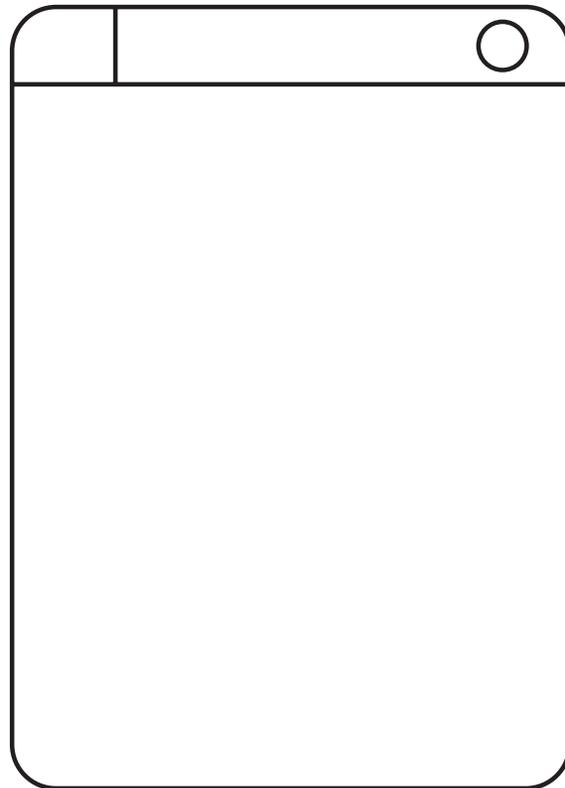

2. Now let's get this race started! Start Dash's **car engine**.


3. Now Dash can start racing! Have Dash **drive forward 70 cm**.



★ **Challenge** Make Dash go faster! How fast can Dash go?





Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter [@WonderWorkshop](#) with the hashtag [#FunWithWonder](#).

Now Let's Get Creative!

Use your coding skills to create a bowling game for Dash or Cue!
Pretend that Dash or Cue is a bowling ball, and program it to knock down a set of pins.
Consider how you might put a spin on the bowling pins. How might you decorate them to be ice cream cones or giraffes?



MATERIALS:

- Dash or Cue robot
- Path, Blockly, Wonder or Cue app
- Bulldozer Accessory (optional)
- Toy bowling pins, or you can substitute empty water bottles or cardboard paper towel rolls
- Painter's tape
- Supplies to decorate pins: scrapbook paper, craft paints, washi tape, scissors, and/or double-sided tape

STEPS:

1. Designate a bowling lane somewhere in your house, and mark the "starting line" with the painter's tape.
2. Set up pins in a triangular pattern (or any pattern you would like) about 8-10 feet from the starting line.
3. Program Dash using Path, Blockly, Wonder, or the Cue app using Cue to bowl a strike, by creating a sequence of commands that will send the robot down the lane to knock the pins down in one fell swoop.
4. Use a clap, voice command, or other event to run your program.
5. Test your program as many times as you want! There are 10 frames in bowling, but who's counting?
6. Record and share your robot victory once you have written a "striking" program.

LEVEL UP!

Start Dash or Cue off to the side, not directly in front of the pins, or backwards, not facing the pins, to practice turns and angles. Or try adding more pins! You also can spread out the pins to increase the difficulty. Definitely choreograph a robot victory dance after you have made a strike!

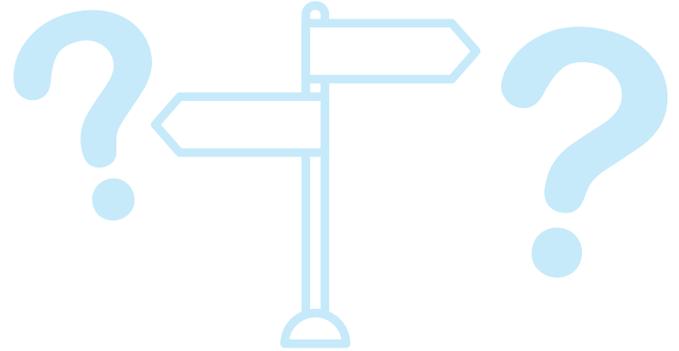
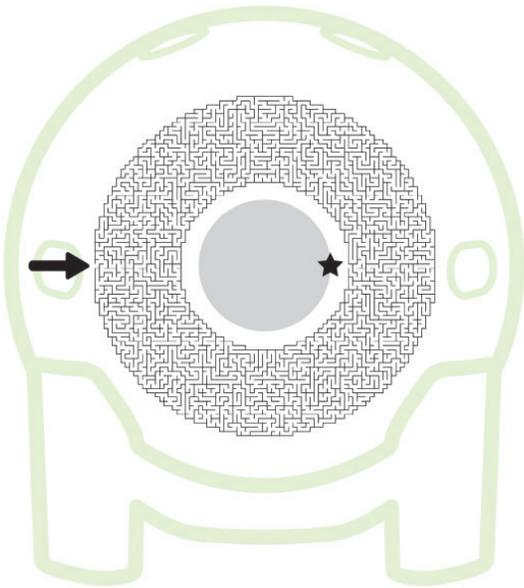
Record your robot bowling a strike and share your video with us on Twitter [@WonderWorkshop](#) with the hashtag [#FunWithWonder](#).

Vocabulary

Event: An action that causes something to happen.

Time to Go Offline!

Want to unplug for a while? Dot wants in on the fun! Put your problem-solving skills to the test with this (eye)ball of a maze on **page 5**:

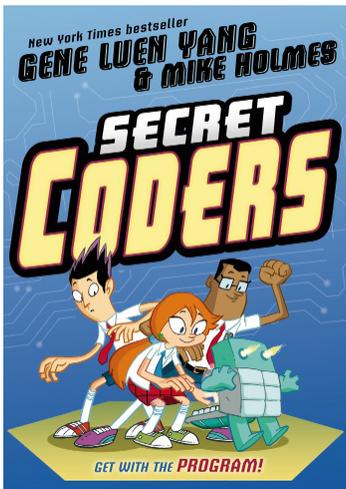


Can you “see” a way to the finish?

Use the activity sheets on pages 5 and 6.
Remember to fail forward and don't give up!

When you are done, try creating your own maze on **page 6**. How difficult will you make it? Will you begin from the start or work backwards from the finish?

READING:



Take a look at our blog's STEAM Reading List. We've just added chapter books to the current list of picture books for older readers. How many books have you read that have to do with coding or robotics? <http://bit.ly/STEAMreading>

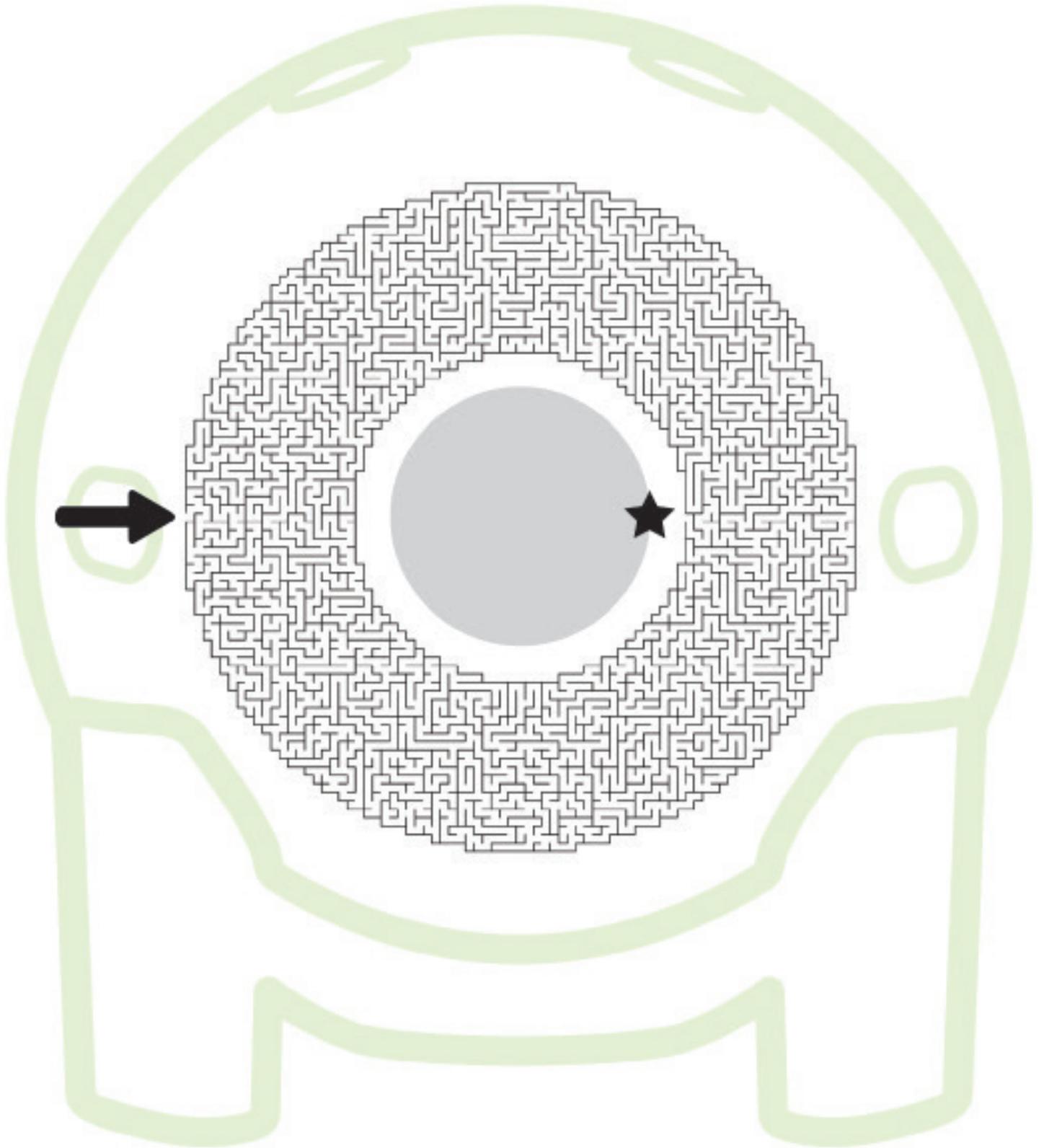
COLOR IN OUR ROBOT'S EYE TO SHOW HOW MANY BOOKS YOU'VE READ SO FAR:



FUN FACT:

The first humanoid robot debuted in 1939. Elektro, built by Westinghouse, was 7 feet tall and could 'speak' 700 words.

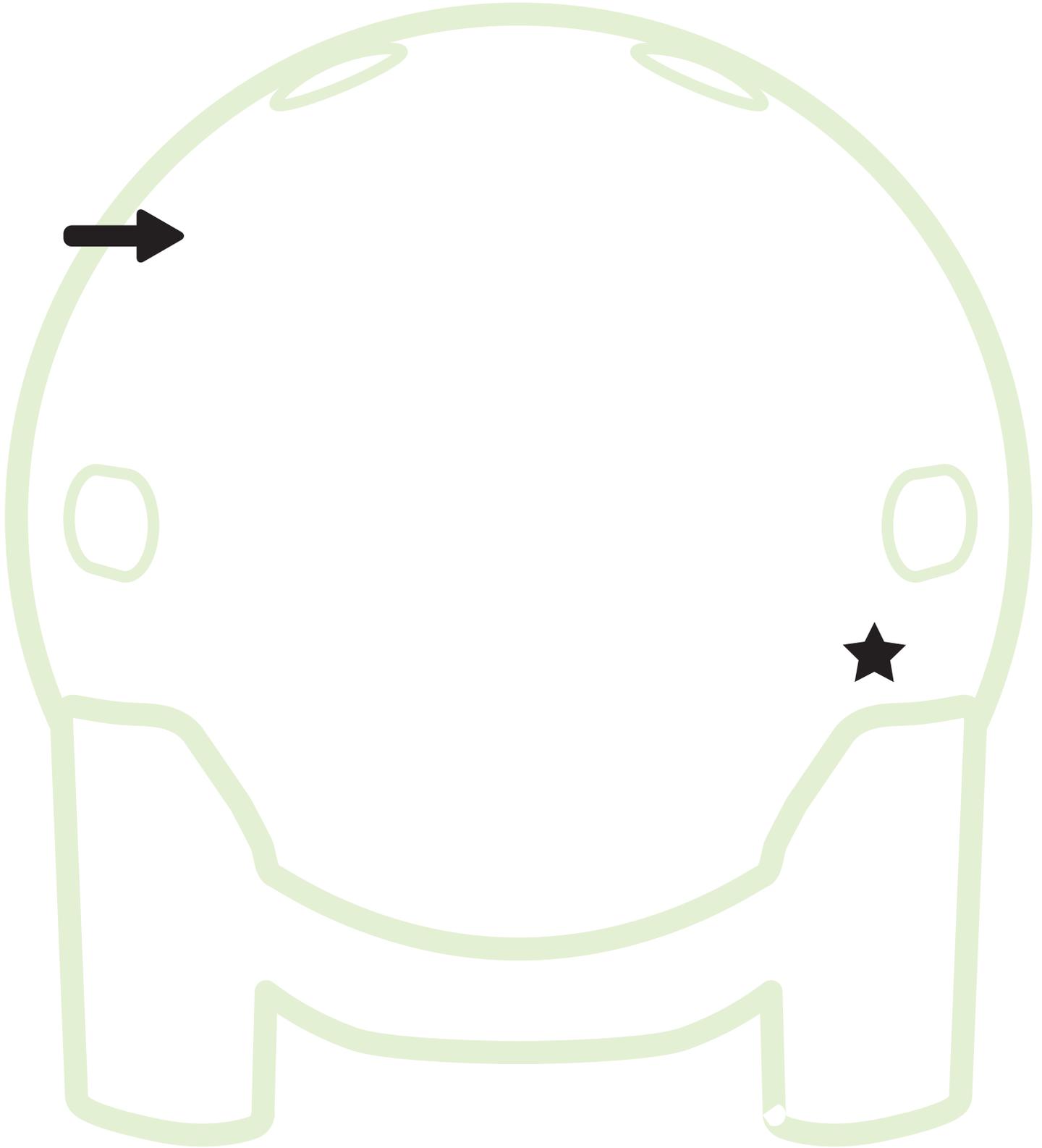
Dot is a-maze-ing!



DON'T FORGET TO SHARE!

Share a photo of your maze with us on Twitter [@WonderWorkshop](#)
with the hashtag [#FunWithWonder](#).

Design Your Own Maze!



DON'T FORGET TO SHARE!

Share a photo of your custom designed maze with us on Twitter [@WonderWorkshop](https://twitter.com/WonderWorkshop) with the hashtag [#FunWithWonder](https://twitter.com/hashtag/FunWithWonder).

Free Activities

Up for a Challenge?

Grades 2-5

Grades 6-8

Follow the Leader!



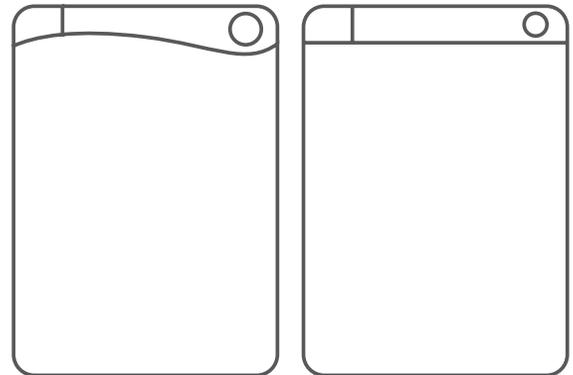
MATERIALS:

- Dash robot
- Blockly app
- Dash Challenge Card (p. 2)

STEPS:

1. Use the "Follow the Leader" Dash Challenge Card to create a sequence of commands for Dash.
2. Open Blockly on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and create a new program.
3. Follow the instructions on the Challenge Card by dragging the block commands onto your screen. Connect them in order below the START block.
4. Press the green PLAY button to test your program.

What Can You Do with Cue?



MATERIALS:

- Cue robot
- Cue app
- Painter's tape
- Blank Challenge Card (p. 2)

STEPS:

1. Take a look at the "Follow the Leader" Dash Challenge Card.
2. Create your own Challenge Card outlining a similar robot activity using conditionals for Cue.
3. On the front side, add an image with a title and problem statement. On the back, outline your challenge in simple steps.
4. Open the Cue app on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and test your challenge.
5. Share away!

Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter @WonderWorkshop with the hashtag #FunWithWonder.

Challenge Cards

4.4 | Conditionals 



Follow the Leader

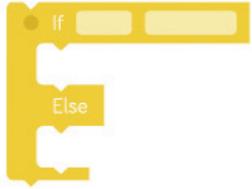
Dash wants to play Follow the Leader.
Lead the way, Dash!



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4.4 | Conditionals 

1. Dash wants you to follow! Add an **If/Else** block.



2. If Dash senses you are following, Dash will **drive 50 cm forward** really fast.

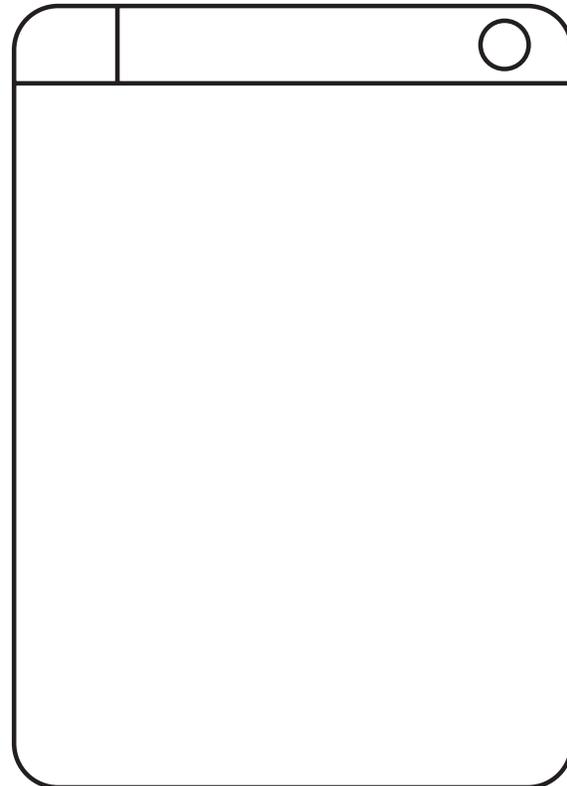
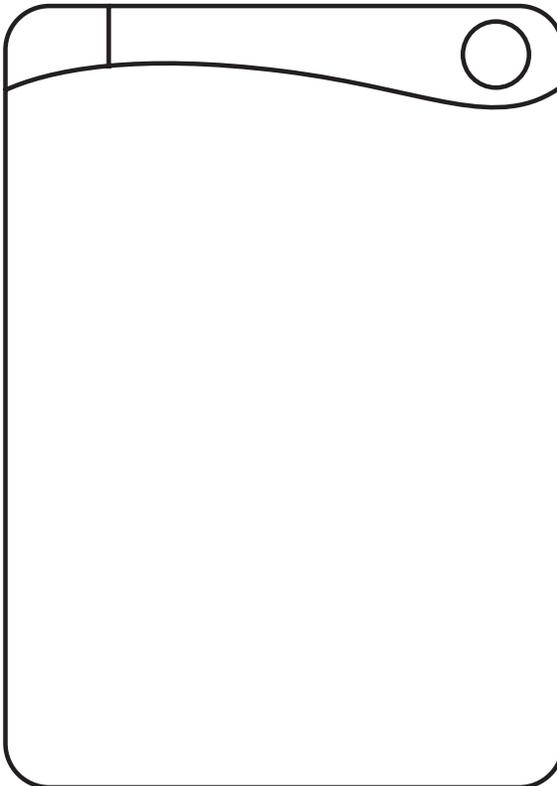


3. If Dash **does not** sense you following, Dash will **wait** until you get closer.



4. Put your entire program in a **Repeat Forever** block.

 Have Dash make **turns** and **spins** for you to follow.



Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter [@WonderWorkshop](#) with the hashtag [#FunWithWonder](#).

Now Let's Get Creative!

Use your coding skills to create a fashion show for Dash or Cue!

Dress up Dash or Cue in the finest robot fashions and program a runway walk. Use craft materials or LEGOs to outfit your robot. Then use the Path, Blockly, Wonder, or Cue app to program Dash or Cue to move down the runway and back. Be sure to add a little style and attitude to your model's walk!

STEPS:

1. Create a "runway stage" with painter's tape or blocks.
2. Create costumes for Dash or Cue using a variety of craft materials.
3. Program your Dash or Cue using Path, Blockly, Wonder, or the Cue app to show off their costume with a creative runway walk.
4. Make sure to add lots of turns, and maybe even a little dance animation or two. Want more flair? Add some lights and sound! Show off your robot's personality.
5. Use a clap, voice command, or other event to run your program.
6. Don't forget about Dot! Dot would make the perfect fashion show host! You can program Dot to do a light show, cheer, or announce the next robot model to take a roll down the runway.



MATERIALS:

- Dash or Cue robot (Dot robot optional)
- Path, Blockly, Wonder, or Cue app
- Crafting materials: fabric scraps, construction/scrapbook paper, pipe cleaners, pom poms, stickers, etc.
- Scissors, (double-sided) tape and/or stapler
- Building Brick Connectors and LEGOs
- Painter's tape or cardboard/wooden blocks to outline the runway

LEVEL UP!

Create a uniquely shaped runway, maybe in the shape of a "T," a "U," or a "+" sign. Use blocks or small cardboard boxes to "fence in" the runway. Use the "IF" programming blocks (you may need more than one) to program your robot to sense the runway's end and then keep turning until it has a clear runway path again.

Record your robot making its fashion show debut and share your video with us on Twitter [@WonderWorkshop](#) with the hashtag [#FunWithWonder](#).

Vocabulary

Conditionals: Statements that only run under certain conditions.

Time to Go Offline!

Want to unplug for a while? Dash and Cue are ready to strut their stuff on the runway! Put on your creative cap to design some show-stopping outfits for Dash or Cue. Design six different outfits for your robot. Need some inspiration?



Imagine Dash is going to an event on the moon; what should Dash wear? Or a ride into the Wild West? No problem! You can design the perfect adventure ensemble. And don't forget the accessories! Robots love hats and bags! Use markers, crayons, or colored pencils to design outfits for Dash and a collection for Cue, found on **page 5**.



READING:



Take a look at our blog's STEAM Reading List. How many books have you read that have to do with coding or robotics?

<http://bit.ly/STEAMreading>

COLOR IN OUR ROBOT'S EYE TO SHOW HOW MANY BOOKS YOU'VE READ SO FAR:

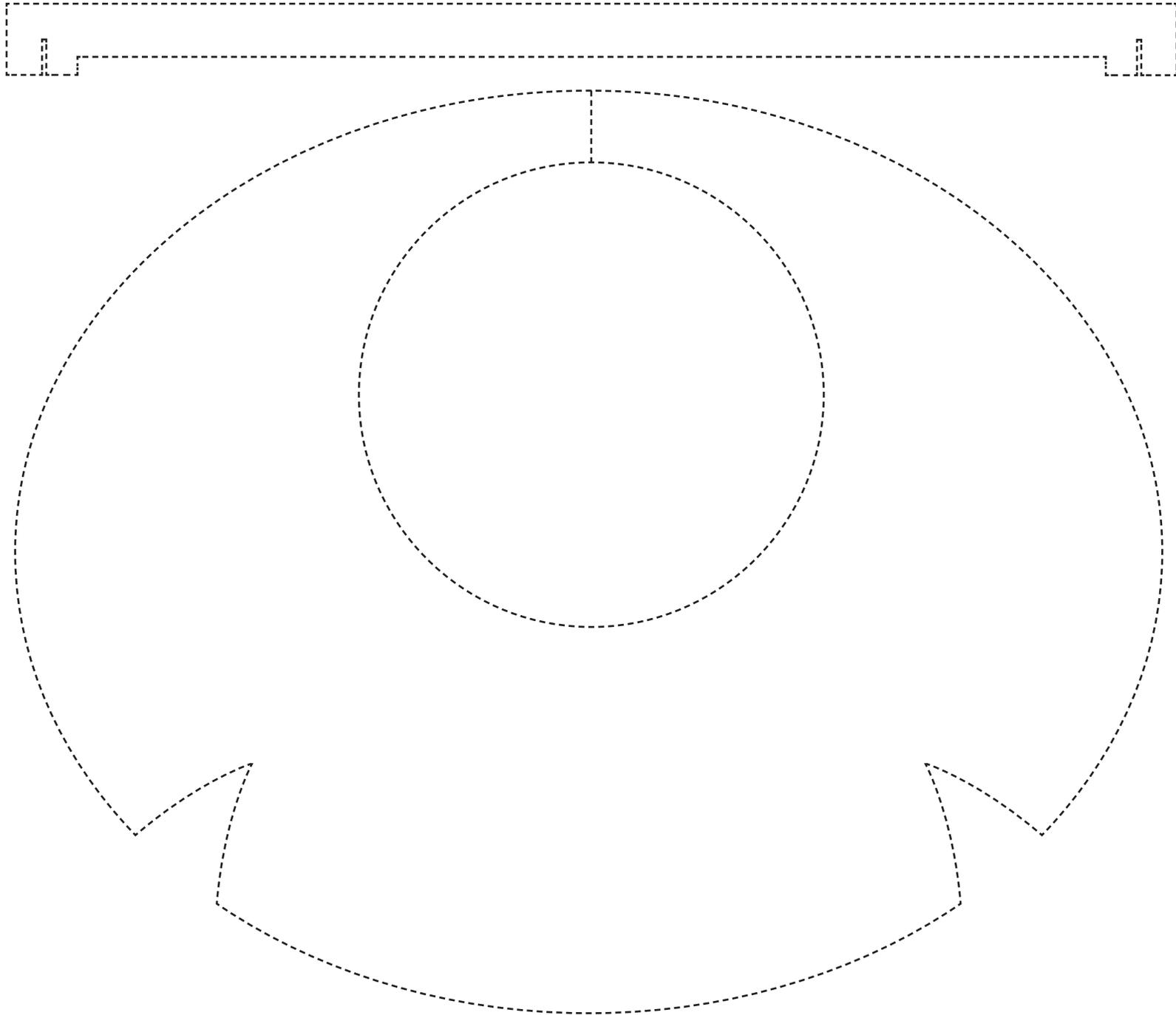
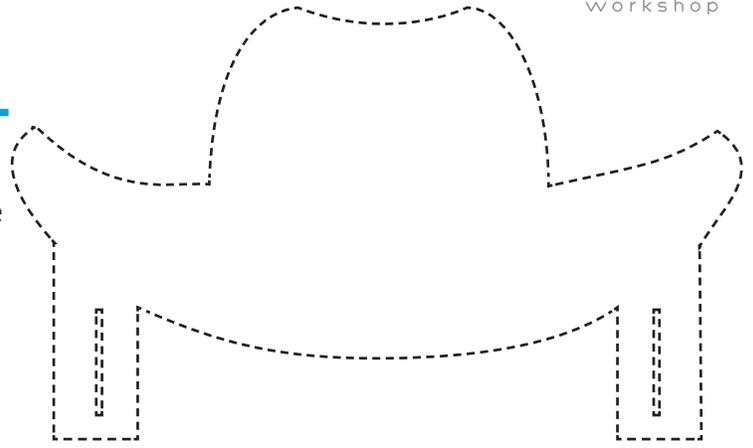


FUN FACT:

The size of the smallest robot is less than 1/1000th part of a millimeter. It is called nanobot.

Design Time!

Use the following templates to create a new look for Dash or Cue. Feel free to make multiple copies of these blank outlines to design even more. Use markers, crayons, or colored pencils to create your designs, and then cut out the outfits and use tape or a stapler to attach the outfits to your robots.

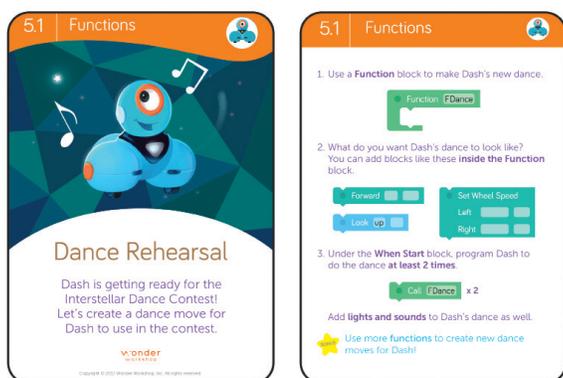


Free Activities

Up for a Challenge?

Grades 2-5

Follow the Leader!



MATERIALS:

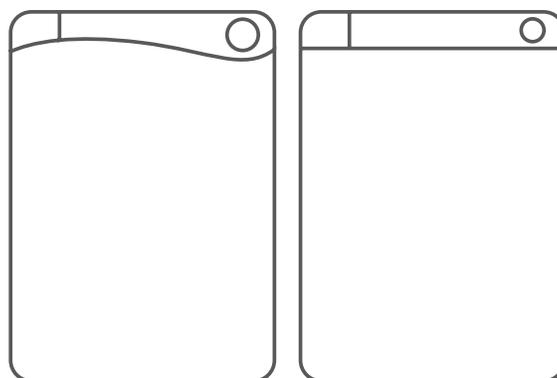
- Dash robot
- Blockly app
- Background Music
- Dash Challenge Card (p. 2)

STEPS:

1. Use the "Dance Rehearsal" Dash Challenge Card to create a sequence of commands for Dash.
2. Open Blockly on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and create a new program.
3. Follow the instructions on the Challenge Card by dragging the block commands onto your screen. Connect them in order below the START block.
4. Be creative when choreographing Dash's dance moves. Don't be afraid to use trial and error until it looks just right.
5. Press the green PLAY button to test your program.

Grades 6-8

What Can You Do with Cue?



MATERIALS:

- Cue robot
- Cue app
- Background music
- Blank Challenge Card (p. 2)

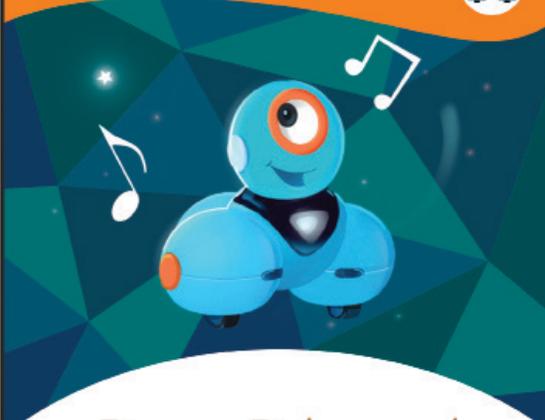
STEPS:

1. Take a look at the "Dance Rehearsal" Dash Challenge Card.
2. Create your own Challenge Card outlining a similar robot dance using functions for Cue.
3. On the front side, add an image with a title and problem statement. On the back, outline your challenge in simple steps.
4. Open the Cue app on your [compatible device](http://www.makewonder.com/compatibility) (www.makewonder.com/compatibility) and test your challenge.
5. Share away!

Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter @WonderWorkshop with the hashtag #FunWithWonder.

Challenge Cards

5.1 | Functions 



Dance Rehearsal

Dash is getting ready for the Interstellar Dance Contest! Let's create a dance move for Dash to use in the contest.

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5.1 | Functions 

- Use a **Function** block to make Dash's new dance.



- What do you want Dash's dance to look like? You can add blocks like these **inside the Function** block.

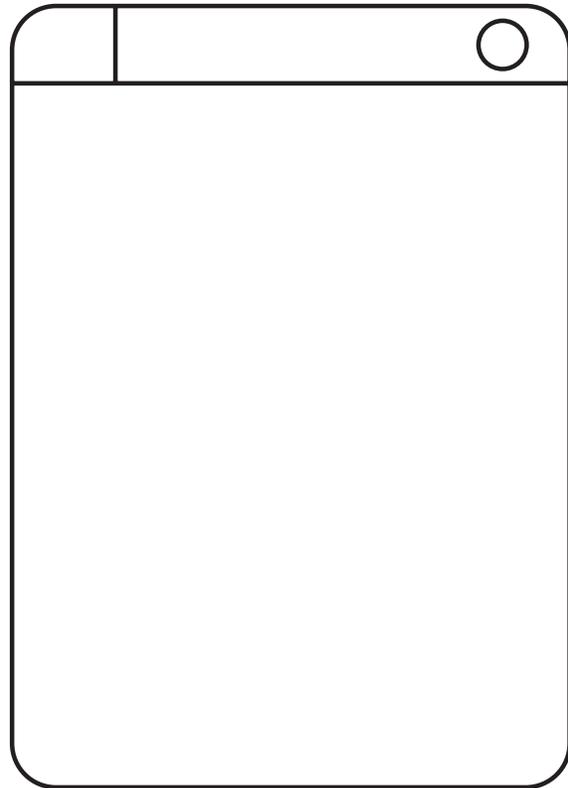


- Under the **When Start** block, program Dash to do the dance **at least 2 times**.



Add **lights and sounds** to Dash's dance as well.

 Use more **functions** to create new dance moves for Dash!



Record a video of Dash or Cue running through your program successfully.
Share your video on Twitter [@WonderWorkshop](https://twitter.com/WonderWorkshop) with the hashtag [#FunWithWonder](https://twitter.com/FunWithWonder).

Now Let's Get Creative!

Use your coding skills to create a music video for Dash or Cue!
Pretend that Dash or Cue is starring in its first music video. Choose a song, or make your own, and choreograph a dance routine to go along with the song of your choice.
Dance costumes are encouraged!



MATERIALS:

- Dash or Cue robot (Dot robot optional)
- Path, Blockly, Wonder, or Cue app
- Building Brick Connectors and LEGOs
- Fun song of your choice
- Sketch Kit (optional)
- Painter's tape
- Craft materials for costumes: fabric scraps, construction/scrapbook paper, tape, scissors, etc.

STEPS:

1. Designate a dance floor somewhere in your house, and mark out a square with painter's tape as the dance space.
2. Program Dash's dance moves using Path, Blockly, or Wonder. Use the Cue app to have Cue complete a dance routine to a song of your choice.
3. Be sure to get creative with lots of spins, head nods, and flashing lights!
4. Use a clap, voice command, or other event to run your program.
5. Record and share your dance routine when you think it is worthy of an MTV Music Video Award!

LEVEL UP!

Dash and Cue need a partner! Include Dot in the music video. Is Dot a background dancer flashing its lights to the music? Or can you build an attachment so that Dash or Cue can carry Dot throughout the routine? If you don't have Dot, try to find another dance partner (perhaps a doll, stuffed animal, action figure, or even you!).

LEVEL UP AGAIN!

Attach the Sketch Kit to Dash or Cue to create an illustration or design while your robot dances along to the music. What shapes can Dash or Cue create as they move across the whiteboard mat dance floor?

Record your robot making its fashion show debut and share your video with us on Twitter [@WonderWorkshop](#) with the hashtag [#FunWithWonder](#).

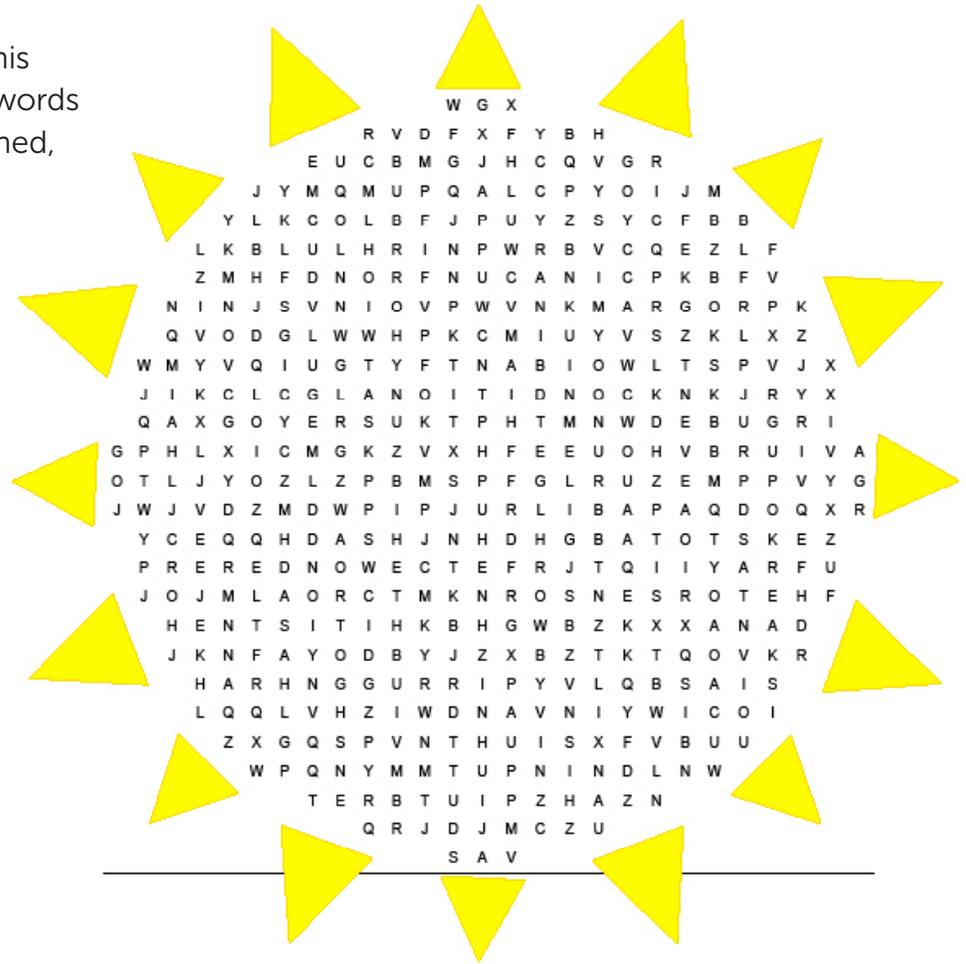
Vocabulary

Function: A function is a command that we get to invent and name. It allows us to break our program into smaller parts, making the program easier to understand.

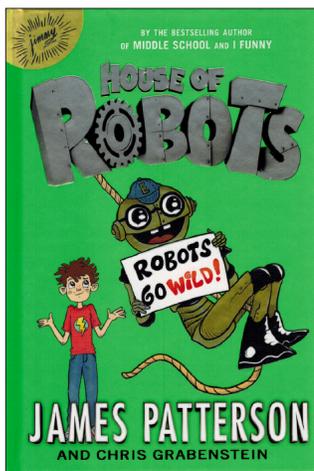
Time to Go Offline!

Want to unplug for a while? Try this coding word search. How many words can you find? When you are finished, create a word search of your own on p. 5.

- | | |
|-------------|-----------|
| DASH | BLOCKLY |
| DOT | WONDER |
| CUE | FUNCTION |
| PROGRAM | EVENT |
| CODE | SENSOR |
| DEBUG | INPUT |
| CONDITIONAL | ITERATION |
| LOOP | RUN |
| BINARY | VARIABLE |



READING:



Take a look at our blog's STEAM Reading List. How many books have you read that have to do with coding or robotics?
<http://bit.ly/STEAMreading>

COLOR IN OUR ROBOT'S EYE TO SHOW HOW MANY BOOKS YOU'VE READ SO FAR:



FUN FACT:

The first working robot made cars as part of the production line at car giant Ford, back in 1961.

Create Your Own Word Search

Use this Code.org [glossary](https://code.org/glossary)
<https://code.org/curriculum/docs/k-5/glossary>
to help you add words to your puzzle.

Place your favorite coding words in the blank
template provided. Remember, you can make
the words go across, down, backwards, and
diagonally. Fill in the remaining boxes with
random letters of your choice.

