THE EDUCATION FUND

FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2018-2019

Ideas with IMPACT

idea packet

sponsored by: FPL

Dashing Through STEAM

DASHing thru STEAM

Presented by

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Learn about and practice fundamental coding concepts. The Scope & Sequence is aligned with Code.org's.

LEARN to Code Curriculum

Scope & Sequence | Level A | Level B | Level C | Level D | Level E | Level F

Scope & Sequence

The **Learn to Code Curriculum** is organized into six coding levels and covers six fundamental coding concepts: sequencing, loops, events, conditionals, functions, and variables. For students who are new to Dash and Dot, we recommend beginning with Level A.

Each coding level is aligned to a recommended grade as a guide, but we also suggest that you consider your students' coding experience when determining where to start.

Concept	Level A	Level B	Level C	Level D	Level E	Level F
Recommended grade level	K	1	2	3	4	5
Sequencing	●	●	●			
Loops	●	●	●	●	●	
Events		●	●	●		
Conditionals				●	●	●
Functions					●	
Variables						●

Curriculum for Cue

Scope & Sequence	Unit 1 Creative Writing	Unit 2 Game Design	Unit 3 Innovation
Recommended Grade Level	Sixth	Seventh	Eighth
Design Thinking Process	●	●	●
Block-Based Programming	●	●	
State-Machine Based Programming	●	●	
JavaScript Programming	●	●	●
Computing Systems	●	●	●
Data & Analysis		●	●
Sequences	●	●	●
Events & Sensors	●	●	●
Loops	●	●	●
Functions		●	●
Variables		●	●
Conditionals		●	●
Booleans		●	●
Arrays			●

Setting UP your classroom:

In small groups students can share ideas, take turns and work together to complete challenges.

Before introducing Dash and Dot to the classroom, be sure to:

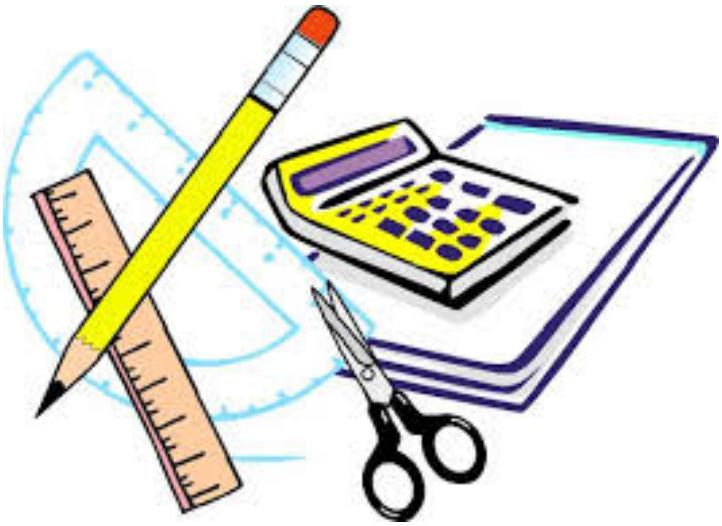
- Individually name each robot
- Use masking tape and/or a marker to label the robots with their names
- Fully charge each robot
- Fully charge and label each tablet
- Download the Blockly app onto each tablet
- Go through the set -up process in the Blockly app and give each robot the name you labeled the robot
- Create floorspace for each group's robot and materials. A 4 x 4 sq. ft. space is recommended)
- Each group should use the same robot and tablet to keep track of their work and save it to Blockly

Addition materials

Some lessons and challenges may require additional materials

- Paper or plastic cups (3 per group)
- Thick books or blocks (4-6 per group)
- Painter's or making tape
- Rulers
- Small toys/objects for Dash to move
- Bulldozer accessory
- 4ft x6 ft gridded mat

Find additional accessories at store.makewonder.com



Unplugged: Sequences and Algorithms

by **Wonder Workshop**

Description

Level A, Lesson 1: Students will be introduced to and define the terms "sequencing" and "algorithms." Students will learn how coding relates to their lives.

Objectives

Students will:

- Define sequences and algorithms.
- Relate coding to their lives at home and school.
- Design an algorithm navigating Dash through a maze to find Dot.

PREPARATION

- Cut sheets of paper into quarters until you have at least 9 pieces of paper.
- Cut out the arrows from the Arrow PDF.
- If you don't have a Dash and/or Dot, cut out the Dash and Dot images from the Arrow PDF.

INTRODUCTION

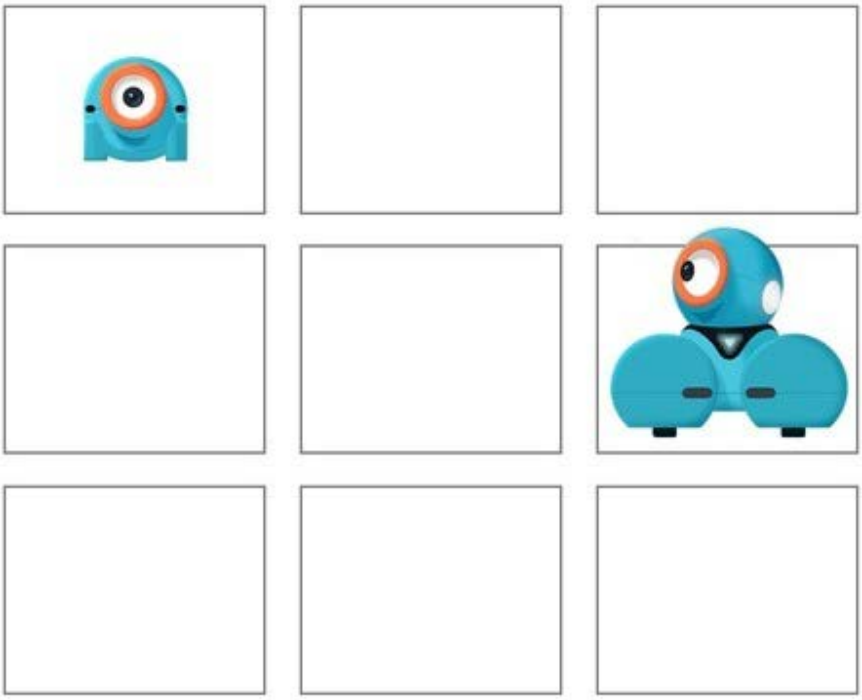
1. Watch Code.org's video about algorithms: https://studio.code.org/s/coursea-draft/stage/3/puzzle/1
   - Say, "An algorithm is a fancy way to say 'directions.'"
   - Say, "When we use algorithms, we give directions to the computer."
   - Say, "We have to be careful with algorithms because computers can only follow the instructions we give, so if we give bad instructions, the computer follows the bad instructions."
2. (Optional) Watch this Exact Instructions Challenge video and end at 4:33: https://youtu.be/_eLM6O9JJvk?t=3m31s. In this video, a little girl writes an algorithm for her dad to follow to make orange juice.
   - What happens?
   - Were the little girl's instructions specific?
   - This is an example of what happens when your algorithm is not specific enough.

QUICK CHECK

- What is an algorithm? (Sample response: “An algorithm is a set of instructions written for a computer to follow.”)
- How do you use algorithms in your life? (Sample response: “I use algorithms every time I give someone else directions. I also use algorithms when I follow someone else’s directions.")

ACTIVITY: DASH FINDS DOT

1. Watch this video that combines algorithms and sequences: https://studio.code.org/s/coursea-draft/stage/5/puzzle/1.
2. Say, “How did the children use an algorithm in the video?” (Sample response: “The children in the video created an algorithm that helped the Flurb get to the fruit.")
   - Ask, “What would happen if the children in the video used the exact same arrows, but put them in a different order?” (Sample response: “The Flurb might not find the fruit.")
   - Say, “It’s important to make sure the instructions in our algorithm are in the right order or it might not work.”
3. Say, “We are going to create an algorithm that helps Dash find Dot."
4. Ask the students to sit in a circle on the floor. Place 9 pieces of paper on the floor in the shape of a rectangle (see the diagram below).
   - Place Dot on one piece of paper.
   - Place Dash on another piece of paper. It doesn’t matter where the robots are placed.
   - If you don’t have Dot or Dash, use the pictures of the robots on the Arrow PDF. Dash Dot Layout
5. Cut out the arrows in the Arrow PDF. Go around the circle and ask each child to put an arrow on the ground to direct Dash to Dot.
   - Once the algorithm has been written, have a student move Dash through the squares, following the arrow sequence.
   - Ask, “Was our algorithm correct? How do you know?” (Sample response: “Our algorithm was not correct because Dash did not find Dot.”)
6. Now take all the arrows that were used in the previous algorithm and mix them up. Place them in a random order in a line on the floor. Have Dash start in the same place as before and ask a student to move Dash in the direction of the arrows.
   - Ask, "Did Dash end up in the same location? Why or why not?" (Sample response: “Dash did not end up in the same place because the sequence of the arrows was incorrect.”)
7. Move Dash and Dot to different locations on the paper grid and follow the same procedures to create and solve a different algorithm.
8. Say, “Now it’s your turn to create your own algorithms.”



QUICK CHECK

- What happens when the sequence of the arrows is wrong? (Sample response: “Dash cannot find Dot if the sequence is incorrect.”)
- How is an algorithm like a recipe? (Sample response: “An algorithm is like a recipe because an algorithm gives instructions and so does a recipe.”)

Have students work on the following activities in pairs.

When students work together while coding, they’re able to help each other identify mistakes and develop creative solutions!

1. Have each pair place 9 pieces of paper on the floor in the shape of a square (see the diagram below).

- Have them place Dot on one piece of paper.
- Place Dash on another piece of paper. It doesn’t matter which pieces of paper the children choose.
- If you don’t have Dot or Dash, use the pictures of the robots in the Arrow PDF. Dash Dot Layout

2. Have students cut out the arrows in the Arrow PDF.

3. Have students lay the arrows on the floor or desk in a sequence that will direct Dash to find Dot.
4. Have student pairs switch algorithms with another group.
    - Have each new group follow the arrow algorithm exactly as is and leave a sticky note of feedback for the algorithm owners.
    - Have the algorithm owners return to their algorithms and respond to the feedback in the Wonder Journal: Reflection Worksheet. If the sequence of arrows in the algorithm is wrong, encourage the algorithm owner to make changes.
    - Have groups rotate to another algorithm and repeat the process.
5. [Optional] After each rotation group, students can move Dash and Dot to create another algorithm using the arrows.

FOLLOW-UP QUESTIONS/DISCUSSION

- What were the challenges with this activity?
    - Sample response: “I thought it was hard to figure out which direction Dash needed to move. Sometimes we chose the wrong direction.”
- Remember how recipes are like algorithms? What happens when the recipe is written in the wrong sequence?
    - Sample response: “Our finished product probably wouldn’t taste very good.”

ASSESSMENT

- Use our Evaluation Rubric to review students' work and presentations.
- [Optional] Share your students' work with the world using @wonderworkshop and #dashanddot!

Resources:

https://www.makewonder.com/

www.code.org

Dash's Basketball Challenge

by **Wonder Workshop**

Description

Take on Dash's Basketball Challenge! Can you program Dash to launch a ball into the basket? Students will test and investigate the best settings that can be used with the launcher to accurately make the basket. They will practice measuring distances and collecting data before sharing their results with the class!

Objectives

Practice using Drive and Launcher blocks in Blockly

Apply coding skills, such as sequencing and parameters, to program Dash to launch a ball into the basketball hoop.

Plan and carry out investigations on how distance and energy affect the launcher's aim.

Collect, analyze, and interpret data on the success and failures for the basketball challenge.

Materials:

Dash Robot and launcher

Other Supplies

Launcher accessory and balls (1 per group)

Mini basketball hoop stand (1 per group): See preparation section to see link of where to purchase

Tablet (1 per group)

Masking Tape (1 roll per group)

Ruler (1 per group)

Markers

Basketball Challenge Recording Sheet (1 per group)

Pencils

Optional: Layout Reference Sheet (1 per group)

Lesson Procedure

This lesson can be broken down into two classes or sections:

Section 1: Introduction, Blockly Review, Directions (15-20 min)

Section 2: Group Work and Presentation (20-30 min)

PRIOR KNOWLEDGE

Before this lesson, make sure students have:

- Used the drive blocks in Blockly before.
- Practiced using rulers to measure objects in centimeters. For each group, clear a large area to set up their basketball challenges (approximately 80 cm x 50 cm)

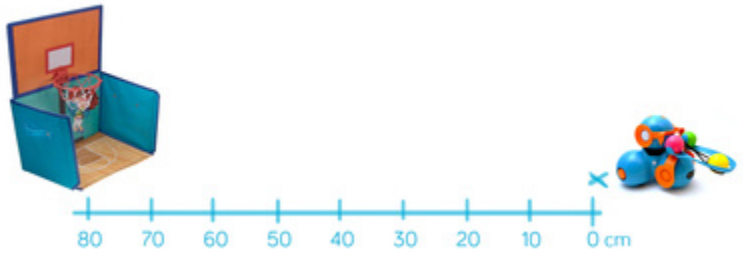
SET UP

Place an assembled basketball hoop, roll of masking tape, ruler, launcher balls, and marker at each area.

You can purchase the basketball hoops here.

Attach a launcher to each Dash.

Create a sample layout near the front of the class (where you will be introducing the challenge):



- Use masking tape to mark the X as a starting point for Dash.
- Use masking tape to create a 80 cm line from the starting point to the basketball hoop.
- Use a ruler and marker to measure and mark each 10 cm increment on the line.

INTRODUCTION (approx. 5 minutes)

Describe the challenge to the class: "Let's play basketball with Dash! We need to program Dash to launch a ball into the basketball hoop."

Ask the class what they would need to program so that Dash could launch the ball (e.g., have Dash move forward, launch the ball, and move back to the starting spot so we can try the code again)

BLOCKLY REVIEW (approx. 5 minutes)

Open the Blockly App on the projector. In Blockly, briefly review how to:

- Navigate to the Create New Project Menu and create a new Blank Project.
- Use and change the Drive Forward and Drive Backward Blocks.
- Name and save their work.

DIRECTIONS (approx. 10 minutes)

Tap the "Accessory" menu and introduce the "Launch with X % Power" Block.

- Place Dash on the starting point (X).
- Set the Forward block to "10 cm."
- Then, have a student volunteer load the launcher with a ball and select a launch power percentage.
- Run the program.

Model filling out the Basketball Challenge Recording Sheet with the selected parameters (e.g., Trial # 1, 10 cm, 70% power).

Run the code and then ask students "What happened?"

Fill out the "Observations" section of the worksheet with student observations (e.g., "The ball didn't go far enough. There wasn't enough power.")

Then ask students, "What would you change?"

- Talk about how students can focus on just one variable (distance versus launch power) to better fine tune results.
- Encourage students to begin forming hypotheses (e.g., "If Dash is closer, then the launcher needs less energy to get the ball in the hoop.")

GROUP WORK (approx. 20 minutes)

Divide the class into teams of 2-4 students.

- Distribute the layout reference sheets and recording worksheets to each team.
- Have students work together to create the basketball layout as seen on the reference sheet.
- Option: To save time, you can also layout the basketball courts before class begins.

Once teams have completed the layout, provide them with a Dash and a tablet.

Briefly meet with each team to discuss Group Member Roles. Have team members assign roles to each other such as:

- **Recorder** : Recording the team's trials on the recording worksheet
- **Programmer** : Using the Blockly app to program Dash
- **Ball Collector and Loader** : Collecting stray balls, reloading the launcher, and resetting Dash
- Encourage students to switch roles during their group work.

Make sure students always fill out the trial parameters (distance forward and launcher power) before running the code.

Have teams continue trying the challenge until they make a basket.

If teams finish early, they can:

- Try to make a basket using different parameters.
- Have Dash start to the left or the right of the hoop (requires turns).
- Have Dash start turned away from the hoop.
- Add lights/sounds/animations to their program.

PRESENTATIONS (approx. 10 minutes)

Have teams take turns showing their programs to the class.

Have teams also share what they learned from their experiments (e.g., "The ball was more accurate when Dash was closer to the hoop." or "We needed a lot of launch power when Dash was farther away.")

After the presentations, have teams fill out the bottom of their recording worksheets with their conclusions/reflections.

DASH Planning Worksheet

Name(s): _____ Date: _____

Coding Level: _____ Card#_____

What do you want Dash to do?

Draw out the steps of the challenge or write a few sentences describing your goal.

Dot Planning Worksheet

Name(s): _____ Date: _____

Coding Level: _____ Card#_____

What do you want Dot to do?

Draw out the steps of the challenge or write a few sentences describing your goal.

General Planning Worksheet

Name(s): _____ Date: _____

Coding Level: _____ Card#_____

1. **What do you want Dash to do?**

Draw out the steps of the challenge or write a few sentences describing your goal.

2. **What will you do to achieve your solution?**

What will each team member do? What steps will you need to take? What blocks will you use?

Reflection Worksheet

Name(s): _____ Date: _____

Coding Level: _____ Card#_____

1. **What did Dash and/or Dot do when you ran your program?**

2. **Did you make any mistakes? If so, how did you fix them?**

Evaluation Rubric

	Programming	**Reflection & Documentation**	**Collaboration & Communication**	**Creativity**
1 Novice	Completed part of the activity and needed assistance	Use a journal, worksheets, and/or multimedia tools (such as video and images) to document some of the activity results	Participates little or not at all in classroom discussions. Demonstrated little to no cooperation with group members during the activity.	Demonstrated limited creativity in developing ways to complete the activity
2 Developing	Used the targeted coding concepts to complete the activity with some assistance.	Incorporated some target vocabulary and some thoughtful reflections on the coding process while documenting activity results using journal entries and media tools.	Occasionally participated in classroom discussions and cooperated somewhat with group members	Developed a few different ways to complete the activity, but the solution was not particularly creative.
3 Proficient	Used the targeted coding concepts to complete the activity without assistance	Incorporated target vocabulary and reflection on the coding process. Clearly documented activity results using journal entries and multimedia tools.	Actively participated in classroom discussions. Answered questions and cooperated with group members during the activity	Applied the iterative process to develop creative and unexpected solutions for the activity.
4 Exemplary	Used the targeted coding concepts to complete the activity without assistance. Enhanced the solution with more efficient (e.g., fewer, blocks) and/or advanced features (e.g., lights, sounds,) in the code.	Incorporated advanced targets vocabulary and in-depth reflection on the coding process. Thoroughly and clearly documented and presented and presented activity results	Actively participated in classroom discussions and cooperated with group members. Gave constructive feedback to others and effectively incorporated feedback from others	Went above and beyond to develop, revise, and execute imaginative solutions for the activity.

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THE EDUCATION FUND

FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

Apply for an Ideas with IMPACT Adapter Grant!

All Miami-Dade County public school teachers, media specialists, counselors, or assistant principals may request funds to implement any project idea, teaching strategy, or project from the 2018 Idea EXPO workshops and/or curriculum ideas profiled annually in the ***Ideas with IMPACT*** catalogs from 1990 to the current year, 2018-19. Most catalogs can be viewed on The Education Fund's website at educationfund.org under "Ideas with IMPACT Catalog Publications."

- Open to all K-12 M-DCPS teachers, counselors, media specialists
- Quick and easy reporting requirements
- Grants range from $150 - $400
- Grant recipients recognized at an Awards Reception

To apply, you must contact the teacher who developed the idea before submitting your application. Contact can be made by attending a workshop given by the Disseminator, communicating via email or telephone, by visiting the Disseminator in their classroom, or by having the Disseminator visit your classroom.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by Monday, June 3, 2019.

APPLICATION DEADLINE:
December 13, 2018

Apply online at educationfund.org

For more information, contact:
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