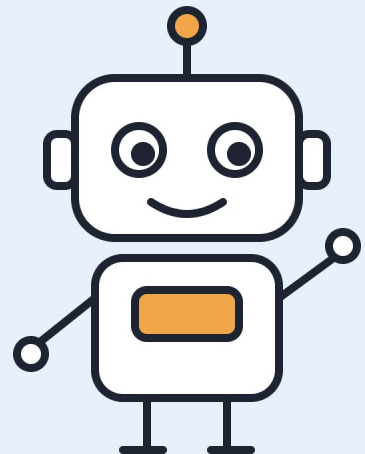


Little Coders

Seven missions to learn to think like a computer programmer, with just a pencil, paper and imagination.



What's in this kit

- 1 Algorithms · steps in order
- 2 Guide the robot · commands and arrows
- 3 Pixels · pictures become code
- 4 Loops · the power of “repeat”
- 5 If... then · making decisions
- 6 Bug hunt · find and fix mistakes
- ★ Certificate · to celebrate
- ✓ Answer key · for grown-ups

Tips for parents

No computer needed. Coding is, above all, about organizing ideas. These activities train the thinking that comes before the code.

One mission a day is plenty. Read the instructions aloud with younger children.

Play robot: follow your child's commands exactly as given. It's fun and shows why order and precision matter.

Mistakes are part of it. Programmers call mistakes “bugs,” and fixing them is the best part. Celebrate every bug you find!

You will need: pencil · eraser · crayons (blue, red and orange)



Step by step

Name: _____

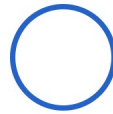
An **algorithm** is a list of steps, in order, for doing something. A computer follows the steps **exactly** as we write them. If the order is wrong, the result is wrong too!

A) Brushing your teeth

The steps are all mixed up! Write a number from **1 to 6** in each circle to put them in order.



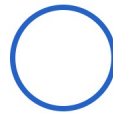
Rinse your mouth



Put toothpaste on the brush



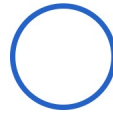
Put the brush away



Pick up the brush



Brush your teeth



Open the toothpaste

B) Your turn: making a sandwich

Write (or draw) the algorithm for making your favorite sandwich.

1

2

3

4

5

Challenge!

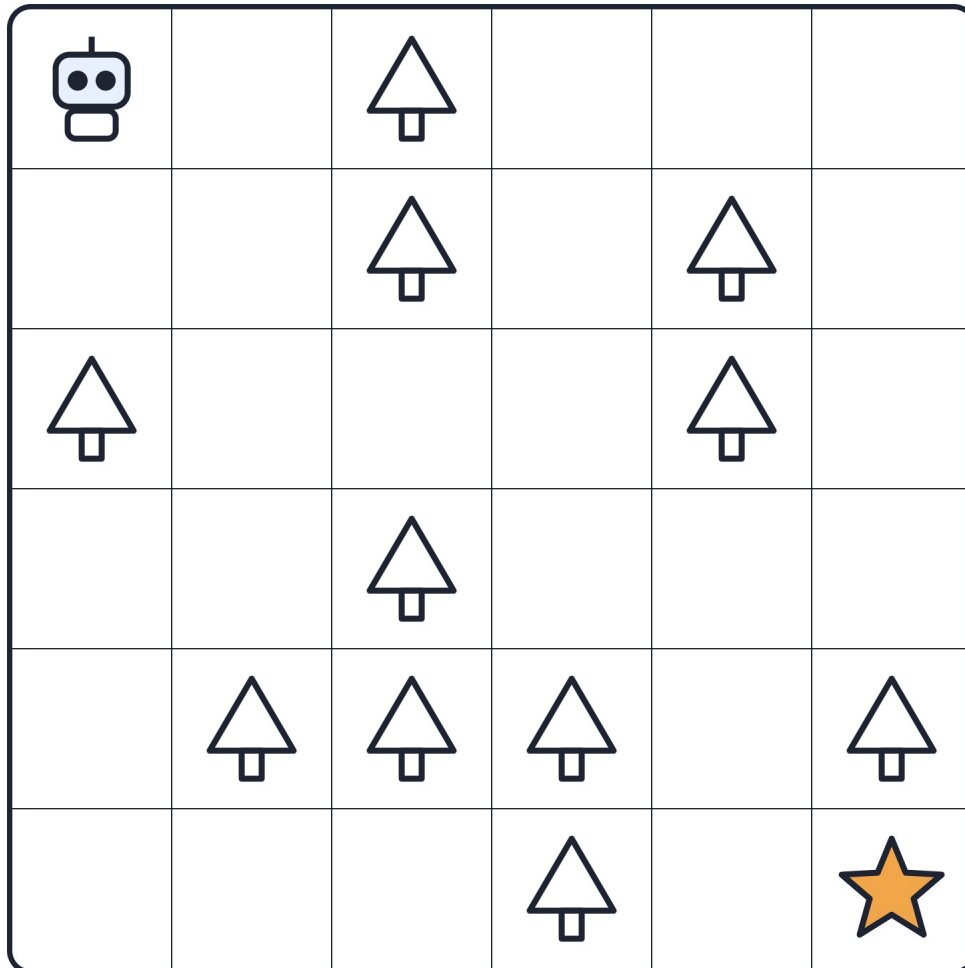
Read your algorithm to a grown-up. They will do **exactly** what it says, no more, no less. Did you miss a step?

2

Guide the robot to the star

Name: _____

Robots only understand simple **commands**. Each arrow moves the robot **one square**. It can't go through the trees or leave the board!



Commands



First draw the path on the board with your pencil. Then write the arrows!

Write the robot's program:

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Challenge!

Can you find a path with only **10 arrows**? Then tape the board on the floor and be the robot yourself!

3

MISSION 3 · PIXELS

The secret color code

Name: _____

Pictures on a screen are made of tiny squares called **pixels**. The computer stores every picture as a code. Read the code for each row, from left to right, and color the squares to discover the picture!

W = leave it white **R** = color it red

1 W 2 R 2 W 2 R 1 W									
8 R									
8 R									
8 R									
1 W 6 R 1 W									
2 W 4 R 2 W									
3 W 2 R 3 W									

Now make your own picture and write its code!

Row 1 _____

Row 2 _____

Row 3 _____

Row 4 _____

Row 5 _____

Row 6 _____

4 The power of "repeat"

Name: _____

When a command repeats, programmers use a shortcut called a **loop**. Instead of writing the same thing over and over, we write **REPEAT**.

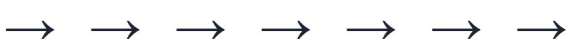
→ → → → is the same as **REPEAT 4 times: →**

A) Make the code shorter

a

REPEAT

times:

b

REPEAT

times:

c

REPEAT

times:

d

REPEAT

times:

B) Continue the pattern



C) The code dance

Do it with your body: **REPEAT 3 times: clap 2 times and jump 1 time.** Now invent your own dance for the family to do:

REPEAT _____ **times:** _____



IF... THEN

Name: _____

Computers make decisions using **IF** and **THEN**. For example: **IF** you press the button, **THEN** the game starts. We do this all the time too!

A) Connect each IF to its THEN

IF it is raining ●● **THEN** I wait**IF** I am hungry ●● **THEN** I turn on the light**IF** the light is red ●● **THEN** I take an umbrella**IF** it is dark ●● **THEN** I eat a piece of fruit

B) You are the sorting robot

IF it is a circle, **THEN** color it blue.**ELSE**, color it orange.

C) Make up your own rules

IF I finish my homework, **THEN** _____**IF** _____ **THEN** _____

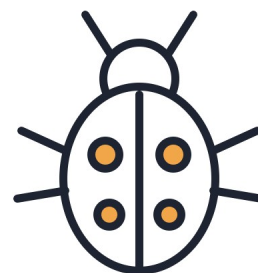
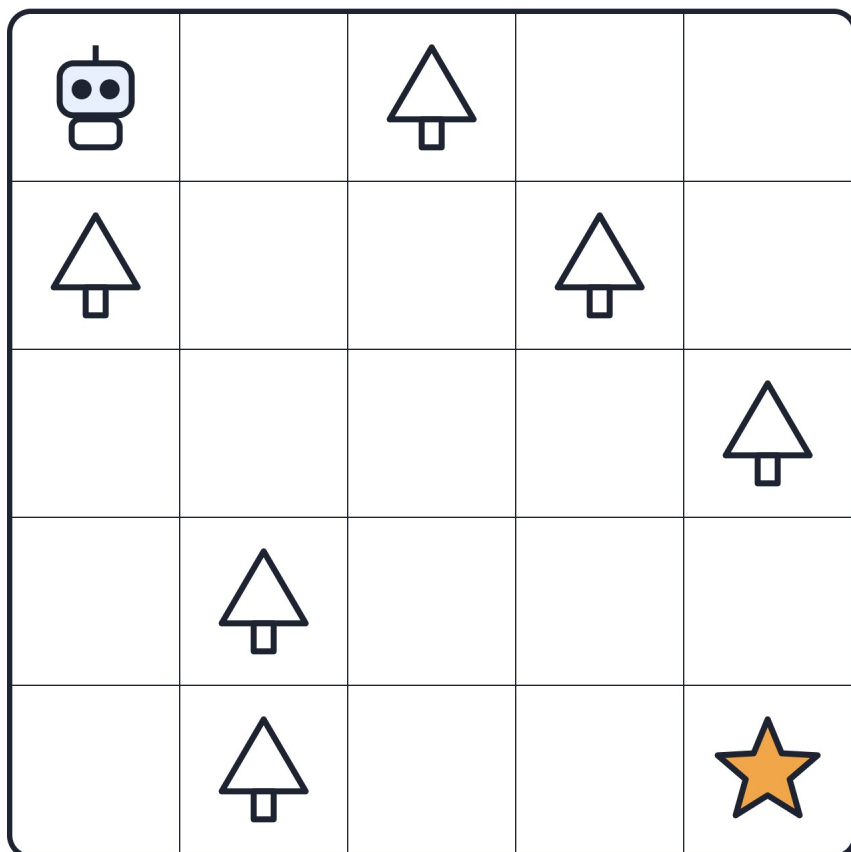
6

MISSION 6 · DEBUGGING

Bug hunt

Name: _____

A **bug** is a mistake in a program. Someone wrote code to take the robot to the star, but there is **one wrong arrow**! Follow the code with your finger, square by square, and find where the robot crashes.



Did you know? In 1947, computer scientist **Grace Hopper**'s team found a real moth stuck inside a computer. Ever since, mistakes in programs have been called "bugs."

The buggy code:



Circle the wrong arrow. It is arrow number _____

The right arrow would be: _____



CERTIFICATE

Little Coder

This certificate is proudly awarded to

who completed every mission and now knows how to write **algorithms**, give **commands**, draw with **pixels**, use **loops**, make decisions with **IF... THEN** and hunt **bugs**!



Algorithms



Commands



Pixels



Loops



If... then



Bugs

Color in a medal for each mission you complete!

Date

Parent's signature

Answer key

Mission 1 • Algorithms

In the order they appear on the sheet: **5, 3, 6, 1, 4, 2.**

Pick up the brush → open the toothpaste → put toothpaste on → brush → rinse → put away. Another logical order, well explained, also counts!

Mission 2 • Guide the robot

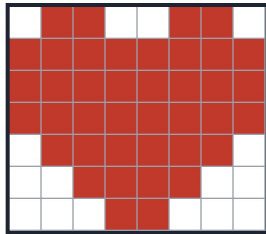
→ ↓ ↓ → → ↓ → ↓ ↓ →

This is the shortest path (10 arrows).

Longer paths that reach the star without crossing trees are correct too.

Mission 3 • Pixels

The secret picture is a **heart**.



Mission 4 • Loops

a) 3 times ↑ · b) 7 times → · c) 5 times ↓ · d) 3 times: → ↓

Patterns: circle, triangle, circle · square, square, circle.

Mission 5 • If... then

Raining → umbrella · hungry → fruit · red light → I wait · dark → turn on the light.

Sorting robot: circles (blue) at positions 1, 4, 5, 8 and 10; the rest orange.

Mission 6 • Bug hunt

The bug is **arrow 2**: the robot hits a tree.

The right arrow is ↓.

→ ↓ ↓ → → ↓ ↓ →

Enjoyed it? Next steps (free)

ScratchJr (tablet app, ages 5 to 7): colorful blocks to create stories and games, with very little reading needed.

Scratch (scratch.mit.edu, ages 8 and up): the same thinking as these sheets, now on the computer.

Code.org (code.org): short courses and “Hour of Code” challenges with characters kids already know.

Talk about it later: ask where your child sees algorithms, loops and “if... then” in everyday life (recipes, traffic lights, games, the microwave). Linking the idea to daily routines is what makes it stick.