iRobot Education

CODE|BREAK

UNPLUGGED

Root's friend Square is **hiding,** and we need your help to find them! Square has been sending us clues in the form of **code** and **puzzles.** Use your programming and math skills to crack the codes, collect answers, decode the mystery and **find Square**!

You'll Need: This activity packet and a pen or pencil.

Ideal for Grades 5-8

Name: _____

Grades 5-8

You Need:

Activity Packet

Pen/ Pencil

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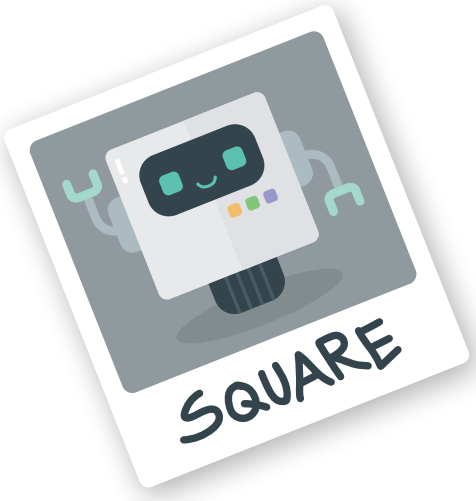
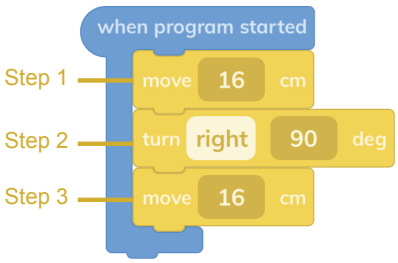


How to Read Root Code

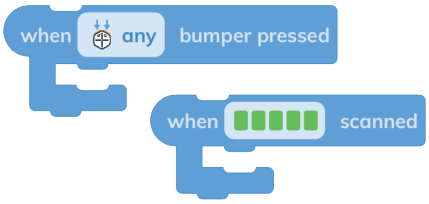
Reading Root Code is a lot like following step-by-step instructions.



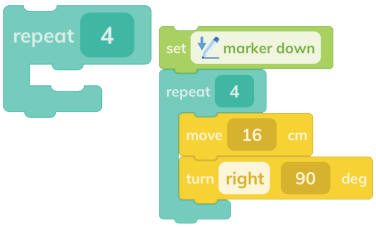
Some code tells Root to move or turn.

Other code tells Root to start drawing lines to everywhere it drives.

These pieces of code tell Root which instructions to follow when something happens.

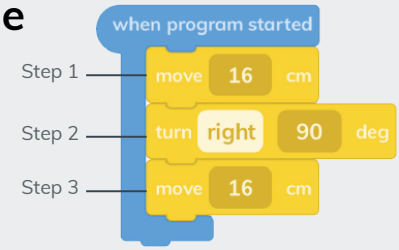


This code tells Root how many times to repeat the instructions inside.



This code helps Root remember numbers that change when something happens, like somebody scoring a point in a game.

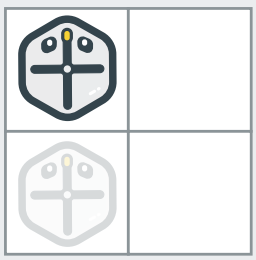
Example Code:



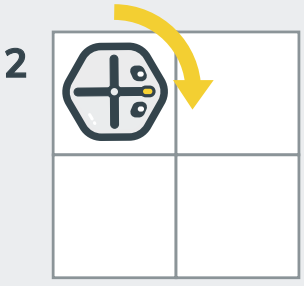
Read the code from top to bottom to follow Root's instructions.

You'll use Root Code to solve the puzzles in this packet and crack the code to where in the world Root is hiding!

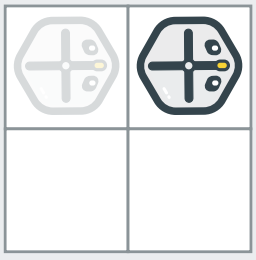
1



2



3



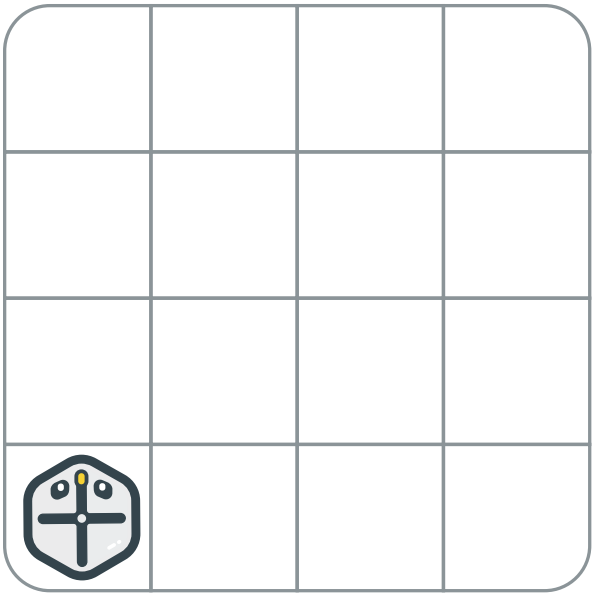
Challenge: Treasure Map

Can you follow the code to see where Root ends?

1. First, read the **code** on the right.
   Hint: 1 grid box = 16cm

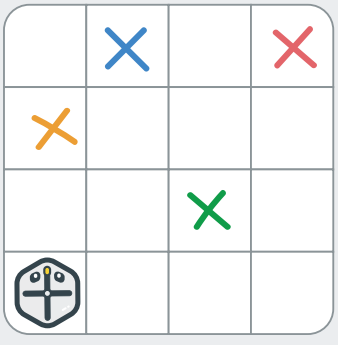
2. Next, place your pen or pencil on Root. Following the code, draw the line that Root will drive.

3. Pace an “X” on the grid square where Root will stop.



3. When you’ve successfully completed the color sequence, check where Root has landed. Use the Root Map to find the correct clue. When you are finished, write the clue’s letters in the Answer Box.

Root Map



If Root landed on grid spot shown on the left with the red “X”, the answer is “J K P”

If Root landed on grid spot shown on the left with the orange “X”, the answer is “M W Q”

If Root landed on grid spot shown on the left with the green “X”, the answer is “S R I”

If Root landed on grid spot shown on the left with the blue “X”, the answer is “A H R”

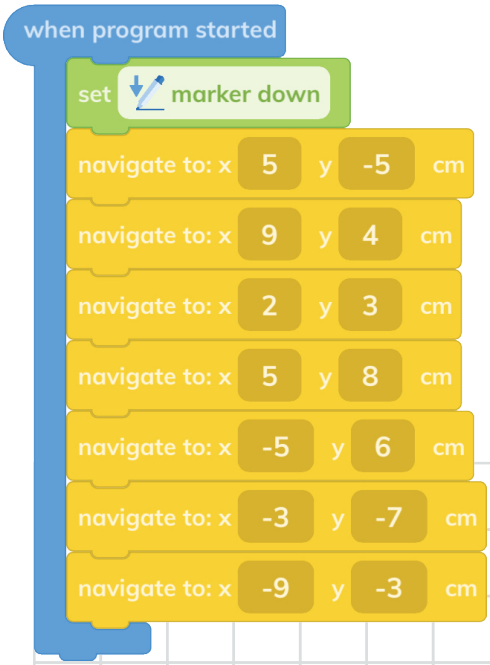
Code #1

___ ___ ___
1 2 3

Have you found the letters? Turn to page 11 to write the code in the spaces beside Code #1.

Challenge: Secret Coordinates

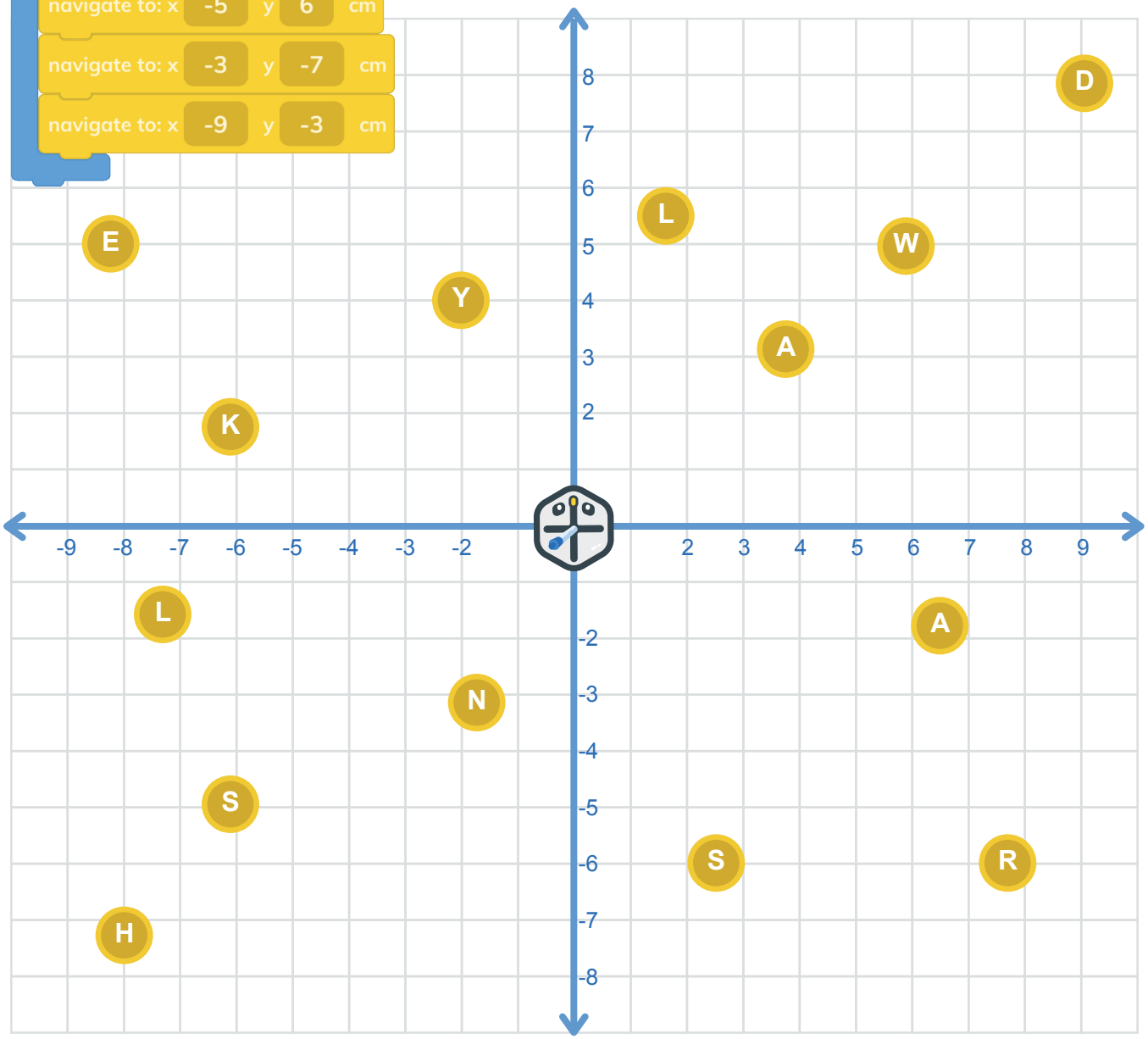
Start at (0,0) and follow the program below, drawing straight lines from each coordinate to the next.
If your lines cross through any letters, write them into the Code Key in the order that you find them.



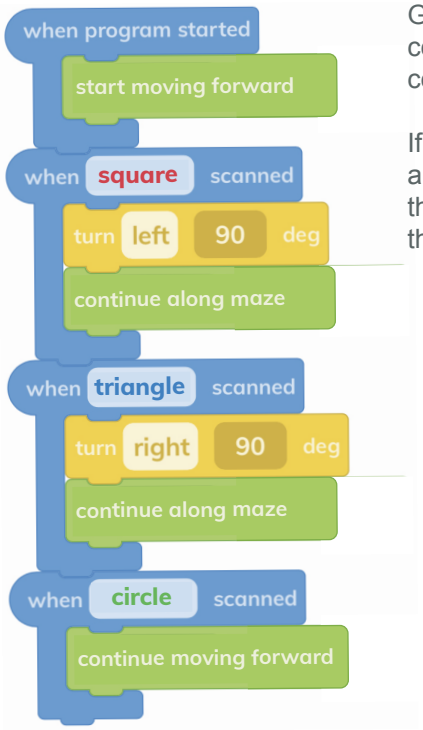
Code #2

___ ___ ___
1 2 3

Have you found the letters? Turn to page 11 to write the code in the spaces beside Code #2.



Learn: Navigate by Shape



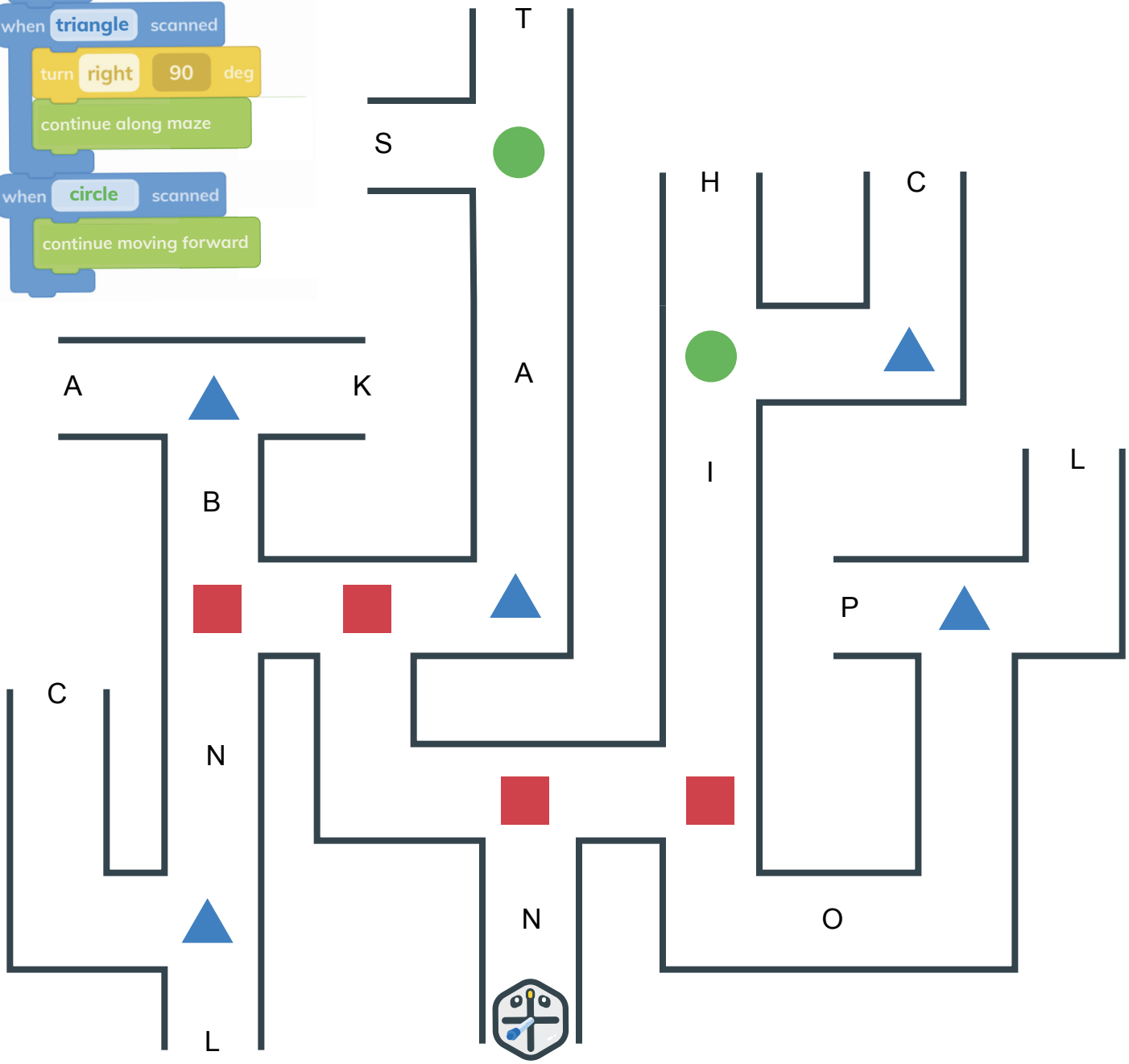
Guide Root through the color maze by following the color-turn code on the left.

If your lines cross through any letters, write them into the Code Key in the order that you find them.

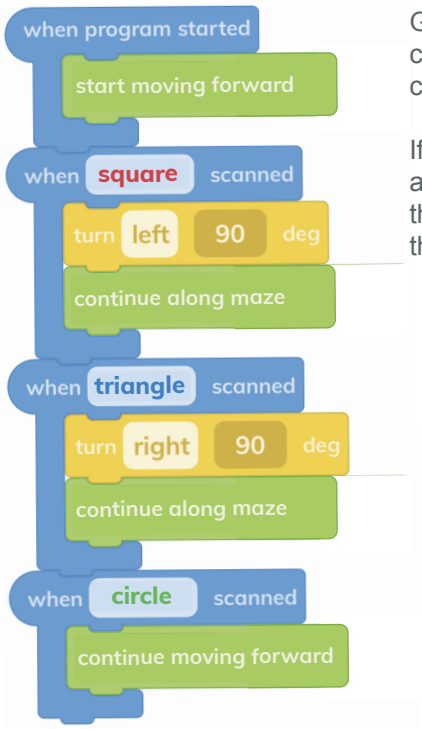
Code #3

1 2 3

Have you found all three letters? Turn to page 11 to write the code in the spaces beside Code #3.



Challenge: Shape Maze



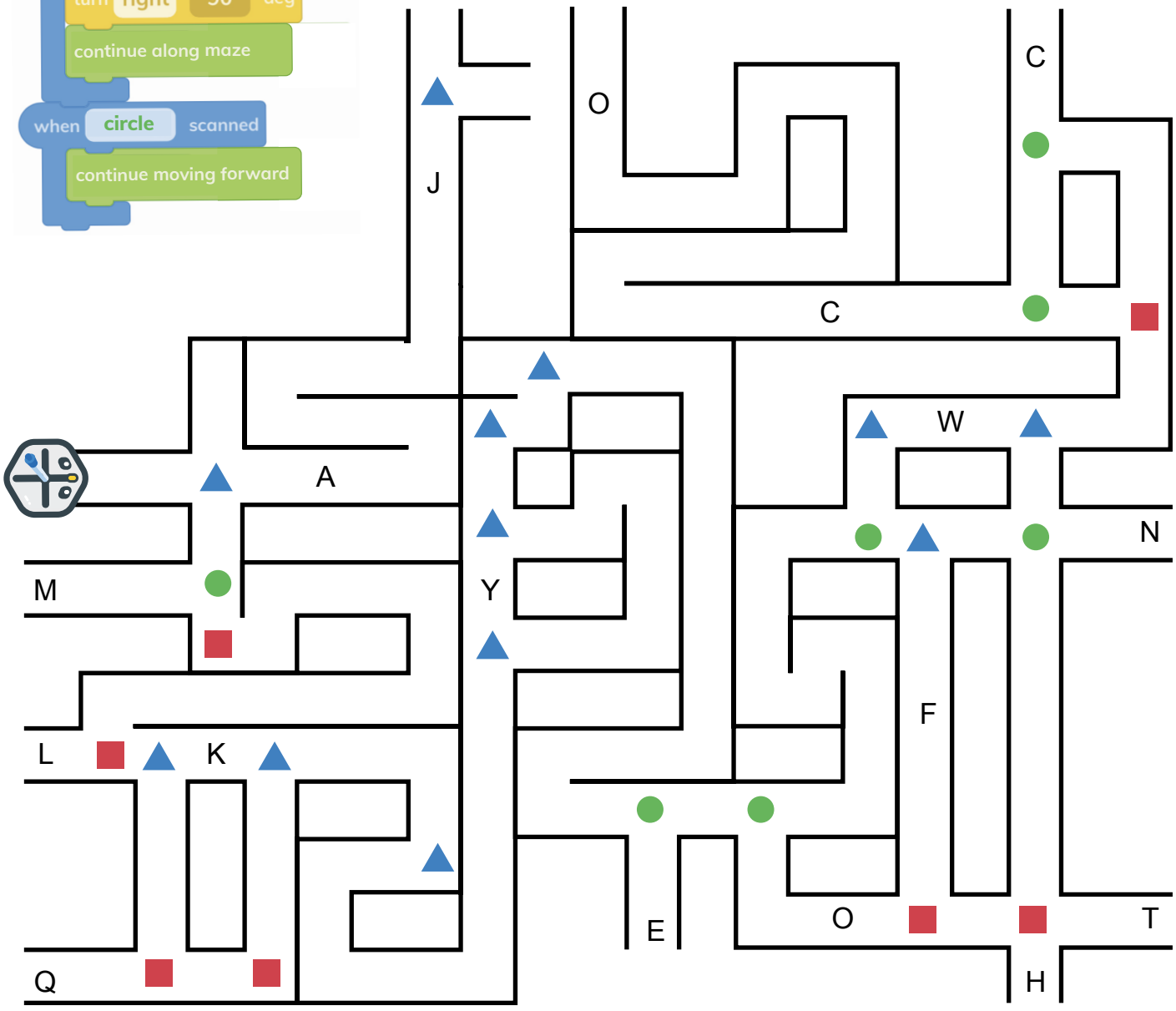
Guide Root through the color maze by following the color-turn code on the left.

If your lines cross through any letters, write them into the Code Key in the order that you find them.

Code #4

___ ___ ___
1 2 3

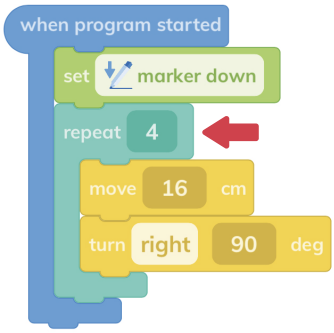
Have you found all three letters? Turn to page 11 to write the code in the spaces beside Code #4.

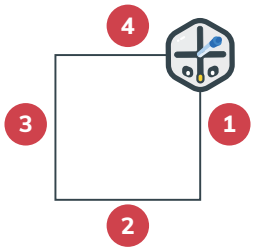


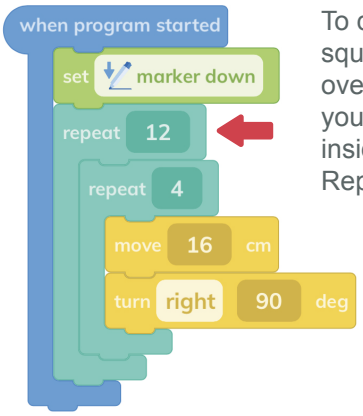
Learn: Coding Shape Wheels

Use this guide to help you with the Shape Wheel Challenges.

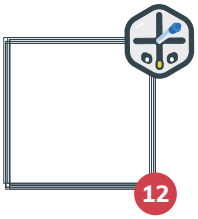
This code draws a square by putting a pen down and then moving forward and turning again and again four times.

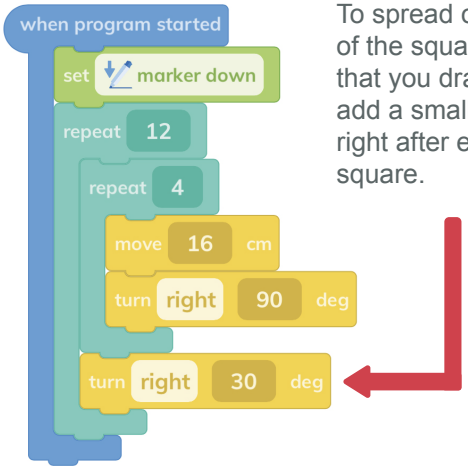




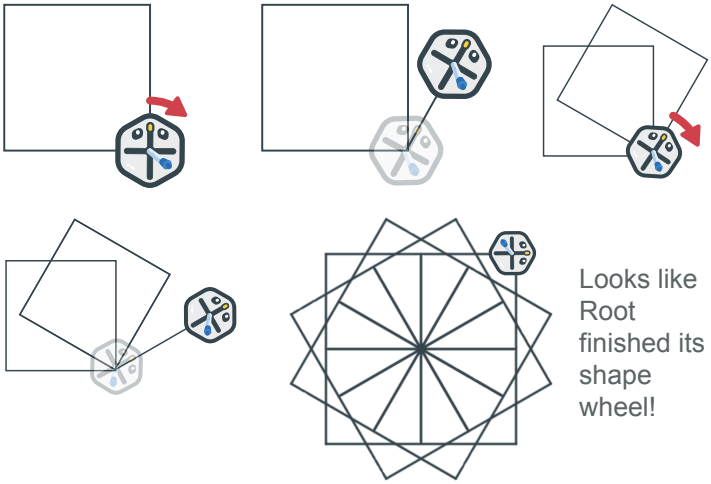


To draw lots of squares over and over, you can place your Repeat Loop inside another Repeat Loop!

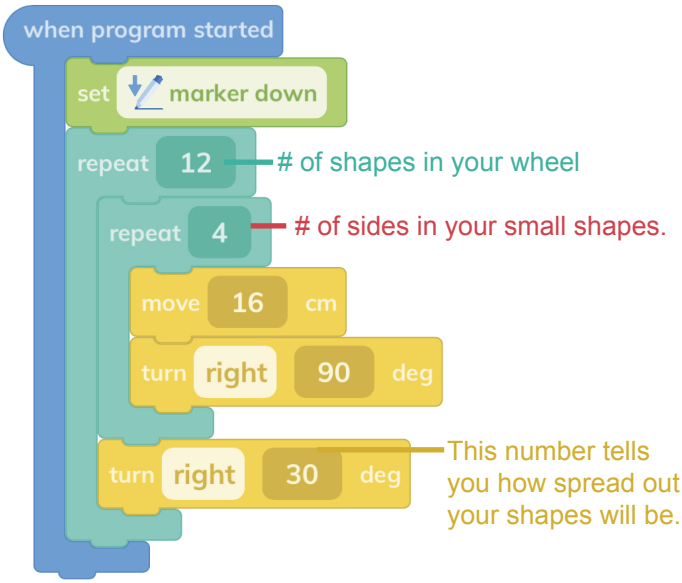


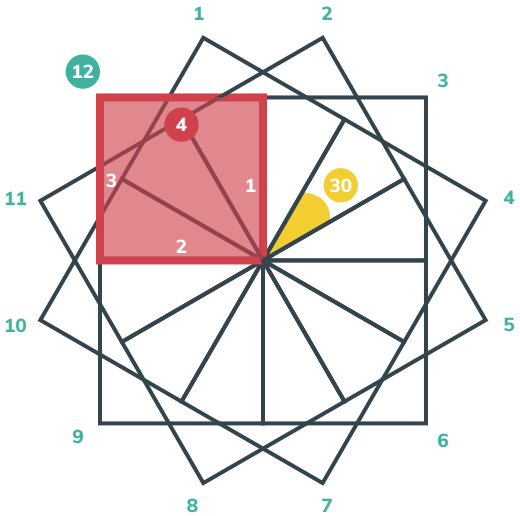


To spread out all of the squares that you draw, add a small turn right after each square.



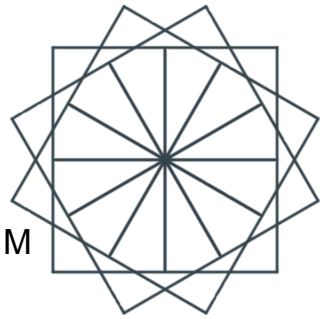
Looks like Root finished its shape wheel!

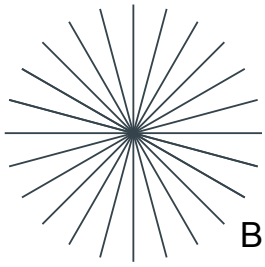


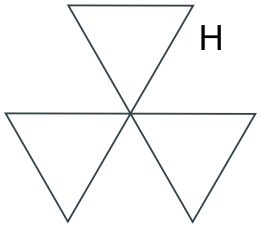


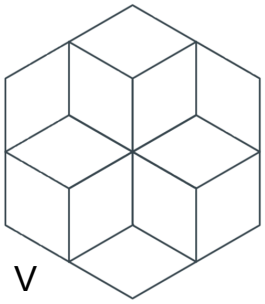
Challenge: Shape Wheel Match

Spirographs are circles of repeating shapes that you can draw with code!
Use the Shape Decoder at the bottom of the page to match each shape wheel to its program.
There will be one left over.
When you're done, fill each spirograph's letter into the corresponding space in the Code Key.

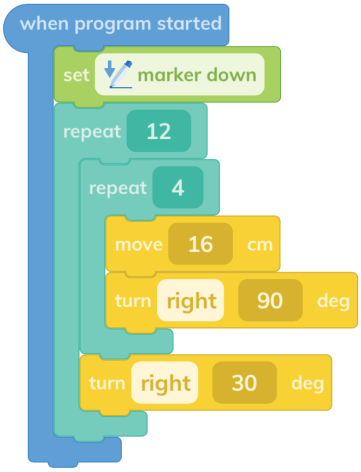




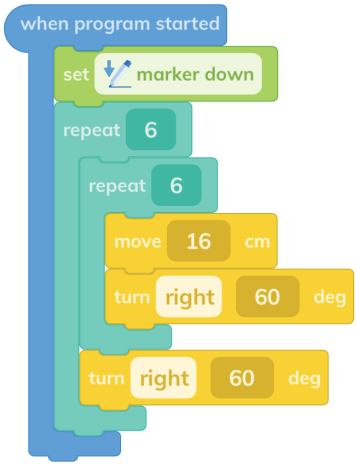




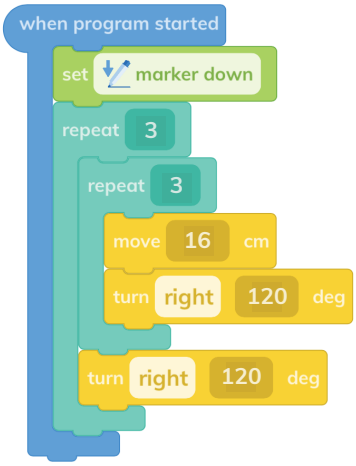
1



2

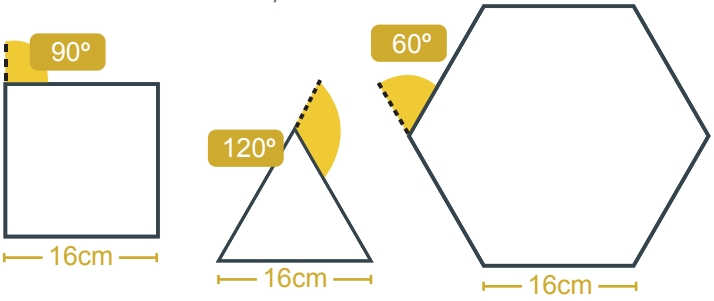


3



Shape Decoder

Learn about the different angles and measurements Root uses to draw these shapes.



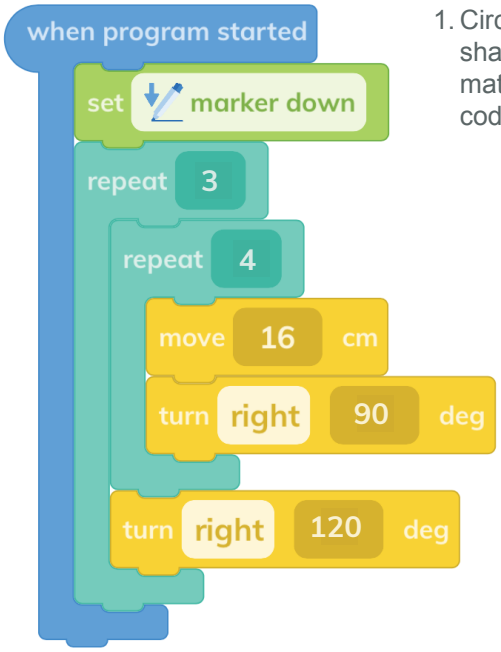
Cross Off

*Root's WHY answer does **NOT CONTAIN** these letters. Turn to the Letter Bank on page 11 and **CROSS THEM OFF** of the list.*

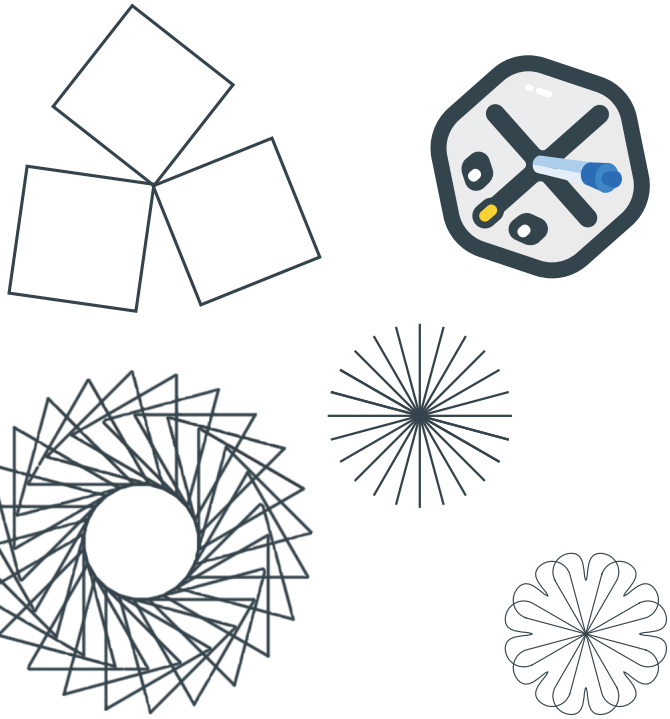
___ ___ ___

Challenge: Shape Wheel Lies

Find the Shape Wheel that matches the code, then use the Super-Secret Lie Detector to find your clue.



1. Circle the shape that matches the code.



Super-Secret Lie Detector

2. Use the Shape Wheel that you circled above.

Read the statements to the right. If a statement is **false**, cross it out. If it is **true**, circle it. When you are finished, write the remaining letters in the Answer Box.

Q. The final shape contains 12 diamond shapes.

T. The spirograph contains 24 circles.

O. The outside border is shaped like a hexagon.

G. The final wheel contains 3 squares.

X. The squares in the final wheel do not overlap.

F. The shape wheel is bigger than Root (pictured above).

Cross Off

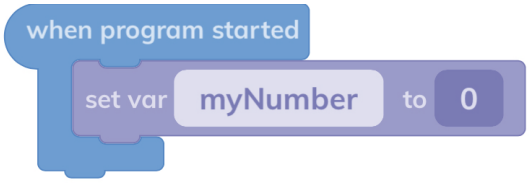
*Root's WHY answer does **NOT CONTAIN** these letters. Turn to the Letter Bank on page 11 and **CROSS THEM OFF** of the list.*

___ ___ ___

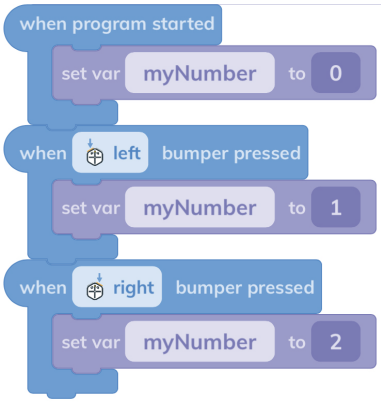
Learn: Using Variables

Use this guide to help you with the Variable Challenge.

A variable is a piece of code that helps your robot remember and change numbers.



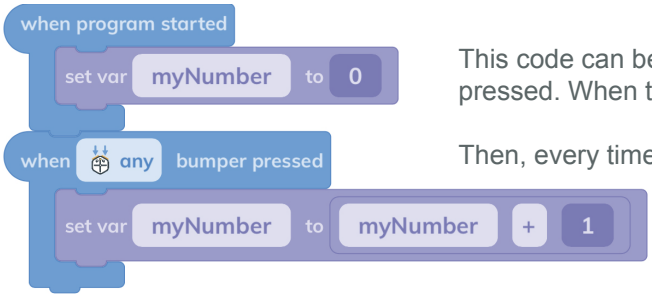
This code's variable is called "myNumber." Right now, the variable is equal to 0.



This code tells Root to change myNumber every time a bumper is pressed.

When Root's left bumper is pressed, myNumber will equal 1.

When Root's right bumper is pressed, myNumber will equal 1.



This code can be used to count how many times Root's bumpers are pressed. When the program starts, we tell Root that myNumber is 0.

Then, every time Root's bumpers are pressed, we tell Root to add 1 to whatever myNumber currently is. That means, if we pressed Root's bumpers three times, we would do the following math:

myNumber = 0

myNumber starts out at 0.

myNumber = myNumber + 1

When a bumper is pressed, we add 1 to myNumber.

Now myNumber = 1

myNumber = myNumber + 1

When a bumper is pressed again, we add another 1 to myNumber. Before this bump, myNumber was 1.

Now myNumber = 2

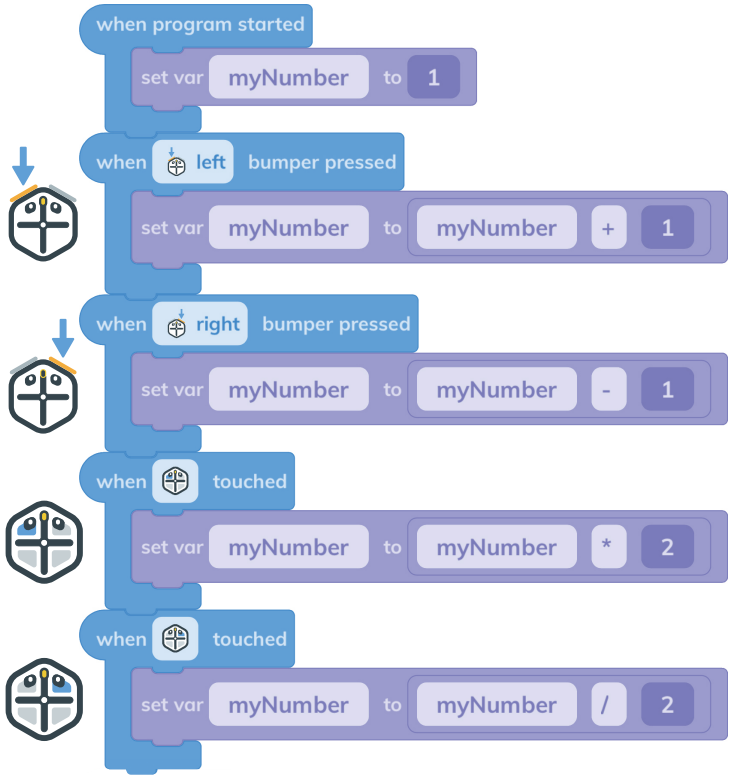
myNumber = myNumber + 1

When a bumper is pressed again, we add another 1 to myNumber. Before this bump, myNumber was 1.

Now myNumber = 3

Variable Math String

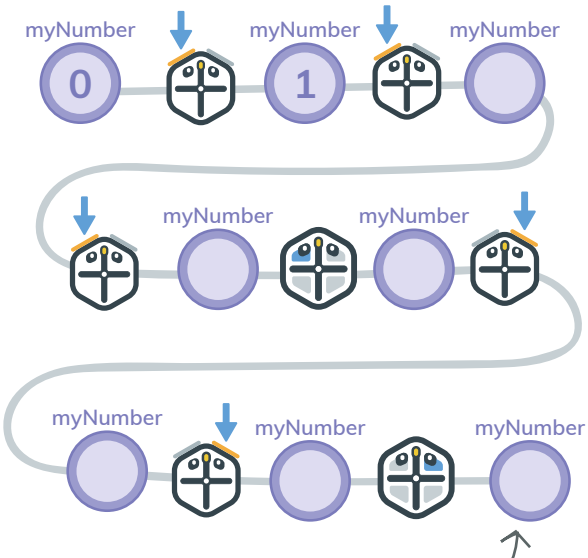
1. First, read the code instructions below.



2. Next, read the example sequence below. myNumber starts as 0. We add 1 to myNumber every time the right bumper is pressed.

3. Follow the sequence below. Keep track of what myNumber equals by doing the math in your head (like a robot) or on a piece of scrap paper.

   When you reach the end, write the final number that myNumber equals in the blank circle.



4. Circle the number in the last circle, then follow the instructions in the Variable Math Decoder below.

Variable Math Decoder

Circle the TRUE statement and write its letters in the Answer Box.

- *If the final number is 1, your answer is "B V E"*
- *If the final number is 2, your answer is " K N P"*
- *If the final number is 3, your answer is "W W L"*
- *If the number is 0, your answer is "A T S"*

Cross Off

*Root's WHY answer does **NOT CONTAIN** these letters. Turn to the Letter Bank on page 11 and **CROSS THEM OFF** of the list.*

Crack the Code!

Where?

To figure out where Root's friend Square is hiding, you must solve the puzzles on **pages 2-5**.

When you complete each puzzle, write the letters in the correct spaces on the right.

Code #1 *(from page 2)*	___ 1	___ 2	___ 3
Code #2 *(from page 3)*	___ 1	___ 2	___ 3
Code #3 *(from page 4)*	___ 1	___ 2	___ 3
Code #4 *(from page 5)*	___ 1	___ 2	___ 3

When you have filled in all of the spaces above, it's time to crack the code!
Follow the directions below for how to fill in the letters in the spaces below from left to right.

1. Start at the top of the column of letters in the "1" spaces. Write all of the letters going down from top to bottom.
2. Now go to the top of the "2" column. Write all the letters going down from top to bottom.
3. Now go to the top of the "3" column. Write all the letters going down from top to bottom.
4. You're finished! Now read the secret message.

Where is Root hiding?

_ _ _ _ _ _ _ _ _ _ _ _ _ _

Why?

To figure out what Square went to go see, you must solve the puzzles on **pages 7-10**.

When you complete each puzzle, **CROSS OUT** the letters you find in the Letter Bank on the right.

When you have solved all the puzzles, write the remaining letters from the Location Decoder in order from left to right in WHY box.

C M A B H L K N E V
C G P A X R F S

Why is Root there?

_ _ _ _ _ _ _ _ _ _ _ _