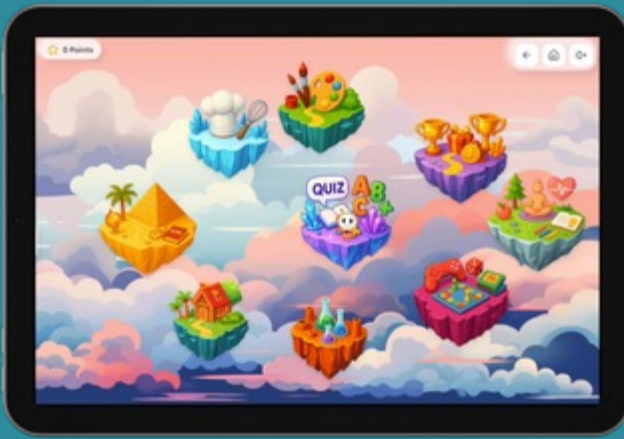


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Programming Directions in a Robot - Year 1

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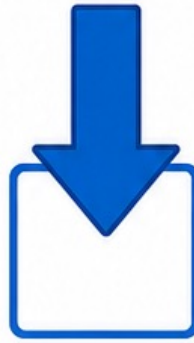


ROBOT COMMAND GUIDE



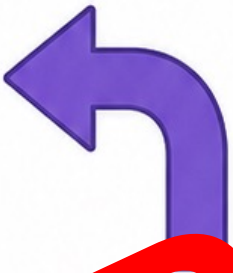
FORWARD

Move one square ahead.



BACKWARD

Move one square back.



TURN LEFT

Turn left.
Stay on the square.



TURN RIGHT

Turn right.
Stay on the square.



GO

Start the algorithm.



STOP

Finish the algorithm.



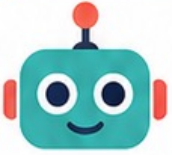
CLEAR

Remove the commands.



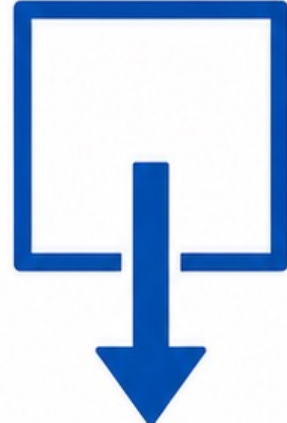
PAUSE

Wait on the square.



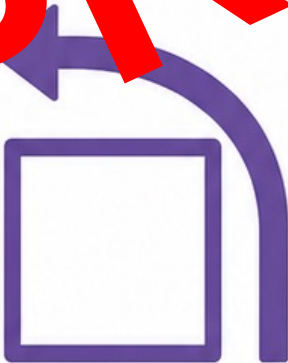
FORWARD

Move one square ahead.



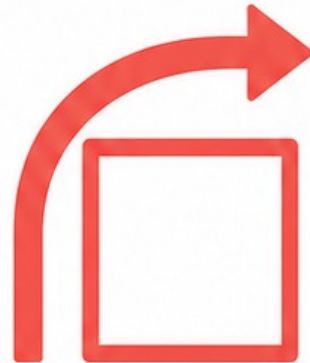
BACKWARD

Move one square back.



TURN LEFT

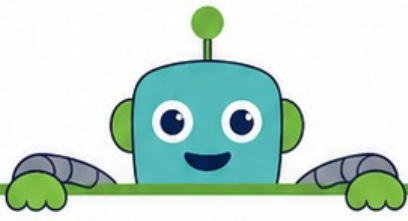
Turn left. Stay on the square.



TURN RIGHT

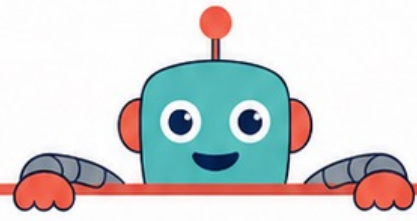
Turn right. Stay on the square.





GO

Start the algorithm.



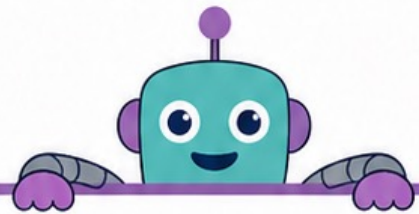
STOP

Finish the algorithm.



CLEAR

Remove the commands.

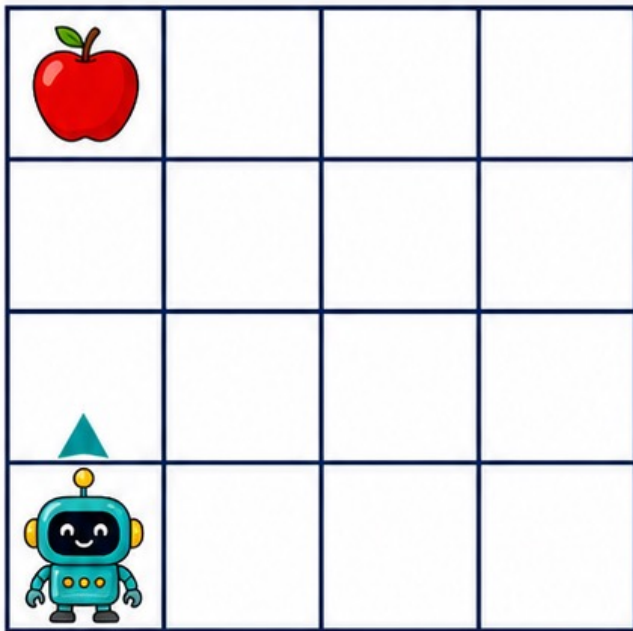


PAUSE

Wait on the square.

CHALLENGE 1

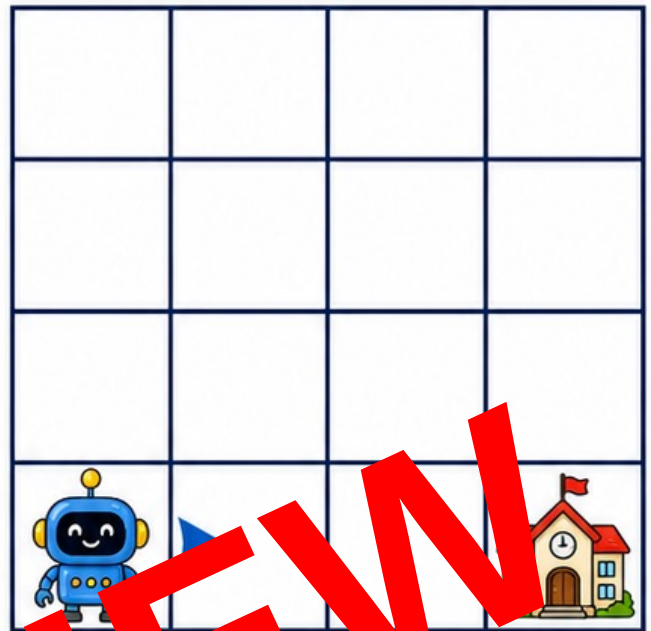
Start facing up.
Reach the apple.



Write the commands.

CHALLENGE 2

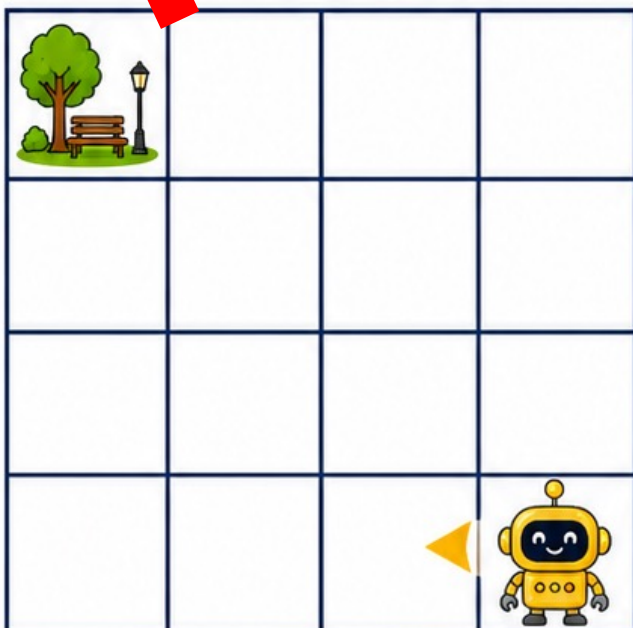
Start facing right.
Reach the school.



Write the commands.

CHALLENGE 3

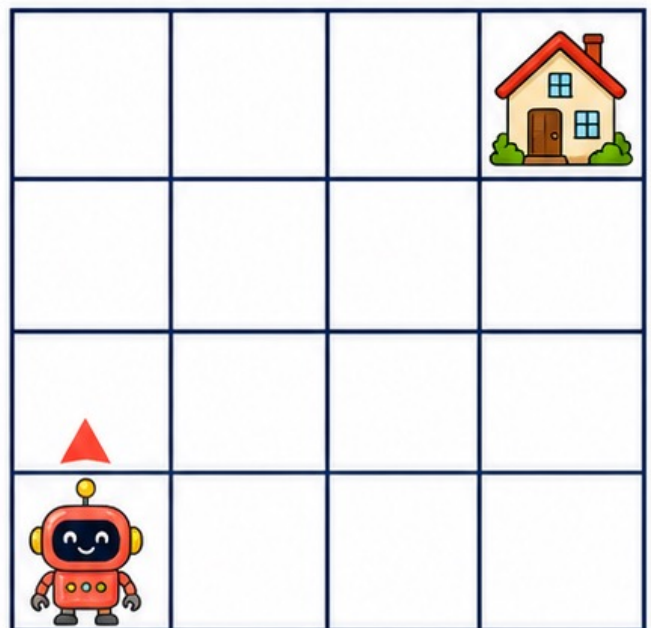
Start facing left.
Reach the park.



Write the commands.

CHALLENGE 4

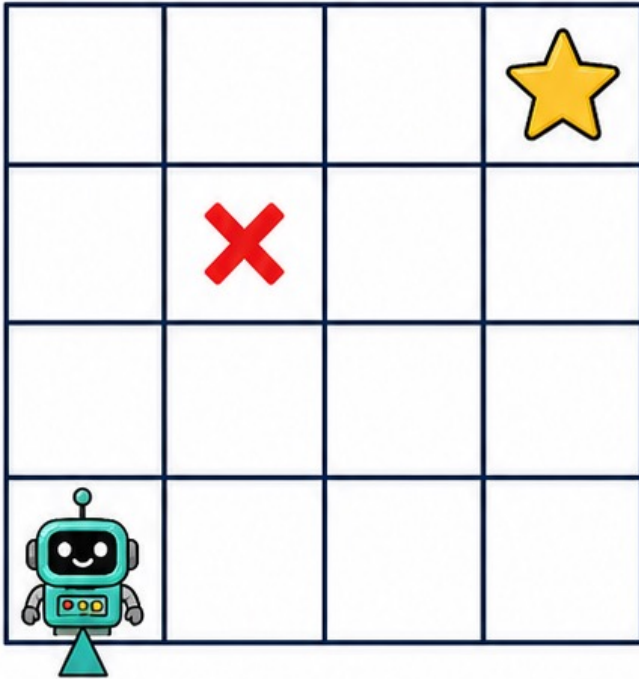
Start facing up.
Reach home.



Write the commands.

CHALLENGE 5

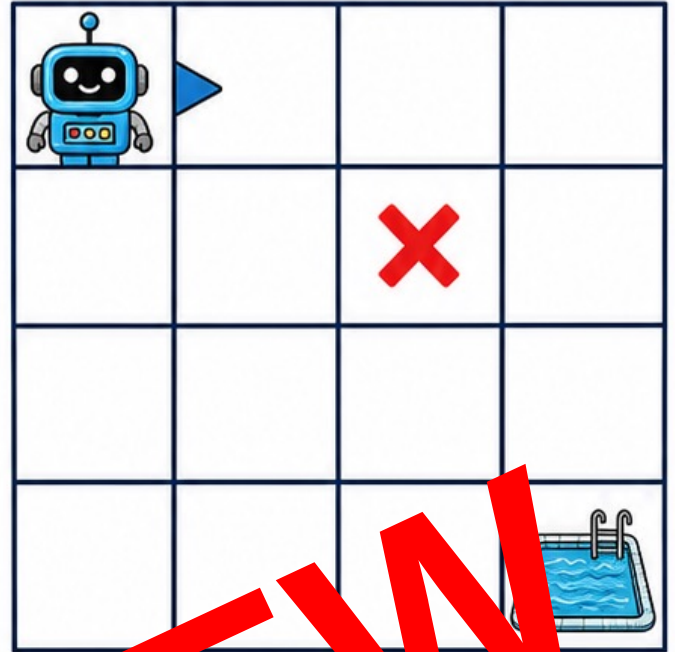
Reach the star. Avoid the X.



Plan and check.

CHALLENGE 6

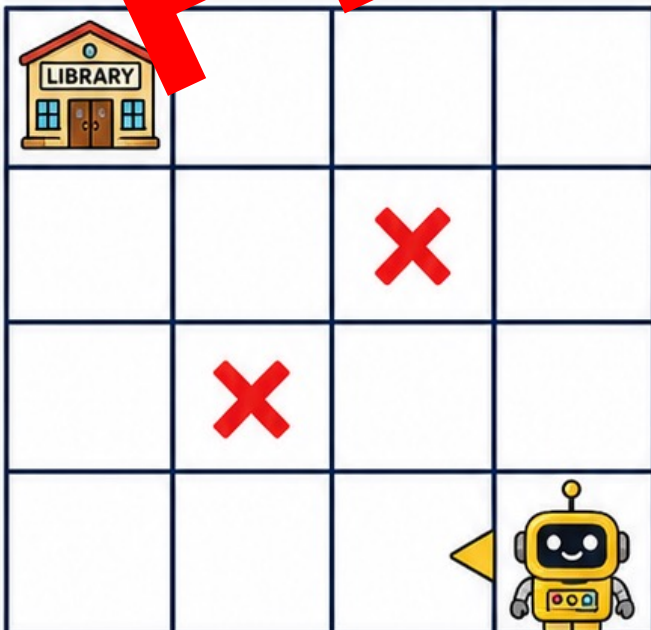
Reach the pool. Avoid the X.



Plan and check.

CHALLENGE 7

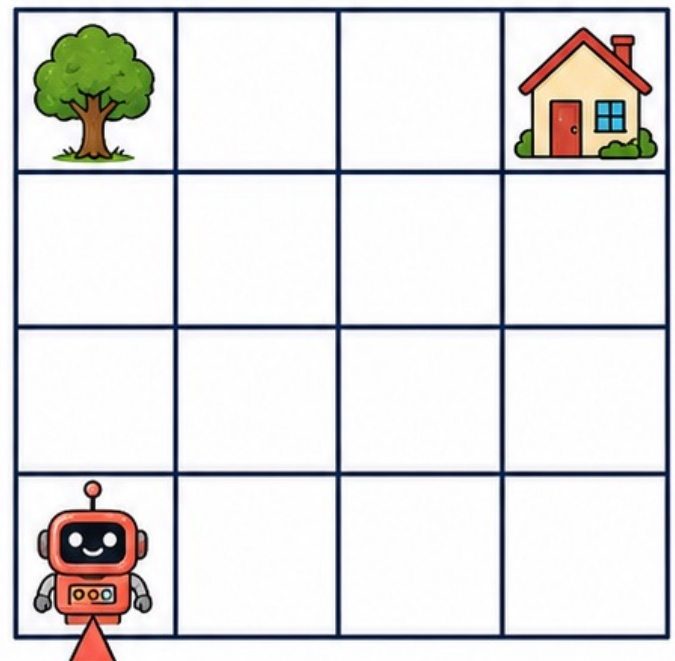
Reach the library. Avoid both Xs.



Plan and check.

CHALLENGE 8

Visit the tree, then home.



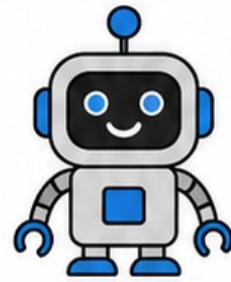
Plan and check.

PROGRAMMER AND ROBOT



PROGRAMMER 1

Say 3 commands.
The robot follows them.



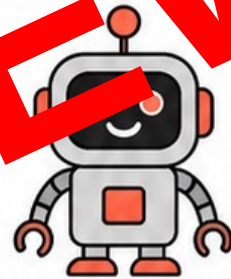
ROBOT 1

Face the start direction.
Move one command
at a time.



PROGRAMMER 2

Add one turn.
Say when to move.



ROBOT 2

Pause after each
command.
Point to your square.



PROGRAMMER 3

Hide one mistake.
Ask your partner to debug.



CHECKER

Did each command
match?
Explain one fix.

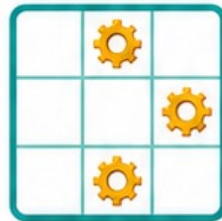


GEAR QUEST



1

Choose a Gear Quest board.



2

Put the robot on START.



3

Plan the commands.



4

Collect every gear.
Avoid the red Xs.



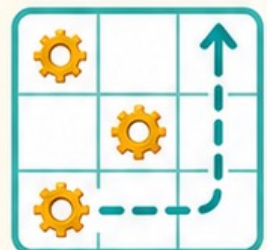
5

Check one command at a time.



TEAM CHALLENGE

Find a different route that still collects every gear.



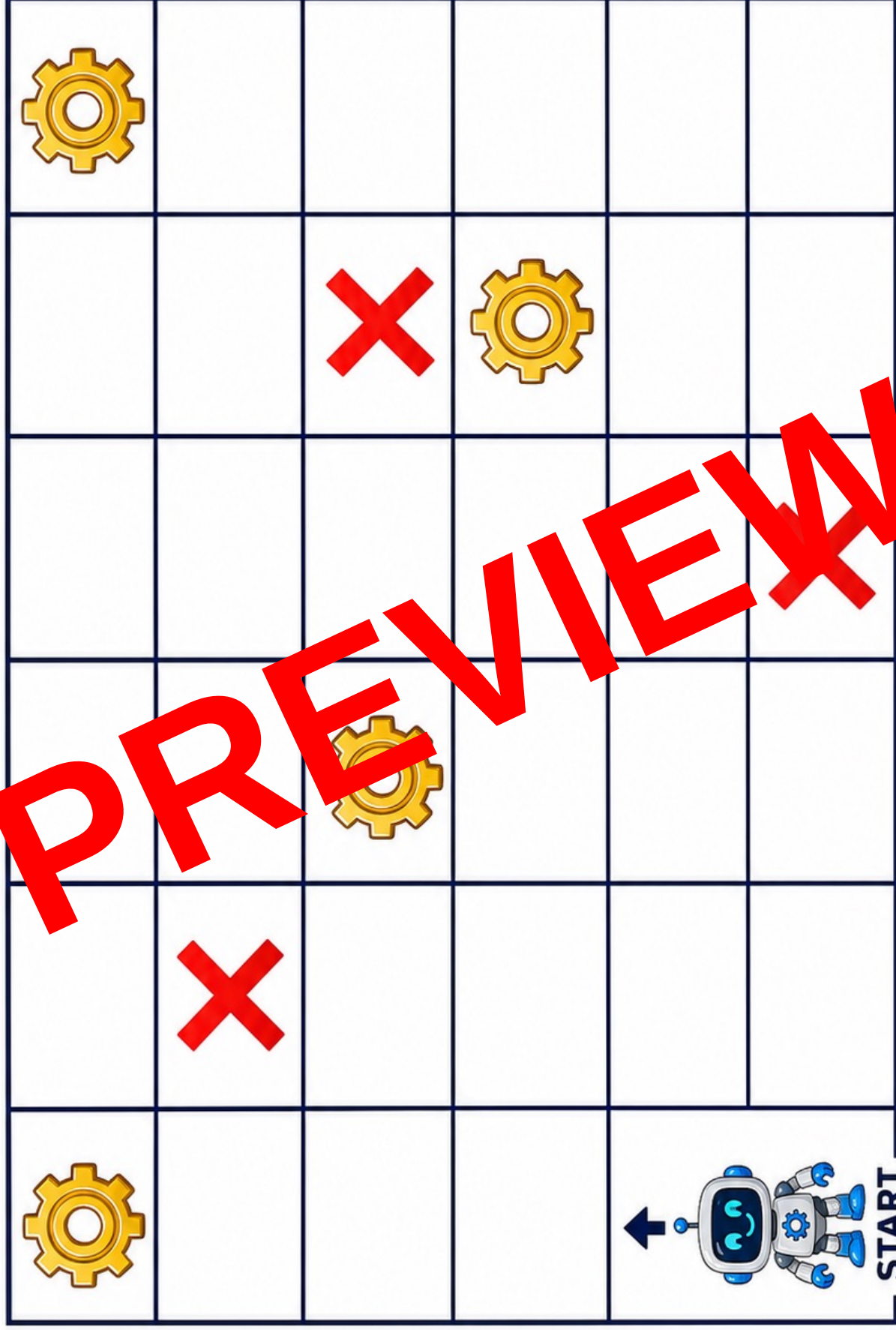
GEAR QUEST: SUPPORT



START

Collect all 3 gears. Avoid the red X.

GEAR QUEST: CHALLENGE



Collect all 4 gears. Avoid the 3 red Xs.

TOWN ROBOT MAP



TOWN MAP TASK CARDS

1.



Start at **START**,
facing up.
Go to **SCHOOL**.

2.



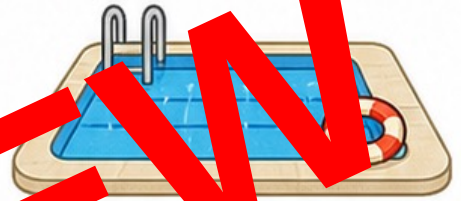
Start at **START**,
facing up.
Go to **PARK**.

3.



Start at **START**,
facing up.
Go to **LIBRARY**.

4.



Start at **START**,
facing up.
Go to **POOL**.

5.



Start at **START**,
facing up.
Go to **HOME**.

6.



Start at **SCHOOL**,
facing right.
Go to **PARK**.

7.



Start at **START**,
facing up.
Visit **HOME**, then **POOL**.

8.



Start at **START**,
facing up.
Visit any two places.
Find a short route.

TOWN MAP ROUTE PLANNER



Start at: _____

Face: up right down left

Destination: _____



MY ALGORITHM

PREVIEW

CHECK IT

☐

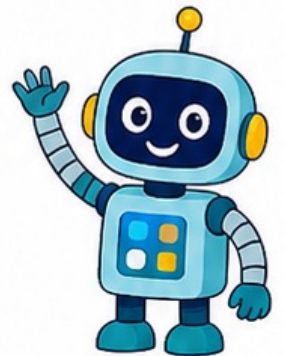
started in the right square.

☐

I faced the right way.

☐

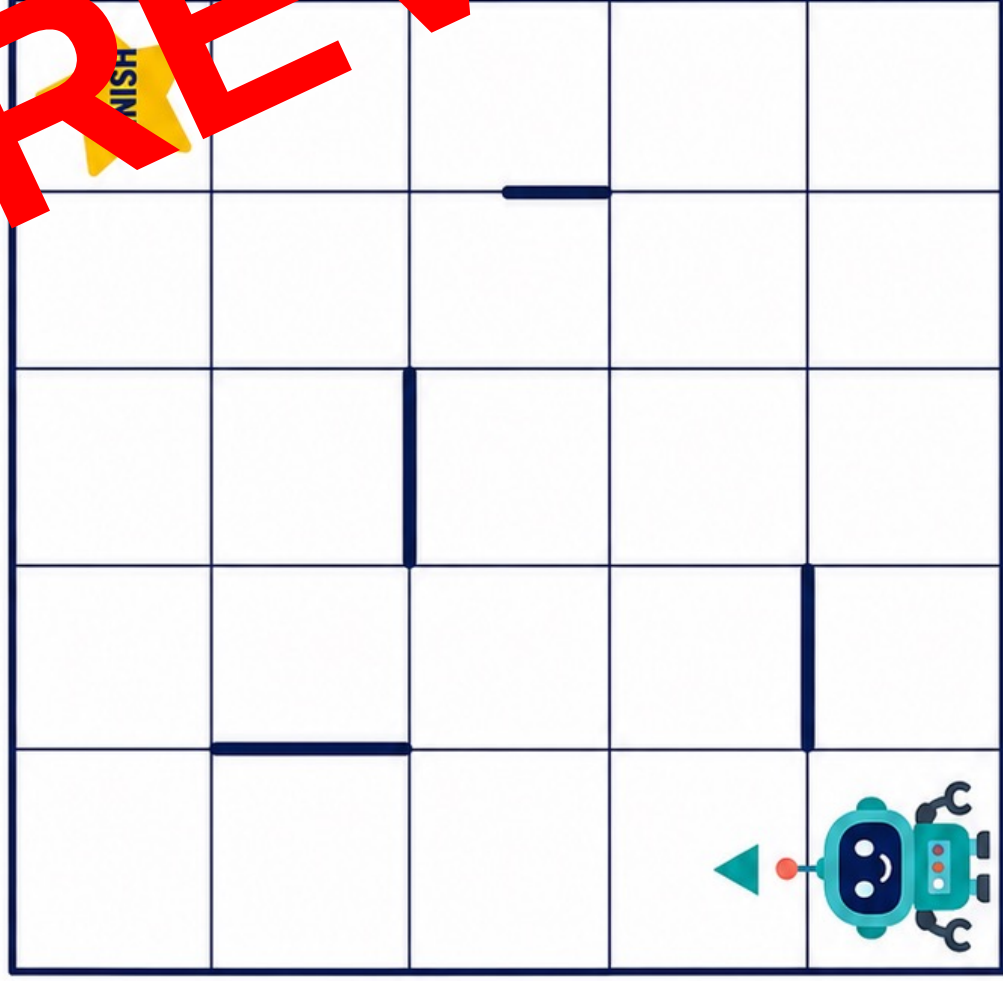
I checked one command at a time.



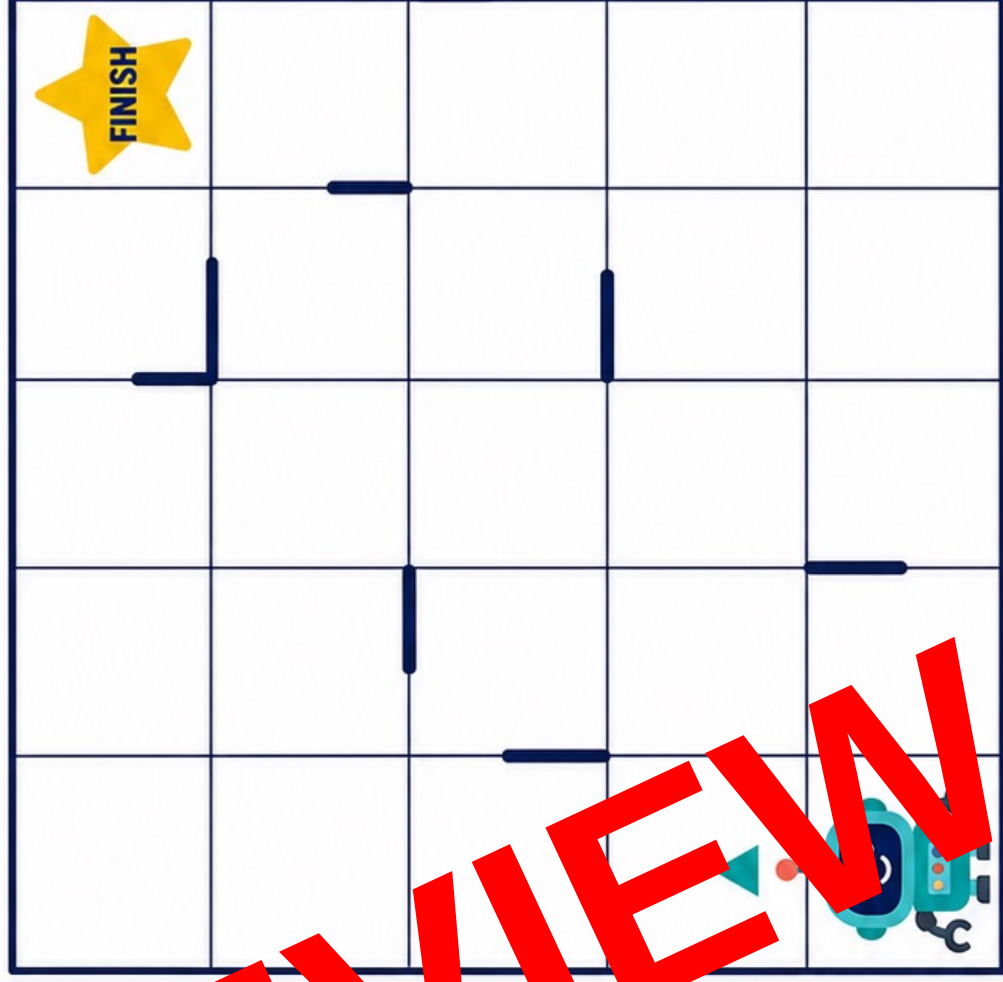
A DIFFERENT ROUTE

ROBOT MAZE BUILDER

SUPPORT MAZE



CHALLENGE MAZE



Plan a route. Check one command at a time.

ROBOT MAZE TILES



FORWARD



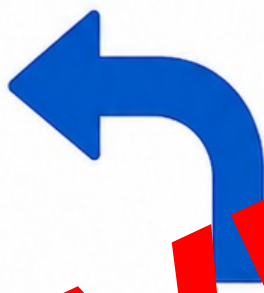
FORWARD



FORWARD



FORWARD



TURN LEFT



TURN LEFT



TURN RIGHT



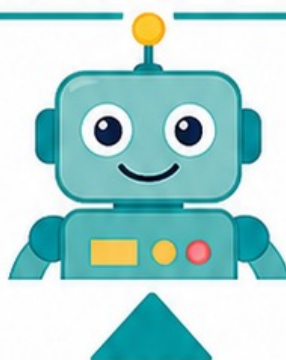
TURN RIGHT



BACKWARD



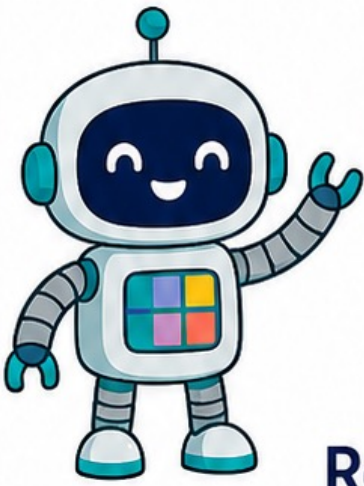
BLOCK



START

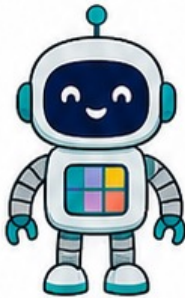
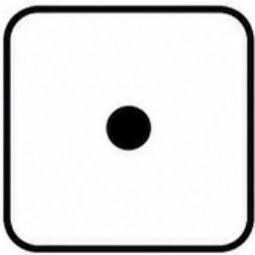


FINISH



ROLL AND PROGRAM

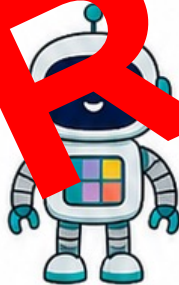
Roll the die. Add the matching command. Test your algorithm.



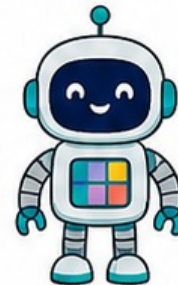
1 — FORWARD



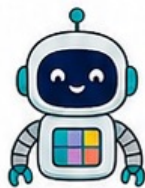
2 — BACKWARD



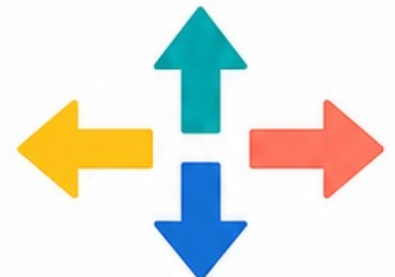
3 — TURN LEFT



4 — TURN RIGHT



5 — FORWARD TWICE



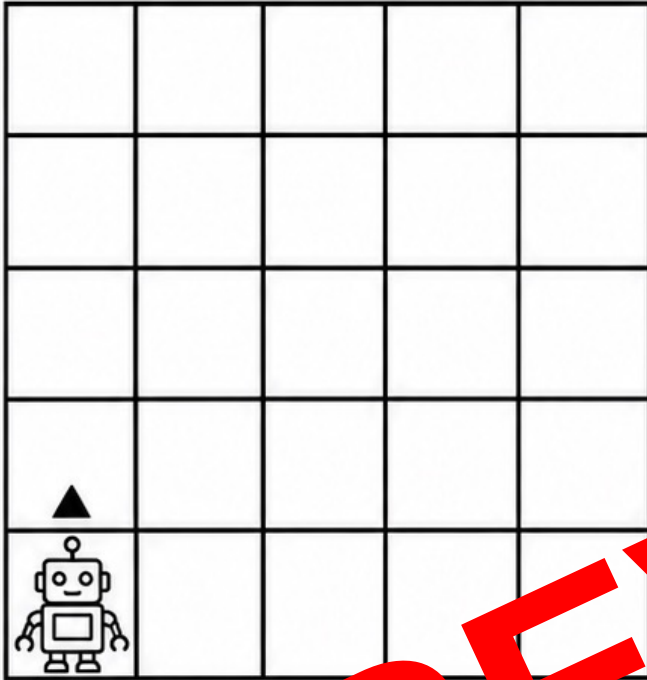
6 — CHOOSE A COMMAND

If a command would leave the grid, pause and roll again.

ROLL AND PROGRAM

Name: _____

ROUND 1

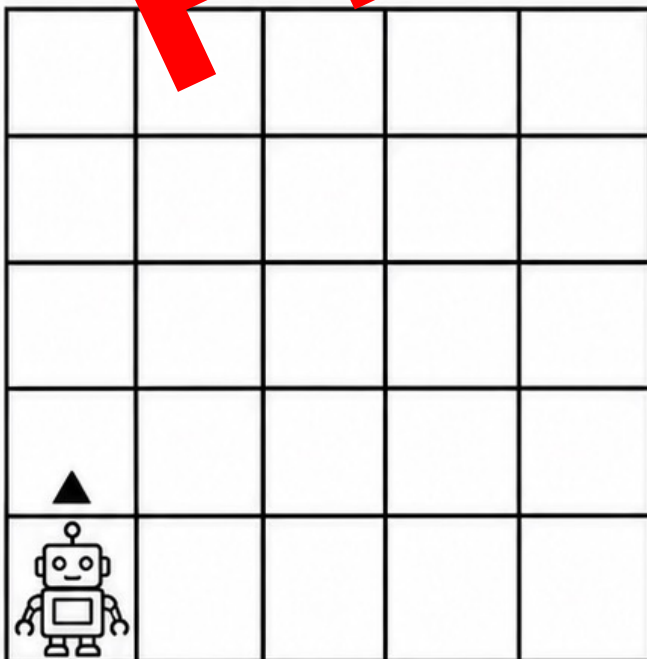


Rolls:



Commands:

ROUND 2



Rolls:



Commands:

☐

Test one command at a time.

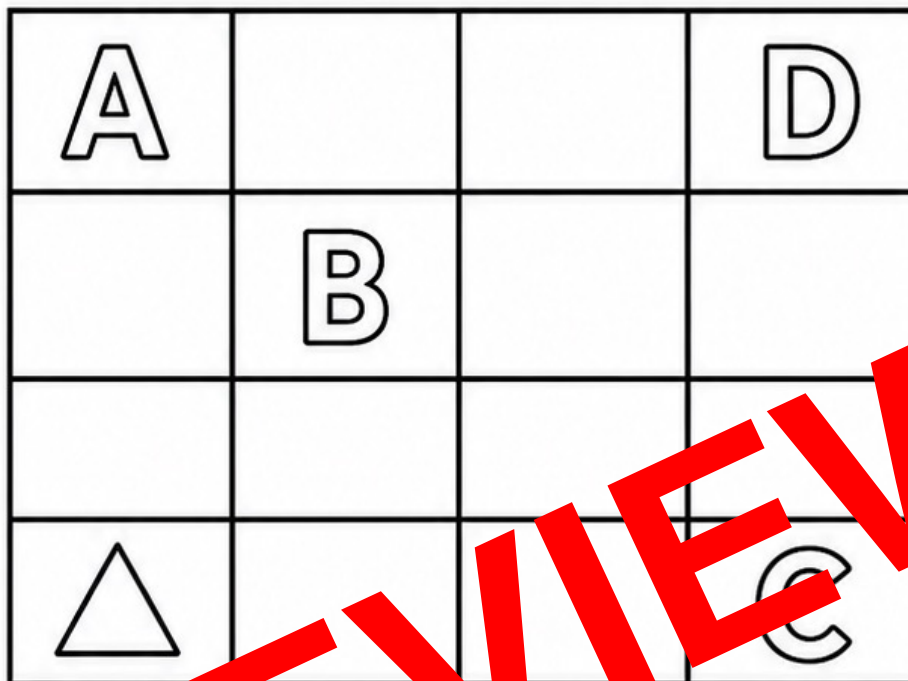
FOLLOW THE ROUTE

PAGE 1

Name: _____

Follow each algorithm. Circle the endpoint.

1.



FORWARD



FORWARD

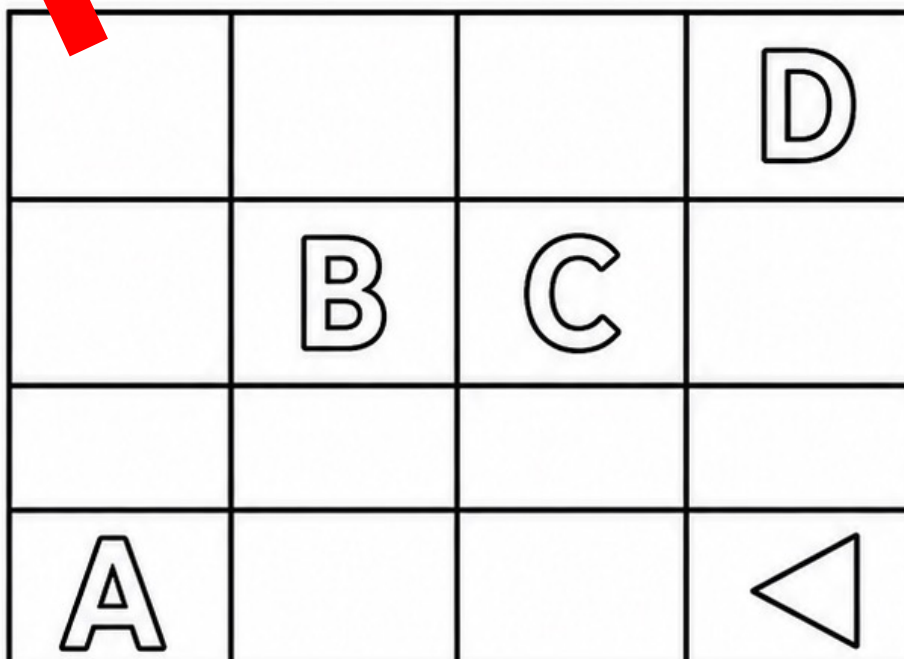


TURN RIGHT



FORWARD

2.



FORWARD



TURN RIGHT



FORWARD



FORWARD

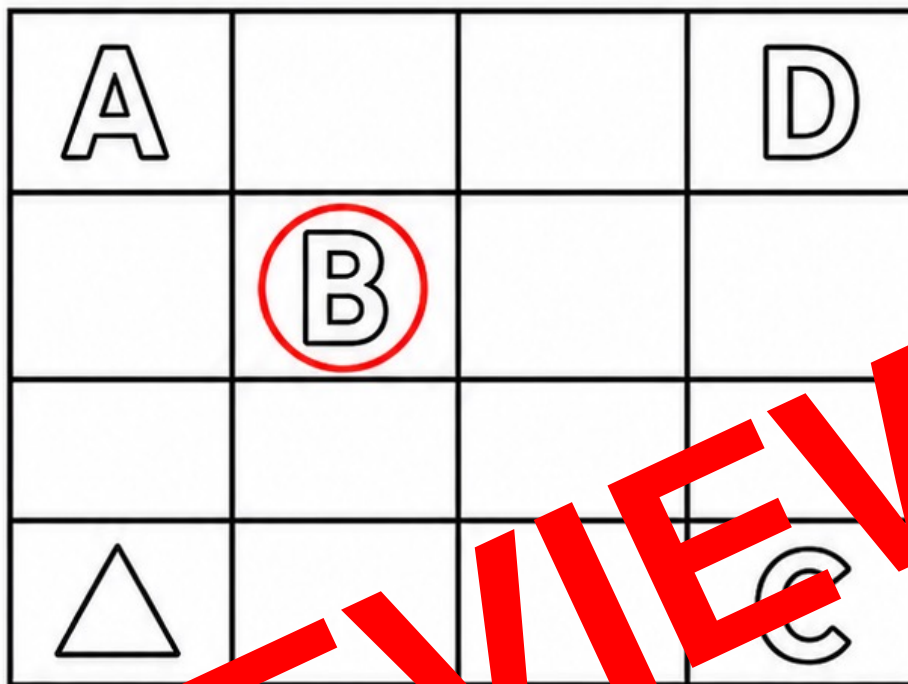
FOLLOW THE ROUTE

PAGE 1

Name: **ANSWERS**

Follow each algorithm. Circle the endpoint.

1.



FORWARD



FORWARD

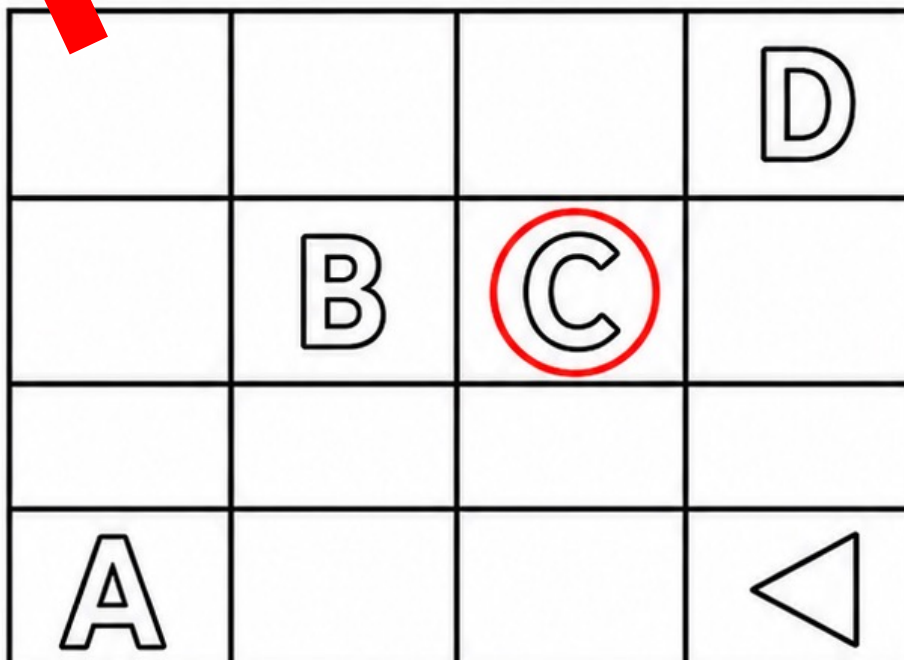


TURN RIGHT



FORWARD

2.



FORWARD



TURN RIGHT



FORWARD



FORWARD

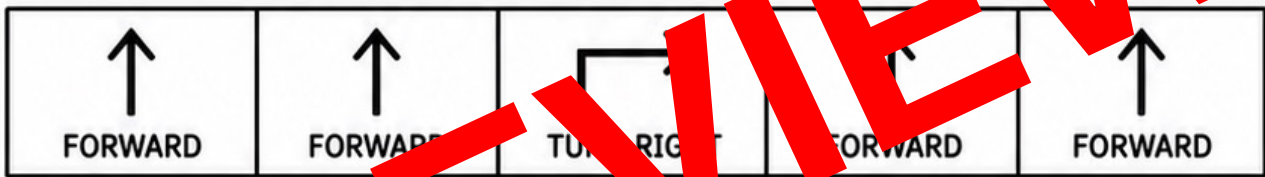
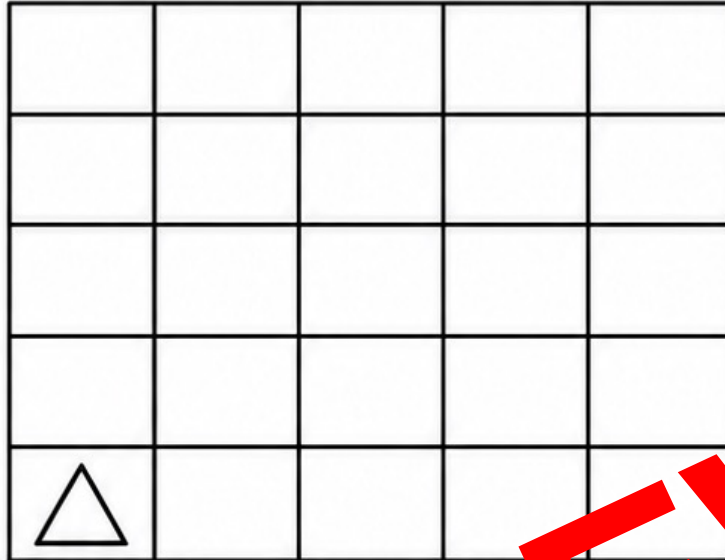
FOLLOW THE ROUTE

PAGE 2

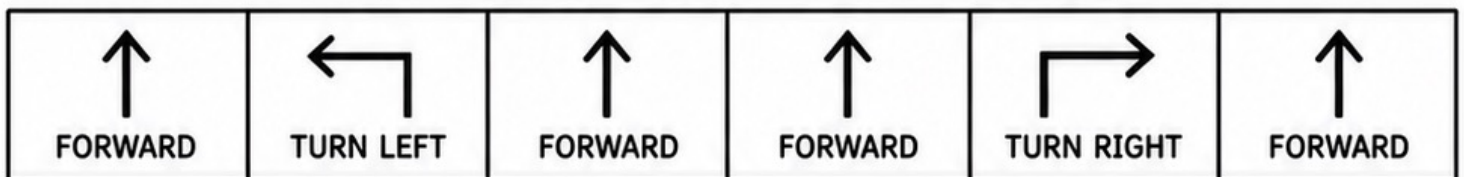
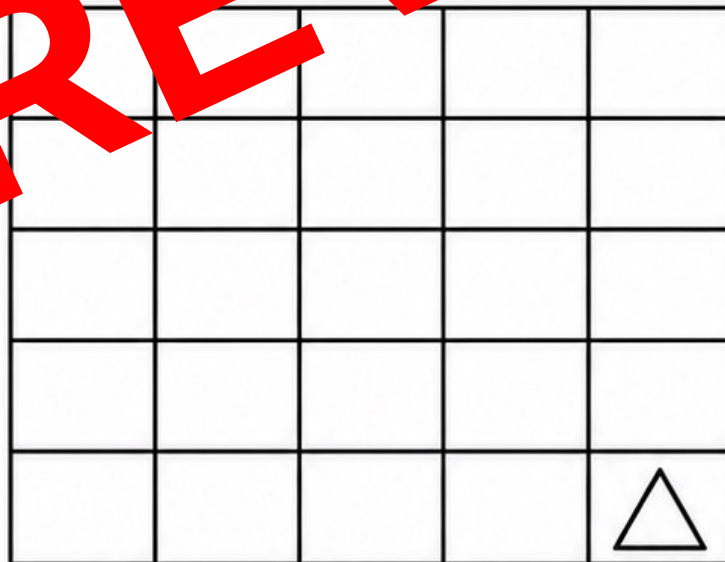
Name:

Follow each algorithm. Draw an X on the endpoint.

1.



2.



Do both robots finish on the same square?

☐

YES

☐

NO

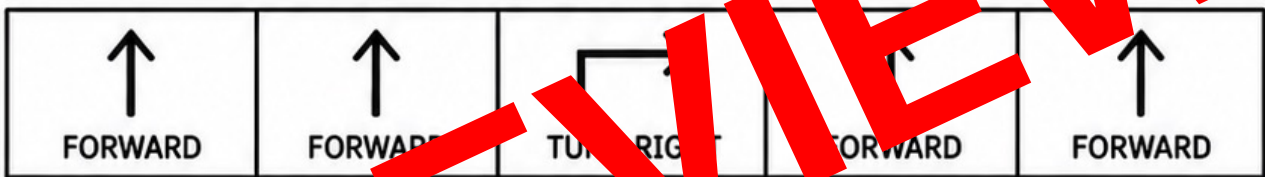
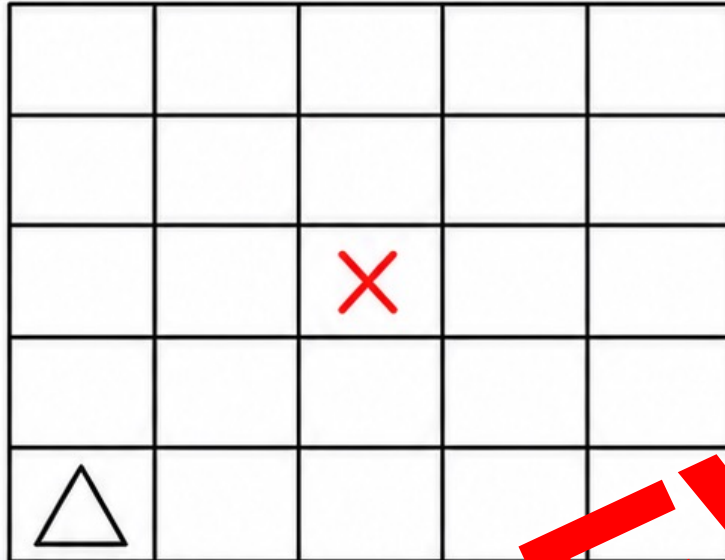
FOLLOW THE ROUTE

PAGE 2

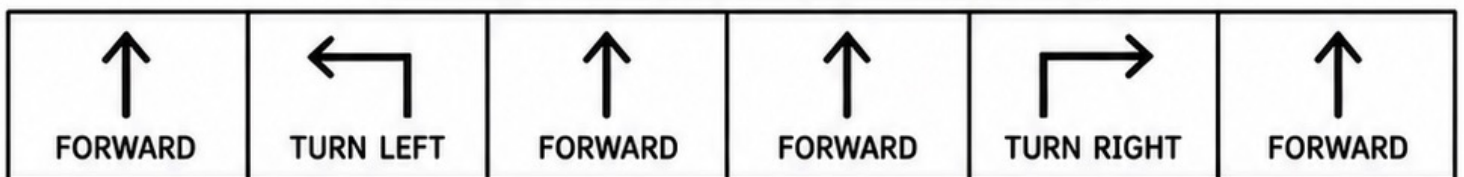
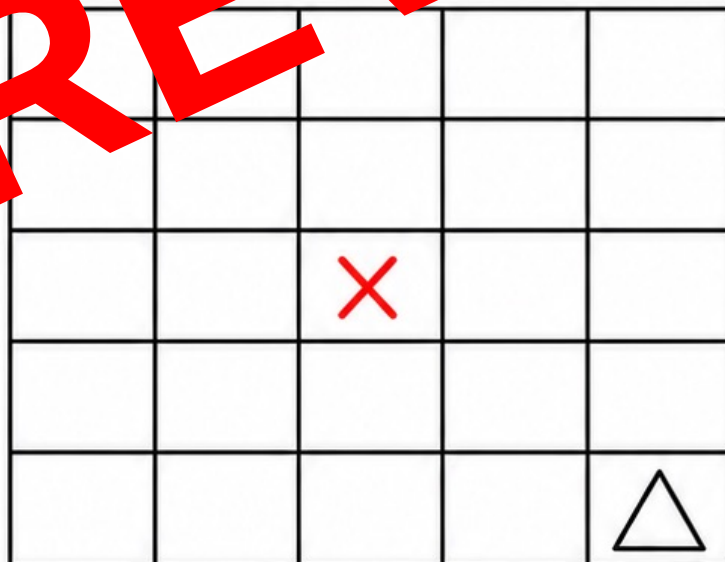
Name: **ANSWERS**

Follow each algorithm. Draw an X on the endpoint.

1.



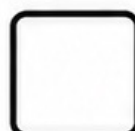
2.



Do both robots finish on the same square?



YES



NO

MISSING ROBOT COMMANDS

PAGE 1

Name:

Write the missing command.

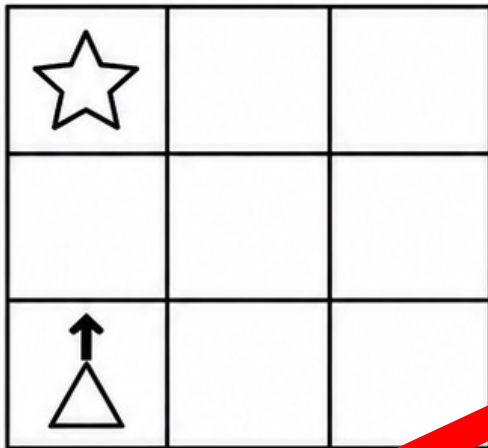
FORWARD

BACKWARD

TURN LEFT

TURN RIGHT

1.



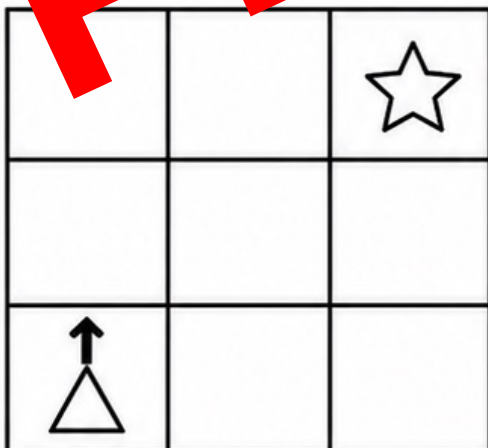
FORWARD

2.



FORWARD

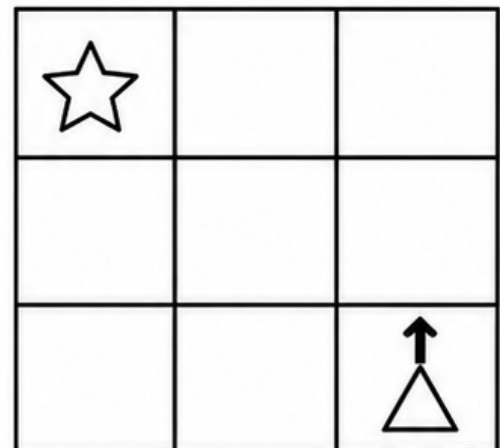
3.



FORWARD FORWARD

FORWARD FORWARD

4.



FORWARD FORWARD

FORWARD FORWARD

MISSING ROBOT COMMANDS

PAGE 1

Name: **ANSWERS**

Write the missing command.

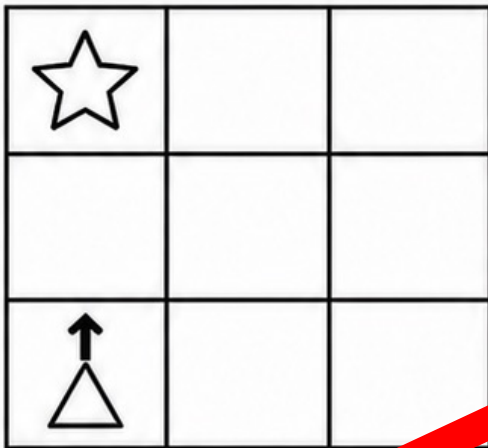
FORWARD

BACKWARD

TURN LEFT

TURN RIGHT

1.



FORWARD

FORWARD

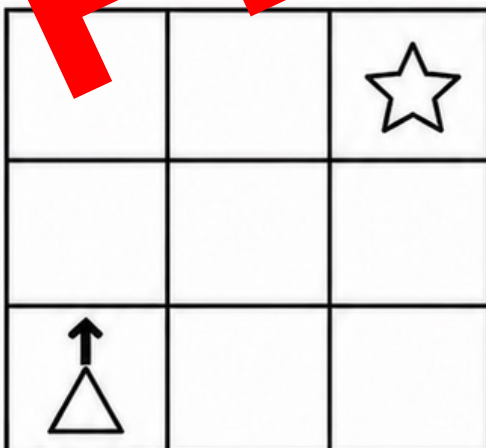
2.



FORWARD

FORWARD

3.

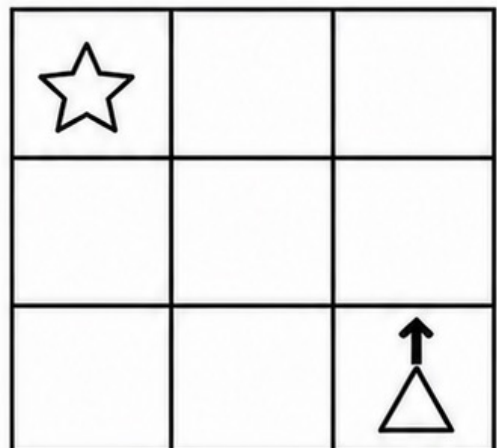


FORWARD FORWARD

**TURN
RIGHT**

FORWARD FORWARD

4.



FORWARD FORWARD

**TURN
LEFT**

FORWARD FORWARD

Missing Robot Commands

PAGE 2

Name: _____

Use the grid to write the missing command.

FORWARD



BACKWARD



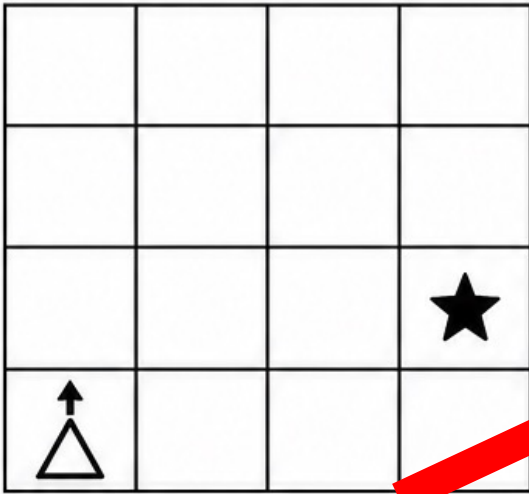
TURN LEFT



TURN RIGHT



1.



FORWARD



FORWARD

FORWARD

FORWARD



2.



FORWARD



FORWARD



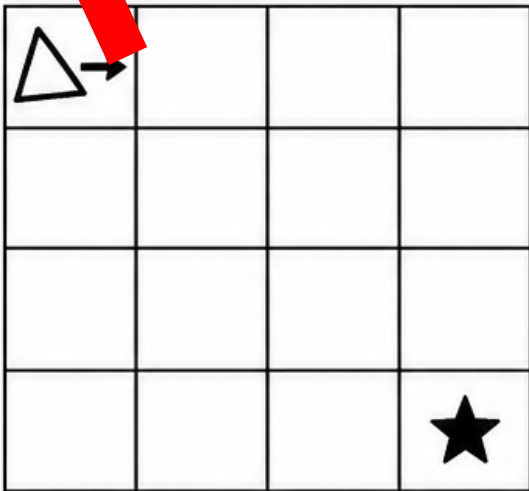
FORWARD



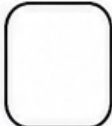
FORWARD



3.



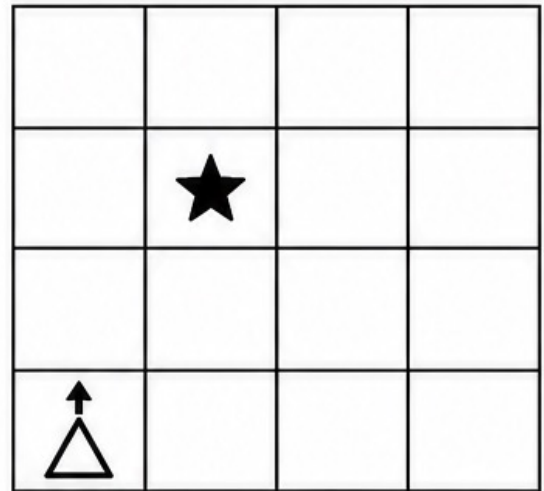
FORWARD FORWARD FORWARD



FORWARD FORWARD FORWARD



4.



FORWARD



FORWARD



TURN RIGHT



Missing Robot Commands

PAGE 2

Name: **ANSWERS**

Use the grid to write the missing command.

FORWARD



BACKWARD



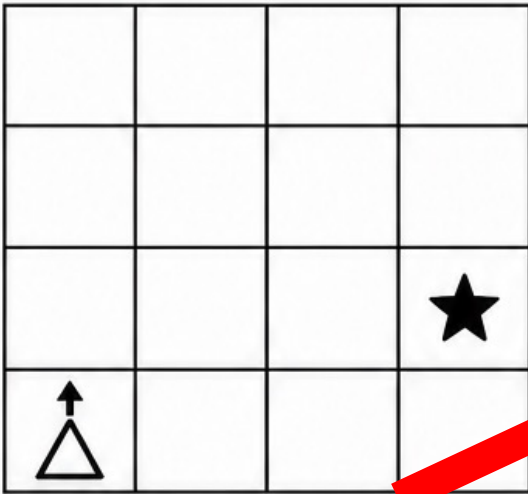
TURN LEFT



TURN RIGHT



1.



FORWARD



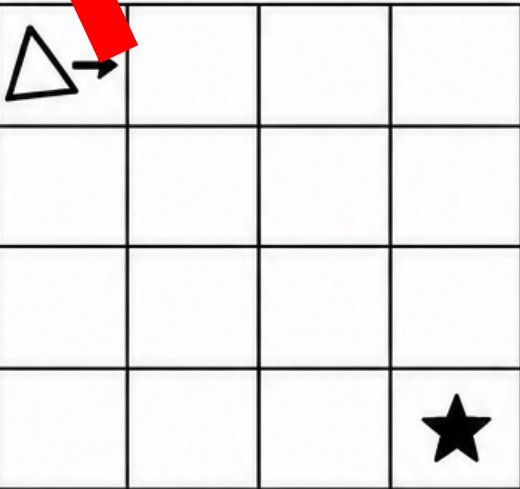
TURN
RIGHT

FORWARD

FORWARD

FORWARD

3.



FORWARD FORWARD FORWARD



TURN
RIGHT

FORWARD



2.



FORWARD



FORWARD



TURN
LEFT

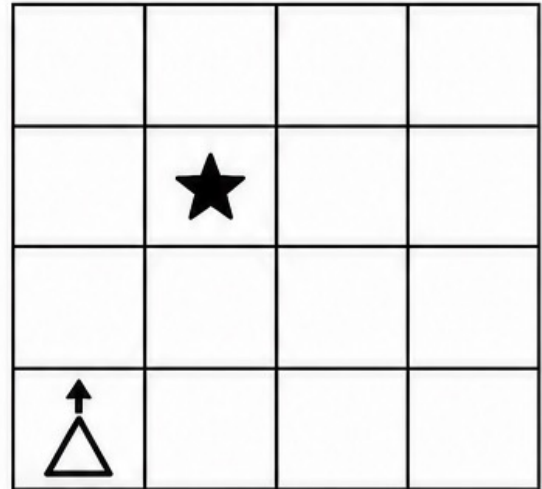
FORWARD



FORWARD



4.



FORWARD



FORWARD



TURN RIGHT



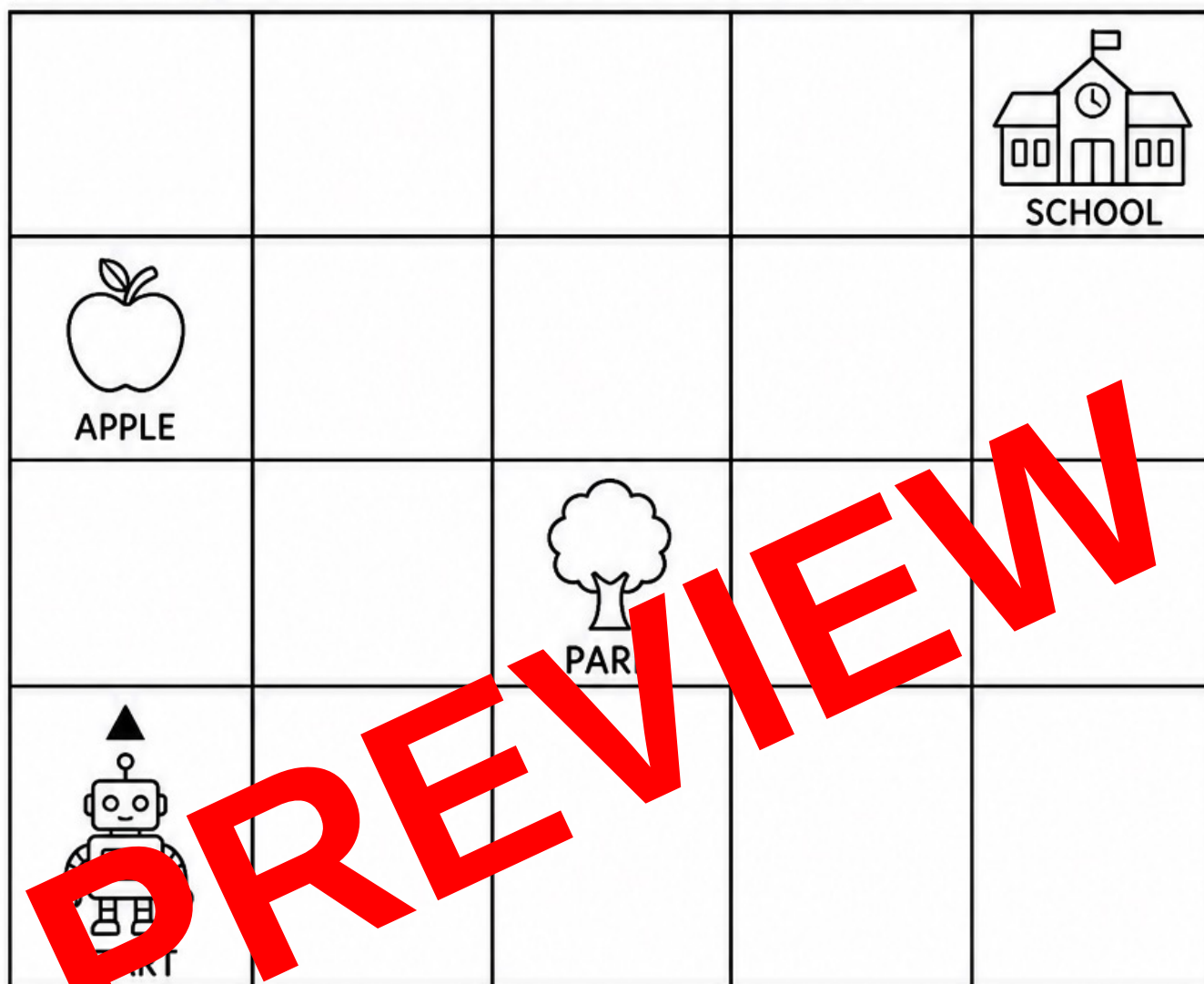
FORWARD

Map A Route

PAGE 1

Name:

Write an algorithm from START to each place.



1. Go to APPLE.

--	--	--	--	--	--

2. Go to PARK.

--	--	--	--	--	--

A turn changes the way the robot faces. It stays on the same square

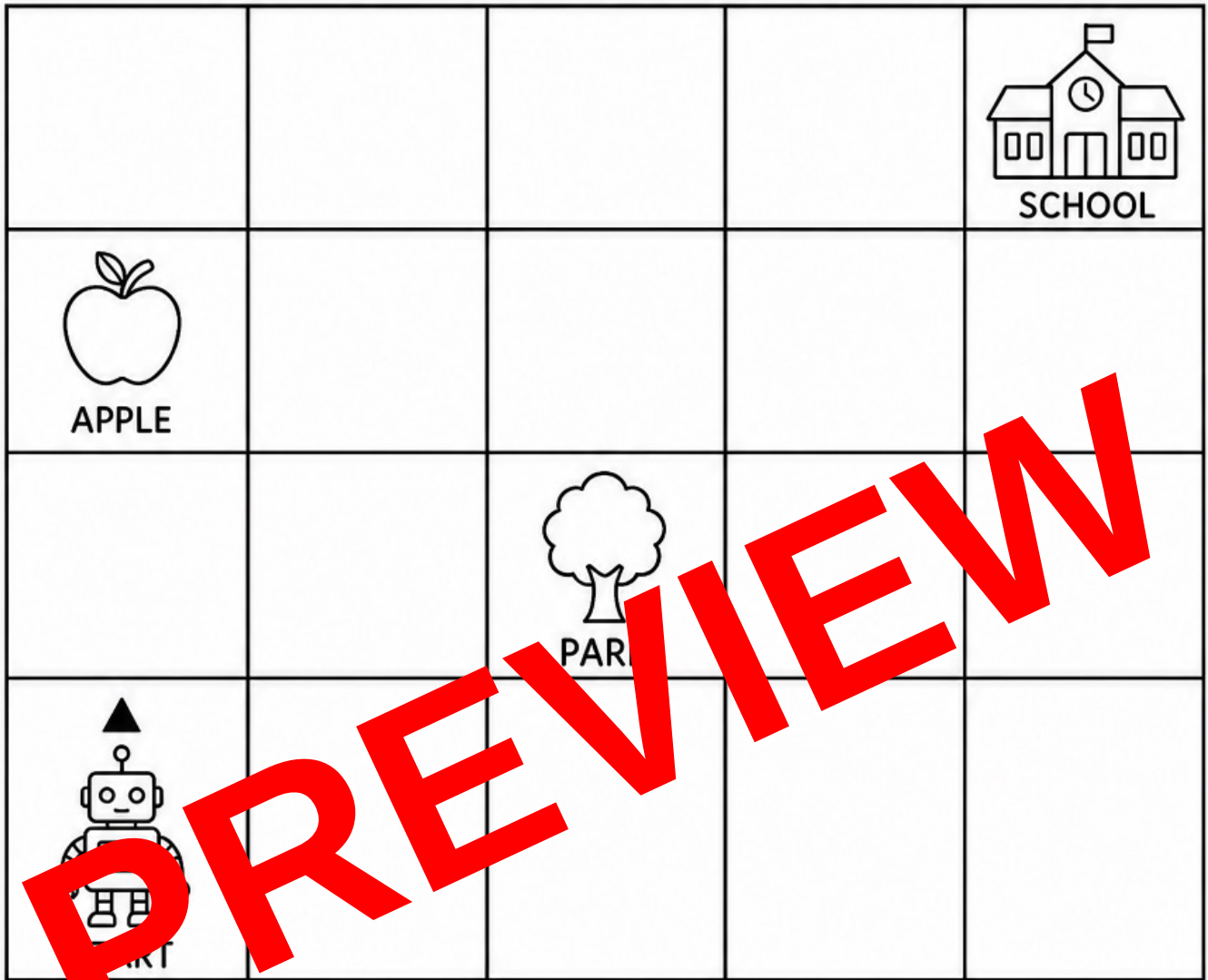
Map A Route

PAGE 1

Name:

ANSWERS

Write an algorithm from START to each place.



1. Go to APPLE.

FORWARD	FORWARD				
---------	---------	--	--	--	--

2. Go to PARK.

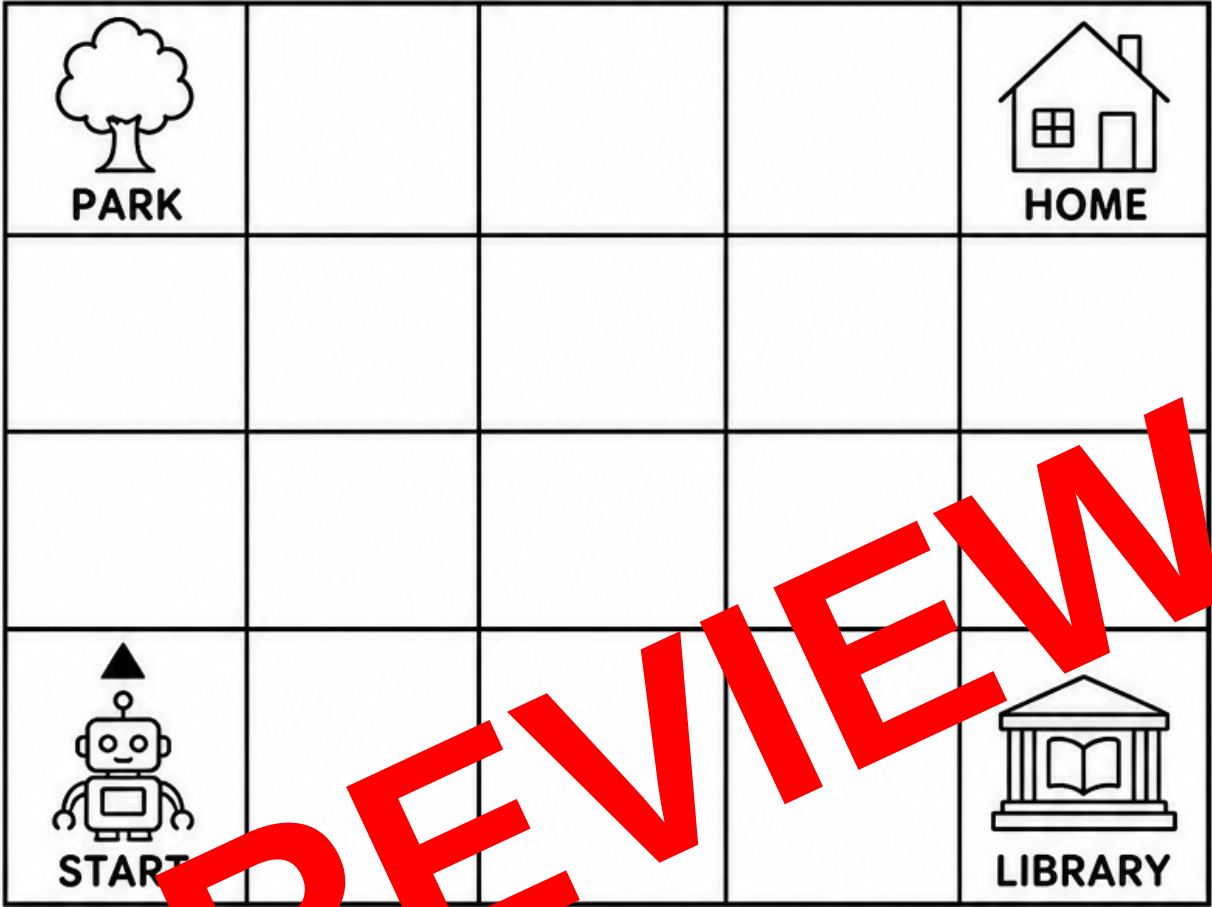
FORWARD	TURN RIGHT	FORWARD	FORWARD		
---------	------------	---------	---------	--	--

A turn changes the way the robot faces. It stays on the same square

Map A Route

Name:

Write both algorithms. Then compare them.



1. Visit PARK then HOME.

2. Visit LIBRARY, then HOME.

Which route uses fewer commands?

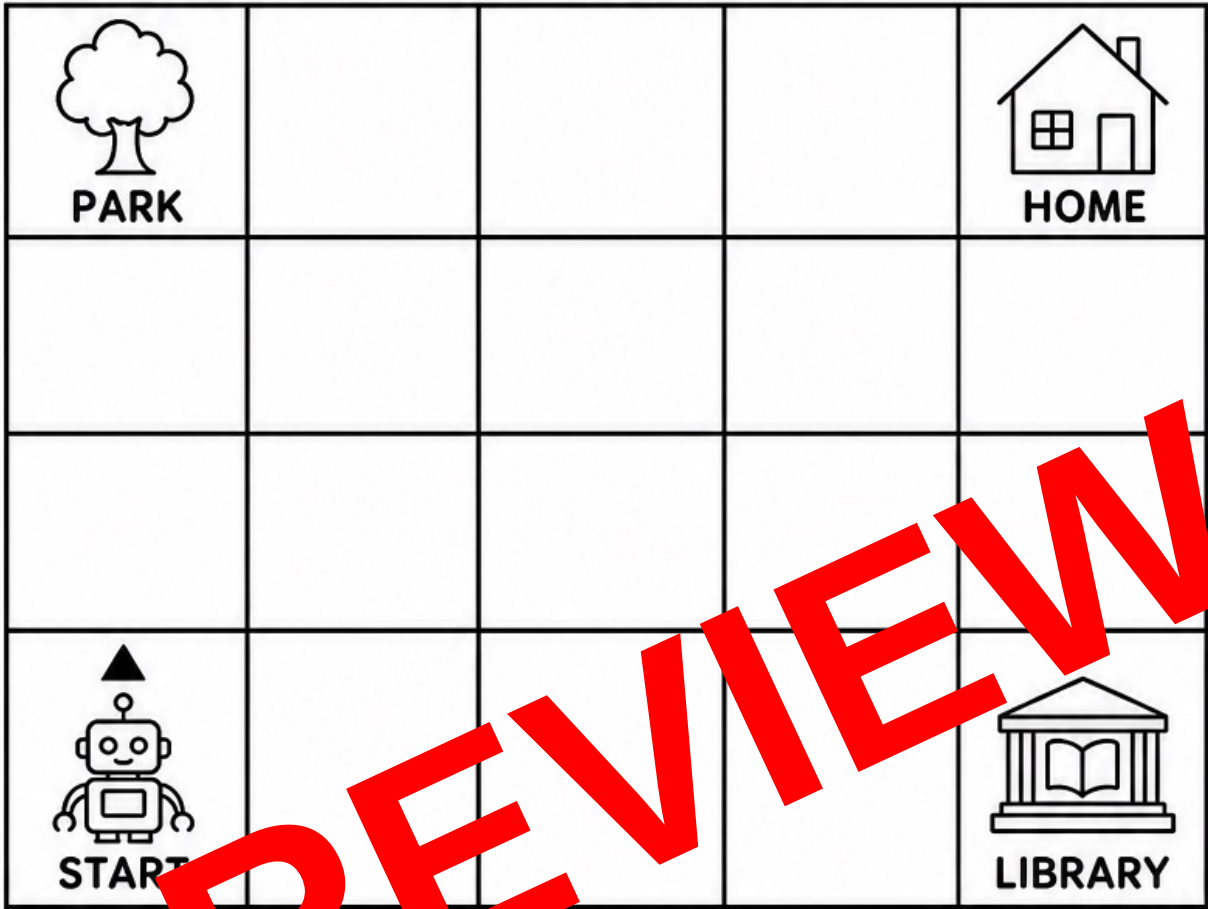
ROUTE 1

ROUTE 2

Map A Route

Name: **ANSWERS**

Write both algorithms. Then compare them.



1. Visit PARK then HOME.

F	F	F	R	F
F	F	F	F	

2. Visit LIBRARY, then HOME.

R	F	F	F	F
L	F	F	F	

Which route uses fewer commands?

ROUTE 1 ☒

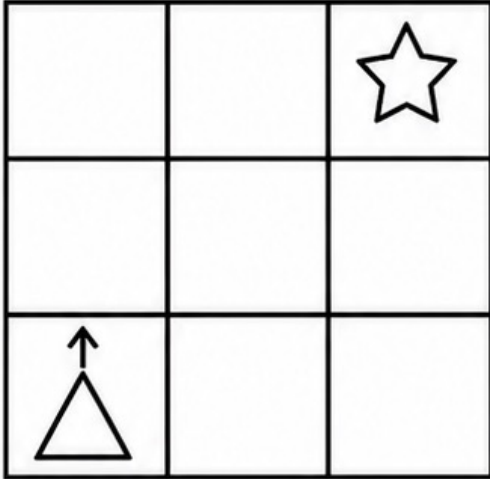
ROUTE 2

DEBUG THE ROBOT

Name: _____

One command is wrong. Cross it out and write the correct command.

1.



FORWARD FORWARD TURN LEFT FORWARD FORWARD

Replace _____ with _____

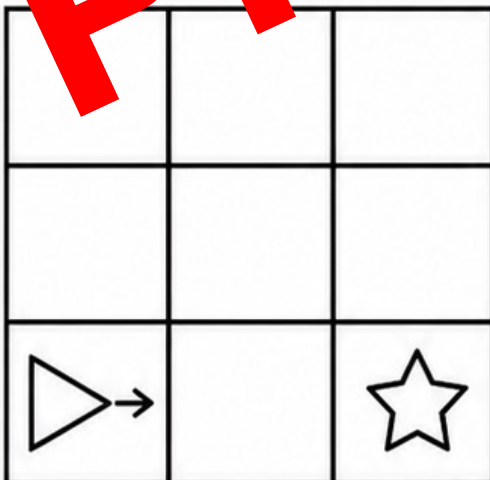
2.



FORWARD FORWARD TURN RIGHT FORWARD FORWARD

Replace _____ with _____

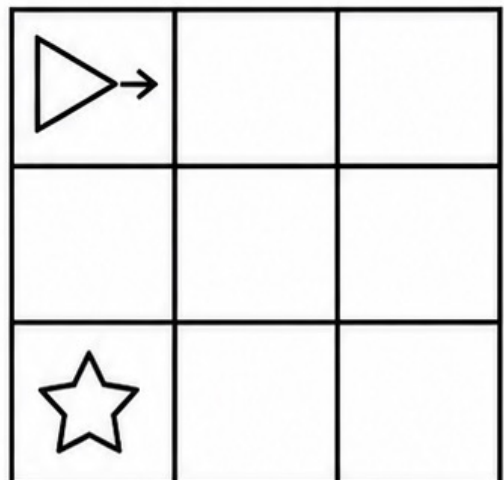
3.



FORWARD BACKWARD

Replace _____ with _____

4.



TURN LEFT FORWARD FORWARD

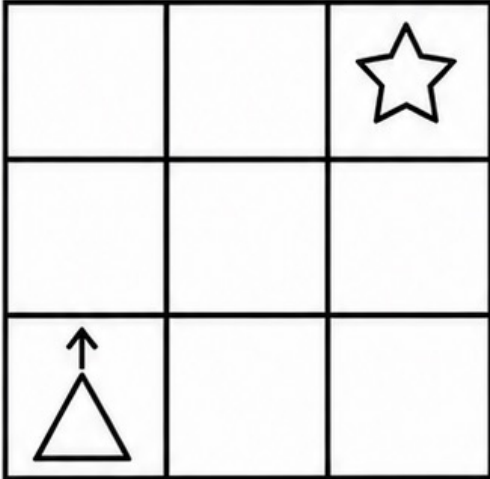
Replace _____ with _____

DEBUG THE ROBOT

Name: **ANSWERS**

One command is wrong. Cross it out and write the correct command.

1.



FORWARD FORWARD ~~TURN LEFT~~ FORWARD FORWARD

Replace TURN LEFT with TURN RIGHT

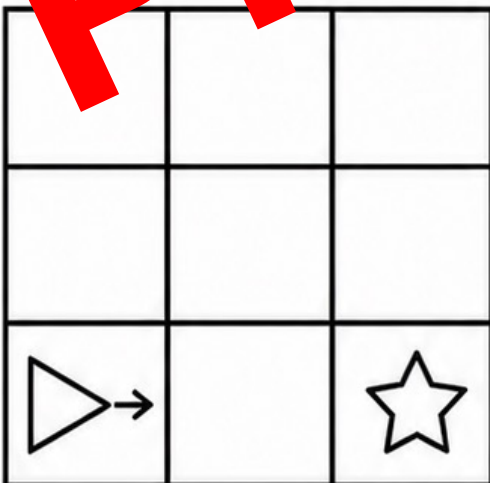
2.



FORWARD FORWARD ~~TURN RIGHT~~ FORWARD FORWARD

Replace TURN RIGHT with TURN LEFT

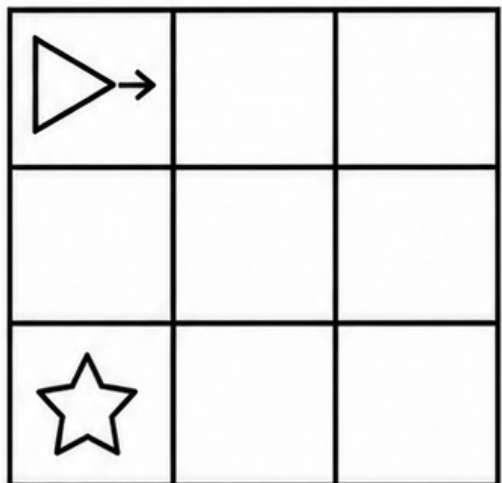
3.



FORWARD ~~BACKWARD~~

Replace BACKWARD with FORWARD

4.



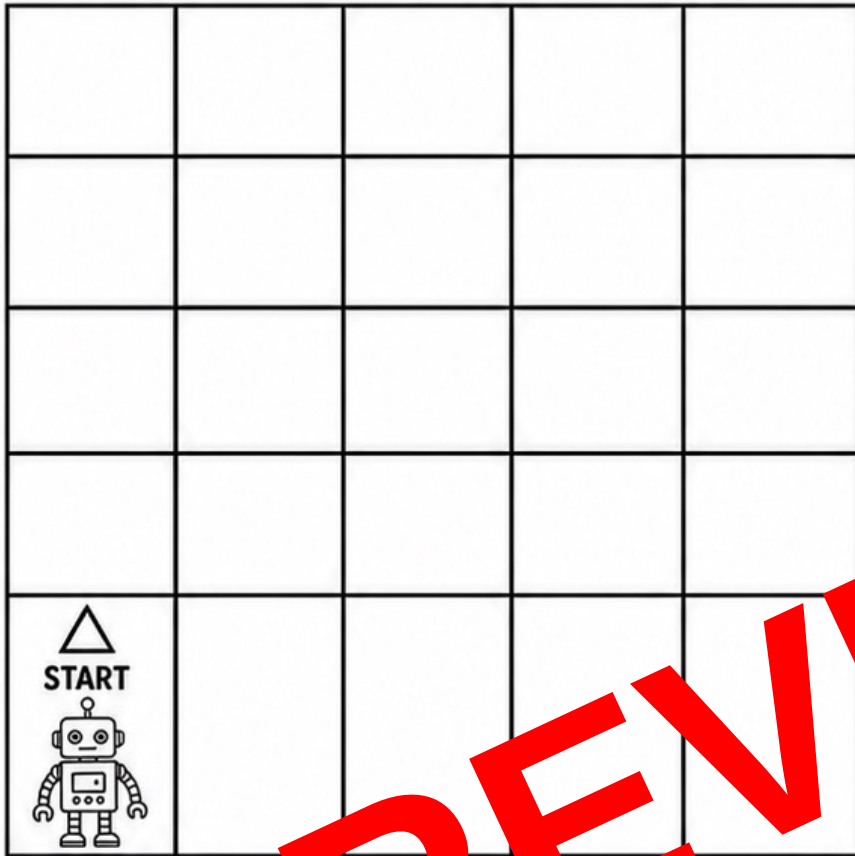
~~TURN LEFT~~ FORWARD FORWARD

Replace TURN LEFT with TURN RIGHT

DESIGN A ROBOT ROUTE

Name: _____

Create, test and improve your own algorithm.



Draw your destination.

MY ALGORITHM

TEST AND IMPROVE

- ☐ I started in the right square.
- ☐ I checked one command at a time.
- ☐ I changed a command if I needed to.

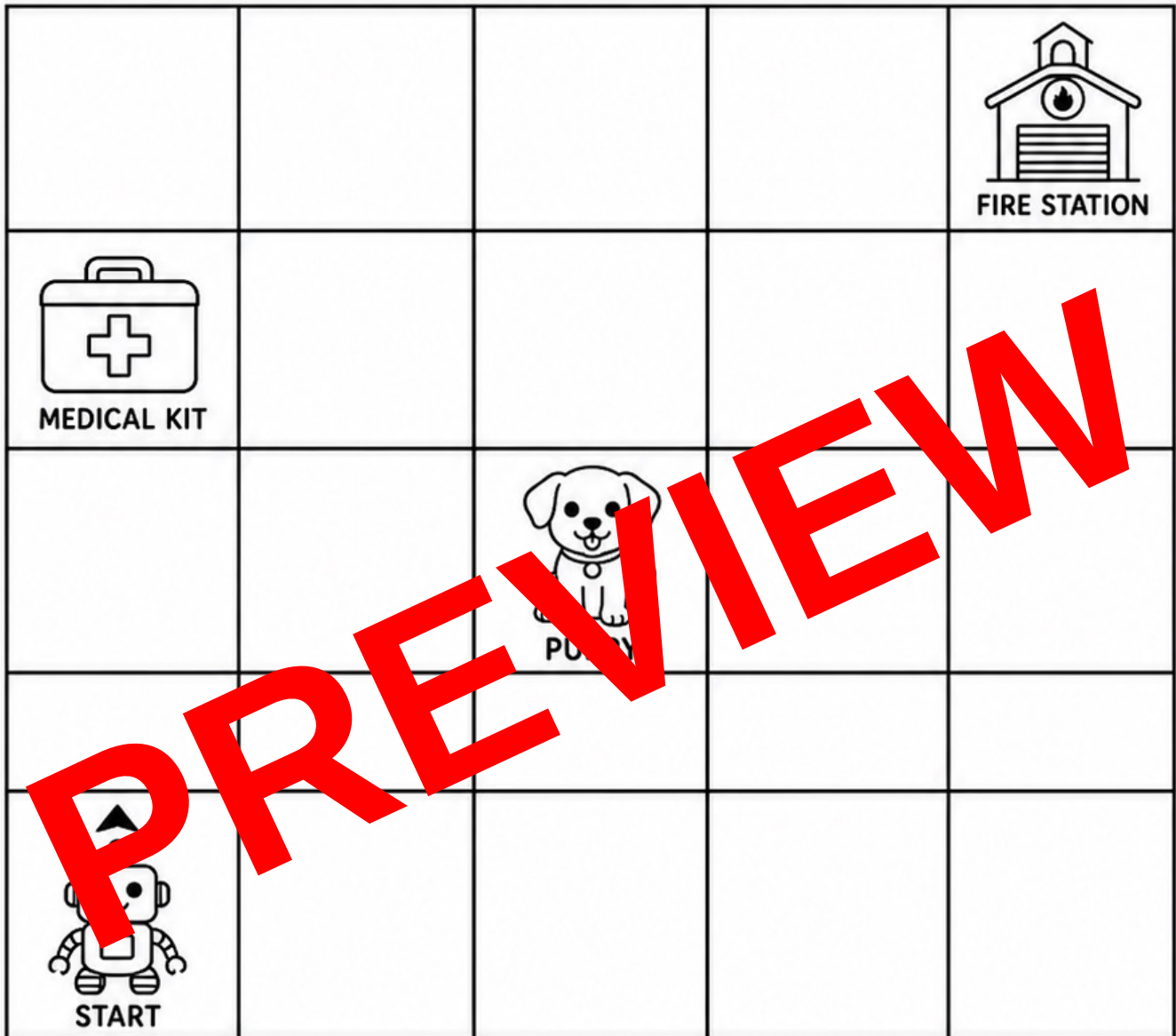
One change I made was: _____

ROBOT RESCUE MISSION

ASSESSMENT — PAGE 1

Name:

Write an algorithm to help the rescue robot.



1. Go to the MEDICAL KIT.

--	--	--	--	--	--

2. Go to the PUPPY.

--	--	--	--	--	--

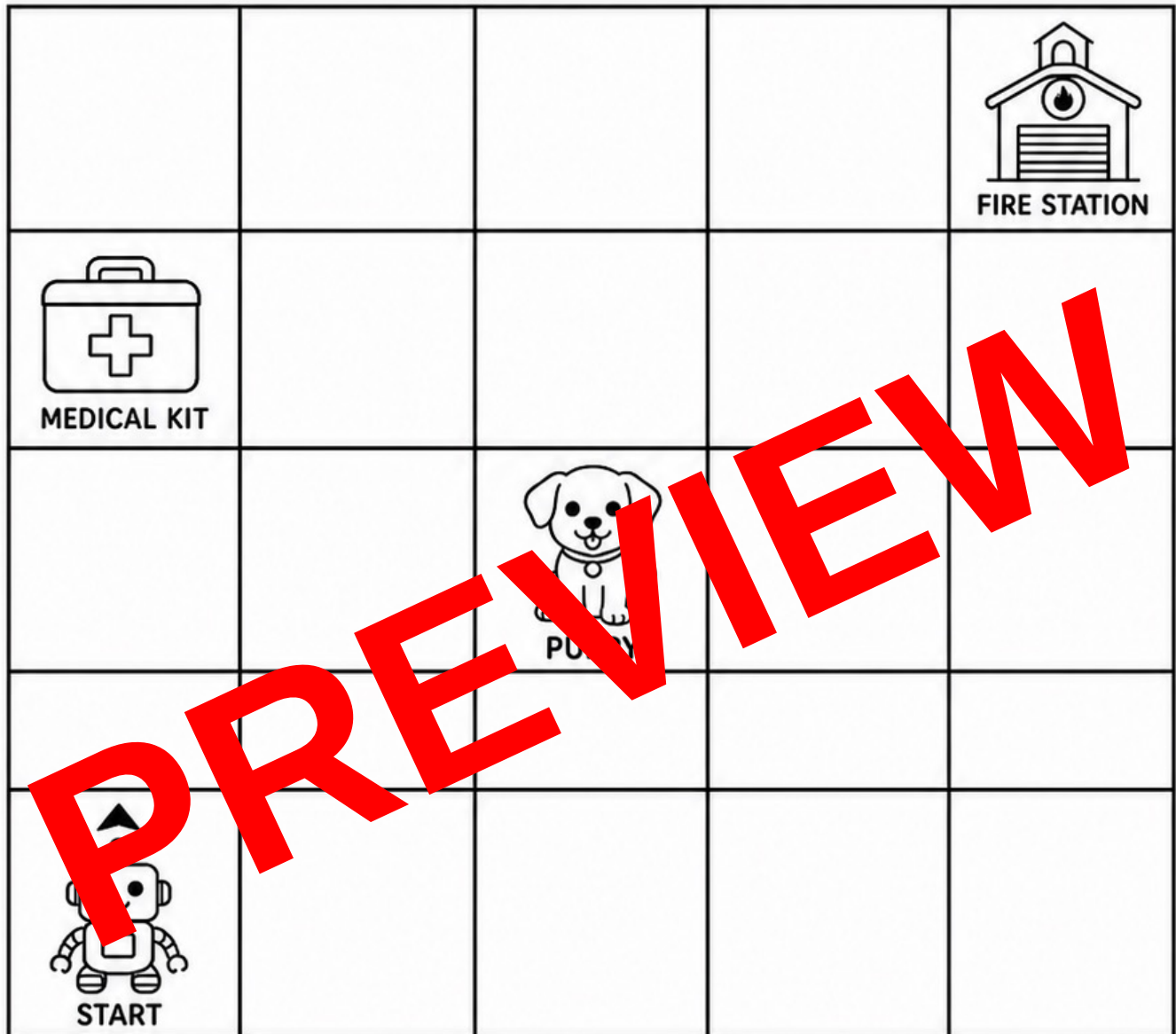
I checked each command. ☐

ROBOT RESCUE MISSION

ASSESSMENT — PAGE 1

Name: **ANSWERS**

Write an algorithm to help the rescue robot.



1. Go to the MEDICAL KIT.

F	F	F			
----------	----------	----------	--	--	--

2. Go to the PUPPY.

F	F	R	F	F	
----------	----------	----------	----------	----------	--

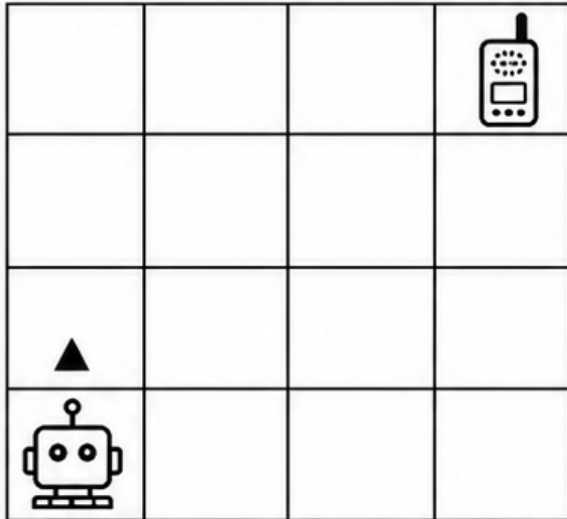
I checked each command. ☒

ROBOT RESCUE MISSION

ASSESSMENT — PAGE 2

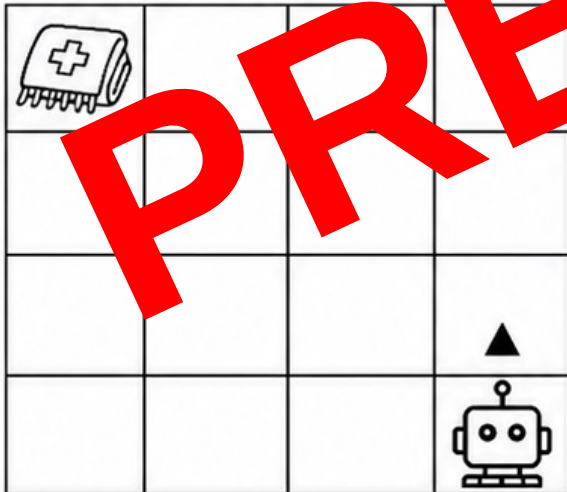
Name: _____

1. Write the missing command.



FORWARD FORWARD FORWARD FORWARD FORWARD FORWARD

2. Debug the algorithm.



FORWARD FORWARD FORWARD TURN RIGHT FORWARD FORWARD FORWARD

Replace _____ with _____

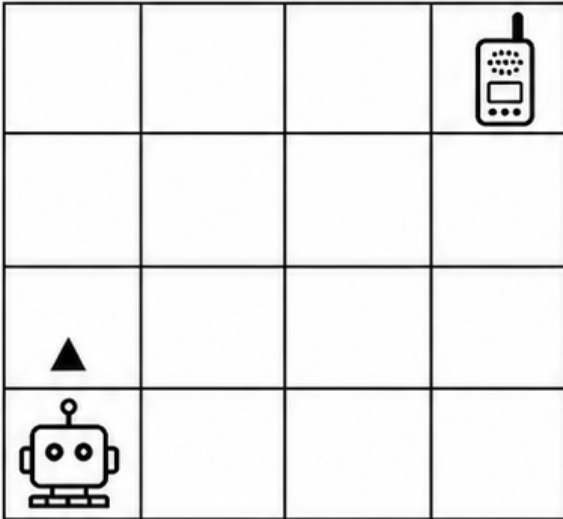
3. Why do we check one command at a time?

ROBOT RESCUE MISSION

ASSESSMENT — PAGE 2

Name: **ANSWERS**

1. Write the missing command.



FORWARD FORWARD FORWARD

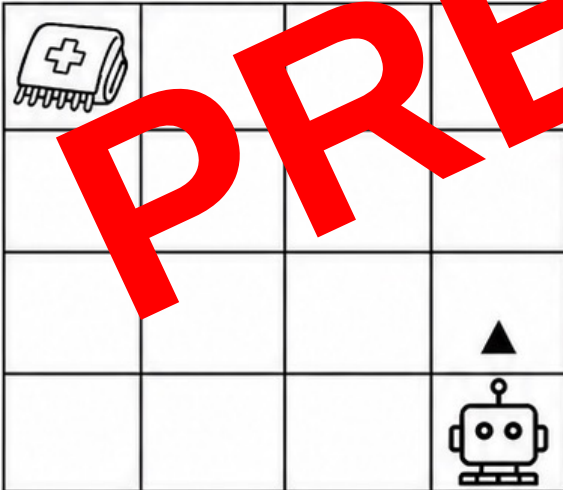
TURN RIGHT

FORWARD

FORWARD

FORWARD

2. Debug the algorithm.



FORWARD

FORWARD

FORWARD

~~TURN RIGHT~~

FORWARD

FORWARD

FORWARD

Replace TURN RIGHT with TURN LEFT

3. Why do we check one command at a time?

To find and fix an error.

Programming Directions in a Robot Rubric

Student: _____

Date: _____

AC9M1SP02

CRITERIA	BEGINNING	DEVELOPING	ACHIEVING	CONFIDENT	EXCEEDING
Direction words	Needs support to use direction words.	Uses some direction words.	Uses direction words correctly.	Uses direction words accurately.	Selects precise direction words and explains them.
Ordered algorithm	Needs support to order commands.	Orders some commands.	Creates a correct ordered algorithm.	Creates and checks a correct algorithm.	Creates efficient algorithms and compares them.
Following	Needs support to follow commands.	Follows short sequences.	Follows an algorithm correctly.	Follows longer algorithms accurately.	Follows and explains complex routes.
Debugging	Needs support to find an error.	Finds an error with a prompt.	Finds and fixes one error.	Checks and fixes errors independently.	Explains why a fix works.
Communication	Gives a limited explanation.	Uses a word or picture to explain.	Explains the route clearly.	Uses maths language to justify choices.	Compares routes and justifies improvements.

Programming Directions in a Robot

PREVIEW



Our Learning Goal

We are learning to give and follow instructions for a robot.

I can use movement commands, order a route, test it and fix mistakes.



What Is an Algorithm?

An algorithm is an ordered list of steps.

A robot follows each command at a time.

The order matters!



Robot Command Vocabulary

FORWARD – move one square ahead

BACKWARD – move one square behind

TURN LEFT – face left on the spot

TURN RIGHT – face right on the spot



Check the Facing Direction

Before moving, find which way the robot is facing.

A turn changes the way it faces.

A turn does not move the robot to a new square.



Follow a Simple Route

Start facing north.

Commands: FORWARD • FORWARD

The robot moves two squares north.

Point to each square as you follow the route.



Turn, Then Move

Start facing North

Commands: TURN RIGHT • FORWARD

First facing east then move one square east.

Remember: turn first, move second.



Build an Algorithm

1. Find the start and destination.
2. Check the robot's facing direction.
3. Choose one command at a time.
4. Record the commands in order.



Test Every Command

Act out the algorithm one command at a time.

Tick each command after it is followed.

Did the robot reach the destination safely?



Debug the Route

Debug means find and fix a mistake.

Stop where the route goes wrong.

Change one command, then try the whole route again.



Compare Two Routes

Two different algorithms can reach the same place.

Compare the number of moves and turns.

Which route is clear and efficient?



Programmer and Robot

PROGRAMMER: says or records one command at a time.

ROBOT: follows exactly what the programmer says.

Swap roles, test the route and help each other debug.

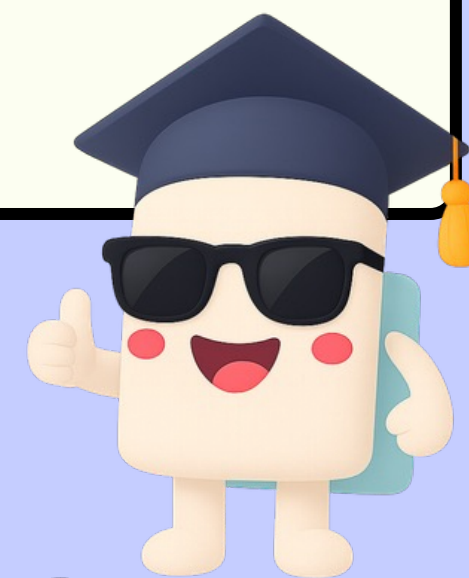
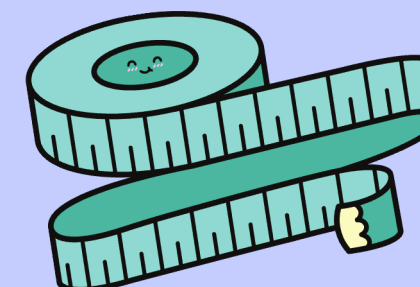
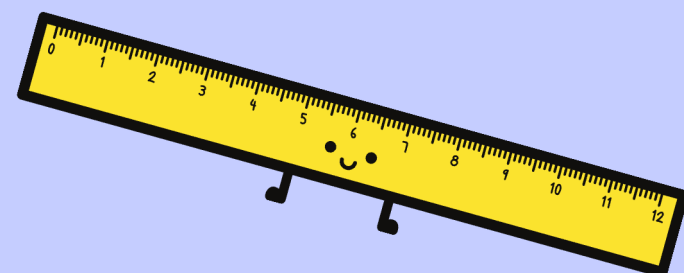
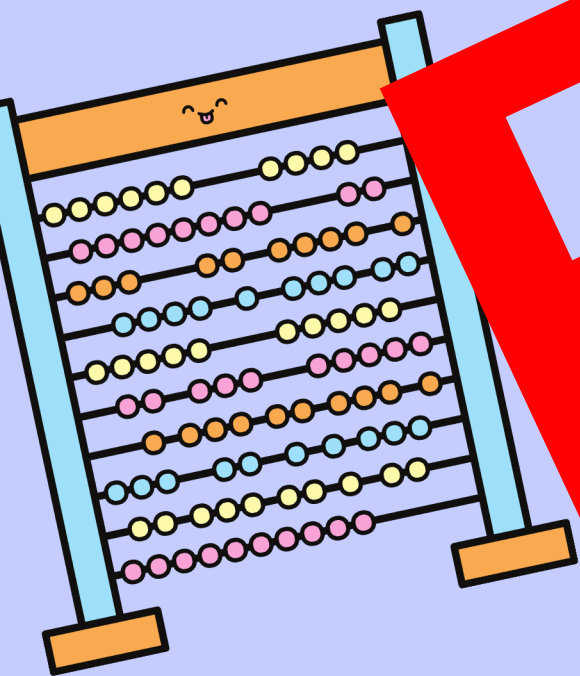
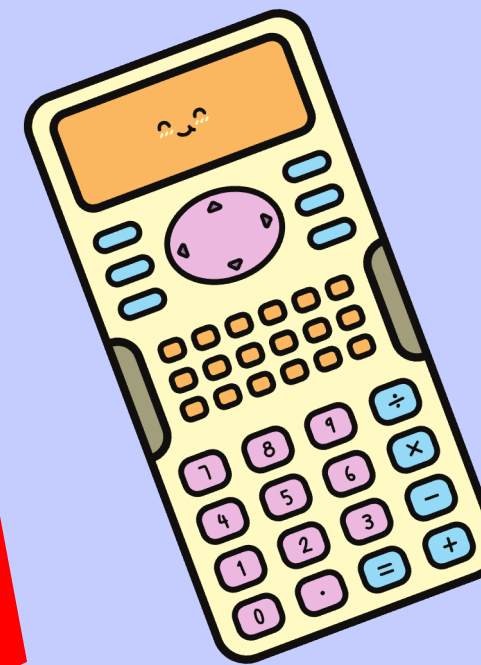
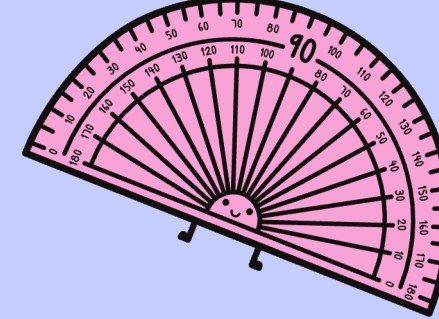
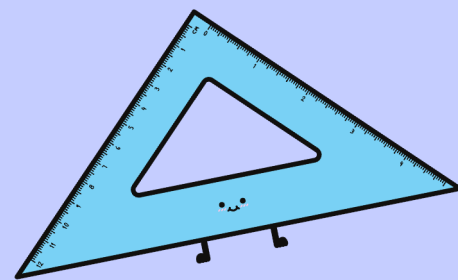
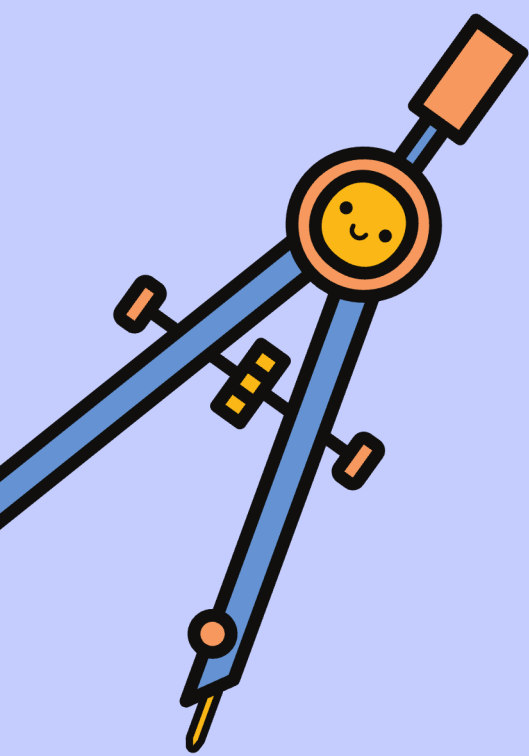


Review Your Learning

I can

- name movement and turn commands
- follow commands in order
- create a route to a destination
- test and debug an algorithm

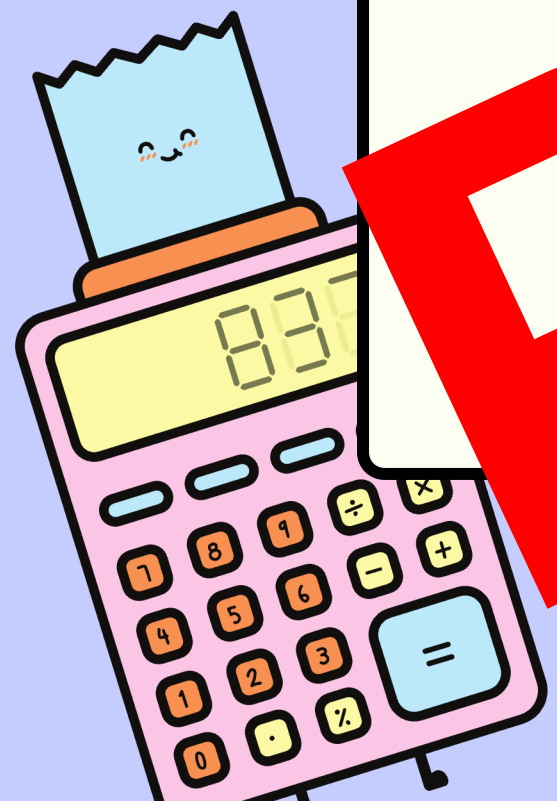
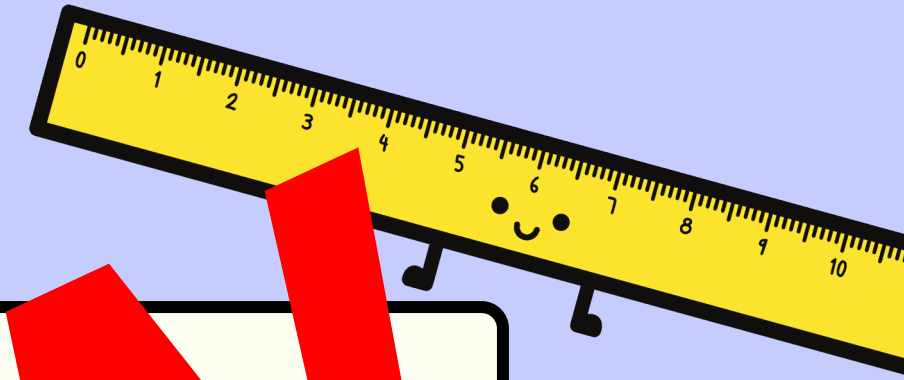
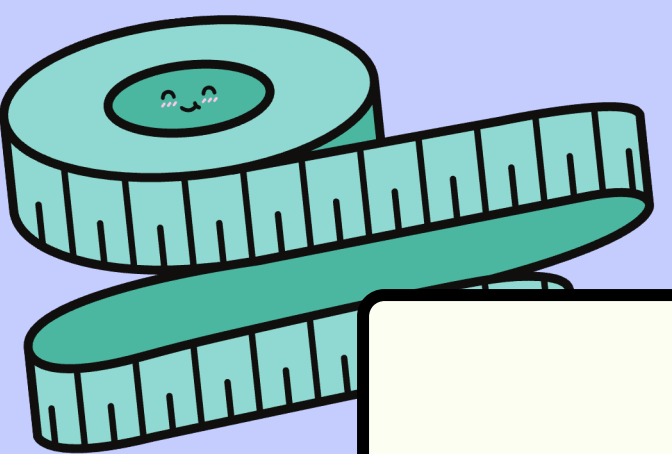




Well Done,
Root Programmers!

Programming Directions Robot Quiz

PREVIEW



Question 1 • True or False

An algorithm is an ordered set of instructions.

TRUE or FALSE?



Answer 1 • True

TRUE

An algorithm tells the robot which steps to follow and in what order.



Question 2 · Multiple Choice

Which command changes the way a robot moves when moving to a new square?

- A. Forward B. Backward
- C. Turn left D. Stop



Answer 2 · C

TURN LEFT

A turn changes the facing direction while the robot stays on the same square.



Question 3 · Short Answer

Start facing North

Commands: FORWARD • FORWARD

How many squares does the robot move?



Answer 3

TWO SQUARE NORTH

Each FORWARD command moves the robot one square ahead.



Question 4 • Multiple Choice

Start facing north

Commands: FORWARD • TURN RIGHT • FORWARD

Where does the robot finish?

- A. One north and one east B. Two north
C. One west D. Back at the start



Answer 4 • A

ONE SQUARE NORTH AND ONE SQUARE EAST

Move north, turn to face east, then move east.



Question 5 • True or False

A turn command moves the robot into the next square.

TRUE or FALSE?



Answer 5 • False

FALSE

A turn changes a robot's facing direction. It does not move to a new square.



Question 6 • Missing Command

A robot turns right and faces east.

Which command is missing to move it one square east?

TURN RIGHT • _____



Answer 6

FORWARD

After turning to face east, FORWARD moves the robot one square east.



Question 7 • Debug It

The robot should travel around the track.

Algorithm: FORWARD • TURN LEFT • FORWARD

What should change?

- A. First FORWARD to BACKWARD
- B. TURN LEFT to TURN RIGHT
- C. Last FORWARD to BACKWARD
- D. Nothing



Answer 7 • B

REPLACE TURN LEFT WITH TURN RIGHT

After moving north, the robot must turn right to face east.



Question 8 · Explain

Why do programmers test an algorithm one command at a time?

PREVIEW



Answer 8

Testing step by step helps us find the exact command that went wrong so we can fix it.



Question 9 • True or False

Two different algorithms can reach the same destination.

TRUE or FALSE?



Answer 9 • True

TRUE

Different routes can find at the same destination. We can compare their moves and turns.



Question 10 · Multiple Choice

What is the best first step when planning a robot route?

A. Press every button

B. Guess a long algorithm

C. Plan the start, destination and facing direction

D. Turn the robot around

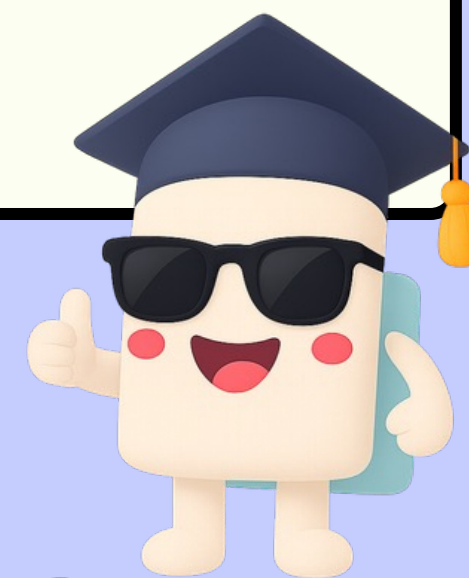
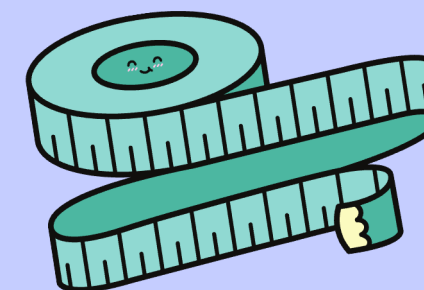
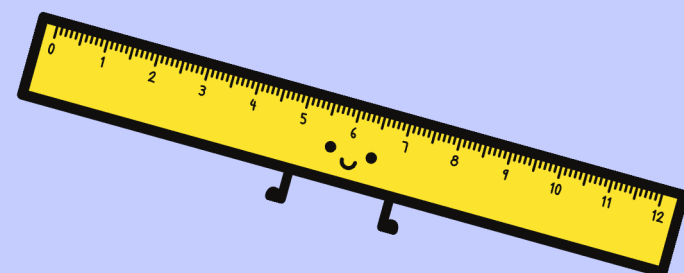
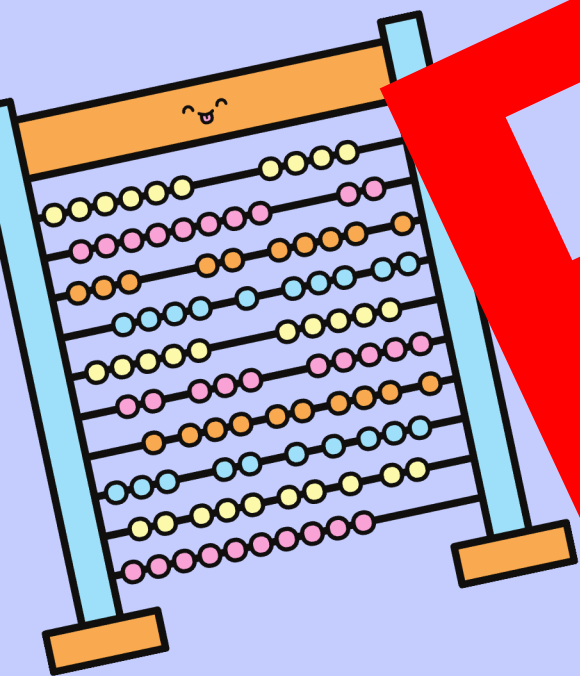
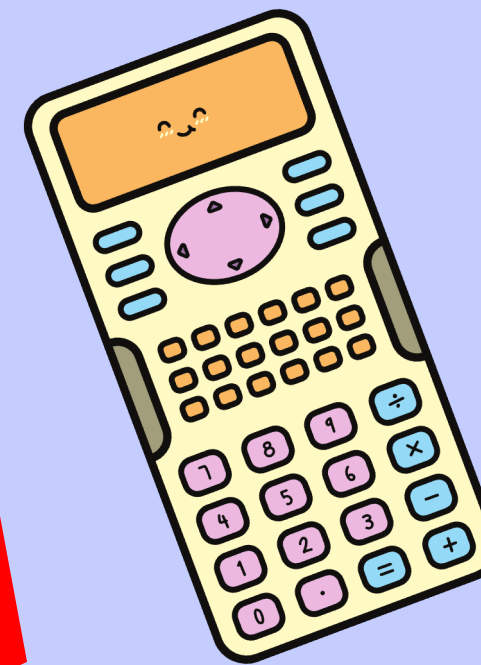
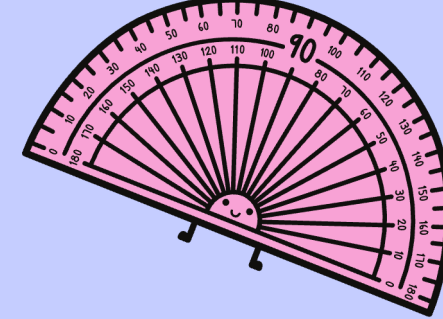
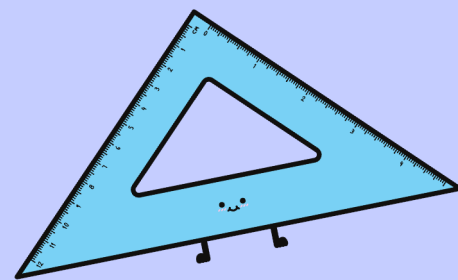
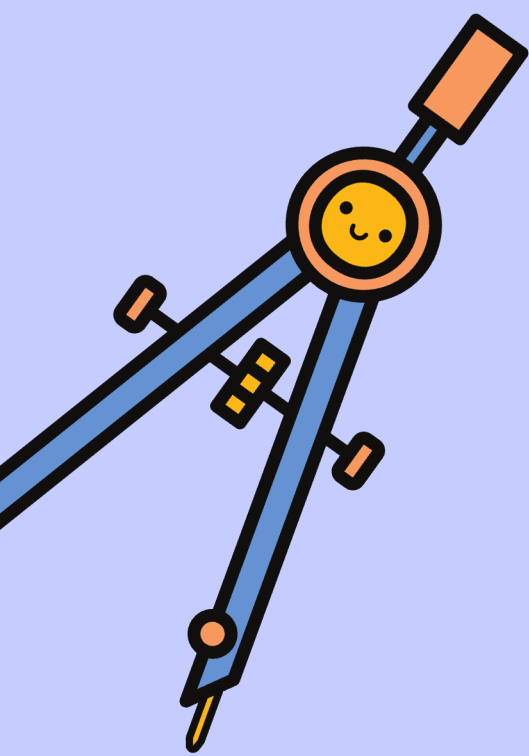


Answer 10 · C

FIND THE START, DESTINATION AND FACIL DIRECTION

These details help you choose the first command correctly.





Quiz Complete!