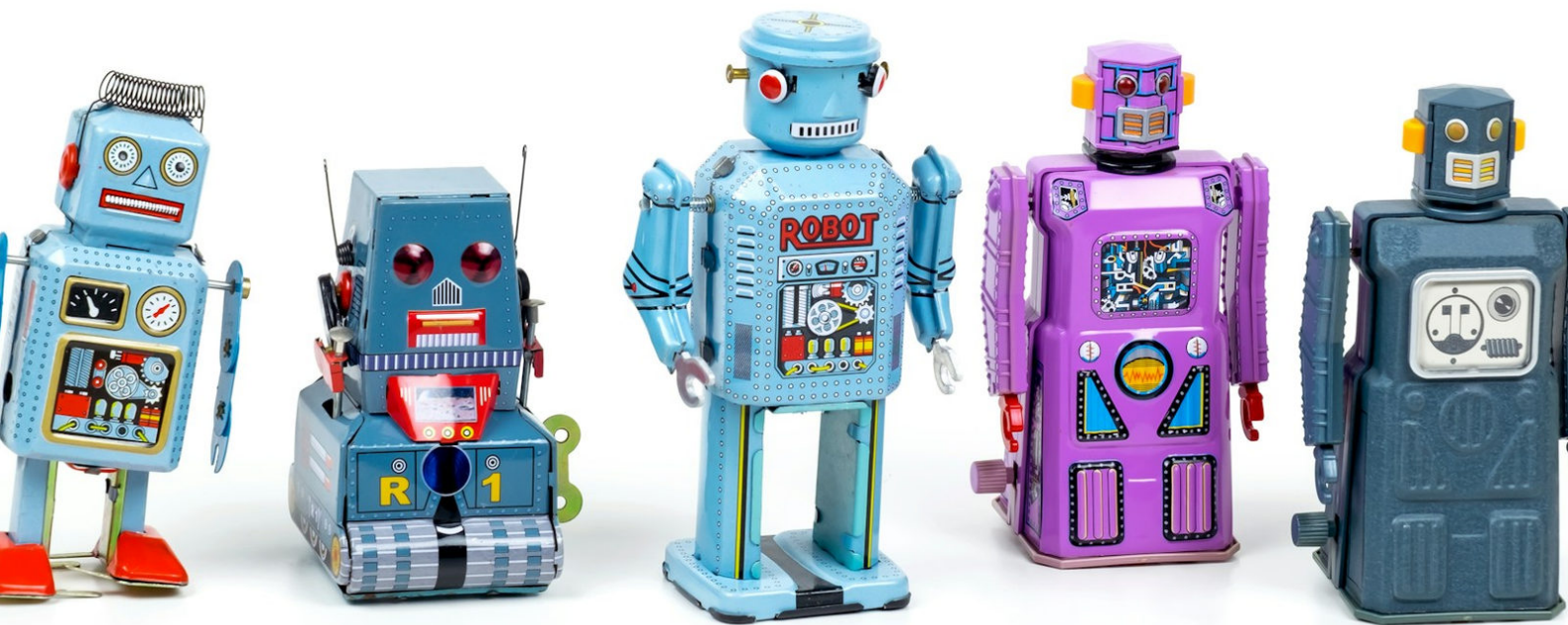




## EduTrend Contents

EDUTECH · INTRODUCTION TO ROBOTICS · PRIMARY

# Robot Shapes

Use loops to make a robot draw squares and triangles

Ages 8–11

Level: Developing

50 minutes

Pairs · up to 30

Activity 02

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 pupil worksheets · assessment checklist

## ACTIVITY 02 · AT A GLANCE

# Robot Shapes

Pairs program a floor robot or on-screen turtle to trace a square with forward and 90° turns. They notice the repeated pair and rewrite it as a loop: repeat 4 (forward, turn 90°). They then predict and test the loops for a triangle and a hexagon, discovering that the turns always add up to 360°.

## Learning outcomes

By the end of the session pupils can:

- program movement and turns;
- spot repetition and use loops;
- calculate turn angles;
- test and debug shapes.

**KEY WORDS**

loop · repeat · turn · angle · 360° · polygon

**CURRICULUM LINKS**

Maths: angles and shapes. Art: geometric patterns. PE: turning.

**1****SENSE**

What can it detect?

**2****THINK**

What should it decide?

**3****ACT**

What should it do?

**4****TEST**

Run it

**5****DEBUG**

Find and fix

**6****IMPROVE**

Make it better

## Materials (per pair)

- Floor robot or device with a turtle-style coding tool
- Protractor
- Worksheets 1, 2 and 3

## Before the session

- Charge robots or test the coding tool.
- Prepare a clear floor area.
- Print worksheets.
- Plan pairs.

**SAFETY**

Keep the floor clear and step around robots in use.

## ACTIVITY 02 · SESSION PLAN

# Step by step

Many pupils first try  $60^\circ$  for a triangle; testing shows why the robot's turn is  $120^\circ$ .

| Time                  | What happens                    | Say or ask                                  |
|-----------------------|---------------------------------|---------------------------------------------|
| 0–8 min<br>Hook       | Program a square without loops. | <i>"What repeats?"</i>                      |
| 8–20 min<br>Loop      | Rewrite with repeat 4.          | <i>"Is it shorter?"</i>                     |
| 20–35 min<br>Triangle | Predict the turn and test.      | <i>"Why not <math>60^\circ</math>?"</i>     |
| 35–45 min<br>Hexagon  | Predict and test.               | <i>"What is the pattern?"</i>               |
| 45–50 min<br>Rule     | Turns add to $360^\circ$ .      | <i>"Why always <math>360^\circ</math>?"</i> |

**CHALLENGE CARD (print or copy onto the board)**

Program a robot to draw a square, triangle and hexagon using loops, and explain the rule for the turn angles.

## ACTIVITY 02 · FACILITATOR NOTES

# The robotics know-how in brief

A loop repeats a set of instructions. A square is repeat 4 (forward, turn 90°). Loops make programs shorter and show the pattern in the task.

To draw a regular shape, the robot turns through the exterior angle each time. The turns add up to one full turn, 360°, so each turn is 360° divided by the number of sides.

## Common ideas to listen for

- “Turn by the inside angle.” The robot turns the outside angle.
- “Loops are only shortcuts.” They show structure.
- “Bigger shapes need bigger turns.” Only more sides change the turn.

## Adapting the activity

### Support

Give the square program to modify.

### Stretch

Draw a star using a different turn angle.

## WORKSHEET 1

# Shape programs

Name: \_\_\_\_\_

Class: \_\_\_\_\_ Date: \_\_\_\_\_

Write each loop.

## Shape programs

| Shape    | Repeat | Forward | Turn |
|----------|--------|---------|------|
| Square   |        |         |      |
| Triangle |        |         |      |
| Hexagon  |        |         |      |

**WORKSHEET 2**

# Tests

Record what happened.

## Tests

| Shape    | Prediction | Result | Fix |
|----------|------------|--------|-----|
| Square   |            |        |     |
| Triangle |            |        |     |
| Hexagon  |            |        |     |

## WORKSHEET 3

# The 360 rule

Explain the pattern.

## Why the turns add up to 360°

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## FOR THE TEACHER

# Assessment checklist

Use during the session. One sheet covers up to eight pupils; copy as needed.

| Pupil | Uses loops | Calculates turns | Debugs shapes |
|-------|------------|------------------|---------------|
|       |            |                  |               |
|       |            |                  |               |
|       |            |                  |               |
|       |            |                  |               |
|       |            |                  |               |
|       |            |                  |               |
|       |            |                  |               |

Suggested codes: W = working towards · E = expected · G = greater depth

## ABOUT THIS ACTIVITY

Robot Shapes is a sample activity from the EduTrend Contents Edutech Introduction to Robotics programme (primary, level: developing). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

**Full 15-, 20- and 32-week programmes are available from EduStore at [edutrend.org](https://edutrend.org).**

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