



## F5.1 What an algorithm is

Algorithms · GCSE · OCR J277 2.1.2, AQA 8525 3.1.1, Edexcel 1CP2 1.2.1 ·  
about 12 min

### What this lesson is about

Inputs, processes and outputs; what makes an algorithm precise; programs implement algorithms.

- An algorithm is not a program
- Inputs, processes and outputs
- What makes a good algorithm
- Many algorithms, one problem

### Questions

5 marks in all

1. What is an algorithm? [1 mark]

- ☐ A A set of step-by-step instructions to solve a problem
- ☐ B A program written in Python
- ☐ C A type of computer
- ☐ D A list of variables

**Answer:** A. An algorithm is the method. A program is that method written in a language a computer can run.

2. "Drive towards the wall and stop when close." What is wrong with this as an algorithm? [1 mark]

- ☐ A It is ambiguous: towards and close are not precise
- ☐ B It is too short
- ☐ C It has no loop
- ☐ D Nothing is wrong

**Answer:** A. Every step must mean exactly one thing: how fast, and how close is close?

3. A program asks for a number of sides, works out the angle and drives the shape. Which are inputs? [1 mark]

Tick every answer that is true.

- ☐ A The number of sides
- ☐ B The angle
- ☐ C The shape driven
- ☐ D The message printed

**Answer:** A. Only the number of sides comes in. The angle is processing; the shape and the message are outputs.

4. What does it mean for an algorithm to be finite?

[1 mark]

- ☐ A It always finishes
- ☐ B It uses few variables
- ☐ C It only works on small numbers
- ☐ D It has exactly one loop

**Answer:** A. An algorithm must end, rather than run forever.

5. In which forms can an algorithm be written?

[1 mark]

Tick every answer that is true.

- ☐ A A flowchart
- ☐ B Pseudocode
- ☐ C Program code
- ☐ D A trace table

**Answer:** A, B, C. A trace table follows an algorithm to check it; it does not describe the algorithm.

## The task: any shape from an answer

Turn the shape algorithm into a program. Ask `How many sides?` , work out the corner angle, drive the shape with 20 cm sides, and print `drew a shape with <n> sides` . The task answers 5 . Work the angle out; do not type it.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

# 1. Ask how many sides.
# 2. Work out the angle.
# 3. Repeat for each side: drive 20 cm, turn.
# 4. Say how many sides were drawn.
```

**The hint students can ask for:** Ask how many sides and make it a whole number. The turn at each corner is a full turn shared between the sides. Then repeat drive-and-turn once per side.

### A solution

```
from bugbot import *
connect()
sides = int(input("How many sides? "))
angle = 360 / sides
for i in range(sides):
    forward(60, distance=20)
    turn_right(30, angle=angle)
print("drew a shape with", sides, "sides")
```

Any program that meets the task's checks is marked correct in the simulator; this is one way, not the only way.