



F2.6 Condition-controlled loops: while

Decisions and loops · GCSE · OCR J277 2.2.1, AQA 8525 3.2.2, Edexcel
1CP2 6.2.2 · about 15 min

What this lesson is about

Looping until something changes, break, and loops that never end.

- while
- Counting with while
- Asking until the answer is right
- for or while?
- break: leave a loop early
- Loops that never end

Questions

8 marks in all

1. What does this program print?

[1 mark]

```
n = 1
while n < 20:
    print(n)
    n = n * 2
```

Answer:

```
1
2
4
8
16
```

The question is asked before every repeat. When n becomes 32 it is no longer below 20, so the loop ends.

2. When should you use `while` rather than `for`?

[1 mark]

- ☐ A When you will only know when to stop by looking, such as until the wall is close
- ☐ B When you know how many times
- ☐ C Always
- ☐ D Never: while is out of date

Answer: A. for when you know how many times; while when a question decides.

3. `count = 0` then `while count < 5: print(count)` with nothing else in the block. What happens? [1 mark]

- ☐ A It never ends: count never changes, so the question stays True
- ☐ B It prints 0 to 4
- ☐ C It prints nothing
- ☐ D SyntaxError

Answer: A. Every while needs something inside it that will eventually make the question False, here `count = count + 1`.

4. What does `break` do? [1 mark]

- ☐ A Leaves the loop immediately
- ☐ B Stops the whole program with an error
- ☐ C Skips one line
- ☐ D Pauses the robot

Answer: A. `break` jumps out of the loop it is in, for or while, and the program carries on below the loop.

5. What does this program print? [1 mark]

```
for i in range(10):
    if i == 3:
        break
    print(i)
print("out")
```

Answer:

```
0
1
2
out
```

When `i` is 3 the loop is left before the print, so 0, 1 and 2 are printed, then out.

6. Why is there a `wait(0.1)` inside a loop that drives until the wall is close? [1 mark]

- ☐ A It gives the robot time to move before the next check
- ☐ B It makes the robot drive further
- ☐ C Python needs it to loop
- ☐ D It stops the robot

Answer: A. Without it the loop would check thousands of times before the robot had moved at all.

7. What is the difference between a while loop and REPEAT ... UNTIL? [1 mark]

- ☐ A REPEAT ... UNTIL checks at the end, so its block always runs at least once
- ☐ B There is no difference
- ☐ C while always runs at least once
- ☐ D REPEAT ... UNTIL can only count

Answer: A. while checks the condition before each time round, so its block may never run. A post-condition loop checks after.

8. What does AQA call a condition-controlled loop? [1 mark]

- ☐ A Indefinite iteration
- ☐ B Definite iteration
- ☐ C Nested selection
- ☐ D A subroutine

Answer: A. Indefinite: nobody knows beforehand how many times it will run.

The task: creep to the wall

Use a `while` loop: while the wall is more than 25 cm away, drive 5 cm and print the distance. Stop inside the green band, without touching the wall.

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

while distance() > 25:
    forward(50, distance=5)
```

The hint students can ask for: Keep going while there is still room: check the distance at the top of the loop and move a short way each time round, so you can stop as soon as it is close enough.

A solution

```
from bugbot import *
connect()
while distance() > 25:
    forward(50, distance=5)
    print(distance())
```

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