



## 0.3 Doing it again

### What this lesson is about

for and while, indentation, and a square drawn with three lines instead of eight.

- A loop that counts
- A square
- A loop that keeps going

### Questions

7 marks in all

1. What does this program print?

[1 mark]

```
for i in range(4):  
    print("this is time number", i)
```

**Answer:**

```
this is time number 0  
this is time number 1  
this is time number 2  
this is time number 3
```

range(4) counts 0, 1, 2, 3. That is four numbers, but it starts at 0, so the last one is 3.

2. What does this program print?

[1 mark]

```
for i in range(3):  
    print("side")  
print("done")
```

**Answer:**

```
side  
side  
side  
done
```

Only the indented line is inside the loop, so it runs three times. print("done") is not indented, so it runs once, after the loop.

3. What does this program print?

[1 mark]

```
for i in range(3):  
    print(i * 10)
```

**Answer:**

```
0  
10  
20
```

Each time round, i is the next number from range(3) : 0, then 1, then 2. Times 10 gives 0, 10 and 20.

4. What does this program make the robot do?

[1 mark]

```
for i in range(4):  
    forward(50, distance=25)  
    turn_right(35, angle=90)  
stop()
```

- ☐ A Drive a square, turning clockwise, and finish near where it started
- ☐ B Drive one straight line 100 cm long
- ☐ C Drive a triangle
- ☐ D Drive a square, turning anticlockwise

**Answer:** A. Four times: one 25 cm side, then a quarter turn to the right. Four sides and four right turns bring it back near the start.

5. You want the robot to drive a triangle with equal sides. How many degrees should `turn_right` turn at each corner? [1 mark]

**Answer:** 120. The robot turns all the way round, 360 degrees, over the three corners, so each corner is 360 divided by 3, which is 120.

6. The robot starts at heading 0 and runs `turn_right(35, angle=90)` three times. Ignoring small errors, what does `heading()` say? Give a whole number of degrees. [1 mark]

**Answer:** 270 (accept within 2). Each quarter turn to the right adds 90 degrees, so three of them make 270.

7. Why does a `while` loop that drives need a small `wait()` inside it?

[1 mark]

- ☐ A So time passes and the robot moves between looks; without it the loop spins as fast as it can
- ☐ B To make the robot drive more slowly
- ☐ C Python gives an error for any loop without a wait
- ☐ D So that `clock()` can start counting

**Answer:** A. `wait()` is where time passes and the robot actually moves. Without it the loop spins as fast as the computer can go, no time passes, and BugBot stops the program and asks for a `wait(0.1)`.

## The task: four corners

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Drive a square: 30 cm a side, turning right at each corner, using a `for` loop. The four green squares are the corners it has to pass through.

```
from bugbot import *
connect()

for i in range(4):
    # one side and one corner
    forward(50, distance=30)

stop()
```

**The hint students can ask for:** One side and one corner, four times over. A quarter turn is 90 degrees.

## A solution

```
from bugbot import *
connect()
for i in range(4):
    forward(50, distance=30)
    turn_right(35, angle=90)
stop()
```

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