Grade 8 Computing

# Unit 2 · Decisions and Loops in Python

**ANSWER KEY · FOR TEACHERS**

Full marks 32

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

## 1 Key words

1. block
2. condition
3. elif
4. iteration
5. loop variable
6. running total
7. counter
8. infinite loop

Each carries 0.5 mark. K · 4

## 2 Multiple choice

**i.** **b.** inside the loop, inside an if that checks the student passed — U · 1

The counter should go up once for each student who passed, so it must be inside the loop (once per student) and inside the if (only when they passed). `passed = 0` goes before the loop, and printing it after.

**ii.** **b.** 4 — U · 1

It gives 2, 5, 8, 11; the next, 14, is past the stop. Four numbers, four rounds.

**iii.** **b.** `for i in range(10):` — U · 1

`range(10)` gives 0 to 9: ten numbers. `range(1, 10)` gives only nine, and `range(0, 10, 2)` five. A while loop runs as many times as its body makes it, which this line alone doesn't say.

**iv.** **b.** The body doesn't run at all. — U · 1

The condition is checked before every round, including the first. If it is `False` at the start, Python goes straight to the line after the loop.

**v.** **b.** `while water > 0:` — U · 1

You don't know how many bottles it will take, so a while loop that goes round as long as there is water fits. `range(10)` fills exactly 10 bottles, however much water there is, and `range(0)` fills none. An `if` would fill only one bottle: it checks once and never goes back.

## 3 What does it print?

**a.** MARKING SCHEME — A · 3

- ✓ `2 even` and `4 even`: only the even numbers pass the first condition (1 and 3 print nothing).
- ✓ `5 last`: 5 is odd, so the elif is asked, and it is true.
- ✓ `Done`, once, after the loop.

**b.** MARKING SCHEME — A · 2

- ✓ `10`, `7`, `4`, `1`, one to a line: the step −3 counts down, and the next, −2, is past the stop.
- ✓ `Rounds: 4`: the counter went up once each time round.



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## 4 Trace the program

**ANSWER** **A · 4**

| Round | `a < 20`? | `b` | `a` | Output |
|---|---|---|---|---|
| (before) | | 0 | 1 | |
| 1 | True | 1 | 3 | |
| 2 | True | 2 | 9 | |
| 3 | True | 3 | 27 | |
| | False (27 < 20 is false) | | | 27 3 |

**MARKING SCHEME**

- ✓ `b` goes 1, 2, 3: one more each round.
- ✓ `a` goes 3, 9, 27: multiplied by 3 each round.
- ✓ The condition is checked again after round 3, and 27 < 20 is `False`, so the loop ends.
- ✓ Output `27 3`, once, after the loop.

## 5 Find and fix the bug

**MARKING SCHEME** **A · 3**

- ✓ `n` jumps over 11 (it is always even), so the condition never becomes `False`.
- ✓ `while n <= 10:` or `while n < 11:`.
- ✓ `for n in range(2, 11, 2):` and `print(n)` indented inside it.

## 6 Write a program

**ANSWER** **A · 4**

```
passed = 0
total = 0
for i in range(5):
    marks = int(input("Marks: "))
    total = total + marks
    if marks >= 35:
        passed = passed + 1
print("Passed:", passed)
print("Average:", total / 5)
```

**OUTPUT**

```
Marks: 72
Marks: 30
Marks: 58
Marks: 90
Marks: 34
Passed: 3
Average: 56.8
```

**MARKING SCHEME**

- ✓ A loop that goes round 5 times, with `int(input())` inside it.
- ✓ A running total, set to 0 before the loop and added to inside it.
- ✓ A counter, set to 0 before the loop, that goes up by 1 inside an if with `marks >= 35`.
- ✓ Both results printed after the loop, the average as the total divided by 5.



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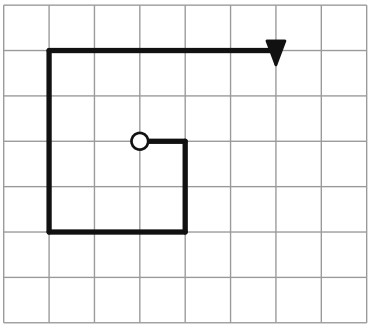
## 7 Short answers

**MARKING SCHEME** U · 2

- ✓ With elif only the first true block runs; separate ifs are all asked, and more than one can run.
- ✓ i. `"A+"`; ii. `"A"`.

## 8 Draw what the turtle draws

**ANSWER** A · 3



One square is 25 steps. ○ is where the turtle starts; the black arrowhead is where it ends, pointing the way it faces.

A square spiral, turning right: 1 square right, 2 down, 3 left, 4 up, 5 right. The turtle ends 3 squares right of the start and 2 squares up, facing down.

**MARKING SCHEME**

- ✓ Lines of 1, 2, 3, 4 and 5 squares (`i * 25` with `i` from 1 to 5).
- ✓ A right turn after each, so the lines go right, down, left, up, right.
- ✓ The end marked 3 squares right and 2 squares up from the start, facing down.

## 9 Think

**ANSWER** HA · 2

`50 // 7` gives 7, the full days, and `50 % 7` gives 1, the kilograms left. Taking 7 away again and again until less than 7 is left is exactly what dividing means: the number of times it can be taken away is the integer division, and what is left at the end is the remainder.

**MARKING SCHEME**

- ✓ `50 // 7` for the days and `50 % 7` for what is left.
- ✓ Integer division counts how many times 7 can be taken away, and the remainder is what is left after that: the same as the loop does.

## 10 Activity: Prayer flags

(not marked)

**WHAT STUDENTS SHOULD FIND**

| i | i % 5, and the color | i | i % 5, and the color |
|---|---|---|---|
| 0 | 0, blue | 5 | 0, blue |
| 1 | 1, white | 6 | 1, white |
| 2 | 2, red | 7 | 2, red |
| 3 | 3, green | 8 | 3, green |
| 4 | 4, yellow | 9 | 4, yellow |

`i % 5` goes round 0 to 4 and starts again, so the five colors come twice, in the same order, as on real prayer flags.

| Marks by level | Knowledge | Understanding | Application | Higher ability | Total |
|---|---|---|---|---|---|
| Marks | 4 | 7 | 19 | 2 | 32 |



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