

Solution 12: Python While Loop

1) Fill in the blanks: What is a `while` loop?

A `while` loop keeps running while the condition is **True**.

- The condition is checked **before** each loop.
 - The code inside the loop must be indented **4** spaces.
 - If variables inside the loop don't change, the while loop **won't** stop.
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2) What does this print?

Output:

```
3  
5  
7
```

3) Fix the infinite loop

One correct answer is:

```
n = n - 1
```

Full fixed code:

```
n = 5  
  
while n > 0:  
    print(n)  
    n = n - 1
```

4) What does this print?

We add `1 + 2 + 3 + 4`.

Output:

```
10
```

5) Count digits

`9000 → 900 → 90 → 9 → 0`, so there are 4 digits.

Output:

```
4
```

6) Sum of digits

Digits are `5`, `0`, and `7`. Sum is `5 + 0 + 7 = 12`.

Output:

```
12
```

7) Product of digits (write code)

One correct solution:

```
n = 2468
product = 1

while n > 0:
    digit = n % 10
    product = product * digit
    n = n // 10

print(product)
```

Output:

```
384
```

8) Count even digits

Even digits in `24861` are `2, 4, 8, 6` → 4 even digits.

Output:

```
4
```

9) Fibonacci numbers up to 20

Output:

```
[1, 1, 2, 3, 5, 8, 13]
```

10) Squares up to 50 (write code)

One correct solution:

```
squares = []
i = 1

while i * i <= 50:
    squares.append(i * i)
    i = i + 1

print(squares)
```

Output:

```
[1, 4, 9, 16, 25, 36, 49]
```

11) Traverse a list with an index

Output:

```
10
20
30
```

12) Collatz list

Output:

```
[6, 3, 10, 5, 16, 8, 4, 2, 1]
```

13) Fill in the Collatz rules

- If `n` is even: `n = n // 2`
- If `n` is odd: `n = 3 * n + 1`

14) Challenge: Count Collatz steps (write code)

One correct solution:

```
n = 7
steps = 0

while n != 1:
    if n % 2 == 0:
        n = n // 2
    else:
        n = 3 * n + 1
    steps = steps + 1

print(steps)
```

Output:

```
16
```