

Exercise walk-through

6.4

Functions and file processing

International Baccalaureate · IB Diploma · Computer Science · HL

You must be able to

- write a **function** with **parameters** that **returns** a value
- tell a **local variable** from a **global variable**
- choose the file **mode** "r", "w" or "a", and say what each does to an existing file
- read a file line by line, split each line into fields and process them

1

The method

Method — Key knowledge: functions and scope

```
RATE = 0.1                                # global constant

def discount(price, qty):
    total = price * qty                    # local: exists only during the call
    if qty >= 10:
        total = total - total * RATE
    return total

print(discount(4.0, 12))                   # 43.2
```

Exercises 2.1·2.2

2.1 Write a function `area(w, h)` that returns the area of a rectangle, and a statement that prints the area of a 3 by 5 rectangle. [2]

2.2 In the `discount` code above, name (i) a parameter; (ii) a local variable; (iii) a global constant. [3]

Exercises 2.1-2.2

2.1 Write a function `area(w, h)` that returns the area of a rectangle, and a statement that prints the area of a 3 by 5 rectangle. [2]

2.1

- `def area(w, h): with return w * h`
- `print(area(3, 5))`

2.2 In the `discount` code above, name (i) a parameter; (ii) a local variable; (iii) a global constant. [3]

2.2

- (i) `price` or `qty`
- (ii) `total`
- (iii) `RATE`

Exercises 2.3-2.4

2.3 State the mode to use for each, and why: (i) adding today's temperature to a log kept all year; (ii) loading saved settings; (iii) replacing last week's report with a new one. [3]

2.4 `line = "Lee,17,B\n"`. State the value of `line.strip().split(",")`. [1]

Exercises 2.3-2.4

2.3 State the mode to use for each, and why: (i) adding today's temperature to a log kept all year; (ii) loading saved settings; (iii) replacing last week's report with a new one. [3]

2.3

- (i) **"a"**: keeps the earlier readings
- (ii) **"r"**: the file is only read
- (iii) **"w"**: the old contents should go

2.4 `line = "Lee,17,B\n"`. State the value of `line.strip().split(",")`. [1]

2.4

- `["Lee", "17", "B"]`, all strings

Exercises 3.1-3.2

3.1 What does `open("data.txt", "w")` do to an existing `data.txt`?

[1]

☐

A adds new lines to the end

B empties it before writing

C reads it from the start

D raises an error

☐

A 6

B 3

C None

D an error, as `y` is undefined

3.2 `def f(x): y = x * 2.` What does `print(f(3))` print?

[1]

Exercises 3.1-3.2

3.1 What does `open("data.txt", "w")` do to an existing `data.txt`?

[1]

☐

A adds new lines to the end

B empties it before writing

C reads it from the start

D raises an error

3.1 B

- write mode empties an existing file first

3.2 `def f(x): y = x * 2`. What does `print(f(3))` print?

[1]

☐

A 6

B 3

C None

D an error, as `y` is undefined

3.2 C

- `f` has no `return`, so it returns `None`

Exercise 3.3

3.3 Which is the main advantage of using functions?

[1]

☐

A the program uses no variables

B each part can be written, tested and reused separately

C the program runs without errors

D files are closed automatically

Exercise 3.3

3.3 Which is the main advantage of using functions?

[1]

☐

A the program uses no variables

B each part can be written, tested and reused separately

C the program runs without errors

D files are closed automatically

3.3 B

- modularity

Exercise 3.4 (a)

3.4 A club stores its members in `members.txt`, one line each, as `name,year` joined, for example `Mei,2019`.

(a) Write a function `joined_before(filename, year)` that returns how many members joined before `year`. [5]

Exercise 3.4 (a)

3.4 A club stores its members in `members.txt`, one line each, as `name,year` joined, for example `Mei,2019`.

(a) Write a function `joined_before(filename, year)` that returns how many members joined before `year`. [5]

(a) One answer:

```
def joined_before(filename, year):
    count = 0
    with open(filename, "r") as f:
        for line in f:
            name, joined = line.strip().split(",")
            if int(joined) < year:
                count = count + 1
    return count
```

- opens the file in read mode
- loops over the lines
- strips and splits each line
- casts the year and compares with <
- counts and returns the count after the loop

Exercise 3.4 (b)

3.4 A club stores its members in `members.txt`, one line each, as `name,year joined`, for example `Mei,2019`.

(b) The file holds `Mei,2019`, `Tom,2023` and `Raj,2015`. State the value of `joined_before("members.txt", 2020)`. [1]

Exercise 3.4 (b)

3.4 A club stores its members in `members.txt`, one line each, as `name,year joined`, for example `Mei,2019`.

(b) The file holds `Mei,2019`, `Tom,2023` and `Raj,2015`. State the value of `joined_before("members.txt", 2020)`. [1]

(b)

- Mei and Raj: **2**

Exercise 3.4 (c)

3.4 A club stores its members in `members.txt`, one line each, as `name,year joined`, for example `Mei,2019`.

(c) Write a statement that adds the new member `Zoe,2026` to the file without losing the others.

[2]

Exercise 3.4 (c)

3.4 A club stores its members in `members.txt`, one line each, as `name,year` joined, for example `Mei,2019`.

(c) Write a statement that adds the new member `Zoe,2026` to the file without losing the others. [2]

(c)

- `with open("members.txt", "a") as f:`
- `f.write("Zoe,2026\n")`, with the newline

Exercise 3.4 (d)

3.4 A club stores its members in `members.txt`, one line each, as `name,year` joined, for example `Mei,2019`.

(d) Explain what happens if the file does not exist, and how the program could deal with it. [2]

Exercise 3.4 (d)

3.4 A club stores its members in `members.txt`, one line each, as `name,year` joined, for example `Mei,2019`.

(d) Explain what happens if the file does not exist, and how the program could deal with it. [2]

(d)

- `open` raises a `FileNotFoundError` and the program stops
- put the code in `try ... except FileNotFoundError` and print a message or return 0