

## Lab Activity

Week 5: Expressions and Operators

Duration: 45 minutes — Work in pairs!

Name: \_\_\_\_\_ Partner: \_\_\_\_\_

### Lab Goals

By the end of this lab, you will be able to:

- Use Python as a calculator with different operators
- Apply the correct order of operations (BODMAS/PEMDAS)
- Create and evaluate boolean expressions that return True or False
- Trace through expressions step-by-step

### Getting Started

1. Extract the given [week5\\_lab.zip](#) file to your desktop. This folder contains all the files you need for this lab.

## 1 Exercise 1: Python as a Calculator (5 minutes)

Type this code exactly as shown and run it.

### 1.1 Basic arithmetic operators

Open [week5\\_ex1.1.py](#) and type the following code:

```
1 price = 50
2 quantity = 3
3 total = price * quantity
4 print("Total cost:", total)
```

### 1.2 Division always gives a float

Open [week5\\_ex1.2.py](#) and type the following code:

```
1 pizzas = 15 / 3
2 print("Pizzas per person:", pizzas)
```

### 1.3 Modulo gives remainder

Open [week5\\_ex1.3.py](#) and type the following code:

```

1 students = 17
2 groups = 5
3 leftover = students % groups
4 print("Students without a group:", leftover)

```

✔ **Checkpoint:** Show your teacher the three outputs before moving on!

Now modify the code:

- In section 1.1, change the price to 75 and quantity to 4
- In section 1.1, add a line to calculate the square of quantity using `**`
- In section 1.2, what type of number does division give you? (Hint: look at pizzas output)

## 2 Exercise 2: Complete the Samosa Calculator (5 minutes)

Open [week5\\_ex2.py](#) and complete the code below.

```

1 # Samosa shop calculator
2 samosa_price = 15
3 chutney_price = 5
4
5 # Hassan buys samosas and chutney
6 samosas_bought = ___ # He wants 4 samosas
7 chutney_bought = 2
8
9 # Calculate totals
10 samosa_total = samosa_price ___ samosas_bought # Use multiplication
11 chutney_total = _____ * chutney_bought
12 grand_total = samosa_total ___ chutney_total # Add them together
13
14 print("Samosas cost:", samosa_total)
15 print("Chutney cost:", _____) # Show chutney total
16 print("Total bill:", grand_total)
17
18 # How many 100 rupee notes needed?
19 notes_needed = grand_total ___ 100 # Use integer division
20 print("100 rupee notes needed:", notes_needed)
21
22 # How many Rs. 10 notes needed?
23 remaining_after_100s = grand_total ___ 100 # Use modulo to find remainder
24 notes_10_needed = remaining_after_100s ___ 10 # Use integer division
25 print("10 rupee notes needed:", notes_10_needed)
26
27 # How many Rs. 1 coins needed?
28 remaining_after_10s = remaining_after_100s ___ 10 # Use modulo
29 coins_1_needed = _____ # This is the final remainder
30 print("1 rupee coins needed:", coins_1_needed)

```

Test values:

- With 4 samosas and 2 chutneys, total should be 70
- Should need 0 hundred rupee notes (since  $70 < 100$ )

✔ **Checkpoint:** Calculator showing correct totals? Excellent!

 **Pair Programming:** Switch who types every 5 minutes!

### 3 Exercise 3: Order of Operations Explorer (10 minutes)

Let's explore how Python follows math rules. In each case you can create a new file in Thonny. For this exercise there is no need to save these files, just run them directly.

**Step 1:** Start with this code:

```
1 # Testing order of operations
2 result1 = 2 + 3 * 4
3 print("2 + 3 * 4 =", result1)
4
5 result2 = (2 + 3) * 4
6 print("(2 + 3) * 4 =", result2)
```

**Step 2:** Try these experiments (run after each change):

1. What is the value of  $10 - 4 / 2$ ?  
Your prediction: \_\_\_\_\_ Actual result: \_\_\_\_\_
2. What is the value of  $2 ** 3 * 4$ ?  
Your prediction: \_\_\_\_\_ Actual result: \_\_\_\_\_
3. Can you use parentheses to make  $6 + 4 * 2$  equal 20?  
Your code: \_\_\_\_\_

**Step 3:** Create your own expression:

```
1 # Make an expression that equals exactly 100
2 # Must use +, *, and parentheses
3 my_expression = _____ # Your expression here
4 print("My expression =", my_expression)
```

 **Tip:** Remember BODMAS: Brackets, Orders (powers), Division/Multiplication, Addition/Subtraction

### 4 Exercise 4: Fix the Cricket Score Calculator (10 minutes)

Open up [week5\\_ex4.py](#). This file contains a cricket score calculator with some issues. Your task is to find and fix them.

```
1 # Cricket score calculator - fix me!
2
3 runs_first_innings = 235
4 runs_second_innings = 189
5
6 # Something wrong here:
7 total_runs = runs_first_innings - runs_second_innings
8 print("Total runs:", total_runs)
9
10 # And here:
11 overs = 40
12 runs_per_over = runs_first_innings + runs_second_innings / 2 / overs
13 print("Runs per over:", runs_per_over)
14
```

```

15 # And here too:
16 wickets = 7
17 average = runs_first_innings % wickets
18 print("Average per wicket:", average)
19
20 # Watch closely:
21 strike_rate = runs_first_innings / 240 * 100
22 print("Strike rate:", strike_rate, "%")

```

### Hints:

- *Error 1:* Should we subtract to get total runs?
- *Error 2:* Which operation should happen first for average of two innings?
- *Error 3:* Is the % operator correct to calculate runs per over?
- *Error 4:* What should be calculated first for percentage?

✔ **Checkpoint:** All calculations working correctly? Great debugging!

👥 **Pair Programming:** Switch who types every 5 minutes!

## 5 Exercise 5: Boolean Expression Practice (10 minutes)

### 5.1 Exploring Boolean expressions

Let's explore True/False expressions. Open [week5\\_ex5.1.py](#) first study and then run the following code (*already typed in the file*).

```

1 # Exercise 5: Comparison operators
2 age = 13
3 height = 5.2
4 grade = 7
5
6 # Basic comparisons
7 print("Age is exactly 13:", age == 13)
8 print("Height is over 6 feet:", height > 6.0)
9 print("In grade 7 or higher:", grade >= 7)
10
11 # Now let's combine conditions
12 # Can join the cricket team? (Must be 12+ AND in grade 6+)
13 can_join_cricket = (age >= 12) and (grade >= 6)
14 print("Can join cricket team:", can_join_cricket)
15
16 # Gets student discount? (Under 18 OR in grade 12 or below)
17 gets_discount = (age < 18) or (grade <= 12)
18 print("Gets student discount:", gets_discount)

```

### 5.2 Creating Boolean expressions

Now create your own boolean expressions. Open [week5\\_ex5.2.py](#) and complete the code below.

```

1 # Check if someone can watch a PG-13 movie
2 age = 11
3 with_parent = True
4

```

```

5 # Fix this line to check: age >= 13 OR with_parent is True
6 can_watch = _____
7 print("Can watch PG-13 movie:", can_watch)
8
9 # Check if it's good weather for a picnic
10 temperature = 28
11 is_raining = False
12
13 # Good weather: temp between 20-35 AND not raining
14 good_weather = _____
15 print("Good picnic weather:", good_weather)

```

 **Tip:** Remember: **and** means **both** must be True, or means **at least one** must be True

 **Checkpoint:** Boolean expressions working correctly? You're thinking like a computer!

## 6 Exercise 6: Quick Quiz - Circle the Correct Answer (5 minutes)

- What is the value of  $15 + 5 * 2$ ?
  - A. 40
  - B. 25
  - C. 30
  - D. 20
- What type does  $10 / 2$  return?
  - A. int (5)
  - B. float (5.0)
  - C. string ("5")
  - D. boolean (True)
- What is  $17 \% 5$ ?
  - A. 3.4
  - B. 3
  - C. 2
  - D. 12
- Which expression equals True? (Assume  $x = 10$ )
  - A.  $x > 10$
  - B.  $x == "10"$
  - C.  $x >= 10$
  - D.  $x != 10$
- What does  $(5 > 3)$  and  $(2 < 1)$  evaluate to?

- A. True
- B. False
- C. Error
- D. None

## 7 Lab Summary

**✔ Checkpoint:** Final checkpoint - make sure you have:

- Completed all exercises with your partner
- Used all arithmetic operators (+, -, \*, /, //, %, \*\*)
- Practiced order of operations with parentheses
- Created boolean expressions with comparisons
- Shown checkpoints to your teacher

### Reflection (2 minutes)

Rate your understanding of today's concepts:

Concept	☹ Need Help	😐 Getting It	😊 Got It!
Arithmetic operators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Order of operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boolean expressions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

One thing I learned today: \_\_\_\_\_

One thing I'm still confused about: \_\_\_\_\_

**😊 Great work using Python as a powerful calculator!**