Computing

Lesson 2: Arithmetic Expression

Programming Part 2: Selection

Rebecca Franks

Materials from the Teach Computing Curriculum created by the National Centre for Computing Education

Task 1: Predict

Take a look at the code below. Read it carefully and try to make a prediction about what might happen when this code is executed. Remember to write your prediction down.

```
print("---Welcome to Split My Bill---")
print("What is the total bill?")
bill_total = float(input())
print("How many people are sharing?")
people = int(input())
print("What percentage tip would you like to leave?")
tip_percentage = int(input())

percentage_decimal = tip_percentage / 100
tip_total = bill_total * percentage_decimal
bill_total = bill_total + tip_total

cost_per_person = bill_total / people

print(f"Total bill including tip is £{bill_total}")
print(f"Total cost per person is £{cost_per_person}")
```

Task 2: Run

Open and **run** the file with this code. Here’s a copy of the program (**oaknat.uk/comp-ks4-splitmybill**).

Was your prediction correct? Did anything unexpected happen? Write down your thoughts.

Task 3: Investigate

Investigate the program using the steps below:

Step 1	Step 2	Step 3
What is the first question that is asked by the program?	What data type is being used for the `bill_total`?	Why is this data type needed for the `bill_total`?

Task 3: Investigate

Investigate the program using the steps below:

Step 4	Step 5	Step 6
On line 5, what data type is being used for the number of people?	Why is this data type being used?	Line 7 is used to enter the percentage tip that the group would like to leave. What is happening at line 9?

Task 3: Investigate

Investigate the program using the steps below:

Step 7

What is calculated at line 10?

Step 8

On line 11, the variable `bill_total` is reassigned with the expression `bill_total + tip_total`. Describe what is happening here

Step 9

What type of error occurs (runtime/syntax/logic) when you enter `hello` for the first question?

- What could you do to avoid this error from occurring?

Task 4: Modify

<table>
<tr><th>Modification 1</th><th>Hint</th></tr>
<tr><td>Lines 9 to 11 contain three separate arithmetic expressions that calculate the final total bill.

Use your knowledge of BIDMAS to write a single expression that performs the same calculation.</td><td>Try writing the expression on a piece of paper first and testing it out with a calculator.

Think about what will need to be calculated first and how you can use BIDMAS to make this happen.

Use # hashtags in front of the original three lines of code so that you can read them for reference whilst testing your new line of code.

<code>#percentage_decimal = tip_percentage / 100</code>
<code>#tip_total = bill_total * percentage_decimal</code>
<code>#bill_total = bill_total + tip_total</code>

Test the code using simple numbers like 100 for the bill, 4 people, and 10 percent tip. This will make it easier to check for errors by performing the calculations in your head.</td></tr>
</table>

Task 4: Modify

Modification 2	Hint

It is important that numbers are entered by the user instead of text.
 	
Add data validation checks at each data entry point.
 	
This will help to make the program more robust.
	Here is a reminder of the ‘try and except’ code that you saw in Programming Part 1 - Lesson 4:
	
	`print("Enter a number")`
	`try:`
	`    number = int(input())`
	`except ValueError:`
	`    print("You must enter a number")`
	`    number = int(input())`