Lesson 6: Selection

Introduction

This lesson moves learners on to the next big programming construct: selection. They will be introduced to it initially through a flowchart that demonstrates how a condition can be used to control the flow of execution in a program. They will then learn about definitions for logical expressions and conditions. A short activity has been included to allow learners to grasp how logical expressions evaluate. Next, they will complete a PRIMM activity where they investigate and modify a chatterbot. Finally, peer instruction will be used to assess their learning.

Learning objectives

- Define a condition as an expression that can be evaluated to either True or False

- Identify flowchart symbols and describe how to use them (decision)

- Identify that selection uses conditions to control the flow of execution

- Walk through code that includes selection (`if`, `elif`, `else`)

Key vocabulary

Selection, condition, decision symbol, control flow, execution, logical expression

Preparation

Subject knowledge:

For this lesson, you will need to be confident with using the following in Python:

- `if`

- `elif`

- `else`

- `.upper()`

- `.lower()`

You should also know how to use a decision symbol in a flowchart.

You will need:

- Slides

- What will be the output? A1 worksheet and solutions

- Chatterbox: A2 worksheet and solutions

You may also need:

- [Chatterbot program](https://replit.com/@awade05/chatterbot#main.py)(https://replit.com/@awade05/chatterbot#main.py)

Vocabulary

Condition	**Used to control the flow of execution in a program. A condition contains a logical expression.**
Decision symbol	**Used on a flowchart to represent a condition.**
Selection	**Controlling the flow of execution in programs using `if` statements.**

Control flow	The order in which instructions are executed in a program.
Execution	Carrying out the instructions for a computer program.
Logical expression	An expression that results in either True or False.

Common misconceptions

M10 An `if` statement triggers whenever its condition becomes true.

M21 Using `else` is optional: the code that follows an `if` statement is the `else` branch (in case one is necessary).

M22 Both `then` and `else` branches are always executed.

Assessment opportunities

The 'What is a condition?' activity uses a worksheet to test learner understanding of different types of selection statements. Use this for peer- or self-assessment, alternatively you could assess the worksheet.

During the 'Chatterbox' activity, the model answers have been provided. Learners could use this to self-/peer-assess, or you could use this to mark their work.

For the plenary activity, learners answer multiple choice questions using peer instruction. You can use this time to assess what learners know and reteach aspects of the lesson where required.

Outline plan

Please note that the slide deck labels the activities in the top right-hand corner to help you navigate the lesson.

Timings are rough guides

Starter activity (Slides 2–5) 5–7 mins	**Make a prediction: What will be the output from this flowchart?** Present the learners with the flowchart on slide 2, which includes a new symbol: the decision symbol. Ask them to make a prediction of the output if the number 10 was the input. Give them a few minutes to walk through the flowchart and predict what they think the output might be. They should write down their prediction on a mini whiteboard or a blank slide on their screens to give you an indication of their answers. Use the following slides to take learners through the flow of the chart and demonstrate the flow of execution. Learners can use this to help see if their prediction was correct. Slide 5 explains what the decision symbol is and what it is used for. This links to the 'What is a condition?' activity, in which learners will see how conditions can be used in a program to control the flow of program execution.

Activity 1 (Slides 7–34) 7–10 mins	**What is a condition?** Introduce learners to conditions: they use logical expressions that can be evaluated to True or False. Remind learners that arithmetic expressions evaluate as a number, whereas logical expressions evaluate to either True or False. *Will the following logical expressions evaluate to True or False?* Present three logical expressions to your learners, and ask them to choose whether they will evaluate to True or False. They can use hand signals or write on mini whiteboards to express their choice. You can use this time to address any differences in answers or to see if they are ready to move on. Talk learners through the example programs introducing them to `if`, `if-else`, and `if-elif-else`. This is all presented via the slides. Next, check their understanding by setting the 'What will be the output?' worksheet, which asks learners what the output will be, based on different inputs. Solutions are provided for peer, self, or teacher marking.

Activity 2 (Slide 35) 30 mins	**Chatterbot: A PRIMM activity** The 'Chatterbox' worksheet walks learners through a chatterbot program. Introduce learners to `.upper()` and `.lower()` to help ensure that conditions can be checked correctly. They will also be introduced to `elif` and `else` used with selection statements. The PRIMM approach has been used to allow learners to investigate the code and read it carefully. This helps learners gain an understanding of the new programming constructs that have been introduced. Towards the end of the activity, the learners will be given tasks to modify the code. This will help to deepen their understanding of using selection in programs. During the activity, circulate the room and provide additional support as needed. In the next lesson, learners will be completing a step related to this activity.
Plenary (Slides 36–39) 5–7 mins	**Multiple choice questions: Peer instruction** Use peer instruction (ncce.io/ks4-qr-pi) to allow learners to decide on their answers to each multiple choice question and share their reasons with the class. You can use A, B, C, D cards for this, or learners could write their letter on a mini whiteboard or a slide on their computer screen.

| Homework | N/A |