This video will discuss how to include decision-making capabilities in a script by using if statements.
Decisions in a script are made by testing the conditions within the script.

**If statements** allow script conditions to be tested – if a test is true, then the statements associated with the test are run.

If statements are **compound statements** and they can have more than one part. Each part has its own header line, performs a single test, and has one or more statements associated with it.
An if statement must contain an if part which is itself a compound statement. It is indicated by the `if` keyword in the header line.

The keyword is followed by the test condition.

The header line ends with a colon (as with all compound statement header lines).

Indented below the header line are one or more associated statements that will run when the test is true.
The **elif** part of an if statement is optional and is only included if additional tests are needed.

The **elif** part is linked to the preceding tests in the if statement. This part is indicated by the **elif** keyword.

The **elif** is followed by a test condition.

And has associated statements that will run if the test is true.
The final part for an if statement is the **else part**. This part does not perform a specific test.

The part is indicated by the `else` keyword and there is no test in the header line.

Associated statements are indented below the header line and will run if the else test is true.

The else test is true if all preceding tests in the if statement were false.

This part ensures that the if statement accounts for all possible conditions – including those not specifically tested.

This part is optional.
Multiple-test if statements

- **if part** begins the statement – only required part.
- **elif part(s)** test additional conditions. Optional part(s).
- **else part** is run if all previous test are false. Optional part.

Header lines for each part must line up

To summarize: the **if part** begins the statement and is the only required part.

The **elif parts** provide additional tests, if needed, and are optional.

The **else part** is the final part and is optional. It will run if all previous tests in the statement have been false.

Note that the header lines for all parts of the **if statement** have the same level of indentation.
Let’s look at an example of an if statement in operation.

The 1\textsuperscript{st} test is run and fails so the testing continues to the next part.

The 2\textsuperscript{nd} test passes and the associated statements are run.

All further tests in the statement are skipped.
In a second example,

The 1\textsuperscript{st} test fails,

The 2\textsuperscript{nd} test fails,

And the 3\textsuperscript{rd} test fails.

The else test passes because all previous tests in the statement have failed – the statements in the else part are run.
Let’s look at what happens if we use a series of if tests rather than a multi-part if statement.

The 1\textsuperscript{st} test fails…

The 2\textsuperscript{nd} test passes and the associated statements are run.

In this case, the 3\textsuperscript{rd} and 4\textsuperscript{th} tests are also run and they fail.

When a series of if tests are used, there is no linkage among the tests so all tests are performed. In this case, the else test cannot be used.
To conclude: if statements run a set of processes only when a specified condition is true. Statements associated with false tests are skipped.

- Linking tests (by using `elif`) is more efficient if tests are related...
  - testing stops when a test passes.
  - using `else` is an option.
This slide lists some of the test conditionals that can be used in Python. Note that tests for equality are made with a double equal sign (a single equal sign is only used to assign values to variables). Also note the symbols used for inequality tests.
Compound statements can contain other compound statements. It is common to include an if statement in a loop or a loop within a loop.

When working with nested compound statements, it is critical to pay attention to indentation.

In these cases, a given compound statement should be treated as a block of code. The associated statements should be indented relative to their corresponding header line.
In this example,

The if statement is a block of code that is associated with the for loop.

Within the if statement, the lines associated with the if part

And else part are indented relative to their respective header lines.

In the 2nd example,

The for loop block is indented relative to the main loop.

The if statement block is indented relative to the nested for loop.

The lines associated with the if

and else parts are indented relative to their respective header lines.