



Lesson 1: Introducing variables

Introduction

Learners are introduced to variables. They see examples of real-world variables (score and time in a football match) before they explore them in a Scratch project. Learners then design and make their own project that includes variables. Finally, learners identify that variables are named and that they can be letters (strings) as well as numbers.

Learning objectives

To define a ‘variable’ as something that is changeable

- I can identify examples of information that is variable
- I can explain that the way a variable changes can be defined
- I can identify that variables can hold numbers or letters

Key vocabulary

Variable, change, name, value

Preparation

Subject knowledge:

- You need to be aware of the concept of variables in programming. In this lesson, a ‘variable’ is defined as something that can be set and changed throughout the running of a program. This definition will be developed in Lesson 2. You should be familiar with the process of adding a variable, which is outlined in this lesson plan.
- In Activity 2 and 3, learners move between all four levels of abstraction of the project. This is demonstrated throughout the plan below. You can find more information about levels of abstraction in the unit overview.
- Learners are required to save their projects during this lesson. We recommend the use of teacher accounts, which enable you to create individual learner accounts and arrange projects into ‘studios’. You can find guidance on the use of teacher accounts in the unit overview. If you are unable to create teacher and learner accounts, projects can be downloaded and saved to local devices.

You will need:

- L1 slides
- Devices capable of running Scratch 3
- A1 Scratch project – [Score change](https://ncce.io/scorechange) (ncce.io/scorechange)
- A2 Activity sheet – Designing a project with a variable
- A2 Solutions – Designing a project with a variable
- AP Activity sheet – Variable values
- AP Solutions – Variable values
- L1 Homework – Real-world variables

Assessment opportunities

Activity 1: You can assess whether learners can relate real-world experiences of variables to a simple project in Scratch, identifying what is changing and how it changes.

Activity 2 and 3: Learners can demonstrate that they can design and code a simple project that includes a variable for ‘score’.

Plenary: You can assess whether learners can identify that variables can hold letters or numbers.

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*

<p>Introduction (Slides 3–4)</p> <p>10 mins</p>	<p>Changing the score</p> <p>Display slide 3. Show learners the questions on the slide and ask them to think about them as they watch the short clip.</p> <p>Click the link to play a short video of highlights from a football match. At various points in the clip, there is a score and time caption in the top left-hand corner of the screen. Learners should identify that:</p> <ul style="list-style-type: none"> • The score changes when either team scores a goal • The time changes as the clip progresses (note that this is a highlight clip, so the time jumps between the pieces of action) <p>Display slide 4 and click to show a simulation of the score from the clip. Explain that there are two variables for score in this clip: one for the USA’s score and one for Japan’s score. Explain that the value changes by one when a goal is scored, but not all variables change by one.</p> <p>Make sure the learners understand that a variable can only hold one value at any one time. In the context of a football match, a team can only have one score at any one time. When they score a goal, the new score (value) replaces the old one. This is an important concept, which they will revisit throughout the unit.</p>
<p>Activity 1 (Slides 5–8)</p> <p>5 mins</p>	<p>Variables in a project</p> <p>Display slide 5 and direct learners towards the ‘Score change’ Scratch project’ linked on the slide.</p> <p>Ask learners to use the project and make a note of what they think is happening when each ball is clicked. They should identify that:</p> <ul style="list-style-type: none"> • The yellow ball increases the score by one • The pink ball increases the score by three • The green ball decreases the score by one <p>Note: In this project, clicking on the green flag will reset the score to 0; some learners may discover this during the activity. This is done using set score to 0 from the Variables blocks.</p> <p>Display slide 6 and show learners the definition of a variable.</p> <p>Display slide 7. Ask learners to click inside the project, and challenge them to modify the variables as shown on the slide.</p> <p>Display slide 8 to show learners what their new code should look like.</p>
<p>Activity 2</p>	<p>Design your own project including variables</p>

<p>(Slide 9)</p> <p>10 mins</p>	<p>Note: In this activity, the ‘task’ level of abstraction is provided (however, learners are expected to write this in their own words on the activity sheet) and learners are working at the ‘design’ level.</p> <p>Display slide 9. Explain to learners that they need to design a project that includes a variable: ‘Score’. The project is similar to the example that they saw in the previous activity.</p> <p>Hand out the activity sheet. Ask learners to first write the task in their own words. Then ask them to choose three sprites and add them to their activity sheet. Next, ask learners to name their variable, and as precisely as possible, describe how each sprite will change the score.</p> <p>Once they have completed their designs, the learners should share them with a partner and ask if they think they could create a project based on the design. The learners should then refine and improve their design as necessary.</p>
<p>Activity 3</p> <p>(Slide 10–11)</p> <p>15 mins</p>	<p>Creating a variable</p> <p>Note: Learners now move to the ‘code’ and ‘running the code’ levels of abstraction.</p> <p>Show the process of creating a variable by sharing the screen recording on slide 10 or demonstrating it in Scratch. To make a variable, click on the Variables blocks, choose Make a variable, and then choose a name for the variable. In this case, the variable name is ‘Score’.</p> <p>Display slide 11. With the task visible on screen, give learners time to create their own project including variables.</p> <p>Ask the learners to compare their completed project with their design and debug (if necessary).</p> <p>Then ask learners to save their completed project. You can find guidance on saving projects in Scratch in the unit overview.</p>
<p>Plenary</p> <p>(Slides 12–13)</p> <p>5 mins</p>	<p>Different variables</p> <p>Move on to slide 12. Show the variables for ‘Score’ and then build the slide to show that the teams are also variables. Explain that variables can also consist of letters or strings, and that these are all values.</p> <p>Build the slide to show that the teams can change. Relate this to the real world, by explaining that there are many teams who can play football matches against each other.</p>

	Display slide 13. Distribute the activity sheet, and ask learners to find the values for the variables relating to teams and scores.
Next time (Slides 14–15) 5 mins	This time, next time Review the ‘Assessment’ and ‘Summary’ slides.
Homework (Optional)	Real-world variables Hand out the homework. Explain to learners that they need to consider where they might encounter variables in the real world. This is an open task with many possible responses. Examples may include: <ul style="list-style-type: none">• Anywhere that a digital read-out is displayed – this could include a temperature reading, time, speed, etc, when the temperature of an oven is set, or the value displayed on a digital speedometer• Games that involve score, whether online or offline – this could include computer games or board games; a good example is Monopoly, where each player is given £1,500 at the beginning of the game, and this value changes as they progress through the game• Prices for items in shops

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