**Getting active**

**Lesson 1: Describing with variables**

**Introduction**

In this lesson, pupils develop their understanding of variables through three unplugged activities. They consider the difference between variable names and variable values, using these to retell stories. Pupils’ understanding is reinforced by using variables to describe the characters they create. They finally consider how variables are changed and use this understanding to describe the numbers of sides that different shapes have.

**Time:** @60 minutes

**Learning objectives**

* To know and understand what variables are
* To use variables to describe a character
* To write algorithms that use variables

**Materials needed:** lesson presentation, mini-whiteboards and dry-wipe pens, printouts of **variable character description** sheet*,* printouts of slide 7 and 14, stacking games or objects

**Lesson summary**

1. Introduction: Playing a game (15 minutes)
2. Introducing variables (25 minutes)
3. Changing variables (15 minutes)
4. Reviewing learning (5 minutes)

**Introduction: Playing a game (15 minutes)**

* Explain to pupils that they are going to have a competition using a stacking game (e.g. ‘chairs,’ ‘Jenga,’ ‘suspend’, etc). If you do not have access to such games, towers could be made from playing cards or plastic cups. Players score a point for each item they add to the stack, their score carries on when they lose a life. Players have two lives. A life is lost each time there is a collapse when the pupil’s lives reach zero it is the end of their turn.
* Select three pupils to act in the role of score, lives and high score give each pupil a mini-whiteboard. Use **slide 4** to discuss with pupils the value of each at the start of the game and when they will change (see speaker notes for answers).
* Select one pupil to play the game and ask the three others to set their whiteboards to the first value identified and make the appropriate changes to the number during the game. At the end of the player’s turn, select another player and invite suggestion what the pupils with the mini-whiteboards should do (high score should be changed to the same value as score - being the first attempt, this will be the high score, while score and lives should be reset to the original value – 0 and 2.)
* Repeat the game with different pupils taking on the roles, ask further questions about what the values of the mini-whiteboards should be and when they should be changed. In subsequent games, the high score should only be changed if the current player’s score is greater than the high score.

**Introducing variables (25 minutes)**

* Use **slide 5** to introduce the concept of variables to pupils. Invite pupils to share any previous experience of variables.
* Display **slide 6** and ask pupils to reflect on the game they played in the introduction and identify the variables that they used (score, lives, high score). Ask pupils to discuss with their partner the questions. (Examples of the type of statements that pupils might make have been included in the slide speaker notes).
* Provide pupils with a copy of **slide 7** and explain that before a variable can be used it has to be set to a value. Set the values of the variables on the slide (e.g. Spiderman, jelly babies, 7 and squirrel) and ask pupils to do the same. Ask directed questions to pupils to get them to identify the value of their variables e.g. *What is the value of your favourite sweet variable?*
* Display **slide 8** and explain to pupils that when writing a program we use the variable name but the computer will find the value of the named variable and use that. Discuss how this could have been used in the opening game.
* Display **slide 9** and invite suggestions on how the passage should be read. Allow pupils to attempt to read it before establishing that each time the variable name has been written the value should be used (e.g. where it says ‘favourite superhero’ say ‘Spiderman’). Invite several pupils to share their version of the story with the class.
* Display **slide 10** and explain how variables are useful when writing computer programs and draw links with how the story was told in different ways without changing anything in the text.
* Give out copies of the **Variable character description**worksheet and explain to pupils that need to set the values of the variables to numbers between 2 and 10. Then they are going to create a character and describe it using their variables. Remind pupils that when writing they should use the name of the variable but when reading it out loud, they should say its **value**.
* When pupils have completed their character descriptions, ask them to swap with another pupil to read their description back to them. Pupils should listen to the description to see if their partner reads it the way it was intended. If not, they should go back to their description and edit it so it does (debugging).
* Once all the pupils have finished, invite them to share their character description with the class. If possible, display the description that they have written at the same time.

**Changing variables (15 minutes)**

* Explain to pupils that in computing, variables in a program can be changed which helps to reduce the number of variables that a program needs to include and making the program more efficient (**slide 12**). Invite suggestions on how and when the variables in the game played at the start of the lesson were changed.
* Display **slide 13** and invite pupils’ suggestions on how and when the variable in the algorithm will change - increase by two if a question is answered correctly, decrease by 1 if a question is answered incorrectly.
* Display **slide 14** and explain that one variable is being used to state how many sides different shapes have. Identify that the variable was set to 3 for the triangle then increased by 1 for the rectangle. Give out a copy of the same slide and ask pupils to work with a partner to identify the value by which the variable should change so it can be used to describe the next shape. Those who finish can add extra lines using their existing knowledge of shapes
* Use **slide 15** to show pupils the correct answers.

**Reviewing learning (5 minutes)**

* Use **slide 16** to help pupils reflect on their use and understanding of variables. Allow them to discuss their responses with a partner before inviting pupils to share their ideas with the class.
* If you wish, use **slide 17** to review the learning objectives of the lesson.

**Extension ideas**

* Pupils could rewrite a counting song (e.g. ten green bottles) using variables.

Example:

set ‘number of bottles’ to 10

Repeat twice

‘number of bottles’ green bottles hanging on the wall

Change ‘number of bottles’ by -1

 If one green bottle should accidentally fall, there’ll be ‘number of bottles’ green bottles hanging on the wall.

Change ‘number of bottles’ by -1

**Differentiation**

**Support:** Pupils could work in an adult-led group to support their use of variables and focus on developing a solid basic understanding of how variables work and are used.

**Stretch & challenge:** Pupils could use **Variable character description (challenge)**worksheet which requires pupils to use a greater number of variables which are set to larger values.

**Opportunities for assessment**

* Informal observation of pupils understanding of variables through class discussions and paired activities.
* More formal assessment of pupils’ use of variables through the character description activity if wished.