N4

National 4 COMPUTING SCIENCE

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BrightRED Study Guide

Curriculum for Excellence

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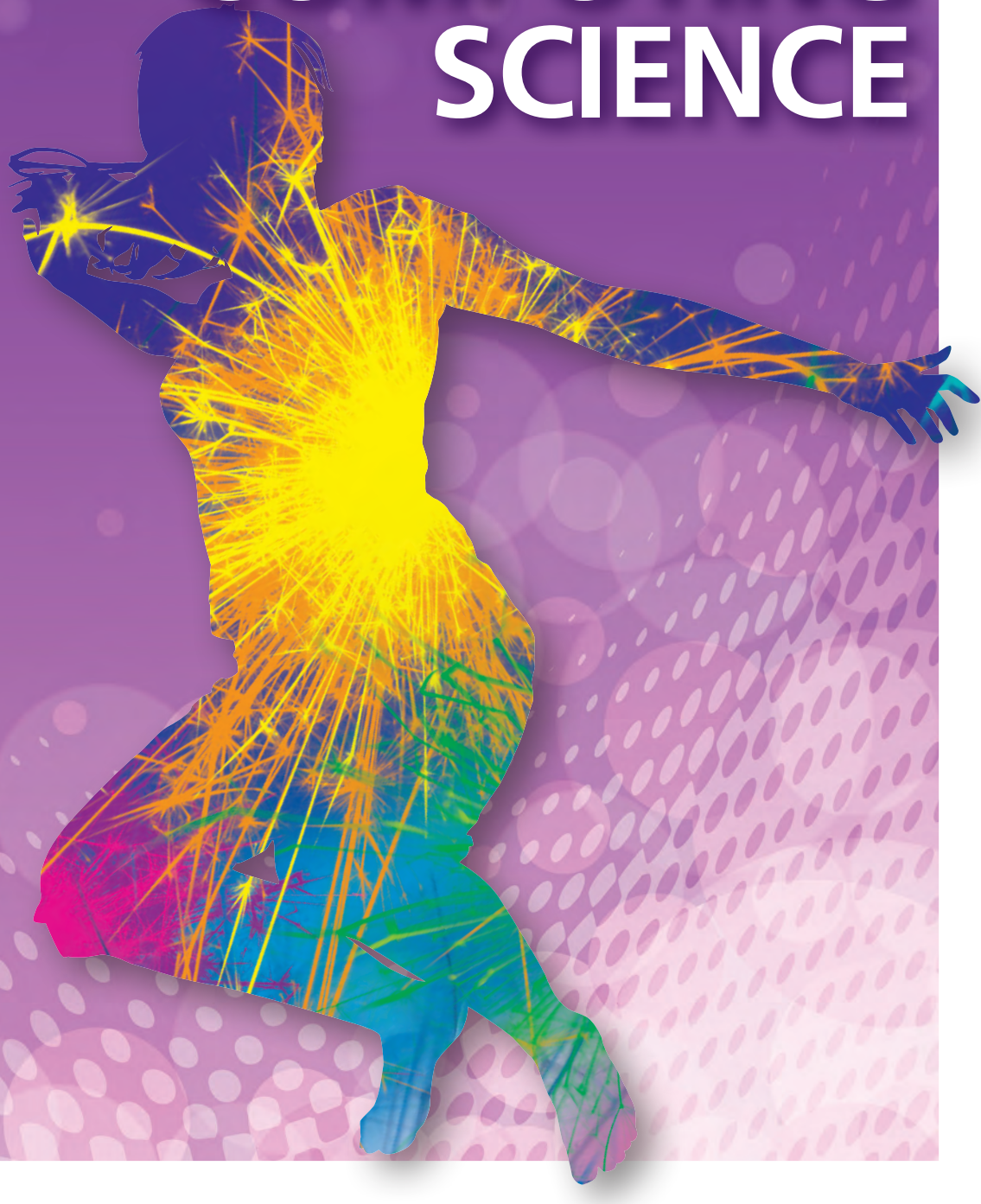
COMPUTING SCIENCE



CONTENTS

NATIONAL 4 COURSE

EXPRESSIONS AND ARITHMETIC OPERATORS

EXPRESSIONS

Variables are used in programs to store and process items of data. Expressions are used to assign a value to a variable. For a variable which is an Integer data type the value assigned to the variable can either be a number or the result of a calculation using other variables. For a variable which is a String data type the variable can be assigned an item of text or the result of processing other variables which are storing text.

EXAMPLE

The following expression assigns the constant value 20 to the Discount variable.

SET Discount TO 20

EXAMPLE

The following expression assigns the item of text "Dagger" to the Weapon variable.

SET Weapon TO "Dagger"

EXAMPLE

The following expression calculates the area of a rectangle from the length and breadth and assigns it to the Area variable.

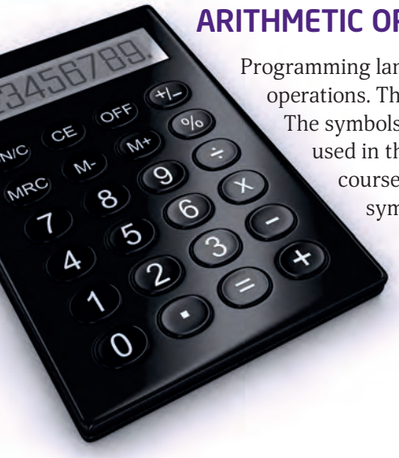
SET Area TO Length * Breadth

EXAMPLE

The following expression joins a first name and a space and a surname together and assigns it to the Fullname variable.

SET Fullname TO Firstname & " " & Surname

ARITHMETIC OPERATIONS (+, - *, /, ^)



Programming languages perform addition, subtraction, multiplication, division and powers operations. These operations are represented by the symbols shown in the table shown below. The symbols for these operations can vary for different programming languages but the ones used in the table are most commonly used and are the ones that you should know for this course. The programming languages Visual Basic, Python and Scratch all use these symbols but note that Python uses "**" instead of "^" for powers.

Operation	Symbol
Add	+
Subtract	-
Multiply	*
Divide	/
Power	^

JUST A WEE NOTE

Make sure that you use the symbols "*" and "/"to perform multiplication and division in computer programs and not "x" and "÷".

The following examples illustrate some uses of these operations:

EXAMPLE

This instruction calculates the number of pupils in a class.

SET ClassSize TO Boys + Girls

EXAMPLE

This instruction calculates an employee's net pay after tax is taken off the gross pay.

SET NetPay TO GrossPay - Tax

EXAMPLE

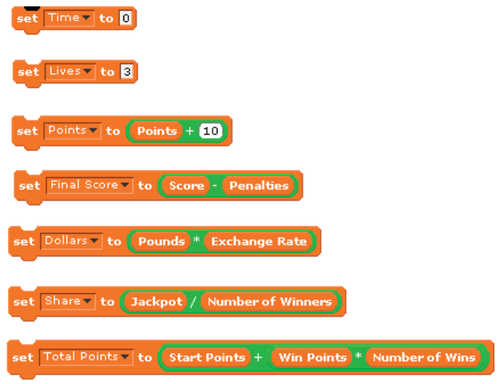
This instruction calculates the share of the jackpot that the winners of the national lottery receive.

SET Share TO Jackpot / NumberofWinners

EXAMPLE

This instruction calculates the area of a circle from the radius.

SET Area TO 3.14 * Radius ^ 2



Scratch

Shown to the left are some examples from Scratch where variables are assigned the value of an expression using the SET script which is found on the Variables tab and the arithmetic operations which are found on the Operators tab.

Visual Basic

Shown below are some examples from Visual Basic where variables are assigned the value of an expression.

Age = 16

Colour = "Blue"

Area = Length * Breadth

COURSE IDEA

The Scratch programming language has a string operation called Join that is found in the Operators tab. Create a Scratch program with two variables to store the first name and surname of the user. Then use the Join operator to combine strings to make interesting phrases.

Enter the script shown below and then make up some more complex phrases using the First name and Surname variables. Try and make up phrases such as:

"Hello Tom, how are you today?"

"Tom Anderson is a nice name."

"I was at school with someone called Tom Anderson."

SUMMARY

Expressions use arithmetic operations (+, -. *, /,) to assign values to variables. You will need to use expressions in your practical programming tasks for unit assessment and course assessment. Make sure that you know the format of the instruction that use expressions to assign values to variables in the programming languages that you use.

THINGS TO DO AND THINK ABOUT

For a program that you have written in your school, print out the program code and highlight any instructions that use expressions to assign values to variables. Try to do this for two different programing languages such as Visual Basic and Scratch.

ONLINE

This online calculator works out the area of a circle from the radius: http://www.calculateme.com/cArea/AreaOfCircle.htm. Can you find another example of an arithmetic operation online?

DON'T FORGET

It is more efficient to use the power symbol than to multiply a variable by itself. For example Length ^ 3 is more efficient than Length * Length * Length.

WEBSITES

INTRODUCTION

Websites are made up of pages which consist of the multimedia elements text, graphics, video and sound. Other elements such as navigation tabs, tables, hyperlinks, and so on. are commonly used.

Websites can be created using Hypertext Mark-up Language (HTML) and often websites are created using a web page editor. Web page editors allow elements of the website to be dragged and dropped onto the page without the need for writing technically difficult HTML code to achieve the same thing.

BROWSER

A browser is a program that displays web pages and allows the user to navigate around other websites on the Internet. Internet Explorer, Chrome and Firefox are examples of commonly used browsers.

Browsers provide other functions such as:

1 Allowing the user to keep a list of shortcuts to favourite websites so that they can quickly be revisited.
2 Keeping a history of recently visited websites.
3 Accessing webmail to send and receive emails.
4 The settings can be customised to suit the preferences of the user. eg. Controlling which toolbars are displayed, which website is initially displayed, the zoom in/zoom out factor, and so on.

HYPERLINK

A hyperlink is usually a piece of coloured text or an image which, when clicked, provides a connection to another page within the site or to another website. Hyperlinks allow the user to navigate within a site or to find further information in other websites.

DON'T FORGET

An external hyperlink is a link to a different website whereas an internal hyperlink is a link to another page or file within the same website.

URL

Websites can be visited by entering a unique address called a Uniform Resource Locator (URL) into a browser program. The URL is made up of several component parts. These parts include the protocol, the domain name, the path to the file and the name of the file.

For example the URL for a web page about Wimbledon on the BBC website is shown below.

http://www.bbc.co.uk/sports/tennis/wimbledon.htm.

Protocol | Domain name | Pathway | Filename

The protocol is an agreed set of rules between the sender and the receiver that is used to transfer the file. In this case the Hypertext Transfer Protocol (HTTP) is used to transfer a web page.

The domain name is the address of the server computer that is hosting the webpage. Dots are used to separate the different parts (two or more) of the domain name. There is a system for identifying different types of organisation and the country where the site is based.

ONLINE

Go on-line and download some of the websites that are stored in your favourites. Investigate the component parts of the URL displayed at the top of the screen in the browser.

Organisation	Meaning
.com	A company
.edu	An educational institution
.org	A non-profit making institution
.gov	A governmental agency

Country	Meaning
.uk	United Kingdom
.fr	France
.nz	New Zealand
.it	Italy

The pathway specifies the route to the page.

The filename is the name of the actual file that is being accessed.

If the URL is not known for a particular website then the site and other relevant sites can be found by entering suitable keywords into a search engine.

NAVIGATION

Browsers provide several ways to allow the user to move between different websites and web pages. Specific sites can be found by entering the URL into the browser or a search engine can be used to find sites on a certain topic by entering appropriate keywords. Backward and forward arrows can also be used to move back and forth to revisit sites and then move forwards to more recently viewed sites. Websites that are frequently visited can be saved as favourite shortcuts so that they can be accessed quickly without the need for entering the URL.

Most websites also contain a search box to allow the user to go directly to an area of a website that contains the search word or phrase.

COURSE IDEA

Create a webpage about the Eiffel Tower that contains 3 text articles, at least one image, a video and a hyperlink to another relevant website.

Most schools use Serif WebPlus software which uses the Insert menu to add the elements to the page. If you use another webpage editor explore the menus to insert text, images and so on. and remember to ask your teacher for help if you are stuck.

SUMMARY

Websites are made up of webpages containing text, images, video and sound content. The websites are identified by an address called a Uniform Resource Locator (URL) or can be searched for using a search engine. Links to webpages and other websites are provided using hyperlinks.

THINGS TO DO AND THINK ABOUT

It is important for this course that you can create a simple website with two or more webpages as part of the unit assessment. Make sure that you can insert text, graphics and video into webpages and provide a hyperlink to navigate between the pages.

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COMPUTING SCIENCE

Alan Williams

This BrightRED Study Guide is just what you need to support your National 4 Computing studies! Written by our trusted author and experienced Computing teacher, Alan Williams, this book contains all the key course information and offers many practical activities, examples and tasks to let you focus on exactly what you need to get the most out of your course. Inside, you will find:

- **All the essential course content** arranged in easily digestible topics.
- **Full colour, highly illustrated, accessible and engaging spreads** to make sure all that study sticks!
- ***Don't forget*** pointers offering advice on the key facts and on how to avoid common mistakes.
- ***Course ideas*** offering assessment help and ideas for further study.
- ***Summaries* at the end of each topic** highlighting important information and learning points.
- ***Things to do and think about*** tasks allowing you to study independently and work out answers on your own.
- **Packed with questions and practice assignments** to put your computing skills to the test.

Be Bright, Be Ready for National 4 and beyond!

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