Appendix 1

Unit Marking Sheet

A sheet that can be used to track the marks of a student through the graded elements of the course and produce a final grade.

Unit Marking Sheet

Pupil Name:_____

Research Project

Research Project Worksheet		
Brainstorming ideas present with some development.	5 x 1	
'Divide work among group members' section of Research Project Worksheet filled in.	3 (work listed) 4 (quality)	
Websites investigated.	5 x 1	
Challenges listed.	2 x 1	
Challenges commented on.	2 x 2	
Positive aspects listed.	2 x 1	
Positive aspects commented on.	2 x 2	
Outline plan of PowerPoint slides included.	7 x 1 (slide titles), 2 x 1 (additional slides), 1 (colour scheme)	
2 suggested improvements.	2 x 1	
Good elaboration of suggested improvements.	2 x 2	
Total	**45**	

Research Project Presentation		
Content:		
Good design including clear font, colour, appropriate graphics, consistent font size, consistent look, spelling.	Clear font = 1, Colour = 1, Appropriate graphics = 1, Consistent font size = 1, Consistent look = 1, Spelling = 1	
Creativity used in preparation of materials, including animation and slide transitions and others such as hyperlinks, graphs etc.	Animation and transition = 2, Other = 2	
Title slide, effective introduction slide, at least 3 information slides included.	Title = 1 Intro = 1 Info slides = 3 x 2	
Effective conclusion slide and references slide included.	2 x 2	
Topics from original topics sheet well-covered.	5	
Delivery:		
Eye contact maintained throughout the presentation.	2	
Good posture and clear speaking voice.	2 x 1	
Well organised, shows confidence, steady rate of delivery.	3 x 1	
Shows enthusiasm and delivers an engaging presentation which keeps the interest of the audience throughout.	3	
Teamwork:		
All group members present part of project equally.	3	
Questions:		
Competent answers to all questions.	3	
Answers are developed.	2	
Total	**45**	

Research Project General		
Independent work (little reliability on teacher support).	10	
Total	**10**	

Advanced Game Testing

Test Cases		
3 Sprites exist	1 mark	
4 Backgrounds exist	1 mark	
Game initialised.	1 mark	
Sprite Behaviour	2 marks	
Variables	2 marks	
Backgrounds	2 marks	
Extra Features	1 mark	
Total	**10**	

Scratch Project

Scratch Group Report		
Well thought-out brainstorming ideas present	4 x 2	
Project Design	Sprites = 2, Backgrounds = 2, Variables = 2, Sounds = 2, Instructions = 2, Start = 2, Middle = 2, Finish = 2	
Diary for each group member	Diary filled in = 6, Quality = 5	
Test Suite (Teacher testing)	Sprites = 2, Backgrounds = 2, Repeat loops = 2, If statement = 1, Sounds = 1, Variables = 2, Instructions = 5 x 2	
Challenges listed	2 x 1	
Challenges commented on	2 x 2	
Positive aspects listed	2 x 1	
Positive aspects commented on	2 x 2	
Presentation Plan (speaker notes)	Introduction =2 , Division of Work =3 , Description of Project = 5, Testing Problems = 2, Solutions =2, Challenges we faced / Things we enjoyed = 2 x 2, Conclusion = 2	
2 suggested improvements	2 x 1	
Good elaboration of suggested improvements	2 x 2	
Total	**93**	

Scratch Project Presentation		
Content:		
Introduction (brief description of project), Division of Work, Clear Description of Project, Evaluation of positive aspects / challenges.	Intro = 1, Division of Work = 2, Description = 4, Evaluation = 2	
Effective conclusion slide.	1	
Delivery:		
Eye contact maintained throughout the presentation.	2	
Good posture and clear speaking voice.	2 x 1	
Well organised, shows confidence, steady rate of delivery.	3 x 1	
Shows enthusiasm and delivers an engaging presentation which keeps the interest of the audience throughout.	3	
Teamwork:		
All group members present part of project equally.	3	
Questions:		
Competent answers to all questions.	2	
Answers are developed.	2	
Total	**27**	

Scratch Project General		
Independent work (little reliability on teacher support)	10	
Extra functionality / creativity in game	20	
Total	**30**	

Final Grade

Research Project Worksheet	
Research Project Presentation	
Research Project General	
Research Project Total	**/100**
Advanced Game Testing Total	**/10**
Scratch Group Report	
Scratch Project Presentation	
Scratch Project General	
Scratch Project Total	**/150**
Unit Total marks	**/260**
Unit Total Percentage	**%**

Appendix 2

Glossary

A glossary of terms referred to in the Key Vocabulary section of the lessons.

Glossary

Acceptance Testing Formal testing conducted to determine whether or not a system satisfies its acceptance criteria and to enable the end user to determine whether or not to accept the system.

AIF This is an audio file format and is the highest-of-high-quality uncompressed audio that you can save on a disc. The file size is very large.

Algorithm A set of instructions to solve a problem. Algorithms are well-ordered, have unambiguous operations, have effectively computable operations, produce a result and must have some operation that tells them to stop.

AU An audio file typically created on a Sun Microsystems or Unix-based machine. This file type is not that common and can be quite large.

Background This is used to describe the appearance of the stage in Scratch. You can use an image of your choice for your background.

Binary search A 'divide and conquer' technique to search a list. The list must be sorted to use this method. We check the middle item of the list to identify which half the search key is in. The process is repeated on each successive half until the list has been narrowed down to just one item.

Bitmap

This refers to a bit-mapped imaged. Bitmap images are made up of dots (pixels). A bitmap is a two-dimensional file in which each pixel is assigned a numeric colour value. JPEGs and GIFs are examples. File extension can be .bmp.

Blocks Palate

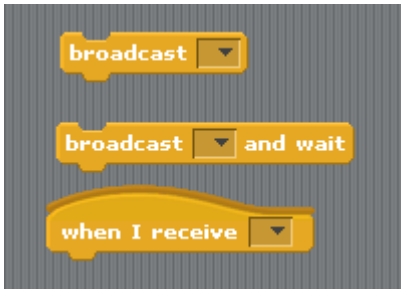
These are blocks for programming your sprite and telling it how to behave.

Boolean Search

This search on the Internet allows users to combine key words with Boolean operators such as And, Or and Not (+, /, -), to produce more relevant / refined results. E.g. a search containing "bread" -"wheat" would limit the results in a search, excluding "wheat" from the results.

Broadcast

In Scratch a broadcast sends a message out to all sprites. If a sprite has a Script that can "receive" the broadcast it is run when the message is sent out.



Bubble sort

This is a simple method of sorting data. The algorithm starts at the beginning of a data set and compares the first 2 elements. If the first is greater than the second they are swapped around. This continues to the end of the set of data and then starts at the beginning again with the first 2 elements, repeating until there are no swaps. Although simple it is a very inefficient algorithm.

Code

In computer science, code / source code is any sequence of statements written in some human-readable computer programming language. It allows a programmer to communicate with a computer.

Computer Virus

A computer virus is a computer program that can copy itself and infect a computer, without permission or knowledge of the user.

Conditional Statements

A conditional statement is also a sentence that can be either true or false. The statement will then run some script depending on whether the statement is true or false. For example if sprite lives equals zero is true then the game is over and all scripts will stop running.

Costume

These are different looks that can be used for a sprite as shown in the image. They are particularly useful when trying to create animation effects.

Debugger

The debugger in Scratch slows down execution of the script and allows you to see the Script highlighted step by step as is happens on the Stage. It is helpful if you do not understand the Script or if there is a problem with it.

Debugging

Debugging is the process of finding and reducing the number of bugs or defects in a computer program, making it behave as originally expected.

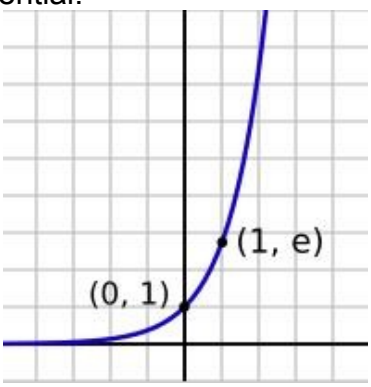
Encryption Encryption is the process of transforming information, using an algorithm (called a cipher), to make it unreadable to anyone, except to those possessing special knowledge called the key. Decryption is the process of converting encrypted information back to its original form so that it can be understood.

End User The final consumer of a product or service that ultimately determines its acceptability.

Event handler A set of actions designed into a program or script to do something in response to an action by a user; for example, "when button is clicked, change Web page."

Execute To carry out a command or to run a program

Exponential A pattern of change in which the amount of change that occurs in a quantity during a small interval of time is proportional to the amount of that quantity present. Exponential functions multiply at a constant rate. E.g. bacterial culture that doubles every 20 minutes can be expressed as an exponential.



Graph of Exponential Growth

GIF GIF (pronounced with a hard 'g') is the acronym for **Graphics Interchange Format**, an image compression format limited to 256 colors. It is considered best for images with solid areas of colour such as logos, or animation. File extension is .gif.

Green Flag This is one way to start scripts.

Hacking Hacking is the act of gaining access to a computer or computer network without legal authorisation.

Hash Tables Hash tables are a common data structure. They consist of a table (Set of containers) and a mapping (the hash function). Items stored in a hash table must have search keys. The hash function maps (Converts) search keys into hash values. The hash value is used as an index (Container) into the hash table for that item. This allows items to be inserted and located quickly.

Image compression Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level. The reduction in file size allows more images to be stored in a given amount of disk or memory space. It also reduces the time required for images to be sent over the Internet or downloaded from Web pages.

Image File Format Image file formats provide a standardised method of organizing and storing image data. Common image file formats include JPEG, GIF and PNG.

Import This button is used to put in elements from the Scratch library or from an external file. These elements can be sound or graphics.

Initialise When starting to run a script it is important that everything affected by the previous running of the script is reset. E.g. Go back to the original costume for a sprite, set score to zero for a game.

Interface The graphical or textual form of interaction between user and software.

Iteration Iteration involves repeating a series of instructions using commands such as **forever** and **repeat**. Iteration = looping.

JPEG JPEG (pronounced jay-peg) is the acronym for **Joint Photographic Experts Group**, the name of the group that developed it. It is an image compression format for full colour (high-quality) images. It is considered best for photos. File extension is .jpg.

Library To save time Scratch has an inbuilt library of images, sounds and games that can be used as example material for you to start your projects.

Linear Search

The Linear Search, or sequential search, is simply examining each element in a list one by one until the desired element is found. The Linear Search is not very efficient. If the item of data to be found is at the end of the list, then all previous items must be read and checked before the item that matches the search criteria is found.

List

A list can store numbers as well as strings of letters and other characters. In Scratch it is possible to make a list by clicking on the Variables button and then clicking on Make a List button

Lossless Compression

Lossless means "fully recoverable". Lossless compression always returns the original data, bit-for-bit identical to the original file. Some image file formats, like PNG or GIF, use only lossless compression. Lossless image compression is preferred for icons, logos and technical drawings. Run length encoding, described in Module 4, Lesson 3, is also a lossless image compression method.

Lossy Compression

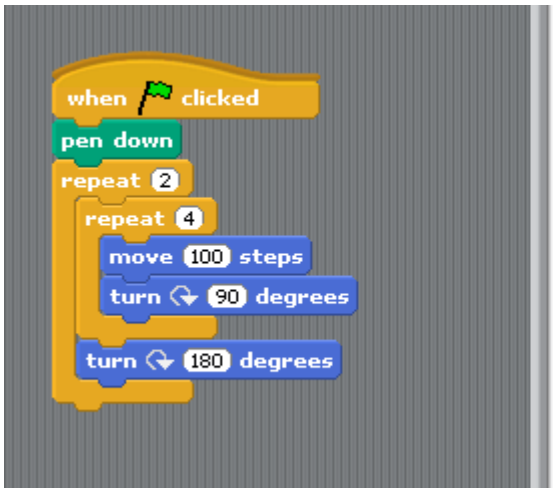
Lossy compression when compressing images, to decrease their file size, means "with losses to quality". Lossy means that some image quality is lost when the image data is compressed and saved, and this quality can never be recovered. This form of compression reduces a file by permanently eliminating certain information, especially redundant information. When the file is uncompressed, only a part of the original information is still there (although the user may not notice it). An example of lossy compression in images is the JPEG.

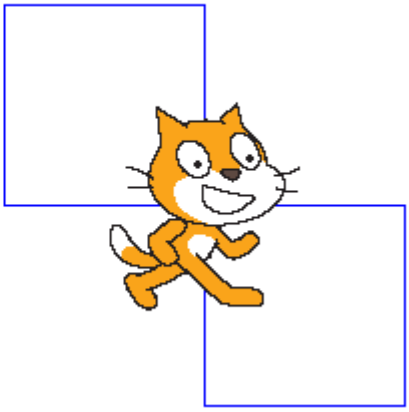
MP3

These are popular audio files because they compress music down to a very small size while maintaining quality.

Nested Loop

This is a loop inside another loop. The instructions inside the first loop are carried out first and then the instructions of the outer loop are carried out.





New Sprite Buttons These are used to create new characters or sprites for your project.

Open Source The difference between software created by the open source communities and commercial software sold by vendors is that open source software is published under licences that ensure that the source code, the language in which the software is written, is available to everyone to inspect, change, download, and explore as they wish. This is the essential meaning of open source: the source code - the language in which the software is written and the key to understanding how the software works - can be obtained and improved by anyone with the right skills. Open Source software is free.

Pixel Pixel is formed from PICture ELement and is the smallest element (single point) of a digital image.

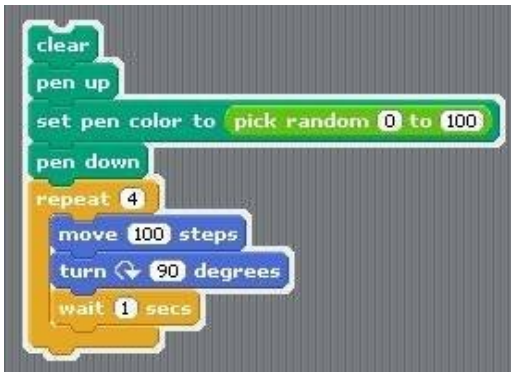
PNG PNG (pronounced ping) is the acronym for **Portable Network Graphics**, an image compression format approved by the World Wide Web Consortium (W3C) as a replacement for GIF files, because GIF files use a patented data compression algorithm and PNG is patent and licence-free. It does not support animation, unlike GIF.

Presentation mode A full-screen preview of a project.

Programming Creating a sequence of instructions (program) to enable the computer to do something

Quick sort (divide and conquer) This is a divide and conquer algorithm, where you choose an element from an array and move all smaller items before this element and all greater items after it. You can then repeatedly sort the lesser and greater sub lists of items.

Random Numbers Scratch generates a random number using a **pick random** command. It's useful when you want to make things appear as if they are happening by chance.



Rotation Style This controls whether costumes rotate with a sprite.

Run Length Encoding This is an image compression technique. The process of "run-length encoding" is applied where runs of pixels that are all the same colour are all combined into one pixel. The longer the run of pixels, the more compression. For example, in a black and white image, a run of black pixels may be represented by one number. The same applies for a run of white pixels.

Scratch A programming language that allows you to create interactive stories, games, music and art.

Script Blocks grouped together to form scripts or programs which tell sprites how to behave

Search Engine A program that searches documents for key words and returns a list of the documents where the key words were found. http://www.google.com is a common example.

Search Key This is a field that can be used to search a data file capable of uniquely identifying a record in relation to all other records in the same data file. E.g. Account Numbers in a bank system.

Selection sort This is a simple algorithm, which improves on the performance of a bubble sort. It works by scanning all elements in a data set, finding the smallest element and swapping it to the first position in the list. It then finds the second smallest element by scanning the remaining items and continues like this.

Sequence When telling a computer to do something we take a sequence of step by step instructions. It is important that things are done in the correct order. E.g. Before drawing something on the screen you must first pick up a pen.

Social Media Social media incorporates the online technology and methods through which people can share content, personal opinions, swap different perspectives and insights into various issues. Social media can take different forms including Internet forums, blogs, instant messaging, message boards, email, wikis and podcasts, photo sharing, video sharing and social networking sites including Bebo and MySpace etc.

Software Program of instructions that directs the operation of a computer.

Sorting In computer science a sorting algorithm is an algorithm that puts elements of a list in a certain order. The most used orders are numerical order and alphabetical order.

Spider A program that automatically fetches web pages. Spiders are used to feed pages to search engines. They are called spiders because they crawl all over the web.

Sprite Characters in your project which can interact with each other.

Sprite List This includes thumbnails of all your sprites. You can click these to select and edit your sprites. It shows the sprite's name, how many scripts it has and how many costumes it has.

Stage The Stage is where you see your stories, games, and animations come to life. Sprites move and interact with each other on stage. It is 480 units wide and 360 units tall. It is divided into an x-y grid.

Tabs Click on these to edit scripts, costumes or sound.

Test Suite A collection of tests used to validate the behaviour of a product.

Testing Software testing is the process of checking software, to verify that it satisfies its requirements and to detect errors.

Thread A thread in computer science is short for a thread of execution. Threads are a way for a program to fork (or split) itself into two or more simultaneously running tasks.

TIFF TIFF is the acronym for Tagged Image File Format. TIFF files may or may not be compressed. TIFF files are usually much larger than similar GIF or JPEG files. They are usually of a very high quality.

Toolbar Click on any of these buttons and then on your sprite to duplicate, delete, grow or shrink a sprite.

Towers of Hanoi

The puzzle was invented by the French mathematician Édouard Lucas in 1883. There is a legend about a Vietnamese or Indian temple which contains a large room with three time-worn posts in it surrounded by 64 golden disks. The priests of Brahma, acting out the command of an ancient prophecy, have been moving these disks, in accordance with the rules of the puzzle. According to the legend, when the last move of the puzzle is completed, the world will end. The puzzle is therefore also known as the Tower of Brahma puzzle. It is not clear whether Lucas invented this legend or was inspired by it. The Tower of Hanoi is a problem often used to teach beginning programming, in particular, as an example of a simple recursive algorithm.
If the legend were true, and if the priests were able to move disks at a rate of one per second, using the smallest number of moves, it would take them roughly 600 billion years to complete.

Travelling Salesman Problem

Given a collection of cities and the cost of travel between each pair of them, the travelling salesman problem, is to find the cheapest way of visiting all of the cities and returning to your starting point.

Variable

In Scratch a variable is a container for a number that can change while a Script is being run. E.g. In a game the score of a sprite can change.

Virtual Reality

Virtual reality (VR) is a technology which allows a user to interact with a computer-simulated environment, be it a real or imagined one.

WAV

This is a sound file format and is also known as a waveform audio file. These audio files are uncompressed and can be quite large.

Appendix 3

Student and Teacher Questionnaires

Questionnaires to allow both students and teachers to evaluate the course.

Evaluation of 'Having Fun with Computer Programming and Games'

STUDENT Questionnaire

1. What did you learn in this class?

   _____

   _____

2. Do you have a computer with Internet access at home?

   Yes ☐ No ☐ (Tick as appropriate)

3. What did you think of computer programming before this class?

   _____

   _____

4. What do you think of computer programming now?

   _____

   _____

5. What did you like about this class?

   _____

   _____

6. What did you dislike about this class?

   _____

   _____

7. If this class was being taught to another group of students what changes would you suggest to make it better?

   _____

   _____

8. If you have anything else you would like to say about this class, please add your comment here.

   _____

Evaluation of 'Having Fun with Computer Programming and Games'

TEACHER Questionnaire

1. Please give information on the classes you taught.

Number of class groups	
Total number of students	
Number of periods per week	
Number of weeks you taught this course	

2. What were the most successful modules? Why?

   _____

   _____

   _____

3. What were the least successful modules? Why?

   _____

   _____

   _____

4. Did you use the assessment approaches for the course?

   Yes ☐ No ☐

   If yes, were they effective?

   _____

   _____

5. Any additional comments?

   _____

   _____

   _____