Computing KS3 Schemes of Work

# Policies

Each unit should be approximately 5 weeks long. This includes time for:

* Self assessment
* Peer assessment (where appropriate)
* Teacher assessment
* Student reflection

A typical unit of work might involve 4 lessons of teaching, 1 lesson to print and self-assess and 1 task to reflect on and respond to feedback during the next unit.

Lesson outlines provided are a framework to support, but not to constrain. As long as the main objectives and level descriptors are being tackled there is room for customisation.

## At the start of each unit the student should:

* Add a title and date to a new page in their exercise book
* Look back to a specific unit (provided in the SoW) and copy out / set themselves a target based on their **I**mprovement.

## At the end of each unit the student should:

* Print out and stick in one piece of work for assessment. This will be specified and should be consistent across the department. Some assessment pieces may be hand-written rather than printed.

## The class teacher should then complete their feedback using WINS:

* **W**hat was good (ideally based on level descriptors)
* **I**mprovements (one or two suggestions to improve, based on that unit’s learning objectives – this does not need to be followed up immediately)
* **N**ext steps (this should be a question posed to the student, dependent on their progress and geared towards helping them meet further levels)
* **S**tudent response (the student’s response to that question)
* Acknowledgement of the student response (does not need to be detailed)

Teachers should highlight the level descriptors at the back of the books at the end of each assessment process. This covers the termly descriptors AND the overall progress grid.

## Home Learning

Home learning tasks should be set at least once per fortnight. These tasks should be taken from the homework books. All homework should be marked within a fortnight.

# Year 7

## Contents

1. Welcome to Egglescliffe
2. Scratch Games
3. We bought a zoo!
4. Egglescliffe youth club (double unit)
5. Save the Amazon Rainforest
6. Micro:Bits

# Year 8

## Contents

1. Magazine Publishing
2. Python Programming
3. Controversial Topic
4. Animation
5. Web Design
6. Binary and Logic Gates
7. Road Safety

# Year 9

## Contents

1. Digital photography
2. Grand Designs (double unit)
3. Encryption
4. Rhymes & Chimes
5. Algorithms
6. Wouldn’t it be great?

# Year 7

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1. Welcome to Egglescliffe
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# Topic 1: Welcome to Egglescliffe

Unit focus: File management, use of school systems, basic document editing skills, identification of hardware.

## Lesson 1 – Logging On

Lesson aims:

* Get students logged on to the system
* Have students think about hardware devices and vocabulary

Lesson outline:

* Distribute blank exercise books – students complete the front
* Discuss username/password policies and rules on sharing passwords
* Hand out printed worksheet for students to complete while you hand out login details:
	+ Main task to fill in names of devices
	+ Differentiation to identify input/output/storage
	+ Extension tasks from worksheet to be done in books

Reflection & Personalisation:

## Lesson 2 – VLE

Lesson aims:

* Have students get used to using online school systems
* Make sure students can manage home directories - files and folders

Lesson outline:

* Students log on to VLE
	+ Complete online quiz
	+ Download a picture
		- Create a suitable directory structure and move file there
	+ Upload file back to VLE
	+ Complete ‘Introduce yourself’ online activity. Focus on literacy.

Reflection & Personalisation:

## Lesson 3 – Email

Lesson aims:

* Become familiar with using the email system
* Develop good habits about subject lines
* Better eSafety awareness
* Sending and saving attachments

Lesson outline:

* Have students log on to the school email system
* Have students practise emailing each other (perhaps in pairs), with attachments too
* Differentiation activity to include CC/BCC (GCSE work)
* Brief discussion of eSafety
* Cybersmart quiz, look at Cybersmart rules - if needed
* Students create a quick report/flyer/poster about eSafety
* Differentiation activity to attach file to email

Reflection & Personalisation:

## Lesson 4 – User Manual

Lesson aims:

* Work on basic document creation and editing skills
* Assess the bulk of the low level IT skills
* Learn how to take screengrabs

Lesson outline:

* Students discuss what they have learned so far
* Explain that students are to create a user manual for next year’s intake to either explain how to use the VLE or the email systems, and that it will be assessed
* Talk through software choices. Either dictate the format as a report / leaflet / poster or discuss the options and allow students to choose
* Demonstrate how to take screengrabs and crop if appropriate
* Students work on the task

Reflection & Personalisation:

## Lesson 5 – User Manual - Assessment

Lesson aims:

* Students peer assess and make improvements
* Students print and stick their work
* Students self assess

Lesson outline:

* Students load their work from last week and peer assess (2 stars and a wish, post-its, whatever method suits) – ideally recorded in books
* Students spend a short time making improvements
* Students print and glue their finished work into their books
* Students produce a self assessment (either by annotation or prose)

Reflection & Personalisation:

# Topic 2: Scratch Games

Unit focus: Algorithms, computer programming.

## Lesson 1 – Laser Pointer

Lesson aims:

* Create sequences of instructions
* Understand how to move a character using ‘point towards’ and ‘move’

Lesson outline:

* Students create a simple game with Scratch chasing a laser pointer.
	+ Laser pointer is mapped to the mouse cursor
	+ Scratch points towards the mouse and moves forward
* Students create a backdrop, try different characters, experiment with sprite rotation settings
* Extension:
	+ Add a timer
	+ Add a counter for how many times the cat caught the mouse

Reflection & Personalisation:

## Lesson 2 – Maze game

Lesson aims:

* Create sequences of instructions
* Use change x and change y to move

Lesson outline:

* Students download and use a maze backdrop
* Students program their character to change x / change y on button press
* Students use ‘if touching’ colour to win / lose
* Extension:
	+ Reset to specific X/Y co-ordinates
	+ Change levels (different backdrops)
	+ Variables: Keeping score
	+ Collectibles (e.g. cherries)

Reflection & Personalisation:

## Lesson 3 – Top down game

Lesson aims:

* Create sequences of instructions
* Rotate and move forward

Lesson outline:

* Students program a character to rotate and move
* Students program baddies to move randomly
* Character has to collect a prize and avoid baddies – collision detection
* Extension:
	+ Variables – points / times
	+ Powerups – collect a power pill to be able to eat the baddies (show/hide)

Reflection & Personalisation:

## Lesson 4 – Game Design

Lesson aims:

* Design skills
* Programming skills

Lesson outline:

* Students plan their own game
* Students start creating it

Reflection & Personalisation:

## Lesson 5 – Finish Game – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students finish their game
* Students print and annotate their code
* Possibly self evaluate for homework

Reflection & Personalisation:

# Topic 3: We bought a zoo!

Unit focus: Spreadsheet skills, image editing, data handling, web page editing

## Lesson 1 – Spreadsheet Model

Lesson aims:

* Students can create simple formulas
* Students can adjust a model to answer ‘What If?” questions

Lesson outline:

* Explain the scenario (your Aunt Mabel bought a zoo on a whim and needs some IT help)
* Students download the spreadsheet file from the VLE
* First 4 sheets are about creating simple formulae.
* Next sheet needs completing to calculate costs for the zoo animals
* Students adjust the values in the spreadsheet to answer the questions
* If time allows – screengrab and annotate a report for Aunt Mabel on how to use / edit / adapt the spreadsheet model

Reflection & Personalisation:

## Lesson 2 – Gift Voucher

Lesson aims:

* Students can add text and images in a graphics package
* Students can rotate and scale images

Lesson outline:

* Explain the idea that Aunt Mabel wants a gift voucher to sell
* Demonstrate some real examples – prompt for what works well
* Demonstrate a few skills – importing images, drawing shapes, resizing and rotating
* Students created a gift voucher
* Extension: Students create a similar-but-different voucher for different denominations (£5, £10, etc…)

Reflection & Personalisation:

## Lesson 3 – Database

Lesson aims:

* Students can add, edit and remove records
* Students are aware of some key terminology
* Students can create simple queries

Lesson outline:

* Explain that some people buy annual memberships to the zoo
* Students download and edit the database file using the worksheet:
	+ Edit / delete and add some records
	+ Perform some simple queries
* Extension: Students add to the spreadsheet report or create a new one, explaining to Aunt Mabel how to maintain the database in the future

Reflection & Personalisation:

## Lesson 4 – Poster

Lesson aims:

* Further image editing skills

Lesson outline:

* Demonstrate some more image editing skills (e.g. borders, effects, masks, etc.)
* Students sketch and then create a poster to promote the zoo
* Extension: Focus on more advanced techniques

Reflection & Personalisation:

## Lesson 5 – Report – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students create a slideshow / report / portfolio to explain what they have done – explaining and justifying the tasks they have completed
* Students stick in their books and self assess

Reflection & Personalisation:

# Topic 4: Egglescliffe Youth Club

Unit focus: Networking, spreadsheets, design, slideshows

## Lesson 1 – Floor Plan

Lesson aims:

* Students can think about and design the layout for a room
* Students can consider the requirements for a client

Lesson outline:

* Explain that the school wants to apply for funding for a youth centre
* Students go to floorplanner.com, create an account and start designing a floor plan
* Students should include different areas for different purposes – gaming, homework, offline activities, etc.

Reflection & Personalisation:

## Lesson 2 – Finish Floor Plan

Lesson aims:

* Students peer assess
* Students reflect and improve

Lesson outline:

* Start with peer assessment – students as a class identify their own success criteria for the floor plan
* Students peer assess each other (possibly in books)
* Students then improve their own work

Reflection & Personalisation:

## Lesson 3 – Spreadsheet Model

Lesson aims:

* Students build their own spreadsheet model
* Students use simple formulae

Lesson outline:

* Explain that we need to specify the equipment we want to buy
* Students use the web to find the prices of items – Xbox, chair, TV, etc.
* Students create a simple spreadsheet model with item, price, quantity, sub-total.
* Students find the grand total
* Extension: Formatting and presentation - UI

Reflection & Personalisation:

## Lesson 4 – Using the Model

Lesson aims:

* Students can answer what if questions using a model
* Students can use common functions

Lesson outline:

* Students extend their model from last lesson with simple functions (Max, Min, Avg, Sum)
* Students add in a grand total (if not already added), max budget and underspend
* Students are given a budget of £20 000 and adapt their model to their budget
* Extension: Conditional formatting / IF statement to deal with overspend

Reflection & Personalisation:

## Lesson 5 – Application – Assessment

Lesson aims:

* Students can create a formal letter / use word processing tools
* Students can justify their decisions

Lesson outline:

* Students create a letter to the local MP justifying their application.
* Students include screengrabs of their floor plan (with justification for the layout and purpose) and spreadsheet model (with explanation of how they have used it)

Reflection & Personalisation:

## Lesson 6 – Council Presentation

Lesson aims:

* Students can use slideshow software
* Students understand the need for consistent layout and house style
* Students can use the Slide Master

Lesson outline:

* Explain that the students’ applications have been accepted and they now have a face to face meeting to present their arguments
* Demonstrate the Slide Master and discuss the need for consistency in presentations
* Students start to create their slideshow

Reflection & Personalisation:

## Lesson 7 – Finish Presentation

Lesson aims:

* Students can create efficient and effective slideshows
* Students understand the need for consistent layout and house style
* Students can self-assess and improve their work

Lesson outline:

* Brainstorm with students the key features of this presentation
* Students self-assess and set themselves 3 targets for the lesson
* Students complete their slideshows
* Students self-assess against their targets

Reflection & Personalisation:

## Lesson 8 – Networking

Lesson aims:

* Students understand the difference between wired and wireless networks
* Students can choose and justify appropriate network structures

Lesson outline:

* Explain that we need to go back to the floor plan and work out how to network the computers
* Discuss the benefits and costs of creating networks (share one internet connection, share a printer, share files, communication, etc.)
* Students consider the pros and cons of wired vs wireless networking
* Students annotate their floor plans (or, better, create a separate networking-only diagram) explaining where they will have wired networks and wireless access points

Reflection & Personalisation:

## Lesson 9 – Poster

Lesson aims:

* Design skills
* Image editing

Lesson outline:

* Students design and then create a poster campaign to encourage people to use the youth club once it is open – focus on the key features to promote the building.

Reflection & Personalisation:

## Lesson 10 – Catchup – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students have some time to catchup and fill any holes and make sure their books reflect the work they have completed.

Reflection & Personalisation:

# Topic 6: Save the Amazon Rainforest

Unit focus: Storytelling, presentation, image editing

## Lesson 1 – Creating a story

Lesson aims:

* Literacy: Students create a 3-part story
* Students select and organise files

Lesson outline:

* Introduce the project brief
* Students complete the online workbook to create characters and a 3 part story
* Students collect images to use as part of their comic

Reflection & Personalisation:

## Lesson 2 – Designing the comic

Lesson aims:

* Students plan effectively for products
* Students can combine images together

Lesson outline:

* Students open their story from last lesson
* Students break the story down into 4 pages
(beginning, 2x main story pages, ending)
* Students create a paper storyboard highlighting the events for each page
* With remaining time students can merge images (only 1 JPG per panel will go into Comic Life)

Reflection & Personalisation:

## Lesson 3 – Creating the comic

Lesson aims:

* Students create a digital presentation to tell a story

Lesson outline:

* Students use Comic Life to create the comic they had planned
* Extension: Students use image editing techniques to remove backgrounds and merge images

Reflection & Personalisation:

## Lesson 4 – Finishing the comic

Lesson aims:

* Students can review and evaluate their own and others’ work
* Students create a digital presentation to tell a story

Lesson outline:

* Peer review of work so far
* Students complete their comic
* Extension: Students can create a single web page to promote their comic

Reflection & Personalisation:

## Lesson 5 – Saving the Amazon Rainforest – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students export, print and glue their finished comics into their books
* Students self-assess their work for this unit

# Topic 7: Micro:Bit

Reflection & Personalisation:

Unit focus: Representation of images, algorithms, programming, problem solving

## Lesson 1 – Retro Images

Lesson aims:

* Students can manipulate data in a spreadsheet
* Students understand how images are stored on a computer

Lesson outline:

* Students use the spreadsheet provided and use the fill tool to colour in cells to represent an image
* Explain how you can use 1s and 0s to represent black and white. Students then use the second sheet to create their own
* Extension: Use formatting tools to hide the values
* The third sheet allows for students to put their own images in. Discuss the difficulties of representing ‘real’ images using this method.
* Zoom in on real photos and demonstrate how they are made up of pixels – just more of them. Similarly discuss colour – use the eye dropper to get Hex codes or RGB values for different colours.

Reflection & Personalisation:

## Lesson 2 – Introducing the Micro:Bit

Lesson aims:

* Students can use a programming language to solve a problem

Lesson outline:

* Students use the Micro:Bit emulator to create simple programs (e.g. Press A for a happy face / press B for a sad face).
* Focus on the pixels initially

Reflection & Personalisation:

## Lesson 3 – Bag Alarm

Lesson aims:

* Students can solve problems using programming tools

Lesson outline:

* Students create a bag alarm using a buzzer crumb and the inbuilt accelerometer
* Start with simple ‘on shake’, but then discuss the fact that you can’t tweak the sensitivity
* Students use the accelerometer reading to create a more detailed and technical approach

Reflection & Personalisation:

## Lesson 4 – Exploring

Lesson aims:

* Students can solve problems using programming tools

Lesson outline:

* Provide students with the full range of crumbs
* In pairs, students come up with their own solutions
* Sample ideas provided for differentiation

Reflection & Personalisation:

## Lesson 5 – Prototype – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students create a pitch for their prototype – poster / slideshow
* Students print this and stick in books
* Students self-assess their work

Reflection & Personalisation:

# Year 8

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# Topic 1: Magazine Cover

Unit focus: Image skills

## Lesson 1 – Selection Tools

Lesson aims:

* Image editing – selection tools (marquee, wand, lasso)

Lesson outline:

* Introduce the project brief for this unit (newly employed at a magazine)
* Demonstrate each of the selection tools
* Students must select and remove various elements from pictures to appear in the magazine
* Extension cards/images available

Reflection & Personalisation:

## Lesson 2 – Fixing Images

Lesson aims:

* Rotate and crop tools
* Brush tools (e.g. dodge & burn)

Lesson outline:

* Demonstrate each of the tools
* Students must rotate/crop and apply brush tools to various elements from pictures to appear in the magazine
* Extension cards/images available

Reflection & Personalisation:

## Lesson 3 – Text, shapes and filters

Lesson aims:

* Adding text to images
* Adding shapes to images
* Using layers to good effect

Lesson outline:

* Students follow the guide to create a series of banner images as part of their magazine image editing role.
* Extension cards/images available

Reflection & Personalisation:

## Lesson 4 – Draft front cover

Lesson aims:

* Design skills
* Image editing skills

Lesson outline:

* Project brief – to pitch a new magazine to the head of the company
* Differentiation – sample ideas provided
* Rubric – use a range of existing tools and appropriate images
* Students produce a sketch of their idea and then begin creating it

Reflection & Personalisation:

## Lesson 5 – Front cover - Assessment

Lesson aims:

* Students peer assess and make improvements
* Students print and stick their work
* Students self-assess

Lesson outline:

* Students peer assess work in books
* Allow some time for improvements
* Print and glue finished drafts and self-assess

Reflection & Personalisation:

# Topic 2: Python programming

Unit focus: Problem solving, algorithms, text-based programming

## Lesson 1 – Quiz

Lesson aims:

* Students can read text-based program code
* Students can adapt existing code

Lesson outline:

* Students download and try the multiple choice quiz
* Have students look at the code and identify which parts control the welcome message, question, possible answers, correct answer, etc.
* Students should alter different parts of the program, testing after each change
* Demonstrate how to change the image (NB: It must be a GIF)
* Students copy and paste the code to create 3 different questions
* Extension: If statement at the bottom to display different messages depending on the number of correct answers

Reflection & Personalisation:

## Lesson 2 – Magic 8 Ball

Lesson aims:

* Students an identify an algorithm to solve a problem
* Students can use if statements

Lesson outline:

* Start by playing with an online magic 8 ball on the whiteboard
* Demonstrate the processes involved
* Hand out the provided instructions in pairs, already cut up
* Students put the cards in order using the natural English descriptions (again, in pairs)
* Make sure everyone has the algorithm correct, then students turn the cards over to reveal the Python code
* Students identify who is the stronger / more confident programmer. Once decided, tell the class that only the less confident programmer is controlling the keyboard
* Have the stronger programmer read the code out to their partner and they should type up and test the program
* The students can then expand the program to allow for more than 2 options
* Extension: Use image editing to create custom messages

Reflection & Personalisation:

## Lesson 3 – Turtle Graphics

Lesson aims:

* Students can use loops to repeat instructions

Lesson outline:

* Have students type up (or download) the instructions to get a turtle and draw a couple of lines
* Students should try to draw a square (extension: octagon, hexagon, pentagon, nonagon)
* Demonstrate how to use a FOR loop to simplify this process. Students create (using a loop) a square, octagon, hexagon, pentagon, nonagon)
* Have students put this code into another loop and demonstrate how to create a pattern
* Students can then experiment and explore to create the best / most interesting shapes
* Extension: Changing colours, using a procedure, using variables to control the number of turns / angle

Reflection & Personalisation:

## Lesson 4 – Chatbot

Lesson aims:

* Students can use their existing skills to solve a problem independently

Lesson outline:

* Provide students with the starting point for a very simple chatbot
* Students then use prints and inputs to create a chatbot that will carry out a conversation with the user
* More able students should be encouraged to use if statements to identify different responses by the computer

Reflection & Personalisation:

## Lesson 5 – Python – Assessment

Lesson aims:

* Students print and stick their work
* Students are assessed

Lesson outline:

* A test booklet is provided, based on the previous lessons
* Students should print and annotate their chatbot code

Reflection & Personalisation:

# Topic 3: Controversial topic

Unit focus: Research, presentation, collaboration

## Lesson 1 – Fact and opinion

Lesson aims:

* Students can differentiate fact from opinion
* Students understand what bias is
* Students are aware that websites may contain information that is unreliable

Lesson outline:

* Discuss what is meant by fact and opinion
* Students use news websites and identify 5 facts and 5 opinions
* Discuss bias
* Students identify for each fact and opinion whether there is any clear bias
* Students have to identify which websites are genuine from a given list (Sellafield Zoo, dehydrated water, etc…)

Reflection & Personalisation:

## Lesson 2 – Research Skills

Lesson aims:

* Students are able to use key words in a search
* Students are able to use filters to narrow down searches

Lesson outline:

* Students carry out a series of searching activities using search engines on Argos, Currys, Auto Trader, etc. (search engines with less user-friendly techniques than Google, etc.)

Reflection & Personalisation:

## Lesson 3 – The Topic

Lesson aims:

* Students are able to use their research and reliability skills to collect reliable information

Lesson outline:

* Students are put into groups of 3
* Students identify a suitable controversial topic
* Students research and collect facts, information, opinions and URLs – they don’t produce anything with them yet. Opportunity for collaborative working using Office 365 or similar

Reflection & Personalisation:

## Lesson 4 – Preparing

Lesson aims:

* Students are able to present their research

Lesson outline:

* In the same groups of 3 students take on 1 role each – creation of slideshow, creation of script, creation of handout
* Students use the resources collected from the previous lesson to create their products. Printing should be completed this lesson (one handout for each audience group)

Reflection & Personalisation:

## Lesson 5 – Presentations – Assessment

Lesson aims:

* Students present their work

Lesson outline:

* Using a random pupil picker, each group comes up and presents their slideshow / hands out their handout
* Audience groups fill in 1 feedback form PER GROUP, providing a score as well as comments for different aspects of the presentation. The teacher does the same
* Once all groups are completed, each group member sticks one copy of their own handout in their book as evidence
* WINS sheets are combined with the teacher feedback sheets before being handed back to students

Reflection & Personalisation:

# Topic 4: Animation

Unit focus: Multimedia, animation

## Lesson 1 – Frame By Frame

Lesson aims:

* Students are able to create a frame by frame animation

Lesson outline:

* Students use Flash and create a hand-drawn, frame-by-frame animation
* Extension: Use symbols to created nested animations

Reflection & Personalisation:

## Lesson 2 – Tweening

Lesson aims:

* Students are able to use tweening in Flash

Lesson outline:

* Students use simple tweens to move, scale, rotate and recolour shapes and images
* Images, once converted to symbols, are tweened with different alpha levels to make them fade in and fade out

Reflection & Personalisation:

## Lesson 3 – Flamingo Land Advert

Lesson aims:

* Students are able to combine tweens and frame-by-frame techniques

Lesson outline:

* Students use the booklet and images provided to create an advert for Flamingo land, with tweened images (Ken Burns effect) and an overlay frame-by-frame animation for the slogan

Reflection & Personalisation:

## Lesson 4 – Own advert

Lesson aims:

* Students are able to plan their own animations
* Students are able to combine tweens and frame-by-frame techniques

Lesson outline:

* Students are given a project brief (to create an animated banner for a product or service)
* Students storyboard their own ideas
* Students start to create their animation

Reflection & Personalisation:

## Lesson 5 – Finished advert – Assessment

Lesson aims:

* Students are able to combine tweens and frame-by-frame techniques
* Students self assess

Lesson outline:

* Students start with a peer review of their work so far, and set themselves targets for this lesson
* Students complete their adverts
* Students screengrab and annotate their advert for assessment

Reflection & Personalisation:

# Topic 5: Web Design

Unit focus: Website creation, HTML

## Lesson 1 – Hacking HTML

Lesson aims:

* Students are able to read and edit HTML tags

Lesson outline:

* Start with a ‘hacked’ website – school or news based with a fake story
* Explain that students will be learning how to hack a website
* Students download the X Ray Goggles bookmark
* Students use this to edit a web page
* Run through a variety of HTML tags (h1 – h6, b, i, etc…)

Reflection & Personalisation:

## Lesson 2 – Editing a web page

Lesson aims:

* Students are able to read and edit HTML tags

Lesson outline:

* Provide students with an One Direction web page
* Explain that the web page needs to be updated with current information
* Students should edit the web page – making sure to use appropriate formatting as well as changing the images and colour scheme
* Extension: Hex colour codes

Reflection & Personalisation:

## Lesson 3 – Hyperlinks

Lesson aims:

* Students are able to create buttons in an image editing package
* Students are able to create hyperlinks between pages

Lesson outline:

* Students should start by adding text based hyperlinks to their page from last week (provide other pages to link to as part of a larger site)
* Discuss user interface and the fact that the text based links are a little dull
* Students should create buttons using an image editing package
* Students should replace the text based hyperlinks with the new buttons
* Extension: Rollover effects

Reflection & Personalisation:

## Lesson 4 – Extra Page

Lesson aims:

* Students can design their own web pages
* Students can create their own web pages

Lesson outline:

* Students should design their own page on any topic (separate to the music website)
* Students make sure they create a space for their advertising banner from animation
* Students should create their own page according to their design
* Students embed their advert

Reflection & Personalisation:

## Lesson 5 – Final Page – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students print and annotate their finished web page

Reflection & Personalisation:

# Topic 6: Fundamentals of Computer Science

Unit focus: Binary, logic gates

## Lesson 1 – Logic Gates

Lesson aims:

* Students understand that computers use logic gates to run
* Students can name and identify the properties of the main logic gates – NOT, OR, AND

Lesson outline:

* Explain that computer systems run on logic gates
* Describe the 3 main gates and their properties
* Students use logic.ly to create logic circuits to test the 3 main gates
* Students try to combine gates to solve simple problems

Reflection & Personalisation:

## Lesson 2 – Logic Gate Challenge

Lesson aims:

* Students can use logic gates to solve problems

Lesson outline:

* Students work in pairs
* Students work through the challenge cards in any order to solve problems – cards with a higher value are more complex
* Students must have the teacher validate their solutions to get those points (though the other machine in the pair can be used to start tackling the next one while they wait)

Reflection & Personalisation:

## Lesson 3 – Binary Numbers

Lesson aims:

* Students understand that numbers in a computer system are stored as binary
* Students are able to convert between 8 bit binary and denary integers

Lesson outline:

* Discuss how logic gates relate to computer systems and how numbers must be stored using binary
* Explain how to convert binary to denary numbers
* Students practise this
* Explain how to convert denary to binary numbers (subtraction method)
* Students also practise this!
* Students compete using the CISCO binary game

Reflection & Personalisation:

## Lesson 4 – Bits, Bytes and Nibbles

Lesson aims:

* Students understand the key units of measurement

Lesson outline:

* Lesson plan TBD
* Content to include bits, bytes, nibbles, kB, MK, GB, TB
* Potential for calculating download times for different files
* Spreadsheet to carry out the calculation?

Reflection & Personalisation:

## Lesson 5 – Test – Assessment

Lesson aims:

* Students demonstrate their understanding

Lesson outline:

* Students complete a test on what they have covered

Reflection & Personalisation:

# Topic 7: Road Safety Game

Unit focus: Planning, Scratch programming, leaflet

## Lesson 1 – Planning

Lesson aims:

* Students can plan for a computer game
* Students can use simple image editing tools to create a backdrop

Lesson outline:

* Explain the scenario (primary school road safety project)
* Discuss example games that might be useful
* Students design the game using a game design sheet (stick in books)
* Students create a suitable backdrop for the game

Reflection & Personalisation:

## Lesson 2 – Game Development

Lesson aims:

* Students can create sequences of instructions to solve real world problems

Lesson outline:

* Students use Scratch to create the game they designed last lesson
* Encourage students to explore selection and iteration to improve their game

Reflection & Personalisation:

## Lesson 3 – Further Development

Lesson aims:

* Students can create sequences of instructions to solve real world problems

Lesson outline:

* Students finish the Scratch game they started last lesson
* Encourage students to explore selection and iteration to improve their game

Reflection & Personalisation:

## Lesson 4 – Bug Testing

Lesson aims:

* Students can test programs to find errors
* Students can debug computer programs

Lesson outline:

* Students play each others’ games
* Students provide feedback – identifying any bugs an suggesting further improvements
* Students use the remaining time to further improve their games

Reflection & Personalisation:

## Lesson 5 – Leaflet – Assessment

Lesson aims:

* Students can use DTP software to promote a product

Lesson outline:

* Students create a brochure or leaflet to promote their game to primary schools
* Students MUST include screenshots of their working game and screenshots of their code
* Print and stick for assessment

Reflection & Personalisation:

# Year 9

## Contents

1. Digital photography
2. Grand Designs (double unit)
3. Encryption
4. Rhymes & Chimes
5. Algorithms
6. Wouldn’t it be great?

# Topic 1: Digital Photography

Unit focus: Photography skills, file handling, image editing

## Lesson 1 – Composition

Lesson aims:

* Students understand some of the rules of photography
* Students can use a digital camera in auto-mode
* Students can transfer files from a camera to their computer

Lesson outline:

* Introduce the unit
* Matching exercise – images with rules
* Students, in groups of 2 or 3, are tasked with picking two rules and collecting images (allow at least 15 minutes for the final part)
* Students transfer their photos onto their computers (at least 1 student per group)

Reflection & Personalisation:

## Lesson 2 – Organising photos

Lesson aims:

* Have students get used to file handling and organisation
* Use appropriate software to create a portfolio

Lesson outline:

* Students use USB sticks to transfer photos within the group
* Discuss the brief, to create a photography portfolio. Discuss presentation options (poster, slideshow, video, other)
* Students organise their photos, deciding which to keep and renaming them
* Students begin to create their portfolio

Reflection & Personalisation:

## Lesson 3 – More composition

Lesson aims:

* Students understand some of the rules of photography
* Students can use a digital camera in auto-mode
* Students can transfer files from a camera to their computer

Lesson outline:

* Students complete a more complex version of the starter from Lesson 1, looking at the purpose of different rules
* Students in groups again go out to collect photos with specific rules in mind.
* Students transfer the images to their computers.

Reflection & Personalisation:

## Lesson 4 – Organising photos

Lesson aims:

* Have students get used to file handling and organisation
* Use appropriate software to create a portfolio

Lesson outline:

* Students use USB sticks to transfer photos within the group
* Students continue to organise their photos, deciding which to keep and renaming them
* Students add to their portfolio, with some time for simple image editing

Reflection & Personalisation:

## Lesson 5 – Portfolio - Assessment

Lesson aims:

* Students peer assess and make improvements
* Students print and stick their work
* Students self assess

Lesson outline:

* Students load their work from last week and peer assess (2 stars and a wish, post-its, whatever method suits) – ideally recorded in books
* Students spend a short time making improvements
* Students print and glue their finished work into their books
* Students produce a self assessment (either by annotation or prose)

Reflection & Personalisation:

# Topic 2: Grand Designs

Unit focus: Spreadsheet skills, image editing, data handling, web page editing

## Lesson 1 – Sketchup Intro

Lesson aims:

* Students can use 3D modelling software to create a model of a real world object

Lesson outline:

* Each demonstration followed by student practice
* How to start a house (rectangle, pull, roof)
* How to add realism (windows, doors, textures, colours)
* How to add a conservatory (line tool, drawing similar shapes)
* How to add a garden (fence, hedge, pool)

Reflection & Personalisation:

## Lesson 2 – Project Planning

Lesson aims:

* Students can create an outline workplan
* Students can create a formal letter
* Students can plan using a mind map

Lesson outline:

* Run through the project brief
* Students compose a letter in return including expected timescales and estimated costs
* Students create a mind map of the external features they would want to see in a new home
* Extension: Students mind map different types of house – bungalow, mansion
* Students EITHER print and stick their letter and mind maps or put them into a slideshow / portfolio

Reflection & Personalisation:

## Lesson 3 – Sketchup Modelling

Lesson aims:

* Students can use 3D modelling software to create a model of a real world object

Lesson outline:

* Students create the house they planned last lesson using Sketchup
* They should stick to their original plan where they can

Reflection & Personalisation:

## Lesson 4 – Finish Sketchup

Lesson aims:

* Students can use 3D modelling software to create a model of a real world object

Lesson outline:

* Students agree on a set of criteria for a good house
* Students peer assess and then set themselves 3 targets for that lesson
* Students work towards the completion of their house
* Students take screengrabs / export images of their finished house
* Extension: Work on other types of housing
* Students EITHER put their images into a document and print/stick or add it to their slideshow / portfolio from next lesson

Reflection & Personalisation:

## Lesson 5 – Logo

Lesson aims:

* Students can use image editing tools to create a logo

Lesson outline:

* Show students some examples of logos from housing and building companies
* Students identify common features and tropes
* Students create their own logos
* Students complete their portfolio – either in books or online (in which case print and stick)

Reflection & Personalisation:

## Lesson 6 – Language

Lesson aims:

* Students can use appropriate language to promote their houses

Lesson outline:

* Ask students to come up with 3 adjectives for their house
* Load up an estate agent site and run through a description
* Ask students to identify adjectives
* Students write a paragraph to promote their homes (ideally using Notepad to avoid formatting worries)
* Peer review (talent show style – 3 judges giving scores and feedback)
* All students amend / redraft / complete their descriptions (you could keep original and revised to demonstrate progress)

Reflection & Personalisation:

## Lesson 7 – Flyer

Lesson aims:

* Students can use DTP tools to create documents

Lesson outline:

* Students create a flyer to promote their house – using images from Lessons 3/4 and the text from Lesson 6 (plus the logo from Lesson 5)
* Flyer is added to the portfolio

Reflection & Personalisation:

## Lesson 8 – Spreadsheet Model

Lesson aims:

* Students can use a spreadsheet model to answer What If questions

Lesson outline:

* Students use the model and questions provided to explore the housing development and potential profits

Reflection & Personalisation:

## Lesson 9 – Web Page

Lesson aims:

* Students can read and edit HTML to alter a web page

Lesson outline:

* Provide students with a sample HTML file
* Students edit the page to match the new information
* Students add their own images to the page
* Students adjust the colour scheme of the page
* Extension: Students create a second page

Reflection & Personalisation:

## Lesson 10 – Portfolio – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students complete any outstanding tasks and assemble their portfolios. Any student who has finished can extend their tasks

Reflection & Personalisation:

# Topic 3: Encryption

Unit focus: Algorithms, programming, problem solving

NB: Additional SoW / resources available – ‘Ciphers and Coding’

## Lesson 1 – Secret messages

Lesson aims:

* Students understand the purpose of encryption
* Students are able to use manual encryption algorithms

Lesson outline:

* Before the lesson create a Scytale encrypted message
* Pass it around the class, students probably won’t understand it
* Pass around the pencil used to create it and have students decrypt it
* Students create their own Scytale
* Explore other simpe algorithms – Moving spaces, PigPen, ATBASH
* Discuss the pros and cons of each

Reflection & Personalisation:

## Lesson 2 – Caesar Cipher

Lesson aims:

* Students understand the purpose of encryption
* Students are able to use manual encryption algorithms

Lesson outline:

* Present a ‘secret’ message for students to decrypt (missing vowels)
* Discuss the purpose of sending secret messages (credit card details, login details, military communications, etc.)
* Demonstrate the Caesar Cipher
* Students build their own Caesar Cipher wheels and decrypt/encrypt messages
* Provide an encrypted message without the key – students should try to decrypt it
* Discuss the problems with the Caesar Cipher and why it is not an ideal algorithm

Reflection & Personalisation:

## Lesson 3 – Spreadsheet Caesar Cipher

Lesson aims:

* Students can design algorithms to solve problems

Lesson outline:

* Students use their knowledge from last lesson to create a Caesar Cipher program
	+ Help sheets provided to guide students on the structure
	+ Students send each other encrypted messages to test
	+ Extension: Students can explore double key encryption

Reflection & Personalisation:

## Lesson 4 – Python Caesar Cipher

Lesson aims:

* Students can create programs using a text based language

Lesson outline:

* Students create the same algorithm as last time, but now using Python
* Differentiated worksheets provided for support
* Students in pairs initially code EITHER encrypt or decrypt algorithms and work with an adjacent pair to test
* Extension: Combine both encrypt and decrypt in the same program
* Extension: Add double key encryption

Reflection & Personalisation:

## Lesson 5 – Military Communications – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students should prepare a brief report or presentation for a new military officer on the importance of and best methods for securely transmitting information, including references to the flaws in the methods used so far

Reflection & Personalisation:

# Topic 4: Rhymes & Chimes

Unit focus: Video editing, audio editing, image editing, spreadsheet modelling

## Lesson 1 – Radio Advert

Lesson aims:

* Audio editing tools
* Awareness of audience and purpose

Lesson outline:

* Introduce the topic (Rhymes and Chimes record label – compilation album)
* Students select appropriate audio tracks
* Students edit a radio advert using Audacity / Garage Band
* Students screengrab their finished timeline and export their audio

Reflection & Personalisation:

## Lesson 2 – CD Cover

Lesson aims:

* Audio editing tools
* Awareness of audience and purpose

Lesson outline:

* Provide students with examples of existing compilation CD covers/album art
* Students identify key features and elements – especially with reference to audience and purpose
* Students sketch and then create their own designs. Front and (for extension) back

Reflection & Personalisation:

## Lesson 3 – Video Advert

Lesson aims:

* Video editing tools
* Awareness of audience and purpose

Lesson outline:

* Explore effective video adverts for compilation albums and identify common trends
* Students select appropriate video clips
* Students edit a video advert using appropriate software
	+ Expected tools include titles, transitions and trimming clips
	+ Extension tools might include picture-in-picture, effects and filters
* Students screengrab their finished timeline and export their video

Reflection & Personalisation:

## Lesson 4 – Online portfolio

Lesson aims:

* Students are able to present their work as part of a digital portfolio

Lesson outline:

* Students use the Mahara ePortfolio system to build a portfolio of their work for this unit.
* For each task the students provide the finished product, a screengrab of the editor and a description of the skills used

Reflection & Personalisation:

## Lesson 5 – Hardcopy Portfolio – Assessment

Lesson aims:

* Students print and stick their work
* Students self assess

Lesson outline:

* Students have a little time to complete their products and/or ePortfolio
* Students screengrab, print and stick a copy of their portfolio in their books
* Students produce a self assessment of their work and also discuss the pros and cons of digital versus physical portfolios (e.g. interactivity but also portability, access to computers, internet, specific plugins/applications)

Reflection & Personalisation:

# Topic 6: Algorithms

Unit focus: Problem solving, abstraction, modelling of problems

## Lesson 1 – Knight’s Tour

Lesson aims:

* Students understand that modelling a problem can make it easier to solve
* Students are able to solve problems

Lesson outline:

* Start by introducing the game ‘Spit Not So’. Students play in pairs.
* After a couple of games, provide the losing partner with a help sheet.
* Discuss the effect of using the help sheet and why it allowed people to consistently win (probably).
* Discuss the way a knight moves on a chess board
* Students in pairs try to solve the Knight’s Tour puzzle
* Students in pairs try to solve the Tour Guide puzzle
* Demonstrate how the two puzzles are really the same
* Students write / complete a worksheet about modelling – specifically what data to hide

Reflection & Personalisation:

## Lesson 2 – Zombie Apocalypse

Lesson aims:

* Students are able to use a model to solve a problem

Lesson outline:

* Explain that there has been a zombie apocalypse in Central London and the streets are now populated by the ‘infected’
* Discuss how rag-tag band of plucky survivors can safely traverse the city, and how the available routes could be modelled (ending up with the walking map of the Tube and Google Maps / an Atlas or A-Z guide)
* Students in small teams try to plot safe routes between stations, minimising their travelling time.
* Students try to describe effective techniques or algorithms for finding the best route. Discuss this in terms of tools such as Google Maps / The Trainline and how route finding algorithms can be used

Reflection & Personalisation:

## Lesson 3 – Sorting algorithms

Lesson aims:

* Students understand the function of 1 or more sorting algorithms
* Students can compare the efficiency of different algorithms
* Students can follow an algorithm

Lesson outline:

* Provide pairs of students with sets of playing cards, shuffled
* Time each pair sorting their cards
* Teams shuffle for each other to avoid cheating
* Discuss different methods used
* Demonstrate how computers carry out a Bubble Sort
* Students carry out several attempts at a Bubble Sort, counting the number of comparisons each time
* Students select the instructions for a second sort (insertion, merge, etc.) – differentiation by type of sort – and practice using that sort
* Students document which sorts were more effective, and why

Reflection & Personalisation:

## Lesson 4 – Searching algorithms

Lesson aims:

* Students understand the function of 1 or more searching algorithms
* Students can compare the efficiency of different algorithms
* Students can follow an algorithm

Lesson outline:

* Provide students in pairs with a database table
* Task students with finding particular records and give them time to complete the task
* Discuss effective techniques and strategies for searching (e.g. on unsorted fields, a linear search is needed; on sorted fields a binary search or initial search can be used)
* Students complete a worksheet that encourages them to consider the effectiveness of a linear vs binary search on sorted data, then considers the efficiency when taking into account the sorting method (making reference to the previous lesson)

Reflection & Personalisation:

## Lesson 5 – The Internet – Assessment

Lesson aims:

* Students produce work to assess their understanding
* Students self assess

Lesson outline:

* Students complete a mind map of the ways that algorithms are used on the Internet (e.g. search engines, route planners, etc.)
* Students create a presentation for silver surfers on how to use online services to help them, making reference to how the algorithms can help them

Reflection & Personalisation:

# Topic 6: Wouldn’t it be great

Unit focus: Research skills, presentation skills, appreciation for technology

## Lesson 1 – Ideas

Lesson aims:

* Students can think about how technology can be useful and what ideas might be developed in the future
* Students can plan for a product

Lesson outline:

* Students watch a video about potential future technologies
* They each come up with 1 idea for a product that could make the world better, adding a few notes and potentially a few drawings (all done offline)
* Students form groups of 3 and collate their ideas on a mind map
* Students settle on one idea to use next lesson

Reflection & Personalisation:

## Lesson 2 – Collecting Information

Lesson aims:

* Students can research online to collect information
* Students can combine a range of computing skills
* Students can work as part of a group

Lesson outline:

* Each group carries out research for their idea
* The researchers find relevant images and facts to support their idea (e.g. who it will help, what it replaces, evidence of the need for it)
* The designers also create sketches / use image editing software, prepare details on functionality, etc.

Reflection & Personalisation:

## Lesson 3 – Preparing to present

Lesson aims:

* Students combine their existing computing skills

Lesson outline:

* Each group elects 1 person each to prepare a slideshow, prepare a script and prepare a handout for their product

Reflection & Personalisation:

## Lesson 4 – Final prep

Lesson aims:

* Students combine their existing computing skills
* Students can present their work to an audience

Lesson outline:

* Each group has 30 minutes to complete their preparation and print their scripts / handouts

Reflection & Personalisation:

## Lesson 5 – Presentation – Assessment

Lesson aims:

* Students are able to present their work to an audience
* Students peer assess

Lesson outline:

* Each group presents their idea and other groups complete feedback sheets

Reflection & Personalisation: