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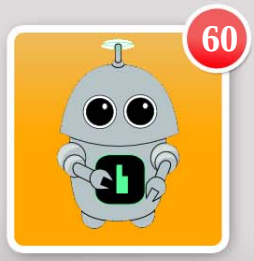
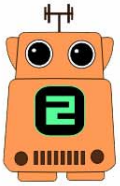




Using Chocolate Bars to learn about Algorithms

DFE Computing Curriculum Subject Content Covered:

Key Stage 1 Subject Content:
- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs

Resources and Preparation:

You will need:

A chocolate bar - sliced through
Large paper and pens for the students
Some idea of the outcome if students need directing
Possibly a visual aid of a chocolate factory production line?

This (from the sweet factory group) may help too: https://docs.google.com/file/d/0B24Znho85BCTdnFzTWxsNHNsS1U/edit?usp=sharing

Lesson Outline:

Show the students the inside of a Chocolate Bar. Ask them to think about how this Chocolate Bar may have been made. What stages did it go through?

Now ask the students to use their ideas to develop a list of instructions for creating the chocolate bar (this is their Algorithm).

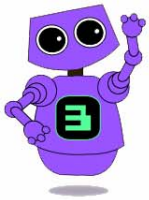
Further development:

Students could now use their list of instructions to actually make the chocolate bar.

Students could also modify their algorithm after trying it out for real. They could give it to another class to try out!

This lesson would best suit...

Girls/Less able/All!



Resource Contributor/s:
Omar, Julia, Kelly and Stacey

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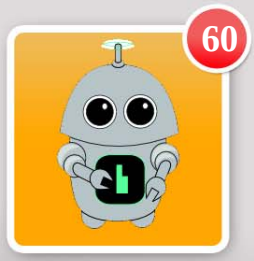
Preparation



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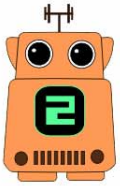


Using a Turtle Program or Bee Bots to learn about Algorithms

DFE Computing Curriculum Subject Content Covered:

Key Stage 1 Subject Content:
- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs

Resources and Preparation:

You will need:

Either some Bee Bots or some Turtle Software (MSW Logo/Scratch)
A production line for students to follow with a Bee Bot or Turtle Software
Possibly an instruction/help sheet if you feel this will be required

This (from the sweet factory group) may help too: https://docs.google.com/file/d/0B24Znho85BCTdnFzTWxsNHNsS1U/edit?usp=sharing

Lesson Outline:

This lesson varies depending on which resource you decide to use.

Show students the production line that you would like them to follow.

Discuss writing instructions and planning out steps (algorithms).

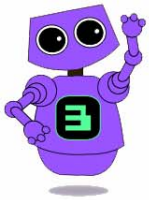
Show the students the commands that the Turtle or Bee Bot understands.

Ask them to come up with some instructions.

Get them to test them out, modifying them as required.

This lesson would best suit...

All



Resource Contributor/s:
Omar, Julia, Kelly and Stacey

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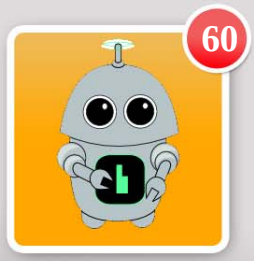
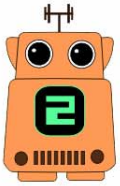




Creating a Python Conversion Program

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

You will need to be aware of :, string, integer (int), float (for decimal input), time function.

You also may want to practice the exercise yourself before running it with your students. Detailed resources are available here:

https://docs.google.com/document/d/1gNjS4R60FtwU3Gmw8N5vuR6Yspxk_fqKtQoQrgWA45g/edit?usp=sharing

Lesson Outline:

The detailed notes in the lesson resource link (google doc) show progression of a Python Conversion Program.

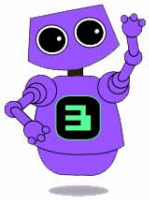
You could give the students this whole document and get them to work through it or you could chunk it and develop the program with your students.

The stages in the program development are:

- Original simple solution
- A developed, less messy solution
- Integer (a whole number) is switched to float (a decimal number)
- A visual context was added to make it more fun
- Students are set the task to convert something else!

This lesson would best suit...

Gender Neutral/Socio-Economic (Python is free)



Resource Contributor/s:
@nbsict nbs@hurworthschool.org.uk acd@hurworthschool.org.uk

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15 Preparation

60 Learning

Flow Charts for a Real World Problem (Supermarket Self-Checkout)

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
• design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.

Resources and Preparation:

Find a YouTube video that shows a self-checkout system. http://www.youtube.com/watch?v=g17DLQ1fgcA This one is good but a bit jumpy!

Maybe prepare a resource that displays the flowchart symbols and their meanings. You can get one from here: http://rfranksblog.files.wordpress.com/2013/03/t8-flowcharts-cheat-sheet1.pdf Large paper and pens are needed for planning in groups. You also may want some props! (e.g. a chocolate bar and a bag)

Lesson Outline:

Prepare the learners so that they understand the relevance of flowchart symbol shapes. Discuss and highlight the use of computational systems in supermarkets Use YouTube video clip to highlight the process.

Explain that during the activity they will model the behaviour of the system and they will work together in groups to devise the flowchart for this system.

Together students brainstorm the key processes, decisions, inputs and outputs in a simple event. Keep it fairly simple by using one product to purchase... eg. Bar of chocolate. They are likely to highlight the following steps...

Assistant Required | Another item | Waiting for customer | Scan the item | "Unexpected Item in the Bagging Area" | Item list state | Pay| Bags Removed | Choose payment method | Bags Removed.

Using the processes they identify which flowchart symbol each function belongs to and write these on the symbol. It is probably sensible to group them into teams of 10 with one student overseeing the process. They deconstruct, debug and refine the procedure until the process works. To add a competitive element you may like to reward the winning team with the bar of chocolate (or a certificate) possible, successful outcomes could be rewarded with the chocolate bar.

Highlight a current topic in the news... "Tesco Petrol Stations Use Face Scan Tech to Target Ads", BBC News, 04.11.13. Open up for discussion and touch on other issues such as privacy etc.

This lesson would best suit...

Less able/Gender Neutral

Resource Contributor/s:
Matt, @awitts,@SAPS_News,Ben,Alex,Emma

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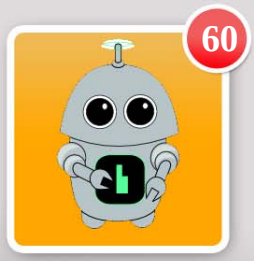

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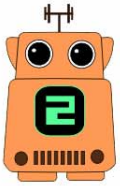


Lesson 1 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

You could possibly prepare a resource to assist creative writing. i.e. a presentation with a picture of a haunted house, a castle, a dark forest, a magical treehouse.

Lesson Outline:

Lesson 1: Planning the story.

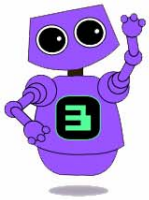
Students should prepare a simple story for their game. They should think of characters and the scene.

Students should prepare a basic flowchart or algorithm for this story - how will it play out?

They should now emphasise the programming vocab such as sequence (the progression from one step to the next), selection (choices, ie "if"), iteration (looping back to an earlier point in the story, ie "while").

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



Resource Contributor/s:
@FluffyEmily, @DavidAmes, @SelfPityCity, @MrHarcombe, @StevePaget

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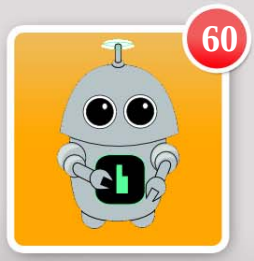
Preparation



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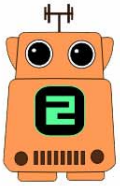


Lesson 2 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

Create a worksheet of control words to help the students pick out which ones are in their story.

Lesson Outline:

Lesson 2: Breaking out the control flow.

From their flowchart, in pairs the pupils talk through their story and listen for the control words.

Provide the worksheet to show which control words are available.

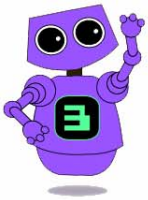
Students should identify variables etc.

They can now create textual control flow (pseudocode) from their story.

Demonstrate how this may look in Scratch.

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



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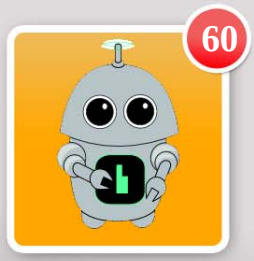

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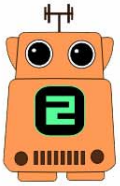


Lesson 3 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

Create a worksheet to support the "branching" element of this activity.

Lesson Outline:

Lesson 3: Teach branching

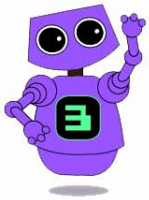
Students should start to think about how the character can move from room to room. They can plan this out using the branching technique. You may wish to carry out a practical activity in your classroom to demonstrate branching. Get one student to be the character and give them two options (move left or right). Then draw the branches on the IWB. Continue the story until students develop a solid understanding.

E.g.
- use prompts to gather user input
- while loops
- if statements to move form one room to another
- print instructions on the screen

Students may need a handout to aid this

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



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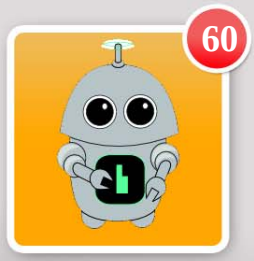

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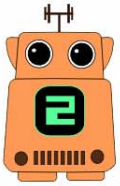


Lesson 4 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

Possibly create a How to use Variables in Scratch Resource.

Lesson Outline:

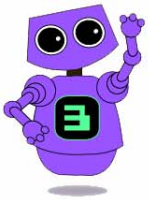
Lesson 4: Variables.

Use variables to remember the current room, variable for remembering the user input. Create concept of a score with a variable that increases as you move through the rooms.

You may need to spend a little time re-capping variables if your class is unfamiliar with this.

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



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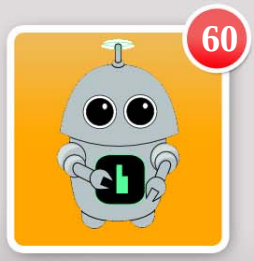

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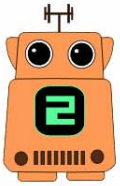


Lesson 5 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

Support for Arrays in Scratch can be found here: http://wiki.scratch.mit.edu/wiki/Array

You may wish to create a supporting resources for this!

Lesson Outline:

Lesson 5: Dead or alive.

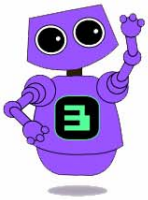
This section becomes more advanced. Some students may get lost here! Worksheets and other differentiation strategies may need to be used depending on the ability of the group.

Show the students how to use an array in Scratch. Tell them that an array can be used to track the items that the character may have picked up along the way. Develop a scene where the character lives or dies depending on what objects he/she is holding.

You could develop this further by adding probabilities to randomise chances of survival.

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



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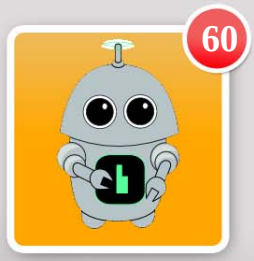

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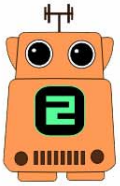


Lesson 6 of 6 - Preparing to move from Scratch to a Text-Based Language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- use computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual
- design and develop modular programs that use procedures and functions

Resources and Preparation:

Teachers need to be familiar with Scratch, in particular the Control Blocks. The aim is that this unit of work "up-skills" the students and prepares them for a text-based language i.e. Javascript or Python

Use this page to learn how to create a procedure in Scratch:
http://wiki.scratch.mit.edu/wiki/Procedures

You may wish to develop a supporting resource or point students to this page.

Lesson Outline:

Lesson 6: Moving code out into procedures to improve code efficiency.

Show the students how a chunk of code that is repeated can be placed into a procedure in order to be used again and again.

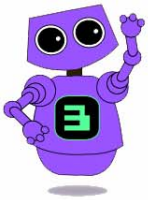
Demonstrate how to do this in Scratch.

Ask the students to develop their programs further so that it uses procedures.

Finish by evaluating each others games.

This lesson would best suit...

Gender Neutral/Socio-Economic (Scratch is free)



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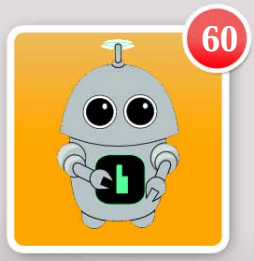

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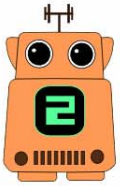


Lesson 1 of 2 Sweet Factory (Organise digital content)

DFE Computing Curriculum Subject Content Covered:

Key Stage 1 Subject Content:
- use technology purposefully to create, organise, store, manipulate and retrieve digital content

Resources and Preparation:

This resource is part of the Sweet Factory set of resources for Key Stage 1.
This set of resources is designed to introduce fundamental computer science principles to Key Stage 1 children through a combination of unplugged and plugged activities and real world examples on the theme of sweets.
This resource focuses on Records. It addresses the need to learn to 'organise digital content' in the Programmes of Study. It might be carried out over a number of lessons.

Resources needed:
Example box of chocolates.
A number of key cards from boxes of chocolates showing images of the chocolates and their descriptions.

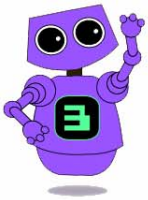
Lesson Outline:

Lesson 1 Unplugged:

The lesson begins with a discussion:
Which are our favourite chocolates? Which ones don't you like?
Sort the sweets or images of the sweets into the ones you like and don't like. How did you know which were which?
The children talk about how they can identify the chocolates by the colour of the wrapper and by looking at the key card.
The next step would be to spend some time inventing chocolates. This could be themed e.g. Bertie Botts Every Flavour Beans (from Harry Potter). (use Google to find a picture of the beans with their desciptions).
Explain to the children that they need to design a key so that they can choose the nice flavours.
The children make a paper key chart on a template.

This lesson would best suit...

Gender Neutral



Resource Contributor/s:
@helencaldwel, @swaygrantham, @coderscot, @craig88, @ntoll, @svtchersndys

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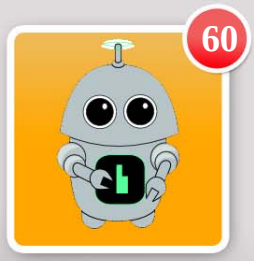
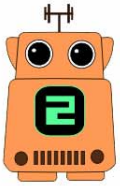




Lesson 2 of 2 Sweet Factory (Organise digital content)

DFE Computing Curriculum Subject Content Covered:

Key Stage 1 Subject Content:
- use technology purposefully to create, organise, store, manipulate and retrieve digital content

Resources and Preparation:

This resource is part of the Sweet Factory set of resources for Key Stage 1.
This set of resources is designed to introduce fundamental computer science principles to Key Stage 1 children through a combination of unplugged and plugged activities and real world examples on the theme of sweets.
This resource focuses on Records. It addresses the need to learn to 'organise digital content' in the Programmes of Study. It might be carried out over a number of lessons.

You may wish to pre-make a spreadsheet to aid some students.

Lesson Outline:

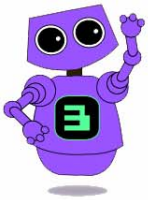
Lesson 2 Plugged:

Children build the key card into Excel and then they can manipulate it by adding different sweets and investigating changing the flavours and colours. Can they use it as a look up?
Link to example look up:
https://www.dropbox.com/s/x5lcf9igetx3qzl/LookupSweeties.xlsx
http://codepen.io/anon/pen/yrpmx
We would talk about how it might be implemented: by adding their own sweets.
They can make predictions about what would happen if you enter different colours and names of sweets.
Key computing concept: understanding the idea of a look up table: how they work and when you might use them.
It is about using a digital version of what we have already modelled physically.

Extending to real world examples:
Link to games children play e.g. passwords for games.
Pokemon decks.

This lesson would best suit...

Gender Neutral



Resource Contributor/s:
@helencaldwel, @swaygrantham, @coderscot, @craig88, @ntoll, @svtchersndys

KS3 Ladder of Resources

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- All sections

Explanation of Resource:

This is an initial list of resources to allow teachers to migrate their existing resources from the traditional approach to the new National Curriculum
There are 9 steps in the "Subject Content" section of the curriculum.
We have named each of these steps and have suggested start point resources to aid teachers to more easily adopt the new curriculum.
Digital Confidence desired outcomes for the National Curriculum starts with creating Digitally Confident Teachers!
We have inserted an additional step - Step 0 which we have named Framework

The Ladder of Resources:

Step 0 - Framework
- https://sites.google.com/site/primaryictitt/
- Hack the Curriculum http://casinclude.org.uk/cs4free
- www.teach-ict.com (some resources are paid)
- http://mattbritland.com KS3 SOW

Supporting the introduction of the framework teachers might consider developing a Digital Leaders Program

Step 1 - IOT & Control Systems
- Raspberry Pi Traffic light recipe

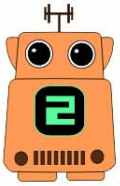
Step 2 - Algorithms
- digital school house - get with the algo-rithm

Step 3 - Programming
- CAS Computing resources
- Tour of Bletchley Park & National Museum of Computing

Step 4 Boolean Logic
- SEO
- Excel
- Logoic Lab
- Raspberry Pi traffic light recipe

Contd on next page...

Resource Contributor/s:
@rylowe7, @jacquitaylorfb, @dal_jit, @carolin3mill3r, @4goggas



KS3 Ladder of Resources

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- All sections

Contd from previous page...

Step 5 - Web/HW/SW
- OCR Raspberry Pi getting started resource booklet
- CAS YR7 HW & SW unit
- singing Jelly Baby recipe raspberry Pi

Step 6 Data & Instructions
- Sonic PI
- Mark Dorling resources on hack the curriculum site
- bitmap graphics

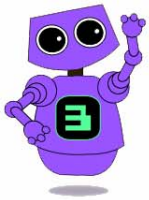
Step 7 Creative Projects
- research, independent study
- codeavengers
- wordpress
- range of devices

Step 8 - Digital Artefacts
- Prezi
- Blogs
- web design

Step 9 - Digitally Confident
- makewaves
- CEOP
- Childnet
- Simon Finch - http://simfin.wordpress.com
- multimedia using images/videos to support blogs

This lesson would best suit...

All



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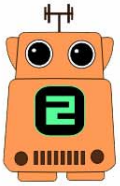


Using SIRI to introduce a text-based programming language

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.
- use two or more programming languages, at least one of which is textual

Resources and Preparation:

Clip of SIRI-first 40 seconds to start
http://www.youtube.com/watch?v=PDpRg81UHy0

http://scratched.media.mit.edu/sites/default/files/Scratch%20Beginner%20001.pdf Hello , what is your name, Print your name

Python 3 examples of basic programs using Print, Input

http://speedy.sh/QEWbZ/CARDS.pptx

see Powerpoint with outline of cards for dual code in Scratch and Python

Lesson Outline:

Prior experience of programming Scratch will be required for this activity.

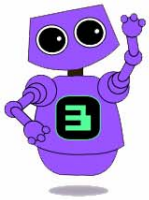
Open the lesson with a Youtube video of 'Siri' with a discussion of what the command is ? response ?

Introduce simple program with print command in Python

Pupils try alternative commands and syntax with errors to show precision requirements
Pupils then use Cards with two versions of coding to run Python code (with Scratch equivalent) Variables

This lesson would best suit...

Gender Neutral/Socio-Economic (Python is free)



Resource Contributor/s:
Naomi Brown, Andrew Sula, Corinne Pinfold, Roger Bamkin, Chris Hall

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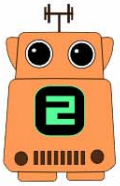


Using Minecraft to introduce programming concepts

DFE Computing Curriculum Subject Content Covered:

Key Stage 3 Subject Content:
- All sections

Resources and Preparation:

Please look at the resource here:

https://docs.google.com/presentation/d/1ZEbkAjbNuKQELxvZ2hvk9K7VS7SqF_FK50nDEEr97zk/edit?usp=sharing

1. Follow #minecraftedu on Twitter to get help
2. Have either normal Minecraft or Minecraftedu mod
3. Allow pupils who are slightly more familiar with Minecraft to contribute and take some responsibility

Lesson Outline:

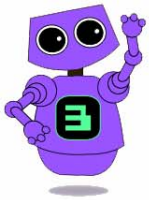
This is a set of lesson activities which teachers can use either in the class if they have Minecraft or Minecraftedu or give to pupils to do at home using their own Minecraft installs. This resource doesn't cover how to use Minecraft rather what you can do with it.

Lesson ideas can be found at this link:

https://docs.google.com/presentation/d/1ZEbkAjbNuKQELxvZ2hvk9K7VS7SqF_FK50nDEEr97zk/edit?usp=sharing

This lesson would best suit...

SEN/All/Feedback shows this is successful with girls



Resource Contributor/s:
@sharland, @aaronpec

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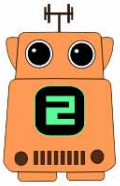
Preparation

Learning



Learn about the Internet using an Obstacle Course

Winning Resource!

DFE Computing Curriculum Subject Content Covered:

Key Stage 2 or 3 Subject Content—This could be adapted for different age groups:

- understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration (KS2)
- understand the hardware and software components that make up computer systems, and how they communicate with one another and other systems (KS3)

Resources and Preparation:

You will need a large space to create an obstacle course. This could be a school hall or field.

The obstacle course can be as imaginative as you like!

You will also need a sliced loaf of bread.

Lesson Outline:

The aim of the obstacle course is to get the full, completed loaf of bread to its destination.

The bread (data file) is split up into slices (packets).

The students take it in turns to take a slice of bread through the obstacle course and get it to the destination. They can take different routes if necessary. Timing them will add some fun to this task!

You could repeat this process to test if they can complete it any faster (find the best route).

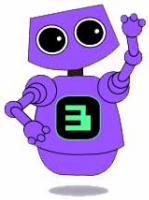
FURTHER DEVELOPMENT:

Google “Georgian Woman Cuts of Internet” to find a news article about the Internet in Armenia being cut off for 5 hours. Discuss it with your class.

Discuss this map with the class http://eightface.com/tag/maps/

This lesson would best suit...

SEN/All/Gender Neutral



Resource Contributor/s:
Emma-Ashley and Team