Computing Science Concepts

-Various inputs

-Sequence

-Repetition

-Counted loops

-Continuous loops

-Algorithm

-Parsons problem

National Curriculum Programs of Study

Pupils should be taught to:

design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

use sequence, selection, and **repetition** in programs; work with variables and **various forms of input and output**

use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Research Focus

This planning uses a **parsons problem**[1] where the code is provided but pupils need to assemble it in the right order. This one has a twist as they are provided with the idea and algorithm to help them construct the programs.

Computer scientists have **four levels of abstraction**[2]. The ideas level, Planning level (which includes the algorithm), code level, and execution level (testing the code).

Animation Planning Version A Parsons Problem

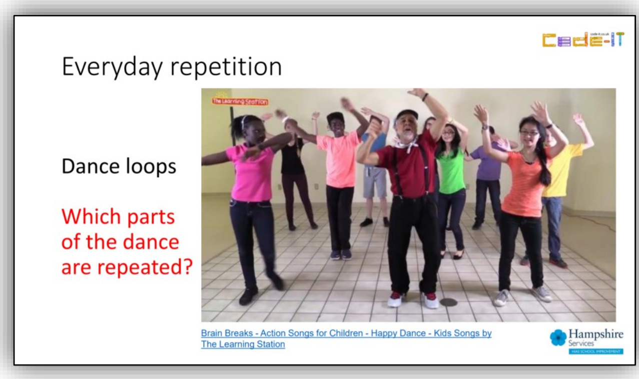
Overview

1. Introduce the concept of repetition through everyday examples
2. Extend the concept of repetition through role play
3. Introduce the challenge by sharing the idea, algorithm and unfinished code of a variety of different animation techniques [Parsons problem]
4. Learn about all the different animation techniques and how they were created
5. Pupils plan their own animations to go with either their monologues or dialogues
6. Pupils turn their algorithmic planning into their own programmed animations
7. Pupils fill in the summative assessment form

1. Introduce the concept of repetition through everyday examples

Download **Everyday computing concepts PDF** from http://code-it.co.uk/knowledge **or directly from** http://code-it.co.uk/wp-content/uploads/2019/04/everydaycomputingconcepts.pdf

Use the ideas in the repetition section to introduce the idea of repetition in our everyday lives. There is a You tube and Vimeo version to the dance activity. By linking the concept to its everyday use you are linking to known knowledge which means pupils are more likely to assimilate the idea.



Everyday repetition

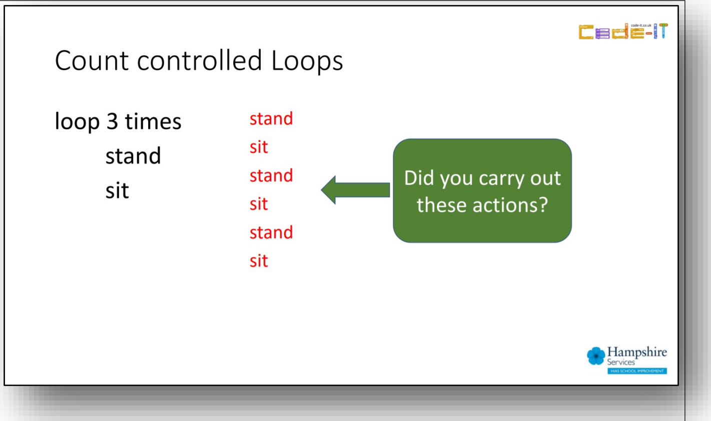
Dance loops

Which parts of the dance are repeated?

Brain Breaks - Action Songs for Children - Happy Dance - Kids Songs by The Learning Station

2, Extend the concept of repetition through role play

Download Concepts before coding PDF from http://code-it.co.uk/knowledge or directly from http://code-it.co.uk/wp-content/uploads/2019/04/conceptbeforecoding.pdf Follow the links in the menu to count controlled loops. Use those slides to roleplay and write simple fun repetition algorithms.



Count controlled Loops

```
loop 3 times
    stand
    sit
```

stand
sit
stand
sit
stand
sit

Did you carry out these actions?

Move on to roleplay and write continuous loop algorithms before moving on.

Formative assessment opportunity

While pupils are writing their own repletion algorithms go round and check them all. Is anyone struggling? Have they copied the one on the board exactly? This is often an indication that they are not sure how to create their own or that spelling is an issue. A good supportive activity is to get them to tell you about their own sequence that you scribe for them.

3, Introduce the challenge by sharing the idea, algorithm and unfinished code of a variety of different animation techniques [Parsons problem]

Opening template file

Give pupils **animationalgorithmplanning PDF** and direct them to open the Scratch **parsons problem example animation** file This can be found either on the Scratch website at https://scratch.mit.edu/projects/305130494/
or as a link on http://code-it.co.uk/gold/

You can also find downloadable Scratch 2 and Scratch 3 files on the same page as

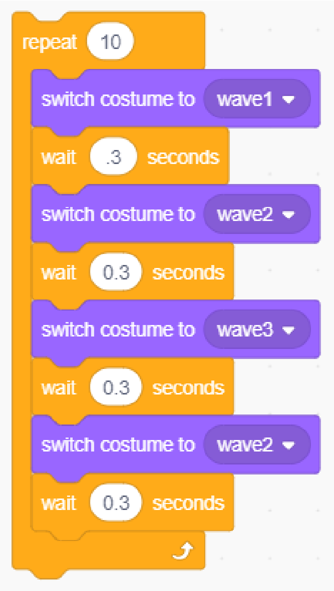
PARSON_A_animationexamplescratch2 ZIP

PARSON_A_animationexamplescratch3 ZIP

Introducing the challenge

Explain that the author got as far as creating their planning and they have created the blocks and put them in the right places but the blocks are not connected together. Can they follow the algorithm to build the code?

Can they use the algorithm plan to help them decide how the blocks fit together. There is a challenge in each sprite.



```
repeat 10
    switch costume to wave1
    wait .3 seconds
    switch costume to wave2
    wait 0.3 seconds
    switch costume to wave3
    wait 0.3 seconds
    switch costume to wave2
    wait 0.3 seconds
```

Animation as a stand alone project

This project works well on its own. Create animations without linking them to the monologue and animation projects.

Example algorithm plan

Idea

Wave hand

Algorithm

```
Loop 3 x
    Hand to right
    Wait
    Hand to left
    Wait
```

A3 Extended planner last column

Animation
Start with stand 1
14 seconds
Hand wave loop
12 seconds
Nod head loop

4, Learn about all the different animation techniques and how they were created

See the double page printable pull out at the end of the module for animation techniques. Demonstrate these yourself or you can also use the videos found at

https://youtu.be/b0igJEQteTA for Scratch 2.0
https://youtu.be/mLzYpXcbv84 for Scratch 3.0

5, Pupils plan their own animations to go with either their monologues or dialogues

There are two parts to this plan. The first is for pupils to decide what they want to animate and how they want to do it. The second is to decide where it will fit in on their existing monologue or dialogue plans.

For the first part there is a idea and algorithm planner and for the second part they need to use the A3 extended planner last column. Where will their algorithms fit into the conversation flow. This is the part that we haven't shown, modelled or discussed so it may be worth briefly sharing a good one similar to that shown on the left.

Formative assessment

Check pupils ideas and algorithms as they are creating. Do their ideas make sense? Have they chosen a loop type? Have they indented what is going to be repeated by their loop? Do they refer to the type of pictures they are going to create? Have they included timing blocks to slow the loop down?

6, Pupils turn their algorithmic planning into their own programmed monologue

Give pupils time to do this and to test their creations. Does it fit in with the dialogue or monologue?

7, Pupils fill in the summative assessment form

You can find a summative assessment quick **Kahoot Quiz** linked at http://code-it.co.uk/gold/

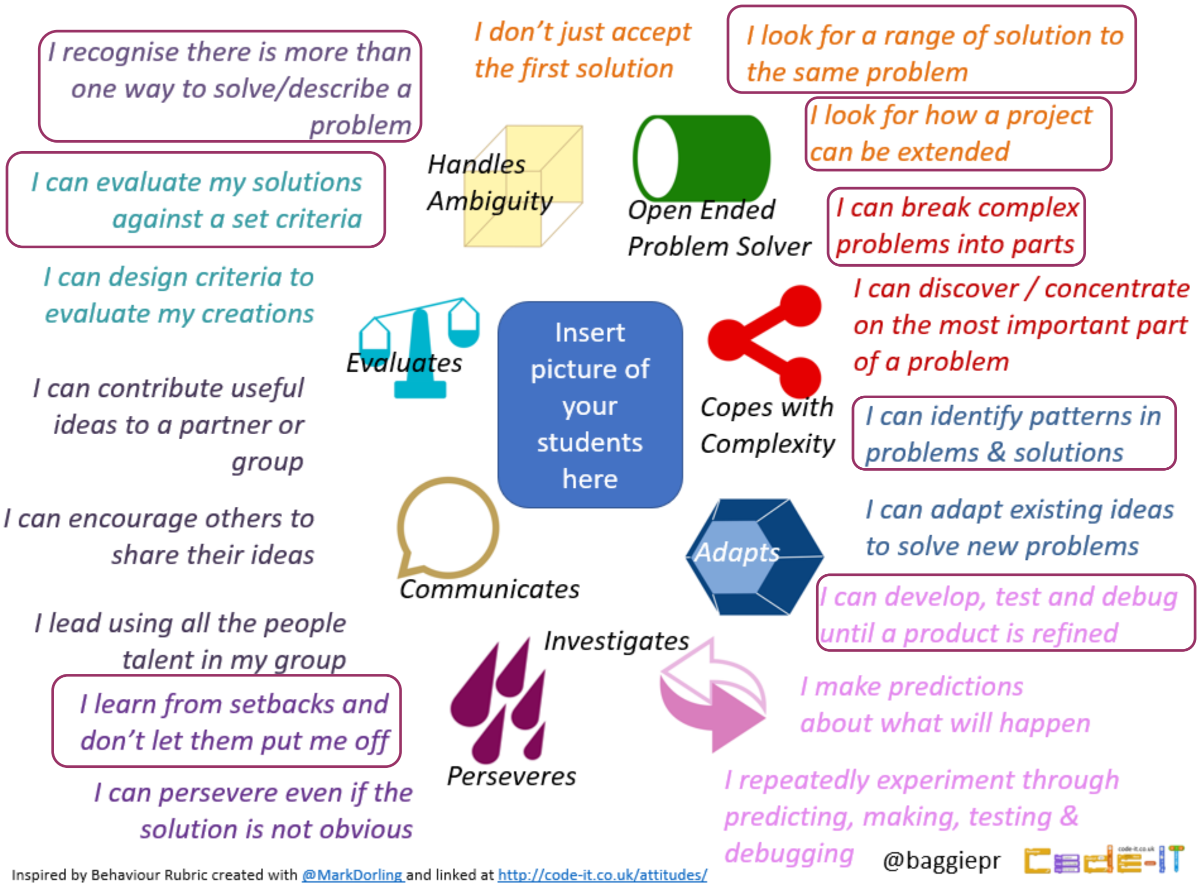
Whilst Kahoot is a limited assessment tool it is free and it is easy for teachers to pass the results back to code-it via phil.bagge@code-it.me so I can look at which method provides best short test results. Not conclusive but useful.

If you pass the results back please

1, Anonymise the results by removing the names

2, Ask the head teacher for permission

3, In the email title say which module you are doing (ie Animation D)



I recognise there is more than one way to solve/describe a problem

I don't just accept the first solution

I look for a range of solution to the same problem

I look for how a project can be extended

Handles Ambiguity

Open Ended Problem Solver

I can evaluate my solutions against a set criteria

I can break complex problems into parts

I can design criteria to evaluate my creations

Evaluates

Insert picture of your students here

Copes with Complexity

I can discover / concentrate on the most important part of a problem

I can contribute useful ideas to a partner or group

I can identify patterns in problems & solutions

I can encourage others to share their ideas

Communicates

Adapts

I can adapt existing ideas to solve new problems

I can develop, test and debug until a product is refined

I lead using all the people talent in my group

Investigates

I make predictions about what will happen

I learn from setbacks and don't let them put me off

Perseveres

I can persevere even if the solution is not obvious

I repeatedly experiment through predicting, making, testing & debugging

Inspired by Behaviour Rubric created with @MarkDorling and linked at http://code-it.co.uk/attitudes/

@baggiepr Code-IT

Research References

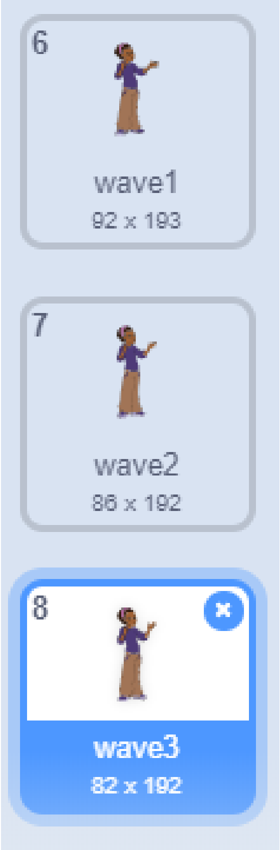
[1] Parsons problems https://www.computingatschool.org.uk/news_items/365

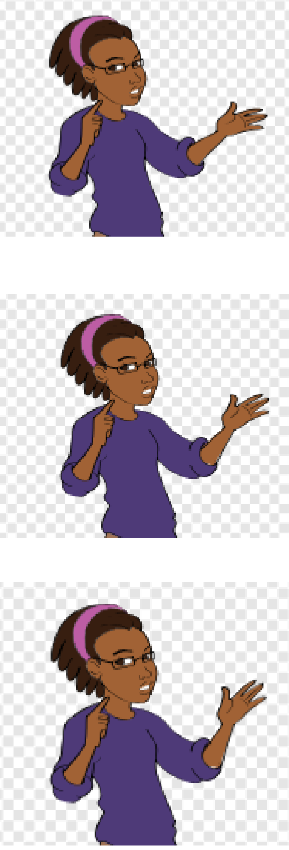
[2] Four levels of abstraction

This article includes an example of the four levels of abstraction and sign posts the work of Waite and Armoni in using them with school level pupils.

http://code-it.co.uk/algprogdiff/

BY NC ND

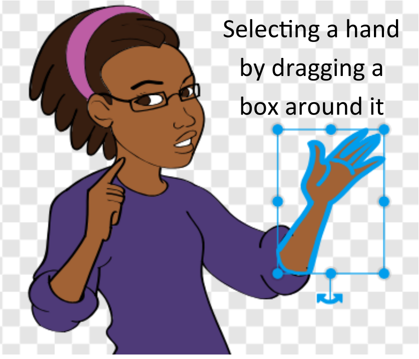




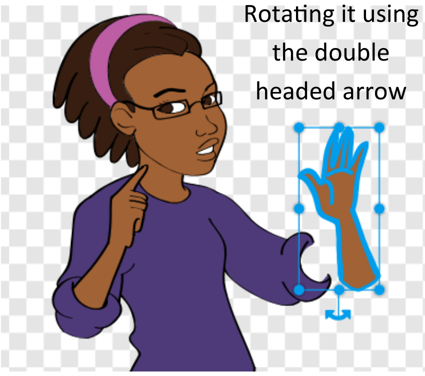
New to Scratch 3 is the ability to deconstruct parts of the pictures by left clicking and dragging a box around the parts that you want to use.

These also have a double headed arrow at the bottom so you can rotate the part you have selected.

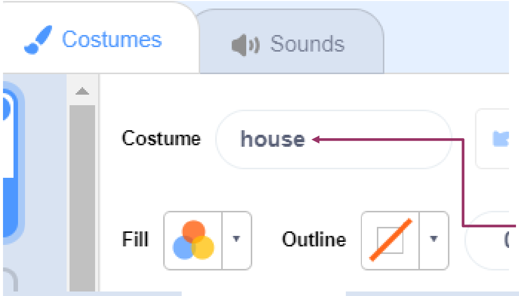
You can move the part by holding it in the middle and resize it from the corner manipulation points.



Selecting a hand by dragging a box around it



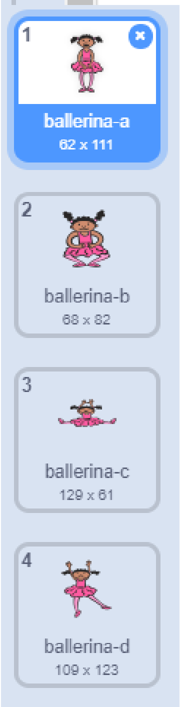
Rotating it using the double headed arrow



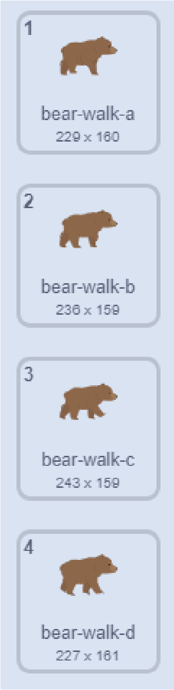
Costumes Sounds

Costume: house

Fill Outline



The bear and the ballet dancer and great examples of sprites with multiple costumes already created



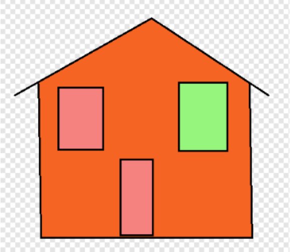
3.0

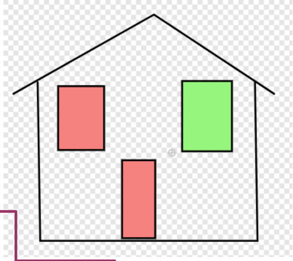
The house is made by starting with an empty sprite and renaming the first one as house.

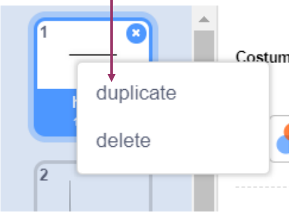
Drawing the first part of the picture in this case the base line.

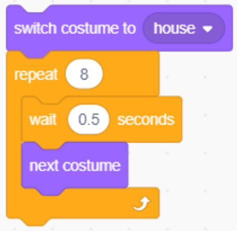
Then duplicating the picture and adding more details before duplicating and repeating the previous steps.

Novice programmers often exclude the initialisation of the sprite costumes and the need to start at the first picture.

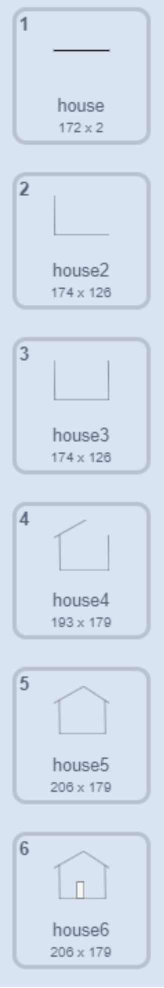


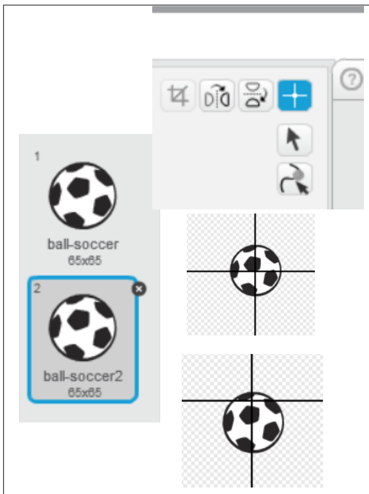






```
switch costume to house
repeat 8
    wait 0.5 seconds
    next costume
```





Making a ball bounce in Scratch 2.0

Import a ball sprite

Duplicate the sprite

On the second sprite only select the centre tool.

Move it up or down

2.0

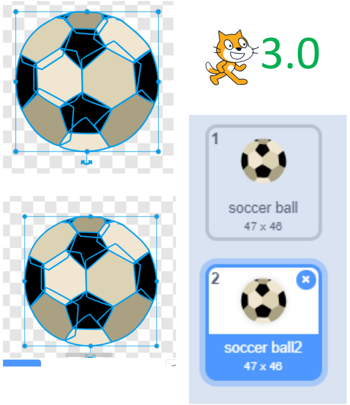
Making a ball bounce in Scratch 3.0

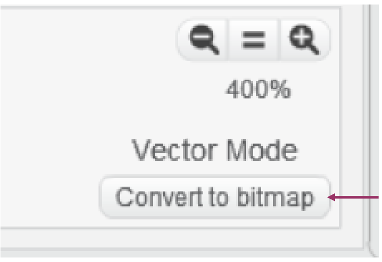
Import a ball sprite

Duplicate the sprite

On the second sprite only drag a box around the whole sprite.

Move it up or down from the middle.

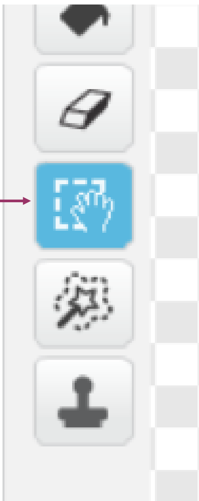




Scratch 2.0 doesn't have the same ability to deconstruct pictures as Scratch 3.0

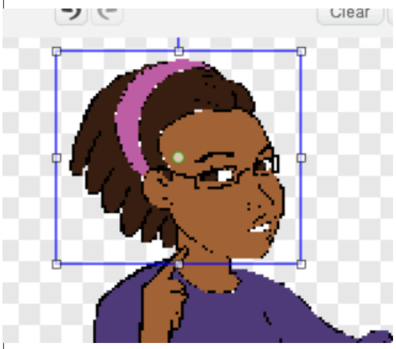
You will need to convert a sprite to bitmap which will reduce the quality of the picture which is noticeable in Scratch 2.0.

Then select the select tool highlighted blue.



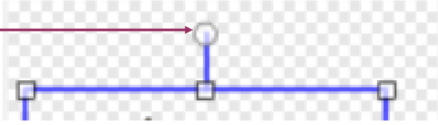
The animal, house and ballerina work the same as Scratch 3.0

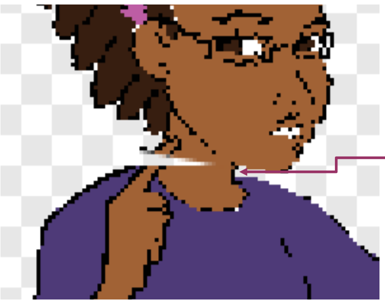
Adjusting pictures needs a different method as shown.



Drag a box around the area of the picture you wish to adjust.

Use the rotate button above the select box to rotate your selection.

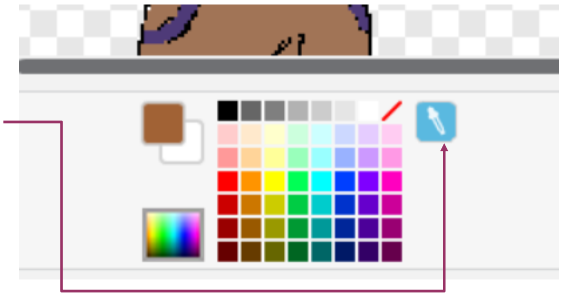




Once you have repositioned the picture you will need to use the colour choosing tool to find the right colour to fill in any damage to the picture.

You may need to zoom in to adjust the picture at pixel level.

Pixels are the tiny dots that makeup every screen. The more dots there are the greater the picture quality.



Once you have selected the colour chooser you need to left click on the colour you need and you can then paint using it.

Animation double page pull out