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3D Shapes Using Beetle Blocks

Program Aim Program 3D shapes, cubes, square based pyramids etc

Computing Science Concepts

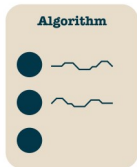
-Sequence

What age is this planning aimed at?

Pupils who understand X & Y axis coordinates

Computational Thinking

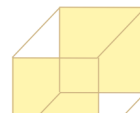
-Algorithmic Thinking



Experiment & Debug



Persistence



Coping with Ambiguity



Open Ended Problem



Adapt

Problem Solving Skills

Resources

Beetle Blocks
Paper XYZ

-Algorithmic Evaluation

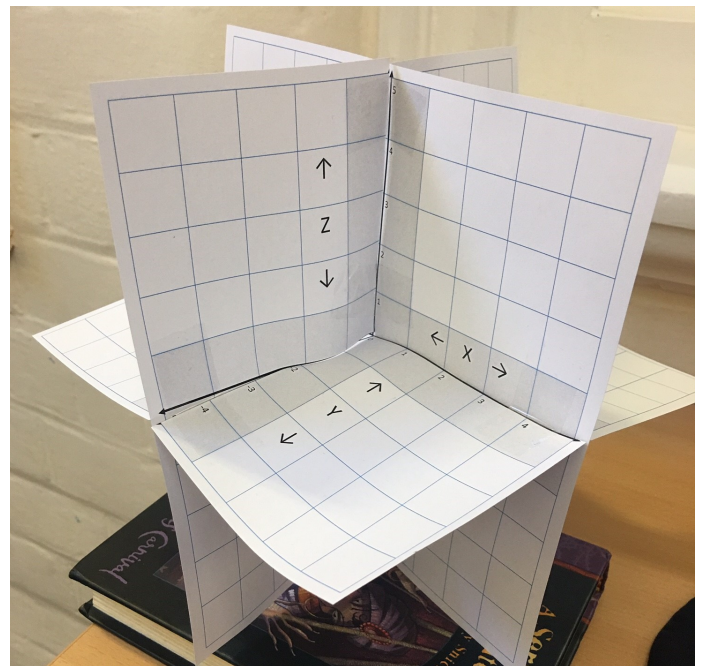
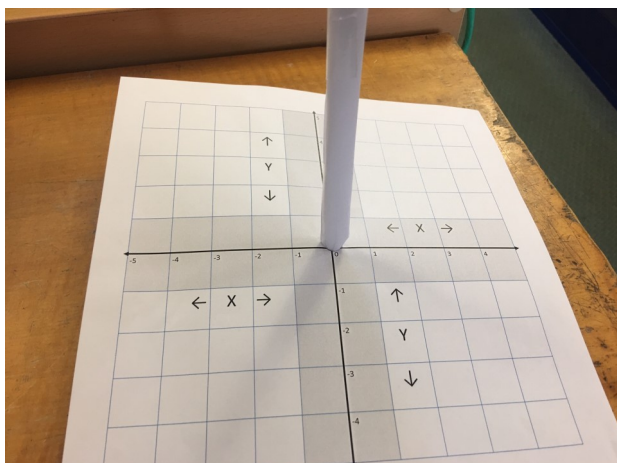


Overview

- 1, Pupils think about Z using a paper model
- 2, Pupils take the Beetle for a walk one coordinate at a time
- 3, Pupils program 2D shapes on one plane only
- 4, Pupils program a cube and then other shapes
- 5, Pupils look for the most efficient way to create a cube using least instructions

1, Adding Z to X & Y

There are two paper models that your class could make or you could make before the lesson. Alternatively you could label some cubes so pupils can see where Z in relation to X and Y



If you can print onto card then these are more durable. If you print onto acetate then they are even more effective.



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3D Shapes Using Beetle Blocks P2

<http://beetleblocks.com/>

About Beetle Blocks

Beetle Blocks is a free online programming resource modelled around the same blocks that Scratch uses. Unlike Scratch, shapes can be programmed in 3D. Shapes can also be exported and printed using a 3D printer. Pupils can setup an account and store their saved files inside the system online. There doesn't seem to be any online safety issues or dangers of inappropriate contact through the tool.

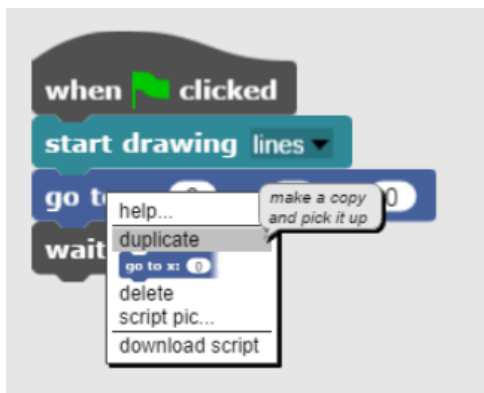
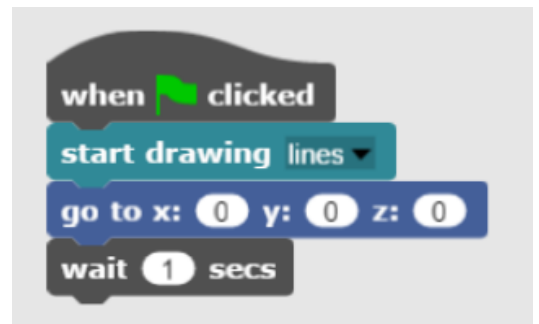
2, Pupils take the beetle for a walk one coordinate at a time



Left click on the wire frame and drag it round to show pupils that it shows 3D space. Some of them may have used Sketch up that has a similar wire frame.

Drag Z down as shown to bring up the classic Y and X they are used to from Scratch

Explain that they are going to take the Beetle for a walk around the screen. Each square is 1. If they are used to Scratch this is a departure from the 1 pixel size. If they want to go half way they will need to use decimal fractions.



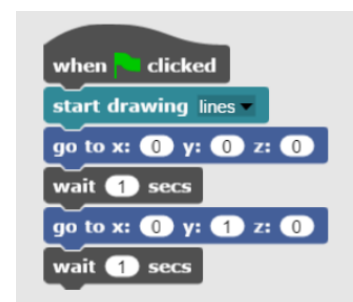
Demonstrate right clicking and duplicating the bottom two blocks.

Instruct pupils to only change 1 coordinate by 1 number only.

A partner could give them a direction to follow such as go up the Y axis or go down the Z axis.

As pupils get the idea make sure they have gone below the wire frame and into negative numbers for X and Y as well.

It can help to have their XYZ models on hand.





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3D Shapes Using Beetle Blocks P3

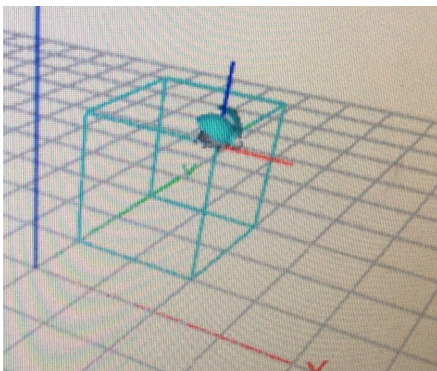
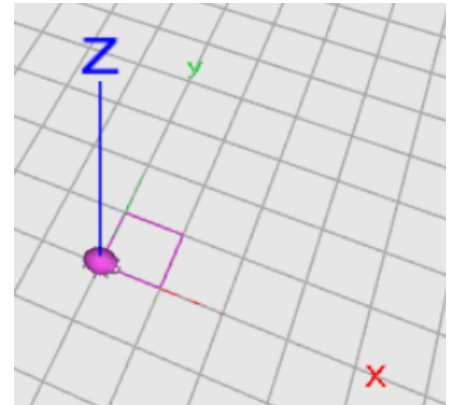
3, Pupils 2D program shapes on one plane only

Can they draw a square using X and Y only, Z and X only or Z and Y only.

You can get them to program more single plane shapes or move on to 3D shapes, depending on their confidence and maths ability.

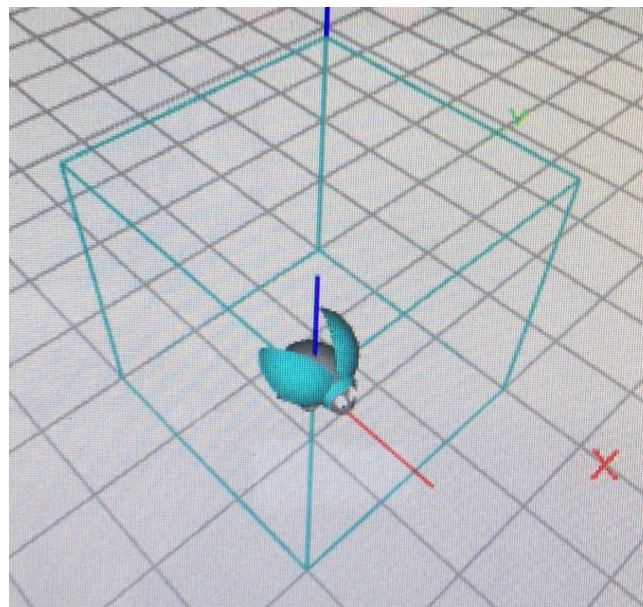
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when clicked
  set hue to pink
  start drawing lines
  go to x: 0 y: 0 z: 0
  wait 1 secs
  go to x: 0 y: 1 z: 0
  wait 1 secs
  go to x: 1 y: 1 z: 0
  wait 1 secs
  go to x: 1 y: 0 z: 0
  wait 1 secs
  go to x: 0 y: 0 z: 0
  wait 1 secs
  
```



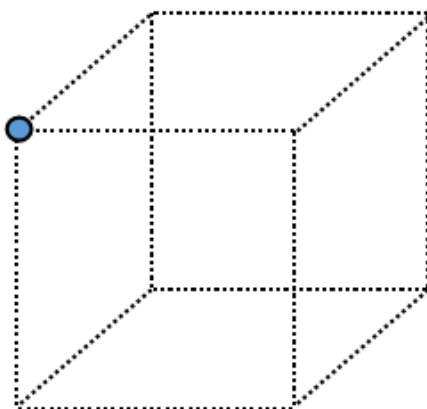
4, Pupils program a cube and then other 3D shapes

Once they have mastered the cube a square based pyramid is a good next challenge.



5, Pupils look for the most efficient way to program a cube using the least amount of instructions

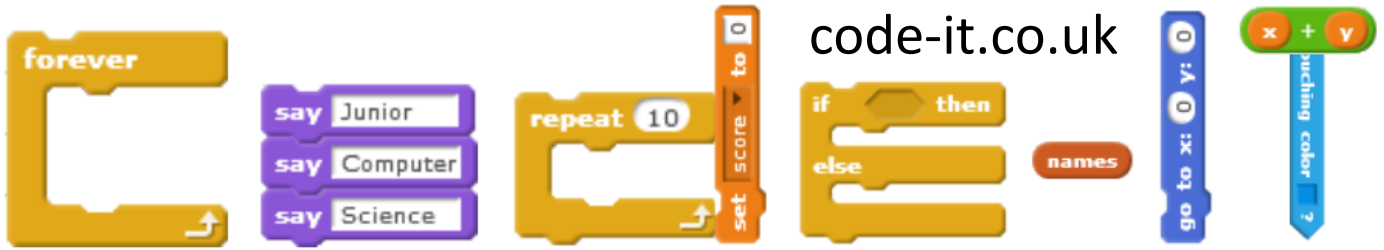
They may want to plan this out using the cube shape sheet.



Useful things to know about Beetle Blocks

Pupils can program a square using a single block. Ban them from using this for this module.

Beetle blocks can freeze if you put it into full screen mode (F11)

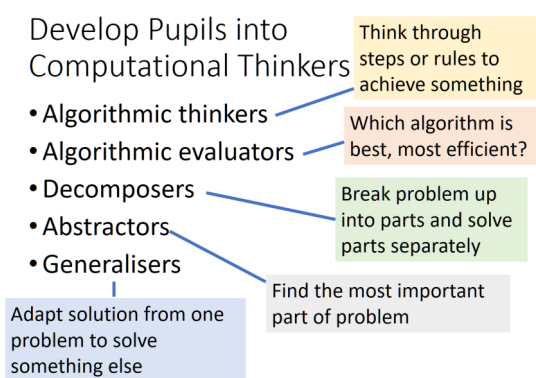


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Where Next?

Explore other programming planning at code-it.co.uk/csplanning

Design your own programming planning using computational thinking & problem solving skills



You can follow me on Twitter @baggiepr

You can find lots of free resources at code-it.co.uk

I enjoy sharing my journey with fellow educators around the world

Complexity	I can break complex problems into parts	I can discover / concentrate on the most important part of a problem	I can explain how I used decomposition & abstraction
Ambiguity	I recognise there is more than one way to solve a problem	I recognise there is more than one way to describe a problem	I can explain how I managed ambiguity
Open Ended	I look for a range of solution to the same problem	I don't just accept the first solution	I can describe how a project can be extended
Adapt	I can adapt existing ideas to solve new problems	I can identify patterns in problems & solutions	I can explain how I adapted a solution to solve a new problem
Evaluate	I can evaluate my solutions against a set criteria	I can design criteria to evaluate my creations	I can explain how evaluation helped me improve a project
Experiment & Debug	I can develop, test and debug until a product is refined	I repeatedly experiment through making, testing & debugging	I can explain how using the iterative cycle improves my work
Persist	I can persevere even if the solution is not obvious	I learn from setbacks and don't let them put me off	I can describe how I overcame problems
Communicate	I can contribute useful ideas to a partner or group	I can encourage others to share their ideas	I can lead using all the people talent in my group

Decomposition Abstraction Generalisation Algorithmic Evaluation Algorithm

Adapted from Behaviour Rubric created with @MarkDorling and linked at <http://code-it.co.uk/attitudes/> Adapted with permission

