



# KS1 Activity: Crazy Character Algorithms

An introduction to sequences of instructions

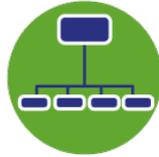
**Recommended Year Group:** Year 1 or 2

**Activity Duration:** 30 minutes

Concepts and approaches



Algorithms



Decomposition



Logic



Debugging

Curriculum links

## Computing:

- understand what algorithms are

## English (spoken language):

- listen and respond appropriately to adults and their peers
- articulate and justify answers, arguments and opinions;
- participate in discussions, presentations, performances, role play, improvisations and debates

## Art and Design:

- use drawing, painting and sculpture to develop and share their ideas, experiences and imagination

## Introduction

An algorithm is a precisely defined sequence of instruction or a set of rules for performing a specific task. This is an ‘unplugged’ activity, which means you do not need a computer.

By teaching this short unplugged activity your pupils will create a set of instructions on how to draw a crazy character and so start to understand what algorithms are.

*Note: You can use any set of instructions to introduce algorithms!*

## Pupil objectives

- I know what an algorithm is
- I can write an algorithm
- I can use an algorithm
- I can improve my algorithm

## Resources

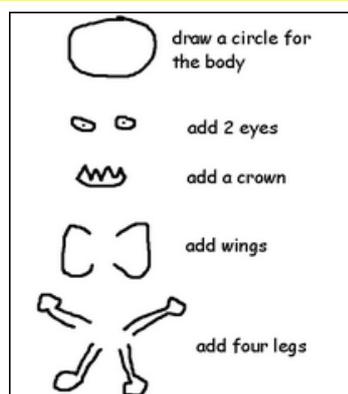
- Crazy character algorithm example (see “**Teaching Notes**”)
- Pupils’ small whiteboards and pens
- Teachers’s interactive whiteboard and [activity presentation](#) downloaded from the webpage or paper flip chart (to model how to create algorithms)
- [Crazy character worksheet](#) downloaded from the webpage
- Algorithm hat or band (optional - see “**Teaching Notes**”)



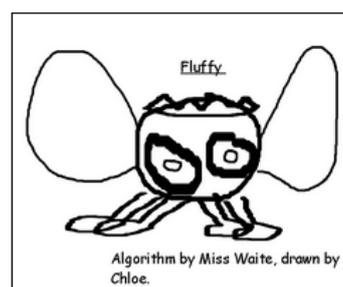
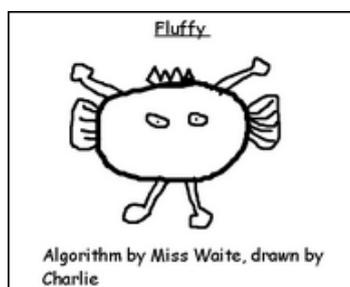
## Introduction (10 minutes)

Teacher has created an algorithm, pupils use it.

- Bring children to carpet with a whiteboard and pen each.
- Explain you are going to teach them a new word - can they listen out for it?
- Explain the lesson is going to be about instructions, and that they are going to have to follow some instructions to draw something.
- Explain to children you have thought of a secret crazy character and you would like to share it with them. You are not going to let them just copy it.
- Say you have already created an **algorithm** to help them draw it. Just slip the word in and see if anyone spots it. Once they spot it, have a little chat about what this word might mean.
- Share the learning intentions on slide 2 of the **presentation** if this is your normal practice. Don't explain algorithms yet.
- Say you are going to use the algorithm now. Pop the algorithm hat on if you are using this and read out your steps giving them time to draw each stage. Be bossy and don't give them extra detail. Show them your algorithm.



- Ask children to show you what they have drawn so that you can model saying if it is or is not what you expected. e.g. "Oh I didn't expect that they are all different. I wanted the legs all around like Charlie's and tiny eyes. I wanted tiny striped wings too, but a big crown."



- Ask children how you could change your algorithm so that it is what you wanted. Pupils should start to realise the need for precision in algorithms.
- Model adding extra words in e.g. tiny, at the top etc.
- Ask what was the algorithm.
- Explain that an algorithm is a list of instructions or a set of rules to make something happen or work something out.

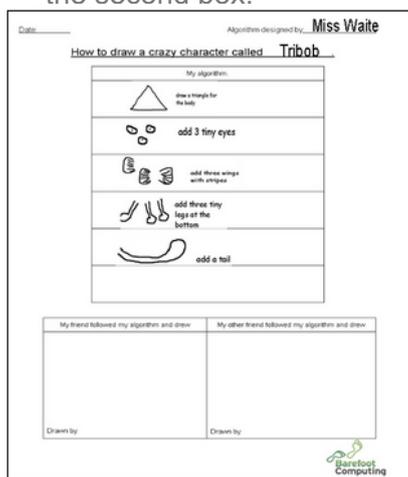


- You may like to say a chant, e.g.  
**“Alligator Algorithm, step, step, step,  
 She’s very, very bossy but she gets things done.  
 How to draw a character, how to open the door,  
 Alligator algorithm think of some more?”**
- Did they notice a new word. Can they listen out for that word? You can change the chant to suit your class to make it memorable.
- Say that the class will be finding out more about algorithms. Explain that they are used to make computer programs and soon the class will be writing programs. To do this well, they will need to practise making algorithms.

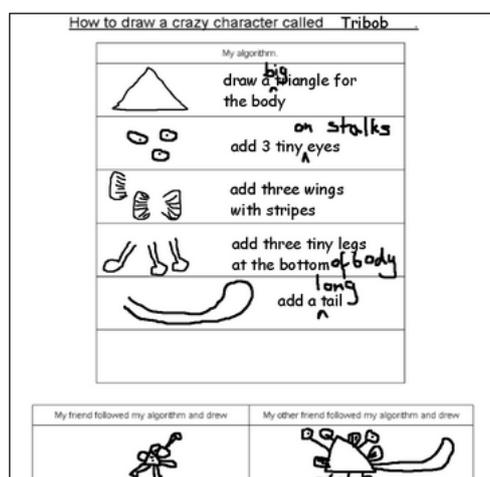
### Main task (20 minutes)

#### Shared class creation of algorithm

- Tell pupils we are going to create instructions on how to draw a class crazy character. Explain you are going to use a worksheet to help set out the work.
- Using an IWB, visualiser or A3 version of the worksheet, model how to create the instructions step by step as follows:
- Model how to imagine/think of a character, e.g. How about a triangle bodied character with wings, as shown below. His name is Tribob. Add the name to the title line.
- Then model how to create the step by step instructions (the algorithm).  
*Note: we are creating the instructions to draw the character.*
- Ask should we start with the instruction to draw a head or body first? Take ideas and then write the instruction ‘draw a triangle for a body’ add a shape too if your children think this will help. Then ask about the instruction for eyes? Add the instruction ‘add three tiny eyes’. Then perhaps an instruction for wings, legs etc.
- Explain the boxes at the bottom are for a partner to try out the algorithm.
- Now ask your TA or a pupil to follow the algorithm and draw the character in one of the bottom boxes.
- Then ask, ‘Is that what I expected?’ Model how to think through each step and think about adding detail (precision). Think about how people will understand (interpret) the words we use e.g. add eyes on stalks.
- Ask a pupil to use the improved algorithm to draw the character again - in the second box.



Example class crazy character algorithm



Example of a completed worksheet



## Pupils create algorithm

- Ask pupils to think of a crazy character and explain it is their turn to write the instructions. Remind them to think of simple instructions that their partners will understand. When they have written their algorithm they can ask a friend test it for them. Remind them to think, “Is this what I expected?” Then they can improve their steps and get another friend to test it. (This is the start of learning to [debug](#).)

The worksheet is titled "How to draw a crazy character called" and includes the following sections:

- At the top: "Date: \_\_\_\_\_" and "Algorithm designed by: \_\_\_\_\_".
- Section 1: "Now it's your turn." followed by a numbered list of 7 instructions:
  1. Think of a character.
  2. Write each step of your algorithm.
  3. When you have done all your steps get a friend to try it.
  4. Was it what you expected?
  5. Change your algorithm to improve it it.
  6. Get another friend to try it.
  7. What did you find out?
- Section 2: A large box labeled "My algorithm:" with several horizontal lines for writing.
- Section 3: Two boxes for drawings, each labeled "My friend followed my algorithm and drew" and "My other friend followed my algorithm and drew". Below each box is a line labeled "Drawn by:".
- At the bottom right: The Barefoot Computing logo.

Arrows point from instructions 2 and 3 to the algorithm box and the drawing boxes respectively.

Instructions on how to use the crazy character worksheet (the instructions are an algorithm too!).

- Then send pupils to their tables with a worksheet each to create their own algorithms.
- Mini plenaries: ask pupils to think about how they are improving their algorithm. Are they thinking carefully about what words to use to explain each step clearly so that their tester will know what to draw? Show examples of how pupils have changed their algorithms to make them easier to understand. Ask pupils for examples of things that happened that they did not expect.

## Plenary (5 minutes)

- Bring children back to the carpet with their algorithms. Ask children to tell their carpet partner how their algorithm changed and why.
- Select a few children to talk about what they tested and how the algorithm changed. What kinds of words were added (position, size, number etc)? How did these help? What happened that they did not expect? What did they do to change their algorithm? Did it work?
- Ask children what an algorithm is. *A set of precise instructions or rules to work out a problem.*
- Can they remember your chant if you used one? (e.g. ‘Alligator Algorithm, step, step, step, she’s very, very bossy but she gets things done, how to draw a character, how to open the door, Alligator algorithm think of some more?’). You could add actions e.g. snapping arms, big step legs, hands on hips, drinking tea etc.



- At home, can they create an algorithm for a member of their family to try out? They could even ask their family members to create some algorithms for them to follow. Why not look online at some of the 'how to draw dinosaurs' or another animal websites? Can you make a class book of algorithms that teach them how to draw animals or other things (perhaps related to your topic)? <http://artforkidshub.com/how-to-draw-a-t-rex/>  
<http://www.howtodrawanimals.net/how-to-draw-a-horse>

### Differentiation

#### Support:

- Pupils who find following instructions or thinking about breaking a problem down into steps (**decomposing**) may find it helpful to be paired with a pupil who is comfortable with this idea, or adult support might be useful.

#### Stretch & Challenge:

- When breaking your problem down into steps (**decomposing**) encourage more able pupils to be very precise when they create their algorithm, to think which details are important and which are not. More able pupils can be asked to think why they need to be precise when designing algorithms. This aspect of algorithms will be further explored as pupils learn more about the relationship between algorithms and programs.

### Assessment opportunities

- Algorithms - pupils' answers to specific questions, jottings on whiteboards and worksheets.

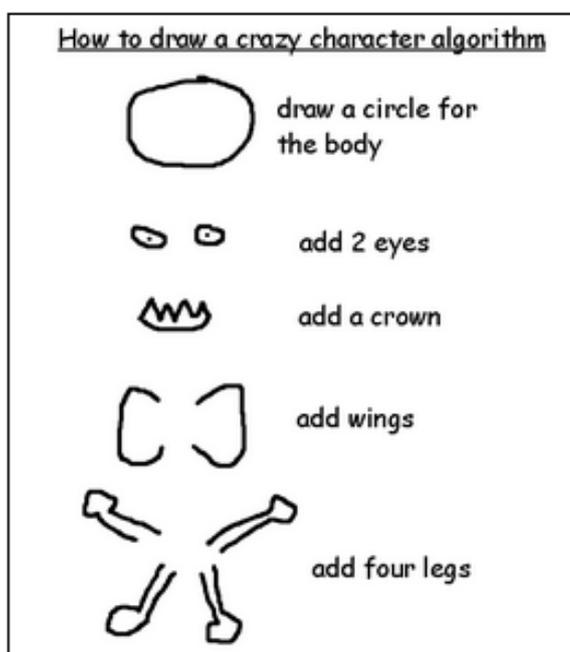
| Assessment                   | Questions or evidence  |
|------------------------------|--|
| I know what an algorithm is. | What is an algorithm?<br>Can you give me an example?<br>What could an algorithm help us do?<br>e.g. Pupils can say an algorithm is a set of detailed steps to make something happen or work something out.   |
| I can create an algorithm    | Review algorithm created by pupil.<br>Check it has clear steps and the steps are in an order that makes sense.<br>If it is just one drawing of the character then it's not an algorithm; it must have steps. |
| I can use an algorithm       | Listen and watch as pupils use an algorithm to draw a friend's character.<br>Do they follow the steps carefully or make up extra bits? Are they being precise?   |



## Teaching Notes

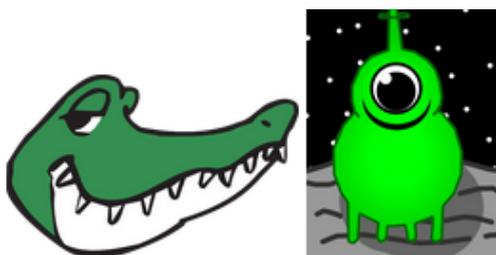
### Before you start

- Adapt the [presentation](#) to your school's format.
- Make up the crazy character algorithm example you are going to model. You could pop it on a whiteboard page or on a flipchart - but keep hidden until after the pupils have followed it.



Draw a secret crazy character Algorithm. The little pictures are to help you remember what to say

- You might like to think of an algorithm chant and character for your class, or use one of these. This is just to help you make this a memorable word - with actions to help pupils remember.
  - “Alligator Algorithm, step, step, step, she’s very, very bossy but she gets things done, how to draw a character, how to open the door, Alligator algorithm think of some more? ”
  - “Alien algorithm, 1,2,3 tell me how to do it, be bossy. We can make a hat, we can line up. Alien algorithm, 1,2,3 what are the steps, tell me”
- You might also like to make an algorithm hat or band to wear. Tailor to your classes chant character for algorithm. This is for the person who will use their algorithm to say the instructions.



Ideas for a hat/band logo to signal to pupils that you are in robot/algorithm mode. You could make a set of these for your role play area. Images from pixabay.



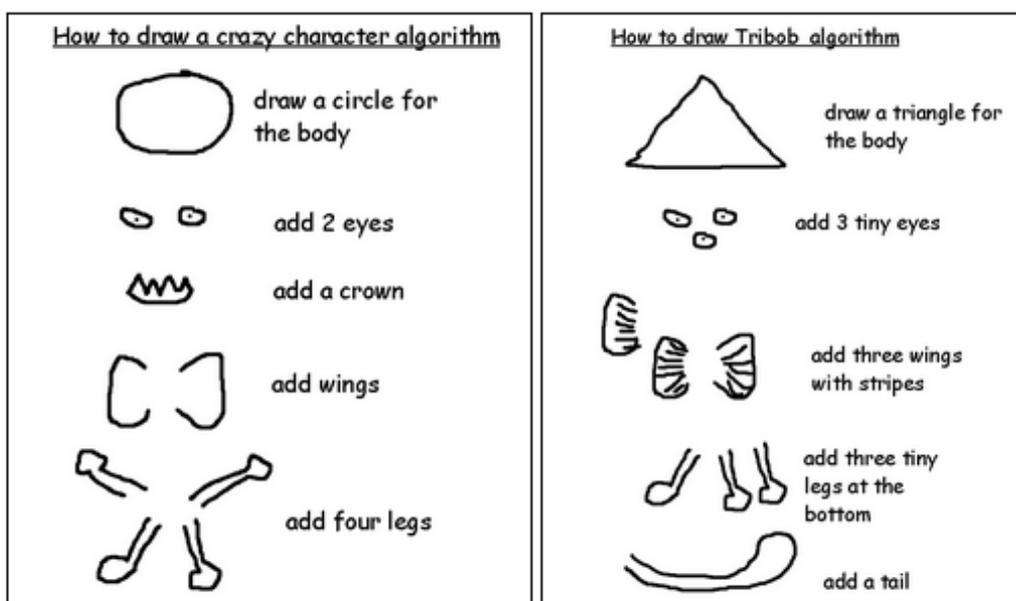
## Concepts and approaches

### Algorithms

Algorithms are the sets of instructions which pupils create for others to draw their characters.

### Decomposition

Decomposition is where pupils break down the task into steps, For example, do the body, then the eyes, then the legs and arms, then the extra bits.



Examples of the task, decomposed into steps to create an algorithm.

### Logic (predicting)

Predicting is when pupils think what will happen when their partner uses the algorithm to draw the character. They use previous knowledge about what happened already for steps like this. They make assumptions that the same kinds of thing will happen again and so predict. If they create more algorithms for new crazy characters they gain more knowledge and their predictions should be come more accurate. This is one aspect of logic.



## Debugging

Debugging is when pupils think what their algorithm should do, test it to find out what it does do, work out where it goes wrong and then fix it. For example when their friend draws the legs at the bottom of the body but they want them all around the body they might change their algorithm to two legs at the bottom, two legs at the top. In this activity, debugging is likely to involve adding greater precision to the language used in each step.

## Taking this further

The CS4fun website, Queen Mary, University of London has a range of related unplugged activities such as the ['Create a Face' activity](#).

## Related activities

[KS1 Sharing sweets activity](#)

[KS1 Spelling rules activity](#)

[KS2 2D shape algorithms](#)