



Junior computer science

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Coins

Computer Science Concepts

- Converting algorithm into code
- Reading a flow chart
- Repeat until control blocks
- Subtracting from a variable
- Converting user input into a variable
- Creating, inputting and deleting a list
- Pattern recognition
- Computational Thinking

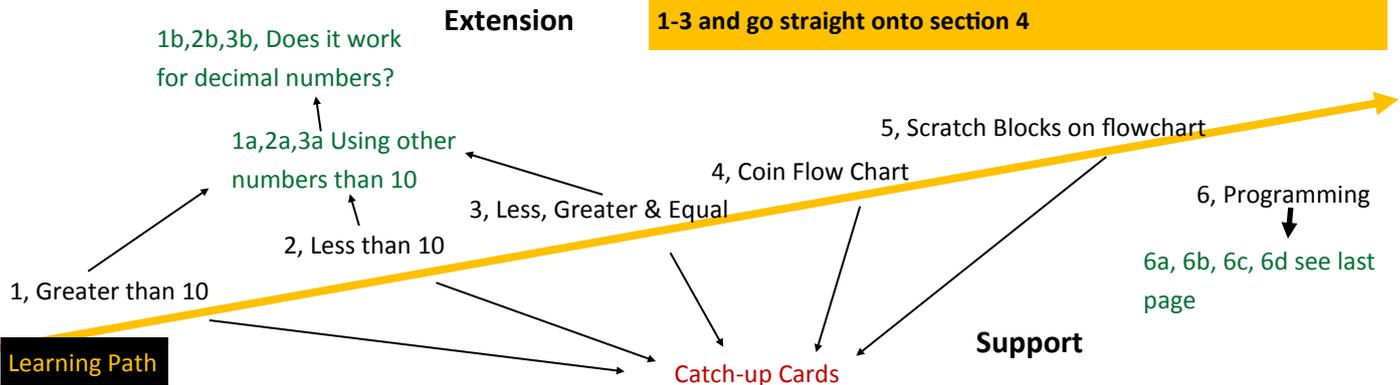
Program Aim Can the users create a program that calculates and records how many coins there are in a given number of pence

Maths Concepts

- Less than
- Greater than
- Subtracting multiples

Differentiation and Assessment for Learning This planning should be used alongside the *catch-up cards* supporting SEN pupils and the *extension cards* supporting the more able, although in this module a lot of the extension tasks can be given orally. At the beginning of each session the *learning intention sheet* is shared and the learning journey expanded through success criteria. Pupils feed their progress back to the teacher through annotating this sheet with smiley faces at the end of the lesson. Teachers can also annotate the sheet to indicate those who need more or less help in future lessons. These extra resources can be found on the code-it.co.uk website.

If your pupils are secure in understanding < and > you can skip 1-3 and go straight onto section 4



1, Greater than 10

Before you start explore < & > with numbers on the board
 Create this basic code
 Refer pupils back to the quiz where they used an if else conditional selection block before
 Test it out with a range of whole numbers by left clicking on the block

See extension challenges

```

ask Type in an amount to check if it is greater than 10 and wait
if answer > 10
  say join answer is greater than 10
else
  say join answer is less than or equal to 10
  
```

Note use of say without timings which will remain until another say command is used

```

if answer > 10
  say Hello! join hello is greater than 10
else
  answer
  
```



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Coins P2

2, Less than 10

Can they adapt the code to investigate less than?

You may wish to show them how to duplicate the block by right clicking on the top block and left clicking duplicate.

They can also right click on the symbol to change its meaning

2a, Less than other numbers

2b, Does it work if you input decimal numbers or make your test number a decimal?

```

ask Type in an amount to check if it is less than 10 and wait
if answer < 10
  say join answer is less than 10
else
  say join answer is greater than or equal to 10

```

```

ask Type in an amount to check if it is less than 10 and wait
if answer <
  say join ans is less than 10
else
  say join ans is greater than or equal to 10

```

```

ask Type in an amount to check if it is equal, less or greater than 10 and wait
if answer = 10
  say join answer is equal to 10
if answer < 10
  say join answer is less than 10
if answer > 10
  say join answer is greater than 10

```

3, Less, Greater & Equal

See if pupils can tell you what is wrong with our less than and greater than machines? The answer is that they don't check to see if something is equal to. Drag out the if blocks. Challenge pupils to adapt their code to check for < > and =. Does the order matter? (= needs to go first why? Checks first block then only goes to second if first condition is not met)

3a, Try other numbers than 10

4, Coin Flow Chart

Explain that we are now going to create a machine that chooses the largest coins possible to make from the pence inputted by the user. So if 15p was inputted it would work out that the best way to turn this into change would be a 10p and a 5p. Draw a very basic input and output machine on the board. Feed 450 into the machine and explain that the machine checks to see if it can take 200 away from 450. It can so it does. Draw a £2 coin next to the machine and explain that this was the 200 it took away which is the same as a £2 coin. Repeat this to subtract another 200 (£2 coin) when it can't take away another 200



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Coins P3

4, Coin Flow Chart Continued

It tries to take away 100 (£1 coin) when it can't do this it tries to take away 50 (50p) it can do this so draw another coin. The machine has worked out the largest coins you could change 450 into. You may need to work some more examples if pupils don't get this.

Sort pupils into mixed ability pairs. Hand out the part completed coin flow chart. Explain that this flow chart describes the coin sorting program.

Can pupils work out what to fill in for the three blank blocks? They are trying to spot the pattern.

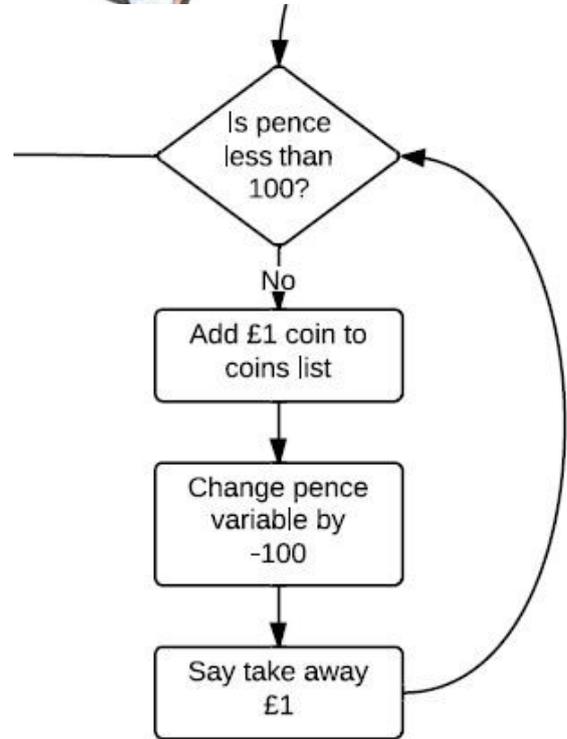
Check pupils answers and ask them to explain what the next pattern would be?

Answer

Add 50p to coins list

Change pence variable by -50

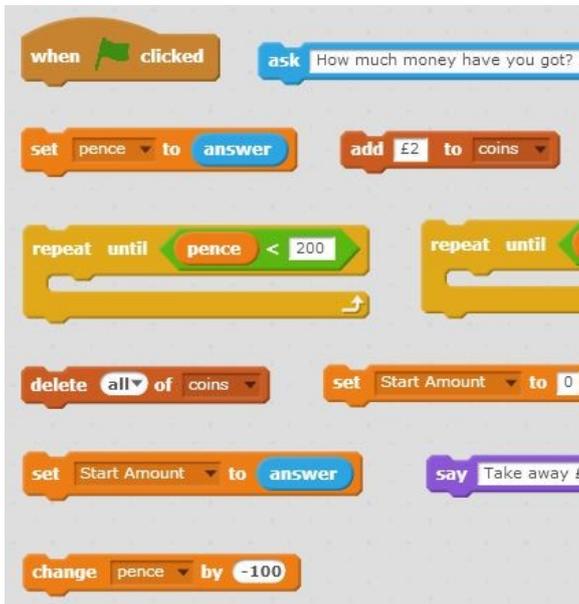
Say take away £50p



Computational Thinking

Many would say that pattern recognition is a computational thinking skill

5, Scratch Blocks to Flow Chart



Hand out the Scratch blocks sheet and explain that all the code can be matched to the flow chart blocks. Pupils need to cut out the blocks quickly and work in pairs to stick them onto the annotated flowchart. Use the example sheet to check the correct order. Some children can be thrown by the repeat until as this can seem quite different to is pence less than 100? Some will miss that some flow chart blocks are represented by two Scratch blocks. You may want to warn pupils that language will be different between flow chart algorithm and Scratch code. As they finish correctly let them move onto coding individually but continue to work in the same pairs.



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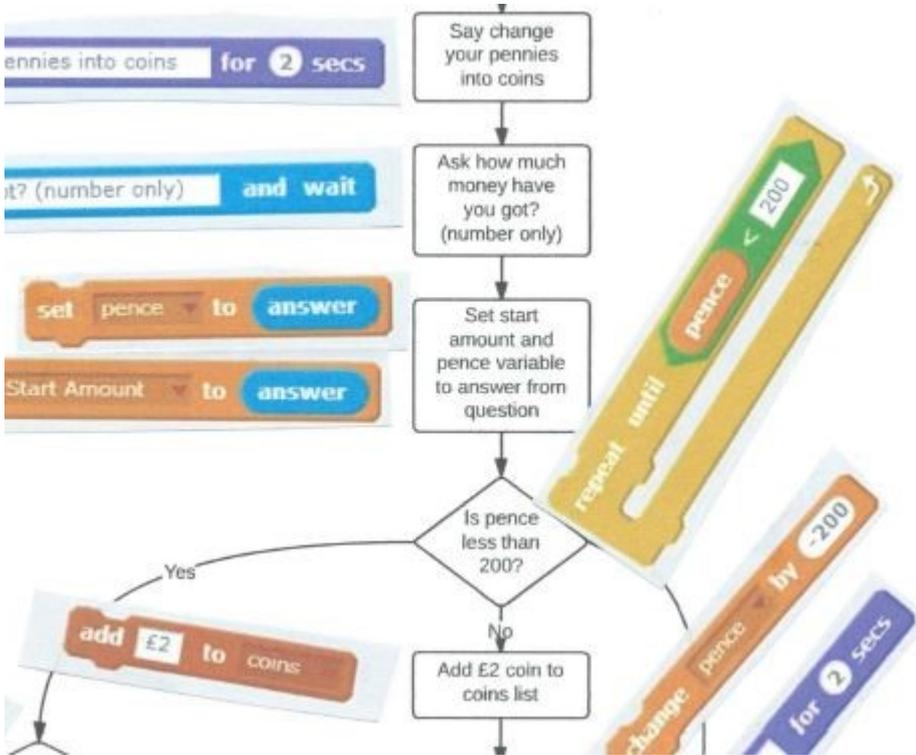
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Coins P4



```

when clicked
  set Start Amount to 0
  set pence to 0
  delete all of coins
  say Change your pennies into coins
  ask How much money have you got
  set Start Amount to answer
  set pence to answer
  repeat until pence < 100
    add £1 Coin to coins
    change pence by -100
    say Taking away £1 for 2 secs
  repeat until pence < 50
    add 50p to coins
    change pence by -50
    say Take away 50p for 2 secs
  repeat until pence < 20
    add 20p to coins
    change pence by -20
    say Take away 20p for 2 secs
  repeat until pence < 10
    add 10p to coins
    change pence by -10
    say Take away 10p for 2 secs
  repeat until pence < 5
    add 5p to coins
    change pence by -5
    say Take away 5p for 2 secs
  
```

6, Programming

The finished program will look like similar to this if pupils make mistakes (bugs) get them to check their annotated algorithms and see if it matches their programming. Get them to go through line by line with their partner.

6a, Can pupils adapt the program independently to add notes?

6b, Can pupils get the program to run continuously?

6c, Can pupils explain what is happening? They could video their explanations or record them as a comment. They could use coins to help them.

6d, Can pupils make a copy of their program and adapt it to convert foreign currency?

There is a 2p block here

```

repeat until pence = 0
  add 1p to coins
  change pence by -1
  say Take away 1p for 2 secs
  
```