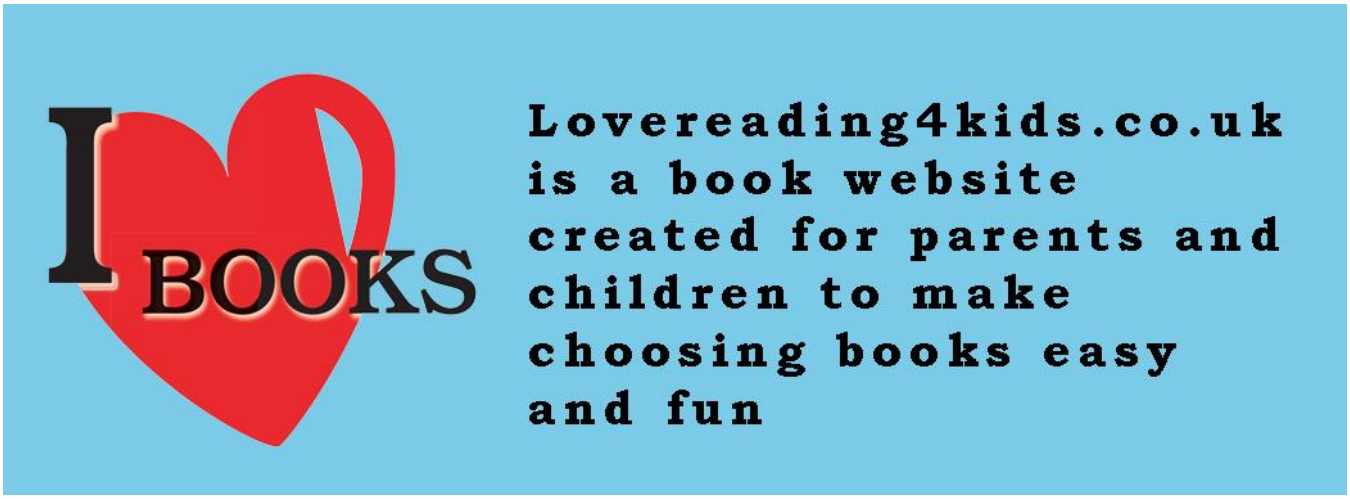


extracts from

Coding for Beginners

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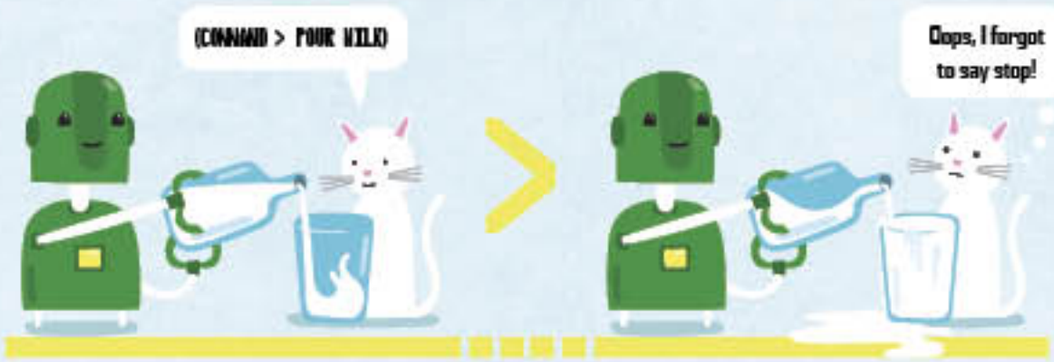
What is coding?

Coding means writing instructions for computers.
A finished set of instructions is known as a program.
If you learn to code, you can create programs of your own.

Being understood

For a program to work, it must be written in a way that the computer understands. That means breaking down all the instructions into clear, simple steps, and putting them into computer language.

WARNING!
Computers follow instructions blindly – they can't think for themselves. So everything must be spelled out clearly, leaving nothing out.



Computer language

Computer language is like ordinary language, but with a limited word list and precise rules about how to set things out.

There are many different computer languages, designed for different kinds of coding. These days, the first one most people learn is called *Scratch* – a language made especially for beginners.

Scratch is great for making games and animations – and for learning about coding in general.



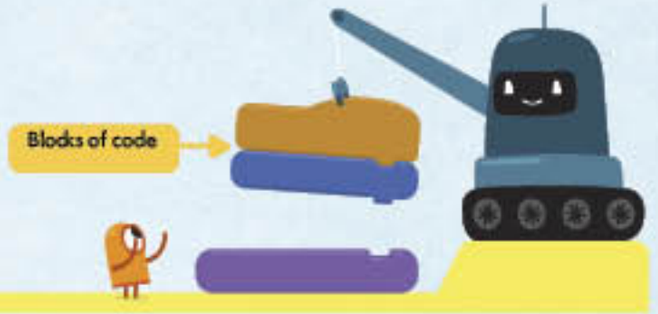


SCRATCH

Scratch is developed by the Lifelong Kindergarten Group at the MIT Media Lab. See http://scratch.mit.edu

Why choose Scratch?

Scratch was designed to be quick and easy to use. It allows you to build up programs by slotting together ready-made blocks of code.





Look out for boxes like this, which introduce **key words** and **ideas**.

About this book

This book will show you how to make the most of Scratch by creating animations, stories and games – along with lots of tips for writing your own code. All the examples are broken down into short, easy-to-follow steps.

Please follow the safety guidelines on the Quicklinks website when using the Internet.

Getting started

The simplest way to use Scratch is on the Scratch website. All you need is a computer (one with a keyboard – not a tablet) and an Internet connection.

Go to www.usborne.com/quicklinks and type in 'Scratch' for a link to the Scratch website and full instructions, as well as other useful coding resources. You will also find a link to finished, working code for all the programs in this book.







If you want to use Scratch offline (without being connected to the Internet), you can download the language and save it onto your computer. Just follow the instructions on the Usborne Quicklinks website.

Build a band

Use the **sounds** menu to assemble a band of sprites, then conduct them in a tune by clicking.

Setting a beat

1 Start a new project. Right-click on the cat in the sprite list and select **hide**.





2 Click on the **Sounds** menu and choose a **drum** block, followed by a **rest**. Select which kind of drum, and how long each block will play.

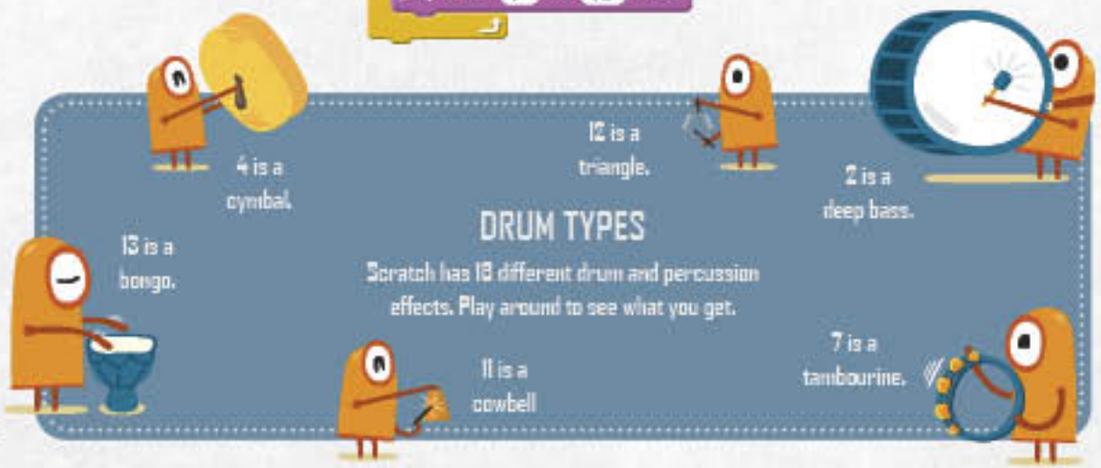


This number changes the type of drum. In Scratch, 1 is always a snare drum.

Length is given as a number of **beats**.

3 Build up a short sequence, like this. Then add a **forever** loop and **green flag** block, so it will keep going once you click the flag.





Adding instruments

You can add more sprites to play more instruments.

1 Choose a new sprite to be your musician.



Make sure the sprite is selected before you start its script.

2 Give it an **instrument** block and pick an instrument from the drop-down menu.



This number changes the instrument. 10 is a clarinet.
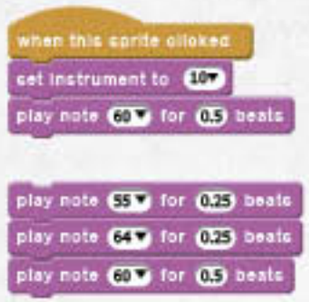
3 Instruments need to be combined with **note** blocks to make a sound. This controls which note will play, and for how long.



The higher the number, the higher the note.

4 Add a start block – **when sprite clicked** makes the instrument play when you click the sprite on the **stage**.

To play a tune, add more **note** blocks to make a sequence.



INSTRUMENT TYPES

Scratch has 21 instruments and musical effects. Here are a few to try...

2 is an electric piano.

4 is a guitar.

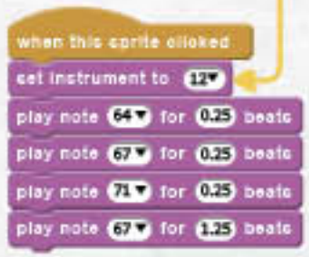
11 is a saxophone.

Now try adding more sprites to complete your band...

Start the drums by clicking the green flag. Then play the other instruments by clicking the sprites on the stage.
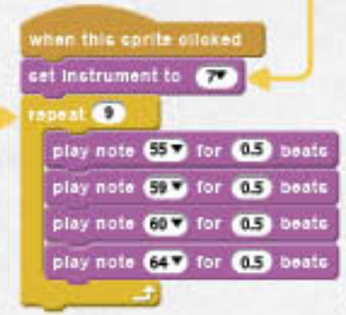


12 is a flute.



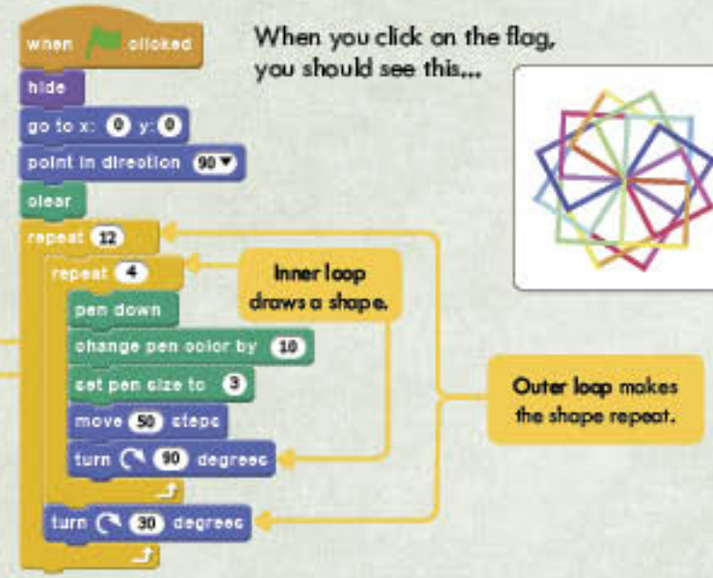
Place a **repeat loop** (from the **Control** menu) around the notes, if you want to play a sequence over and over again.

7 is a pizzicato (plucked string).



Shape patterns

To draw a shape again and again, so it makes a pattern, you can remove the **wait** block and add an extra loop, like this.



You can add a **change colour** block for a multicoloured effect.

Change the line thickness with the **set pen size** block.

Inner loop draws a shape.

Outer loop makes the shape repeat.

When you click on the flag, you should see this...

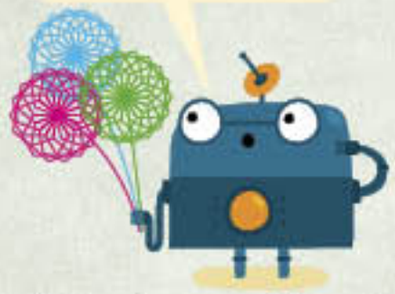
Changing the numbers of repeats and turns can create very different patterns. Experiment and see what you get.

1 Outer loop: **repeat** 10, **turn** 36
Inner loop: **repeat** 3, **turn** 120



Replace **change pen colour** with **set pen colour** to draw in a single colour.

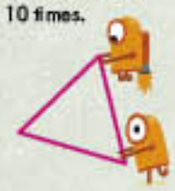
If the outer repeat and turn values multiply to make 360, the pattern will go all the way around. (360 degress is a circle.)



2 Outer loop: **repeat** 45, **turn** 8
Inner loop: **repeat** 3, **turn** 120



This triangle repeats 10 times.



3 Outer loop: **repeat** 12, **turn** 30
Inner loop: **repeat** 10, **turn** 36



Shape sliders

You can use variables to create slider controls, to make changing the shapes quicker and easier.

1 Go to **Data** and select **Make new variable**, 'For all sprites'. Create two new variables: **shapes** and **sides**. Make sure the boxes next to the new variables are ticked, so they appear on the stage.



This will decide how many shapes you get in a pattern.

This will set the number of sides in each shape.

2 Replace the value in the *outer* **repeat** loop with a **shapes** variable, and the one in the *inner* **repeat** loop with a **sides** variable.

3 In the **turn** blocks, replace the values with **divide** blocks (from **Operators**).

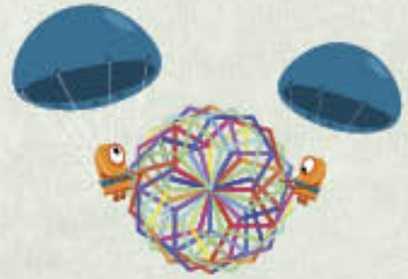
Make the *inner* **turn** 360 / **sides**. Make the *outer* **turn** 360 / **shapes**.

In the **move** block, replace the value with **500 divided by sides**. This makes the shape stay a reasonable size, no matter what you do with the variables.



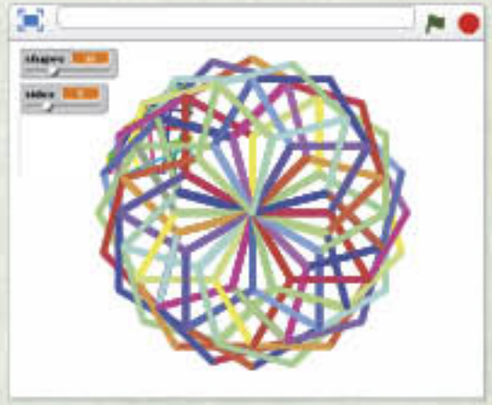
This makes sure each shape joins up.

This makes the shapes repeat all the way around.



4 On the **stage**, right-click on each variable and select 'slider'. Right-click again to 'set slider min and max'. This makes the sliders easier to use.

Now you can play around with patterns by moving the sliders and clicking the green flag, instead of changing your code.



For the sliders, set shapes to 1-100, and sides to 3-20 (you can't have a shape with less than 3 sides).