Random numbers and simulation

What are random numbers and simulation?

If something is **random**, it happens by chance, or without any pattern. This makes it impossible to predict. By using random numbers to control certain properties in your program, you can make things less predictable and more interesting.

A **simulation** is a computer program which models something from real life. This is useful when we need to test how something might work, or to practise a skill without taking any risks. For example, a flight simulator is a complex computer program that allows pilots to train without putting anyone in danger.

What you'll build

In *Level 5 - Random numbers and simulation*, you'll do the following:

Generate random numbers to control the speed in a racing game.

Make a caterpillar move in random directions and appear in random places.

Try to get a tortoise to cross a road safely with traffic moving at random.

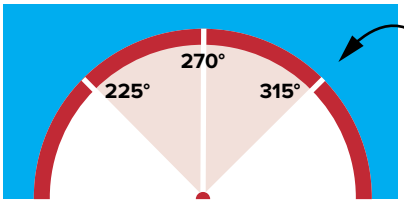
Set random directions within a specific range to simulate a ball bouncing.

Your blocks

You can use random numbers to control properties like the speed or direction (heading) of an object.

The heading is the direction that the object travels in.

The code must include a **range** from which a random number can be generated.



To set a range for the heading of an object, you use degrees of turn on the stage.

You can also place an object in a random position on screen. The position uses the x and y coordinates of the stage.

Random numbers and simulation

Can you choose the correct meaning for each term?

Simulation	A set of numbers to choose from when assigning a random value
Random	Something about an object that can be represented by a number
Range	A computer program which represents something in the real world
Object property	Something that happens by chance rather than being planned

Free code challenge

Create a simulation of a natural environment, showing the creatures that live there. Add some random elements to the make the scene more interesting. You could make an underwater scene which is different each time you run the program, with fish and other sea creatures moving in random directions and at random speeds. Or design a garden, with bugs that change directions every few seconds, or whenever they are clicked on. Use the space below to plan your app.

Randomness

Sometimes we want the computer to pick something at random from a finite set of options. Computer programmers must assign a number to each option, then tell the computer the range from which to generate a random number.

Circle the best number range for each event.

Shooting stars

At the start, the star moves at a random speed.

Penalty kick taker

When the *shoot* button is clicked, the computer shoots the ball in the direction of the goal.

Virtual rock, paper, scissors

When the *play* button is clicked, the computer selects either rock, paper or scissors.