Loops

WHAT ARE LOOPS?

Just like the name implies, loops go round and round! In coding, there are often tasks that require doing something, or checking something, again and again. Loops are perfect for these tasks because they are essentially pieces of code that contain instructions that repeat. Because computers don't care if they have to keep doing something over and over, it is easier to give the job to them!
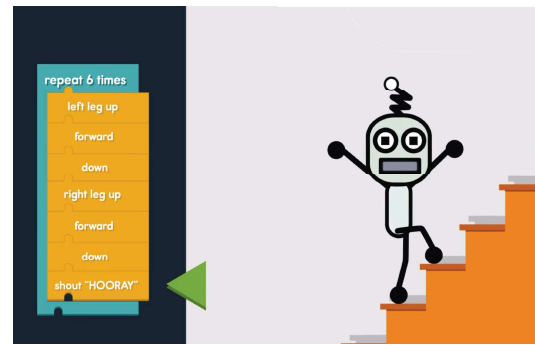
THE LOOPS VIDEO

The loops video introduces loops and uses an example of instructing a robot to walk up the stairs. The first time it is done without a loop and the second time it is done with a loop.
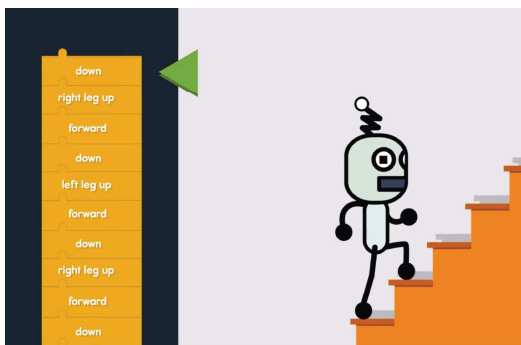
(0:53) 1st time. Over and over again we have to code 'left leg up, forward, down'.

(2:04) 2nd time. We put 'left leg up, forward, down' into a loop just one time! We also added hoorays for fun!

TAKE AWAYS:

- Loops are instructions that repeat!
- Loops can save you coding time and can keep things more organized.
- Loops are instructions that repeat! (see what we did there?)

Activities

Counting Loops

Loops are great to use when an action is repeated over and over again or when we need to tell a computer how many times to repeat an action! Think back to the sequence learners created for Lesson 3: Sequence (check out the lesson to see how!). Let's say, for example, their sequence was about brushing their teeth.

Have learners go over the steps of their sequence. Ask them, "Are there any steps that repeat?" In the bushing teeth example, the learner could express that they need to rinse their mouth multiple times at the end of the sequence. Have them choose an action that repeats in their sequence before moving on to the next step.

Breaking it Down

Make sure learners have a way to write down their ideas for this activity! The goal of this activity is for learners to write out the actions that repeat, in the form of a loop. Using the learner's chosen repeating action, ask learners how many times the action needs to be completed. Then have learners write each instance of the action on an individual line. In the teeth brushing example, we might say we rinse our mouths 3 times at the end. It would be written as follows:

Rinse mouth
Rinse mouth
Rinse mouth

Explain that this is what a task can look like before we use loops. Have either the learner or yourself write down the word 'repeat'. If needed, take some time to explore what the word repeat means. Ask learners what the action is that needs repeating, then add it below the word repeat, as follows:

Repeat
Rinse Mouth

Ask learners, "How many times does your action repeat?" Have them add that number to the right of the word 'repeat'. The teeth brushing example would be:

Repeat [3 times]
Rinse Mouth

You've just created a loop! Have learners compare how they originally wrote the actions down in comparison to the loop they created and ask them why they think loops might help them save time. Mention the example in the video of the robot walking up the stairs.

Activities

Conditional Loops

There are loops that repeat actions until a new condition is met! These are called conditional loops.

Have learners pretend they are computers, and have to follow a set of instructions given to them. Write out, or explain, the actions they will have to follow. You may create your own or use the following example:

Repeat [Forever]

Turn left 180
Clap
Turn right 180

Tell learners we want this to be a conditional loop; we need to know when to stop! Ask them, "How can we change 'repeat' so it tells us when to stop?" Have learners think about a condition they want to use that, that when completed, will tell them to stop the loop. In our example, the condition is met when the learner hears the instructor clap:

Repeat [Until you hear instructor clap]

Turn left 180
Clap
Turn right 180

You've just made a conditional loop! Remind learners that conditional loops tell computers to perform an action until a condition is met.

Song Lyrics

What are loops?
They are instructions that repeat
What are loops?
They are instructions that repeat
What are loops?
They are instructions that repeat
What are loops?
They are instructions that repeat

Computers love to repeat things
And they never get bored!
Loops tell them what to repeat
And repeat some more!

And loops will also help
To save a lot of time
By repeating many things
So you don't have to keep writing
Line after line, after line, after line, after line

Now let's say you got a robot friend here
And you want to teach it to climb the stairs
You can't just say "go climb those stairs!"
Cause it's not gonna know what to do when it's there

So you gotta be specific, give it a try:

Left leg up, forward, down
Right leg up, forward, down
Left leg up, forward, down
Right leg up, forward, down
Left leg up, forward, down
Right leg up, forward, down
Left leg up, forward, down
Right leg up, forward, down
Left leg up, forward, down
Right leg up, forward, down
Left leg up, forward, down
Right leg up, forward, down

I did it!

Well that's all good, the robot got to the top
But hold on a minute, that's right stop!
You said a lot of the same things again and again
Is there a better way to say everything?

Yes there is, that's where a loop comes in,
Ah thanks loop, what a great friend!
Instead of writing everything many many times
You put it in a loop and write it one time

Set up a loop, put the stuff inside
Then there's only one thing left to decide
That is to tell the loop how many times to repeat
Yep that's it, the loop is pretty much complete

So let's return to our robot climbing the stairs, OK
We got the steps in a loop And soon it's on it's way
But let's add other stuff in the loop for fun today
How about we get the robot to shout hooray!

Alright, let's run the loop and see what happens!

Left leg up, forward, down
Right leg up, forward, down, hooray!
Left leg up, forward, down
Right leg up, forward, down, hooray!
Left leg up, forward, down
Right leg up, forward, down, hooray!
Left leg up, forward, down
Right leg up, forward, down, hooray!
Left leg up, forward, down
Right leg up, forward, down, hooray!
Left leg up, forward, down
Right leg up, forward, down, hooray!

Chorus