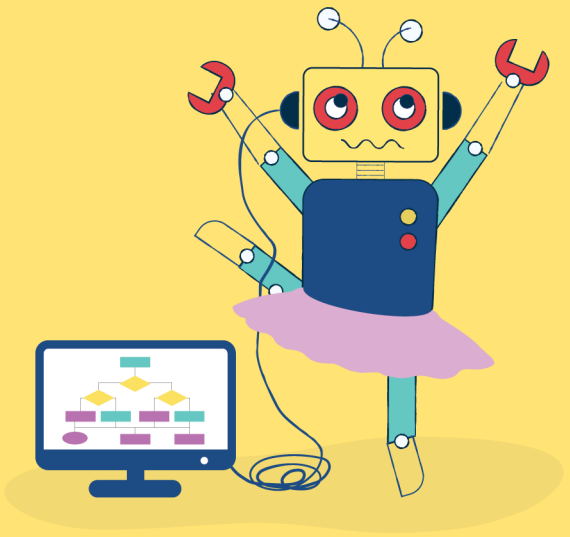
ALGORITHMS

An algorithm is a set of directions – like a recipe! When a software engineer writes a computer program, she is writing a set of directions for a piece of hardware (a machine, like a computer) to follow. The directions must be very precise and be followed in a particular order. Help children understand this concept by learning to give and follow directions.



Countdown to Coding

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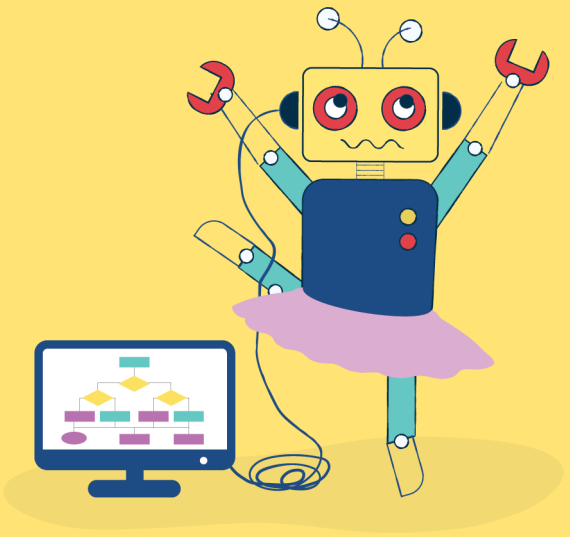

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"How to Code a Sandcastle"
By Josh Funk

"The Little Red Hen"
By Paul Galdone

"Pout Pout Fish"
By Deborah Diesen

"Pete the Cat: I Love My White Shoes"
By Eric Litwin

"Knuffle Bunny"
By Mo Willems

Activities

Sing: *Five Little Monkeys Jumping on the Bed*

Sing: *The Ants Go Marching*

Write: A plan or itinerary for your day

Write: A set of directions

Read: Recipes together

Read: Books with a beginning, middle, and end

Play: Simon Says

Play: Board games that involve following directions

Talk: About what you did today

Talk: Retell stories that you read together

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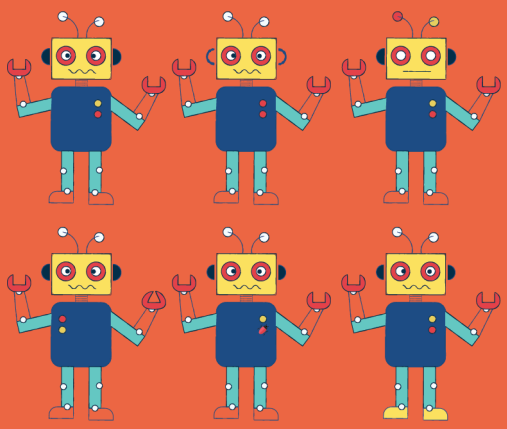
Countdown to Coding

PATTERNS

Patterns can be simple (two things that repeat themselves over and over, AB AB AB), or really complex . Being able to recognize when a pattern is occurring and identify that pattern is an important component of computer science. Patterns help us predict what will happen next. Being able to identify patterns in shapes can help children better identify letters, and recognize patterns in sounds, which helps children develop phonological awareness. Pattern recognition is also an important math skill.



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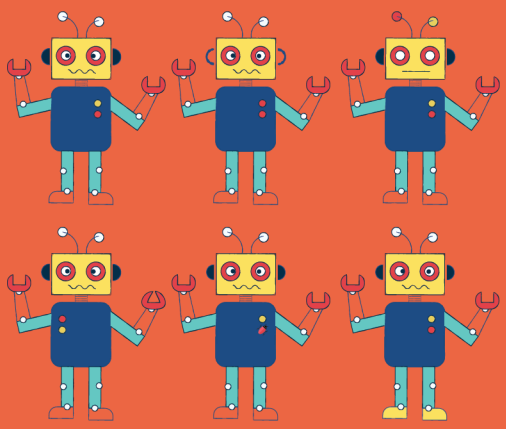

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"Pattern Fish"
By Trudy Harris

"I Dream of an Elephant" and

"Big Cat, Small Cat"
By Ami Rubinger

"Polar Bear's Underwear"
By Tupera Tupera

"Teddy Bear Patterns"
By Barbara Barbieri McGrath

Activities

Sing: *Head, Shoulders, Knees and Toes*

Sing: *The Hokey Pokey*

Read: Books with visual patterns

Read: Books where children can complete the rhyme

Play: Make patterns out of beads, cereal, felt pieces, etc.

Play: Sort the laundry together and make patterns with socks or other pieces of clothing

Write: Draw patterns together

Talk: About patterns you spot in nature or during your daily routine

Talk: About days of the week, months of the year, and special days that occur in a pattern—like birthdays!

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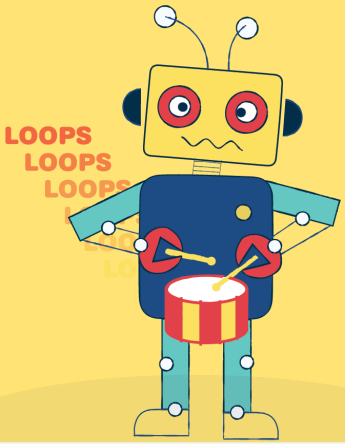
Countdown to Coding

LOOPS

Repetition, or looping as it's called in computer science, is an important part of computer programming. A programmer can make her program more efficient by telling a computer to perform the same function eight times in a row, rather than write out the same series of commands eight times – this is called a loop. Understanding repetition helps young children learn this skill early. Try using the words loop and repetition when discussing this concept with your child.



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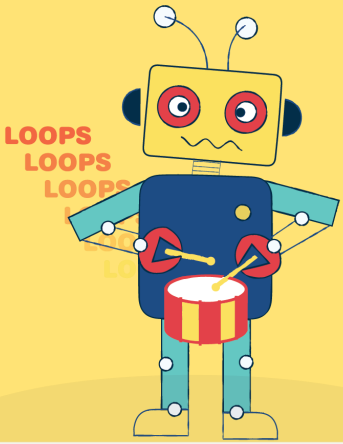

Books

"There Was an Old Lady Who Swallowed a Fly"
By Simms Taback

"The Jacket I Wear in the Snow"
By Shirley Neitzel

"Monster Boogie"
By Laurie Berkner

"Brown Bear, Brown Bear, What Do You See?"
By Bill Martin

Activities

Sing: *Songs with repeated choruses*

Sing: *Songs with movements that repeat*

Read: Books with phrases that kids can say with you

Read: Books where something happens over and over again

Write Loops when you find them

Play: Games that involve doing the same task several times

Play: Games where you take a "loop" around a game board

Talk: About routines and things you do every day and use the word "loop" to describe something that repeats

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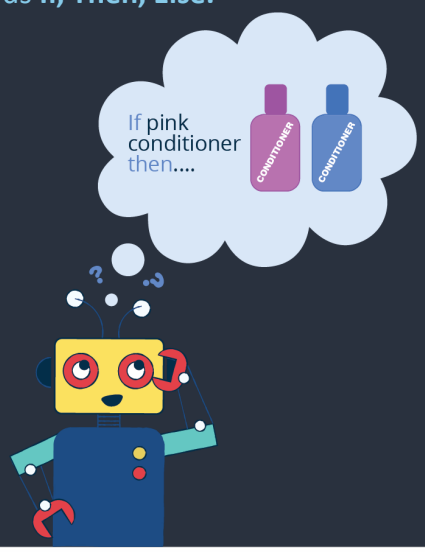
CONDITIONALS OR IF/THEN/ELSE STATEMENTS

Conditionals, or if/then/else statements, are a fundamental component to computer science – they are how a programmer tells the program when to make a choice between two or more options. You can help children learn computer science by framing choices as conditionals and using if/then statements. Have them practice making choices. Use the words **If, Then, Else.**



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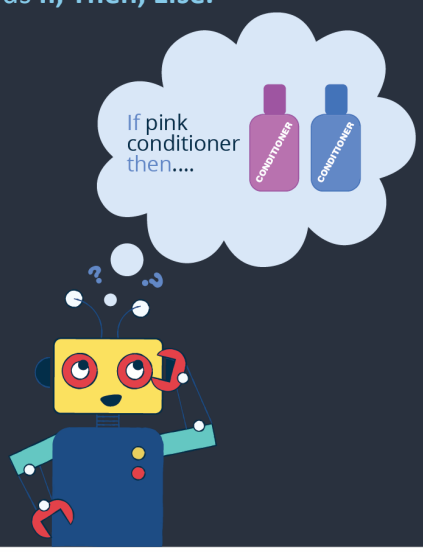

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By Laura Numeroff

"A Good Day for a Hat"
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"What If Everybody Did That?"
By Ellen Javernick

"Hello World: Weather"
By Jill McDonald

"What If?"
By Laura Vaccaro Seeger

Activities

Sing: *If You're Happy and You Know It*

Sing: *Let children choose a song to sing—let them practice making choices*

Read: Books about making choices

Read: Books about the weather

Write A decision-tree or flow chart with different choices

Talk: Discuss making choices and consequences of choices

Talk: About what to wear today, based on the weather conditions

Play: Dramatic or pretend play where children must make decisions and work together

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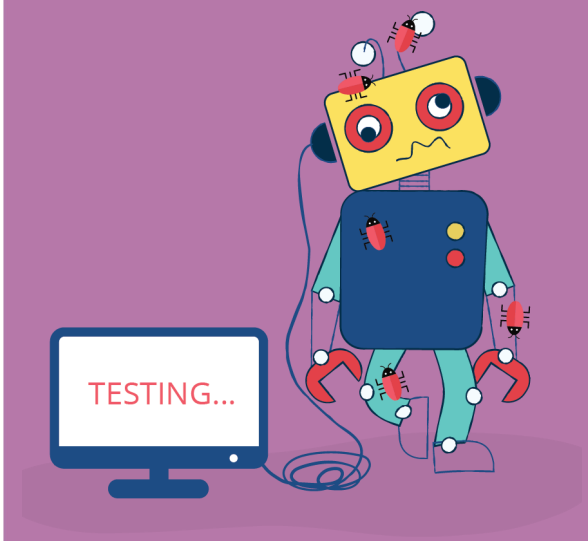
TENACITY OR TESTING

Computer programs rarely work on the first try. Often, programmers need to re-trace the steps of their code to find out where they went wrong and how they can fix it. To develop this skill, children need to learn that failure is part of learning, and that it's important to review your work and figure out how to fix your mistake.



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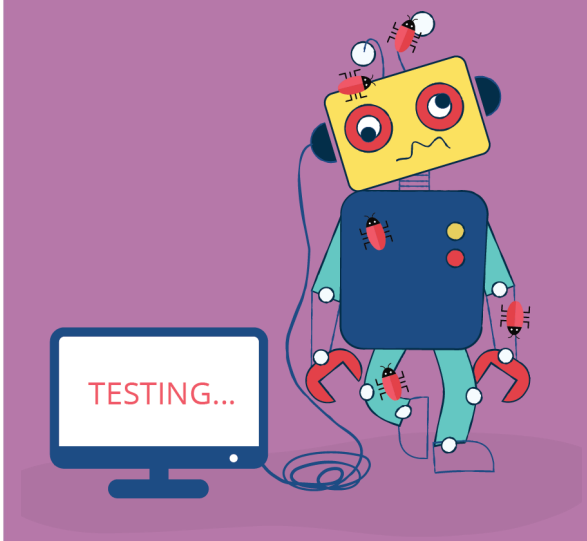

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Activities

Sing: *Practice playing musical instruments*

Read: Books where characters have to fix a mistake

Read: Books where failing is normal

Write A plan and then revise it—show how to go back and make adjustments

Talk: About what to do if you make a mistake

Talk: About the concept of a "bug"

Play: With puzzles

Play: Tinker with old gadgets or broken machines

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