

**Computational Thinking
and Little Learners**

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Suddenly It Clicks!

Welcome!

As we get settled, here is a task for you:

Decode the message!

GSV KILXVHH LU
WVXLWRMT XZM YV
WRUURXFOG. SLD WRW
GSRH GZHP XSZMTV ZH
BLF DLIPVW?

Suddenly It Clicks!

Thinking strategically about this...

Decode the message!

GSV KILXVHH LU
WVXLWRMT XZM YV
WRUURXFOG. SLD WRW
GSRH GZHP XSZMTV ZH
BLF DLIPVW?

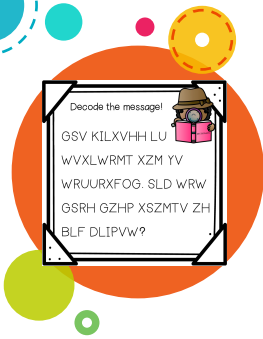
Is it English?

Look for frequency of letters (often vowels)

Look for 1-letter words (usually a or i)

Consider context
Is it likely about quilting or sky diving?

Look at punctuation.
(A sentence ending with a "?" usually starts with a "question word" like "how", "can" or "who")



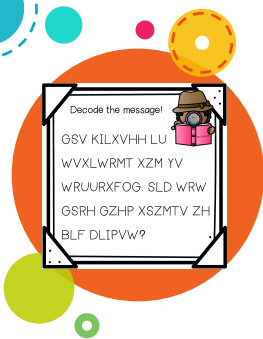
Decode the message!

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REVERSE ALPHABET ↩

A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N

N O P Q R S T U V W X Y Z
M L K J I H G F E D C B A

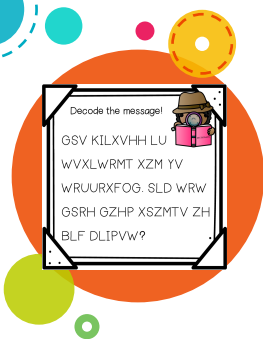


Decode the message!

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Decoded!

The process of decoding can be difficult. How did this task change as you worked?



Decode the message!

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Computational Thinking was at work here!

CT

Computational Thinking

What does it mean, why does it matter, and what does it look like with learners ages 3-8?

Defining Computational Thinking

Computational thinking is a thought process used to formulate a problem and express its solution or solutions in terms a computer can apply effectively
<https://bit.ly/ISTECT>

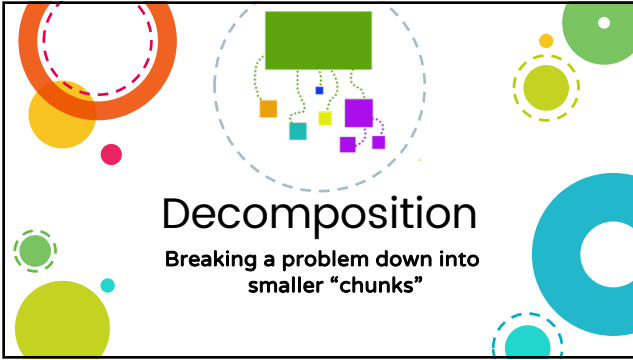
Computational thinking is a focused approach to problem-solving, incorporating thought processes that utilize abstraction, decomposition, algorithmic design, evaluation, and generalizations" (Selby and Wooland, 2013).

Computational thinking (CT) is a creative way of thinking that encourages young children to be systematic problem-solvers who can identify problems and generate step-by-step solutions that can be communicated and followed by computers or humans.
Gail Lovely <https://bit.ly/CTLovely>

Suddenly It Clicks!

<https://bit.ly/ctexamples>

Add your ideas here



Decomposition
Breaking a problem down into smaller "chunks"



What do we REALLY mean when we tell students to get ready to leave for the day?



<https://bit.ly/dismissaltasks>



Decomposition

Beebot – an almost perfect starting robot

<https://www.terrapinloop.com/bee-bot-ss.html>


Decomposition

How to introduce a robot to learners...


Ask:

- What is a robot?
- What do you notice?
- What might we make it do?

<https://www.terrainlogo.com/bee-bot-ss.html>




Decomposition



<https://bee-bot.terrainlogo.com/>

Decomposition

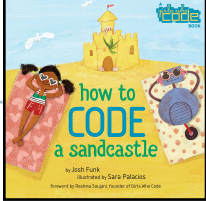
7	13		8	
		5		11
3	12		4	
	14	9		10
		6		
2		1	15	

Bee-Bot Mystery Number

FFRBLFFRFLFLFFFRBRFF


Decomposition

Designed for teaching Decomposition



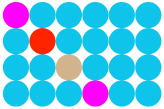
Available in English, Simplified and Complex Chinese, Korean, Russian, and Vietnamese

Decomposition

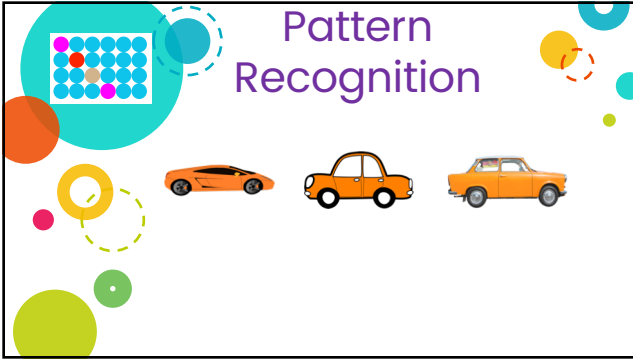


The skill/process of breaking "things" down into smaller "pieces" or looking at processes as multiple steps is key to SO many things in life and learning.

Pattern Recognition

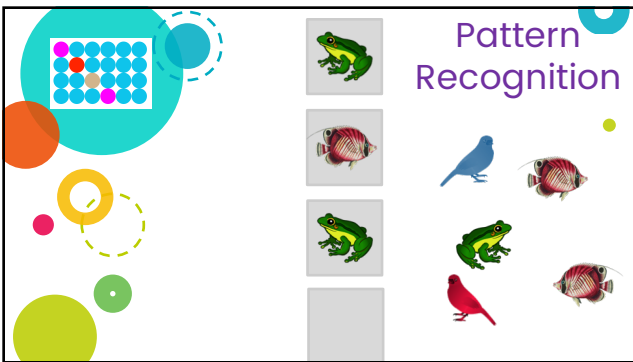


Making connections between similar problems and experience or finding patterns and testing them.
Not just ABABAB...



Pattern Recognition

A 5x5 dot grid with colored dots in a pattern. Below it are three cars: a red sports car, a yellow car, and a yellow car.



Pattern Recognition

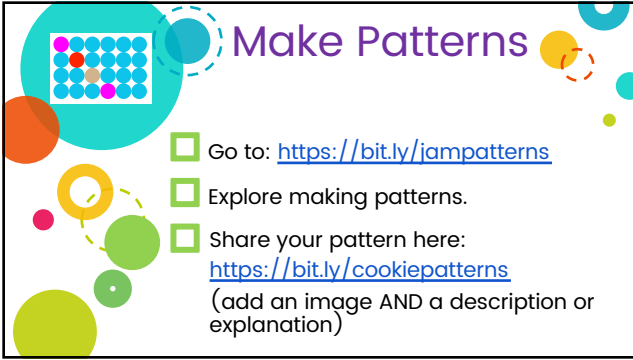
A 5x5 dot grid with colored dots in a pattern. Below it are several animal icons: a green frog, a blue bird, a red fish, a yellow frog, a red bird, and a red fish.



Make Patterns

Start with real objects:
crayons, shoes, toy vehicles,
clipart

More complex items:
photos, books, sounds,
foods, animals, actions,
stories, songs...



Make Patterns

- Go to: <https://bit.ly/jampatterns>
- Explore making patterns.
- Share your pattern here: <https://bit.ly/cookiepatterns>
(add an image AND a description or explanation)



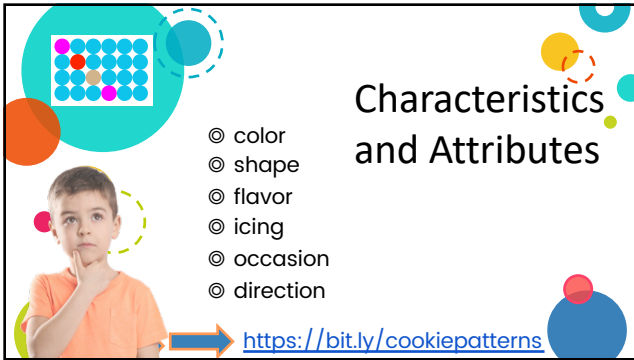

What sorts of thinking did you do?

<https://bit.ly/cookiepatterns>



Make Patterns

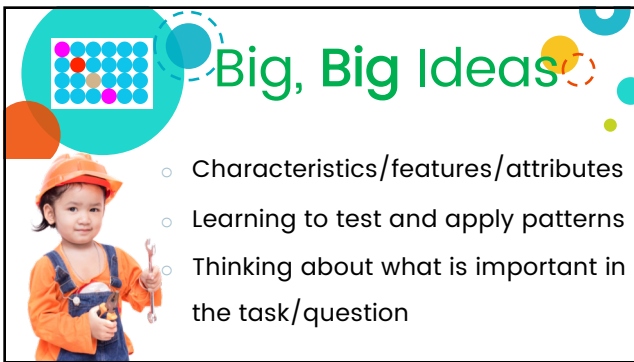
- Another Tool: Book Creator
- Explore making patterns.
- <https://bit.ly/makingpatternsbook>



Characteristics and Attributes

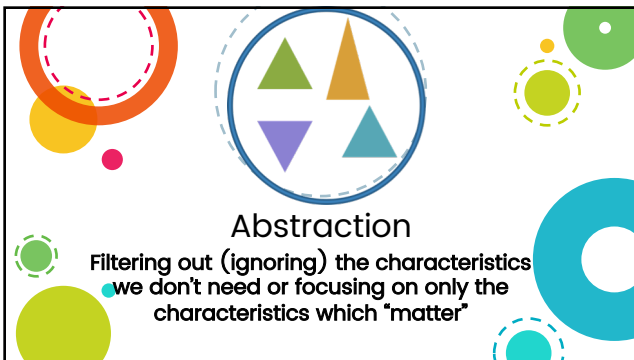
- ⦿ color
- ⦿ shape
- ⦿ flavor
- ⦿ icing
- ⦿ occasion
- ⦿ direction

<https://bit.ly/cookiepatterns>



Big, Big Ideas

- Characteristics/features/attributes
- Learning to test and apply patterns
- Thinking about what is important in the task/question

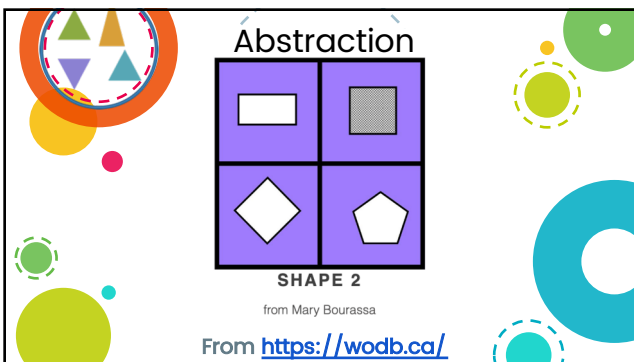


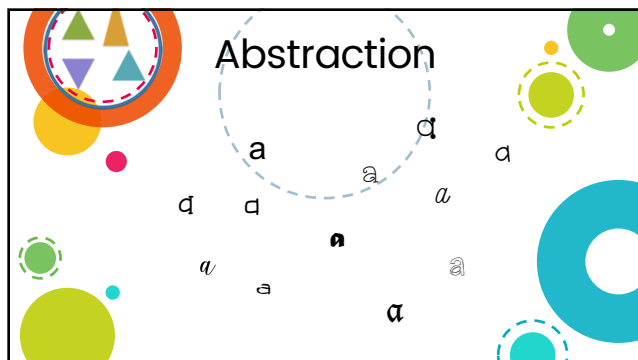
Abstraction

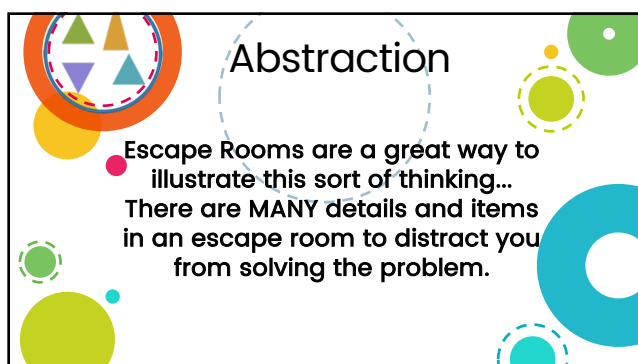
Filtering out (ignoring) the characteristics we don't need or focusing on only the characteristics which "matter"

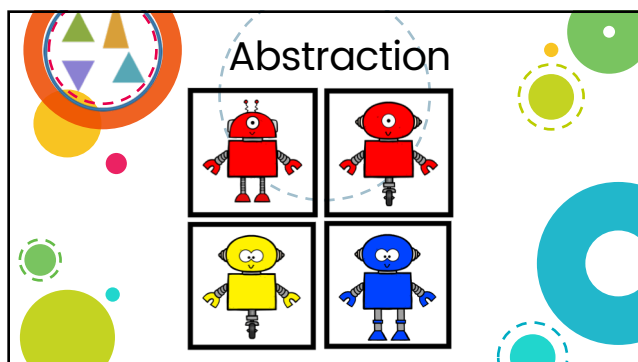










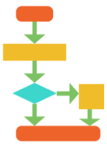


Abstraction



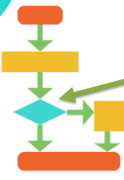
<https://www.youtube.com/watch?v=Qu0H6h2AbYc>

Algorithms

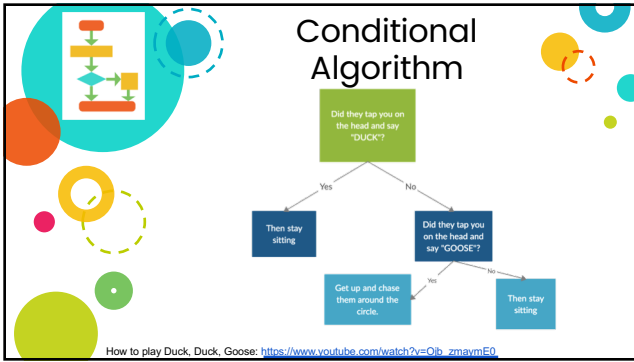


A precise set of steps which leave as little as possible to the imagination... simple enough for a computer or robot to follow.

Conditional Algorithm



Within an algorithm we often have *conditionals*. These are action(s) that occur if something specific happens. (if THIS, then THAT)



Books with maps, paths, and decisions can provide opportunities to explore algorithms and practice algorithmic thinking

<https://bit.ly/CTjamsandwich>



Thoughts to share...

<https://bit.ly/ctexamples>



We do it for
our future
and
theirs!



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Thank you!

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Suddenlyitclicks.com

Tools Used or Mentioned

Bit.ly <https://bit.ly/> (free)
creates short links and QR Codes, customizable, trackable
case sensitive

Padlet <https://padlet.com/> (free/paid)
Creates interactive "websites", can be password protected,
etc.

Jamboard <https://jamboard.google.com/> (free)
Collaborative "white board"

Book Creator: <https://bookcreator.com/> (free/paid)

Beebot Emulator: <https://beebot.terrapinlogo.com/>

Suddenly It Clicks! <https://www.suddenlyitclicks.com/> (free)
Gail's Website, many resources there

