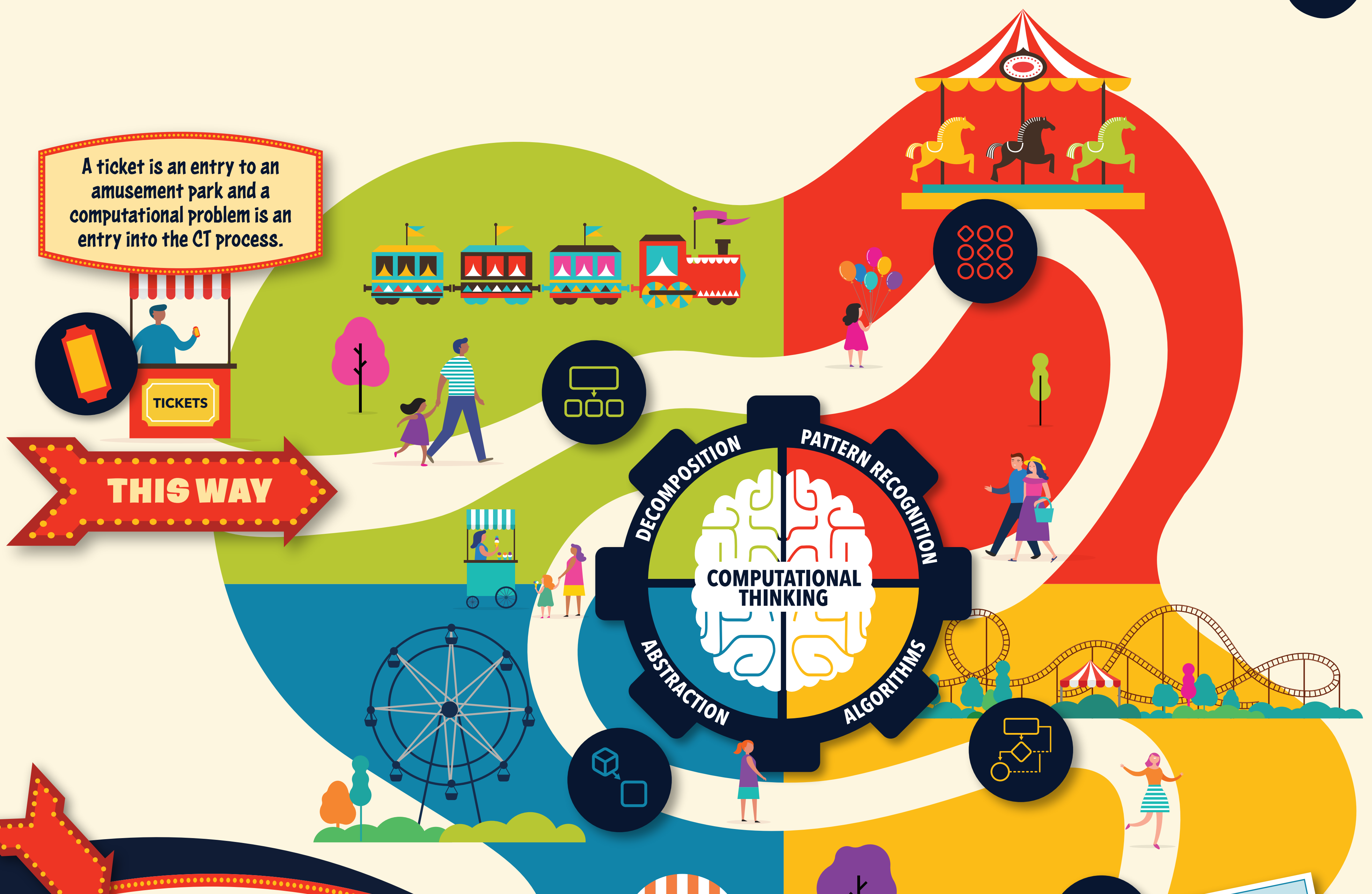
A Computational Thinking Process for Problem Solving

A ticket is an entry to an amusement park and a computational problem is an entry into the CT process.



Like a commemorative photo, a CT artifact illustrates your experience through the CT process.

Start by identifying a **computational problem.**

Think about:

Could it have multiple solutions?

Is it a problem that includes collecting data or using a data set?

Is there an opportunity to create a procedure (algorithm)?

Decompose the computational problem you identified to:

- Help you better understand the problem.
- Create sub-parts.
- Reveal assumptions or missing information.
- Identify where you can use CT elements to address sub-parts.
- Help organize your next steps.

Use **pattern recognition** to address your computational problem by:

- Collecting data or using an available data set.
- Analyzing the data.
- Representing the data (table, charts, graphs).
- Identify patterns.

Use **abstraction** to simplify complexity and generalize findings

- Abstractions relate to your computational problem.
- Pattern recognition and abstraction go hand-in-hand.

Design an algorithm to address your computational problem. Your design can be a flow chart, decision tree, pseudo code or other approach.

- First, establish a set of procedures.
- Then, have others follow your procedures.
- Finally, others should arrive at your expected results consistently.

  (If others get unexpected results, you will need to modify your design or procedures.)

Create your **computational artifact.** It, much like an assignment's final report, showcases how you addressed and solved your computational problem.

DEFINITIONS KEY

Computational problem
Computational problems are open-ended and may be real-world, but they must include data and an algorithm.

Problem decomposition
Breaking down (unpacking) your computational problem into more manageable parts.

Pattern recognition
Collecting data or identifying a data set (numerical, text, audio, video, images or symbols) and analyzing it to find similarities, differences or trends.

Abstraction
Reducing complexity by filtering out non-relevant information. This can simplify problem solving and helps create a general idea of the computational problem.

Algorithm design
Developing a procedure (algorithm) that can be replicated by humans or computer; includes testing and redesign if the outcome is not what is expected.

Computational artifact
This can be a program, image, recording, video, presentation, webpage or anything else you can make using a computer.

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