Candy Bar Activity

Exploring Computer Science

Unit 2 – Day 3

Standard 2 – Problem Solving

Objective 1:

Students will be given opportunities to become "computational thinkers" by applying a variety of problem-solving techniques as they create solutions to problems that are situated in a variety of contexts. They will:

a. **List and explain the steps they use in solving a problem.**

b. **Solve a problem by applying appropriate problem-solving techniques.**

c. **Communicate an algorithm to others.**

d. **Determine if a given algorithm successfully solves a stated problem.**

Directions

Open the Unit 2 Day 3 Worksheet. Complete the worksheet as you view this PPT.

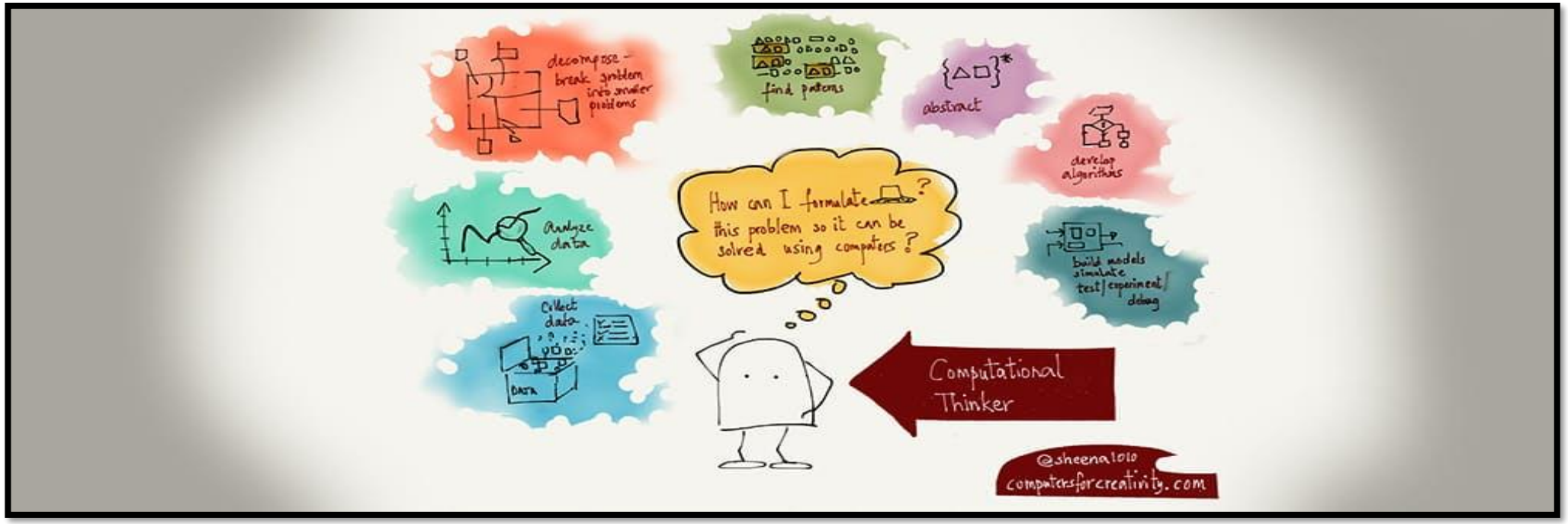
Dropbox the worksheet when you are finished.

Computational Thinking

Computer science is the study of **computation— what can be computed and how to compute it**.

Computational thinking thus has the following characteristics:

A computational thinker is one who collects data and analyzes it to understand the problem. That person then decomposes (breaks it down) into simpler problems. Instead of solving only that problem, you look for patterns, remove details and abstract so you can solve all problems of that type. You define the steps to solve the problem (the algorithm) and if possible, build a model to simulate, test and debug the solution.



From: https://www.edsurge.com/news/2016-08-06-what-s-the-difference-between-coding-and-computational-thinking

The Problem-Solving Process

1. Understand the problem
   a) Read or listen to the problem statement
2. Make a plan to solve the problem
   a) Use pictures, charts, graphs, systematic lists, objects, or act out the solution to help you devise a plan to solve the problem. In Computer Science we call this plan an **algorithm**.
3. Carry out the plan
   a) Once the plan is conceived and understood, follow the plan. If you have planned well, this is the easy part.
4. Review and reflect on how the problem was solved
   a) Once the problem is solved, reflect on the plan that was used.

Use Computational Thinking

Your task is to determine how many cuts it will take to cut a candy bar into 12 equal pieces.

Information: 1 break of one piece of the candy bar will result in that one piece being divided into 2 pieces.

Complete the Problem-Solving Chart as you Solve the Problem

USE THE PROBLEM-SOLVING PROCESS	
Step 1 – Understand the problem	
Step 2 – Make a plan to solve the problem	
Step 3 – Carry out the plan	
Step 4 – Review and Reflect	

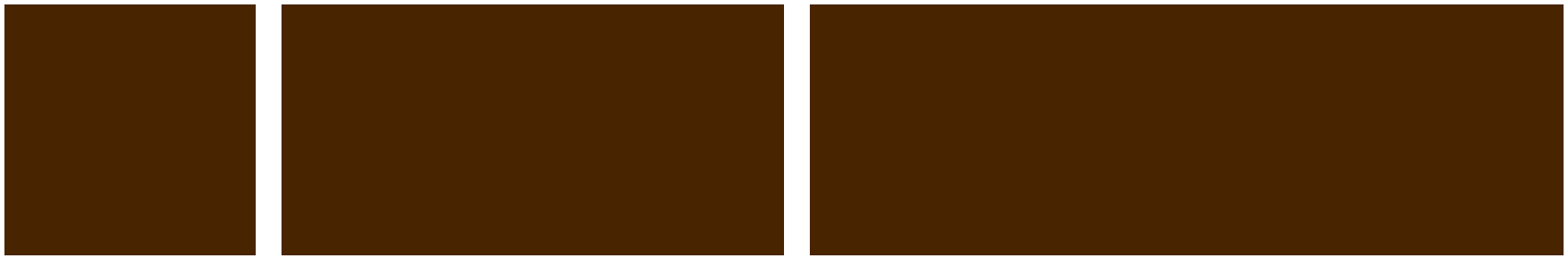
Number of Pieces	Number of Cuts
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
N	N

One Possible Solution

Start

Cut #1

Cut #2



Cut #3

Cut #4

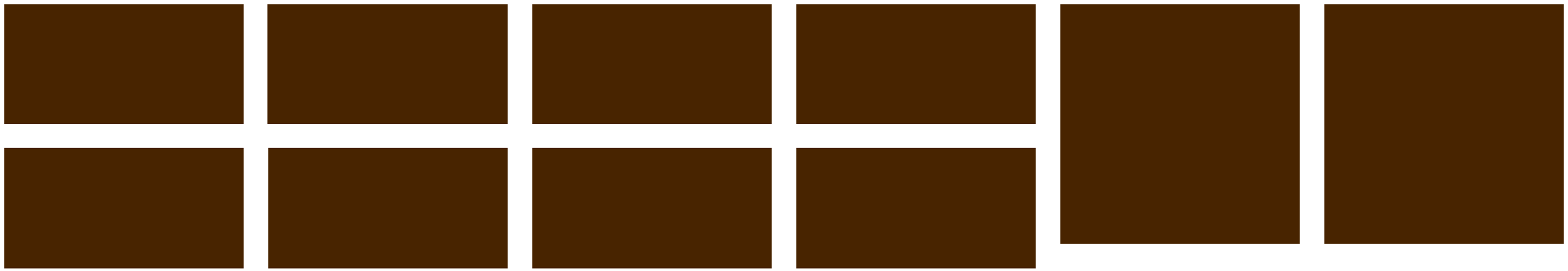
Cut #5

Cut #6

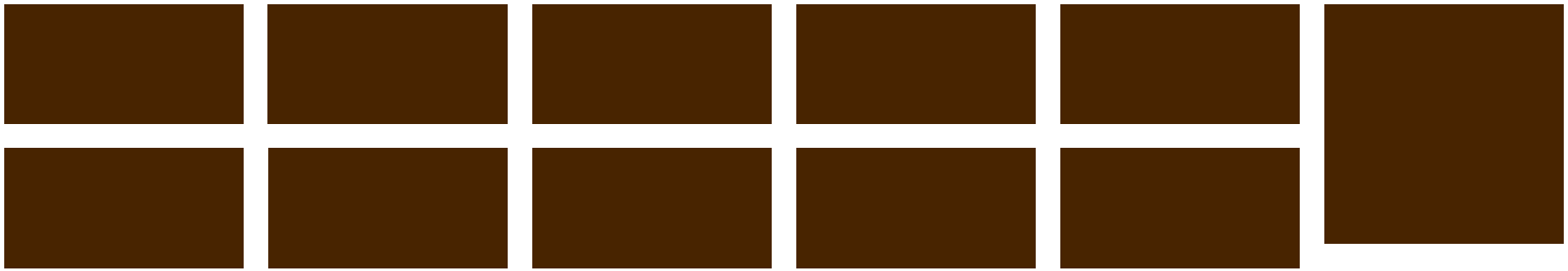
Cut #7

Cut #8

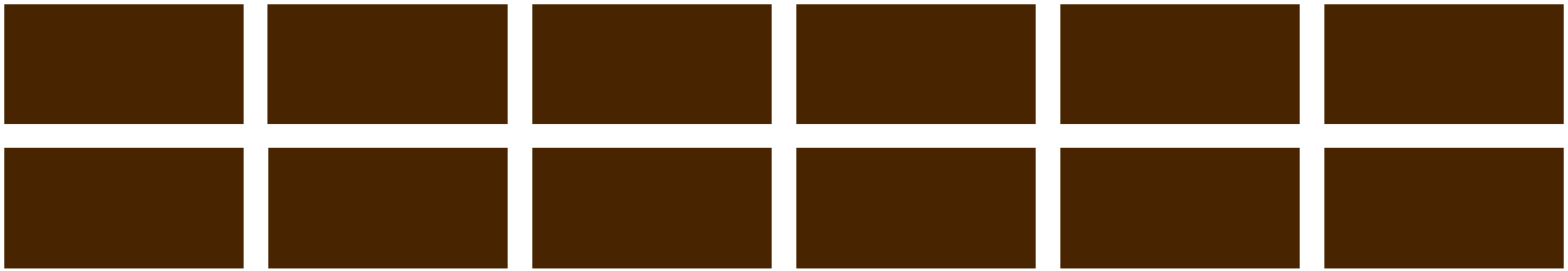
Cut #9



Cut #10



Cut #11



Number of Pieces	Number of Cuts
1	0
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
10	9
11	10
12	11
N	N-1

Question?

How did your problem-solving process work?

How is solving this kind of a problem the same/different from how you solve a problem in “real life”?

Complete the reflection questions 10-12 on your worksheet.

Review - The Problem-Solving Process

1. **Understand the problem**
   a) Read or listen to the problem statement
2. **Make a plan to solve the problem**
   a) Use pictures, charts, graphs, systematic lists, objects, or act out the solution to help you devise a plan to solve the problem. In Computer Science we call this plan an **algorithm**.
3. **Carry out the plan**
   a) Once the plan is conceived and understood, follow the plan. If you have planned well, this is the easy part.
4. **Review and reflect on how the problem was solved**
   a) Once the problem is solved, reflect on the plan that was used.

Problem Solving

What makes a problem solvable by computer?

Being able to provide a step-by-step algorithm is important.

Think back to the peanut butter and jelly sandwich. Even if we refined the algorithm, would a computer be able to make one?

(No, but a robot could!)

Algorithm - a process or set of rules to be followed in calculations or other problem-solving operations.

Credits

- Exploring Computer Science 5.0 – Unit 2, Day 3, Pages78-80

- http://en.wikipedia.org/wiki/Milky_Way_(chocolate_bar)

PowerPoint created by Jeff Hinton (2014)

Modified by Dawnene Young (2015)