Get on Board with Coding Skills!

(*computer not required)

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Poll - Prior Coding Knowledge







SOME FAMILIARITY



NOVICE



NONE

Poll – Languages



None of the above

Poll – Did you ever ...

Play Tac Toe

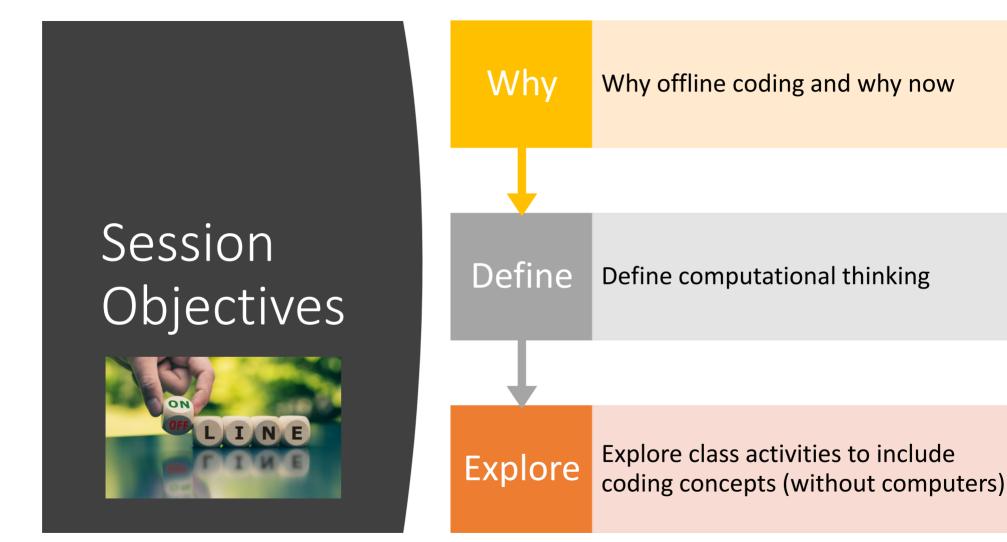
Scrabble

Word Searches

Suduko

Use symbols to figure out words in a puzzle

Complete a puzzle



Why?

- Outreach events
 - Difficult to transport
 - Not enough technology
- Technology Distractions
 - Social media
 - Email
- More and more jobs require some level of coding skills

Why? - Coder Shortage

61% of executives concerned about getting software developer talent ("The Developer Coefficient", 2018)

7 million job openings in 2015

("Beyond Point and Click", 2016)

1.3% unemployment rate for tech at 20year low ("U.S. Tech Unemployment",

2019)

2018-2028 Job Outlook

Why? -Follow the Money!

```
Web Programmer $69,430 - 20,900 - 13%
```

(United States Department of Labor, 2018)

Computational Thinking







PATTERN RECOGNITION



ABSTRACTION



ALGORITHM

Decomposition

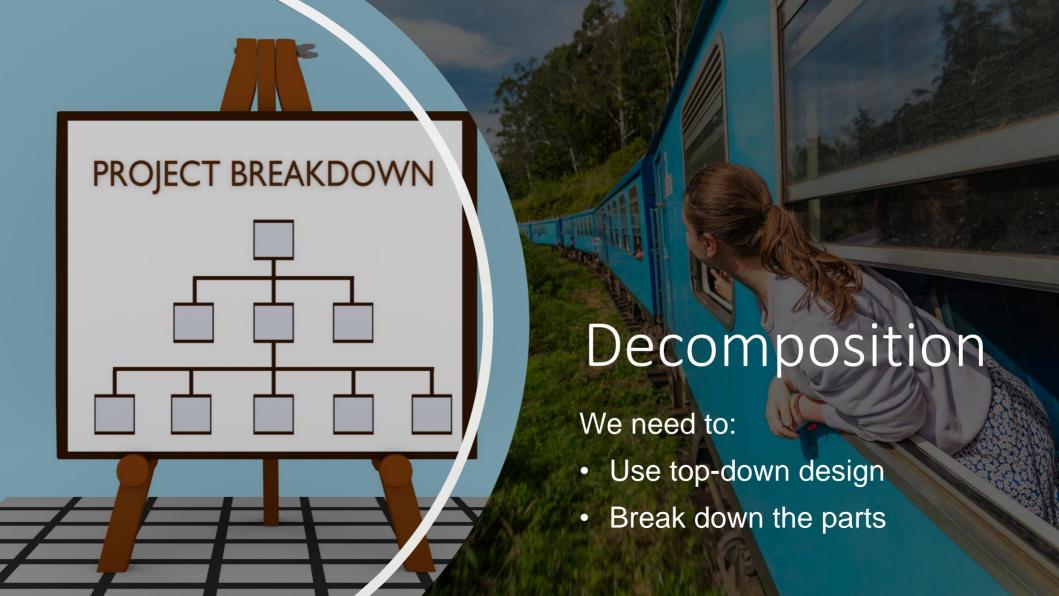
Pattern Recognition

Abstraction

Algorithms

Offline Coding Activities

Computational Thinking



Code the payroll system for the US Armed Forces

ALL Branches



Poll – Clean Home

Wash dishes, dust living room, sweep floor

Clean kitchen, clean bathrooms, wash floors

Schedule the cleaning service

That's not the way I would do this!

Decomposition

Pattern Recognition

Abstraction

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Computational Thinking

Code examples showing patterns

XML new employee entry

```
<Employee>
  <name> </name>
   <address>
  </address>
   <phone></phone>
   <email></email>
   <deductions>
    <deduction1 >
     <startDate></startDate>
     <dependents>
          <dependent1>
          </dependent1>
           <dependent2>
          </dependent2>
       </dependents>
    </deduction1>
 </deductions>
</Employee>
```

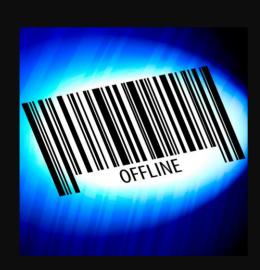
Python email validation

```
function validateEmail(email) {
   var re = /^(([^<>()\[\]\\.,;:\s@"]+(\.[^<>()\[\]\\.,;:\s@"]+)*)|(".+"))@((\[[0-
9]{1,3}\\.[0-9]{1,3}\\.[0-9]{1,3}\\])|(([a-zA-Z\-0-9]+\.)+[a-zA-Z]{2,}))$/;
   return re.test(String(email).toLowerCase());
}
```

XML International phone number

```
<xs:pattern value="\d{1}-\d{2}-\(\d{3}\) \d{3}-\d{4}" />
```

Pattern Recognition











Coding Games We Play(ed)

(and maybe didn't know it)

What "Coding" Games Do/Did You Play?

Kanoodle

Gravity Maze

Codemaster

Word scramble

Suduko

Word searches

Crack the code (using symbols)

Decomposition

Pattern Recognition

Abstraction

Algorithms

Offline Coding Activities

Computational Thinking

Who wants to focus on these details when you are learning code?

01001110 01000010 01000101 01000001 00110010 00110000 00110010 00110000

Abstraction



I use a _____, but do I need to know .

My mom went to the _____ and took out ____

Decomposition

Pattern Recognition

Abstraction

Algorithms

Offline Coding Activities

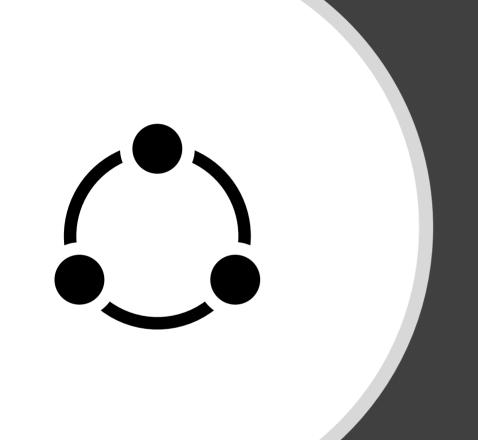
Computational Thinking

Example of an algorithm *

Web Searches

Netflix recommendations Music

Any recipe you have followed



Flowcharts



Raise your hand if...

Did you ever wonder if your house was being bugged after you logged into social media and saw the latest sponsored ad in your newsfeed?

Algorithms

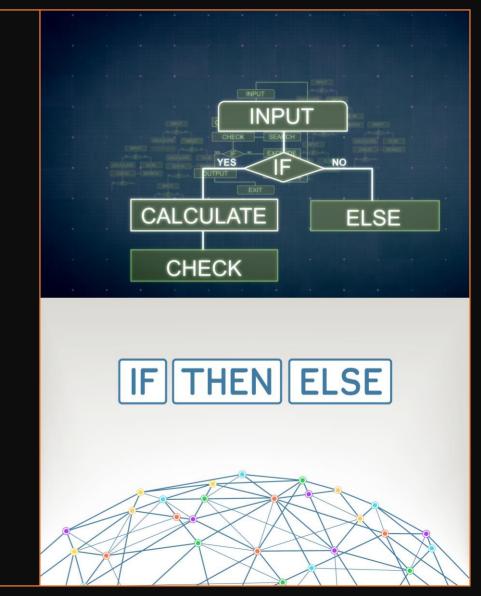






Chat

Algorithms







Computational Thinking Training

Education.microsoft.com

https://computationalthinkingcourse.withgoogle.com/

https://edu.google.com/resources/programs/exploring-computational-thinking/



Offline Coding Websites

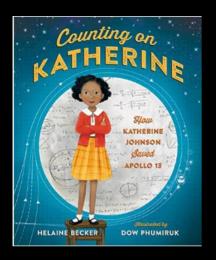
Code.org - https://code.org/

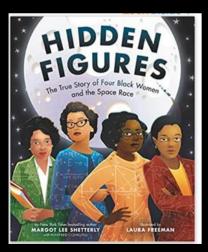
CS Unplugged - https://csunplugged.org/en/



Careers that use Coding Skills

Construction
Autotomotive Sports
Database Business-Analysis
Carpentry Data-Analysis Electronics
Engineering Software-Development
Accounting Cybersecurity
Agricultue
Banking





Reading Activities for All Ages

Hello Ruby – Adventures in Coding

The Woman Who Smashed Codes

Code Girls: The Untold Story

Hidden Figures

Rocket Girl

Questions? Share Your Ideas!

Word Searches

Word Scrambles

Suduko

Symbol searches (crack the code)

Puzzles

Breaking down big projects (concert tickets)

Recognizing patterns (pictures, words)

Write out rules for a game, then test out the rules

Commercial games

Obstacle courses

Tasks – clearing a room of chairs and stack chairs

Get in alphabetical order without speaking

Create a flowchart

Listen for use of algorithm in news

Stacking cups

Create algorithms for CTSO projects (tying flannel blankets)

Additional Reading

- Code Girls: The Untold Story of American Women Codebreakers of WWII

 Liza Mundy
- The Girls of Atomic City Denise Kiernan
- Rise of the Rocket Girls Nathalia Holt
- The Secret Lives of Codebreakers Sinclair McKay
- Our Mothers' War: American Women at Home and at the Front During World War II – Emily Yellin

References

Burning Glass Technologies. (2016, June). *Beyond point and click: The expanding demand for coding skills*. Retrieved from Burning Glass website: https://burning-glass.com/wp-content/uploads/Beyond_Point_Click_final.pdf

CompTIA (2019, Jun 7). *U.S. tech unemployment rate at record low, CompTIA analysis reveals*. Retrieved from PRNewswire website: https://www.prnewswire.com/news-releases/us-tech-unemployment-rate-at-record-low-comptia-analysis-reveals-300863947.html

Stripe. (2018, September). *The Developer Coefficient: Software engineering efficiency and its \$3 trillion impact on global GDP.* Retrieved from Stripe.com website: https://stripe.com/reports/developer-coefficient-2018.

Text to binary converter. (n.d.). Retrieved from https://www.rapidtables.com/convert/number/ascii-to-binary.html

United States Department of Labor (2018). Computer and Information Technology Occupations. In *Occupational Outlook Handbook*. Retrieved from U.S. Bureau of Labor Statistics website: https://www.bls.gov/ooh/computer-and-information-technology/home.htm

Wing, J. (2006, March). Computational Thinking. *Communications of the ACM*. Retrieved from https://www.cs.columbia.edu/~wing/publications/Wing06.pdf

Citations based upon APA, 6th edition