Empower Students with Problem Solving Skills
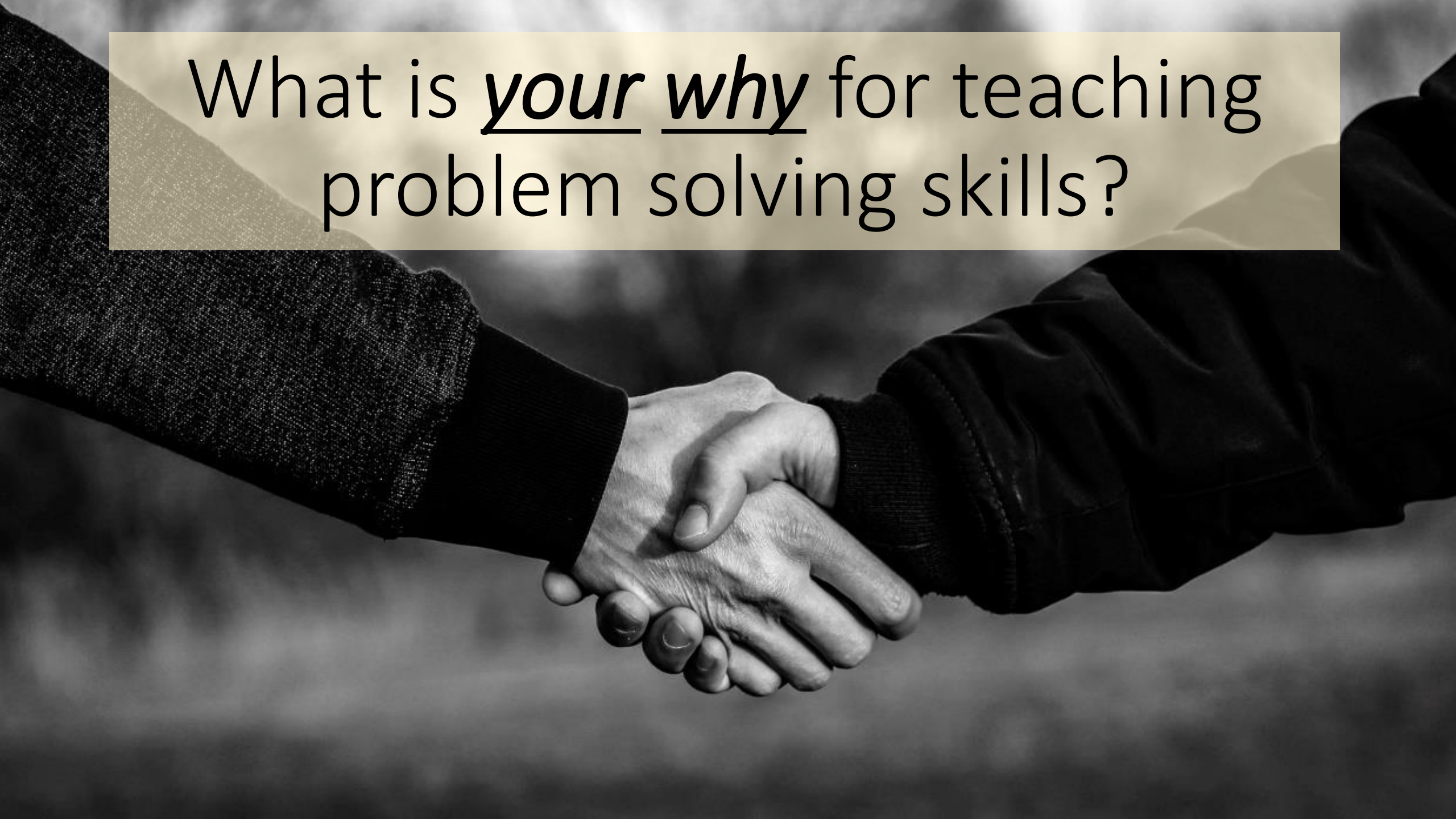

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Objectives:

- Discuss and use problem solving skills

*career*tech

What is *your why* for teaching problem solving skills?

Top 10 Skills......
According to the World Economic Forum

in 2020		in 2015	
1.	Complex Problem Solving	1.	Complex Problem Solving
2.	Critical Thinking	2.	Coordinating with Others
3.	Creativity	3.	People Management
4.	People Management	4.	Critical Thinking
5.	Coordinating with Others	5.	Negotiation
6.	Emotional Intelligence	6.	Quality Control
7.	Judgment and Decision Making	7.	Service Orientation
8.	Service Orientation	8.	Judgment and Decision Making
9.	Negotiation	9.	Active Listening
10.	Cognitive Flexibility	10.	Creativity

Computational thinking is one model of the problem solving process.

Did you know…….

- Computational thinking is foundational?
  - Logic
  - Creativity
  - Problem Solving
- The state of Oklahoma has adopted computer science standards for grades K-12? https://sde.ok.gov/computer-science-standards

Frequently Asked Questions

3. **Are the standards written for all Oklahoma students?**
    - The Oklahoma State Department of Education and the members of the Writing and Draft Review Teams strive to ensure the new standards communicate a vision for Computer Science education that prepares all students for a future that is increasingly technological. We believe defining clear, attainable, yet ambitious learning standards for Computer Science sets a worthwhile goal for our state as we work to ensure that any child might pursue a career in coding, engineering, or any number of pathways that are strengthened by computational thinking.

Oklahoma Academic Standards for Computer Science {Grades 3-5}

3rd Grade	4th Grade	5th Grade
3.AP.A.01 Compare multiple algorithms for the same task.	4.AP.A.01 Compare and refine multiple algorithms for the same task.	5.AP.A.01 Compare and refine multiple algorithms for the same task and determine which is the most efficient.
3.AP.M.01 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.	4.AP.M.01 Decompose (break down) large problems into smaller, manageable subproblems to facilitate the program development process.	5.AP.M.01 Decompose (break down) large problems into smaller, manageable subproblems and then into a precise sequence of instructions.

Decomposition

"If you can't solve a problem, then there is an easier problem you can solve: find it."

George Pólya

https://tinyurl.com/y9agemoc

Groups of 2 – 3

Choose Person 1, Person 2, and Person 3

Which card am I holding?

Person 1
---Pick a card
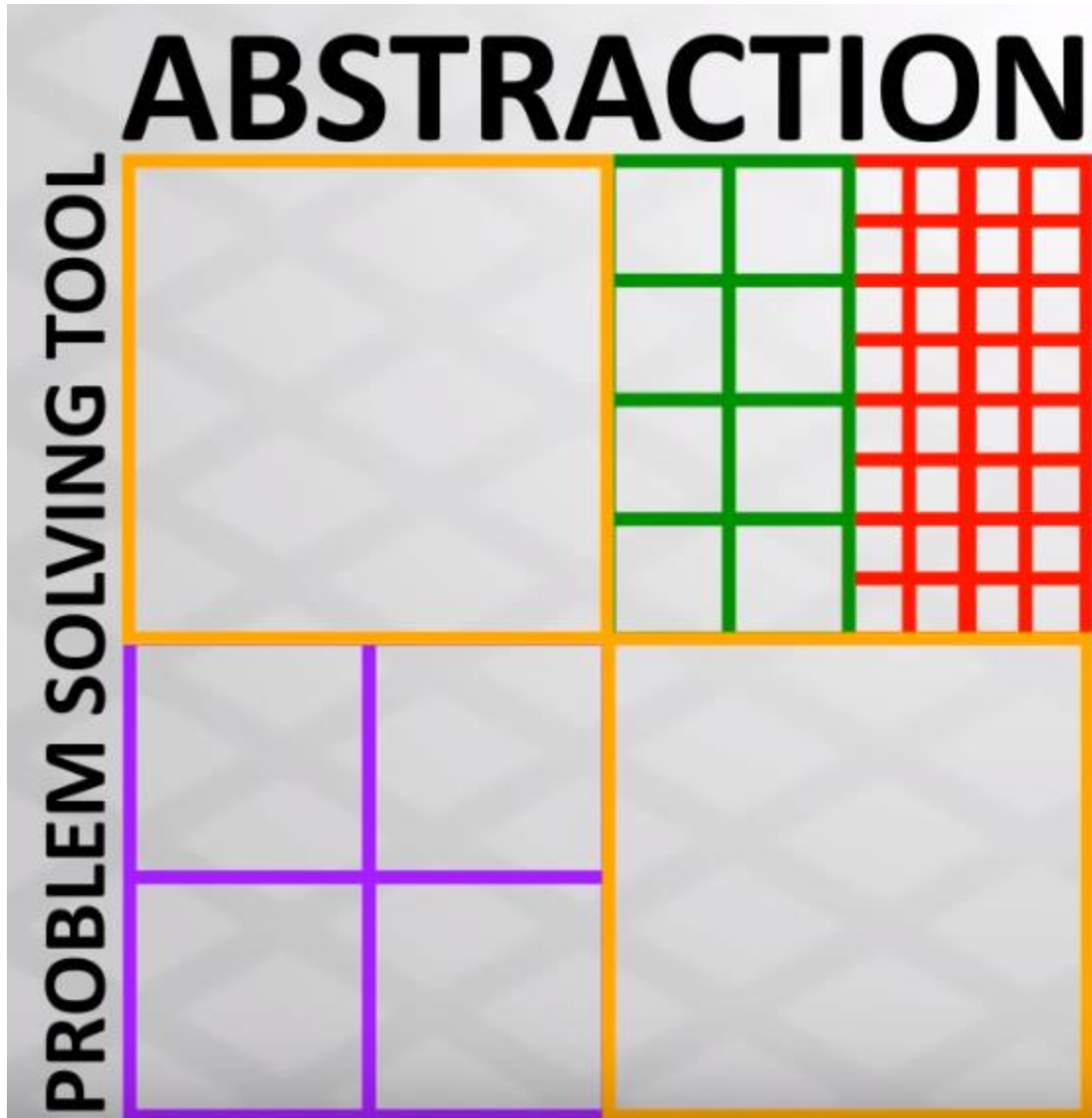Persons 2 & 3
---Which card?
Think about the problem solving process

Fan-N-Pick

- **Person 1 – Fan the cards**
- **Person 2 – Pick and read one card**
- **Person 3 – Answer the question**

Abstraction

Multiple Choice

Here are three sentences. Which of the templates below correctly abstracts so that all three match the same pattern as the template?

Seattle is a big city.
Eugene is a medium city
Hillview is a small city.

Submit

○ Seattle _____ a _____ _____.

○ _____ is a _____ city.

○ _____ is _____ a _____.

○ Eugene is a _____ city.

Submit

Algorithms

- Time to strategize
- Once the **relay** begins, no talking **among the group**.
- Each person must **run to a line of cups**, picking any **adjacent pair** of cups to check.
- **Read the item in** the two cups
- If the items are in the wrong order then, **swap the cups** and place them in the correct order.
- **Quickly** return to your team and tag the next person.
- The winner is the team to fully sort the cups in the shortest time.

Sorting Relay

Sorting Relay

1 Minute to Discuss Strategy with Group → Once the Relay begins, no talking! → Each person– run to the line of cups → Pickup a PAIR of Adjacent Cups

Read the item in the 2 cups → If the item is in the wrong order, swap the cups. → Quickly return to your **team** and tag the next person. → Winning Team! First one to sort all cups in shortest time!
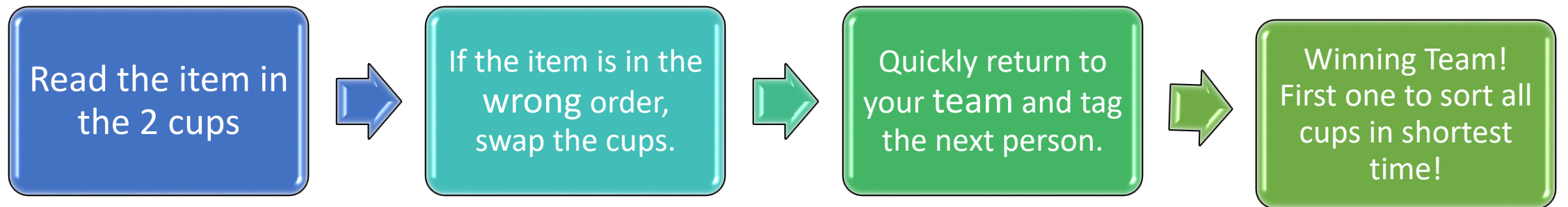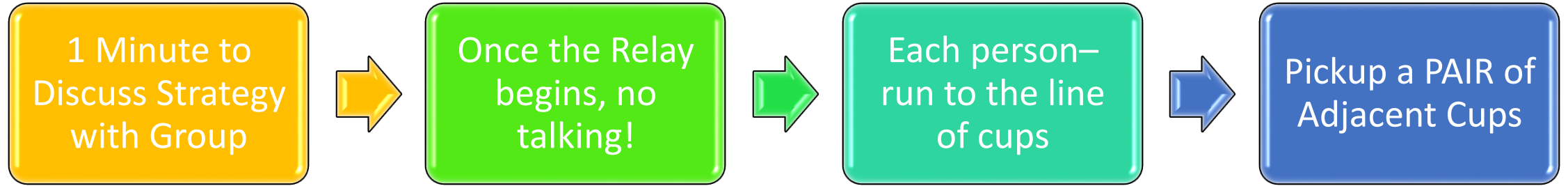
Decomposition

Breaking into smaller, more manageable pieces

Patterns

Finding similarities between items

Thinking Tools

Abstraction

Filtering out unnecessary information, making one solution work for multiple problems

Algorithms

Using a list of steps to follow in order to complete a task

Using the thinking tools could have what type of impact for students?

In the Classroom

Decomposing
- What task requires multiple steps?

Abstracting Information
- What task might require removing extraneous information, or might require the identification of certain characteristics?

Identifying Patterns
- Where will the students be required to analyze data and make sense of it?
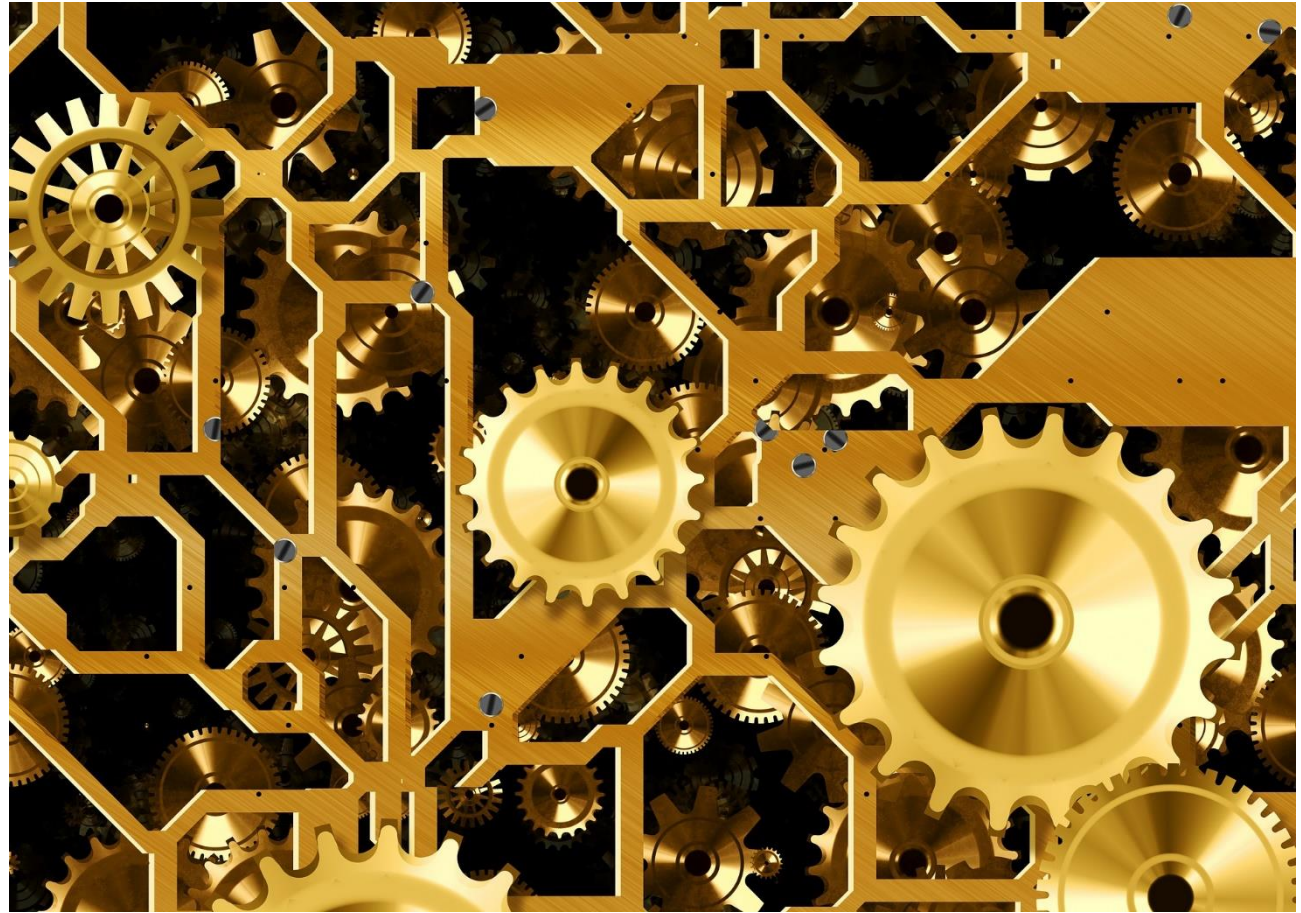
Creating (or using) Algorithms
- Which part of the lesson will require students to follow a specific set of procedures or to create their own?

How can you….

Incorporate these skills?

Support your students as they use the them?