



Algorithms – March 30, 2016

This week's Looney Challenge will help you teach your students about algorithms. Understanding algorithms is an important and basic skill that students need to know to solve a mathematics and computer science.

This week's Challenge is worth **8 points**.

What is an Algorithm?

In simple terms, an algorithm is a “set of instructions designed to perform a specific task” (<http://techterms.com/definition/algorithm>). We use algorithms in computer science to solve a problem or task. The algorithm is a sequence of steps that “transform the input to the output” (Cormen, T.H., Leiserson, C.E. (2009), Introduction to Algorithms, 3rd Edition).

Algorithms are used in everyday life, not just computing and mathematics. An example might be how you make your bed every day, how you bake cookies, or do a query in a search engine.

Following are several videos that may help explain algorithms to your students:

“What is an Algorithm and Why Should you Care?”

<https://www.khanacademy.org/computing/computer-science/algorithms/intro-to-algorithms/v/what-are-algorithms>. This Kahn Academy video may be more helpful for students 3rd grade and above.

What is an Algorithm? David J. Malan, <https://www.youtube.com/watch?v=6hfOvs8pY1k>.

Pharrell Williams – Happy – The Algorithms make you Happy version, https://www.youtube.com/watch?v=od_zF0HZWGM

After watching the video, ask your students to think of an algorithm they use every day.

Lets get started!

Beginners – We have two activities for beginners to help teach algorithms.

Activity One - Daily Algorithms:

1. Print the *Daily Algorithms* worksheet from Code.org (<https://code.org/curriculum/course2/2/Assessment2-EverydayAlgorithms.pdf>).
2. Complete both activities on the worksheet. If you prefer to do the intermediate challenge, you may skip the paper airplane activity on the worksheet.
3. Ask your students to write their own algorithms for an every day activity. For example, the steps needed to walk to the principal's office or how to make S'Mores.

Activity Two - Paper Airplane:

1. Go to Code.org's "Real-Life Algorithms: Paper Airplanes" (<https://code.org/curriculum/course2/2/Teacher>). Scroll down to the "Teaching Guide" section to find instructions and materials that you will need (e.g. paper and link to the worksheet).

2. Click on the “Real-Life Algorithms Worksheet: Paper Airplanes” link. Print as many copies as you need.
3. If needed, watch the videos to give you additional information and tips to help you teach the activity.
4. Ask your students to figure out the steps using the worksheet to make a paper airplane.
5. Fly the airplanes!

Another way to teach simple algorithms is to ask two students to partner together. Ask one student to wear a blind fold and the partner provide the algorithm (or steps) to complete a task. Ideas could be to ask students to walk from Point A to Point B or to fold a piece of paper into a shape.

Intermediate/Experienced – Twenty Questions

In this Challenge your students will learn about search algorithms, specifically a linear search algorithm.

1. Ask your students: What is a linear search algorithm? It is a simple algorithm that moves, sequentially, through a collection of data looking for a matching value.
2. Go to the 20-Question link from the Teaching London Computing website, <http://teachinglondoncomputing.org/resources/inspiring-unplugged-classroom-activities/the-20-questions-activity/>. Scroll down the page to the “Resources” section. Click on the 20 Questions PDF link, <https://teachinglondoncomputing.files.wordpress.com/2014/01/activity-20questions.pdf>.
3. Read the “Summary” and “Aim” before starting.
4. Go to Page 2. In “The Grab” section the author’s describe another activity, “Locked-in,” If you would like to do the activity, please go to: <https://teachinglondoncomputing.files.wordpress.com/2014/01/activity-lockedin.pdf>.
5. Follow the instructions for the activity.
6. After you have completed and discussed the activity and students have an understanding of algorithms.

If you have students who understand algorithms and already know some coding, you can ask them to do write a search algorithm. If your students know the language Python, you can ask them to build a one-player version of Battleship at CodeAcademy, <https://www.codecademy.com/courses/python-beginner-en-4XuFm/0/1>.

Or play Battleship by printing out worksheets from the Computer Science Unplugged link, http://csunplugged.org/wp-content/uploads/2014/12/unplugged-06-searching_algorithms.pdf

How to earn points:

1. If you haven’t registered your class, please go to cs.montana.edu/looney-challenge and click on the “Register for Looney Challenges.
2. Discuss with your class the difficulty of the activity. What did they learn? How difficult was the activity? Do they understand the concept?
3. Briefly, in a couple of sentences, describe in your email what happened during the activity? Did your students understand the concept(s)? Email your description to looneychallenges@gmail.com.
4. If you want to attach an example, photographs of students working, or video of student’s outcomes, please send them as an attachment.
5. We will send you a confirmation and provide you your point total for the activity and your total points for Looney Challenges.

For questions, please contact Sharlyn Izurieta, 994-4794 or send an email to looneychallenges@gmail.com

Deadline is June 30, 2015.

Additional Resources:

* Otero, Marcus (2014). *The Real 10 Algorithms that Dominate Our World*,
https://medium.com/@_marcos_otero/the-real-10-algorithms-that-dominate-our-world-e95fa9f16c04#.47h4gr3mo