

Algorithm Efficiency; Linear vs. Binary Search

Unit 2 - Algorithms: How do we create and apply step by step procedures for efficient problem solving?

AIM: Students will discuss what efficiency means for algorithms, and how to evaluate the efficacy and efficiency of algorithms

Do now:

Two students are racing to navigate from a starting position to an end goal. Student one has to flip a coin in order to move: heads, they move forward one square. Tails, backwards 1 square.

The second student does the same, but after every third coin flip they roll a die. If the die is a 5 or 6, then instead of moving forward / backward 1 step, they move 3 steps.

If any move would cause the student to move beyond the start or finish line, they instead move the same amount in the opposite direction.

Who will reach the target first and why?

Agenda:

- Mr. U gives example demonstration of activity
- Do now discussion
- Simulate activity
 - Need 6 volunteers for each round:
 - 2 walkers to act out the respective algorithms
 - 2 coin flippers (one of whom will also be given a dice) to instruct their player to move or jump forward / backward
 - 2 people keeping track of number of steps each person takes and their position
 - [Make a copy of the spreadsheet](#), and fill in the number of steps (how many times a coin has been flipped) and a position (0 is start)
 - Place your bets - if you can get all most of your guesses correct, extra credit!
- Commence with activity
 - 3 rounds: target is small, target is big, and target is REALLY BIG
- [Demonstrate simulation](#) and [discuss RET work](#)
- Breakdown discussion
 - How does this relate to linear vs. binary search?

- Which of today's algorithms corresponds more to which search algorithm?
- How does divide and conquer help us to understand the outcome of the activity?
- Which algorithm finishes in the more reasonable amount of time?
- Are there any downsides to either algorithm?

Homework:

NGSS Standards and alignment: