Name: _____   Date: _____

Aim: **Why should we study Computer Science?**

Do Now: *Read "Solving Problems with Computers" below.*

SOLVING PROBLEMS WITH COMPUTERS

Computer science is more than just the study of different programming languages or hardware parts. In most computer science careers, specialists use computer science thinking techniques to solve problems and puzzles and achieve specific goals.

In this activity, you will be presented with a set of real-world problems and goals that computer programmers, computer animators, and more, challenge themselves with each day. For each problem, we will discuss it, brainstorm ideas for addressing it, and then watch a video that presents one possible solution.

PROBLEM A: JEOPARDY AND NATURAL LANGUAGE PROCESSING

Computers are already great at understanding instructions written in their own languages, but what about teaching them to understand the languages we speak in every day? The field of computer science called "Natural Language Processing" seeks to lessen the gap between human communication and computer understanding. IBM, a technology corporation, decided to put their language processing work to the test when they challenged some of the best players in a popular trivia game show called "Jeopardy" with a computer named Watson.

VIDEO: examples of Watson's interaction in Jeopardy

1.) How would you teach a computer to listen to or understand human speech?
-teach words and phrases
-teach common questions and answers
-audio component/speech recognition
-maybe teach different languages

2.) What other functionalities would IBM's Watson need?
-database of information
-must know how to buzz in
-answering questions
-how to wager/bet
-pick categories
-know when to answer and when not to answer
-"backwards" style of answering Jeopardy questions

SOLUTION FROM VIDEO
While watching the video, answer the following questions:

• Does Watson "understand" the questions and answers he gives?
-he picks up keywords and browses through its database/doesn't quite understand
-strictly algorithmic
-doesn't understand relationships – can only answer fact-based questions

How is Watson's processing similar to ours?
-computer similar to brain and long term memory
-we interpret questions and then look for answers
-self contained information (both not connected to internet)
-we learn from experience like Watson

How is it different?
-Watson's brain is much larger
Identifies parts of speech of each word of a question
-comes up with multiple answers and numerically ranks confidence
-he knows what he knows and knows what he doesn't know

• Where else could Watson's technology be used?
-many industries use him, such as healthcare, finance, law

PROBLEM B: CAR SAFETY

Worldwide, about 1.2 million people die every year in car accidents and 50 million are injured. Over 90% of these accidents are caused by human error. To try and combat the problem of human error in transportation, the United States Defense Advanced Research Projects Agency created a competition titled the DARPA Grand Challenge, where any group could win $2 million if they could create a self-driving vehicle that can drive across a desert by itself.

1.) How would someone make a self-driving car?

-work with automobile manufacturers, GPS companies/navigation

2.) What would such a car have to do, besides move?

-follow rules of the road
-GPS/directions
-sensory skills to see pedestrians, other cars
-reactionary skills
-antivirus software/firewalls

SOLUTION FROM VIDEO
While watching the video, answer the following questions:

• What steps does Google use to better their technology?

-test drivers ➔ give feedback
-uncover scenarios that the car may experience
-teach vehicle about navigating through different events
-creates a 360 degree laser
-safety drivers

- What different events would the car need to handle?

-light signals
-signs
-weather conditions
-construction zones
-railroad crossings
-cyclists
-hand signals
-busy intersections
-speed limits
-etc.

- What other tasks could you imagine automating?

-food ordering
-bank tellers
-cashiers/self checkout
-delivery drones (Amazon)

What are the cons? Jobs may be taken!!!