Name_____

U2-1.1 Let's explore how computers 'think'

Imagine a computer. Now imagine a person. Which one do you think is smarter?

This is a bit of a trick question. Believe it or not, most computers cannot do anything without help from people.

Why is that?

Both computers and people can follow instructions, but people can also think for themselves. We can learn and change what we do based on new knowledge.

Most computers, however, cannot do that. An Edison robot, for example, cannot think for itself. It can only follow instructions. Where do those instructions come from? A person like you!

People give computers instructions by giving them computer programs.

To make a good computer program for our Edison robot, or any computer, we need to write that program in a way that the computer can understand. To do this, we need to try to think about things as if we were a computer.

Don't forget

A computer program is a collection of instructions that tell a computer to perform a specific task.

This kind of thinking is called computational thinking.

Jargon buster

Computational thinking means thinking about a problem or task similar to how a computer thinks. It is a way of logically working through problems, breaking them down into smaller pieces, finding patterns, and then using the information to come up with a step-by-step solution.

In other words, computational thinking is a way of planning, problem-solving and analysing information the same way a computer does.

Whenever you want to write a program for your Edison robot, you need to use computational thinking to help you work out what to do. By learning to think in a way that will make sense to Edison, you will be able to give the robot instructions to get it to do what you want.

One of the most important things about giving instructions to Edison is the order in which you give the instructions.

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The importance of going step-by-step

Computers, including Edison robots, are very good at following the instructions that we give them as computer programs. In fact, an Edison robot will follow the instructions in a program *exactly* as they are written. That's why one of the most important parts of computational thinking is using sequence.

Jargon buster

Sequence means going in order, step-by-step.

Imagine you want to bake a cake. You might look up a recipe in a cookbook. To make the cake, you would then follow each step one by one. That's sequence!

Whenever you write a program for Edison, you will need to use sequence in the same way. You need to tell Edison exactly what to do, in the exact order you want the robot to do each step.

Task 1: Follow step-by-step

If your teacher tells you to go to the door, what actions do you have to take to get there? You probably don't think about how many steps you need to take. You just do it! If there is a desk in your way, you simply turn and walk around it.

That's not how a robot works. To get your robot to the door, you would need to give it very careful instructions with each step explained one by one. In other words, you would need to tell the robot each action you want it to take in sequence.

Thinking about doing something sequentially like this takes some practice. People are so good at 'just doing' things, we don't usually think about what it is that we are doing broken out into each and every step.

Try following some exact step-by-step directions to see how it feels. Use activity sheet U2-1 to answer the following questions.

1. Start on the ice cream cone, pointing towards the heart. Turn right. Move forwards 2 squares. Where are you?
   Sample student answer: The car.

2. Start on the panda bear, pointing towards the bicycle. Move backwards 1 square. Turn left. Move forward 2 squares. Turn right. Move forwards 1 square. Where are you?
   Sample student answer: The car.

3. Start on the star, pointing towards the cat. Turn left. Turn left again. Move backwards 2 squares. Turn right. Move forward 1 square. Turn right. Move forwards 1 square. Turn left. Move backwards 2 squares. Where are you?
   Sample student answer: The ice cream cone.

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Task 2: Give step-by-step instructions

Let's practice giving exact instructions, describing each item step-by-step. Use activity sheet U2-1 to answer the following questions.

Hint!

Use these commands to write your answers:

move forwards *move backwards* *turn left* *turn right*

4. Write directions for this: start on the rainbow, pointing towards the dog. End on the bird.

Sample student answer: Move forwards 3 squares. Turn left. Move forwards 2 squares.

5. Write directions for this: start on the rainbow, pointing towards the dog. Do NOT touch the dog. Do NOT touch the cat. End on the bird.

Sample student answer: Move forwards 2 squares. Turn left. Move forwards 2 squares. Turn right. Move forwards 1 square.

6. Write directions for this: start on the diamond, pointing towards the beachball. Do NOT use any 'move forwards' commands. End on the beachball.

Sample student answer: Turn right. Move backwards 1 square. Turn right. Move backwards 1 square. Turn right. Move backwards 1 square.

Activity sheet U2-1: Go step-by-step