CHRISTMAS-5

SNOW PATROL MARTY

Outcomes, Resources & Learning Plans

EDUCATION LEVEL: Second/Third Level (Ages 8-13) **PRE-REQUISITES:** Lesson 1.13
LESSON DURATION: 45 minutes **DEVICE COMPATIBILITY:** Laptop, PC or Tablet
CROSS-CURRICULAR LINKS: Technologies/Social Studies/Numeracy/Literacy

LESSON OVERVIEW

Snow can be great but can also cause several problems for traffic and transport. Students will be tasked with the challenge to design and code Marty to clear the streets of snow so that everyone can get out and buses can start running again!

LEARNING OBJECTIVES

- Design an attachment for Marty to scoop snow with
- Consider the best practices for clearing snow from roads using robots
- Code Marty to move around the streets and collect snow using a customised walking function

KEY VOCABULARY

- Navigation
- Sequence
- Collection
- Movement
- Prototype

RESOURCES & EQUIPMENT

- Marty the Robot
- Access to compatible devices connected to Marty on Scratch/Python
- Cardboard, tape and scissors
- Cotton wool balls
- A3 paper with pens/pencils

ADDITIONAL READING

- Marty the Robot Educator Guide
- Educator FAQ

LEARNING PLAN & ACTIVITIES

1. Ask students what happens when it snows a lot (paying attention to how their daily routines and in particular transportation)
2. Since it's difficult to keep roads clear when it is snowing, we are going to design and code our own snow patrol robot
3. In small groups, students should use A3 paper to design an area of a town with roads and houses for Marty to walk around and collect snow from using cotton wool balls as snow on the roads (reminding students they will need to think where in their town the collected snow should go)
4. Using cardboard, tape and scissors, ask groups to design a scoop that Marty can carry around to collect the snow on the road
5. Ask students to try testing out their design on the A3 paper that has roads and snow on and hopefully they should realise that the built-in walk command on Scratch moves Marty's arms which may not work with their scoop design
6. Students should code their own walking function (see Lesson 1.13 for more details on this) before testing how much snow they can collect now and discuss how efficient their snow collecting system is

EXTENSIONS & CHALLENGES

- How fast can students collect all the snow from their town? (*Technologies/Numeracy*)
- Research other ways our Marty scoop to help local communities? *(Technologies/Social Studies/Literacy)*

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Curriculum for Excellence - Technologies

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Digital Literacy	TCH 0-01a	●
	TCH 0-02a	●
	TCH 1-02a	○
	TCH 2-02a	●
Technological Developments in Society and Business	TCH 0-05a	●
	TCH 1-05a	○
	TCH 0-07a	●
	TCH 1-07a	●
Craft, Design, Engineering and Graphics	TCH 0-09a	●
	TCH 1-09a	●
	TCH 2-09a	●
	TCH 3-09a	○
	TCH 0-10a	●
	TCH 1-10a	●
	TCH 2-10a	●
	TCH 3-10a	○
	TCH 0-12a	●
	TCH 1-12a	●
	TCH 2-12a	●
	TCH 3-12a	○
	TCH 4-12	○

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Curriculum for Excellence Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Computing Science	TCH 0-13a	●
	TCH 1-13a	●
	TCH 2-13a	●
	TCH 3-13a	●
	TCH 4-13a	○
	TCH 3-13b	○
	TCH 0-14a	●
	TCH 1-14a	●
	TCH 2-14a	●
	TCH 3-14a	●
	TCH 0-14b	●
	TCH 1-14b	●
	TCH 0-15a	●
	TCH 1-15a	●
	TCH 2-15a	○
	TCH 3-15a	○

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

National Curriculum - Computing, Design & Technology

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Computing	1-a	●
	1-b	●
	1-c	●
	2-a	●
	2-b	○
	2-c	●
	3-a	●
	3-g	●
	4-a	●
	4-b	●
Design & Technology	1.1-a	●
	1.1-b	●
	1.2-a	●
	1.3-b	●
	1.4-a	●
	2.1-b	○
	2.2-a	●
	2.3-a	●
	2.4-a	○
	3.1-b	●
	3.3-c	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Australian F-10 Curriculum - Digital Technologies, Design & Technologies

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Digital Technologies	ACTDIK001	●
	ACTDIP004	●
	ACTDIP005	●
	ACTDIP006	○
	ACTDIP010	●
	ACTDIP011	○
	ACTDIP012	●
	ACTDIP013	●
	ACTDIP017	●
	ACTDIP019	○
	ACTDIP020	○
	ACTDIP021	●
	ACTDIP030	○
Design & Technologies	ACTDEK001	●
	ACTDEK002	●
	ACTDEK004	●
	ACTDEP005	●
	ACTDEP006	●
	ACTDEP007	●
	ACTDEP008	●
	ACTDEP009	●
	ACTDEK010	●
	ACTDEK011	○
	ACTDEK013	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Australian F-10 Curriculum Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Design & Technologies	ACTDEP014	●
	ACTDEP016	●
	ACTDEP017	●
	ACTDEP018	●
	ACTDEK023	○
	ACTDEP024	●
	ACTDEP026	●
	ACTDEK043	○

CSTA K-12 - Computer Science

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Computing Systems	1A-CS-01	●
	1A-CS-02	●
	1B-CS-01	●
	1B-CS-02	●
	1B-CS-03	○
	2-CS-02	○
Algorithms & Programming	1A-AP-08	●
	1A-AP-09	●
	1A-AP-10	●
	1A-AP-11	●
	1A-AP-12	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

CSTA K-12 Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-5
Algorithms & Programming	1A-AP-08	●
	1A-AP-09	●
	1A-AP-10	●
	1A-AP-11	●
	1A-AP-12	●
	1A-AP-14	○
	1A-AP-15	●
	1B-AP-10	○
	1B-AP-11	●
	1B-AP-13	●
	1B-AP-15	●
	2-AP-12	○
	2-AP-15	●
	3A-AP-13	○

DISCUSSION PROMPTS & GUIDES

Prompts & Questions for Delivery of Lessons

SNOW PATROL MARTY

PROBLEMS SNOW CAN CAUSE

In this lesson, students will be exploring the different ways that snow can cause problems in local communities. They will be reflecting on what changes when there is a lot of snow outside.

- What happens when there is lots of snow outside?
- Do you get days off school because of the snow?
- How many cars do you see out when there is a lot of snow? Why do you think that is?
- Are there any places that lots of snow doesn't affect?

BUILDING A SNOW SCOOPER FOR MARTY

Hopefully, students have realised that a big problem when there is a lot of snow is that roads get covered in snow and need to be cleared and gritted before cars and buses can safely drive on them. Maybe this is something we can use robots to help out with.

- How can Marty help with clearing the snow on the roads?
- What parts of Marty could we use to clear the snow on the roads?
- Could we design an additional part for Marty to carry around to collect snow on?
- How should it work?
- How should it connect to Marty?

PROGRAMMING MARTY WITH A SNOW SCOOPER

Students will need to create their own walking command to use the snow scoopers if it is attached to the arms because the built-in command moves Marty's arms.

- Why doesn't the built-in walking command work?
- What movement in the built-in walking command makes it difficult to use our snow scoop with?
- How are you going to create your own walking command in Scratch? What coding constructs will you need to use?
- Do you think you will need to use functions or loops?
- What should Marty do with the collected snow?

SOLUTIONS

Sample Solutions & Activity Guides

1 Building a Snow Scoop

There is no specific way to build a snow scoop for Marty but the easiest solution will involve attaching the scoop to Marty's arms. Students will need to test different sizes to ensure that their scoop isn't too heavy for Marty's arms but also to make sure that is can collect enough snow.

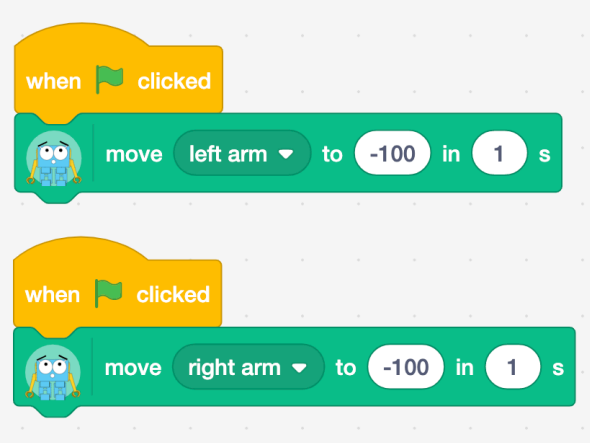
Here are some things to look out for,

DESIGNING A SNOW SCOOP

- Where will it be attached to Marty?
- Will Marty be able to collect snow with this design?
- How heavy is the scoop? Will Marty be able to lift it?
- How do snow plough machines gather snow? Where do they put the snow whilst clearing the roads?

2 Programming Marty to collect snow

Please see the solutions for Lesson 1.13 for creating a custom walking command for Marty using Scratch. Once students have done this they should have more control with using their snow scoop.



If students want to lift the scoop up then they will need to incorporate parallel coding into their programs so that both arms can lift up or down at the same time. There is an example of how to do this on the right. ***Note:*** **this does not include a *get ready* command**