CHRISTMAS-6

WINTER OLYMPICS: SKIING MARTY

Outcomes, Resources & Learning Plans

EDUCATION LEVEL: Second/Third Level (Ages 8-13)
PRE-REQUISITES: Lesson 1.13
LESSON DURATION: 90 minutes
DEVICE COMPATIBILITY: Laptop, PC or Tablet
CROSS-CURRICULAR LINKS: Technologies/Sciences/Numeracy

LESSON OVERVIEW

In this lesson, students are tasked with creating a cross country skiing robot using Marty where they will need to design and build skis and code Marty to slide along the table to win gold at your robot winter olympics. Students will need to consider how Marty moves to influence the design of the skis and poles.

LEARNING OBJECTIVES

- Design and build skis for Marty that are functional and fit for purpose
- Evaluate ski designs to improve the prototype
- Code Marty to slide along the table by breaking down the individual movements

KEY VOCABULARY

- Skiing
- Functional
- Prototype
- Design
- Olympics

RESOURCES & EQUIPMENT

- Marty the Robot
- Access to compatible devices connected to Marty on Scratch/Python
- Cardboard/paper/materials to make skis and poles
- Cello-tape/bluetac to attach skis to Marty
- Scissors

ADDITIONAL READING

- Marty the Robot Educator Guide
- Educator FAQ
- Video of the World’s First Robot Ski Tournament

LEARNING PLAN & ACTIVITIES

1. Reveal today’s topic as the Winter Olympics with a class discussion on what kind of sports they think are involved in this and what sports they think that robots could possibly do
2. Show students the video from the world’s first robot ski tournament and discuss whether they think Marty could do this
3. In small teams, students are tasked with designing and building some skis and poles for Marty along with the design criteria that they should fit Marty and be functional for skiing along a table (students may find it useful to do some research into what skis and poles typically look like)
4. Once students are happy with their first prototype, discuss how Marty should move to ski - they might want to think about how they broke down the walking command in Lesson 1.13 and what they would change to code Marty to slide instead of step
5. Encourage students to test out their design and programs and make changes to their designs afterwards
6. Near the end of the lesson, bring all the student groups together to test out their designs in a small race and a discussion on what kind of designs work well and what doesn’t work well

EXTENSIONS & CHALLENGES

- Could you add a small incline for Marty to ski down? (*Technologies/Sciences*)
- What other winter sports could we code Marty to take part in? Curling? Ice hockey? *(Technologies/Literacy)*
- How could you use less lines of code in your skiing program? *(Technologies/Numeracy)*

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Curriculum for Excellence - Technologies

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Digital Literacy	TCH 0-01a	●
	TCH 0-02a	●
	TCH 1-02a	○
	TCH 2-02a	○
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 0-11a	●
	TCH 0-12a	●
	TCH 1-12a	●
	TCH 2-12a	○
	TCH 3-12a	○
Computing Science	TCH 0-13a	●
	TCH 1-13a	●
	TCH 2-13a	●
	TCH 3-13b	○
	TCH 0-14a	●
	TCH 1-14a	●
	TCH 2-14a	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Curriculum for Excellence Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Computing Science	TCH 0-14b	●
	TCH 1-14a	●
	TCH 0-15a	●
	TCH 1-15a	●
	TCH 2-15a	●
	TCH 3-15a	○

National Curriculum - Computing, Design & Technology

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Computing	1-a	●
	1-b	●
	1-c	●
	1-e	●
	2-a	●
	2-b	○
	2-c	●
	3-a	○
	4-a	○
	4-b	○
Design and Technology	1.1-a	●
	1.1-b	●
	1.2-a	●
	1.2-b	●
	1.3-a	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

National Curriculum Continued...

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Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Design and Technology	1.1-a	●
	1.1-b	●
	1.2-a	●
	1.2-b	●
	1.3-a	●
	1.3-b	●
	1.4-a	●
	2.1-a	●
	2.1-b	●
	2.2-a	●
	2.2-b	○
	2.3-a	●
	2.3-b	●
	2.4-a	●
	2.4-d	○
	3.1-b	●
	3.1-c	○
	3.2-b	○
	3.3-c	●
	3.4-a	●

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-6
Digital Technologies	ACTDIK001	●
	ACTDIP004	●
	ACTDIP006	○
	ACTDIP010	●
	ACTDIP011	○
	ACTDIP012	●
	ACTDIP013	○
	ACTDIP017	●
	ACTDIP019	○
	ACTDIP020	○
	ACTDIP021	○
	ACTDIP027	○
	ACTDIP030	○
Design & Technologies	ACTDEK001	●
	ACTDEK002	●
	ACTDEK004	●
	ACTDEP005	●
	ACTDEP006	●
	ACTDEP007	●
	ACTDEP008	●
	ACTDEP009	●
	ACTDEK010	○
	ACTDEK011	○
	ACTDEK013	●

CHRISTMAS-6

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

Australian F-10 Curriculum Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Design & Technologies	ACTDEP014	●
	ACTDEP015	○
	ACTDEP016	●
	ACTDEP017	○
	ACTDEP018	●
	ACTDEK023	●
	ACTDEP024	●
	ACTDEP025	○
	ACTDEP026	●
	ACTDEP035	●
	ACTDEP037	●

CSTA K-12 - Computer Science

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Computing Systems	1A-CS-01	●
	1A-CS-02	●
	1A-CS-03	●
	1B-CS-01	○
	1B-CS-02	●
Algorithms & Programming	1A-AP-08	●
	1A-AP-09	●
	1A-AP-10	○
	1A-AP-11	●

LINKS TO THE CURRICULUM

Support with Benchmarks & Frameworks

CSTA K-12 Continued...

● = Fully Addresses Benchmark ○ = Partially Addresses Benchmark

Curriculum Organiser	Benchmark Covered	CHRISTMAS-6
Algorithms & Programming	1B-AP-13	●
	1B-AP-15	●
	1B-AP-16	●
	1B-AP-17	○
	2-AP-13	○
	2-AP-14	○
	2-AP-15	○
Impacts of Computing	1B-IC-19	○

DISCUSSION PROMPTS & GUIDES

Prompts & Questions for Delivery of Lessons

WINTER OLYMPICS: SKIING MARTY

WHAT ARE THE OLYMPICS?

Students are challenged to design some skis to fit Marty's feet and code Marty to ski along a table in training for the Winter Olympics for robots.

- What are the Olympics?
- What different sports are there in the Winter Olympics?
- What is your favourite sport from the Olympics to watch or play?

ROBOTS PLAYING SPORTS?

Robots are starting to become more sophisticated as research and design continues, this has led to robots competing in different sports becoming a much more common event. Show students the video of the world's first robot ski tournament and discuss.

https://www.youtube.com/watch?v=jBze13_04Gs

- Do you think Marty could have taken part in that tournament? Why?
- What other sports do you think robots could play? Or maybe already are playing?
- What do you notice is different when you watch robots playing these sports compared to humans?

SKI AND PROGRAM DESIGN

When students are designing the ski and program to code Marty to slide along the surface, there are some things that they should keep in mind or be asked to discuss in their small groups.

- What do skis typically look like? Will your skis for Marty be a similar design? Why?
- How is Marty going to slide across the table? What other movements have we coded Marty to do that involve moving forwards? How can we adapt these?
- What would make your solution better/faster/more efficient?

SOLUTIONS

Sample Solutions & Activity Guides

1 Designing Skis for Marty

Students may need to design several iterations of their ski prototypes for Marty based on how well Marty can move in the designed skis. They should look into the design of skis for humans and consider why they are that shape and how they can use this to design skis for Marty, taking into account the side of Marty's feet and the weight when Marty moves around because a lot of Marty's weight is in the head.

Here are some things to look out for,

MATERIALS

- What material will slide enough on a table?
- What material will be strong enough not to tear when Marty moves?

SHAPE

- Does Marty move smoothly whilst wearing the skis?
- How is Marty's weight placed across the designed skis?

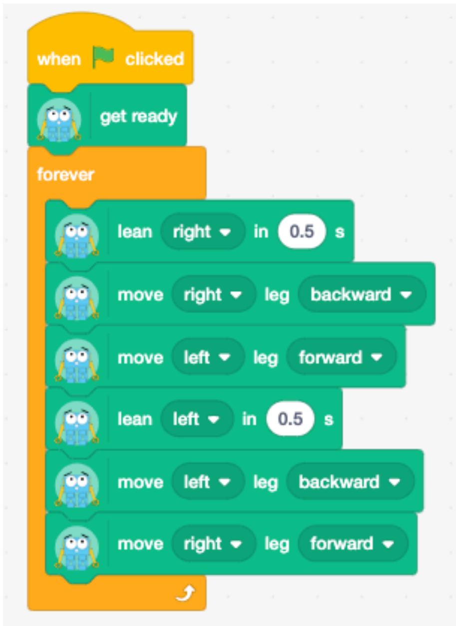
SOLUTIONS

Sample Solutions & Activity Guides

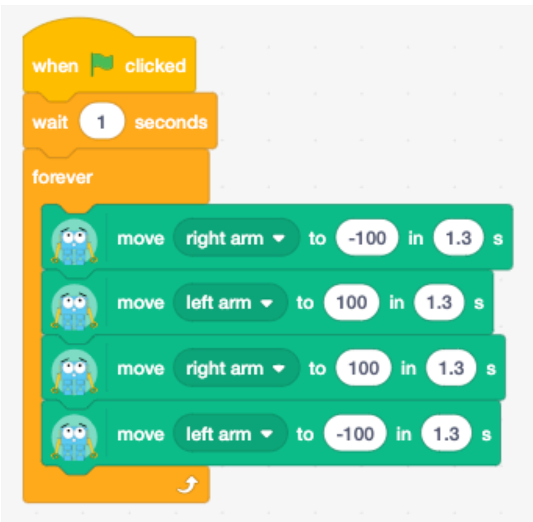
2 Coding Marty to Slide with Skis

To code Marty to slide along the ground instead of lift the feet, we are going to need to design and create our own custom movement. We can do this by breaking down the built-in *walk* command that is available in both Scratch and Python.

If you have already completed Lesson 1.13 then you will have already created your own walking routine and the solution to sliding is similar with one small difference. Instead of lifting the feet off the ground, the feet will stay on the ground and still move forwards and backwards. A sample Scratch block showing this is to the right.



Students may want to improve from this and create functions that they can easily call or add different loops to make their movements faster or more efficient.



Students may then want to add on some arm movements, which can be done by running another movement in parallel to the sliding feet movement.

An example in Scratch is to the left, the same event trigger has been used so that both the sliding and arm movements will be called to start happening at the same time.