WA Digital Technologies Unit Planner

School Name: St Anthony's School, Greenmount	Teacher/s: Philippa Wicksey

(Year 6)	Year Level Description	In Year 6, students further develop understanding and skills in computational thinking such as identifying similarities in different problems and describing smaller components of complex systems. They will have opportunities to create a range of solutions, such as quizzes and interactive stories and animations that involves more than one branching solution (choice of options). Students consolidate their understanding of the role individual components of digital systems play in the processing and representation of data. They acquire, validate, interpret, track and manage various types of data, and begin to explain the concept of data states in digital systems and how data are transferred between systems. Students learn to further develop abstractions by identifying common elements across similar problems and systems and make connections between models and the real-world systems they represent. When creating solutions, students further refine their skills to identify and use appropriate data and requirements. They increase the sophistication of their algorithms by identifying repetition. They learn to incorporate repeat instructions or structures when implementing their solutions through visual programming environments, such as reading user input until an answer is guessed correctly in a quiz. Students critique design solutions and examine the sustainability of their own, and existing, information systems. Students develop strategies to communicate information and ideas using agreed ethical protocols, taking into account the safety aspects of working in digital environments.
	Achievement Standard	At Standard, students outline interactions between components and basic functions within digital systems and how they transmit different types of data to form networks. They make a connection between whole numbers being used to represent data within a digital system. They use software to collect, sort, interpret, visually present and manipulate data for a range of purposes. Students use simple visual programming environments to design, modify, follow and represent both diagrammatically, and in written text, algorithms (sequence of steps), involving branching (decisions), iteration (repetition) and consider user input. Students manage, create and communicate information for online collaborative projects, using agreed social, ethical and technical protocols. Digital Technology students identify available resources to design a solution for a given digital task, outlining problem-solving decisions, using algorithms (sequenced steps). Students develop alternative solutions by designing, modifying and following both diagrammatically and in written text, using a range of appropriate technical terms, technologies and techniques. They select and apply safe procedures when using a variety of components and equipment to make solutions. Students develop criteria collaboratively to evaluate and justify design processes and solutions. They work independently, or collaboratively, considering resources and safety to plan, develop and communicate ideas and information for solutions.

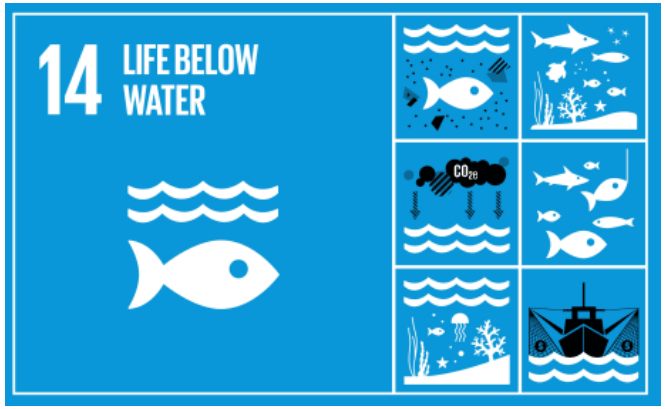
Strand	***Knowledge & Understanding***		***Processes & Production Skills***						
Sub-Strand	*Digital Systems*	*Representation of Data*	*Collecting, Managing & Analysing Data*	*Digital Implementation*	*Creating Solutions By:*				
					Investigating & Defining	*Designing*	*Producing & Implementing*	*Evaluating*	*Collaborating & Managing*
	Digital systems have components with	Whole numbers are used to represent	Collect, sort, interpret and	Design, modify, follow and represent both	Define a problem, and a set of	Design, modify, follow and represent	Select, and apply safe, procedures	Develop collaborative criteria	Work collaboratively considering

Content Description	basic functions and interactions that may be connected together to form networks which transmit different types of data	data in a digital system	visually present different types of data using software to manipulate data for a range of purposes	diagrammatically, and in written text, simple algorithms (sequence of steps) involving branching (decisions) and iteration (repetition) Implement and use simple visual programming environments that include branching (decisions), iteration (repetition) and user input Manage the creation and communication of information, including online collaborative projects, using agreed social, ethical and technical protocols	sequenced steps, with users making decisions to create a solution for a given task Identify available resources	both diagrammatically, and in written text, alternative solutions using a range of techniques, appropriate technical terms and technology	when using a variety of components and equipment to make solutions	to evaluate and justify design processes and solutions	resources and safety, to plan, publish and manage projects, including sequenced steps
General Capabilities	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology	Information & Communication Technology
	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking	Critical & Creative Thinking
	Literacy	Literacy	Literacy	Literacy	Literacy	Literacy	Literacy	Literacy	Literacy
	Numeracy	Numeracy	Numeracy	Numeracy	Numeracy	Numeracy	Numeracy	Numeracy	Numeracy
	Personal & Social	Personal & Social	Personal & Social	Personal & Social	Personal & Social	Personal & Social	Personal & Social	Personal & Social	Personal & Social
	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding	Ethical Understanding

	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding	Intercultural Understanding
Cross Curriculum Priorities	Aboriginal & Torres Strait Islander histories & cultures (**ATSI**) , Asia & Australia's engagement with Asia (**ASIA**) , Sustainability (**SUST**)								

Year 6 Digital Technologies Lesson

Curriculum Content Covered	Learning Objective Summary	Resources
Content Descriptions Covered **Digital Systems** Digital systems have components with basic functions and interactions that may be connected together to form networks which transmit different types of data. **Collecting, Managing and Analysing Data** Collect, sort, interpret and visually present different types of data using software to manipulate data for a range of purposes **Digital Implementation** Design, modify, follow and represent both diagrammatically, and in written text, simple algorithms (sequence of steps) involving branching (decisions) and iteration (repetition) Implement and use simple visual programming environments that include branching (decisions), iteration (repetition) and user input Manage the creation and communication of information, including online collaborative projects, using agreed social, ethical and technical protocols **Investigating and Defining** Define a problem, and a set of sequenced steps, with users making decisions to create a solution for a given task Identify available resources **Designing**	We live in a fragile world that is at risk of environmental devastation due to human inhabitation. This unit looks at real-world problem as outlined in the Sustainable Development Goals, empowering our students to develop their understanding of critical issues and stimulate creative problem-solving skills to innovate and develop solutions. Together the class explores Sustainable Development Goal 14; Life Below Water and the impact of population on sea life. Students engage with the BricQ Motion kits to develop their understanding of mechanism such as gears, weighted blocks and pulleys to develop their own system to clean oceans. **Prior to Unit** **Sustainable Development Goal 14** **Time:** 50mins **Learning Intention:** • Students know what the Sustainable Development Goals are and why they were developed. **Success Criteria:** • Students explore the Sustainable Development Goals website. • Students discuss the SDG 14: Life Below Water, providing insights into their prior knowledge of ocean pollution, evidencing reflections on the goals and generating ideas to achieve this SDG. Together with your students explore the Sustainable Development Goals website. https://www.globalgoals.org/resources **Explore and discuss Development Goal 14: Life Below Water.**	LEGO Spike Essential LEGO BricQ Aquarium filled with water to simulate the ocean environment iPads Evaluation Checklist

Design, modify, follow and represent both diagrammatically, and in written text, alternative solutions using a range of techniques, appropriate technical terms and technology **Producing and Implementing** Select, and apply safe, procedures when using a variety of components and equipment to make solutions **Evaluating** Develop collaborative criteria to evaluate and justify design processes and solutions **Collaborating and Managing** Work collaboratively considering resources and safety, to plan, publish and manage projects, including sequenced steps	**https://www.globalgoals.org/resources**  *"**Healthy oceans and seas are essential to our existence.** They cover 70 percent of our planet and we rely on them for food, energy and water. Yet, we have managed to do tremendous damage to these precious resources. We must protect them by eliminating pollution and overfishing and immediately start to responsibly manage and protect all marine life around the world."*  **REDUCE MARINE POLLUTION** By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.	
Vocabulary/Key Questions	**Activity Sequence** *Suggested timeframe:*	**Assessment**

- Digital system
- Software
- Hardware
- Programming environment
- Loop
- Iterate
- De-bugging
- Data
- Code blocks
- Programming area
- Motor
- Sensors
- Algorithms
- Brick
- Forces
- Pull
- Push
- Gears
- Weighted Blocks
- Pulleys
- Float
- Sink
- Water resistance
- Sweep
- Grab
- Reel

Lesson 1: Ocean Survey

LEGO Spike Education Essential 45mins Beginner

Learning Intention:

- Students build a submarine that Brizo and Coralia can use to survey the ocean, collecting data on pollution.

Success Criteria:

- Follow instructions to build a submarine.
- Follow instructions to create program to drive submarine with a motor.
- Use loop programming block for continuous automated drive.

Brizo and Coralia have been charged with the task of surveying the ocean near their scientific research centre. They must collect data about the pollution in the ocean by taking photographs, videos, water and pollution samples.

Your task today is to build Brizo and Coralia a submarine that they can travel in the ocean.

Prepare

- Review the Ocean Survey lesson, Spike Essential kit and explore the Spike App.
- Prepare the word wall with vocabulary appropriate to this unit and pre-teach any unknown words.
- Consider the educational needs of the students and differentiate the lesson accordingly.

Engage

Whole class- 5 minutes

- Review content covered in Sustainable Development Goal 14 lesson. Ensure students have a good understanding of the goals and their purpose.
- Introduce the characters Brizo and Coralia, two scientists working to monitor the ocean environments.
- Build Brizo and Coralia's submarine so they can inspect the ocean environment.
- Distribute LEGO Spike Education Essential kits and iPads.
- Don't forget to name your scientific submarine!

Evaluate

Observation Checklist

Measure student proficiency of the success criteria using the following scale.

-Needs additional support from peers and teachers.

-Works collaborative with a peer to complete task.

-Completes tasks and supports other teams.

Self-assessment

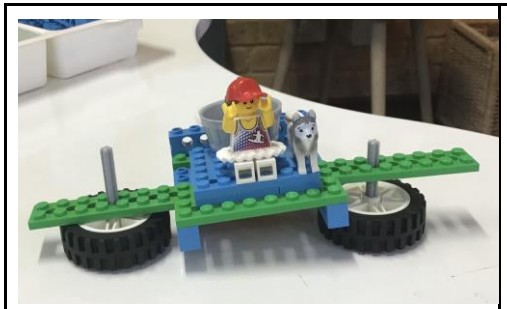
Students use LEGO bricks to create an emoji that represents their performance.

Peer-feedback

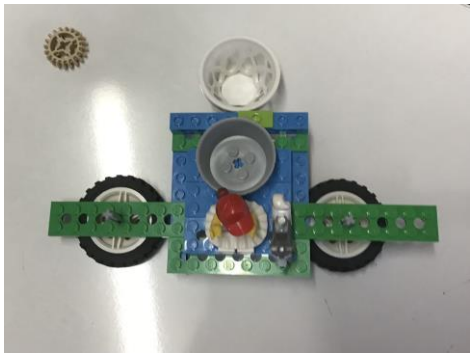
	Explore **Small groups- 30 minutes** • Students use the LEGO Spike Education Essential kit and App to build a scientific submarine. • Make and try the program that propels the scientific submarine. • Students iterate and test their submarine, debugging and problem-solving when needed. • Students can modify submarine to make it better. **Explain** **Whole-class 5 minutes** • Bring all students together to reflect on their completed challenge. • Ask questions What was the most challenging aspect? What problems did you encounter? How did you change the program to make the submarine better? How did you change the build to make the submarine better? What problems might Brizo and Coralia experience in this submarine? **Elaborate** **Whole-class 5 minutes** • Prompt your students to discuss and reflect on the process of following the building instructions. • Ask questions Why is it important to follow instructions? What happens when you are missing pieces? What happens if you don't click the pieces together tightly? Have your students cleaned up their workstation and checked that your kit has all it's pieces. **Differentiation** **Simplify this lesson by:** Read the story and have each group build the submarine without the motors. **Increase difficulty by:** Challenge students to improve the submarine by making changes to it.	

	Extension **Mathematics:** Provide students with a sample of rubbish collected from the ocean. Students represent this data in various graphs. **Science:** Students conduct simple tests to ascertain water quality. **Art and Technology:** Students create video footage that could have been collected from Brizo and Coralia's cameras. Students use an aquarium and underwater cameras to produce footage.  **Jayden and Beau**	
 **Kate** 	**Lesson 2: Gears Are Go!** Brizo and Coralia have collected sea life to examine, build their viewing platform that will allow them to move the sea life around without touching them. **Learning Intention:** • Students use gears to build a viewing platform for Brizo and Coralia's scientific studies. **Success Criteria:** • Follow instructions to build a functioning gear system. • Students work collaboratively to build the system and solve problems effectively.	**Introducing Squidward Junior;** a curious squid who likes to follow Brizo and Coralia.  **Evaluate** Observation Checklist Self-assessment Peer-feedback

 **Kate and Xavier**	**Lesson 3: Pulley Me Up!** Brizo and Coralia noticed that lots of rubbish is washing up in the bay. Brizo and Coralia need a system that pulls the rubbish out of the water. What system can be used that lifts a heavy weight with little force? **Learning Intention:** • Students build a variety of pulley systems that Brizo and Coralia can use to easily pull pollution from the ocean. **Success Criteria:** • Follow instructions to build two pulley systems. • Follow instructions to create program to drive the pulley using the force of manual operation or an automated motor. • Use loop programming block for continuous automated drive.	 **Evaluate** Observation Checklist Self-assessment Peer-feedback
 **Hudson**	**Lesson 4: Weighted Winches!** Brizo doesn't know what to do with all the rubbish pulled from the bay! How will he get it up the bay and transport it to the recycling plant? How can we use a pulley system that's weighted so it won't fall over when pulling the heavy rubbish? **Learning Intention:** • Students build a variety of pulley systems that Brizo and Coralia can use to easily pull pollution from the ocean. **Success Criteria:** • Follow instructions to build a pulley system. • Follow instructions to create program to drive the pulley using the force of manual operation or an automated motor. • Use loop programming block for continuous automated drive.	**Evaluate** Observation Checklist Self-assessment Peer-feedback



Blayde



Lesson 5 and 6: Create Phase
Time: 45mins **Skill:** Intermediate

Students design and build a system that will collect and remove pollution from the ocean. Although they are creating a prototype, the model should demonstrate the mechanism used to operate the system (sweep, grab, reel, gears, weighted blocks, pulleys).

Students are familiar with the mechanisms of gears, weighted blocks and pulleys from the previous activities. However, students may explore the design library for inspiration for devices that sweep, grab and reel.

Learning Intention:

- Students build a NEW innovation that will collect pollution from the ocean.

Success Criteria:

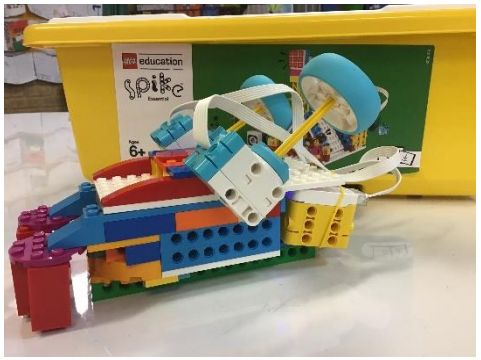
- Students use the design process to develop their innovation.
- Students use gears, pulleys and weighted winches to collect the rubbish and remove it from the ocean.
- Students create a program to drive the mechanisms so they are fully automated.
- Students use a motor.
- Use loop programming block for continuous automated drive.

Evaluate
Observation Checklist
Self-assessment
Peer-feedback

Plenary Activity
Create a diorama or an aquarium to replicate Brizo and Coralia's scientific research bay. Place a model from each lesson in the bay and allow students to set up and demonstrate their pollution collector to an audience.

Additional Content

We named our characters Brizo (God of Sailors) and Coralia, they are ocean scientist who live at a research facility in a Byron Bay. They have noticed that the ocean pollution has been getting worse, so they need a scientific submarine to allow them to survey the ocean. Our students designed all the LEGO builds in this unit. That's right, they have even designed the scientific submarine!



As a part of this unit, students explore gears, weighted winches, and pulley systems. There is a lesson for each mechanism and our students created....

A sea life viewing platform using gears!	A Pulley system to pull pollution from Byron Bay!	A winch system to pull the rubbish into the transporting vehicle to go to the recycling centre!	But most importantly is SQUISHWARD JUNIOR, a curious and friendly helper who is always checking out Brizo and Coralia's work!!!