Technology Learning Area Plan – Year 6

UNIT TITLE:	Shake it Off - Earthquake Simulator
INQUIRY	**In this unit students will investigate the following questions:** • What causes an earthquake? • How are the effects, magnitude and intensity of earthquakes measured?
DIGITAL & TECHNOLOGY CURRICULUM	This unit is designed to cover the following curriculum areas: **Digital Technologies Knowledge and Understanding** Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014) **Digital Technologies Processes and Production Skills** Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019) Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)

LEARNING INTENTIONS	ASSESSMENT
Note: This unit can be combined into multiple activities over a number of days, or split into lessons over a number of weeks dependent on the requirements of your school. Lessons structure is only a guide, activity order can be modified dependent on needs. **Guided Inquiry** – Understand the preliminary events that take place before construction – Planning and Design. **Inquiry** – Plan, design, test and evaluate different bridge designs through design challenges with differing materials. **Investigation** – Identify and describe bridge types and	**To design and program a robotic shake table to replicate the movement of an earthquake.** • In pairs or groups of three, students will use the Shake Table Building Instructions to construct a NXT Lego Shake Table. • Students will program their NXT to make the most intense earthquake • Students will construct a structure above the shake table that is freestanding, however this structure should collapse when the earth shake table is turned on. The structure needs to be made from spaghetti, marshmallows and cheese balls only.

designs and some engineering principals behind bridge building. **Data response** – demonstrate their understanding of simple physics behind designing, building and using bridges.	
SUCCESS CRITERIA	**VISIBLE LEARNING**
At the end of this unit students will be able to: • Explain what the task is asking them to do and record what I know about earthquakes. • Work collaboratively in a team to build and program a shake table. • Work collaboratively in a team to design and construct a structure to be assembled on top of the shake table. • Test my structure and shake table • Troubleshoot and reprogram and issues that arise • Reflect on my learning by completing an evaluative journal.	**Outlining Lesson Objective:** • Explaining what your expectations are for the class by the end of the lesson/unit/activity etc… • Verbally state lesson outcomes to students, we are learning to…at the end of this lesson you will….etc • Write objectives in a specific place – laminated card, whiteboard that state outcomes and have students repeat them back. **Student feedback ideas:** Students can give feedback in numerous ways dependent on the activity/lesson: • **Thumbs up signals** – Two thumbs up, (understood and able to work independently and/or able to instruct another students in the class), One thumb up (understands well, able to work independently), Thumb to the side (has some understanding, but needs more time and/or assistance), Thumb down (has not yet understood). • **Coloured cups/cards/traffic lights** etc. – red (needs help), yellow (ok, but may require time or assistance), green (ok to go, understands concepts) Have a specific place in the room where students can fill in post-it notes and stick them up – these can include what they have learned, any questions they may have, what they didn't understand, how well they understood, one thing they feel that have improved on and/or what they think they can improve on for next time...etc.
YEAR LEVEL ACHIEVEMENT	<u>TECHNOLOGY</u> **Achievement Standard** By the end of Year 6, students will have had opportunities to create a range of digital solutions, such as games or

STANDARD	quizzes and interactive stories and animations. In Year 5 and 6, students develop an 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 are introduced to the concept of data states in digital systems and how data are transferred between systems. <mark>They learn to further develop abstractions by identifying common elements across similar problems and systems and develop an understanding of the relationship between models and the real-world systems they represent.</mark> When creating solutions, students define problems clearly by identifying appropriate data and requirements. When designing, they consider how users will interact with the solutions, and check and validate their designs to increase the likelihood of creating working solutions. Students increase the sophistication of their algorithms by identifying repetition and incorporate repeat instructions or structures when implementing their solutions through visual programming, such as reading user input until an answer is guessed correctly in a quiz. They evaluate their solutions and examine the sustainability of their own and existing information systems. Students progress from managing the creation of their own ideas and information for sharing to working collaboratively. In doing so, they learn to negotiate and develop plans to complete tasks. When engaging with others, they take personal and physical safety into account, applying social and ethical protocols that acknowledge factors such as social differences and privacy of personal information. They also develop their skills in applying technical protocols such as devising file naming conventions that are meaningful and determining safe storage locations to protect data and information. ## SCIENCE By the end of Year 6, students <u>compare</u> and <u>classify</u> different types of observable changes to materials. They <u>analyse</u> requirements for the transfer of electricity and <u>describe</u> how energy can be transformed from one form to another when generating electricity. <mark>They <u>explain</u> how natural events cause rapid change to Earth's surface.</mark> They <u>describe</u> and <u>predict</u> the effect of environmental changes on individual living things. <mark>Students <u>explain</u> how scientific knowledge helps us to <u>solve</u> problems and inform decisions and <u>identify</u> historical and cultural contributions. Students follow procedures to <u>develop</u> investigable questions and <u>design</u> investigations into simple cause-and-effect relationships.</mark> <mark>They <u>identify</u> variables to be changed and measured and <u>describe</u> potential safety risks when planning methods. They collect, <u>organise</u> and <u>interpret</u> their data, identifying where improvements to their methods or research could improve the data.</mark> They <u>describe</u> and <u>analyse</u> relationships in data using appropriate representations and <u>construct</u> multimodal texts to communicate ideas, methods and findings.
ASSESSMENT	To program an earthquake simulator (shake table) using Lego NXT Robotics. 1. Students will use the picture instructions to build their earthquake simulator. 2. They will work in groups with specific roles to build, program and test their NXT Robot that will simulate an

earthquake.
3. They will have to build freestanding structure with specific materials that will collapse when they turn their shake tables on.
4. They will need to test, troubleshoot and reprogram their robot throughout the testing phase.
5. They will then evaluate their programming with a written response to the following questions:

Describe what happened to your structure during the earthquake?
Was my shake table successfully? If not why?
How do I know if my shake table was successful or not?
Did I need to troubleshoot my programming? Why?
How did I find this task? Easy, Ok, Difficult?
If I were to undertake this task again, what would I change or do differently?

DEVELOPING INQUIRING AND REFLECTIVE LEARNERS

☒ Community Contributor	☒ Effective Communicator	☒ Designer and Creator
☐ Leader and Collaborator	☒ Active Investigator	☒ Quality Producer

CROSS CURRICULAR PRIORITIES

☐ Catholic Ethos	☐ Aboriginal and Torres Strait Islander Histories and Cultures	☐ Asia and Australia's Engagement with Asia
☒ Sustainability Education	☐ Social Emotional Learning	☒ Inclusive Education

GENERAL CAPABILITIES

☒ Literacy	☒ Numeracy	☒ Information and Communication Technology
☒ Critical and Creative Thinking	☒ Ethical Behaviour	
☐ Intercultural Understanding		☒ Personal and Social Competence

LEARNING AND TEACHING STRATEGIES

WEEK	1	2	3	4	5	6	7	8	9	10

SCIENCE CONTENT DESCRIPTORS			*MATH CONTENT DESCRIPTORS*		*TECHNOLOGY CONTENT DESCRIPTORS*		
(ACSHE100)					(ACTDIP019)	(ACTDIP020)	

LEARNING INTENTIONS	*SUCCESS CRITERIA*
Students will: • Explain what the task is asking them to do and record what they know about earthquakes.	I can: • Explain what the task is asking them to do and record what I know about earthquakes.

<p align="center">Engage → Explore → Explain → Elaborate → Evaluate</p>

ENGAGE	*RESOURCES*
<u>FOCUS LA:</u> SCIENCE *What are the causes and effects of earthquakes?* **ACTIVITY** • Introduce students to the unit- Shake it Off – Earthquake Simulator • Introduce students to the task and challenge • Form Learning Teams – Pairs and Teams of 3 would be ideal. • View YouTube video on a large scale Earthquake simulators and discuss the cause and effects of earthquakes: https://www.youtube.com/watch?v=ZKdnFKqb5ls&feature=youtu.be - Japanese Earthquake Simulator – Seismic Intensity 7 (2:04) https://www.youtube.com/watch?v=8CA7PJ7ZV7g&feature=youtu.be Earthquake Simulation (0.23) https://www.youtube.com/watch?v=nO9wc1bkM5l Shake & Quake Earthquake Safety- Mythbusters (3:07) • Students need to explain what the task is asking them to do and record what they know about earthquakes. Students are required to take notes	Student Resources: Technology Journals Laptops with access to NXT Software Teacher Resources: www.youtube.com/watch?v=ZKdnFKqb5ls&feature=youtu.be https://www.youtube.com/watch?v=8CA7PJ7ZV7g&feature=youtu.be https://www.youtube.com/watch?v=nO9wc1bkM5l
	ASSESSMENT OPPORTUNITIES
	Technology Journals

during the short videos.										

LEARNING AND TEACHING STRATEGIES

WEEK	1	2	3	4	5	6	7	8	9	10
SCIENCE CONTENT DESCRIPTORS			*MATH CONTENT DESCRIPTORS*			*TECHNOLOGY CONTENT DESCRIPTORS*				
						(ACTDIP019)		(ACTDIP020)		

LEARNING INTENTIONS	*SUCCESS CRITERIA*	A
Students will: • Follow instructions to construct the shake table using Lego NXT Robotics pieces	I can: • Work collaboratively in a team to build and program a shake table. • Work collaboratively in a team to design and construct a structure to be assembled on top of the shake table.	

Engage →   **Explore →**   **Explain →**   **Elaborate →**   **Evaluate**

ENGAGE	*RESOURCES*
<u>FOCUS LA:</u> SCIENCE *What are the causes and effects of earthquakes?* **ACTIVITY** • In their learning teams, students will use the Shake Table Building Instructions (supplied) to construct their NXT Lego Shake Table. This lesson may need to be split over two sessions. • Once construction of the shake table is complete, students will need to begin programming their Robot. Using the code at the bottom of the Instructions PDF, students need to program the robot to make the most intense earthquake in order to collapse the structure. Students need to record their code in their technology journals and explain their reasoning for the changes they make to their code. Ideas for technology journals are listed in the evaluate phase.	<u>Student Resources:</u> Shake Table Building Instructions PDF Lego NXT Pieces – see detailed equipment in the PDF document. Technology Journals Spaghetti Marshmallows Cheese balls <u>Teacher Resources:</u> Teacher built shake table to demonstrate
	ASSESSMENT OPPORTUNITIES

• The challenge is to construct a structure above the shake table that is freestanding on its own, however will collapse when the earthquake table is turned on. The structure needs to be made from spaghetti, marshmallows and cheese balls only. • Optional- Teacher to demonstrate a completed NXT Shake Table as an example.	

TECHNOLOGIES LANGUAGE
Code, programming,

LEARNING AND TEACHING STRATEGIES

WEEK	1	2	3	4	5	6	7	8	9	10
SCIENCE CONTENT DESCRIPTORS				MATH CONTENT DESCRIPTORS				TECHNOLOGY CONTENT DESCRIPTORS		

LEARNING INTENTIONS	SUCCESS CRITERIA		^
Students will: • Test their shake tables and troubleshoot and reprogram to meet the task requirements.	I can: • Test my structure and shake table • Troubleshoot and reprogram and issues that arise		

Engage → Explore → Explain → **Elaborate** → Evaluate

ENGAGE	RESOURCES
FOCUS LA: Science **ACTIVITY** • Teams are to test their shake table with their structures on top. Teacher to video each group's shake table results. • Students are to journal their progress by describing and explaining, what they are seeing on the screen and how that corresponds with what the robot's actions are. • Students have the opportunity to troubleshoot and reprogram their shake tables to meet the task requirements. Any troubleshooting should be recorded their technology journals.	Student Resources: Shake Table Building Instructions PDF Lego NXT Pieces – see detailed equipment in the PDF document. Technology Journals Spaghetti Marshmallows Cheese balls Teacher Resources: IPad to video the shake table tests

	ASSESSMENT OPPORTUNITIES
	This is a full or half day design assessment task with all classes working in groups of no more than 3.
TECHNOLOGIES LANGUAGE	

LEARNING AND TEACHING STRATEGIES

WEEK	1	2	3	4	5	6	7	8	9	10
SCIENCE CONTENT DESCRIPTORS				*MATH CONTENT DESCRIPTORS*				*TECHNOLOGY CONTENT DESCRIPTORS*		
								(ACTDIP019)	(ACTDIP020)	

LEARNING INTENTIONS	SUCCESS CRITERIA		A
Students will: • Complete an evaluative journal on their shake table	I can: • Reflect on my learning by completing an evaluative journal.		

Engage → Explore → Explain → Elaborate → **Evaluate**

ENGAGE	RESOURCES
<u>FOCUS LA:</u> Science **ACTIVITY** • Students individually complete their technology journal evaluating how successful their shake table was. Students can use the following questions as a guide: Describe what happened to your structure during the earthquake? Was my shake table successfully? If not why? How do I know if my shake table was successful or not? Did I need to troubleshoot my programming? Why? How did I find this task? Easy, Ok, Difficult? If I were to undertake this task again, what would I change or do differently? Technology Journals can be completed in a variety of way. They could be completed using apps	<u>Student Resources:</u> Technology Journal <u>Teacher Resources:</u> *ASSESSMENT OPPORTUNITIES* Technology Journal

such as:
- Explain Everything
- Book Creator
- Show Me
- Popplet
- Baiboard HD

TECHNOLOGIES LANGUAGE

Educational Modifications

CLASSROOM ACCOMMODATIONS	FOR WHOM
Seat near teacher	
Assign student to low- distraction area	
Seat near positive peer models	
Use support groups / cooperative learning	
Use rows instead of tables	
Use learning centre	
Use of time-out	
Stand near student when giving instruction	
Arrange classroom for safe visibility, accessibility and movement	

PRESENTATION OF LESSONS	FOR WHOM
Adjust work load, reduce assignments or give alternative assignments	
Use visual aids with oral presentation	
Teacher gives student outlines or study guides	
Ensure regular lesson revisits/reviews	
Highlight instructions (marker or highlighter tape)	
Give clear behavioural objectives	
Ask student to repeat instructions for clarification and understanding	
Use high- impact game-like materials	
Call on student often	
Acknowledgment effort put forth	
Give reminders for student to stay on task, monitor student is on task/topic	
Use large type/font and dark ink	
Keep page format simple	
Use visual prompts	
Divide page into clearly marked sections	
Remove distractions from paper	

ALTERNATIVE EVALUATION PROCEDURES	FOR WHOM
Reduce number of items	
Practice completely similar questions	
Arrange for oral testing	
Have support staff administer test	
Permit student to type or use word processing	
Adjust grading criteria based on individual	
Adjusted grading option	

NOTE TAKING STRATEGIES	FOR WHOM
Provide student the means to record	
Arrange for note taker e.g. Aide	
Give student a copy of notes	
Provide time for periodic review of student's notes (written, dictated, word processed)	

ORGANISATIONAL STRATEGIES	FOR WHOM
Use calendar to plan assignments	
Use of assignment notebook or work checklist especially diary	

Daily schedule	
Give time top organise desk during class	
AM check-in to organise for the day	
Lunch-time check-in to organise for PM	
PM check-out to organise for homework	
Arrange a duplicate set of classroom material for use at home	
Develop parent/school contract	
Training in time management	
SUPPORT SERVICES	**FOR WHOM**
Peer tutoring	
Cross-age tutoring	
Student buddy	
Work with school officer	
Meet with staff during available times	
Teach student to monitor own behaviour	
Implement behaviour contract/reward	
Self advocacy/communication skill training	
Conflict resolution strategies	
Other _____	

Adapted with permission from Positive Partnerships PD Facilitators Guide
Module 5 Support materials

Appendix 3

Assessment Task Sheet and Criteria Sheet

Digital Technology Assessment Task Sheet

Student Name: **Year Level: YEAR 6**

Name of Task: **Teacher:**

Learning Area/s: Science

Date Commenced: **Date Due:**

Type of Task: ☐ Oral   ☒ Written   ☐ Other

Task Conditions: ☒ Individual   ☐ Pair   ☒ Group Work

☒ In Class   ☐ Homework   ☐ Other

Opportunity to Access: ☐ Books   ☒ Notes   ☐ Library   ☒ Technology

Assessed By: ☒ Self   ☐ Peer   ☒ Teacher

Task Description:

To design and program a robotic shake table to replicate the movement of an earthquake.

PROCEDURE

- In pairs or groups of three, students will use the Shake Table Building Instructions to construct a NXT Lego Shake Table.
- Students will program their NXT to make the most intense earthquake
- Students will construct a structure above the shake table that is freestanding, however this structure should collapse when the earth shake table is turned on. The structure needs to be made from spaghetti, marshmallows and cheese balls only.

Resources:

- NXT Lego Unit
- Specific Lego Parts are outlined in the PDF instruction documents
- Spaghetti
- Marshmallows
- Cheese balls
- Technology Journals – can be electronic

DIGITAL AND TECHNOLOGY – SHAKE IT OFF

Criteria	A	B	C	D	E
The student work demonstrates evidence of:					
Examine the main components of NXT Lego Robotics and how they connect with computer software. They are able to journal to show their programming data from the screen to the robot (ACTDIK014)	They have demonstrated a very high understanding of how the NXT Robotics connects with the computer software. Student has a detailed and comprehensive journal response of their programming progress.	They have demonstrated a high understanding of how the NXT Robotics connects with the computer software. Student has a detailed journal response of their programming progress.	They have demonstrated some understanding of how the NXT Robotics connects with the computer software. Student has a satisfactory journal response of their programming progress.	They have demonstrated a limited understanding of how the NXT Robotics connects with the computer software. Student has a limited journal response of their programming progress.	They have not yet demonstrated an understanding of how the NXT Robotics connects with the computer software. There is little or no journal response of their programming progress.
Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) Students are able to test and troubleshoot their NXT Robot.(ACTDIP019)	Is able to independently design, modify and correctly follow simple algorithms to program their robot. Has shown initiative by testing and troubleshooting their robot so that it achieves the intended design solution.	Is able to independently design, modify and mostly correctly follow simple algorithms to program their robot. Was able to test and troubleshoot their design so that it achieves the intended solution. By testing and troubleshooting their robot so that it achieves the intended design solution.	Is able to satisfactorily design, modify and follow some simple algorithms to program their robot. Was able to make sensible suggestions for future redesign.	Is able to design, modify and follow simple algorithms to program their robot. Attempted to make suggestions for future redesign.	Requires assistance or is not able to design or follow simple algorithms. Was not able to make suggestions for future redesign.
Student is able to implement a digital solution by creating and programing an earthquake simulator involving branching, iteration (repetition), and user input (ACTDIP020)	Student is able to independently and correctly implement a digital solution by creating and programming an earthquake simulator involving branching, iteration (repetition), and user input.	Student is able to independently implement a digital solution by creating and programming an earthquake simulator involving branching, iteration (repetition), and user input.	Student is able to satisfactorily implement a digital solution by creating and programming an earthquake simulator involving branching, iteration (repetition), and user input.	Student is able to implement a digital solution by creating and programming an earthquake simulator involving branching, iteration (repetition), and user input.	Student requires assistance or is not able to implement a digital solution by creating and programming an earthquake simulator involving branching, iteration (repetition), and user input.

Feedback

Signed: Date