Coordinator Notes: Module 3.3 Weather – Wild Weather and Natural Disasters

This Module explores some of the wild weather and natural disasters that impact Australia and the rest of the world.

Students will learn more about:

- Cyclones
- Thunderstorms and lightning
- Earthquakes and Tsunami's
- Designing structures to withstand wild weather and natural disasters

Session Length:

This Module can be presented in different session durations per your needs.

Lesson plans are provided for:

- A 120 minute session, or, 2 x 60 minute sessions
- 45 minute, 75 minute, and 90 minute sessions

Technology:

PowerPoint: If you do not have access to a data projector and cannot display the PowerPoint presentation, we recommend that you print the most important slides before the session, and either enlarge them onto cardboard to use in place of slides, or create a booklet that students can share in small groups.

The most important slides have been included as a 'Reduced Slides' PowerPoint file, and an easily printable pdf version of these slides is also provided. If you choose this option, we recommend that you still read and use the slide notes included in the full PowerPoint for the session.

The session can be conducted without slides all together, but they offer visual aid in explanation of scientific concepts. We recommend at the very least that instructions for each experiment are printed for the students.

Videos links: The suggested links to online videos within the session can be helpful with explanation. Notes have been included in the slides if there is an essential component to a video which the facilitator should discuss or demonstrate, if the video cannot be played.

Video files: A video file for each Module has been provided to aid explanation and instruction for some experiments and challenges. It is recommended coordinators view video files prior to delivering sessions, if the experiments and challenge activities are unfamiliar.

Please read the Module 3 Risk Assessment before proceeding with the activity

Contents	Page

Module 3.3 Weather – Wild Weather and Natural Disasters: Overview

Wild weather and natural disasters occur throughout Australia. Extreme events can result in loss of property, and loss of life. Use your local knowledge to assess the benefit of delivering this session, and ensure sensitivity is shown where/when students may have experienced, or be likely to experience, a severe weather or natural disaster event.

Encourage students to use the scientific method (introduced in Module 1) to form hypotheses for their experiments in Module 3.

Content overview:

Concept / Activity	Session Duration (minutes)			
	120	90	75	45
Wild Weather: Exploration of types of extreme weather	*	*	*	*
Experiment 3.3.1 Tornado Tube Explores the shape and movement of tornados	*	*	*	-
Exploration of Tropical Cyclone formation and categorisation	*	*	*	*
Experiment 3.3.2 Tornado Jar Explores the shape and movement of tornados	*	-	-	*
Experiment 3.3.3 Cyclone in a Box Explores the formation and shape of cyclones	*	*	*	-
Thunderstorms and Lightning: exploration of features & risks	*	*	-	-
Experiment 3.3.4 Static Power Explores the generation storage and use of static electricity	*	*	-	-
Natural Disasters: Exploration of types of natural disasters, and connection of some natural disasters to weather	*	*	*	*
Earthquakes and Tsunamis: exploration of features and concepts, measurement and global occurrences	*	*	*	-
Designing for weather and disaster proofing: exploration of building standards	*	*	*	*
Challenge 3.3 Disaster Proofing Challenge Students use a range of materials to design, build and test a flood and wind proof structure	*	*	*	*

Slides:

PowerPoint Slides are available to support the delivery of this module. Slides explain concepts visually, and include short, engaging videos relevant to the topic. A full list of slides and recommended inclusions for each session duration are provided in the table below. Appropriate slides are also noted in lesson plans for each duration.

PowerPoint Presentation: 'M 3.3 - Master Slides 120 minute Session Duration'		Session Duration (minutes)			
Slide	**Content**	**120**	**90**	**75**	**45**
1	Introductory title page for Module 3.3	*	*	*	*
2	Prompt slide: Wild Weather, sea foam	*	*	*	*
3	Prompt slide: Wild Weather, types and impacts	*	*	*	*
4	Experiment E3.3.1 Outline: Tornado Tube	*	*	*	-
5	Prompt slide & Video: Tropical Cyclone formation	*	*	*	*
6	Prompt slide: Australian Cyclone Categories	*	*	*	*
7	Experiment E3.3.2 Outline: Tornado Jar	*	-	-	*
8	Intro to DRY ICE in preparation for Experiment 3.3.3	*	*	*	-
9	Experiment E3.3.3 Outline: Cyclone in a Box (DEMO)	*	*	*	-
10	Prompt Slide: Thunderstorms and Lightning	*	*	-	-
11	Introductory Slide: Lightning	*	*	-	-
12	Experiment E3.3.4 Outline: Static Power	*	*	-	-
13	Introductory Slide: Natural Disasters, bush fire, flood	*	*	*	*
14	Introductory Slide: Earthquakes, Tsunamis. Video.	*	*	*	-
15	Prompt slide: Tectonic plates	*	*	*	-
16	Prompt slide: Richter Scale	*	*	*	-
17	Introductory Slide: Designing for Wild Weather	*	*	*	*
18	Introductory slide for C3.3 Challenge	*	*	*	*
19	Wind proofing information – roofs	*	*	*	*
20	Wind proofing information – foundations	*	*	*	*
21	Wind proofing information – doors and windows	*	*	*	*
22	Flood proofing information – foundations	*	*	*	*
23	Challenge Rules	*	*	*	*
24	Session references, online links	*	*	*	*
25	Session references, online links	*	*	*	*

Module 3.3 Wild Weather and Natural Disasters

Lesson Plan

120 minute session or 2 x 60 minute sessions

High Tech: Use PowerPoint Presentation 'M3.3 - Master Slides'
Low Tech: Print PowerPoint 'M3.3 - Reduced Slides for Printing'. Use slide notes from the ENTIRE 120 minute presentation, adapting discussion to cover omitted slides.

Key Learning Area	**Topic**
Earth Science, Physical World	Weather, Natural Disasters

Timing	Running Time (hh:mm)	Procedure	Materials
5 min	00:05	**Lesson Introduction** Welcome. Discuss types of wild weather experienced, seen in the news or heard of. Watch the Channel 7 news videos, showing Sea Foam in QLD in 2013 after a cyclone and a water spout in NSW in 2011. (If videos unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slides 1-3)
10 min	00:15	**Body of Lesson** **(Lesson 1, 2 x 60 minute sessions)** Discuss hypothesis, conduct Experiment E3.3.1 Tornado Tube	PowerPoint M3.3 (Slide 4) Plastic 1.25L drink bottles, tornado tube valves, water food colouring, glitter
5 min	00:20	Watch the video about Tropical Cyclones and discuss categories of severity. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 5-6)
5 min	00:25	Discuss hypothesis, conduct Experiment E3.3.2 Tornado Jar	PowerPoint M3.3 (Slide 7) Jars, lids, waters, liquid soap, food colouring

10 min	00:30	Discuss hypothesis, demonstrate experiment 3.3.3 Cyclone in a Box	PowerPoint M3.3 (Slides 8-9) Pre-prepared box, fan, battery, dry ice, container, water, gloves, safety glasses
5 min	00:35	Explore thunderstorms and lightning features, risks, concepts	PowerPoint M3.3 (Slide 10-11)
10 min	00:45	Discuss hypothesis, conduct Experiment E3.3.4 Static Power	PowerPoint M3.3 (Slide 12) Balloons, fluoro light tubes, woollen clothing e.g. sock, tissues
5 min	00:50	Explore wild weather and natural disasters, discuss links and differences. Watch the video about Tsunamis. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 13-14)
5 min	00:55	Discuss earthquakes, tectonic plates, Richter Scale. **(Break for 2 x 60 minute sessions)** **(Lesson 2, 2 x 60 minute sessions)**	PowerPoint M3.3 (Slide 15-16)
3 min	00:03 / 1:03	Discuss wild weather, and natural disasters, and ideas for how we might design buildings to withstand them.	PowerPoint M3.3 (Slide 17)
5 min	00:08 / 1:08	Introduce Challenge Activity, explain rules and materials. Outline tips for designing structures.	PowerPoint M3.3 (Slide 18-23) Planning Sheet M3.3 Paddle pop sticks, skewers, straws, paper, polystyrene trays, cling wrap, aluminium foil, masking tape, paper clips, rubber bands, modelling clay, blue tack, cardboard, large tub, water, bucket, chopping board or tub lid, fan and / or hair dryer or leaf blower, plastic bottles Worksheet 3.3
2 min	00:10 / 1:10	Form into groups, hand out planning sheets.	
40 min	00:50 / 1:50	Planning, construction and testing.	

5 min	**00:55/ 01:55 END**	**Lesson Conclusion** Clean up. Discuss session!	

Module 3.3 Wild Weather and Natural Disasters: Experiments

E3.3.1: Tornado Tube

Aim: To observe the shape of a tornado using two bottles.

Materials (per group):

- 2 x 1.25L clear recycled plastic bottles
- 1L room temperature water
- 1 x tornado tube valve
- Food colouring and glitter (both optional)

Procedure:

1. Form into groups and collect materials.
2. Fill one of the bottles with water. You may also like to add food colouring and glitter, these are optional and do not change the experiment result!
3. Connect the tornado tube valve to the bottle with water, and then connect the empty bottle to the other end of the valve.
4. Flip the bottles over, so the water filled bottle is now on top of the empty bottle. Observe.
5. Repeat the experiment, this time give the bottles a swirl in a circle. Observe and document your results!

Extensions:

- How quickly does the water drain from the top bottle to the bottom?
- Does swirling the bottles change the draining speed?

Expected Result:
When the bottles are flipped over, water will being to flow from the top (full) bottle to the bottom (empty) bottle. A tornado shape will form in the top bottle, with a wide circular mouth at the surface of the water, and a thin spinning tube towards the tornado valve. The tornado shape will be more noticeable when the bottles are swirled in a circular motion immediately after flipping them over.

Explanation:
A tornado tube works similar to the way a real tornado does. Water is denser than air, so it seeks to sink below air, and air seeks to rise above water. In order for the air to rise and the water to fall they must change places, and when they do so they must past one another. Much like two people moving opposite ways through a doorway, they must move over so both can fit through the space. The circular motion of the water allows water to swirl around the outside of the bottle while the air travels up the centre of the tube. Gravity forces the water down while the water forces the air up.

*****This experiment is demonstrated in the Module 3 video*****

E3.3.2: Tornado Jar

Aim: To observe the shape of a tornado using a jar.

Materials (per group):

- 1 clear jam jar / container with a screw on lid
- Water
- Washing-up liquid or liquid soap
- Food colouring

Procedure:

1. Form into groups and collect materials.
2. Fill up the jar with water, and add a few drops of food colouring.
3. Add a few drops of the washing-up liquid to the coloured water.
4. Tightly screw on the lid.
5. Swirl the container around in a circle a few times, then stop. Place the jar on a table.
6. Observe and document your results!

Expected Result:

Inside the jar, you should see what looks like a tornado, with a wide circular shape towards the top of the jar, and a thin, cone shape towards the bottom of the jar. It will slowly disappear as it reaches the top of the container and the water stops spinning.

Explanation:

A tornado forms when cold and hot air combine and spin very quickly. Inside the jar, the fluid on the outside starts spinning before the fluid at the centre. When you put the jar down after swirling it, you see the fluid on the outside slowing down as the fluid on the inside continues to spin. What you are seeing is the formation of a vortex: the water spins rapidly around the vortex due to centripetal force.

A centripetal force is an inward force that directs an object or fluid towards the centre of its circular path.

Vortexes found in nature include tornadoes, hurricanes and waterspouts.

Video of experiment available online at 'kidspot.com.au':
https://youtu.be/cU7jUx5Mvx0

E3.3.3: Cyclone in a Box (Demonstration Only)

Aim: To observe the formation and shape of a cyclone!

Materials:

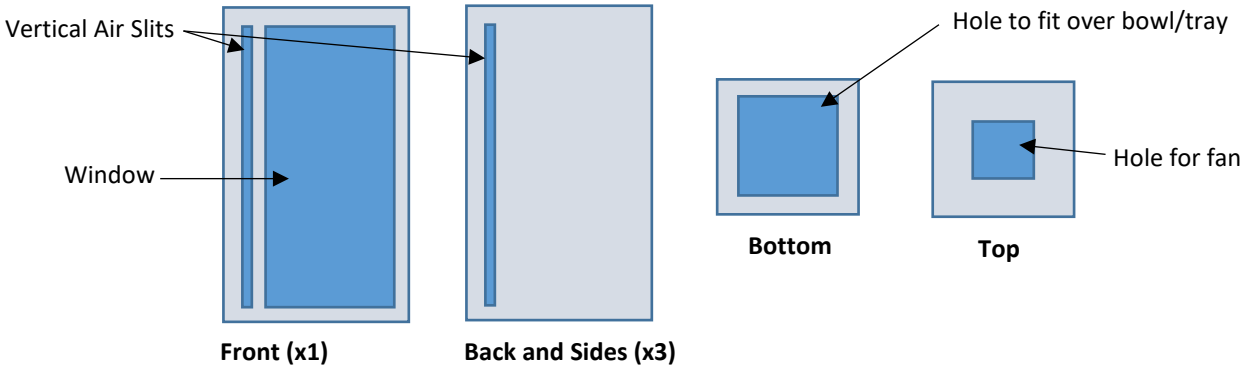
- Dry Ice (Caution: refer to risk assessment)
- Bowl/tray
- Warm water
- Tongs, gloves (thick gardening gloves), safety glasses
- 12 Volt computer fan and 9 Volt battery (if fan does not have own power)
- Wire strippers and electrical tape
- Box constructed of cardboard and clear plastic (see below)

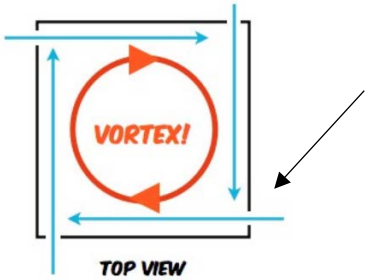
Procedure:

BEFORE SESSION: Construction of box – *to be completed before the session*.

1. Collect a cardboard box that is rectangular and tall, a copy paper box would work. The exact size is not that important.
2. Cut out a thin vertical slit in each side on the box. The slit MUST be on the left hand side of each side of the box to create the right air flow.
3. Cut out a large window in one side of the box. Ensure you don't interfere with the air slit while doing this.
4. Cover the window with clear plastic. A thin sheet of plastic like a folder cover works well, cling-wrap is also an alternative.
5. Cut a hole in the top of the box just smaller than the computer fan.
6. Cut a large hole in the bottom of the box. This hole should be bigger than the bowl or tray you will be using.

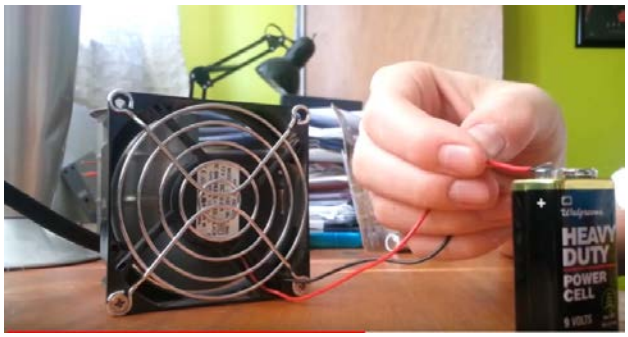
Diagram of pieces for cyclone box construction:





Note: Ensure the vertical air slits are located diagonally opposite each other, to allow the air to circulate. Air will able to flow in through the slits in the direction of the blue arrows, when the fan is turned on.

7. Attach the computer fan to the battery. The red wire (positive) should be attached to the smaller terminal of the battery. You may need to use wire strippers to remove some of the plastic coating so the wire touches the terminals properly. Do the same with the black wire, attaching it to the larger terminal. Alternately, tape the wires down with electrical tape, or use a 9 volt battery clip. See images on next page.



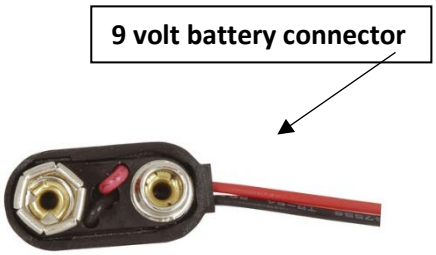


Image sources: *https://www.youtube.com/watch?v=73jABQJFCaw*
https://www.jaycar.com.au/9v-battery-snap-high-quality/p/PH9232

DURING SESSION: Perform demonstration of Cyclone in a Box Experiment

1. Explain to students the differences between "Dry Ice" and 'regular' ice. Refer to the notes on PowerPoint Module 3.3 Master Slides, Slide 8. Highlight risks.
2. Wearing safety equipment, fill your bowl/tray with warm water, then place 2 egg-sized pieces of dry ice into the water, using tongs. ***See Module 3 Risk Assessment.***
3. Position the cardboard box over the bowl/tray.
4. Place the fan on top of the box, so it sits over the hole. Ensure the direction of the wind created by the fan is pointing up, not down. The motion of the fan will suck air in through the slits in the box, to create a circulating vortex of air inside the box.
5. Invite students to watch the box carefully.
6. Turn the fan on, and observe through the plastic window.

Expected Result:
The dry ice will convert to gaseous carbon dioxide, and form fog as water vapour condenses. When the fan is turned on, the fog and carbon dioxide will rise up in a circular motion, appearing like a swirling vortex, or cyclone, inside the box. The motion will stop when the fan is switched off.

Explanation:
The fog around the dry ice is mostly water vapour. When the fan is turned on, the water vapour gets sucked up toward the top of the box, spiralling because of where the air inlets are positioned and because of the spinning fan blades.

Notes:

- ***Refer to Risk Assessment for Module 3 before handling Dry Ice.***
- ***Always ensure the dry ice is not accessible by students.***
- ***Use safety equipment when handling dry ice, including thick gloves and safety glasses. Wear long loose clothing and closed in shoes when handling dry ice.***

E3.3.4: Static Power

Aim: To observe the power of static electricity

Materials (per group):

- 1 balloon
- 1 fluorescent light bulb (thin tube)
- 1 hairy head (or 1 woollen piece of clothing)

Procedure:

1. Form into groups and collect materials.
2. Blow up the balloon and tie off the end.
3. Darken the room / turn out the lights / pull down the blinds.
4. Charge up: rub the inflated balloon against your hair (or a woollen piece of clothing!) for 30 to 60 seconds.
5. Touch the metal prongs of the fluorescent light bulb to the balloon (being careful not to push too hard / pop the balloon).
6. Observe and document your results!

Extensions:

- How long can you make the globe glow for?
- What happens when you place the 'charged up' balloon near a small piece of tissue?

Expected Result:
The balloon will become (negatively) charged through the process of rubbing against hair or a woollen item. The fluorescent tube will glow when the bulbs prongs touch the charged balloon. The bulb will glow until the stored electricity on the surface of the balloon is used up.

The charged balloon will attract small pieces of tissue. If the charged up balloon is held close to a piece of tissue on a table, the tissue will appear to jump toward the balloon and stick to its surface. Negatively charged objects attract positively charged and neutral objects.

Explanation:
Atoms contain tiny particles called electrons that carry negative electrical charge. When an object contains an excess of electrons, we say it is negatively charged. Objects containing many atoms that have lost electrons are positively charged. Since the electrons in these objects are not flowing to or from the objects, this type of electricity is called static (still).

Rubbing a balloon against hair (or woollen items) charges the surface of the balloon with electrons, by adding electrons to it. The balloon becomes negatively charged. When the bulbs prongs both touch the balloon, this creates an electrical circuit for the electrons to flow through. Instead of being static, they become a flowing current of electricty. Inside the bulb is mercury gas, and when electrons from the balloon bump into the electrons in the mercury gas a chemical reaction occurs, and photons are released, generating light energy.

Challenge M3.3 – Disaster Proofing Challenge
Coordinator Notes

Scoring:

A scoring mechanism is not included for this module. Consider asking students how they might approach the task differently if asked to do it again, or how they might teach the same things they learned during the club to a younger student.

Activity Notes:

- Students may choose to work individually, or in groups of 2-3.
- Encourage students to first plan a design for their structure. Allow students time to observe and interact with the available materials during the design phase.
- After 5 – 10 minutes, encourage students to start building their structure.
- Set up test stations:
    - **Wind Test:** Designate a test area on a table or floor surface. Use masking tape to form a ~30cm x ~30cm square in which students will place their structure for testing.
    - Set up locations (use masking tape on the floor or table) for a fan to be located at 2 – 3 pre-set distances away from the designated test area. Perhaps test from 1.5m away, 1m away, and 0.5m away.
    - You may like to set up anchor points in the test area, or, provide a standard base for the structures to be secured to, so that some success is had without them blowing away at first test.
    - Decide with the group how long the wind test will be at each distance. It may be 20 – 30 seconds, or longer.
    - Explore: Which parts of the structure fail first, where are the weak points? Do any structures make it through all tests?
    - **Flood Test:** Set up a shallow tank / tub big enough to fit the maximum allowable structure size (suggest maximum structure built be 20cm x 20cm).
    - You may like to set up anchor points in the test area, or, provide a standard base for the structures to be secured to, so that some success is had without them washing away at first test.
    - Set up a board, or the tank lid, at an angle of 30 to 45 degrees, sloping towards the test zone.
    - Decide with the students how many tests will be run.
    - Using a bucket, or a watering can, tip water down the ramp, flowing towards the structure. Observe the impact.
    - Increase the amount of water, change the angle of the ramp, or change the speed of water for additional tests. Observe differences.
    - Explore: Which parts of the structure fail first, where are the weak points? Do any structures make it through all tests?

- Supervise the test stations and assist students to test their structures. Encourage students to watch other designs be tested and to observe differences.
- Test wind impact first, then flooding.
- Allow students to repair structures between the wind and flooding tests, if time permits.

Suggested rules:

- Set a maximum and minimum size for the structure, perhaps no smaller than 5cm x 5cm x 5cm and no bigger than 20cm x 20cm x 20cm.
- Ensure students build a structure with a roof, four walls, and at least one door and window.

Challenge M3.3 – Planning Sheet: Disaster Proofing

To design your structure, consider:

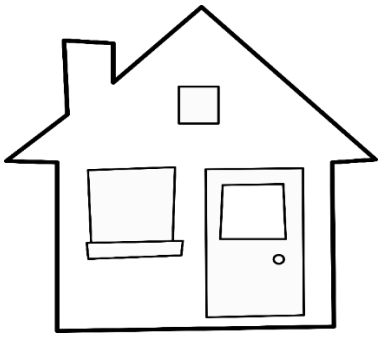
SIZE – Does the structure fit minimum / maximum size rules?

WEIGHT – Does the weight of the structure help it's stability against wind, and / or flooding impact?

FOUNDATION – Will your structure be built on a solid base, or on stilts?

ROOF – Will your roof design be flat, angled, hip, or gable style?

Take a look at the materials available, and design your structure!



Challenge M3.3 – Worksheet: Disaster Proofing

Design Team / Individual Name:		
Wind Tests		
1	**Distance from Fan:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage
2	**Distance from Fan:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage
3	**Distance from Fan:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage
Flooding Tests		
1	**Flooding conditions:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage
2	**Flooding conditions:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage
3	**Flooding conditions:**	**Result:** ☐ No damage ☐ Mild Damage ☐ Severe Damage

Module 3.3 Wild Weather and Natural Disasters
Lesson Plan

90 minute session

High Tech: Adapt PowerPoint Presentation 'M3.3 - Master Slides', hide slide 7.
Low Tech: Print PowerPoint 'M3.3 - Reduced Slides for Printing'. Use slide notes for the ENTIRE 90 minute presentation, adapting discussion to cover omitted slides.

Key Learning Area	**Topic**
Earth Science, Physical World	Weather, Natural Disasters

Timing	Running Time (hh:mm)	Procedure	Materials
		Lesson Introduction	
5 min	00:05	Welcome. Discuss types of wild weather experienced, seen in the news or heard of. Watch the Channel 7 news videos, showing Sea Foam in QLD in 2013 after a cyclone and a water spout in NSW in 2011. (If videos unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slides 1-3)
		Body of Lesson	
10 min	00:15	Discuss hypothesis, conduct Experiment E3.3.1 Tornado Tube	PowerPoint M3.3 (Slide 4) Plastic 1.25L drink bottles, tornado tube valves, water food colouring, glitter
5 min	00:20	Watch the video about Tropical Cyclones and discuss categories of severity. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 5-6)
10 min	00:30	Discuss hypothesis, demonstrate experiment 3.3.3 Cyclone in a Box	PowerPoint M3.3 (Slides 8-9) Pre-prepared box, fan, battery, dry ice, container, water, gloves, safety glasses

5 min	00:35	Explore thunderstorms and lightning features, risks, concepts	PowerPoint M3.3 (Slide 10-11)
7 min	00:42	Discuss hypothesis, conduct Experiment E3.3.4 Static Power	PowerPoint M3.3 (Slide 12) Balloons, fluoro light tubes, woollen clothing e.g. sock, tissues
5 min	00:47	Explore wild weather and natural disasters, discuss links and differences. Watch the video about Tsunamis. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 13-14)
2 min	00:49	Discuss earthquakes, tectonic plates, Richter Scale.	PowerPoint M3.3 (Slide 15-16)
2 min	00:51	Discuss wild weather, and natural disasters, and ideas for how we might design buildings to withstand them.	PowerPoint M3.3 (Slide 17)
3 min	00:54	Introduce Challenge Activity, explain rules and materials. Outline tips for designing structures.	PowerPoint M3.3 (Slide 18-23) Planning Sheet M3.3
2 min	00:56	Form into groups, hand out planning sheets.	Paddle pop sticks, skewers, straws, paper, polystyrene trays, cling wrap, aluminium foil, masking tape, paper clips, rubber bands, modelling clay, blue tack, cardboard, large tub, water, bucket, chopping board or tub lid, fan and / or hair dryer, or leaf blower, plastic bottles. Worksheet 3.3
30 min	01:26	Planning, construction and testing.	
		Lesson Conclusion	
4 min	**01:30 END**	Clean up. Discuss session!	

Module 3.3 Wild Weather and Natural Disasters
Lesson Plan

75 minute session

High Tech: Adapt PowerPoint Presentation 'M3.3 - Master Slides', hide slides 7, 10, 11, 12
Low Tech: Print PowerPoint 'M3.3 - Reduced Slides for Printing'. Use slide notes for the ENTIRE 75 minute presentation, adapting discussion to cover omitted slides.

Key Learning Area	**Topic**
Earth Science, Physical World	Weather, Natural Disasters

Timing	Running Time (hh:mm)	Procedure	Materials
		Lesson Introduction	
5 min	00:05	Welcome. Discuss types of wild weather experienced, seen in the news or heard of. Watch the Channel 7 news videos, showing Sea Foam in QLD in 2013 after a cyclone and a water spout in NSW in 2011. (If videos unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slides 1-3)
		Body of Lesson	
10 min	00:15	Discuss hypothesis, conduct Experiment E3.3.1 Tornado Tube	PowerPoint M3.3 (Slide 4) Plastic 1.25L drink bottles, tornado tube valves, water food colouring, glitter
5 min	00:20	Watch the video about Tropical Cyclones and discuss categories of severity. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 5-6)
10 min	00:30	Discuss hypothesis, demonstrate experiment 3.3.3 Cyclone in a Box	PowerPoint M3.3 (Slides 8-9) Pre-prepared box, fan, battery, dry ice, container, water, gloves, safety glasses

5 min	00:35	Explore wild weather and natural disasters, discuss links and differences. Watch the video about Tsunamis. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 13-14)
2 min	00:37	Discuss earthquakes, tectonic plates, Richter Scale.	PowerPoint M3.3 (Slide 15-16)
2 min	00:39	Discuss wild weather, and natural disasters, and ideas for how we might design buildings to withstand them.	PowerPoint M3.3 (Slide 17)
3 min	00:42	Introduce Challenge Activity, explain rules and materials. Outline tips for designing structures.	PowerPoint M3.3 (Slide 18-23) Planning Sheet M3.3
2 min	00:44	Form into groups, hand out planning sheets.	Paddle pop sticks, skewers, straws, paper, polystyrene trays, cling wrap, aluminium foil, masking tape, paper clips, rubber bands, modelling clay, blue tack, cardboard, large tub, water, bucket, chopping board or tub lid, fan and / or hair dryer, or leaf blower, plastic bottles. Worksheet 3.3
27 min	01:11	Planning, construction and testing.	
		Lesson Conclusion	
4 min	**01:15 END**	Clean up. Discuss session!	

Module 3.3 Wild Weather and Natural Disasters
Lesson Plan

45 minute session

High Tech: Adapt PowerPoint Presentation 'M3.3 - Master Slides', hide slides: 4, 8, 9, 10, 11, 12, 14, 15 and 16.
Low Tech: Print PowerPoint 'M3.3 - Reduced Slides for Printing'. Use slide notes for the ENTIRE 45 minute presentation, adapting discussion to cover omitted slides.

Key Learning Area	**Topic**
Earth Science, Physical World	Weather, Natural Disasters

Timing	Running Time (hh:mm)	Procedure	Materials
		Lesson Introduction	
5 min	00:05	Welcome. Discuss types of wild weather experienced, seen in the news or heard of. Watch the Channel 7 news videos, showing Sea Foam in QLD in 2013 after a cyclone and a water spout in NSW in 2011. (If videos unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slides 1-3)
		Body of Lesson	
5 min	00:10	Discuss hypothesis, conduct experiment 3.3.2 Tornado Jar	PowerPoint M3.3 (Slide 7) Jars, lids, waters, liquid soap, food colouring
5 min	00:15	Watch the video about Tropical Cyclones and discuss categories of severity. (If video unable to be played, coordinator should watch prior to the session).	PowerPoint M3.3 (Slide 5-6)
2 min	00:17	Discuss wild weather, and natural disasters, and ideas for how we might design buildings to withstand them.	PowerPoint M3.3 (Slide 13, 17)

2 min **2 min** **20 min**	00:19 00:21 00:41	Introduce Challenge Activity, explain rules and materials. Outline tips for designing structures. Form into groups, hand out planning sheets. Planning, construction and testing.	PowerPoint M3.3 (Slide 18-23) Planning Sheet M3.3 Paddle pop sticks, skewers, straws, paper, polystyrene trays, cling wrap, aluminium foil, masking tape, paper clips, rubber bands, modelling clay, blue tack, cardboard, large tub, water, bucket, chopping board or tub lid, fan and / or hair dryer, or leaf blower, plastic bottles. Worksheet 3.3
4 min	**00:45** **END**	**Lesson Conclusion** Clean up. Discuss session!	

Module 3.3 - References

- http://www.dwf.org/en/content/ten-key-principles-cyclone-resistant-construction
- http://www.unisdr.org/files/11711_CycloneArchitecture1.pdf
- http://qldreconstruction.org.au/u/lib/cms2/planning-for-stronger-nq-part-2.pdf
- http://www.bom.gov.au/cyclone/about/
- http://www.australiangeographic.com.au/topics/science-environment/2011/02/australias-worst-cyclones-timeline/
- http://www.disaster.qld.gov.au/disaster-resources/documents/storm-tide-handbook.pdf
- http://news.nationalgeographic.com/news/2014/01/140115-earthquakes-california-faults-science/
- http://www.australiangeographic.com.au/topics/science-environment/2011/10/earthquakes-in-australia/
- https://www.youtube.com/watch?v=68RrXdy2d9I
- https://www.sunshinecoastdaily.com.au/news/foam-frenzy-may-hide-toxic-sewage/1734706/
- https://www.sunshinecoastdaily.com.au/news/the-foam-rolls-out/1740733/
- https://www.youtube.com/watch?v=9Sw8HFgOwpI
- http://www.bom.gov.au/cyclone/history/yasi-satellite.shtml
- http://www.theherald.com.au/story/3551445/lightning-camera-action-storm-chasers-cracking-shots/
- http://www.bom.gov.au/cyclone/index.shtml
- http://www.nprsr.qld.gov.au/managing/cyclone-yasi.html
- http://media.bom.gov.au/social/blog/64/cooking-up-a-storm--how-thunderstorms-form/
- http://www.sciencemadesimple.co.uk/curriculum-blogs/primary-blogs/thunder
- http://media.bom.gov.au/social/blog/1478/a-bolt-from-the-blue-what-is-lightning/
- http://www.gpats.com.au/lightning-detection-network
- http://www.australia.gov.au/about-australia/australian-story/natural-disasters
- https://youtu.be/zUn7QFZdDBg
- https://www.rfs.nsw.gov.au/resources/multimedia
- https://ed.ted.com/lessons/how-tsunamis-work-alex-gendler
- http://www.sms-tsunami-warning.com/pages/seismology-measurement#.Vp2HCPl9670
- http://www.worldatlas.com/aatlas/infopage/tectonic.htm
- http://easysciencefor kids.com/all-about-earthquakes/

Module 3.3 - Required Materials

- Pens, pencils and writing paper are generally required every session.
- Students may like to bring a note pad to record their observations and ideas.
- A group usually refers to 2 - 4 students.

Activity	Material	Amount	Where can I find it?
All sessions	PowerPoint Slides* (digital, or printed)	1 per coordinator	Coordinator Package
All sessions	Printed PowerPoint* Slide Notes	1 per coordinator	Coordinator Package
All sessions	Printed Lesson Plan	1 per coordinator	Coordinator Package
All sessions	Printed Module 1 Risk Assessment	1	Coordinator Package
All sessions	Computer, Data Projector, Screen	1	Venue
Experiment E3.3.1 Tornado Tube 120 minute, 2 x 60 minute, 90 minute and 75 minute sessions	1.25L clear plastic bottles	2 per group	Supermarket, recycled
	Tornado Tube valve	1 per group	Online store, see link on final page
	Water	1 L per group	Supermarket, venue
	Food colouring, glitter (optional)	A few drops per group	Supermarket, stationary shop
Experiment E3.3.2 Tornado Jar 120 minute, 2 x 60 minute, and 45 minute sessions	Clear jam jars with screw on lids (or similar)	1 per student (or per group)	Supermarket, recycled
	Water	Enough to almost fill each jar	Supermarket, venue
	Food colouring	A few drops per group	Supermarket
	Washing-up liquid or liquid soap	A few drops per group	Supermarket

Required materials list continues on next page

* PowerPoint Slides have been provided as a Master Slide Set for a 120 minute (or 2 x 60 minute) session duration. Hide/ omit slides as noted in lesson plans for delivery of shorter session durations.

Note: Some listed materials, for example jars and food colouring, can be re-used for multiple experiments. Review the experiments you plan to include, and the required materials for efficiencies, prior to sourcing materials for your session.

Activity	Material	Amount	Where can I find it?
Experiment E3.3.3 Cyclone in a Box (Demo) 120 minute, 2 x 60 minute, 90 and 75 minute sessions	Cardboard box	1	Recycled
	Scissors / Stanley knife	1	Supermarket, hardware store
	Bowl / tray	1	Supermarket / recycled
	Clear Plastic (to fit side of box)	1	Recycled / stationary store
	Masking tape / glue (to fix plastic to box)	1	Supermarket / stationary store
	Dry Ice	2 x egg size pieces	Specialty store, see link on final page
	12 Volt Computer Fan	1	Computer store, electronics store, recycled
	9 Volt battery	1	supermarket
	Tongs	1	Supermarket / recycled
	Gloves (thick)	1 pair	hardware store
	Safety Glasses	1 pair	hardware store
Experiment 3.3.4 Static Power 120 minute, 2 x 60 minute, 90 minute sessions	Balloons	2 per group	Supermarket
	Fluorescent light bulb tubes (short)	1 per 3 groups, shared	Supermarket, hardware store
	Woollen clothing: sock, jumper, beanie, glove, scarf	1 piece per group, or, use a group members hair!	Recycled
	Tissue	1 small piece per group	Supermarket
Challenge 3.3 Disaster Proofing (All sessions *Add / subtract materials to suit location / available supplies.* *Adjust quantities to suit available materials.*	Fan, leaf blower, or hair dryer	1 – 2 per session, for wind testing	Supermarket, hardware store, recycled
	Cling wrap Aluminium foil	2 x 30m rolls per session of each	Supermarket
	Masking tape	3 – 4 rolls per session, shared	Supermarket, hardware store
	• Paddle pop sticks • Skewers • Toothpicks • Paper clips • Rubber bands	10 of each, per group	Supermarket, stationary store
	String	2 x 50m rolls	Supermarket
	Cardboard boxes, toilet rolls	3 – 5 pieces per group	recycled
	Polystyrene trays	1 – 2 per group	recycled
	Measuring tape	1 – 2 per session	Supermarket, hardware store
	Large plastic / water tight tub	1 per session	Supermarket, hardware store, recycled

	Plastic / timber ramp / lid	1 per session	Supermarket, hardware store, recycled
	Bucket / watering can	1 per session	Supermarket, hardware store, recycled
	Water	20L per session	venue
	News Paper	4 sheets per group	recycled

Links:

Tornado Tubes (from $2.50 each)

https://www.questacon.edu.au/qshop/Vortex-Valve/

https://www.madaboutscience.com.au/shop/vortex-valve-tornado-tube.html

Dry Ice

http://coolpac.com/resources/dry-ice-suppliers-australia/

http://supagas.com.au/products/hospitality/dry-ice/