StormSafe

YEARS FIVE TO SEVEN



TEACHER RESOURCE

CONTENTS

PROGRAM OVERVIEW

RATIONALE

The Queensland Stormwater Safety Education Program is designed for use by teachers working with students in years 5 through to 7 in Queensland schools. The aim of the program is to assist students to develop an understanding of the dangers of stormwater, floodwater and stormwater drainage systems, and to promote in students an awareness of safe practices when in and around flood and stormwater.

The program engages students in interactive, collaborative learning experiences to promote an understanding of:

- Flood and storm related weather patterns.
- Where and when floods and storms occur.
- What hazards are presented by storm and flood water.
- What actions should be taken in and around storm and flood water.

Through a range of tasks and interactive learning opportunities, students develope understandings leading to two key culminating tasks. Firstly, students design a persuasive piece of work to warn of the dangers of flood and storm water; and secondly, students complete a folio of work demonstrating their developing understandings that will inform their persuasive piece. Key learning activities throughout the program are designed to be interactive, collaborative and engaging, and link specifically to core learning outcomes identified in the Australian Curriculum (English and Science) and Queensland Essential Learnings (Health and Physical Education).

Key unit question

How do we stay safe around floods and storms?

Focus questions

- What are floods and storms?
- Where and when do floods and storms occur?
- What are the dangers associated with floods and storms?
- How can we stay safe around flood water?

Culminating tasks

Through participation in the learning activities throughout the unit, students develop skills and knowledge, which they demonstrate in the two culminating activities of the unit.

1. Student folio
2. Persuasive text

YEAR 5 ENGLISH

Year 5 level description

In Years 5 and 6, students communicate with peers and teachers from other classes and schools, community members, and individuals and groups, in a range of face-to-face and online/virtual environments.

Students engage with a variety of texts for enjoyment. They listen to, read, view, interpret and evaluate spoken, written and multimodal texts in which the primary purpose is aesthetic, as well as texts designed to inform and persuade. These include various types of media texts, including newspapers, film and digital texts, junior and early adolescent novels, poetry, nonfiction, and dramatic performances.

Informative texts supply technical and content information about a wide range of topics of interest, as well as topics being studied in other areas of the curriculum. Text structures include chapters, headings and subheadings, tables of contents, indexes and glossaries. Language features include complex sentences, unfamiliar technical vocabulary, figurative language, and information presented in various types of graphics.

Students create a range of imaginative, informative and persuasive types of texts including narratives, procedures, performances, reports, reviews, explanations and discussions.

Year 5 content descriptions

Language

Language for interaction

1. Understand that patterns of language interaction vary across social contexts and types of texts, and that they help to signal social roles and relationships (ACELA1501).
2. Understand how to move beyond making bare assertions and take account of differing perspectives and points of view (ACELA1502).

Literacy

Texts in context

1. Show how ideas and points of view in texts are conveyed through the use of vocabulary, including idiomatic expressions, objective and subjective language, and that these can change according to context (ACELY1698).

Interacting with others

1. Clarify understanding of content as it unfolds in formal and informal situations, connecting ideas to students' own experiences and present and justify a point of view (ACELY1699).

Interpreting, analysing, evaluating

2. Use comprehension strategies to analyse information, integrating and linking ideas from a variety of print and digital sources (ACELY1703).

Creating texts

1. Plan, draft and publish imaginative, informative and persuasive print and multimodal texts, choosing text structures, language features, images and sound appropriate to purpose and audience (ACELY1704).
2. Reread and edit student's own and others' work using agreed criteria for text structures and language features (ACELY1705).

YEAR 5 SCIENCE

Year 5 level description

Over Years 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales. In Year 5, students are introduced to cause and effect relationships that relate to form and function through an exploration of adaptations of living things. They explore observable phenomena associated with light and begin to appreciate that phenomena have sets of characteristic behaviours. They broaden their classification of matter to include gases and begin to see how matter structures the world around them. Students consider Earth as a component within a solar system, and use models for investigating systems at astronomical scales. Students begin to identify stable and dynamic aspects of systems, and learn how to look for patterns and relationships between components of systems. They develop explanations for the patterns they observe.

Year 5 content descriptions

Science understanding

Chemical sciences

1. Solids, liquids and gases have different observable properties, and behave in different ways (ACSSU077).

Science as a human endeavour

Use and influence of science

1. Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives (ACSHE083).
2. Scientific knowledge is used to inform personal and community decisions (ACSHE217).

Science inquiry skills

Questioning and predicting

1. With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS231).

Communicating

1. Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (ACSIS093).

HEALTH AND PHYSICAL EDUCATION — ESSENTIAL LEARNINGS BY THE END OF YEAR 5

- Health is multidimensional and influenced by individual and group actions and environments.
- Health includes physical, social, emotional and cognitive (relating to thought processes, reasoning and intuition) dimensions.
- Individual and group action can promote health and wellbeing, including safety.

SOURCE: Queensland Studies Authority (2007) Queensland Curriculum, Assessment and Reporting Framework.

YEAR 6 ENGLISH

Year 6 level description

In Years 5 and 6, students communicate with peers and teachers from other classes and schools, community members, and individuals and groups, in a range of face-to-face and online/virtual environments.

Students engage with a variety of texts for enjoyment. They listen, read, view, interpret and evaluate spoken, written and multimodal texts in which the primary purpose is aesthetic, as well as texts designed to inform and persuade. These include various types of media texts, including newspapers, film and digital texts, junior and early adolescent novels, poetry, nonfiction and dramatic performances. Students develop their understanding of how texts, including media texts, are influenced by context, purpose and audience.

Informative texts supply technical and content information about a wide range of topics of interest, as well as topics being studied in other areas of the curriculum. Text structures include chapters, headings and subheadings, tables of contents, indexes and glossaries. Language features include complex sentences, unfamiliar technical vocabulary, figurative language, and information presented in various types of graphics.

Students create a range of imaginative, informative and persuasive types of texts, such as narratives, procedures, performances, reports, reviews, explanations and discussions.

Year 6 content descriptions

Language

Language for interaction

1. Understand that strategies for interaction become more complex and demanding as levels of formality and social distance increase (ACELA1516).
2. Understand the uses of objective and subjective language and bias (ACELA1517).

Text structure and organisation

1. Understand how authors often innovate on text structures and play with language features to achieve particular aesthetic, humorous and persuasive purposes and effects (ACELA1518).

Literature

Literature and context

1. Make connections between students' own experiences and those of characters and events represented in texts drawn from different historical, social and cultural contexts (ACELT1613).

Responding to literature

2. Identify and explain how choices in language (for example, modality, emphasis, repetition and metaphor) influence personal response to different texts (ACELT1615).

Literacy

Interpreting, analysing, evaluating

2. Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts (ACELY1713).
3. Analyse strategies authors use to influence readers (ACELY1801).

Creating texts

1. Plan, draft and publish imaginative, informative and persuasive texts, choosing and experimenting with text structures, language features, images and digital resources appropriate to purpose and audience (ACELY1714).

YEAR 6 SCIENCE

Year 6 level description

Over Years 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales. In Year 6, students explore how changes can be classified in different ways. They learn about transfer and transformations of electricity, and continue to develop an understanding of energy flows through systems. They link their experiences of electric circuits as a system at one scale, to generation of electricity from a variety of sources at another scale and begin to see links between these systems. They develop a view of Earth as a dynamic system, in which changes in one aspect of the system impact on other aspects; similarly they see that the growth and survival of living things are dependent on matter and energy flows within a larger system. Students begin to see the role of variables in measuring changes and learn how look for patterns and relationships between variables. They develop explanations for the patterns they observe, drawing on evidence.

Year 6 content descriptions

Science understanding

Earth and space sciences

1. Sudden geological changes or extreme weather conditions can affect Earth's surface (ACSSU096).

Science as a human endeavour

Nature and development of science

1. Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena (ACSHE098).

Use and influence of science

1. Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives (ACSHE100)
2. Scientific knowledge is used to inform personal and community decisions (ACSHE220).

Science inquiry skills

Questioning and predicting

1. With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS232).

Communicating

1. Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (ACSIS110).

HEALTH AND PHYSICAL EDUCATION – ESSENTIAL LEARNINGS BY THE END OF YEAR 6

- Health is multidimensional and influenced by individual and group actions and environments.
- Health has physical, social, emotional, cognitive and spiritual (relating to beliefs) dimensions which are interrelated.
- Family, peers and the media influence health behaviours.
- Individuals, groups and communities act on the advice in health promotion campaigns to promote health and wellbeing, including safety, and contribute to management of health risks.

SOURCE: Queensland Studies Authority (2007) Queensland Curriculum, Assessment and Reporting Framework.

YEAR SEVEN ENGLISH

Year 7 level description

In Years 7 and 8, students communicate with peers, teachers, individuals, groups and community members in a range of face-to-face and online/virtual environments. They experience learning in both familiar and unfamiliar contexts that relate to the school curriculum, local community, regional and global contexts.

Students engage with a variety of texts for enjoyment. They listen to, read, view, interpret, evaluate and perform a range of spoken, written and multimodal texts in which the primary purpose is aesthetic, as well as texts designed to inform and persuade. These include various types of media texts, including newspapers, magazines and digital texts, early adolescent novels, nonfiction, poetry and dramatic performances. Students develop their understanding of how texts, including media texts, are influenced by context, purpose and audience.

Informative texts present technical and content information from various sources about specialised topics. Text structures are more complex including chapters, headings and subheadings, tables of contents, indexes and glossaries. Language features include successive complex sentences with embedded clauses, unfamiliar technical vocabulary, figurative and rhetorical language, and information supported by various types of graphics presented in visual form.

Students create a range of imaginative, informative and persuasive types of texts (for example, narratives, procedures, performances, reports and discussions) and are beginning to create literary analyses and transformations of texts.

Year 7 content descriptions

Expressing and developing ideas

2. Analyse how point of view is generated in visual texts by means of choices (for example gaze, angle and social distance) (ACELA1764).
3. Investigate vocabulary typical of extended and more academic texts and the role of abstract nouns, classification, description and generalisation in building specialised knowledge through language (ACELA1537).

Literature

Literature and context

1. Identify and explore ideas and viewpoints about events, issues and characters represented in texts drawn from different historical, social and cultural contexts (ACELT1619).

Responding to literature

2. Discuss aspects of texts, for example their aesthetic and social value, using relevant and appropriate metalanguage (ACELT1803).

Literacy

Interacting with others

1. Identify and discuss main ideas, concepts and points of view in spoken texts to evaluate qualities, for example the strength of an argument or the lyrical power of a poetic rendition (ACELY1719).

Interpreting, analysing, evaluating

1. Analyse and explain the ways text structures and language features shape meaning and vary according to audience and purpose (ACELY1721).

Creating texts

1. Plan, draft and publish imaginative, informative and persuasive texts, selecting aspects of subject matter and particular language, visual, and audio features to convey information and ideas (ACELY1725).

YEAR SEVEN SCIENCE

Year 7 level description

Over Years 7 to 10, students develop their understanding of microscopic and atomic structures; how systems at a range of scales are shaped by flows of energy and matter and interactions due to forces, and develop the ability to quantify changes and relative amounts. In Year 7, students explore the diversity of life on Earth and continue to develop their understanding of the role of classification in ordering and organising information. They use and develop models such as food chains, food webs and the water cycle to represent and analyse the flow of energy and matter through ecosystems and explore the impact of changing components within these systems. They consider the interaction between multiple forces when explaining changes in an object's motion. They explore the notion of renewable and nonrenewable resources and consider how this classification depends on the timescale considered. They investigate relationships in the Earth, sun, moon system and use models to predict and explain events. Students make accurate measurements and control variables to analyse relationships between system components and explore and explain these relationships through increasingly complex representations.

Year 7 content descriptions

Science understanding

Earth and space sciences

1. Water is an important resource that cycles through the environment (ACSSU222).

Science as a human endeavour

Nature and development of science

1. Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world (ACSHE119).
2. Science knowledge can develop through collaboration and connecting ideas across the disciplines of science (ACSHE223).

Use and influence of science

1. Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE120).
2. Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management (ACSHE121).

Science inquiry skills

Questioning and predicting

1. Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124).

Communicating

1. Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (ACSIS133).

HEALTH AND PHYSICAL EDUCATION – ESSENTIAL LEARNINGS BY THE END OF YEAR 7

- Health is multidimensional and influenced by individual and group actions and environments.
- Health has physical, social, emotional, cognitive and spiritual (relating to beliefs) dimensions which are interrelated.
- Family, peers and the media influence health behaviours.
- Individuals, groups and communities act on the advice in health promotion campaigns to promote health and wellbeing, including safety, and contribute to management of health risks.

SOURCE: Queensland Studies Authority (2007) Queensland Curriculum, Assessment and Reporting Framework.

SESSION	KEY QUESTION(S)	ORGANISATION	ACTIVITY
1	What do we know about floods and stormwater?	Whole class	Graphic organiser
		Individual/paired	Think and pair with stimulus pictures
		Whole class	Discussion points
2	What makes a storm or flood?	Individual	Wordsearch
		Individual	Labelled diagram
		Small group	Model making
3	Where do they happen?	Whole class	Mapping
		Pairs	Cut and paste sort
		Small group	Where would you live?
4	Why are they dangerous?	Whole class	Brainstorm
		Small group	Water experiment
		Individual	Science report
5	What are the dangers?	Small group/pairs	Boardgame
		Pairs	Futureteller
		Individual	Short answer
6	What should we do?	Individual	Help a friend
		Small group	Surf and storms
		Whole class	Cars and storms
7	What are the other types of floods?	Pairs	Definition hunt
		Individual	Draw away
		Pairs	Warning jingle
8	Who can help?	Whole class	Mindmapping the Emergency services
		Individual	Help from local community
		Small group	How can you help?
9	Where do we find more information?	Whole class	Brainstorming
		Individual	Webquest
10	What have we learnt about floods and storms?	Individual student task	Completion of student folios
		Small group task	Recording of group presentation
		Individual/paired/ whole class task	Final Reflection activity

Queensland Fire and Emergency Services

PO Box 1425
Brisbane Qld 4001
Phone: 07 3635 1946
Fax: 07 3406 5280
Email: qfrs.cerv@dcs.qld.gov.au

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StormSafe

INFORMATION SHEETS

The Stormwater System

The stormwater system carries rain water from roofs, roads and buildings through gutters, drains and channels, and discharges it into rivers and creeks where it eventually flows to the bays and the ocean.

We need drains to prevent floods. Entering stormwater drains at any time, even when it is not raining, is both dangerous and illegal.

With no warning at all, a drain can become a very dangerous place.

Drain hazards

- Water levels can rise even in sunny dry conditions. Rainwater falling many kilometres away can flow downstream, arriving quickly and unexpectedly. When it rains, huge amounts of water can suddenly wash into the drain. If you are swept away by the water, you may not be able to get out and could drown. Even shallow water can be very powerful and could knock you over.
- Slow-moving water flows can quickly become raging fast-moving torrents.
- Poisonous gases and lack of oxygen may be present at any time and remain undetected until it is too late.
- Drains can contain pollution, like broken glass, dangerous chemicals and disease-causing bacteria.
- Animals, like rats, spiders or even snakes, can be found in stormwater drains.
- If you are in a flooded area, stay away from flooded roads, footpaths and areas where you can't clearly see where you are walking. A stormwater grate may have lifted from the force of the water, and you could fall into a drain.
- Drains are dark, wet and slippery. They may contain steep, hidden declines, making it is easy to slip and fall; and it is also difficult for others to hear you call for help if you're injured. Entering a drain could cost your life and place others at risk rescuing you.
- Trespassing in a drain is against the law, which means you could also face a hefty fine.

What are floods?

FACT SHEET 1.
WHAT ARE FLOODS?

Flood definition

A body of water rising and overflowing onto normally dry land.

Geoscience Australia defines a flood as – a general and temporary condition of partial or complete inundation of normally dry land from overflow of inland or tidal waters from the unusual and rapid accumulation of runoff of surface waters from any source.

- **Static Water** – water collected in dams, reservoirs and tanks for urban use. These collection areas for water can reach capacity and create a flood.
- **Back Water** – a body of water that is held back by a flood or a tide. Excess water coming down a waterway could be held back by a high tide creating a backwater.
- **Swift Water** – fast moving water. Specialist teams from the Emergency Services are trained in "swiftwater" rescues. These rescues are sometimes required when people are caught in flooded waterways or stormwater drains.
- Waterways such as rivers and creeks flood when the water flows over their banks Creeks

INTERESTING FACT

In the flat inland regions of Australia, floods can can spread over thousands of square kilometres and last several weeks, in contrast to coastal area where flooding can happen rapidly with little warning.

Causes

Rain

When rain falls over an area of land, some is absorbed by the soil, while the rest becomes runoff and flows down hill. The area of land that contributes runoff to a particular point is called the catchment. Heavy rain, such as a thunderstorm or prolonged periods of rain, creates runoff and flooding as the watercourses and stormwater systems reach capacity.

High tides and storm surges

Large tides and storm surges can also flood costal areas. A storm surge is a rise above normal water level along the coast line resulting from strong winds. Storm surges always accompany a cyclone.

What happens during a flood event?

Cyclones

A cyclone is a low-pressure system that develops and is sufficiently intense to produce sustained gail force winds (63km/hr or higher). In other parts of the world, cyclones are called hurricanes or typhoons.

Water storage and release

Many urban water supply dams, such as the Wivenhoe Dam near Brisbane, have a dual purpose of providing flood mitigation, which reduces the effects of flooding by capturing and holding significant amounts of runoff from the catchment area. However, when the water is released from the dams, the waterways below the dam can become flooded.

What can you see during a flood?

- Watercourses such as rivers and creeks filling with fast moving water and rising beyond their banks.
- Stormwater drains filling with rushing water disappearing into the underground pipes.
- Flood water flowing over low-lying roads
- Large bodies of flood water in parks, paddocks and low-lying land.

What are the risks?

Fast-moving water is extremely dangerous. It is deceptively strong and can easily wash a person or a vehicle into flooded watercourses or stormwater systems.

There are hidden dangers in flood water including debris (e.g. tree branches, fences materials), animals or reptiles that have been washed from their homes, and roads can be damaged OR washed away.

Emergency Response

FACT SHEET 2.
WHAT IS THE EMERGENCY RESPONSE DURING A FLOOD AND WHAT IS THE ROLE OF THE EMERGENCY SERVICES?

Who are the government agencies and emergency services involved in flood events?

- Bureau of Meteorology (BOM) – provides warnings and predictions of weather systems.
- Police – emergency response and co-ordination.
- Fire and rescue – emergency response such as swift-water rescue.
- State Emergency Service – SES – The SES is a volunteer organisation to help communities in times of emergency or disaster. State and local government work in partnership to support the SES.
- Federal, state and local government work in partnership to resource and manage both immediate need and rebuilding after flood events. Government leaders will make regular official announcements to keep the community informed of developments and strategies to remain safe.

How do the emergency services communicate to the public during storms and flood events?

Tune in

- Radio and TV alerts.

Log on

- Websites – **www.emergency.qld.gov.au** and **www.bom.gov.au** and local council websites.
- Social media – Twitter and Facebook The SES are on twitter and have a Facebook page – check it out.

Listen out

- Text messages.
- Door-knocking by emergency service personnel in areas directly or imminently affected.
- Messages on your landline phone.

Tune in, log on and listen out – Is a slogan from the Emergency Management Queensland – **http://www.emergency.qld.gov.au/emq/css/tunein.asp**

FACT SHEET 3.
WHAT ARE THE TYPES OF FLOODS?

There are 3 types of flooding that occur in Queensland:

1) **Flash flooding** – is the rapid flooding of low-lying areas. The ground becomes saturated and water can not be absorbed, creating large amounts of runoff into watercourses and stormwater systems.

   Flash flooding results from relatively short, intense bursts of rainfall, commonly from thunderstorms. This flooding can occur in any part of Australia, but is a particularly serious problem in urban areas where drainage systems may not cope, and in very small creeks and streams. Flash floods tend to be quite local, and it is difficult to provide effective warning because of their rapid onset (Australian Bureau of Meteorology).

2) **Mountain or coastal rivers quick onset flooding** – occurs in the upper reaches of rivers of large rivers as well, as rivers that drain to the coast. These floods last for one or two days.

3) **Inland rivers slow onset flooding** – is the flooding of rivers in the vast flat areas of central and western Queensland. These floods can last for a number of weeks.

   For further information, visit the Emergency Management Australia Website – **http://www.ema.gov.au/www/ema/schools.nsf**

FACT SHEET 4.
WHAT ARE THE RISKS DURING A FLOOD EVENT AND WHAT SHOULD YOU DO TO BE SAFE?

Dangers of flood

- **Drowning**
  - Entering floodwater either walking or in a car, is highly dangerous. Flood water is runs deceptively fast and can wash people or a car into the waterway or stormwater system.
  - Getting caught by a snag in the flooded water.
  - Being taken into a drain by fast-moving water.
  - Floating debris that can injure or knock you over into the fast-moving water.
- **Toxic contents** that spill into the flood water, such as chemicals or effluent from sewerage treatment works affected by floodwater that could have overflowed.
- **Venomous animals,** such as snakes, that have been caught in the fast-moving water.
- **Barbed-wire fences** could have been displaced during a flood and are might move along with the water. This wire can cause serious injury and trap you in the water.
- **Temperature** – being caught in floodwaters can cause the onset of hyperthermia and serious health conditions as the water effects your body temperature.
- **Rising water** levels can occur very quickly and with little or no warning.

- **Parks** – often have large drains and drain covers that may have been washed away or displaced, leaving the drain open and creating a real risk of people falling into the pipes underneath.

Flood risks for drivers

Driving into any water crossing a road is highly dangerous. A very small amount of moving water can move a car, even a 4WD, and wash it off the road. The road may also have been damaged or washed away, which is not visible under the floodwater.

Why do people drive into floodwater?

- **Ignorance** – not being aware of the risks.
- **Pressure** to be at a destination (getting to work, meeting friends, collecting children etc.).
- **Peer pressure** – passengers in the car influencing the decision to drive through the water.
- **Inflated belief** in their own capabilities based on their previous experience – every flood is different, just because it was ok last time does not mean it is safe this time.
- **Impatience.**

Flood risks at the beach

- Floods can change the characteristics of beach conditions making the conditions unpredictable, even with local surf knowledge.
- More hidden dangers are present, such as debris, chemicals and wildlife, can be washed into the ocean from waterways and, ultimately, onto the beach.
- The beach is not a theme park during floods or weather events – the conditions can be extremely dangerous and change quickly.

How to be safe during a flood:

- Do not go near floodwater.
- Do not walk or wade through floodwater.
- Do not drive through floodwater covering a road – if you need to drive, find an alterative route.
- If floodwater is approaching your home, contact the SES or emergency services for assistance and advice.
- Monitor updates by Emergency Services in the media, and online.

If you are unfortunate enough to be caught in floodwater, use a defensive swimming technique. This technique involves being on your back with your feet pointing down stream. Defensive swimming allows you to evaluate what is approaching, and your feet protect your body. Keeping your feet up also reduces the risk that they will get caught or wedged in a submerged object. If you need more power to avoid an object, an alternative technique is an aggressive swim, which involves rolling onto your stomach and using the crawl stroke to create momentum and get you to where you want to be or away from what you need to avoid.

Do you live in an area that floods or is vulnerable to a storm surge? Your local council or Emergency Services Queensland will be able to tell you.

If you live in a flood- or storm-surge prone area, you need a household emergency plan.

- Know what the emergency arrangements are in your local area, such as evacuation sites, or identify where you will go in the event of an evacuation such as friend's or family-member's house.
- Ensure you have the contact details for all the emergency services in your local area.
- Know how to access warnings and keep informed (that is, tune in to the radio or TV, log on to websites with critical information, and listen out for any activity in your street. (Have a battery powered radio in case there is no electricity.)
- Make sure everyone is familiar with the plan and ready to act if required.

Go to **www.emergency.qld.gov.au** for a step-by-step emergency plan guide.

Make sure you have the contact details for all the emergency services in your area!

FACT SHEET 5.
WHAT IS THE STORMWATER SYSTEM AND WHAT ROLE DO URBAN WATER SUPPLY DAMS PLAY IN MANAGING FLOODS?

The stormwater system carries rain water from roofs, roads and buildings through gutters, drains and channels, and discharges it into rivers and creeks where it eventually flows to the bays and the ocean. We need drains to prevent floods.

Entering stormwater drains at any time, even when it is not raining, is both dangerous and illegal. With no warning at all, a drain can become a very dangerous place.

Drain hazards:

- Water levels can rise even in sunny and dry conditions. Rainwater falling many kilometres away can flow downstream, arriving suddenly and unexpectedly. When it rains, huge amounts of water can quickly wash into the drain. If you are swept away by the water, you may not be able to get out and could drown. Even shallow water can be very powerful and could knock you over.
- Slow-moving water flows can quickly become raging, fast-moving torrents.
- Poisonous gases and lack of oxygen may be present at any time and remain undetected until it is too late.
- Drains can contain pollution, like broken glass, dangerous chemicals and disease-causing bacteria.
- Animals, such as rats, spiders or even snakes, can be found in stormwater drains.
- If you are in a flooded area, stay away from flooded roads, footpaths and areas where you can't clearly see where you are walking. A stormwater grate may have lifted from the force of the water and you could fall into a drain.
- Drains are dark, wet and slippery. They may contain steep, hidden declines, making it is easy to slip and fall; it is also difficult for others to hear you call for help if you're injured. Entering a drain could cost you your life and place others at risk rescuing you.
- Trespassing in a drain is against the law, which means you could also face a hefty fine.

How do dams help prevent or reduce the effect of floods?

The dams have sophisticated management plans to ensure they provide a dual role of providing urban water supply and flood mitigation. The Wivenhoe Dam, for example, has a true capacity of 225% before water pours over the dam wall. When it is at 200%, the dam has 5 overflow valves that release water into the valley below. The 100% capacity figure is in reference to the dam's drinking water capacity; subsequently, the dam can collect and hold over twice this amount to prevent flooding.

INTERESTING FACT

During the floods of 2011/2012, the Wivenhoe Dam peaked at 190%, up from 17% 3 years earlier during drought conditions.

FACT SHEET 6.
THE SCIENCE OF FLOODS

Hydrology is the study of the movement, distribution and quality of water. The people responsible for planning flood-mitigation strategies and flood forecasting are often hydrologists.

Floodwater characteristics and terms

Speed
Floodwater can move slowly or at great speed — 60 cm of water can wash a car away and only 15 cm of water can knock a person over. Floodwater moves quickly and carries greater force than you would expect due to the great volumes and weight of water, which creates momentum as the water travels to its destination (river, ocean, etc.).

The speed is determined by the slope of the terrain the water is moving down and the quantity of water pushing its way down the watercourse or stormwater system.

The speed that floodwater rises is determined by the amount of rain, the capacity of the terrain to absorb the water, and the slope of the terrain.

Laminar flow
Laminar flow is the scientific term to describe the smooth flow of a liquid (or gas) such as water. The opposite is turbulent flow, which is rough and a characteristic of floodwater.

Eddies
An indicator of turbulent flow is the presence of eddies. Eddies are swirling sections of water created by obstructions in the water.

Strainer
One common obstruction in floodwater is a strainer. A strainer is created when a large object blocks smaller objects, but still allows the water to pass through.

Stoppers
Another dangerous feature of floodwaters are holes or stoppers. Stoppers are formed when water moves over the top of a submerged object causing the surface water to flow back upstream, creating a recirculating dynamic. Stoppers can be very dangerous in flood conditions.

Aerated water
When the laminar flow is disturbed enough to create turbulence, the water can take on a white appearance, often referred to as “white water”. The frothy, aerated water appears white and bubbly as the air mixes with the turbulent water. White water can be created due to increased flow, the gradient of the watercourse, constriction as the watercourse becomes narrow forcing larger quantities of water into a smaller space or an obstruction in the watercourse.

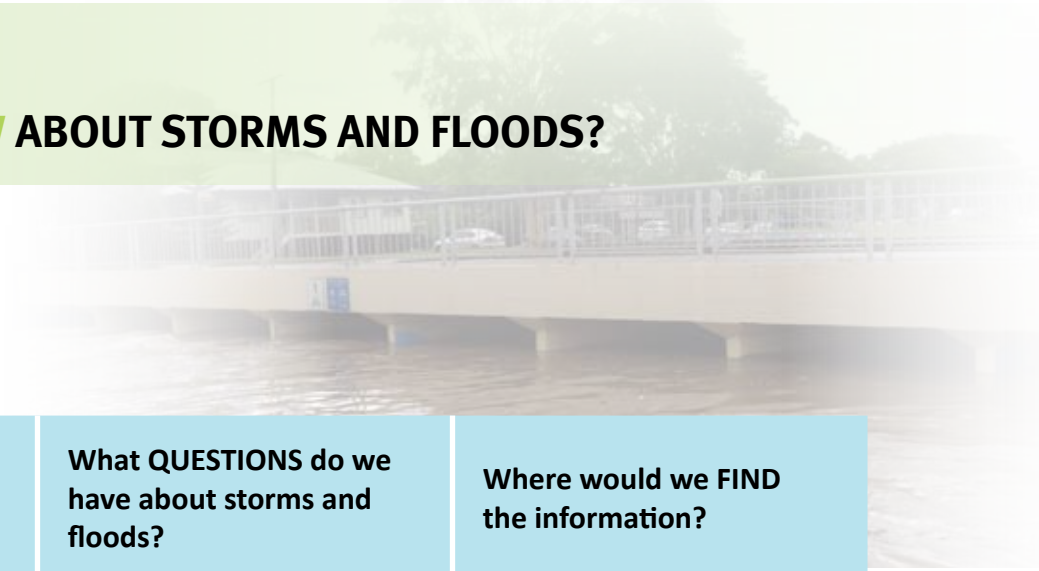
Upstream V
An upstream V is a warning sign that there are obstacles in the water creating turbulence and hidden danger.

Downstream V
A downstream V is formed where the current of a watercourse is the quickest, where the water is the deepest, and where there are the least obstacles. White water rafting specialists use this strategy to navigate safely through rapids.

StormSafe

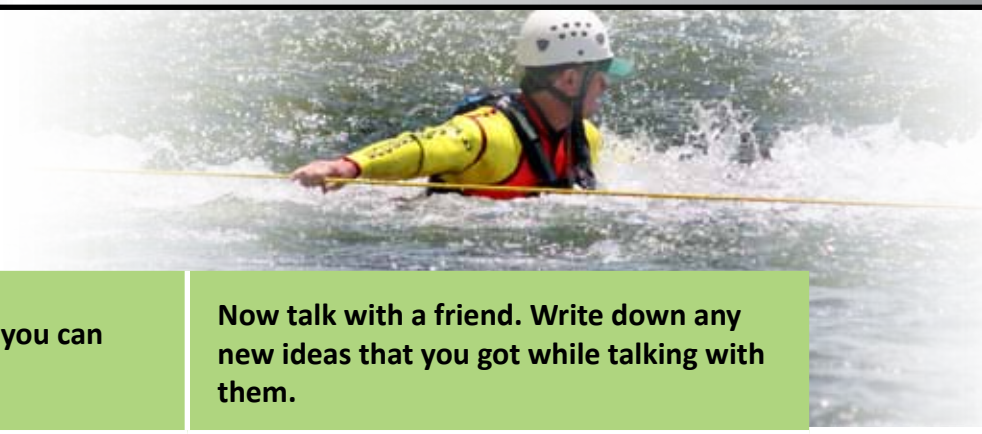
STUDENT ACTIVITIES

KEY QUESTION
WHAT DO WE KNOW ABOUT STORMS AND FLOODS?



Activity 1.
What do we know?

What do we KNOW about storms and floods?	What QUESTIONS do we have about storms and floods?	Where would we FIND the information?



Activity 2.
Think and share

Write down as many things as you can about floods and storms.	Now talk with a friend. Write down any new ideas that you got while talking with them.

Activity 3.
Class discussion

Your Task

Discuss the following questions as a whole class.

Q1. What makes a storm?

Q2. What makes a flood?

Q3. Where do floods occur?

Q4. Why are storms and floods dangerous?

Q5. What are the different types of floods?

Q6. What should you do if there is a flood?

Q7. Where can you get help if you need it?

KEY QUESTION
WHAT MAKES A STORM OR FLOOD?

Activity 4.
Developing vocabulary

E	R	A	E	W	O	L	F	R	E	V	O	W	M
M	R	A	W	E	A	T	H	E	R	S	D	T	E
E	E	W	I	M	A	N	U	S	T	F	R	I	T
R	N	M	K	N	A	R	M	C	L	L	E	D	E
G	B	V	C	X	W	K	R	T	I	O	N	A	O
E	G	K	L	Z	E	A	O	D	R	W	C	L	R
N	T	N	E	R	R	O	T	V	D	I	H	P	O
C	B	G	E	W	I	Q	S	E	J	N	M	D	L
Y	I	N	U	N	D	A	T	E	R	G	L	E	O
F	N	O	I	T	U	L	L	O	P	R	J	D	G
B	S	I	R	B	E	D	C	K	I	U	S	O	Y
A	M	T	Y	U	I	E	V	D	P	N	U	O	D
C	R	E	D	N	U	H	T	J	E	O	B	L	R
T	O	P	O	I	P	O	B	A	S	F	M	F	A
E	T	C	Y	C	L	O	N	E	R	F	E	S	I
R	S	A	T	U	R	A	T	E	D	G	R	N	N
I	L	O	U	T	P	O	U	R	I	N	G	I	A
A	A	C	C	U	M	U	L	A	T	E	E	A	G
G	F	L	A	S	H	F	L	O	O	D	F	R	E
H	J	S	S	E	C	X	E	F	L	O	W	D	M

RAINWATER
DEBRIS
METEOROLOGY
STORM
FLOWING
FLASH FLOOD
POLLUTION
STORM

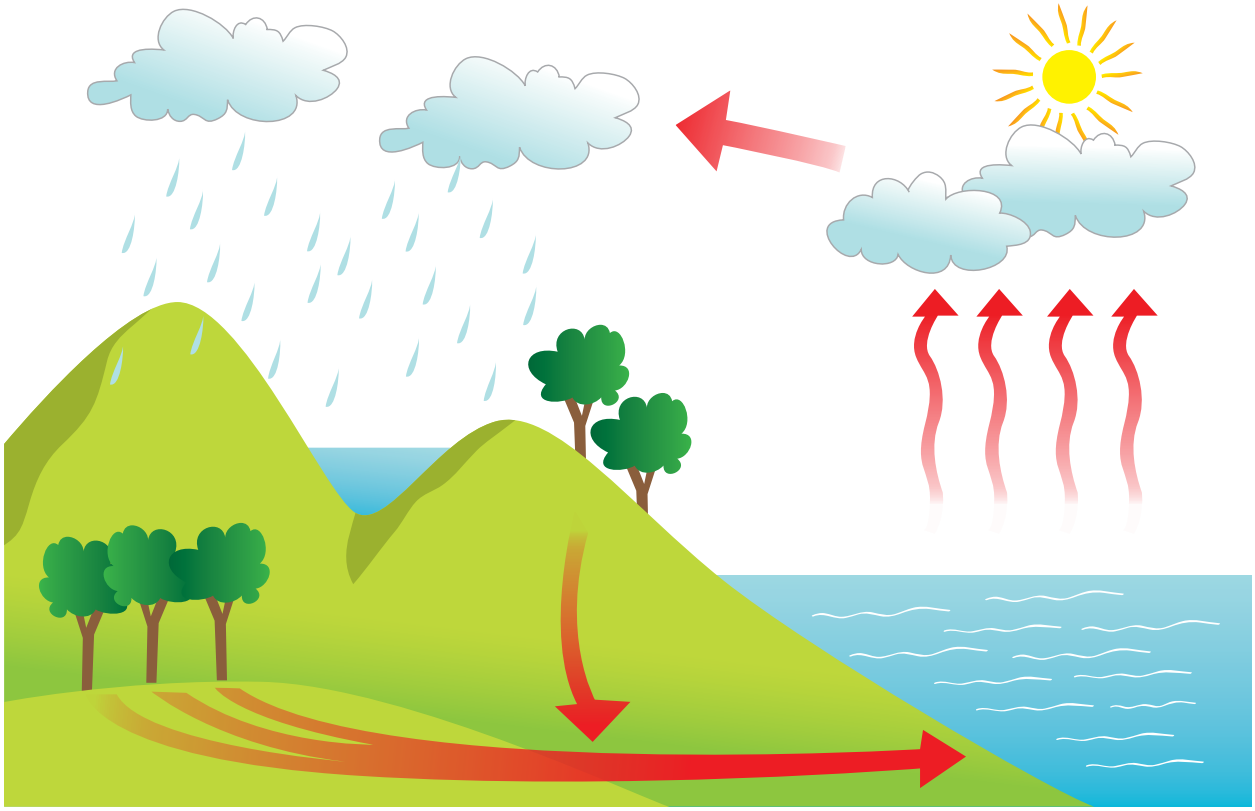
SATURATED
RUNOFF
PIPES
BACTERIA
GRATE
DRAIN
EXCESS
OVERFLOW

TIDAL
OUTPOURING
TORRENT
INUNDATE
THUNDER
FLOODED
DRENCH
SUBMERGE

WEATHER
TSUNAMI
ACCUMULATE
DRAINAGE
FLOW
CYCLONE
EMERGENCY

Activity 5.
Labelling a diagram

The water cycle



Your Task

Label the diagram by placing the words in the appropriate place on the water cycle. Use the information sheets and your own research to help you.

Transpiration	Condensation
Precipitation	Evaporation
Energy	Respiration
Infiltration	Groundwater
Runoff	Combustion

Activity 6.
Make a model

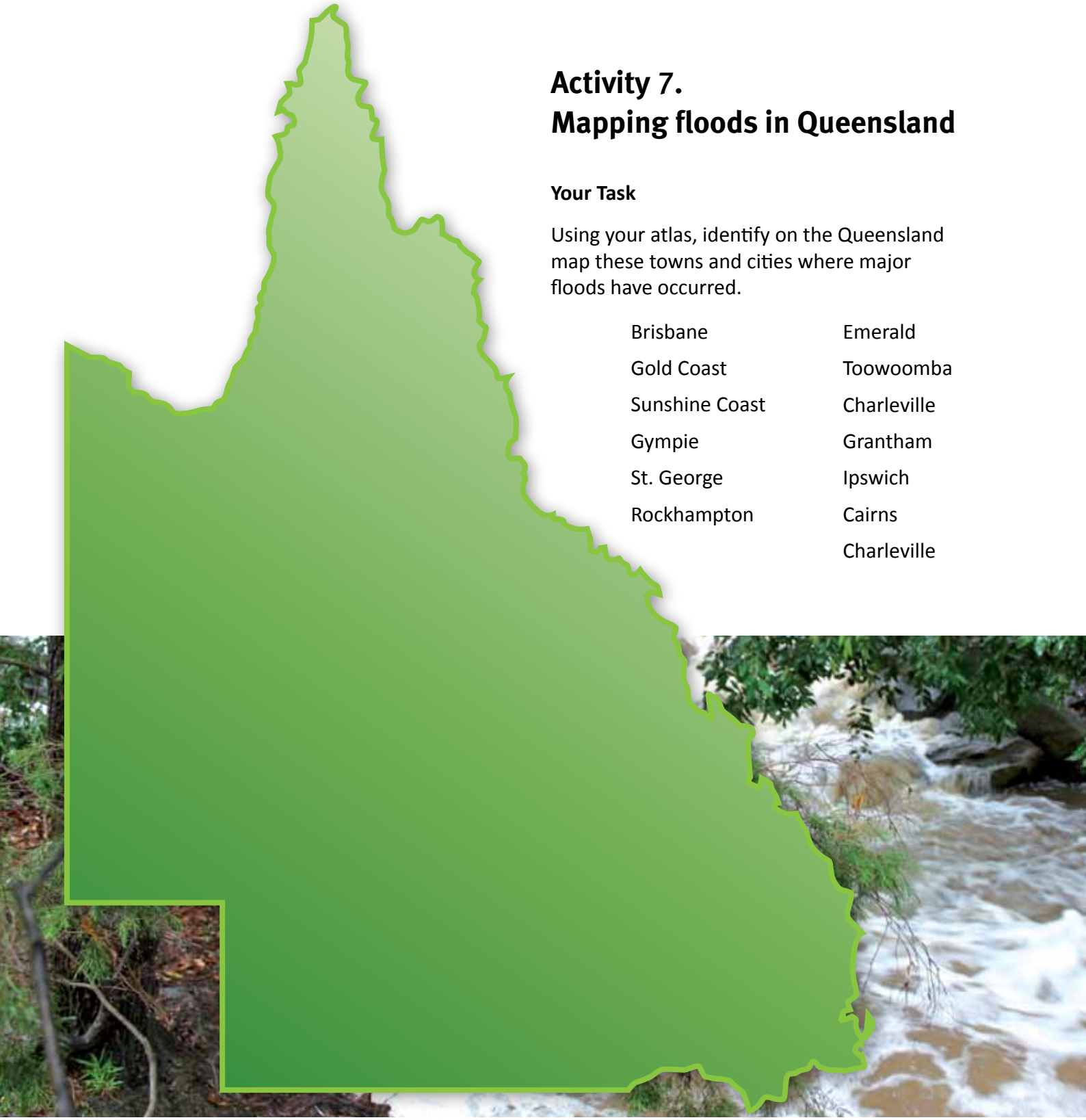
Your Task

Now that you have an understanding of the water cycle and where the water comes from, create a model showing how this cycle could cause a flood. Use any materials you like, including paper, plastic, wood, figurines, etc.

Models should be approximately the size of a shoebox and should be labelled to show the parts of your model.

You might like to use the fact sheet or other sources of information to find out more about floods to help you with your project.

KEY QUESTION
WHERE DO FLOODS HAPPEN?



Activity 7.
Mapping floods in Queensland

Your Task

Using your atlas, identify on the Queensland map these towns and cities where major floods have occurred.

Brisbane	Emerald
Gold Coast	Toowoomba
Sunshine Coast	Charleville
Gympie	Grantham
St. George	Ipswich
Rockhampton	Cairns
	Charleville

Activity 8.
Where and why?

Sort the following words and glue them into the table below.

heavy rain	have a plan	causeways
toxic contents	high tides	drowning
contact authorities	police	avoid swimming
parks	streets	caught by snags
avoid driving through	cyclones	defensive swimming
aerated water	ambulance	low-lying areas
watercourse	prolonged rain	SES
drains	venomous animals	surf lifesavers
water storage failure	know your area	fire and rescue
water storage release	contact authorities	floating debris

Where?	When?	Why?	What?	How?
Where do floods occur?	When there is a flood, who can help?	Why are they dangerous?	What should you do?	How do floods occur?

Activity 9.
Where would you live?

Your Task

Now that you know a little about floods and where they occur, it's time to choose. Your family have decided to move house; it's been a wet summer in Queensland and the Bureau of Meteorology is advising that there is more wet weather to come. Write a short paragraph detailing where the best location for a house would be to avoid floods.

KEY QUESTION
WHY ARE THEY DANGEROUS?

Activity 10.
Brainstorming

Your Task

How many dangers can you think of that might by lurking in floodwater? Are there other dangers that we might not be able to see?

Activity 11.
Science experiment

Your Task

As a class, using three different trays filled with soil, build a river out of foil or plastic (the same for each, but don't add the water just yet). Add landscapes including small houses, people, etc. Then, when you have finished building your landscape, build a dam across each of the rivers using three different materials: first, sticks, then foil, then plastic or similar. Gently add water and observe what happens to the dams and the surrounding landscape.

Activity 12.
Writing up your experiment

TITLE

EQUIPMENT

PROCEDURE

RESULTS

DISCUSSION

DIAGRAM

KEY QUESTION
WHAT ARE THE DANGERS?

Activity 13.
Don't get stuck!

Your Task

Rules of the game:

1. Roll the dice to see who goes first.
2. Begin on the square marked "start".
3. On your turn, roll the dice and move the number of spaces marked on the dice.
4. Pick a card from the pile and follow the instructions provided on the card.
5. Play then moves on to the next player.
6. The winner is the player who reaches dry land first.

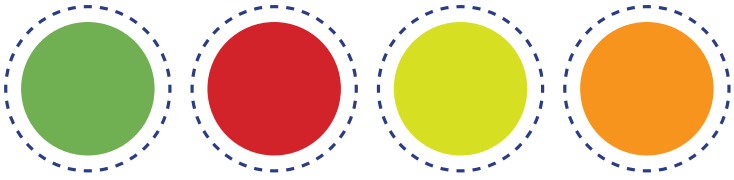
DON'T GET STUCK!

Stack your game cards HERE.

Markers

Cut on the dotted lines to remove the cards and markers for the game.

Stuck in a drain. **Miss a turn.**	Bitten by a snake that was washed past by the flood. **Go back 2.**	Drove through floodwater and got washed away. **Go back to start.**	Didn't have a plan for being safe in a storm. **Miss a turn.**
Chose to turn around rather than drive through floodwater. **Go ahead 2**	Stopped your mate from surfing the huge swell. **Have another turn.**	Took swimming lessons. **Go ahead 2.**	Got struck by floating debris. **Go back 3.**
Water storage held. **Go ahead 1.**	Heavy rain causes flooding. **Go back one** to avoid the flooded road.	Followed the instructions of the emergency services during a storm. **Have another go.**	Emergency supplies are ready. **Go ahead 3.**
Walked through a flooded park and got stuck. **Miss a turn.**	Rang 000 when you saw someone trapped by floodwater. **Have another turn.**	Bridge is washed away during a flood. **Go back 2** to wait until it's fixed.	The area is low-lying, so prone to flooding. **Go ahead 2** for knowing your area.
Moved bikes and furniture indoors before the storm. **Go ahead 2.**	Secured your pet before the storm. **Move ahead 3.**	Went swimming in a swollen creek. **Go back 2.**	Chose not to surf down a flooded street. **Go ahead 3.**



Activity 14.
Fact Finder

Your Task

How to play the Fact Finder (find the Fact Finder on page 38)

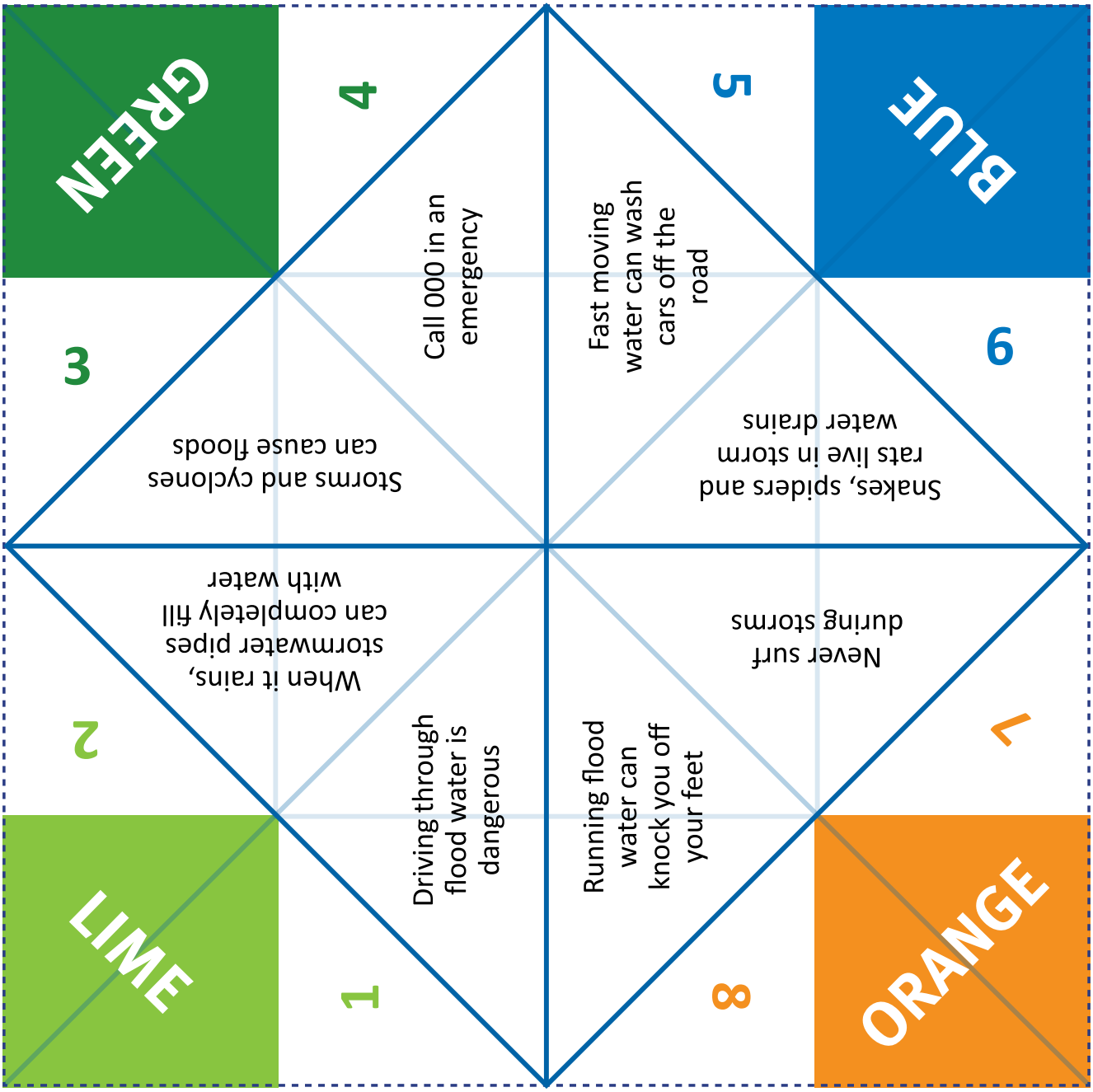
- Have a player choose one of the coloured mates4life squares.
- Spell the colour they chose, while you open and close the Fact Finder (once for each letter in the colour they selected).
- The player then selects one of the four visible numbers on the inside. Open up and down and side to side as you count the right amount they picked. When you've stopped counting, look inside and let the player choose again. Open and close the right number of times.
- Finally, open the panel under the number and read the fact you find.
- Play again and again.

How to make your Fact Finder

- Print your Fact Finder.
- Cut out the Fact Finder along the outside line.
- With the printed side up, fold the square in half horizontally and then vertically. Open the folds.
- Turn the square over.
- Fold each corner over so they meet in the middle. Do not let them overlap.
- Leave the square folded, and flip the square over.
- Now fold the corners into the centre – make sure they do not overlap.
- Fold the entire square in half and poke your thumbs and forefingers in under the flaps.
- Bring your fingers together so the Fact Finder forms a peak.
- YOU are ready to PLAY and find some interesting facts!

Fact Finder (for activity 14, see page 37)

✂ Cut along the dotted line and follow the instructions on page 37 to create your Fact Finder.



Activity 15.
Short answer quiz

Your Task

1. Why do you think floodwater is dangerous?

_____

_____

_____

2. How do you know if it's safe to walk through floodwater?

_____

_____

_____

3. What dangers could there be besides the water?

_____

_____

_____

4. What would you do if you were caught in a flood?

_____

_____

_____

5. Who can help in a flood situation?

_____

_____

_____

_____

KEY QUESTION
ARE ALL FLOODS THE SAME?

Activity 16.
Definition match

Your Task

✂ Cut out each of these cards and match the correct definition with the correct term.

STATIC WATER	fast-moving water.
BACK WATER	a body of water that is held back by a flood or a tide.
SWIFT WATER	a violent rotating windstorm.
FLOOD	an atmospheric disturbance manifested in strong winds accompanied by rain, snow, or other precipitation, and often by thunder and lightning.
CYCLONE	water collected in dams, reservoirs and tanks for urban use.
STORM	a body of water rising and overflowing onto normally dry land.
STORMWATER	water flow that occurs when the soil is infiltrated to full capacity and excess water from rain, meltwater, or other sources flows over the land.
SURFACE RUNOFF	water that originates during precipitation events.

Activity 17.
Draw away

Your Task

Draw a diagram to show your understanding of the following concepts. If you don't know what they are, you can use the fact sheets or a dictionary to help you.

Swift Water	Stormwater Drain
Flood	Grate

Thunderstorm	Cyclone
Causeway	Emergency
Eddies	Aeration

Back Water	Flash Flood
Debris	Venomous Animals
Water Storage Release	Ford

Activity 18.
Remember the jingle

Your Task

Advertisers use jingles and slogans to help people remember the products they are trying to sell. You can also use jingles to help people remember important things, such as the planets of the solar system, or to remember important information, or how to be safe during a flood. Write your own jingle to help yourself and others remember how to be safe during a storm or flood.

KEY QUESTION
ARE ALL FLOODS THE SAME?

Activity 19.
Help a friend

Your Task

Oh, no! You have just received an email from your friend who lives in North Queensland. There has been lots of rain over the past couple of weeks and it looks like it's going to flood. Send your friend a reply email and tell them what you've learnt about what to do during a flood. It's important they know what the risks are and what they can do.

_____

_____

_____

_____

_____

Activity 20.
Surfing the storm

Your Task

Many Queenslanders live by the coast and go to the beach for a swim or a surf. During a storm, it can be very dangerous to be at the beach. What do you think the dangers are at the beach during a storm? List them below.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Activity 21.
Why would you risk it?

Your Task

Unfortunately, during floods, drivers die when they try to drive through floodwater, or the bridges they are crossing get washed away. Why do you believe someone would risk their life by driving through or across flooded areas?

KEY QUESTION
WHO CAN HELP?

Activity 22.
The emergency services

Your Task

There are a number of services that can help during a flood or storm. Create a mindmap of these services and identify some of the ways they may help you, your family, or your community during a storm or flood.

Activity 23.
How can communities help?

Your Task

The Emergency Services have a very important role when storms or floods affect people, homes and businesses. Communities can help in lots of different ways. How do you think your local community could help if there was a weather-related emergency?

_____

_____

_____

_____

_____

Activity 24.
How can you help?

Your Task

You now know all the ways others can help in a flood or storm. Now, write yourself a safety checklist of things you can do to ensure you are safe and don't need to be rescued. Write your safety checklist below.

_____

_____

_____

_____

_____

_____

KEY QUESTION
WHERE CAN I FIND MORE INFORMATION?

Activity 25.
Finding out more

Your Task

In the space below, list some places you could find out more information about floods, storms, and other weather emergencies.

Activity 26.
Webquest

Your Task

Some of the younger students have asked about floods and storms. Devise a 10-step webquest to help the younger students learn about floods and storms.

Remember to give clear instructions and to record the full web address so the students can follow it easily. Even adding a diagram may help the students.

Step 1

_____

_____

_____

Step 2

_____

_____

_____

Step 3

_____

_____

_____

Step 4

_____

_____

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Step 5

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Step 6

_____

_____

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Step 7

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_____

Step 8

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_____

Step 9

_____

_____

_____

Step 10

_____

_____

_____

StormSafe

ASSESSMENT PORTFOLIO

Task 1.
Create a poster

Your Task

Create a poster to warn people of the dangers of floods. Use pictures and words to get your message across. Remember, the colours you use, the words, and the pictures all help to give meaning to your poster.

Task 2.
What would you do?

Your Task

Read the following scenarios and describe what you would do if you found yourself in these situations. Think about what you've learnt over the course of the unit and what you now know about floods and storms and keeping safe. Include as much detail in your answer as you can.

Scenario One

You find yourself caught in the middle of a flooded park.
What do you do?

_____

_____

_____

_____

_____

Scenario Two

You are building a house and want it to be safe from floods.
Where would you build the house? What would it look like?

_____

_____

_____

_____

_____

_____

Scenario Three

Your friend wants to go surf during the storm as the swell is huge. What are you going to do? What will you tell your friend?

_____

_____

_____

_____

_____

Scenario Four

You've heard about this really cool place to hang out. Your friend tells you to go through the stormwater drain by the school until you reach the end. Do you go? Why/Why not?

_____

_____

_____

_____

_____

_____

Task 3.
Draw storm events

Your Task

Draw a picture to describe the following events. Think about what you've learnt throughout the unit and how each picture might be different or the same.

Drain	Water Storage
Flood	Eddies
Swift Water	Flash Flood

Task 4.
Prepare an advertisement

Your Task

Working in groups of four or five, you are to collaboratively prepare an advertisement or community message for storm safety. You may choose storms, floods, or stormwater drains as the topic for your presentation. Use the knowledge you have developed over the course of the unit to prepare a script for your group. Think about how you will record your presentation and where it will be conducted. Also, think about your audience. If you are preparing your presentation for a younger audience, what kind of language will you use? What message are you trying to get across to them?

Group Presentation

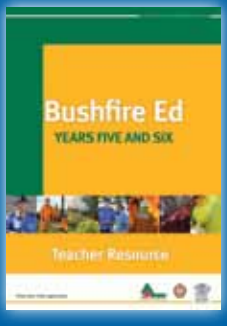
Presentation Notes:

Teacher's Notes

StormSafe

TEACHER RESOURCE

Also available at
www.fire.qld.gov.au/communitysafety/schools/default.asp



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StormSafe

YEARS THREE TO SEVEN



STUDENT PRESENTATION

STUDENT PRESENTATION

PURPOSE OF THE PRESENTATION

The purpose of this presentation is for students to develop an understanding of the dangers of storms and floods and how to avoid them. It is also designed to explore the role of the emergency services.

Key Questions

- What are floods and storms?
- Where and when do floods and storms occur?
- What are the dangers associated with floods and storms?
- How can we stay safe around floodwater?
- What is the role of the emergency services when it comes to floods?

Grades: Appropriate for Grades 3 – 7

Time Required: 45 minutes

Preparation

Equipment needed:

- Emergency services vehicle.
- Print-out of floodwater danger pictures.
- Print-out of cars driving through floodwater.
- Student activities.

Vocabulary

Flash flood – is the rapid flooding of low-lying areas. The ground becomes saturated and water can not be absorbed, creating large amounts of runoff into the watercourses and stormwater systems.

Mountain or coastal rivers quick onset flooding – occurs in the upper reaches of large rivers, as well as rivers that drain to the coast. These floods last for one or two days.

Inland rivers slow-onset flooding – is the flooding of rivers in the vast flat areas of central and western Queensland. These floods can last for a number of weeks.

PRESENTATION

Introductory activity – 10 minutes

Following the initial introduction including the name and an explanation of where the presenter is from (e.g. QFRS SES), explain to students that the purpose of the visit is to help them learn more about floods and how to be safe around them. *(Ask students to respond with a show of hands)* How many of you have seen somewhere that was flooded? How many of you have been a passenger in a car where there was flooding?

Note: It's useful to know the area in which you are presenting and the major flood events that have occurred there. If there has been a recent flood event, it is useful to talk to students about how they were affected, or if there were people they know who were affected by the event.

Developing understanding – 25 minutes

Discuss with students the various causes of flooding, including flash flooding, quick-onset flooding and slow-onset flooding. Explore with students how storms can cause flooding though there are other causes including cyclones, high tides and rain. Ask students to describe what they might see during a flood episode and record these on chart paper or a whiteboard. Explore with students the potential for floodwater to be over roads and in low-lying areas; stormwater drains filling with rushing water; homes and businesses being inundated, and creeks and rivers rising beyond their banks.

Next, ask students to identify why floods might be dangerous. As students identify different dangers, place the corresponding picture up on the whiteboard or wall for them to see. Ask students to think about which dangers they might find in their local area if there was a flood.

Focus specifically on areas of concern relevant to the students' local environment. Show students images of cars driving through floodwater and the dangers

concerned. Discuss with students the need to talk with their parents about floods and flood safety. Following this, discussion may focus on any aspect of flood safety relevant to students. For example, students in coastal regions should become familiar with high-tide and storm-surge flooding and the dangers of swimming and surfing during these times. Students in rural and remote areas should develop an understanding of slow-onset flooding and the danger that it presents for families and communities being cut off for extended periods of time from other regions. Additionally, students in rural and remote areas could engage in discussion around the dangers of swimming in flooded creeks and streams; whereas, for students in more urban locations, discussion should centre around stormwater drains and the dangers present in those environments.

Following the discussion of the dangers of floods relevant to their environment, it is important for students to identify ways of staying safe. For each of the dangers identified by students, discuss ways of staying safe (e.g. not swimming at the beach during a storm). Students can then record this information on the back of their colouring sheet on the notes page provided. Students can develop a list depending on their age and ability between 5 and 15.

Concluding – 10 minutes

Ask students to commit to staying safe during floods and storms. Ask them also to talk to their parents when they get home about the dangers and what they can do to avoid them.

Then, discuss with students the role of the emergency services when a natural disaster occurs, such as a flood, and provide time to explore and discuss the emergency services vehicle.

Students can complete their colouring sheets as a follow-up activity.

Optional activities

1. Have students create a board game to show the dangers and safety steps for floods and storms. Students can be encouraged to create a game board, game cards, and a series of instructions and rules so other students can play the game.
2. Students can create a poster advertising the dangers of floods for other students to colour in and decorate.

PROFESSIONAL DEVELOPMENT FOR EDUCATORS

The topic of flood and storm safety offers many opportunities for additional learning. Consider one of the following, or pursue ideas of your own.

Weather-related topics are of great concern to all students. Look at your whole school program around healthy behavior and weather. Do they include a major section on the risks of major weather events such as floods? Do they have take-home materials to help parents understand the issues of safe behavior? Look at pulling together material to help update the health program if needed.

Look at your own experience of floods and storms. Do you know what the major risks are for your family and community? Have you got safe strategies in place in the case of floods and storms?

Research the current information around the emergency services and the role they play in major flood events. Explore what recommendations are in place for your local community.

PARENT MATERIAL

1. If you are aware of the dangers of floods and the safety behaviours to avoid these dangers, you're sending a very powerful message that being safe during storms and floods is important.
2. Discuss with children the dangers of floods, particularly around your home and local area, and have a plan as a family to avoid those dangers.
3. Discuss with the school the information your child is receiving around safe behaviours particularly those related to major weather events, including floods.
4. Teach the children the number to ring in case of an emergency is zero, zero, zero (000).
5. Plan for major flood events; for example, rising flood water can cut off some communities – what plans need to be in place if this occurs?

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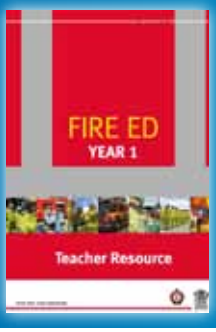
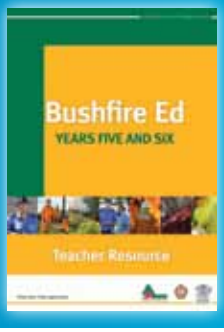
STUDENT PRESENTATION

Also available at
www.fire.qld.gov.au/communitysafety/schools/default.asp





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