

**YEAR 1**  
**LOCAL ENVIRONMENTS &  
PATTERNS ON EARTH**

**Australian Curriculum Earth Science activities  
with links to other subjects.**



Santos & ESWA supporting earth science education



**Santos**





## Year 1 - Teacher Introduction

The Primary Australian Literacy Mathematics & Science (PALMS) Program aims to enrich and support the teaching of earth science from Kindergarten to Year 5 across Australia. This will be achieved by providing, within the mandated Earth and Space Science curriculum, hands-on activities integrating aspects of Chemical Sciences, Physical Sciences and Biological Sciences as well as relevant components of English, Mathematics and other subjects into teaching packages.

These teaching packages will be made available at [www.palms.edu.au](http://www.palms.edu.au).

### LOCAL ENVIRONMENTS & PATTERNS ON EARTH

Activities marked **PPP** (PALMS PARENT POWER) are ones you may wish to send home with the students to do with their parents or by themselves.

They replay the concepts recently covered in Science. Studies demonstrate that if a student describes what they have learned to another, they deepen their own understanding and retain it longer.

Topic No.	Topic	Activities	Student Worksheet	Subjects	Page No.
1	Senses	Senses Words	√	Science + English	1 + 5
		Using Your Senses	√	Science + Mathematics	2 + 6
		Kim's Game		Science + English	9
		<b>PPP</b> - Senses and Slime		Science + English + Technology	12
2	Weather Changes	Weather Words	√	Science + English	16 + 17
		Rain, Lovely Rain		Science + English	18
		Rain and Senses	√	Science + English + Mathematics	18 + 28
		Rain Making		Science	19
		Make a Rain Gauge		Science + Technology	19





## Year 1 - Teacher Introduction

Topic No.	Topic	Activities	Student Worksheet	Subjects	Page No.
2	Weather Changes	Read a Rain Gauge	√	Science + Mathematics	21 + 29
		Rainfall Graph	√	Science + Mathematics	22 + 30
		Changes in Weather	√	Science + English	23 + 31
		Make Clouds		Science	24
		Blue Skies		Science	24
		Make a Rainbow		Science	26
		Testing Guesses	√	Science + Mathematics	27 + 32
		Changes in Temperature		Science + English	33
		Temperature and Senses	√	Science + English	33 + 39
		Hot and Cold Hands		Science	35
		Temperature and Smells	√	Science	36 + 40
		Changes in Temperature	√	Science + English	37 + 41
		Wind		Science + English	42
		Wind and Senses	√	Science + English	43 + 49
		Flying Feather		Science + Technology	44
Pointing Pencil		Science + Technology	45		





## Year 1 - Teacher Introduction

Topic No.	Topic	Activities	Student Worksheet	Subjects	Page No.
2	Weather Changes	Tea Bag Testing or Leaf Looking		Science + Technology	46
		Change in Wind		Science + English	47
		Weather in the Sky	✓	Science + English + Technology	50 + 52
		Two Day Weather Report	✓	Science + English	50 + 53
		<b>PPP</b> - Build Your Own Weather Vane		Science + Technology	54
3	Day and Night	Day and Night Words	✓	Science + English	56 + 61
		Day and Night Words - Part 2	✓	Science + English	57 + 63
		Music Appreciation		Music	58
		Student Wristband		Science + Technology	58
		Acting Time!		Science + Drama	60
4	Landscape Changes and Timescale	Landscape Changes and Timescale		Science + History	64
		Dog and Landscape	✓ (pictures)	Science + Geography	67 + 73
		Aboriginal Dreamtime		Science + History	69
		Sandpit Landscapes		Science	70
		Puddles		Science + Mathematics	94
		Salt Lakes		Science	95





## Year 1 - Teacher Introduction

### **Australian Curriculum - Earth and Space Sciences**

Observable changes occur in the sky and landscape (ACSSU019)

#### Elaborations

- Exploring the local environment to identify and describe natural, managed and constructed features
- Recording short and longer time patterns and events that occur on Earth and in the sky, such as the appearance of the moon and stars at night.

#### **Major concepts also included:**

Being, becoming, belonging

#### **English**

- Language for different text & purposes
- Communication
- What is happening?
- What is being described?
- Who or what is involved

#### **Mathematics**

- Number line
- Half & whole
- Hours, days, months
- Will happen/won't happen?
- Represent data as drawings

#### **Geography and History**

- Change over time





## Senses - Teacher's Notes

Students in this year are asked to **observe** and **describe** their surroundings. This group of activities is designed to remind students to observe using their five senses and provides them with a basic vocabulary for this and later activities.






### Materials

- Worksheets provided
- Looking tubes or students can use their hands

### Senses Words - Student Activity (with worksheet)

Organs **Eyes, Nose, Hand, Ears, Mouth.**

Senses **Look, Smell, Feel, Listen, Taste.**

Picture	Name of sense organ	What does it do?
	Eye	Look (see, sight, view)
	Ear	Listen (Hear, noises, sounds)
	Hand	Feel (Touch, hold)
	Mouth	Taste
	Nose	Smell



## Senses - Teacher's Notes

Which sense do we NOT use in Science experiments? Taste (Unless the teachers says it is safe)

How many senses do we have? Five

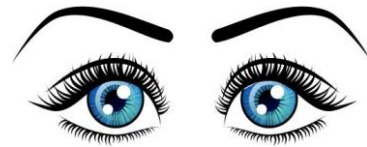
### Using Your Senses - Student Activity (with worksheet)

*A suggestion: Some excitable students can focus their sight and hearing more easily by using a simple cardboard or plastic tube. This can help them "frame" a small section of their surroundings and reduce distractions.*

In science we use four of our five senses to discover about the world.

1. Our eyes see.

Put your hands up to make a picture frame or use a looking tube. Draw what you see between the hands below.



Drawing in here



2. Our ears hear noises. What two noises can your ears hear now?  
Any two noises that could have been heard in the classroom







## Senses - Teacher's Notes

3. Our **mouths taste** things.  
Should we taste things in Science?

No (never, unless told to by your teacher)



4. Our **hands feel** things.

Name two things on your desk, which feel hard.

Any two things that could have been on the desk

5. Our noses smell. Do these things have a smell?

Onions

YES / NO

A pencil

YES / NO (dependent on pencil)

Your hands

YES / NO



**Food smells** - Mathematics - number line and range

Which food do you think has the best smell?  
(1 is worst and 5 is best)

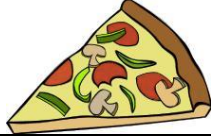




1	2	3	4	5
Worst				Best

Which do you think the class will choose as best? Answers will vary





## Senses - Teacher's Notes

Food		My choices	Class choices
Pizza			Teacher count
Banana			Teacher count
Toast			Teacher count
Fish			Teacher count
Chocolate			Teacher count

Question for the class:

Which do you think a shop would sell most of?

*Which ever your group selects.*

In Science we rarely make a judgment based on information from just one source, as there can be a large variation within any group of people.








Name \_\_\_\_\_

## Senses Words - Student Worksheet

**Organs**    **Eyes, Nose, Hand, Ears, Mouth.**

**Senses**    **Look, Smell, Feel, Listen, Taste.**

Picture	Name of sense organ	What does it do?
		
		
		
		
		

Which sense do we **NOT** use in Science experiments? \_\_\_\_\_

How many senses do we have? \_\_\_\_\_

Name \_\_\_\_\_

## Using Your Senses - Student Worksheet

In science we use four of our five senses to discover about the world.

1. Our **eyes see**.

Put your hands up to make a picture frame or use a looking tube. Draw what you see between the hands below.



2. Our ears hear noises. What two noises can your ears hear now?

\_\_\_\_\_

\_\_\_\_\_



Name \_\_\_\_\_

## Using Your Senses - Student Worksheet

3. Our **mouths taste** things.  
Should we taste things in Science?



\_\_\_\_\_

4. Our **hands feel** things.  
Name two things on your desk, which feel hard.

\_\_\_\_\_

\_\_\_\_\_

5. Our **noses smell**. Do these things have a smell?

Onions



YES / NO

A pencil



YES / NO

Your hands



YES / NO



Name \_\_\_\_\_

## Using Your Senses - Student Worksheet

### Food smells

Which food do you think has the best smell?

(1 is worst and 5 is best)

1

2

3






4

5

Worst

Best

Which do you think the class will choose as best? \_\_\_\_\_

Food		My choices	Class choices
Pizza			
Banana			
Toast			
Fish			
Chocolate			



## Kim's Game - Teacher's Notes

Scientists try to explain change. First they have to collect evidence that a change has occurred. They use all their senses. Humans preferentially use their sense of sight. Using this activity, students can train themselves and each other to develop a good memory and to discover techniques to help themselves concentrate and remember.

In the children's book "Kim" by Victorian writer Rudyard Kipling, young Kim is a trainee spy and is taught to improve his observation and memory skills by looking at a tray of jewels for a short time. The tray was covered and young Kim tried to remember what was there. He was told

"Do it many times 'till it is done perfectly. For it is worth doing"



The exercise is still a part of fundamental training in the Scouting movement, in the CIA and for many diplomatic corps. It can be used to gainfully fill in 5 minutes at any time during the day.





## Kim's Game - Teacher's Notes

### Materials

- A variety of familiar objects from the classroom
- A cloth or piece of paper to cover them

### Method

This can be done as a whole class or in groups with one student in charge of placing the objects, timing viewing and covering.

An alternative version can be done with the whole class by loading object images on the Smart Board and screening them.

### Activity 1 What was there?

It is best to start with a few (perhaps 6) familiar objects and slowly build up to 10 or 12. Students turn their backs on the tray (or Smart Board) and then all turn to view at the same time. After the teacher counts 20 seconds, the tray is covered with a cloth (dish towel) or sheet of newspaper and students, either as individuals or in groups try to remember as many objects as they can. Initially 20 seconds is long enough for viewing 6 objects but viewing time can be extended when more objects are added.







## Kim's Game - Teacher's Notes

### Activity 2 What was changed?

Students are reminded that this year we are looking for evidence of change. One or more objects on the tray are substituted with others (as above) and students are asked, "What has changed?" The position of one or more objects can be also changed.

Students are encouraged to explain to others any strategies they may use to remember what was on the tray.

Some strategies are:

- Group those with similar uses together. E.g. pencil + pencil sharpener + ruler + pencil (writing) then knife and milk (eating) then glasses + matches (grandma smokes).
- Make up a story involving most of the objects. E.g. I had to put on my glasses to find the knife to open the milk carton, I sat down and used the pen and ruler to draw the matches and pencil sharpener.
- Memorising the first letter of each object.

Rare students with an eidetic memory, the ability to recall sights and sounds after only a few seconds exposure, will shine. All students will benefit from helping each other learn to learn.





## Senses and Slime - PPP

In Science we have been studying how we use our 5 senses to find out about the world.

Please ask your student to name (and perhaps spell) their five senses and say which one they do not use in Science activities.

You use your nose to smell	<b>S M E L L</b>
You use your ears to listen or hear	<b>H E A R</b>
You use your fingers/hand to feel/touch	<b>F E E L</b>
You use your eyes to look/see	<b>L O O K</b>
You use your mouth to taste	<b>T A S T E</b>



We do not taste anything in Science unless the teacher tells us to! Ask the student why it wouldn't be a good idea to just taste anything.

### SCIENCE GAMES

#### **Come to your senses!**

Blindfold your student with a piece of soft material, a dish towel or a beanie/hat pulled down over their eyes and see if they can recognise three things by:

#### **1 Smell alone**

Examples could be: chopped onions, toothpaste, coffee, soap, apples, sports shoes, and fly spray on a tissue. If you prepare clean tissues with a smear of each and hide them under newspaper or a towel in advance, it is more fun.

#### **2 Touch alone**

Examples could be: a ball, their school hat, a pencil, a banana, grass, or a mobile phone. *Gross Science - a raw egg in a bowl!*





## Senses and Slime - PPP

### **3 Sound alone**

Examples could be: a door shutting, a spoon stirring in a cup, striking a match on a matchbox, a book falling onto the floor, a door bell, a ball bouncing, a fan being switched on, or a familiar voice.

Sometimes more than one sense helps us to recognise these objects or activities.

### **Kim's Game**



Place 6 things on a table or tray and cover them with a cloth. Uncover them for 20 seconds to let the student memorise them. Cover them and ask the student to tell you what was on the tray or table. Then increase the number of things or change the things on the table.

These activities are more fun if you both test each other.



## Senses and Slime - PPP

### Slimy Senses (30mins)

Student and parent or carer, working together.



*Warning: not to be ingested, keep away from younger children*

#### Materials for ordinary slime

(You might wish to try this recipe first!)

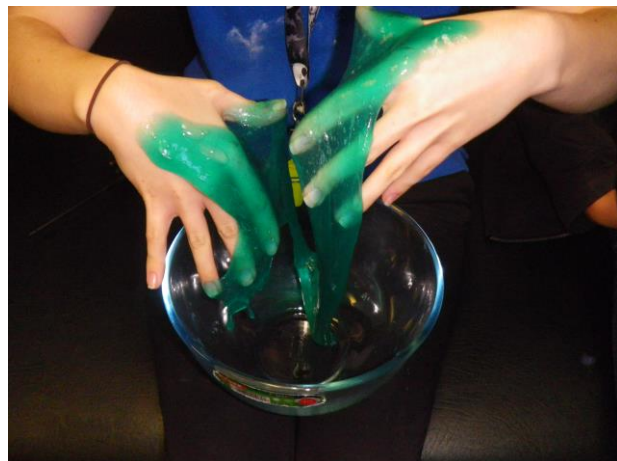
- A zip lock bag (sandwich bag)
- PVA glue (woodworking glue such as Aquadhere from supermarkets or hardware shops)
- Borax solution (from laundry section of the supermarket or hardware shop)

1. Dissolve 1 tablespoon of borax in half a cup of water
2. In a zip lock sandwich bag mix 1 tablespoon of water with 1 tablespoon of PVA glue.
3. Add food colouring if you wish. Zip up the bag and gently squeeze to mix.
4. Open the bag and add the borax solution and squeeze gently to mix.

Store in bag when not handling

#### Materials for superslime

- Mixing bowl (medium sized)
- Jug or small plastic cool drink bottle
- Pop stick or old spoon
- Stirring spoon
- 400mL of warm water (one and a half cups)
- 4 heaped teaspoons of Borax (can be bought from supermarkets in the laundry section).





## Senses and Slime - PPP

- 2 teaspoons of Glycerine (can be bought from supermarkets or pharmacies)
- 1g Guar Gum (1/2 teaspoon) (can be bought from health food stores)
- Food colouring (optional)

### Method

#### Solution 1 in bowl Water + guar gum + glycerol

1. Put half a cup of warm water into the bowl.
2. Add food colouring, if you wish.
3. Add  $\frac{1}{2}$  teaspoon of guar gum to the water and stir until dissolved.
4. Add 2 teaspoons of glycerol to the mix and stir.
5. Leave while you make up the borax solution

#### Solution 2 in jug Water + borax

1. Place  $\frac{1}{2}$  cup of water into the bottle or jug
2. Add about 4 teaspoons of borax.
3. Stir or shake the container to mix the borax into the water
4. Keep adding borax until no more will dissolve

#### Mixing solutions

1. While stirring solution 1 add a few drops of solution 2
2. Keep adding until the mix thickens and you can pick up the slime using your popstick

The slime can be kept in a jar or ziplock sandwich bag in the fridge



*Warning: not to be ingested, keep away from younger children*









## Weather Words - Teacher's Notes

Copy the correct word under each picture.

Sunny, Rainy, Puddle, Lightning, Cloudy, Windy, Stormy, Thermometer, Rainbow

		
Sunny	Cloudy and Rainy	Cloudy

		
Stormy	Thermometer	Lightning










		
Rainbow	Windy	Puddle

Name \_\_\_\_\_

## Weather Words - Student Worksheet

Copy the correct word under each picture.

Sunny, Rainy, Puddle, Lightning, Cloudy, Windy, Stormy,  
Thermometer, Rainbow

Other useful words in alphabetical order:

Cold, Day, Dry, Hot, Humid, Night, Snowy,  
Sunscreen, Umbrella and Wet.



## Rain, Clouds and Rainbows - Teacher's Notes

### Rain, Lovely Rain - Classroom Discussion

It is important to notice **when it rains** and **how much rain has fallen** because everyone in Western Australia depends directly or indirectly on rain for water.



Some suggestions for discussion:

- Water is used for drinking by most animals (including us).
- Plants take in food from the soil dissolved in water.
- Water is used for household activities such as washing clothes, showering, cooking and cleaning. If there is a water shortage we need to limit our usage or we will use it up.
- We play sports such as swimming, sailing and fishing in water.
- Water is needed for farming, fishing and most industrial processes.
- Too little rain and we have a drought, too much we have a flood.

In Science we use our senses to test for change

### Rain and Senses - Student Activity (with worksheet)



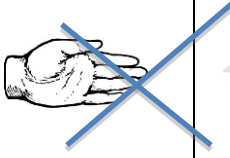


For discussion with the class:

Can you see rain?	Yes you can see raindrops and sheets of rain
Can you hear rain?	Yes, particularly if there is a tin roof.
Can you feel rain?	Yes, your hair and skin feel colder and wet.
Can you taste rain?	We don't test by tasting in Science however fresh rainwater has no taste.
Can you smell the rain?	Rain itself doesn't have a smell but it often releases dried chemicals into the atmosphere producing a smell.





## Rain, Clouds and Rainbows - Teacher's Notes

SEE	HEAR	FEEL	TASTE	SMELL
				
YES	YES	YES	NO	?

Students are also asked to survey the class (hands up?) to find who likes and who dislikes rain. This will demonstrate if more people like or dislike rain.

### Rain Making - Teacher Demonstration

Make "raindrops" appear in a zip-lock plastic bag by half filling the bag with hot water then plunging it into icy cold water. Condensation of steam will form drops of water on the inside of the bag. This replicates the condensation of water vapour in clouds when they cool, to form raindrops.

### Make a Rain Gauge - Student Activity

Plastic cool drink bottles can be modified to make rain gauges. They can be temporarily saved from the recycling bin, washed in soapy water and pre-cut with a bread knife or craft knife. The top section can be up-ended to make a collection funnel and stop birds and some animals from getting in. The Weather Bureau takes reading of their gauges at 9am every day. The measurement given is over the prior 24 hours. The gauge should be emptied completely after each reading. The gauge





## Rain, Clouds and Rainbows - Teacher's Notes

should be positioned in the open away from the school's reticulation system spray. Unless the ribs on the side of the bottle are horizontal a ruler may be needed for measuring any increase.

### Materials per student or group

- 1 pre-cut clean cool drink bottle
- A few stones
- A plastic ruler
- A watering can or large water bottle

### Method

1. Place a few stones into the bottom of the bottle so it doesn't blow over easily.
2. Turn the bottle top upside down and place firmly into the bottom half.
3. Test the gauge by sprinkling some water over it. I added food colouring to this water to make it easier to see.
4. Measure how much water was collected using the ruler on the outside of the gauge. Estimate to the nearest half-centimeter.
5. Empty out all the water and place the gauge in an open area.
6. Repeat every Science day and enter the results in your weather report sheet.

### Option

An inexpensive commercial rain gauge can be purchased from some \$2.00/reject shops. This one cost \$3.00 and has units on the side that are clear and easy to read.

Some teachers top up the rain gauges so that students can practice reading them during dry periods. In Year One they only have to be able to read to units and half units.

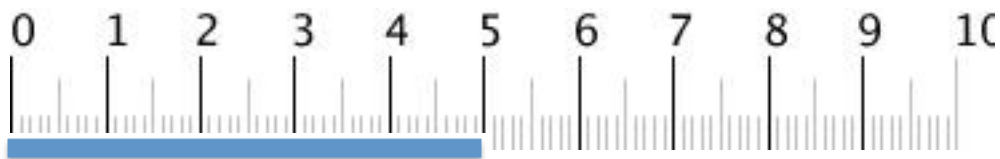




## Rain, Clouds and Rainbows - Teacher's Notes

### Read a Rain Gauge - Student Activity (with worksheet)

Read the rain gauges and write how many units of rain were collected on each day.



**Monday:** How much rain has fallen? 5 units



**Tuesday:** How much rain has fallen? 3 units



**Wednesday:** How much rain has fallen? 3 and a  $\frac{1}{2}$  units



**Thursday:** How much rain has fallen?  $\frac{1}{2}$  a unit

Which day had the **most** rain? Monday

Which day had the **least** rain? Thursday

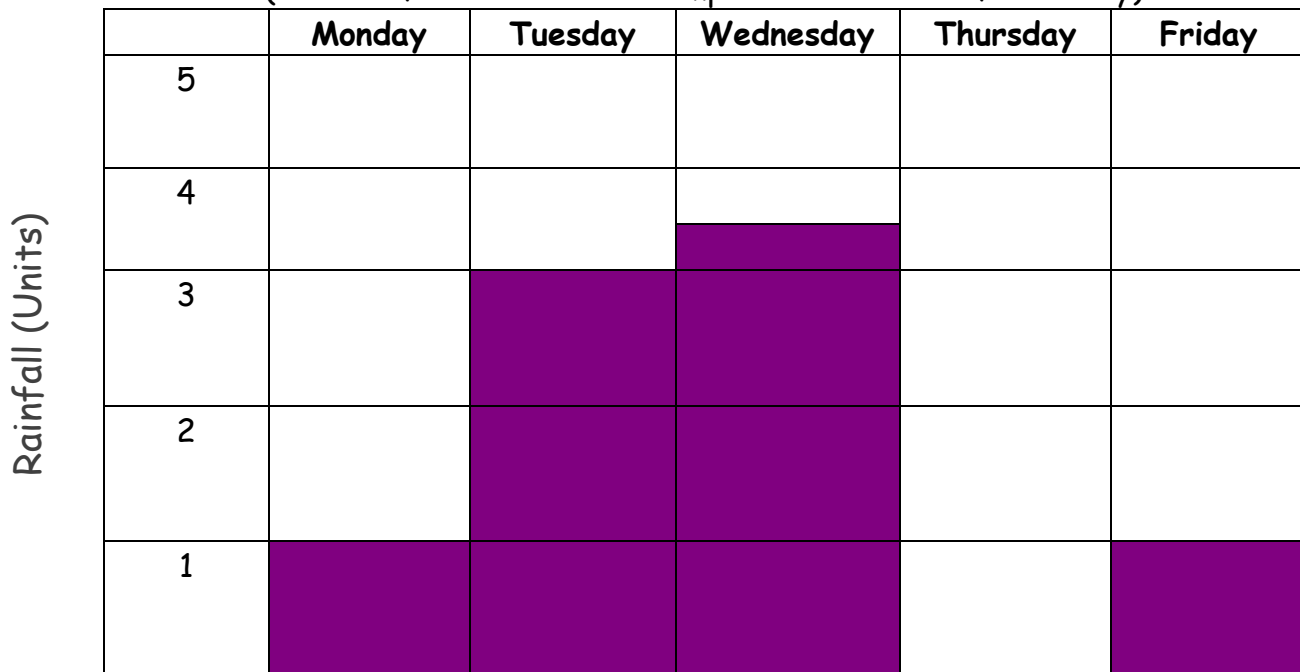


## Rain, Clouds and Rainbows - Teacher's Notes

### Rainfall Gauge - Student Activity (with worksheet)

#### Rainfall graph at YOUR SCHOOL NAME HERE

(The rainfall collector was emptied at the end of each day)



Use units (milliliters) collected by group or class or provide units to students  
e.g.

Monday 1 unit, Tuesday 3 units, Wednesday  $3\frac{1}{2}$  units, Thursday 0 units, Friday 1 unit

Possible questions for discussion:

Which day would be best for school Sports Day?

Thursday

Which day would be best to stay inside?

Tuesday or Wednesday



## Rain, Clouds and Rainbows - Teacher's Notes

### Changes in the Weather - Student Activity (with worksheet)

Change the pictures of these students to suit a very rainy day. Would their clothes be the same?



Student answers will vary due to where your school is located. Students in temperate locations will have different experiences from those in the Tropics and from those in the inland.

If these students were outside, how would they know it was raining?  
(*may need a scribe*)

- What would they hear? Pitter patter/rainfall, thunder & lightning, downpipes gurgling.
- What would they see? Rainfall, sheets of rain, clouds, darkness, wet and dripping plants, puddles, drainpipes running, floods.
- What would they feel? Wet, colder, dripping, shivering, wonderfully wet and steamy.
- What would they smell? Wet soil.

Rain Words: Wet, rainfall, damp, clouds, dark, lightning, puddles, gutters & downpipes.



## Rain, Clouds and Rainbows - Teacher's Notes

### Make Clouds - Teacher Demonstration

Clouds appear when warm air containing water vapour gets cooler. Two people are needed for this experiment and it is recommended to wear eye protection during this demonstration.

#### Materials

- A bicycle pump
- A large clear bottle (minimum of 1.25L)
- Cap for bottle with a hole (about half a centimeter) drilled through
- A measuring cup
- Warm water
- Matches
- Blu-tack

#### Method

1. Pour about half a cup of warm water into the bottle.
2. Shake the bottle to get the inside wet.
3. Light a match and let it burn for a few seconds before dropping it into the bottle. The idea is to introduce some smoke particles into the bottle.
4. Place the cap upside down on the bottle and someone holds it firmly on top of the bottle. Blu-tack may be used to create a good seal.
5. Hold the tube of the bicycle pump onto the hole and pump two or three times.
6. Pull the cap away from the bottle. There will be a pop and a cloud forms in the bottle!

The air inside the bottle is compressed as the bicycle pump adds more air. It gets hotter. When the cap is rapidly removed it suddenly gets cooler and water vapour (gas) forms water droplets (condensation). These water





## Rain, Clouds and Rainbows - Teacher's Notes

droplets attach to the tiny smoke particles, making larger droplets, which collect together to form a cloud. Other tiny particles such as dust, salt from sea spray or ash from volcanoes can also help to form clouds.

### Blue Skies - Teacher Demonstration

This activity works best in a darkened room. Turn out any lights or demonstrate in the storeroom. White light is actually made from a mix of all the colours of the rainbow.

#### Materials

- A large clear glass beaker or jar
- Water
- Milk (1tbs)
- Pasteur pipette or teaspoon
- Torch

#### Method

1. Fill the beaker (or jar) full of water.
2. Shine the torch through the side of the beaker.
3. Observe the light pass through the clear water
4. Add two or three drops of milk to the water.
5. Shine the torch through the beaker again.

When a little milk is added to the water it causes the white light to be split up and scattered. The blue light is scattered more than the others so the white milky water appears to turn blue.

Sunlight entering our atmosphere is similarly scattered by atmospheric gasses. This is what causes the sky to change colour. Clean dry air only scatters blue and that is why the sky is blue on a sunny summer's day. On rainy days the





## Rain, Clouds and Rainbows - Teacher's Notes

atmosphere is full of water vapour and all the colours are scattered making the sky grey.

### Rainbows Explained

Raindrops are actually not shaped like the drips beloved by artists. Rain falls in little spherical ball shapes. These act like glass prisms and regularly separate and scatter back all the colours of sunlight to create a rainbow. You can only see a rainbow with the sun behind you and rain in front of you.

### Make a Rainbow - Teacher Demonstration

This activity works best early in the day. Ask the class to line up three deep with the Sun at their back.

Ask a student to set a garden hose held high with its nozzle pointed down to make a high sprinkling arc a couple of meters in front of the line of students. A rainbow should appear. Exchange the student in charge of the hose so that they too can see the rainbow.

### Testing Guesses - Student Activity (with worksheet)

Our Wheatbelt farmers know we need a good rainfall of 20mL before they can plant seed for wheat and have some hope that it will germinate. They monitor the weather reports and try to get out just before it rains to sow the seed. Trying to plant after rain is messy and vehicles can get bogged.







## Rain, Clouds and Rainbows - Teacher's Notes

Further rainfall is necessary for the wheat to grow.

Guess which container would hold 20mL of water exactly.

A bucket, a cool drink bottle or four teaspoons? **Four teaspoons**



A bucket contains about 10L, a cool drink bottle about 600mL and a teaspoon  
5mL

My guess \_\_\_\_\_

Let's test the guess

A teaspoon holds 5mL. Colour in five blocks for each teaspoon.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

How many teaspoons do we need? 4 (this is much less than a 600mL bottle  
and would only cover the very bottom of an 10L bucket).

### Reading Suggestions

Tiddalik the frog by R Roennfeldt

The Rainy Day by A Milbourne & S Gill

Little Cloud by E Carle



Name \_\_\_\_\_

## Rain and Senses - Student Worksheet

In Science we use our senses to test for change.

Please put the correct word in the correct box






SEE

FEEL

TASTE

HEAR

SMELL

				
YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

Circle yes if you can use the sense with rain and no if you cannot.

### Rain Words

Rain

Raindrop

Umbrella

Wet

How many people in the class like rain? \_\_\_\_\_

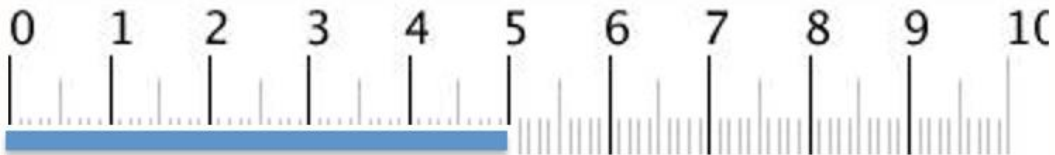
How many people in the class do not like rain? \_\_\_\_\_

Do most people like or dislike rain? \_\_\_\_\_

Name \_\_\_\_\_

## Read a Rain Gauge - Student Worksheet

Read the rain gauges and write how many units of rain were collected on each day.



**Monday:** How much rain has fallen? 5 units



**Tuesday:** How much rain has fallen? \_\_\_\_\_



**Wednesday:** How much rain has fallen? \_\_\_\_\_



**Thursday:** How much rain has fallen? \_\_\_\_\_

Which day had the **most** rain? \_\_\_\_\_

Which day had the **least** rain? \_\_\_\_\_



# Rainfall Graph - Student Worksheet

Name \_\_\_\_\_

Rainfall graph at \_\_\_\_\_ (school)  
(The rainfall collector was emptied at the end of each day)

Rainfall (Units)

	Monday	Tuesday	Wednesday	Thursday	Friday
5					
4					
3					
2					
1					



Name \_\_\_\_\_

## Changes in Temperature - Student Worksheet

Draw different clothes and equipment needed for each student for different temperatures.



HOT



HOT



COLD



COLD

If these students were outside, how would they know whether it was hot or cold?

---

---

Name \_\_\_\_\_

## Testing Guesses - Student Worksheet

Farmers need a good fall of rain before planting.  
For wheat they need **20mL** of rain to soak the soil.

Guess which container would hold 20mL of water exactly.  
A bucket, a cool drink bottle or four teaspoons?

My guess \_\_\_\_\_

Let's test the guess!

A teaspoon holds 5mL. Colour in five blocks for each teaspoon.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

How many teaspoons do we need? \_\_\_\_\_



## Changes in Temperature - Teacher's Notes

### Changes in Temperature - Classroom Discussion

It is important to notice **changes in temperature** because it controls how we live our lives. Humans change their behavior, put on or take off clothes, eat and drink, light fires or switch on air conditioners to keep our body temperature fairly constant. This is because body relies on enzymes to work and they only function within a narrow range of temperatures. (About 37°C)

Some suggestions for discussion:

- If it is close to 0°C plants get killed by frost
- If it gets colder our own bodies can suffer from frostbite and we can even die
- If we know it will be hot or cold we can dress to balance this out
- We can exercise when it is cool and rest when it is hot.
- We can put animals in the shade or cool the air if we know it will get too hot
- We can take water to drink if it is hot

In Science we use our senses to test for change.

### Temperature and Senses - Student Activity (with worksheet)

Can you see heat or cold?

No but you can sometimes see hot air shimmering above hot things. Frost can cause ice crystals to appear or snow.

Can you hear heat or cold?

NO.

Can you feel heat or cold?

Yes. Your skin feels colder and hotter. You sweat when it is hot





## Changes in Temperature - Teacher's Notes




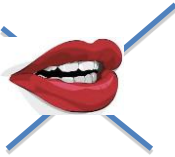

Can you taste heat or cold?

This is a difficult question. Your tongue can sense heat and cold. Different nerves from those that taste are used.

Can you smell heat or cold?

Another difficult question to answer. Heat often causes minute chemicals to be released into the air making it easier to smell some things when they are heated.

Which senses do you use to tell the temperature?

SEE	HEAR	FEEL	TASTE	SMELL
				
NO	NO	YES		?

### Temperature Words

Hot, heat wave, cold, frosty.

Which word would the snow man like? *Cold or frosty*

The class may like to vote (hands up) to work out the answers to these questions.

How many people in the class prefer hot weather?

How many people in the class prefer cold weather?

Which do most people prefer?







## Changes in Temperature - Teacher's Notes

### Hot and Cold Hands - Student Activity

We do not use our bodies as thermometers because our tolerance for heat and cold is a very variable thing. This can be demonstrated by asking selected students to plunge their hands into two of three bowls of water.

#### Materials

- Three bowls or basins big enough for a hand to be covered.
- Old newspaper under the bowls to mop up spills
- Hot, icy and tepid water
- Towels to dry hands
- Six (good natured) students

#### Method

1. Prepare one bowl of hot (but not too hot!) water, one of tepid and one of cold (add ice to make it chilly). The bowls need to be close enough together to permit a student to stand between two and be able to put a hand in both.
2. Do not tell the students which bowl is which.
3. Send three students outside the classroom.
4. Ask the three remaining students to sequentially place one hand in the hot bowl and the other in the tepid bowl.
5. Ask them which is the cold water.
6. Swear the class to silence.
7. Bring in the three students who were outside and ask them to put one hand in the tepid bowl and the other in the icy water.
8. Ask them which bowl has cold water.

Students in different groups will give different answers.

The hypothalamus in our brain senses heat and the cerebellum compares nerve input from different parts of our bodies to create balance. We can





## Changes in Temperature - Teacher's Notes

easily tell which is colder by comparison. We cannot however give a consistent measurement to measure the coldness. We need a thermometer (thermo = heat, meter = measurer) to do that.

### Temperature and Smells - Student Activity

Most teachers are aware of the difference temperature makes to our sensitivity to smells from some school toilets on a hot day! Students may be reminded of how on a hot day they can smell the scent of eucalyptus trees and conifers from quite far off. They are also more aware of the smell of hot food from the school canteen than cold food.



Q. How far away can you smell a hamburger? **20 steps**

Q. How far away can you smell a salad sandwich?  **$\frac{1}{2}$  step**

Q. Which did most of the class find easiest to smell? **Hamburger**

### Materials

- An incense stick or scented candle and matches
- A cup of hot coffee and a cup of cold coffee, or two cups of instant soup, one dissolved in hot water and the other in cold
- A handful of dried gum, leaves, matches and two saucers
- A saucer and two globs of scented hand cream, liquid soap or vinegar
- Four pairs of selected students free of sinus problems or head colds.

### Method

1. Decide which side of the room shall be "Hot" and which shall be "Cold".
2. Space out the "Hot" materials on one side of the room and the "Cold" on the other



## Changes in Temperature - Teacher's Notes

Hot side	Cold side
Lit candle or incense	Unlit candle or incense
Hot coffee or soup	Cold coffee or soup
Lit gum leaves (carefully)	Unlit gum leaves
Scented cream held in warm hand	Scented cream held on cold saucer

3. Set the scenting pairs of students (assigning them a scent) in the middle of the classroom facing away from each other and ask them to take slow steps towards their side of the room (hot or cold) and stop when they can smell their assigned scent.

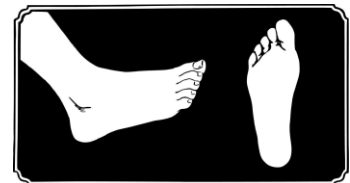
### Observations

Most students need to be very close to cold materials to be able to smell them. Heat energy makes molecules in the hot materials more mobile and more able to disperse through the air.

For discussion:

Which are easiest to smell, hot feet or cold feet?

Hot feet are easier to smell than cold feet. A combination of hot air and hot feet is most effective at spreading their scent!





## Changes in Temperature - Teacher's Notes

### Change in Temperature - Student Activity (worksheet)

Draw different clothes and equipment needed for each student for different temperatures.



HOT/COLD

HOT/COLD

Student answers will vary due to where your school is located; Students in temperate locations will have different experiences from those in the Tropics and from those in the inland. Students may change the drawings and words may need to be scribed by teacher or EA.

If these students were outside, how would they know whether it was hot or cold?

- What would they hear? Hot - sports being played, splashing on the beach, air conditioners.  
Cold - running, teeth chattering.
- What would they see? Hot - sun, clear skies, shimmering, dry plants, fire, people with few clothes.  
Cold - clouds, snow, ice, people with big coats.
- What would they feel? Hot - sweaty, sticky, sunburn.  
Cold - cold, shivering, tingling ears and toes.
- What would they smell? Hot - fire, road smell (hot bitumen)  
Cold - nothing, smoke from fires






Name \_\_\_\_\_

## Temperature and Senses - Student Worksheet

In science we use our senses to test for change.

Which senses do you use to tell the temperature?

Please put the correct word in the correct box below.

FEEL	TASTE	SMELL	SEE	HEAR
				
YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

Circle yes if you can use the sense with temperature and no if you cannot.

### Temperature Words

Hot, heat wave, cold, frosty.

Which word would the snow man like? \_\_\_\_\_

How many people in the class prefer hot weather? \_\_\_\_\_

How many people in the class prefer cold weather? \_\_\_\_\_

Which do most people prefer? \_\_\_\_\_

Name \_\_\_\_\_

## Temperatures and Smells - Student Worksheet



Q. How far away could you smell a hot hamburger? \_\_\_\_\_ steps.

Q. How far away could you smell a cold salad sandwich? \_\_\_\_\_ steps

Q. Which did most of the class find easiest to smell?

Record the number of steps away each tester stopped.

Hot side	Cold side

Name \_\_\_\_\_

## Changes in Weather - Student Worksheet

Change the pictures of these students to suit a very rainy day.  
Would their clothes be the same?



What would they hear? \_\_\_\_\_

What would they feel? \_\_\_\_\_

What would they see? \_\_\_\_\_

What would they smell? \_\_\_\_\_

**Rain Words:** Rain, wet, rainfall, damp, clouds, dark, lightning, puddles, gutters, downpipe, cold.



## Wind - Teacher's Notes

### Wind - Classroom Discussion

We need to know about changes in the weather because a change in the weather affects what we choose to do.

The clothes we wear

The place where we eat lunch

The sports/games we play

Whether we switch on an air conditioner or a fire

How fast washing will dry

What is planted in the garden



It is important to notice where the wind is coming from and how strong it is because a change in the wind often brings a change in weather.

Some suggestions:

- A hot wind can change to a cool wind, such as the "Fremantle doctor" cooling down the land in the afternoon in summer.
- A wind from the inland grassland in spring can bring asthma causing grass pollen to students on the coast. Students will need to bring their medicine.
- The wind becomes much stronger before rain. It also raises dust clouds.
- In hot weather willy willies can start over open land.
- Cyclones in the tropics cause swirling winds, which cause terrible destruction.

In Science we use our senses to test for change

### Wind and Senses - Student Activity (with worksheet)

Can you see wind?

You can't see wind but you can see the effect it has on things around it. (See activity below)

Can you hear the wind?

Yes. A breeze rustles leaves and a cyclone howls.

Can you feel the wind?

Yes. A cold wind gives you goose bumps.












## Wind - Teacher's Notes

Can you smell the wind? Not always. You can smell the scent of the sea or dust carried in the wind.

Can you taste the wind? We don't test by tasting in Science however wind from the sea can taste salty because of tiny drops of water carried by it.

LOOK	HEAR	FEEL	TASTE	SMELL
				
YES	YES	YES		?

If there is a wind blowing outside you can ask students to wet one hand only in the sink and then hold both hands out into the wind. Ask them if they can see the wind passing over their hands? (No) Then ask them how they know the wind is blowing (wet hand gets cold)

Change this to only wetting one finger and feeling to find which direction the wind is coming from.

How do you know where the wind is coming from? The wet side of the finger feels colder.



Flag



No wind



Strong wind



## Wind - Teacher's Notes

Draw what happens to the flag if the wind stops blowing and what happens if the wind blows very hard (a strong wind).

**Wind words** Blow, Gust, Breeze

There are several suggestions for wind measurers (anemometers). Please ask students to save good ones for use in the "Weather Report over two days" activity. The first two activities "Flying Feather & Pointing Pencil" can be done inside the classroom. The second activities "Tea Bag Testing or Leaf Looking" which measure wind strength needs to be done outside or a fan or hairdryer is necessary to simulate different strengths of wind. We can easily record which direction the wind is coming from but it requires more effort to record how strong the wind is

### Flying Feather - Student Activity

Dinosaurs prefer walking into the wind. Can the feather or streamers help them tell them the direction the wind is blowing and how strong it is?



**Materials** per student or group

- A lump of play dough or plasticine for the base
- A short length of plastic straw (about 3.5cm)
- A feather or a feather shape cut from cardboard





## Wind - Teacher's Notes

### Method

1. Press the plasticine onto a flat surface to form an anchoring base
2. Stick the piece of straw into the plasticine to form a socket for the feather
3. Place the feather onto the socket
4. Test equipment by blowing at it from different directions.

### Pointing Pencil - Student Activity

#### Materials per student or group

- Plasticine base as above
- Sticky tape
- Streamers, ribbon, tape, strips of paper

### Method

1. Stick streamers to point of pencil
2. Fix upright into plasticine or playdough
3. Test by blowing from different directions
4. Look for a change

### Questions for discussion

1. In both these experiments, what changed? *The direction of the feather and streamers were changed by the wind.*
2. Do these experiments tell the dinosaurs which way the wind is blowing? *YES!*

#### Option

The school plan, a compass or a mobile App can tell you the direction the wind is coming from. The points of the compass could be chalked in the yard for future reference.



## Wind - Teacher's Notes



In olden times people depended on wind power to trade and travel with sailing ships, grind grain and pump water. Many old buildings still have a weather vane. In port cities such as Fremantle, weather vanes were found near the docks so that merchants could decide on good days to leave port and how long voyages might take.

The direction and strength of wind is also critical for aircraft to know for take off and landing.

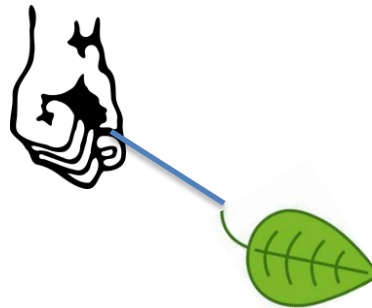
Clever bush architects used to build houses with a central corridor aligned to the wind direction in summer to help cool rooms. Wind

was also used to winnow chaff from grain and separate gold nuggets from dirt.

### Tea Bag Testing or Leaf Looking - Student Activity



**Very strong wind**



**Less strong wind**

**Materials** per student or group

- Large leaf or a tea bag which has been emptied of tea leaves tied to a length of string or thread





## Wind - Teacher's Notes

### Method

Hold the string with the leaf or tea bag and move around the yard to see if you can find the spot with the strongest wind OR if you remain inside, test the leaf or tea bag by setting the hairdryer or fan to different strengths and observe the changes.

### Question for discussion

In both these experiments, what changed? The angle of the tea bag or leaf from vertical (straight up and down). The stronger the wind, the more the object moved from vertical to horizontal.

### For Teachers

This chart will let you convert the angle of the string to estimate the strength of the wind

Angle	90	80	70	60	50	40	30	20
km/hour	0	13.2	19.0	24.0	29.0	34.4	41.5	52.3

**Option:** Students can suggest which area in the yard is the windiest and then test their guess scientifically with this equipment.

### Change in Wind - Student Activity (with worksheet)



In a strong wind hair and clothes will be blown by the wind.





## Wind - Teacher's Notes

These answers need to be modified by where your school is located. Students in temperate locations will have different experiences from those in the Tropics and from those in the inland

How would these students know if it was a windy day?

What would they hear? Breeze, blow, blast, wind whistling, howling cyclone

What would they see? Clouds moving fast, leaves flying, branches bending, dust blowing/dust storm

What would they feel? Wind on skin, perhaps cold skin, hair blown about

What would they smell? Dust, smoke?






Suggested reading

The Wind Blew by Pat Hutchins

Name \_\_\_\_\_

## Wind and Senses - Student Worksheet

In Science we use our senses to test for change. Which senses can we use for wind?

				
YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

What happens if a wet finger is blown on by the wind (or by a student!)

\_\_\_\_\_

How do you know which way the wind is blowing from?



Flag



No wind



Strong wind

Draw what happens to the flag if the wind stops blowing and what happens if the wind blows very hard (a strong wind).



## Weather Reports – Teacher’s Notes

### Weather in the Sky – Student Activity (with worksheet)

This worksheet asks students to use their senses and words used in earlier activities and worksheets to “fill in the blanks”. Teacher’s answers are given on the next page.

Students then break into “Think, Pair, Share” groups and share their results. Groups report their finding to the class.

### Two Day Weather Report – Student Activity (with worksheet)





This worksheet asks students to use equipment they have made during this topic to create a report. (Rain gauges, wind strength and direction indicators etc.) They are also provided with three options of possible words, however you may wish to change these to suit local weather conditions at your school location and at the time of year the activity is carried out. Students may then compare their observations and measurements against those from official weather reports on television, radio, newspapers and from Apps to see how accurate they are.







## Weather Reports – Teacher’s Notes









										
	YES NO	Drawing	YES NO	Sound	YES NO	Feeling	YES NO	Taste	YES NO	Smell
<b>Rain</b>	YES		YES	Pitter patter	YES	Cold, wet	YES	Water	YES	Damp soil
<b>Clouds</b>	Yes		No		No		No		No	
<b>Rainbow</b>	Yes		No		No		No		No	
<b>Thunder</b>	No	—	Yes	Bang Crash Roll Peal Boom	No		No		No	
<b>Lightning</b>	Yes		Yes	Crack Bang	Yes	Some people feel tingling, others get shocked!	?	Lightning releases some ions which dissolve in rain and ozone	?	Ozone smells
<b>Storm</b>	Yes		Yes	All of the above	Yes	Wind, cold, wet and the above	Yes	As above	?	As above





# Weather in the Sky - Student Worksheet

Name \_\_\_\_\_


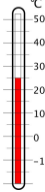


										
	YES NO	Drawing	YES NO	Sound	YES NO	Feeling	YES NO	Taste	YES NO	Smell
<b>Rain</b>	YES		YES	Pitter patter	YES	Cold, wet	-	-	YES	Damp soil
<b>Clouds</b>										
<b>Rainbow</b>										
<b>Thunder</b>										
<b>Lightning</b>										





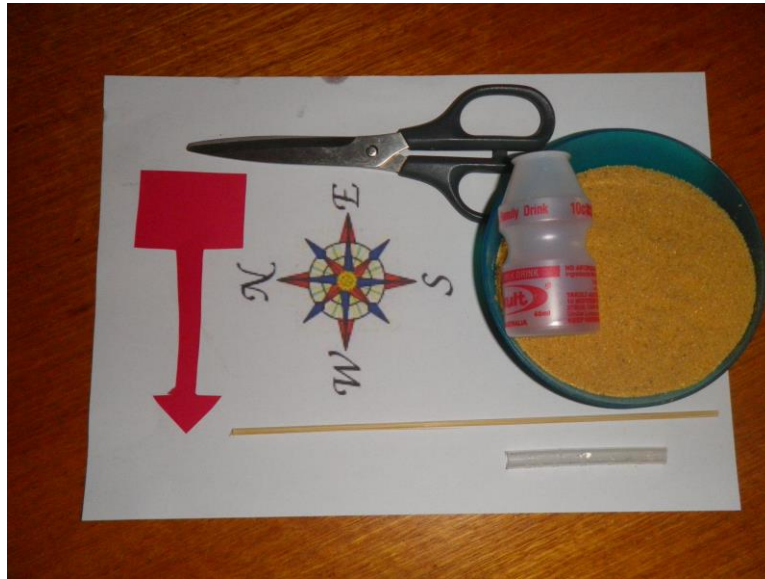
# Two Day Weather Report - Student Worksheet

Name \_\_\_\_\_

	Wet or dry	Hot or cold	Clouds or sun	Wind	And?
<b>Useful Words</b>	Very rainy Rainy Dry 	Very hot Hot Warm Cold 	Cloudy Clouds and sun Sunny 	Very windy Windy No wind 	
<b>Day 1</b>					
<b>Day 2</b>					

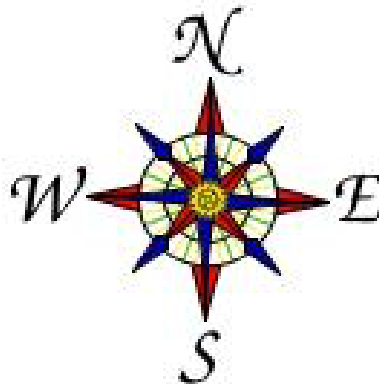


## Build Your Own Weather Vane - PPP



### Materials

- Sand or soil in a container (small bottle or tin can)
- Half a drinking straw
- Wood skewer (or dowel) with point removed
- Cardboard or plastic (e.g. lid off ice cream container) to make arrow with point smaller than tail
- Sticky tape
- Compass points (provided below)

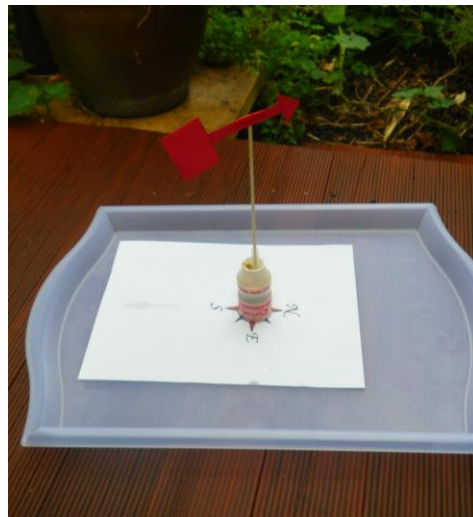




## Build Your Own Weather Vane - PPP

### Method

1. Fill container with sand and press the half straw into it. This provides a weighted base.
2. Stick arrow to skewer end.
3. Place other end of skewer into the drinking straw.
4. Set up compass points so that N points to North. (Road maps, Apps, Google maps can be useful)
5. Place weather vane on compass points outside in the wind.



### Experiment further

Suggestions for improvements

Will it work better if the arrow is bigger?

What happens if the arrowhead and tail are the same size?

Could you make a better one with a bamboo stake and 2L milk bottle?



In class students have also made their own rainfall measurer with an empty cool drink bottle and wind strength measurer with an empty tea bag. They may want to make one at home and have their own weather station.








## Day and Night - Teacher's Notes

### Day and Night Words - Student Activity (with worksheet)

Students are asked to observe and describe the short-term changes from day to night.

What do we see in the sky during day and night?




Sun, clouds, birds (owl and seagull), bats, moon, stars, meteor/shooting star, lightning

		
Day or night Bats Moon	Day or night Clouds Rain	Day or night Sun

		
Day or night Bird (Seagull)	Day or night Moon Stars	Day or night Cloud Lightning



## Day and Night - Teacher's Notes

		
Day or night Meteor	Day or night Owl Moon	Day or night Rainbow

Clouds can be seen at night if there is moonlight. Occasionally large meteors can be seen and heard during the day

Other useful day and night words in alphabetical order:  
dark, light, morning, sunrise, sunset

### Day and Night Words - Part 2 - Student Activity (with worksheet)

Students are asked to use the words to finish the sentences below.

Night    Dark    Sleep    Play    Light    Day

#### Night

The sky is **dark** at night.

I go to bed at night to **sleep**.

The moon shines at **night**.

#### Day

I see the sun in the **day**.

In the day, I **play**.

The sun gives us **light**.





## Day and Night - Teacher's Notes

Q When can you see geckos? Mostly at night.

### Music Appreciation

Play Clair de Lune (Moonlight) by Debussy and ask students what they think the music represents. The moon shining over rippling water.

It is a very short dramatic piece of piano music.

[www.youtube.com/watch?v=ZIsQPdC9YnY](http://www.youtube.com/watch?v=ZIsQPdC9YnY)

### Time Wristband – Student Activity

#### Short term patterns during one day

A pattern is something that repeats regularly. The time wristband records patterns during a school day and night. This can be followed by asking students to act what they do during the day in the short "Acting Time" activity.

**Common student word confusion** Students from an ESL background can confuse "Day" = 24 hours, with day = daylight. In this activity the word "day" refers to the period of daylight. This will vary with time of year and distance from the equator. Visit Google "sunrise and sunset for your location" if you wish to find the length of daylight for your school on a particular day.

#### Materials

- A ruler
- A strip of plain paper 26cm long to make a wristband
- Glue
- Coloured pencils or pens



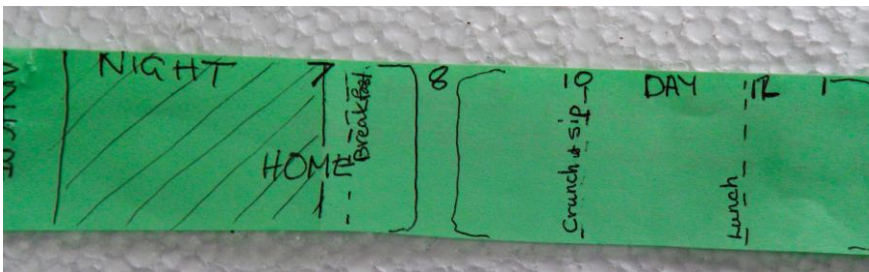
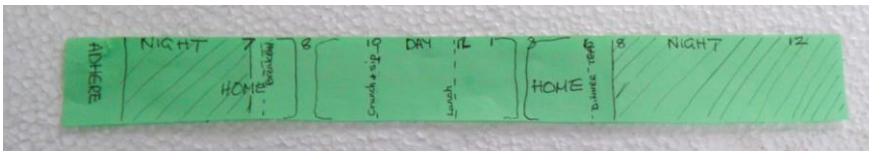




## Day and Night - Teacher's Notes

### Method

1. Cut a strip of paper about 26cm long and 2cm thick.
2. With the ruler mark off 24x1 cm stripes to represent 24 hours. The remaining band will be used as a tab to glue the strip to make a wristband.
3. With a dark pencil gently shade in the hours of darkness for that day.
4. Locate hours of a school day for start, morning recess/Munch and Crunch, recess, lunch, and end of school. Using this plotted information, students can then locate waking, washing, breakfast, lunch, play, sport, watch TV, dinner/evening meal and go to bed.
5. Using glue stick the ends of the band to make a wristband.



**Suggestion** Perhaps have prepared stick-on pictures on band for ESL students.

For less able students have the 24 hour strip already prepared so they can proceed with hours and activities in a controlled step by step pattern.



## Day and Night - Teacher's Notes

### Questions for discussion

1. Are there regular time patterns in how you spend your school days?  
*Usually Yes! - Arrival/departure, lunch/recess/crunch & sip etc.*
2. Compare your band with others - Is there a common pattern? *YES*
3. Would there be the same pattern of activities at the weekend? *Give some examples*  
*NO! School activities would be replaced by others such as visiting relatives, playing sports, etc.*

### Acting Time! - Student Activity

Collect students on the mat and ask them to quietly act out what they do at each hour of the day. It is often easier if you first choose one natural actor to demonstrate to the rest of the class, monitor for acceptability and then ask the class to join in.

E.g. 6am = sleep, 7am = putting on clothes & washing face, 9am = sitting at desk.

It is easier for most students if you proceed from hour to hour, morning to night. However, some might enjoy the challenge of random time calls.





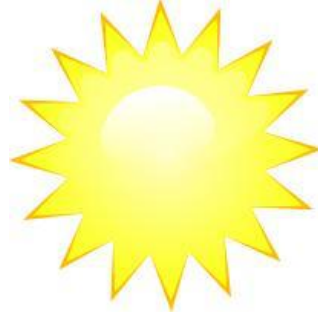
Name \_\_\_\_\_



## Day and Night Words - Student Worksheet

What do we see in the sky during day and night?

Sun, clouds, birds (owl and seagull), bats, moon, stars,  
meteor/shooting star, lightning.




Colour the correct choice and label it.

		
Day or night	Day or night	Day or night

		
Day or night	Day or night	Day or night

Name \_\_\_\_\_

## Day and Night Words - Student Worksheet

		
Day or night	Day or night	Day or night

Other useful day and night words in alphabetical order:  
dark, light, morning, sunrise, sunset

Name \_\_\_\_\_

## Day and Night Words - Part 2 - Student Worksheet

Use the words to finish the sentences below.

**Night    Dark    Sleep    Play    Light    Day**

### Night words

The sky is \_\_\_\_\_ at night.

I go to bed at night to \_\_\_\_\_.

The moon shines at \_\_\_\_\_.

### Day words

I see the sun in the \_\_\_\_\_.

In the day, I \_\_\_\_\_.

The sun gives us \_\_\_\_\_.

When can you see geckos? \_\_\_\_\_.



## Landscape Changes and Timescale - Teacher's Notes

### Landscape Changes and Timescale - Classroom Discussion

During Western Australia's geological history there have been massive changes in the landscape.

1. Rocks that crystallised 5km under the surface of the Earth 1.8 billion years ago have been uplifted to eventually form the relatively low lying granite gneiss landscape around Margaret River. As the rocks rose they were worn away by weathering and erosion down to present day levels.
2. Seafloor rose to become mountains. The wonderful red plateaus of the Kimberly were shallow marine coral reefs over 360 million years ago. Fossils can tell us about landscape changes. Fossil coal found at Collie in the southwest and near the Irwin River behind Geraldton tell us that these areas were once great swamps rich with lush rotting vegetation from which the coal formed.
3. The Darling Range behind Perth is the result of a massive fault or break in the Earth's surface that runs north south along the western edge of our state. The eastern side keeps slowly moving up and the weathered material of many millions of years is washed down to form the lower Swan Coastal Plain. Over 15 kilometers of sediment has accumulated on the downward moving western side.

More recently:

4. Sea level rise and fall during the most recent Ice Age (Pleistocene) has left raised beaches and old cliff lines inland and conversely signs of early Aboriginal arrival are now found under the sea. Skin divers can find great heaps of abalone shells (kitchen middens) and old campfire sites under what is now sea. These were important meeting and feasting places. Aboriginal people could (and did) walk over to what is now Rottnest Island at the mouth of the Swan River until comparatively recently because water was still locked up in glaciers.





## Landscape Changes and Timescale - Teacher's Notes

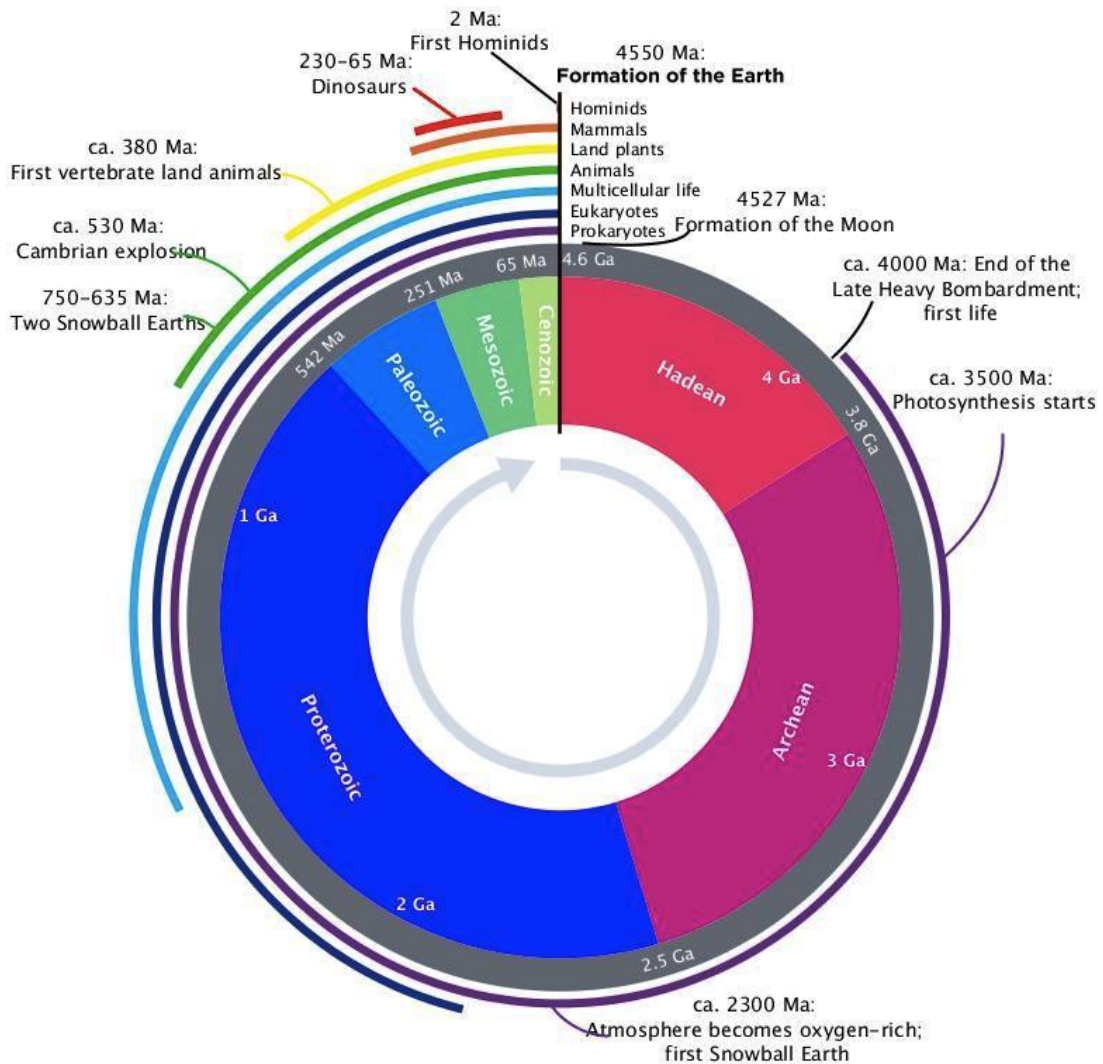
5. As recently as 80,000 years ago, Western Australia was home to many species of marsupial mega fauna. Giant marsupials such as the Diprotodont (mega-wombat) and Thylacoleo (marsupial lion) lived in forests of soft leaved trees. The climate changed and became drier and harsher. The trees died and were replaced by hard leaved eucalypts and spinafex started to colonise the grasslands. The arrival of Aboriginal people with their fire stick farming about 50,000 years ago coincided with the last of these amazing creatures. The change in vegetation changed the landscape.
6. The arrival of Europeans with their different agricultural techniques, ability to drill for water and dig for minerals and their vastly increased numbers has also caused change. In particular the increased frequency and intensity of fires have further impacted on the natural vegetation and changed the landscape.

Our planet formed about 4.6 billion years ago. Natural landscapes have changed greatly over geological time. Indeed the major geological time units have been named and divided by these major changes in landscape resulting in changes of animal life and plant life. About 66 million years ago massive volcanic outpourings of lava built mountains and were major contributors to the K/T extinction event that caused the death of 75% of animals on Earth including the dinosaurs. All life on our planet at present evolved from the survivors. After this the great supercontinent of Gondwana broke up releasing the Australian tectonic plate to travel south round the pole to its present position. The different climatic zones it travelled through created different landscapes.





## Landscape Changes and Timescale - Teacher's Notes



**Natural landscapes and features** are those that have only been slightly affected by humans. It is difficult to find truly natural landscapes in Western Australia as most accessible areas have roads.

**Managed landscapes** have been partly modified by humans to suit their purposes. Farming land and parkland are reasonable examples.

**The constructed landscapes** have been built by humans.







## Landscape Changes and Timescale - Teacher's Notes

### Dog and Landscape - Student Activity (with pictures)

**Changes in natural features** in a landscape are created by

- Long term geological activity
- Shorter term weathering agents such as rain, wind, flowing water, ice and heat from the sun
- Long and short term changes in climate



*Millie the dog in granite rocks with lichens, grasses, herbs and running water*

Natural landscape features are those that already existed before the advent of humans and still exist now. These tend to be geographic features such as mountains, rivers, plains, volcanoes, oceans, beaches and forests.

**Managed features** are changes made by humans to natural features so that they can more easily access and control Earth's resources such as pathways in National Parks, toilets in Nature Reserves, grassed playing fields in schools and drainage channels across areas liable to flood. Managed features can also be



*Alfie the dog in a park where grass has been planted watered and mowed and sand dumped to create a paddling beach*

seen where one type of vegetation has been replaced by another such as when acacia scrub has been replaced by planting wheat or canola for farming or when one kind of animal is replaced by another such as cows grazing where kangaroos and emus used to.



## Landscape Changes and Timescale - Teacher's Notes

**Constructed features** are built by people such as houses, schools, roads, railways, airports, dams, irrigation ditches sewers, power stations, mines and ports.

### Materials

- 12 or more laminated pictures of different landscapes or upload the photographs included in this package onto a Smart Board.
- 4 different coloured non-permanent felt tip pens



*Rory the dog on pavement outside a café with railings, bicycle parking bars and non-native vegetation.*

### Method

Almost every picture has a dog, cat, or fox in it to engage interest, excepting of course those taken in National Parks or Nature Reserves where non-native animals are not permitted. These pictures may be expanded, printed and laminated so a student or group can mark them with water-soluble felt pens to highlight the location of the dog, any built features and natural features.

If the pictures are printed and laminated then they can be cleaned and used in subsequent years. Students are issued with a picture and first find the dog (or not) and then give three good reasons why their picture is of a natural, managed or built landscape. They both identify and describe the features in the picture.

### Extension

Take your students for a walk round your local environment and ask them to identify the natural, managed and built features



## Landscape Changes and Timescale - Teacher's Notes

### Aboriginal Dreamtime - Classroom Discussion

Some Aboriginal cultures believe that the Universe, including the Earth and all its people was created by a giant rainbow serpent (called Goorialla, in the Northern Territories and Queensland). Either it or a lesser Dreamtime snake called The Wagyl in Western Australia then shaped the landscape where its body moved over the unformed land. It pushed up mountains and created valleys where it moved over the land. Spots where it stopped to rest at night later became good meeting places for Aboriginal groups. Where its body had squirmed it left low hollows away from the wind where good water collected. It eventually returned to the sky where it watches down on people making sure they care for country. There are many depictions of this being in Australian rock art and paintings. Walkways and tracks through Western Australia are often marked with a snake image.



In The Lands (Wongi), which lie north and inland from Kalgoorlie, a similar serpent is said to be responsible for chewing Gnamma holes out of the rock. These collect and store freshwater after rain. Aboriginal people would cover them with more rock or brush to stop animals contaminating them and defended them as a precious resource in hard country. This gnamma hole (above) at Barlangi rock near Sandstone has lost its cap and has filled in. It is over 1m deep.



## Landscape Changes and Timescale - Teacher's Notes



Concentric circles carved into rock, or painted onto rock often mark the location of good water. (Perhaps the petroglyph represented circular ripples spreading from a stone dropped into water) Groups would fight over water resources and the game, which collected round them. The rock above is near Puunu waterhole near Mt. Newman.

Aboriginal people believed that the landscape was created in the Dreamtime before the world, as we know it, began.

Geologists and geographers believe that earth forces such as weathering, erosion, mountain building, faulting and other tectonic forces are continually shaping and reshaping the surface of our planet.

### Sandpit Science - Classroom Discussion

Raindrops quickly change the shape of unconsolidated material but have little short-term effect on rocks. Ideally the sandpit should be bordered by rock. If not please have a few pieces of rock (road gravel) or concrete handy.

If you do not have plastic droppers like Pasteur pipettes, a straw can be used. The straw is held vertically and half immersed in water. A finger is used to seal the upper opening of the straw and it can be raised out of the





## Landscape Changes and Timescale - Teacher's Notes

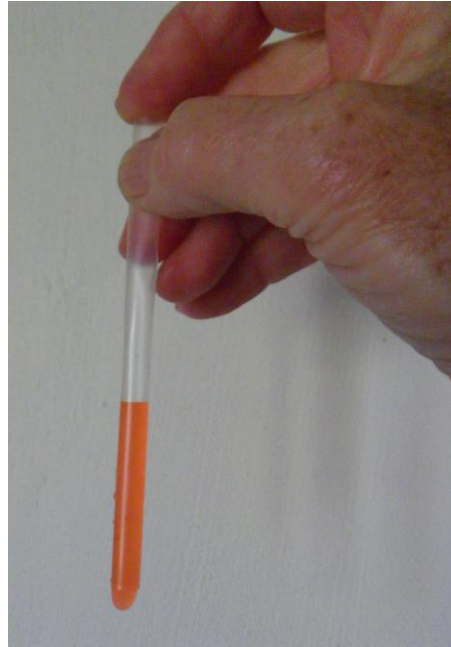
water still retaining water. It can be taken (still sealed by the finger) to where it is needed and water drops "milked" out by the other hand.

### Materials

- Sandpit and rocks (or cement).
- Hands, buckets & spades.
- Four containers of water (ice cream containers are ideal).
- A straw or a Pasteur pipette for each student.

### Method

1. Take students to sandpit and ask them to quickly landscape the sand into mountains.
2. Demonstrate to the students how to use the straw to make a water dropper.
3. Drop 30 raindrops on one part of their mountain landscape and observe any changes.
4. Repeat dropping all the water at once on another part of the mountain range to represent the flow of a river.
5. Repeat the last two activities to see the effect of rain and a river on the rock.



### Questions for discussion

1. Does rain have a short-term effect on soil and sand? *Yes.*
2. Does rain have a short-term effect on rock? *No*

Over millions of years rain and running water and others forms of weathering and erosion eventually wears away mountains.





## Landscape Changes and Timescale - Teacher's Notes

### Suggested Activities

Dick Roughsey's book - The Rainbow Serpent

This beautifully illustrated book explains how our landscape was formed and how rainbow lorikeets got their colours.

Students may wish to draw or paint the serpent.

Local elders may be invited to discuss the importance of country and of local landscape features.





# Constructed Landscapes - Pictures





# Constructed Landscapes - Pictures







## Constructed Landscapes - Pictures





# Constructed Landscapes - Pictures





# Constructed Landscapes - Pictures





# Constructed Landscapes - Pictures





# Constructed Landscapes - Pictures





# Managed Landscapes - Pictures





# Managed Landscapes - Pictures





# Managed Landscapes - Pictures







# Managed Landscapes - Pictures





# Managed Landscapes - Pictures





# Managed Landscapes - Pictures





# Managed Landscapes - Pictures





## Natural Landscapes - Pictures





# Natural Landscapes - Pictures





## Natural Landscapes - Pictures





## Natural Landscapes - Pictures







# Natural Landscapes - Pictures





# Natural Landscapes - Pictures





## Natural Landscapes - Pictures





## Short and Long Term Changes in Landscapes - Teacher's Notes

### Puddles - Student Activity

Students can either use real puddles out in the yard if it has rained or can create puddles on a dry day by pouring about 100ml of water over an impermeable surface such as concrete or asphalt. Since the rate of puddle disappearance depends on the volume of water, temperature and humidity it will vary with weather, season and locality. This puddle evaporated over 4 hours on a windy winter day (about 20°C). Chalk marks were made at 1-hour intervals.



**Option 1:** For teachers who have this class over 1 day

#### Materials

- Bucket of water to create several puddles.
- Sticks of chalk.
- A clock.

#### Method

Students draw around the outline of their puddle early in the day and return at regular intervals to note what has happened to the puddle shape and size.

#### Questions for discussion

1. Why did we draw round the puddle first thing? To mark the original size
2. What will happen to the puddle? It will dry up/evaporate.
3. What senses will we use? Our sense of sight.





## Short and Long Term Changes in Landscapes - Teacher's Notes

### Conclusion

Students discuss whether what they thought would happen was the same as what did happen.

1. Where did the water go? Into the air. Heat from the Sun evaporated it.
2. How long did it take for the puddle to disappear? In the case above 4 hours
3. Did this change take a long term or a short term? Short term

**Option 2:** For teachers who only have this class for 1 session per week. Use the photograph above to discuss changes over 1 day.

### Salt Lakes - Student Activity



*Lake Ballard The product of thousands of years of evaporation*

In many areas of Western Australia soil naturally contains quite a lot of salt. The salt is the product of millions of years of weathering of rocks and also salt brought in by winds from the sea. When the climate started





## Short and Long Term Changes in Landscapes - Teacher's Notes

warming up about 100,000 years ago, major north-south rivers in the inland started drying up leaving the long strips of salt lakes we see on maps and from airplanes. When it rains water still flows underground along these drainage channels bringing more salt with it. In the Goldfields region groundwater is hypersaline (saltier than the sea). It will kill most vegetation and is not tolerated by most animals.

Natural vegetation such as trees, bushes and grasses take water and dissolved salt from the upper layers of the soil. This maintains the low salinity and fertility of the topsoil. Clearing for agriculture and building means salty water can now rise to the surface and deposit salt there. This ruins the land for agriculture and building. Western Australia has a major salinity problem. Salt scoured land can be reconditioned by planting salt tolerant plants such as "Old Man Saltbush" which is native to this area.

***"Salt can sleep comfortably in the land for thousands of years but when something disturbs the monster.." Jim Heath***

We use the dry lakes as a source of salt for food and chemical production and also for gypsum to make plaster for walls, ceilings and broken limbs. Lakes may form in less than ten years if vegetation is cleared. They become progressively salty as later rains sink into the ground, dissolve more salt and bring it to the surface.

### Materials

- A take away container, saucer, bowl or bottom of an old cool drink bottle
- 2 tablespoons of salt  
(1 tbs gypsum may also be added)
- 6 tablespoons of damp (not wet) sand





## Short and Long Term Changes in Landscapes - Teacher's Notes

- Water and Pasteur pipette or straw
- Something to raise up one end of the container

### Method

1. Two thirds fill the bottom of the container with sand
2. Add salt to the sand and mix well. Students should landscape the surface into a valley shape as above.
3. Pour about one cup of water gently into the sand in the container. The sand should be damp but not wet.
4. Leave on a warm window sill or outside where it is very dry
5. Over several weeks use the pipette or straw dropper to "rain" onto the land whenever it dries out.

### Questions for discussion

1. What did the sand look like at first? Depends on sand or soil used.
2. What changed? The damp sand developed a thin white crunchy salty crust especially at the foot of the valley.
3. What happened when we dropped rain on the crust? It disappeared but the lake at the bottom of the valley became progressively saltier.



The "lake" above took two weeks to develop during winter. The salty crust could be seen and felt after one week.



## Short and Long Term Changes in Landscapes - Teacher's Notes

*Please note that salt is "deliquescent". This means that it can absorb moisture from the surrounding air and the dry salt lake will become liquid again. This is why we sprinkle salt on spilt red wine to stop staining!*

4. Would it take a long time or a short time to make a crust as thick as the school is high? *A long time. Hundreds and thousands of years*  
Land can become salt scoured (salt at the surface) over ten years but a salt lake takes much longer to accumulate the vast deposit of salt.

### *Teacher talk*

Teachers used to be known as "chalkies" because they used chalk on the blackboard. That chalk was pure calcium carbonate and was soft enough to leave a good white streak. It was imported from the great chalk deposits in Europe. To demonstrate the production of the gas carbon dioxide, a chalky would just have to drop some blackboard chalk into vinegar and it would effervesce beautifully. Not so now! Most Australian blackboard chalk has a high percentage of gypsum in it. It makes the "chalk" less dusty and harder leaving a clean line. However it means that it doesn't react well with vinegar and gas production is very disappointing.

