SCIENCE
CURRICULUM LEVELS 2–3

Te Kura
Te Aho o Te Kura Pounamu
THE CORRESPONDENCE SCHOOL

I SEE COLOURS

SCL304 2015/1

Science Curriculum Levels 2–3

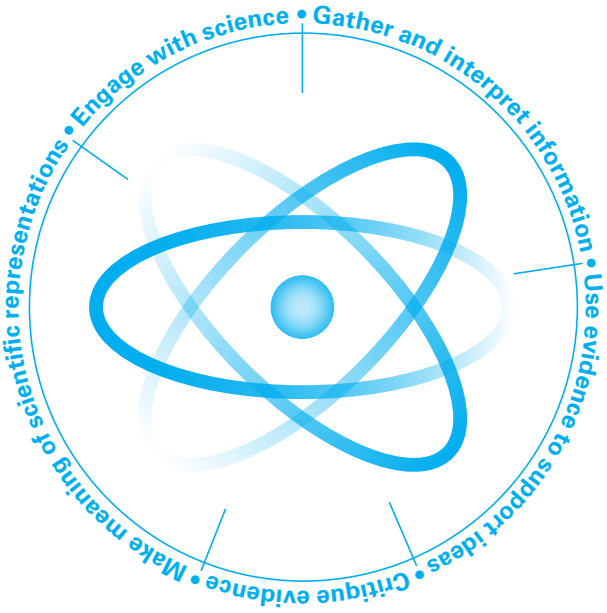
The Nature of Science

The Nature of Science strand is the overarching science strand. Through it, students learn what science is, how scientists work, as well as ways science knowledge is created and used.

This is done through the context strands of the Living World, Planet Earth and Beyond, the Physical World and the Material World.

It involves:

- understanding about science
- investigating in science
- communicating in science
- participating and contributing.



The skills that scientists use are:

- Gather and interpret information
- Use evidence to support ideas
- Critique evidence
- Make meaning of scientific representations
- Engage with science

When you see this icon in the activities, you will know you are practicing and using these nature of science skills.

Key competencies

Key competencies are skills, knowledge and values that help us live, learn and work independently and with others.

The key competencies you will focus on in this topic are:

- Thinking
- Using language, symbols and text

As you work through this unit, think about which of these key competencies are being used.

You could:

- talk together about the key competencies you are using, and how you know
- write examples in your journal of how you are using the key competencies.

Making sense of the material world

The **Material World strand** involves the study of matter and the and changes it undergoes.

- Group materials in different ways, based on the observations and measurements of the characteristic chemical and physical properties of a range of different materials.
- Compare chemical and physical changes.

Introduction

In this topic you will investigate:

- how we get colour
- different ways you can mix primary colours together to form new colours.

Learning Outcome

At the end of this topic you will be able to describe some of the properties (special characteristics) of different colour media.

Learning Intentions

I will:

- explore mixing primary colours using different media
- give explanations for what I observe and find out.

Supervisor

Media

In this resource, media means materials like acrylic paint, powder paints, colour pencils, oil pastels, felt pens and so on.

You will:

- mix wet and dry colours
- separate colours
- investigate properties (special characteristics) of different colour media (like paints, felt pens, pencils).
- predict what you think will happen
- gather data (information)
- make and record careful observations about what you did and what happened
- say 'What might that mean?' (interpret and infer).

Assessment

Your teacher will give feedback on:

- the activities in your recording journal
- the assessments and evaluation on the inside back cover.

How to do the work

Spread this work over two weeks, for example an hour a day over three days each week.

WHEN YOU SEE THESE ICONS:

Check for more information using the internet or other resources. A page with useful sites is included in this resource.

RECORDING JOURNAL

Keep all your results in a journal, this may be electronic or paper.

When you are asked to add results to your journal, if you have made an electronic journal, take a photo or video and add that to the journal.

Make sure you give all journal entries a heading which links them back to the activity.

YOU WILL NEED:

- powder paints and brushes from your art pack
- water
- to read the instructions for mixing on the paint packs
- containers for mixing paint (saucers, jars, cups)
- several coloured felt tip pens including black
- scrap paper and any other surfaces to test
- paper towels or blotting paper or coffee filter paper
- five pieces of blank A4 paper
- internet access.

Supervisor
Help your student to:

- **read and work their way through this resource**
- **discuss/talk about their learning as they go**
- **record their observations and learning in their recording journal.**

What is colour?

Colour is the aspect of things that is caused by differing qualities of light being reflected or emitted by them.

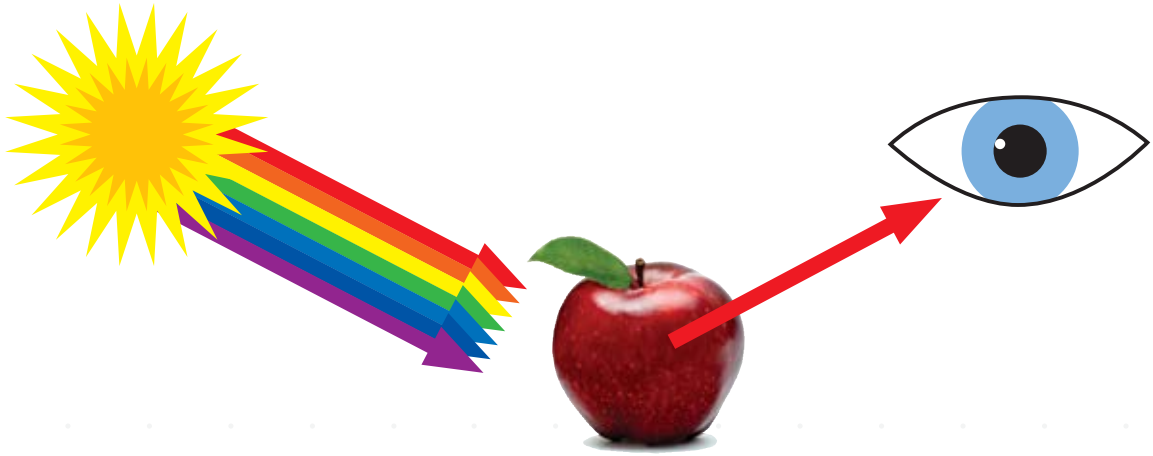
How do we see colour?

To see colour, you have to have light. When light shines on an object some colours bounce off the object and others are absorbed by it. Our eyes only see the colours that are bounced off or reflected.

The sun's rays contain all the colours of the rainbow mixed together. This mixture is known as white light.

To remember the colours of the rainbow, remember this name ROY G BIV.

Red Orange Yellow Green Blue Indigo Violet



All the colours of sunlight shine on the apple.

The surface of a red apple absorbs all the colour light rays, except for those corresponding to red, and reflects this colour to the human eye.

The eye receives the reflected red light and sends a message to the brain.

Check for more information using the internet or other resources.

Talk with your supervisor about things you found out.
In your recording journal write about one new thing you discovered.

Primary colours

There are three primary colours red, blue, and yellow.

When you combine two primary colours you get the secondary colours: green, purple, and orange.

Observe and make your own discoveries as you work through the activities.

Check for more information using the internet or other resources.

Activity 1
Observe colours around you

Imagine a world without any colours.

What do you think it would look like, feel like?

Brainstorm some ideas with someone else.

In your journal write some key words that describe a colourless world or map your ideas.

Almost everything in the world is coloured.

Natural things (things found in the living world) have their own colour, like an orange flame, a green leaf. Other things have had colour added or given to them by people.

Gather and interpret information

Find **five** examples of natural colour and manufactured colour.

In your recording journal, create a chart like the one below to record your findings under each of the headings.

	Living world: Natural colour	**Manufactured or colour added or given to them by people**
1	Green leaf	Blue paint on a car
2		
3		

Draw your own explanatory picture to show how we can see one of the things you have listed above in the daytime. Use the diagram on page 3 to help you.

Explain the meaning of this?

Activity 2
Natural colours

Engaging with science

Explore how natural materials are used in real life to create colour for everyday use.

The natural colour in things like plants, earth, people's skin and animals is called **pigment**.

Long ago, people found out how to make colours or pigments from natural materials like rock, clay, earth and ash and burnt wood from fires. They mixed earth with animal fats to make paints.

Kōwhaiwhai or rafter patterns were once painted on large rafters coloured white.

Colours that were used were:

- white – from white clay
- red – from red ochre clay, burnt
- black – from soot
- blue and grey – from clay.

These materials were all mixed with shark oil to make a paint.

How Māori use natural materials for colour

Kōkōwai is the name for the earth from which red ochre (kura) is produced by burning.

Kōkōwai, literally means 'red water'. Kura (red ochre) was often used to paint Māori wood carving.

Kōkōwai and kura are extremely sacred media and their origins lie in the separation of Papatūānuku (Earth Mother) and Ranginui (Sky Father).

Kōkōwai is used in a number of traditional ceremonies, and when applied along with a karakia (Māori prayer/ blessing) it becomes tapu (sacred).

The kōkōwai was burned in a fire, ground into a fine powder and mixed with shark oil to make paint. This paint was then used as a stain for wood carvings and for kowhaiwhai patterns painted on the rafters of meeting houses.

Can you find ways other cultures have used natural materials for paint and dye?

Check for more information using the internet or other resources.

Then in your journal record a way another culture has used natural materials for paint and dye.

Make paint from natural materials.

You need:

- dry earth (like clay, soft rock, soil)
- cooking fat (like oil, kremelta, bacon fat)
- an old knife
- something to paint with
- sheet of blank A4 paper
- containers for mixing.

Method

Mix some earth with a little cooking fat.

Try different proportions until you get a good paint.

Test it on scrap paper.

Paint a simple picture with your best paint mixture on your blank paper.

You could paint a plant, animal, or any shape.

When it dries, write the heading 'My earth paint'.

Write what you used to make your paint.

Keep your picture in your recording journal.

Activity 3
Mixing primary colours

Gather and interpret information

Powder paints are pigments. Red, yellow and blue are primary paint colours.
Other colours can be made from mixing them.

You need:

- red, yellow and blue powder paint
- to read the mixing instructions on the paint packets
- water
- paint brushes
- sheet of blank A4 paper.

Method

Mix two primary colours to make a secondary colour.

Make a prediction first and record it in your recording journal.

Example

If I mix equal amounts of	I will make
red and yellow	
blue and yellow	
red and blue	
three primary colours, red, yellow and blue	

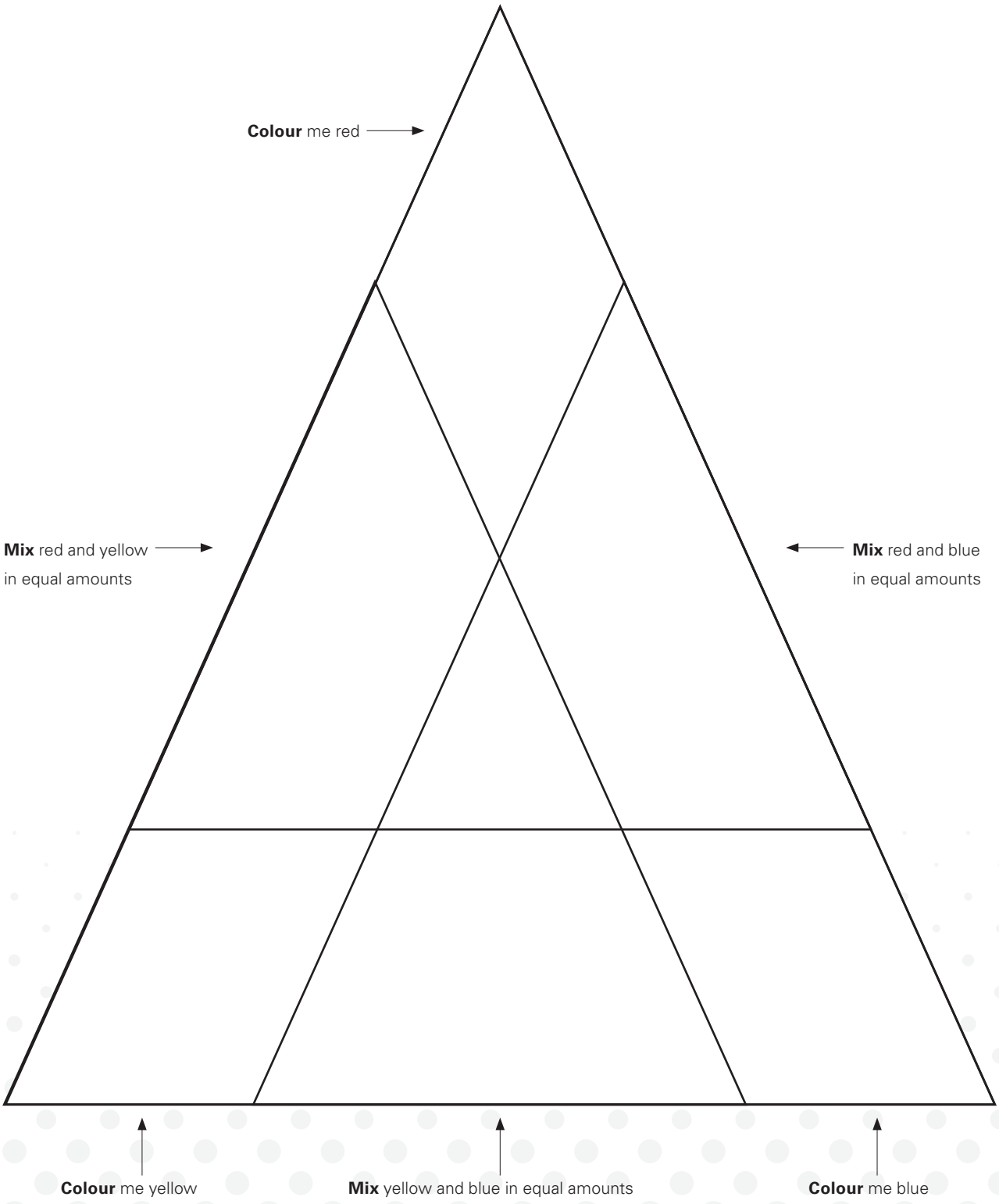
Test your predictions.

Use the chart *Mixing Primary Colours* and follow the instructions.

Record your colours on the chart.

In your recording journal, write a brief statement comparing your predictions and results. Cut out and add the chart, or take a photo and add that to the journal.

Mixing Primary Colours



Make a colour chart.

Gather and interpret information

Use a blank sheet of A4 paper.

Write a heading ‘My colour chart’.

Find out how many different colours you can make.

You could:

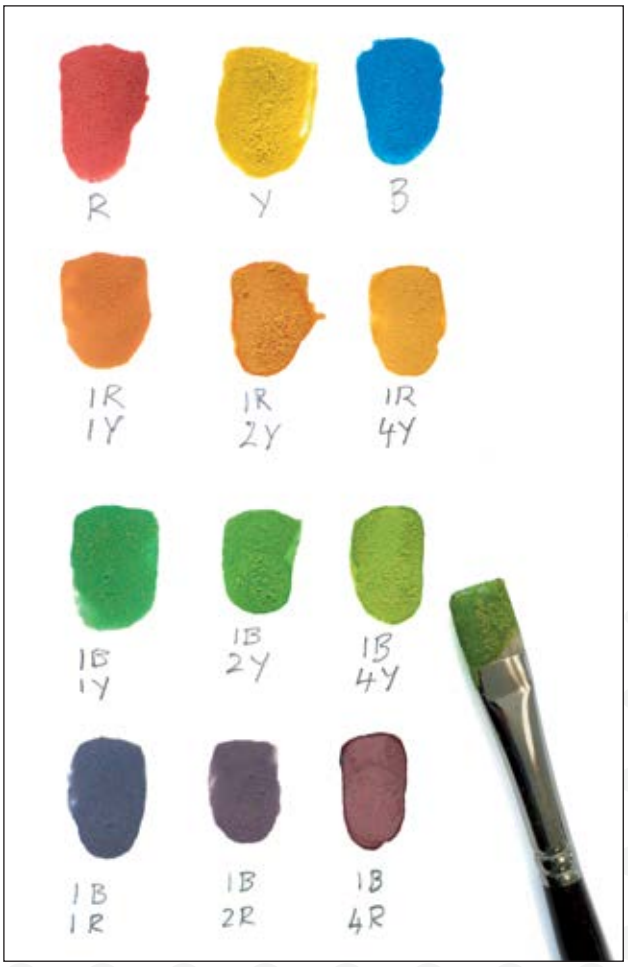
- mix two primary colours in different proportions
- mix all the primary colours in different proportions
- mix a primary colour with a secondary colour to make a tertiary colour.

Make a note of what colours you mix each time.

Record at least 12 different colours on your chart.

Write underneath each new colour what colours you mixed.

Look at the example.



What do you notice about mixing primary colours and secondary colours?

Record your observations and add your chart in your recording journal.

Check the ideas in the ‘Possible answers’ section.

What's in a colour?

Find out what colours are mixed to make different felt pen colours.

To begin to learn about chromatography, view Chromatography for kids

http://safeshare.tv/w/cQbYgAXZaM

Investigate chromatography

Before you start the chromatography test, have a go at predicting what colours you think will appear when each of the dots separate out.

You need:

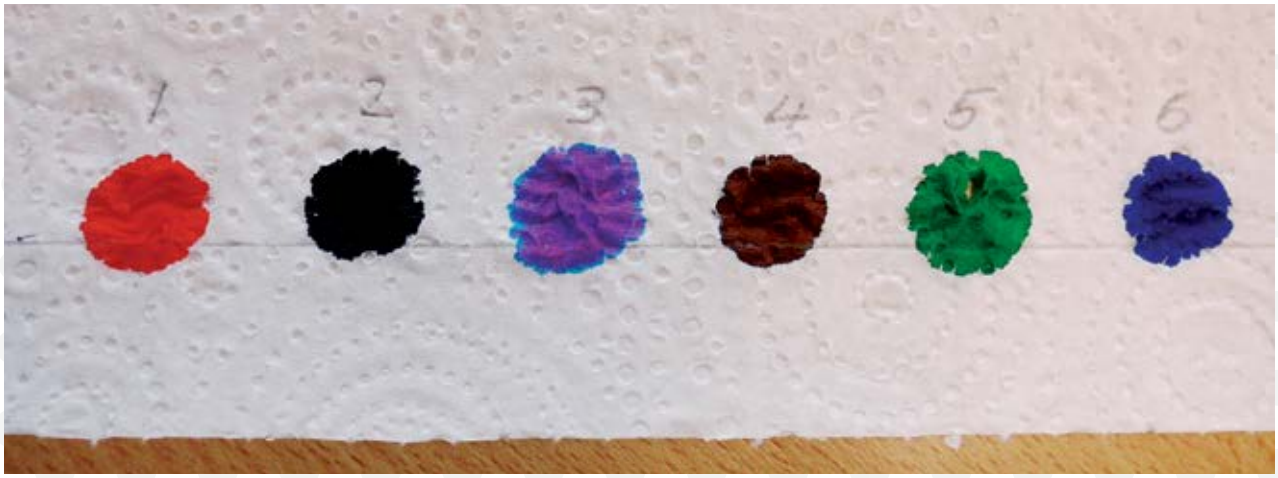
- a strong paper towel, blotting paper or coffee filter paper
- at least six different coloured felt pens (you may need to try different brands of felt pens to get true chromatography results)
- pencil
- clean empty jar
- water.

Method

Draw a pencil line across the paper towel that is three centimetres from the bottom edge.

Make a large spot with each felt pen along the line. Leave at least a 2 cm gap between each spot.

Number each spot with a pencil.



Pour some water in the jar, no more than two centimetres high.

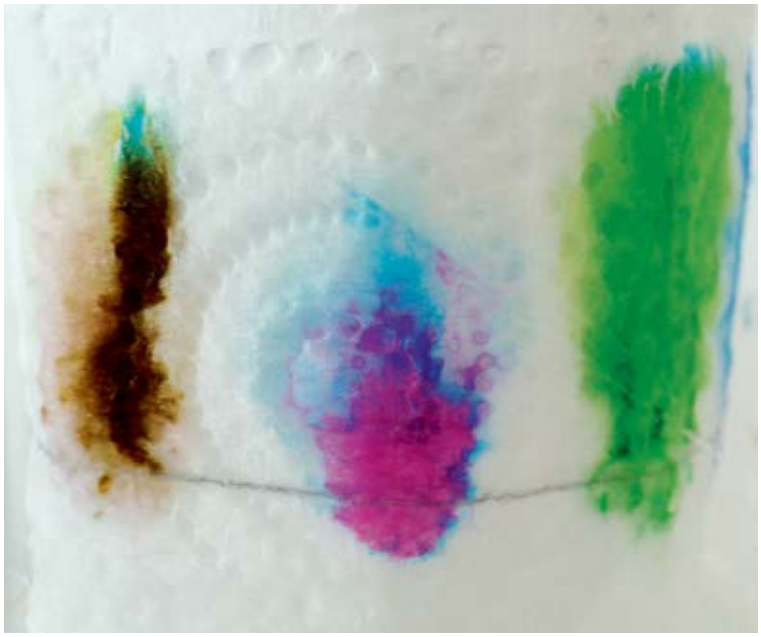
Roll the paper towel and fasten the edges together with paperclips, so you can see all the spots.

Stand it in the jar and cellotape it to the rim.

Leave it for several minutes and watch what happens.

Remove your paper towel and let it dry.

You may need to test this a few times to get the best results.



Separating colours in this way is called chromatography.

Write a heading in your recording journal 'My chromotography test' and attach the test results. Write a brief statement comparing your predictions and results.

List any pen colours that contain only one colour.

List any pen colours that contain several colours.

List colours that are used to make black.

Check for more information using the internet or other resources.

Activity 4
Comparing the properties of wet and dry colour media

Gather and interpret information

Use evidence to support ideas

Investigate the properties of different wet colour media.

You need:

- colours in different wet media (different paints, ink, dye)
- a paint brush
- scrap paper and any other surfaces to test (like wood, plastic, glass).

Method

Test each wet colour medium separately.

Apply with a brush some of each colour medium to paper and other surfaces (e.g. wood, plastic, glass).

Now try mixing two colours of the same media together.

Investigate questions such as:

- Do the colours run together?
- Does it cover the surface so you can't see it?
- Does the colour change on different surfaces?
- How can you thin this colour?
- Does it dry quickly?
- And any others you can think of.

In your recording journal, create a chart like the one below to record your findings under each of the headings.

Example.

Colour medium	**Properties**	**What happens when you mix two different colours?**
Powder paint	Dry powder can be sprinkled on a wet surface. It mixes with water. Colours run together when they're wet. Paint dries quite quickly.	

If possible, take photos of your results.

Investigate the properties of different dry colour media.

You need:

- coloured pencils
- crayons
- chalks
- pastels.

Method

Test each dry colour medium separately.

Apply some of each colour medium to paper and other surfaces (e.g. wood, plastic, glass).

Now try mixing/blending two colours of the same media together.

Investigate questions such as:

- Do the colours run together?
- Does it cover the surface so you can't see it?
- Does the colour change on different surfaces?
- Is it soft?
- Does it smudge?
- Do colours blend easily?
- Is it clean to use?
- Any others you can think of.

In your recording journal, create a chart like the one below to record your findings under each of the headings.

Example.

Colour medium	Properties	What happens when you mix two different colours?
Coloured pencil	Hard. Can be sharpened to a point. Hands don't get dirty. Lead covered with wood. Colours don't run together.	

If possible, take photos of your results.

Investigating colour further

What is colour? – page 3

What is colour?

www.crayola.com/for-educators/resources-landing/articles/color-what-is-color.aspx

How we see colour

http://ed.ted.com/lessons/how-we-see-color-colm-kelleher

Spectrum of colours

http://lifestyle.howstuffworks.com/crafts/other-arts-crafts/science-projects-for-kids-spectrum-of-colors.htm

Natural colours – page 6

Colours of nature

http://safeshare.tv/w/bvaAndQGDW

Primitive pigments and painting

http://safeshare.tv/w/sUCUiBxELq

The science of pigment

http://mocomi.com/pigment/

Mixing colours – page 9

Mixing colours experiment

www.turtlediary.com/kids-science-experiments/mixing-colors-experiment.html

Mixing primary colours

www.omsi.edu/tech/colormix.php

What's in a colour? – page 14

Chromatography for kids

http://safeshare.tv/w/cQbYgAXZaM

Acknowledgements

Every effort has been made to acknowledge and contact copyright holders.
Te Aho o Te Kura Pounamu apologises for any omissions and welcomes more accurate information.

Photos – iStockphoto.com

Cover: Abstract colourful background, 43066126

Rainbow, 6089126

Red apple, 5631178

Blue Siamese fighting fish, 8266604

Kiwifruit, 8758707

Ancient stone desert, 53243222

Garden poppies, 20010596

Chaffinch (Fringilla coelebs), 6971678

Rock paintings, 4127789

Māori kōwhaiwhai patterns, 13631946

Preparation for aboriginal body painting, 25124535

Red powder, 729898

Yellow powder, 729905

Blue powder, 729891

Liquid colour droplets, 10609623

Artists chalk pastels, 1446304

Photo: Kōkōwai (Hematite), Bigstock.com 8569594

Assessment and Evaluation SCL304

Tick the boxes that best match your learning.

Name	Student ID No.

I can	Not attempted	Had a go	Succeeded	Did very well	Did an excellent job
Describe the different properties (special characteristics) of different colour media.					
Explain what happens when two colours of the same media are mixed together.					

Student comment

Supervisor comment

Teacher feedback

SCL304 2015/1

STUDENTS – PLACE STUDENT ADDRESS LABEL BELOW OR WRITE IN YOUR DETAILS.

FULL NAME _____

ID NO. _____

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www.tekura.school.nz