Background information

Year 2, unit 3: Mixing things together

Glossary of terms used for this unit

- **objects** – purpose-made items in our environment that we can touch and that are made from one or more materials.
- **material** – the substance objects are made out of.
- **combine** – joining materials together to create something which can utilise the properties of the materials.
- **mix** – creating something by blending materials together in an even way.
- **ochre** – a type of earth pigment derived from naturally tinted clay containing mineral oxides. The mineral oxides give it the distinctive colours. It is one of the earliest pigments used by man for all manner of painting and dyeing.
- **binder** or **binding material** – a wet material, originally found in the natural environment, for mixing with ground ochre clays to allow the colours to be applied to other objects. Binding materials used by Aboriginal peoples included tree saps, kangaroo blood, water, turtle egg yolks and bush honey.

Lesson 2: investigating how playdough ingredients mix

At the end of this investigation students can combine the ingredients they have used for the investigation to make playdough. Playdough is relatively fail-safe and the results should still be successful as the ingredients will still be in rough proportion. Extra flour or water can be added at the final mixing stage if needed.

If desired, you can split the playdough into balls and invite students to add different things like glitter, lavender oil, lemon essence, vanilla essence, peppermint essence, pieces of netting (tulle), glass pebbles, feathers, real pebbles, sequins, lentils and mixed herbs. While students are creating with the dough, discuss with them the mixing and combining process.

Recipe for uncooked playdough for a class of 25 students

- 2 cups of salt (500 g)
- 8 cups of plain flour (2 kg)
- 8 tbsp oil (200 mL)
- 8 tbsp cream of tartar (125 g)
- 7–8 cups warm water (2 L)
- a few drops food colouring in water
- a few drops of glycerine for extra shine, stretch and smoothness (optional)

Mix all of the ingredients together in a bowl, then knead the mixture well on a floured board or tray until the dough becomes smooth but not sticky.

The quantities listed in the materials and equipment table have been calculated per student, so that the when all the ingredients used for the investigation are mixed, the quantities are in proportion and should make a class batch of dough. The amounts shown in parentheses on the materials and equipment list are the total quantities to be purchased for a class of 25.

Before the lesson

Prepare a desk with required materials for each group of three students.

- 1 ice-cream container in which stands a cup with flour (nearly full) and a cup with salt (half full) plus one tablespoon and one teaspoon (accurate measuring type preferable but not necessary)
- 1 cup containing 2–3 teaspoons of cream of tartar
- 1 cup containing about 4 tablespoons oil
- 1 cup half filled with warm water
- 6 paddle pop sticks (2 per student)
- 6 paper/plastic cups (2 per student)
- 3 sheets of paper
- a damp cloth for clean up

Extra materials if intending to make playdough

- food colouring (two primary colours)
- cup of warm water
- extra flour
- glycerine (optional)

Begin the investigation

1. Allocate students into groups of three at desks with materials.
2. Instruct students to open their own science journals and to fold a page into four columns and then use their ruler to draw the table as was modelled by you.

Material 1	Material 2	What do I see?	Notes

3. State expectations, emphasising close observation of mixing the ingredients, the need for care and for using specified amounts, particularly remembering to level the spoonfuls. Instruct students to record their results in the same way you modelled.
4. Tell students to begin by mixing 2 level tablespoons of flour and 1 level tablespoon of salt (Mix 1) into one of their cups, just as you did earlier, and observe how they mix. Instruct them to pour this mix onto the piece of paper, gently pressing it flat with their hand and observe what it looks like. Ask them to **record** what they did and saw in their science journal.
5. Instruct students to pour the flour mixture on the paper into the ice-cream container and explain that this is where they will place all the ingredients they have finished with.
6. Tell students to place 1 level tablespoon of flour (new from the cup with flour) and 1 teaspoon of cream of tartar (Mix 2) into one of their cups. They need to predict, observe, mix, tip the mixture onto the paper, flatten it then observe and **record** what it looks like. When finished, instruct the students to tip this mix into the ice-cream container as well.

7. Tell students to place 2 tablespoons of water into one of their cups and then predict what will happen when they add 1 teaspoon of salt (Mix 3). Tell students to observe, mix, observe and **record**.
8. Instruct students to now add another teaspoon of salt to this same cup (Mix 4) and mix and observe again. Tell them to discuss observations and then all tip the contents of their cup into the ice-cream container.
9. Instruct students to place 2 tablespoons of flour into one of their cups and add 1 tablespoon of water (Mix 5) then observe, mix, observe and **record**. Tell them to set this cup to one side (do not tip into the ice-cream container).
10. Tell students to place 2 tablespoon of water and 1 teaspoon of oil into their empty cup (Mix 6) and observe, mix, observe and **record**.
11. Instruct students to tip this mix into the other cup containing the flour and water (which had been set aside) and observe.
12. Ask students to tip all mixes into ice-cream container and clean up.
13. Regroup in front of the class science journal with students having own science journal recordings with them.

Summary of steps for quick reference – remember: observe, mix, observe, record.

Ingredient	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
flour	2 tbsp	1 tbsp			2 tbsp	
salt	1 tbsp		1 tsp	Add 1 tsp to Mix 3		
cream of tartar		1 tsp				
water			2 tbsp		1 tbsp	2 tbsp
oil						1 tsp

Lesson 3: mixing ochres investigation

Before the lesson

Prepare a desk with required materials for each group of three students.

- 1 ice-cream container (this will also double as a bin)
- 3 pieces of material to paint on (eg paper, cloth, bark, wood, cardboard)
- 3 cups each containing a small amount of different-coloured ground ochre (you could also try charcoal and coloured chalk)
- 3 teaspoons
- 6 paddle pop sticks for mixing
- paper or plastic cups, 1 per student per binder
- damp cloth for clean ups
- handful of cotton buds
- handful of tissues to wipe sticks clean
- a mixing container per student.

Display the names for the different binders on the science word wall.

Begin the investigation

1. Open the class science journal to a clean double page and record the title **Mixing ochre investigation**.
2. Show students the materials they will paint.
3. Scaffold discussion to clarify the question the students will be investigating – 'Which binder mixes with ochre to make the best paint for painting on paper, cloth, bark, wood and cardboard?' Record the question.
4. Underline the word **best** (or similar non-scientific word) and ask students what is meant by 'best'. For example, 'What do you think the best paint might look like?'. Decide on the properties of a paint that they will be looking for (smooth, makes a good colour, doesn't smell, doesn't fall off when dry, can be found in the local environment, goes onto the painting surface easily). Record these under the title and question.
5. Recall the mixing activity and how they recorded results. Draw a table similar to below and briefly model.

Ochre colour	Binder	Results
yellow	water	?

6. Hold up and identify each binder available – water, coconut milk, egg yolk, egg white and honey. Point to where the labels for these are displayed on the science word wall.
7. Explain expectations, including the conservation of materials.
8. Model taking ½ teaspoon of ochre for each test and wiping the mixing stick before doing another test.
9. Allocate students into groups of three at each desk and ask them to draw up the table in their own science journals.
10. Ask a member from each group to collect the first binder. Each student places half a teaspoon of ochre into a cup (perhaps each a different colour) and a small amount of binder and mixes. Ask students to show each other their mixtures and discuss.
11. Tell students to use cotton buds to try the paint on the provided material, share ideas and then record results.
12. Repeat the process with the other binders.
13. Monitor the activity by observing students sharing their observations, explaining ideas, personal and social capabilities and inquiry skills.

Lesson 4: paper recycling investigation

Some paper materials have layers and split into the layers easily but the layers themselves do not break. The kitchen towel should demonstrate this (pre-test to ensure). You will need to discuss with the class if this counts as 'breaking into

smaller pieces' or just separating. If you keep shaking, the separate layers will start to break and this is probably a fairer 'shake point'.

Before the lesson

- Source five to six different types of paper and cardboard. For example, kitchen towel, newspaper, tissue, wrapping paper, 'junk' mail, used greeting cards, corrugated cardboard, shiny card, cardboard from food packaging. You will need 5 cm x 5 cm of each type per student.
- Pre-cut all the samples to be tested. This will save time during the lesson and ensure the tests are as fair as possible.
- If desired, pre-cut the remaining paper or card into small swatches for the students to glue into the table in their journal to record their testing. Alternately, the students could do this themselves. This is so students do not have to write the name of every material thereby saving time and supporting beginning writers.
- Prepare a desk with required materials for each group of three students.
  - 1 large ice-cream container (this will also double as a bin)
  - 1 jar or plastic container with a lid that seals well. Size needs to be small enough for students to hold easily and shake up and down in a controlled manner but big enough to hold 100 mL water and the 5 cm x 5 cm sample. Ideally containers for all the groups need to be similar in size and shape to be able to draw comparisons at the end, but this is not necessary.
  - 4–6 samples of different cardboard and paper each cut to 5cm x 5 cm.
  - 4–6 samples of the same cardboard and paper from which students can cut a piece to glue into their journals
  - plastic tweezers or plastic fork
  - glue stick
  - scissors
  - 1 measuring cup or jug showing 100 mL, or if preferred a one-third cup
  - plastic soft-drink bottle filled with tap water
- a 'Paper recycling investigation' worksheet per student plus an A3 size copy of the worksheet for the class science journal.
- Hand out the worksheet 'Paper recycling Investigation' for students to follow along with the discussion.

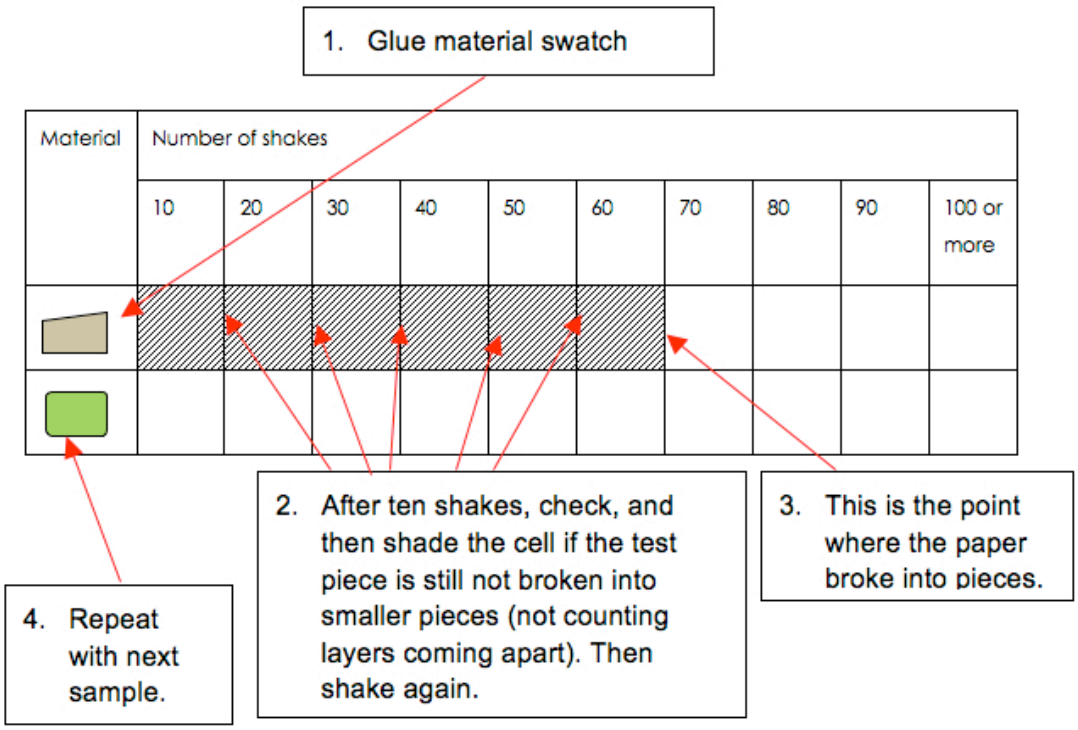
Begin the investigation

1. Open up the class science journal to an A3 copy of the worksheet. Recall and read out the question being investigated from the top of the worksheet.
2. Hold up a jar and explain that the students will be using a container like this as a pretend recycling machine. Explain that they will be placing some water and one piece of paper material into the container each time and then they will shake it.
3. Measure out 100 mL of water and pour this into the jar. Explain that students need to measure the same amount when they do the investigation so that they know it is not the amount of water that affects how the paper breaks up.
4. Hold up the paper and cardboard materials and explain that these are the paper materials the students will be testing. Identify each type. Ask if there is anything

the same about them (size). Explain that these are the samples they will test because they are all the same size. State –'We will call these our test pieces.'

5. Hold up the extra paper and cardboard. Explain that the other paper and card is for the students to cut a piece and glue it onto their table so they know which type they are testing. Model doing this on the A3 example using the kitchen towel.
6. Place the pre-cut kitchen towel test piece into the jar and put the lid on. Tell students to watch closely as you shake it ten times. Hold the jar in front of you with two hands, elbows bent and resting at your waist, and shake it slowly with a similar repeatable action up and down a distance of approximately 30 cm. Count out loud as you shake. (One shake is up and down.)
7. Cover the jar with your hands. Ask the students what they think they will see. Show the jar contents and ask if they can see any change. Remind them they are looking for evidence that the paper has broken into smaller pieces.
8. Decide if the kitchen towel has broken. (Use the tweezers to carefully move the piece if need be.) If unbroken, shade the first cell of the row because it has stayed together for ten shakes. Then shake for another ten and check again, shading the second cell if it is unbroken. Keep shaking in sets of ten and shading the cells until the paper sample is identified as having broken down. When it has broken, **do not** shade that cell explaining that somewhere in that ten shakes it broke apart so we do not count those shakes. Summarise the finding stating that 'We have found it took about (60) shakes to make the (paper product) break apart.'

For example:



9. Explain that when the piece has broken, tip the contents of the jar into the ice-cream container and begin the next test sample.

10. Recap each step quickly and check for understanding of task.
11. Allocate students into groups of three and direct them to the desks set up with equipment.

Lesson 5: making recycled paper seed sachets

Choosing a paper type that will break apart easily when soaked in water. Soak the paper two to three days before this activity. As a rough guide, one double page sheet from a local newspaper makes three seed sachets.

Seed types suitable are snow pea sprouts, zinnias, grass seeds, sorghum or any other fast-germinating seed. Snow pea sprouts can be grown by placing the dried sachet on a shallow plate or tray and watering regularly. The sprouts can then be snapped off and eaten as they grow to about 10–12 cm tall.

The number of seeds depends on the cost and seed type. Snow peas and zinnias are more costly and also only a few are needed per seed sachet. Other seed types can be added more freely. It is valuable learning to try a few different types and grow some in class for observation and comparison.

The sachets, once dried, could be placed in gift boxes made from recycled packaging or decorated brown paper gift bags and used as gifts.

You will need for each group

- art shirts
- pre-soaked paper or cardboard
- buckets for soaking and mixing
- water
- electric stick mixer or blender **for teacher use only** (see safety advice sheet for this unit for more information)
- seeds
- sieves and strainers
- 40 cm x 40 cm pieces of fabric or cloth (old sheeting, calico, hessian, cleaning cloths)
- shape makers (eg biscuit cutters, egg cartons, flexible ice-cube trays)
- newspaper or trays for drying sachets on
- scented essences, for example, lavender, vanilla, materials for making gift packaging, label/s explaining gift (optional)

Procedure for students

1. Mix wet paper very well with hands, tearing into small pieces as you mix.
2. Scoop out the wet paper into an ice-cream container or mixing bowl.
3. Empty the old water from the bucket onto the garden.
4. Take the mix to your teacher. Your teacher will add some fresh water and use the electric mixer to blend the paper even more.
5. When it is well pulped, add some seeds and mix well with your hands.

6. Balance and hold a sieve in place over your bucket. Pour your pulp mix into the sieve.
7. When most of the water has drained through, lay your piece of material on some concrete.
8. Tip the contents of the sieve onto the middle of the cloth. You may need to bang it once or twice to get all the pulp out.
9. Bring together the four corners of the cloth and twist the corners gently together so that it gradually forces the pulp into a ball shape.
10. Twist the top of the cloth even further to squeeze out more water. The pulp needs to be a little soft and wet to be able to be shaped so you don't have to squeeze too hard.
11. Open the cloth and take the ball of pulp out.
12. Take small pieces of pulp (about table tennis ball size) and press them into your shape makers. If the pulp is still quite wet you can press some more water out once it is in the shape.
13. Remove the shaped pulp and place the sachet on a tray or newspaper to dry.
14. Repeat until all pulp is used.
15. Place the tray of sachets where they will dry quickly and not get wet again.
16. When dry, they can be kept until ready for planting/growing or given as a gift.