Material World Unit

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| **Stage 1** | **Timing: 8 weeks/ 1 hour per week** |
| **Knowledge and Understanding Outcomes** | **Skills Outcomes** |
| ST1-12MW – identifies ways that everyday materials can be physically changed and combined for a particular purposeST1-13MW – relates the properties of common materials to their use for particular purposes | ST1-4WS – investigates questions and predictions by collecting and recording data, sharing and reflecting on their experiences and comparing what they and others knowST1-5WT – uses a structured design process, everyday tools, materials, equipment and techniques to produce solutions that respond to identified needs and wants |
| **Content – Key Ideas** | **Values and Attitudes Outcomes** |
| >Everyday materials can be physically changed in a variety of ways.>Different materials can be combined, including by mixing, for a particular purpose.>The different properties of materials enable them to be used for particular purposes. | ST1-1VA – shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunitiesST1-2VA – demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futuresST1-3VA – develops informed attitudes about the current and future use and influence of science and technology based on reason |
| **Vocabulary**  | **Learning Support** |
| Material, hard, soft, strong, weak, transparent, waterproof, flexible, absorb, stretch, cut, bend, heat, cool, freeze, melt, mix, combine, change, observe, predict, similarity, difference,  | A broad variety of teaching and learning activities are provided to cater for the needs and interests of all students. Open-ended tasks allow all students to work at the level most appropriate for them.***Students with learning difficulties***-additional pictures and prompts, word banks to assist with writing tasks, modified writing activities, tools and equipment modified or adjusted to meet needs, examples and case studies personally relevant to students***Gifted and talented students***-additional texts to extend knowledge at own level and pace, provision to conduct deeper and further investigations, more advances tools and equipment to meet more sophisticated designing and making processes, examples and case studies that extend beyond the students’ immediate and familiar experiences |
| **Assessment** | **Learning across the Curriculum** |
| In this unit, assessment incorporates a variety of strategies to support the investigative and hands-on nature of the unit. It includes both formal and informal assessment approaches, and incorporates teacher observations as well as self and peer-assessment.Students are provided with opportunities to demonstrate their learning through a wide variety of activities. These include:* inquiry and design projects
* investigation and problem-solving activities
* spoken and written responses, incorporating drawings, symbols and words
* compare and contrast activities
* presentations and discussion
 | Aboriginal and Torres Strait Islander histories and cultures Asia and Australia’s engagement with Asia Sustainability Critical and creative thinking Ethical understanding Information and communication technology ability Intercultural understanding Literacy Numeracy Personal and social capability Civics and citizenship Difference and diversity Work and enterprise  |
| **Quality Teaching Framework** |
| ***Intellectual Quality***Deep KnowledgeDeep UnderstandingProblematic KnowledgeHigher-Order ThinkingMetalanguageSubstantive Communication | ***Quality Learning Environment***Explicit Quality CriteriaEngagementHigh expectationsSocial SupportStudents’ self-regulationStudent direction | ***Significance***Background KnowledgeCultural KnowledgeKnowledge IntegrationInclusivityConnectednessNarrative |

**Lesson 1 – Focus - Introduction**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST1-4WS – investigates questions and predictions by collecting and recording data, sharing and reflecting on their experiences and comparing what they and others know.ST1-12MW – identifies ways that everyday materials can be physically changed and combined for a particular purpose. | Everyday materials can be physically changed in a variety of ways. (ACSSU018)*Explore how some everyday materials can be physically changed by actions, e.g. bending, twisting, stretching, squashing or heating.* | 1. Explain to the students that we will be looking at different materials and what we can do with them. Allow students to share what they think materials are.
2. Provide each of the students with some playdough. Invite the students to discover as many different ways as they can to manipulate the playdough. Ask the students to share with the class some of the ways they manipulated their playdough, e.g. bend, twist, roll, stretch, cut, squeeze.
3. Optional: Create a word wall, adding these words to describe how materials can be changed.
4. Watch and play with “Changing Kitchen Materials” game (Medium Level) on BBC Bitesize : <http://www.bbc.co.uk/bitesize/ks1/science/changing_materials/play/>

Optional: Add further words describing changes to the word wall.1. Explain that the students will be exploring the ways that we can change some materials e.g. a popsicle stick, aluminium foil and pipecleaner.
2. Using the worksheet provided, students will work independently to predictions about the effect performing different actions will have on the materials.
3. Students will each be given a sample of the 3 materials and invited to perform different actions on them and observe changes to them. Observations will be recorded on their work sheet.
4. Discuss the students’ findings, comparing their predictions to their observations.
 | * Playdough
* Foil
* Popsicle sticks
* Pipe cleaners
* Worksheet for each student
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**Lesson 2 – Focus - Changing Shape**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
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2. Introduce the concept of flexibility – *able to bend without breaking.* **Optional: Add to a word wall and/or a glossary.**
3. Provide students with a range of materials. Explain to students that they will need to test each material’s flexibility. *If the material can squash, bend, twist or stretch without breaking, it would be flexible.*
4. Test each material to see if it can squash, bend, twist or stretch (individually/pairs/small groups)
5. Sort the materials into two groups, those that can easily change shape and those that can’t.
6. Students to record their findings in their science journal.
7. See if the materials can be changed back to their original shape.
8. Discuss findings and focus on one particular item that would be familiar to students e.g. fabric. Ask students why they think it is important for fabric to be flexible.
 | * Science journals
* Pieces of different household and garden materials e.g. newspaper, clingwrap, foil, rubber, wood, fabric, metal, twigs, sand, clay, plastic, cardboard, leaves, feathers etc.
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**Lesson 3 – Focus – Will It Mix?**

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2. Class discussion about materials being combined for a particular purpose. Ask students to provide any examples that they know of. They may need prompting for example, what ingredients go into a cup of tea?
3. In pairs or small groups, provide students with a jar of water.
4. Add a few tablespoons of one of the items to the jar of water. Mix well.
5. **Optional: Students to record predictions and observations in their science journal.**
6. Students to look closely at the mixture. Has the item mixed in with the water, does it float on top or settle on the bottom? **Add mix and combine to the word wall.**
7. After testing an item, rinse the jar in soapy water using a sponge.
8. Test all of the items available.
9. Class discussion on which items mixed in with the water and where they may have seen some of those items mixed before. For example, sugar and water in a cup of tea, sand and water at the beach, detergent and water to clean dishes.
 | * Different household items e.g. juice, cooking oil, vinegar, milk, sunscreen, detergent, sugar, salt, sand etc.
* Jars of water
* Tablespoons or teaspoons
* Containers with soapy water (to clean jars)
* Sponges
* Science journals
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**Lesson 4 – Focus – Making Glue (Paper Mache Balloon)**

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2. Explain to students that they will be making a paper mache balloon using only newspaper, flour and water. Ask students what they think the flour and water will be used for.
3. In pairs, students mix one cup of flour with half a cup of water, stirring well. This becomes the glue.
4. Carefully, students dip a piece of newspaper in the glue, allowing it to soak up some glue.
5. Students to lay the piece of paper on the bottom of the balloon and smoothen it out with their finger.
6. Repeat this process, overlapping the paper pieces to cover the entire surface of the balloon.
7. Make a second layer of paper mache.
8. Make a third layer of paper mache.
9. Let the paper mache dry completely, this may take around 2-3 days.
10. Once the paper mache has dried, ask students to describe what has happened to the glue.
11. **Depending on the time of year, these balloons could be painted to suit a particular theme or event. For example, painted as giant Easter eggs, made into a particular book character, hot air balloon etc.**
 | * Flour
* Water
* Containers
* Measuring cups
* Strips of newspaper
* Inflated balloons *(small balloons are easier)*
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**Lesson 5 – Focus – Heating Materials**

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| ST1-4WS – investigates questions and predictions by collecting and recording data, sharing and reflecting on their experiences and comparing what they and others knowST1-12MW – identifies ways that everyday materials can be physically changed and combined for a particular purpose | Everyday materials can be physically changed in a variety of ways. (ACSSU018)*Explore how some everyday materials can be physically changed by actions, e.g. bending, twisting, stretching, squashing or heating.* | 1. Review the previous lessons about how materials can be changed.
2. Show students a slice of bread and a slice of toast. Ask the students:
* Why do we toast bread?
* How can we tell that bread has been toasted?
* What are the differences between bread and toast?
* What do we do to bread to toast it?
* Can we change toast back into bread? Why or why not?
1. Introduce an enlarged copy of the “Heat and Cool” resource sheet. Discuss the purpose and features of a table. Model completing the table for the slice of bread and toast.
2. Show students the foods they will be using to compare. Explain that the students will need to melt the chocolate to observe how it changes. Ask the students for ideas about how they might be able to melt the chocolate. If the students suggest melting the chocolate in their hands, ask how they can do that without getting melted chocolate on their hands.
3. Discuss with the students how they will know if the chocolate is melted. Discuss how students will decide when it is fully melted, for example, when there are no hard lumps of chocolate.
4. Ask teams to collect the equipment and samples. Allow students time to observe and compare samples and complete the ‘Before heating’ and ‘After heating’ sections of the resource sheet.
5. Allow time for the samples to cool. Alternatively, have cooled food samples prepared for the students. Allow time for students to record their observations of the cooled samples on their resource sheet.
6. Ask groups to report their findings to the class. Complete the enlarged resource sheet with the class.
7. Discuss with students the similarities and differences between the different sections of the resource sheet. Ask students if answers in any of the sections are similar or the same, e.g. ‘Before heating’ and ‘After cooling’. Students might notice that the chocolate is almost the same after cooling as before heating but the popcorn is not.
8. Ask students if they can think of other foods that are very different after heating and stay like that after they have cooled, e.g. cheese, egg. Ask if they can think of other foods that seem to change back to what they were after heating and cooling, e.g. water/ice. Ask students how knowing about changes to foods helps us.
9. Optional: Update the word wall with words and images if using.
 | * Slice each of bread and toast
* Chocolate
* Popcorn – popped and unpopped
* Snap lock bags
* Resource sheet for each student
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**Lesson 6 – Focus – Cooling Materials**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST1-4WS – investigates questions and predictions by collecting and recording data, sharing and reflecting on their experiences and comparing what they and others knowST1-12MW – identifies ways that everyday materials can be physically changed and combined for a particular purpose | Everyday materials can be physically changed in a variety of ways. (ACSSU018)*Explore how some everyday materials can be physically changed by actions, e.g. bending, twisting, stretching, squashing or heating.* | 1. Revise what had happened when particular materials were heated. Ask students what they think will happen to certain materials when they are cooled. <http://www.bbc.co.uk/schools/scienceclips/ages/8_9/solid_liquids_fs.shtml>
2. Introduce ingredients to students and explain that they are going to be placed in the freezer.
3. In small groups, provide students with one of the materials (already placed in the container). In their science journal, students draw a small picture of the item and describe how it feels.
4. Rotate the items between the groups so that students can see all of the ingredients.
5. Place the containers in the freezer overnight.
6. Check the materials the next day – what are they like now?
7. Draw a second picture next and describe what the item feels like after it has been in the freezer.
 | * Science journals
* Containers
* Different household ingredients e.g. water, vinegar, tomato sauce, bread, rice, butter etc.
* Freezer
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**Lesson 7 – Focus – How Aboriginal people used materials**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST1-13MW – Relates the properties of common materials to their use for particular purposes | The different properties of materials enable them to be used for particular purposes.*Identify a range of natural materials used by Aboriginal and Torres Strait Islander peoples and share ideas about the ways they are used to suit a particular purpose, eg the use of wood, stone and fibres in the built environment* | 1. Revise with the students some of the materials and their uses from previous lessons.
2. Explain that for many thousands of years, Aboriginal Australians used the materials they found in the environment to make products that met their needs.
3. View some of the objects at the Australian Museum: <http://australianmuseum.net.au/Explore-Indigenous-Australian-Objects>

Discuss the objects, including the materials used and the purpose of the object. Discussion may also include what materials would now be used to make this object or do the same job.1. In their science journals, students will write a description of one of the objects, including its name, what it is made from and what it was used for. Students may also include what object we might use for the same job.
2. View the Aboriginal Art online website to consider in more detail the methods and materials used in both traditional and contemporary Aboriginal art: <http://www.aboriginalartonline.com/methods/methods.php>
3. Optional: Create an artwork inspired by traditional methods, e.g. dot painting with ochre colours, bark-style painting on brown paper
 | * Science journals
* Optional: paints and materials for art work
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**Lesson 8 – Focus – Right for the job**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST1-13MW – Relates the properties of common materials to their use for particular purposesST1-5WT – Uses a structured design process, everyday tools, materials, equipment and techniques to produce solutions that respond to identified needs and wants | The different properties of materials enable tem to be used for particular purposes.*Identify the properties of some common materials and why they are used for particular purposes* | 1. Revise with the students the properties of materials they have discovered throughout the unit.
2. Use the learning object from BBC Science Clips to revise some of the characteristics of materials and explore how these characteristics help us to use them. <http://www.bbc.co.uk/schools/scienceclips/ages/7_8/characteristics_materials.shtml>

**ASSESSMENT**1. Explain that the students will be working independently to investigate the properties of a range of everyday materials and answer questions regarding which material would be best for a particular purpose.
2. Provide each student with the materials (popsicle stick, plastic plate, cotton buds, alfoil, playdough, pipecleaner, balloon, etc) and the assessment worksheet. Allow students time to observe the materials and complete the worksheet.
3. After collecting the student worksheets, discuss as a class some of the solutions the students identified. Why would this material be a good choice for this purpose? What might be problems if we chose this material? Are there any other materials that might also be suited to this purpose?
4. Reflect as a class what activities they have enjoyed in the unit. What ideas that we had about materials have changed? What were some of the things they learned about materials and how they can be changed?
 | * Popsicle sticks
* Plastic plates
* Cotton buds
* Alfoil
* Playdough
* Pipecleaners
* Balloons
* Assessment worksheet
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**Methods for Extension Activities:**

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2. Add a tablespoon of water to the cornflour, stirring well with the spoon. Keep adding water a few drops at a time until the goo is thick and creamy.
3. Pick up the goo and roll it between your fingers. Stop rolling – what happens? *When you roll the goo, it feels dry and hard, like a solid. When you stop rolling, it slowly spreads over your fingers, like a liquid. Cornflour particles float in water. When you roll the cornflour and water, the particles are forced together. When you stop rolling, the cornflour and water separate again.*

Sugar Scrub1. Combine 1 cup of sugar with ½ a cup of oil. You may need to add slightly more sugar if the mixture is too oily.
2. Add a few drops of flavoured essence and food colouring of your choice.
3. Stir the mixture well.
4. Students can test the mixture by rubbing the sugar scrub between their hands and then rinsing with water.

Jelly*Following packet instructions. In general:*1. Empty jelly crystals into a bowl and add 1 cup of boiling water.
2. Stir and dissolve well.
3. Add 200ml of cold water and stir.
4. Refrigerate until firm.
 | * Water
* Cornflour
* Bowls
* Spoons
* White sugar
* Canola oil (or any oil with a low scent)
* Flavoured essence (e.g. vanilla, coconut, orange)
* Food colouring
* Bowl
* Spoon
* Measuring cup
* Packet of jelly crystals
* Bowl
* Boiling water
* Cold water
* Measuring cup
 |  |