Material World Unit

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| **Stage 2** | **Timing: 8 weeks/ 1 hour per week** |
| **Knowledge and Understanding Outcomes** | **Skills Outcomes** |
| ST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use | ST2-4WS – investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertakenST2-5WT – applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteria |
| **Content – Key Ideas** | **Values and Attitudes Outcomes** |
| >Natural and processed materials have a range of physical properties which influence their use. (ACSSU074) | ST2-1VA – shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunitiesST2-2VA – demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futuresST2-3VA – develops informed attitudes about the current and future use and influence of science and technology based on reason |
| **Vocabulary**  | **Learning Support** |
| Object, material, properties, fabric, variable, decomposition, rot, biodegradable, leak, soak, repel, absorb, waterproof, snap, tear, stretch, tensile strength, recycle, insulation, thermal. | ***Students with learning difficulties-****provide support and additional explanation****Gifted and talented students-****provide extension activities and opportunities for extension and mentoring of others* |
| **Assessment Opportunities** | **Learning across the Curriculum** |
| Pre Assessment – Students knowledge on different materials and their properties (Match up Exercise)Informal Observation – Lesson to lessonScience Journal creation (Lesson 1)Glove Guide Exercise (Lesson 2)Science Journal Entries – Verbal Description and Reasoning (Lesson 3 Material Samples)Anecdotal Notes based on participation in Leak, Soak or Repel activity (lesson 4)Snap, tear or stretch Resource sheet activity (Lesson 5)Completion of Carrying Dilemma Resource sheet (Lesson 6)Informal Observation from Student Feedback on discussion of Plastic – Positive and Negative attributes (Lesson 7)Completion of Keeping it warm Resource Sheet 8 (Lesson 8)Completed Outfit Drawing (Final Assessment)Oral Presentation (Final Assessment) | 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 – Curious Clothes**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use.ST2-1VA – shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities. | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Describe how a range of common natural and processed materials are used in everyday life. | 1. Watch youtube clip at <http://www.youtube.com/watch?v=seCw76LuGDE> to introduce that different materials are suitable for different uses.
2. Gage students understanding of material suitability by asking discussion questions such as: When would you wear gumboots? Why? Would you wear a jumper in the desert? Why/Why not?
3. Discuss what students believe the terms object, material and properties mean. **Optional: Add these to a word wall and/or a glossary.**
4. Use the examples of gumboots and raincoats to create a table using the 3 terms mentioned above (See appendix 1).
5. Have students participate in a group discussion about the different materials they know, what their properties are and how they are used. For example; Plastic is waterproof and is used in raincoats.
6. **Optional: Students to create a science journal to write what they know about materials and what they want to find out about.**
 | IWBScience WorkbooksButcher Paper (Word wall)Computer Access |  |

**Lesson 2 – Focus – Gripping Gloves**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use. | Generate ideas about how the physical properties of some natural and processed materials influence their use. | 1. **Revisit word wall if started in lesson 1.**
2. Introduce a box full of different types of gloves to create a class discussion on what each glove would be used for.
3. Questions to be answered include: What might the glove be used for? What is the glove made of? Why do you think it is made of that material? What else could the glove be used for?
4. Use glove guide worksheet (Primary Connections Resource Sheet 1) to draw different types of gloves and describe what material they are, their properties and their possible uses.
5. **Optional: Students entry in science journal to identify what they think they know about properties and uses of materials and what they are more interested in finding out in this unit.**
6. At home task: Students are to complete the Bags at Home worksheet (Primary Connections Resources Sheet 3)
 | IWBScience WorkbooksButcher Paper (Word wall)Box of glovesGlove guide worksheetBags at Home worksheetComputer Access |  |

**Lesson 3 – Focus – Rot or Remain**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-4WS – investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertakenST2-2VA – demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures | Observe the changes that occur in the physical properties of everyday materials when they are cooled. | 1. **Revisit word wall if being utilised.**
2. Ask students what their findings were from the bags at home task.
3. Class discussion on what happens to household items that are no longer needed. (recycle, throw out etc.)
4. Discuss with students what they think the words decompose, rot and biodegradable mean. **Optional: Add these words to the word wall/glossary.**
5. Create a table to list everyday materials that can decompose and cannot decompose. (See appendix 2 below for example)
6. In small groups have students bury samples of materials in moist soils and predict what they think will happen to the different materials.
7. To keep the testing fair for all groups make sure: the pieces of material are all the same size, they are all buried to the same depth in their soil, the soil receives the same amount of water to keep it moist. (Place materials at the bottom of the container and cover it with 10cm of moist soil).
8. Keep all containers in a similar location out of direct and classroom lighting and record weekly changes in Science journal.
 | IWBScience WorkbooksButcher Paper (Word wall)Bags at home worksheetMaterials to be buriedSoilContainersComputer Access |  |

**Lesson 4 – Focus – Leak, Soak or Repel**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-4WS – investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertaken.ST2-1VA – shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities. | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Identify the properties of some natural and processed materials. | 1. **Revisit word wall if being utilised.**
2. Discuss with students what they think the words leak, soak and repel mean. **Optional: Add these words to the word wall/glossary.**
3. Measure students understanding of these concepts by asking various questions like; Why do you wear swimmers and not jumpers when going swimming? When wiping a spilt glass of water, what would you want the cloth to be made of?
4. Set up 4 stations with different materials attached to the top of open containers for students to identify which materials soak up the most water.
5. As a class identify what each material is, what the material might be used for, what is similar about the materials and what is different.
6. Split students into 4 groups and rotate around stations to complete the Leak, Soak or Repel worksheet (Primary Connections Resource Sheet 4)
7. Class discussion on which materials soaked up water, which didn’t and what happened to the water, and any other observations made.
8. Look at material samples from previous lesson and write in journal on any changes that you have noticed.
 | IWBScience WorkbooksButcher Paper (Word wall)Material samples Materials attached to containersWaterLeak, Soak or Repel worksheetComputer Access |  |

**Lesson 5 – Focus – Snap, Tear or Stretch**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-5WT – applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteriaST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use | Observe and describe the structure of materials that can be seen with the naked eye and a magnifying glass.Generate ideas about how the physical properties of some natural and processed materials influence their use. | 1. **Revisit word wall if being utilised.**
2. Discuss with students what they think the words snap, tear and stretch mean. **Optional: Add these words to the word wall/glossary.**
3. Give students various scenarios to ascertain their understanding of the above concepts. Scenarios may include: If you had to carry something heavy, what kind of material would you want your bag to be made of? What would you select to wear if you want to perform gymnastics?
4. Carry out small group investigations to discover what happens to different materials when they are pulled at their ends by pegs.
5. Complete Snap, Tear or Stretch worksheet (Primary Connections Resource Sheet 5) in these groups.
6. Make use of a magnifying glass to identify what materials look like when they are stretched, snapped or torn.
7. Vary factors such as: size of the material, the way the material is wrapped around the peg, the force and speed used when testing.
8. Explain what tensile strength is (Measurement of force required to pull or stretch a material to the point where it breaks). **Optional: Add this to your word wall/glossary.**
9. Look at material samples from lesson 3 and write in journal on any changes that you have noticed.
 | IWBScience WorkbooksButcher Paper (Word wall)Material samples PegsMagnifying GlassSnap, Tear or Stretch worksheetComputer Access |  |

**Lesson 6 – Focus – Choosey Consumers**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use.ST2-4WS – investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertaken | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Describe how a range of common natural and processed materials are used in everyday life. | 1. **Revisit word wall if being utilised.**
2. Revise some of the materials and their properties that have been discovered so far in this unit.
3. Class discussion on how specific properties make materials suitable/unsuitable for making certain objects. For example, What properties does the material for a sponge need? (Permeable) What properties might you want the materials of a raincoat to have? (Light and waterproof) etc.
4. Discuss when students have had difficulties carrying something in a bag. What caused the difficulty? (How did indigenous cultures carry different objects?)
5. Have students work in small groups to complete the Carrying Dilemma worksheet (Primary Connections Resource Sheet 6) to identify what type of bags will be used for different items and why?
6. Discuss results among the class and illustrate why some items are inappropriate for certain bag types. For example, an echidna in a plastic bag, a surprise gift in a transparent bag etc.
7. Look at material samples from lesson 3 and write in journal on any changes that you have noticed.
 | IWBScience WorkbooksButcher Paper (Word wall)Material samples Carrying Dilemma worksheetComputer Access |  |

**Lesson 7 – Focus – Puzzling Plastics**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-4WS – investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertakenST2-2VA – demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Observe the changes that occur in the physical properties of everyday materials when they are cooled. | 1. **Revisit word wall if being utilised.**
2. As a class discuss what the terms decomposition and biodegradable mean. **Optional: Add these to a word wall and/or a glossary.**
3. Final review of material sample from lesson 3. Did your object decompose? Why/Why not? **(Make sure students do not inhale from their containers and wash their hands after completing their investigation)**
4. As a class discuss: What types of materials rotted, which did not rot, What caused some to rot, Why do some things rot, while others don’t, What are the positive aspects of non-biodegradable materials and what are the negative aspects of non-degradable materials.
5. Read the factual text ‘Puzzling Over Plastics’ (Primary Connections Resource Sheet 7) and discuss the features and purpose of a factual text.
6. Discuss the positive and negative aspects of plastics. (Create table)
 | IWBScience WorkbooksButcher Paper (Word wall)Material samples Puzzling Over Plastics worksheetComputer Access |  |

**Lesson 8 – Focus – Investigating Insulation**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-5WT – applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteriaST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their use | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Observe the changes that occur in the physical properties of everyday materials when they are heated. | 1. **Revisit word wall if being utilised.**
2. Class discussion on what the terms insulation and thermal mean. **Optional: Add these to a word wall and/or a glossary.**
3. In small groups students investigate what happens to the temperature of water place in metal containers, when wrapped with different materials.
4. Students complete Keeping it warm investigation worksheets (Primary Connection Resource Sheets 8). Different materials will be wrapped around metal containers full of water and their temperatures will be measured at 5 minute intervals (For at least 30 minutes).
5. Discuss the variables that may affect the temperature of the water, such as: container type, amount of water, initial temperature, surrounding temperature, container placement and the material around the container.
6. Complete and graph information from the investigation and answer reflection questions to explain the results of the experiment (Also on Primary Connection Resource Sheets 8).
7. Discuss reflection responses as a class.
 | IWBScience WorkbooksButcher Paper (Word wall)Metal containersWaterMaterials to wrap around containersKeeping it warm Investigation worksheetsComputer Access |  |

**Final Assessment – Material Matters**

**(Assessment covers areas from various KLAs – Science, English and Creative Arts)**

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| Outcome | Content | Teaching and Learning Activities | Resources | Notes and Register |
| ST2-3VA – develops informed attitudes about the current and future use and influence of science and technology based on reason ST2-13MW – identifies the physical properties of natural and processed materials, and how these properties influence their useST2-5WT – applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteria | Natural and processed materials have a range of physical properties which influence their use.(ACSSU074)Describe how a range of common natural and processed materials are used in everyday life. | 1. **Revisit word wall if being utilised – Review and discuss.**
2. Students analyse their workbooks to evaluate the completed unit.
3. Give the students a list of possible scenarios to design clothes for. Remind them that different materials have different properties. Encourage students to create outfits out of materials not yet considered in our society (See appendix 3 for possible scenarios)
4. Have students draw a picture of their outfit and annotate the materials chosen for their outfit, providing reasoning for their selected materials. (This can be linked to CAPA and designs can be shared among the class)
5. **Optional: Oral presentation on the outfit they have created with use of Microsoft Powerpoint optional, For example photos, designs etc.**
 | IWBScience WorkbooksButcher Paper (Word wall)A4 Paper (Outfit Template)Computer Access |  |

**Appendix 1:**

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| **Object** | **Material** | **Properties** |
| The itemGumbootsRaincoat | What is it made of?RubberPlastic | What are the special feature?Water ResistantLight and Waterproof |

**Appendix 2:**

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| **Rot** | **Remain** |
| Food itemsWood furnitureBooksPlant materialsGreen waste bio bags | CarBench topsTVPlastic chairElectrical games |

**Appendix 3:**

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| Going into dark, damp cavesExploring underwater, scuba divingGoing into the desertGoing for a walk in the scrubGoing shoppingWeeding the prickly gardenGoing surfingGoing to the marketsWashing a carGoing dancingPlaying soccer | Going walking in the snowGoing into spaceGoing for a walk in the wet, tangled jungleGoing for a hike up a mountainRunning in a competitionBuilding a snowmanMountain bike ridingGoing out in windy weatherGoing to schoolWorking in a rubbish tipBee Keeping |