Unit 2M.3 & 2M.4:

Natural and man-made materials and changing materials

- Natural and man-made materials.
- Shaping materials
- Heating materials

Science Skills
- Observing
- Classifying
- Predicting
- Experimenting

By the end of this unit you should:

- Classify materials according to natural and man-made properties and know that they are changed further before use.
- Know that flexible materials can be changed temporarily whereas not flexible materials can changed permanently.
- Know that heating materials can cause temporary or permanent change.
Natural and man-made materials

Activity 1:

You will need: A range of items from around the classroom (ie. Pencils, scissors, fabric, erasers, scissors etc)

Steps: Sort the items into a Venn diagram.

<table>
<thead>
<tr>
<th>Natural materials</th>
<th>Man-made materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All objects around you are made from materials.

Materials can be classified into two groups:

- Natural Materials
- Man-made Materials
Natural materials can be found in around us. Man-made materials have been manufactured by machines or other processes.

Materials either natural or man-made are changed before they are used by people.

Look at the picture; discuss what happened for the wool?

- Wool from sheep is a natural material
- Plastic is a man-made material made from petrol
Look at the picture; discuss what happened for the petrol?

Key Terms:
• Natural
• Man-made

Key ideas:
• Natural and man-made materials are often changed further before they are used.

Key Questions:
Q1. Write 3 natural materials:
1………………………………     2……………………………………   3…………………………………

Q2. Write 3 man-made materials:
1………………………………     2……………………………………   3…………………………………
Shaping Materials

Activity:

You will need:

Modelling clay or play dough, foam balls

Steps:

1- Take a piece of modelling clay or play dough and a foam ball.
2- Shape the modelling clay into a ball.
3- Predict (P)  
   What will happen to each ball if you squeeze it in your hand?

Write your prediction in the boxes below.

Foam Ball  Modelling Clay

4- Squeeze each ball.
5- Observe (O): What happened to each ball after you squeezed them? Write your observation in the boxes below.

Foam Ball  Modelling Clay
Explain (E): Was your observation the same as your prediction?

........................................................................................................................................
........................................................................................................................................

Can you think of any other objects that change back after we squeeze them?.....................

........................................................................................................................................

Foam ball and rubber band are ............... materials. (Flexible - not flexible)

Some flexible materials can be temporarily changed by pushing and pulling like bending, twisting and stretching whereas not flexible materials are changed permanently.

Bending  Twisting  Stretching  Squeezing

Flexible material: Any material that you can bend, squeeze, twist or stretch easily
Activity: Explore the properties of clay

You will need:

Play dough or modelling clay, tape measure or ruler, strips plastic bags.

Steps

1. Take a lump of clay or dough; roll it, squash it, stretch it, squeeze it. Now roll it into a ball.

2. Now, make a shape/ object that has;
   A bend (ie. tree)
   A twist (ie. a knot)
   Squash it up again and roll into a ball.

3. Now roll the shape into a long sausage.
   What is the longest sausage you can roll before it breaks?
   Measure the longest piece?..........(cm)
4. Roll another sausage. Was this one longer? Measure how long? ..........(cm)

Could you change Play dough back again?......... .

Any material change back again to its original state after the change.

The change is called temporary change

5. Cut thin strips of plastic carrier bags.

6. Stretch the strip as much as you can until it snaps.

Can the plastic bag be turned back into a strip again? ............. ( YES , NO).

Any material doesn't change back into its original state. The change is called permanent change
Activity:

You will need: Examples of materials made from wood, fabric, paper, metal, plastic, rubber and Clay.

(*Glass is too dangerous to use for this activity)

Steps:

Use the table to test each material for its flexibility and permanent change.

1. Place a tick in the box if the material changed
2. Shade the box if it changed permanently.

✓ If flexible       Shade if permanent change
<table>
<thead>
<tr>
<th>Material</th>
<th>Bend</th>
<th>Twist</th>
<th>Squash</th>
<th>Stretch</th>
<th>Temporary/ permanent change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabric</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Heating materials

Look at the pictures; identify the state of matter in each picture.

Activity:

Look at the pictures; write the state of matter in each picture.

Butter (--------) Heat Melted butter (--

What would happen if you cool the melted butter?
Activity: Melting Things

You will need:

Ice cubes, plates

Steps:

1- Place an ice-cube on a plate and put it in a warm place. What is the state of ice cube?

My ice-cube on the plate
2- Predict (P) what will happen to the ice after 10 minutes. Write your prediction.

My prediction

3- Check the ice-cube after 10 minutes. Record your observation in the box below.

My ice-cube after 10 minutes

4- Compare your results with your predictions.

<table>
<thead>
<tr>
<th>My Prediction</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity: Melting Chocolate

*Teacher demonstration

You will need: chocolate, bowl, water saucepan, stove, spoon, chocolate moulds

Steps:

1- Break the chocolate into a bowl. Pour some water into a saucepan and place the bowl to simmer in the water. Heat the water until it simmers. What is the state of chocolate? 

2- When the chocolate has melted, spoon it into the chocolate moulds and place in the fridge to set. What is the state of chocolate?

3- After the chocolate has set press them out to eat. What do you think will happen if the chocolate is heated up again?
Some materials turn into a liquid when they are -------------. They start as a solid material but if they are warmed they start to melt and can turn into a -------------. 

Question 1
Which of these things melt if you place it in warm place? Circle the objects that melt.

Chocolate  Wood  Butter  Fabric
Activity:

You will need: *Teacher Demonstration

Water, heater, plates, kettle, large spoon.

Steps:

1- Place water into a kettle and press boil. Observe the steam leaving the kettle's spout.

2- Now hold a ladle horizontally, with the cup of the ladle placed directly in the path of the steam, and place a bowl beneath. Predict (P) what will happen to the steam.

-----------------------------------------------
Write your observation.
-----------------------------------------------

3- Can you describe what is happening?
Activity: The Dough Test

*Teacher demonstration

You will need:

Flour, yeast, water, hot oven, fridge and a warm sunny place.

Steps:

1- Teacher to make the bread dough.
2- Divide the dough into 3 parts.
   1. Place one part in a refrigerator.
   2. Place one part in a hot oven.
   3. Place one part in a warm place.
3- Record your observation after 10 minutes.

<table>
<thead>
<tr>
<th>Refrigerator</th>
<th>Hot oven</th>
<th>Warm place</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

4- Which place did the bread rise best? ...........

5 - Place the dough in the oven to cook.
The yeast in the bread helps it to rise when it is left in a warm place. The temperature is important for helping the bread to rise properly.

Activity:
You will need:
Bread, bread knife and toaster.
Steps:
1. Cut some slices of bread. Leave some fresh and place some in the toaster to cook.
2. Use the attribute list organiser below to compare the fresh slice of bread to the toasted slice. Eg. Dry, soft, crunchy, yummy etc

<table>
<thead>
<tr>
<th>Bread</th>
<th>Smell</th>
<th>Texture</th>
<th>Appearance</th>
<th>Taste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toasted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity:
Look at foods before cooking and after cooking, compare between them.

<table>
<thead>
<tr>
<th>Before cooking</th>
<th>After cooking</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Before Egg" /></td>
<td><img src="image2.png" alt="After Egg" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Before Potatoes" /></td>
<td><img src="image4.png" alt="After Potatoes" /></td>
</tr>
<tr>
<td><img src="image5.png" alt="Before Rice" /></td>
<td><img src="image6.png" alt="After Rice" /></td>
</tr>
</tbody>
</table>

Question:
Can these food after cooking change back to the original state?----------
List some other foods that change after they have been heated?

..........................................................
..........................................................
..........................................................

Heating the food causes it to change permanently. It can't be changed back to original state after it has been cooked.

Key Terms:

- Bend, twist, flexible, stretch, snap, squeeze, squash, heat, warm, cool, melt.
- Permanent change, temporary change.
- Solid, liquid, water, ice, steam, bubble

Key Ideas:

- Flexible materials can bend, twist and stretch.
- Sometimes the change is temporary change, sometimes the change is permanent.
- Some solids such as ice can turn into liquids when they are warmed.
- Steam from boiling water in a kettle when collected turns back to water.
Project:

- Take some photos of objects that change when we stretch, squeeze, bend or heat them.
- Make a booklet of the photos that can be changed either temporarily or permanently.

Key questions
Q1: Some children try to stretch the following objects:

- elastic band
- cling film
- tennis ball
- play dough
- hair ties
- clay

Circle the objects that will go back to their normal shape when the children let go.
What will happen to the others?...........................
..........................................................
Key questions

Q2: Colour **GREEN** the things that can be changed back after heating. Colour **RED** the things that cannot be changed back after heating.

- egg
- butter
- chocolate

Q3: Amal knows that chocolate changes when it gets warm. Tick one box to show how it changes.

- From a solid to a liquid  
- From a liquid to a solid  
- It boils
Use the concept map to show all the things you know about heat, materials and change. Add more lines if you need.