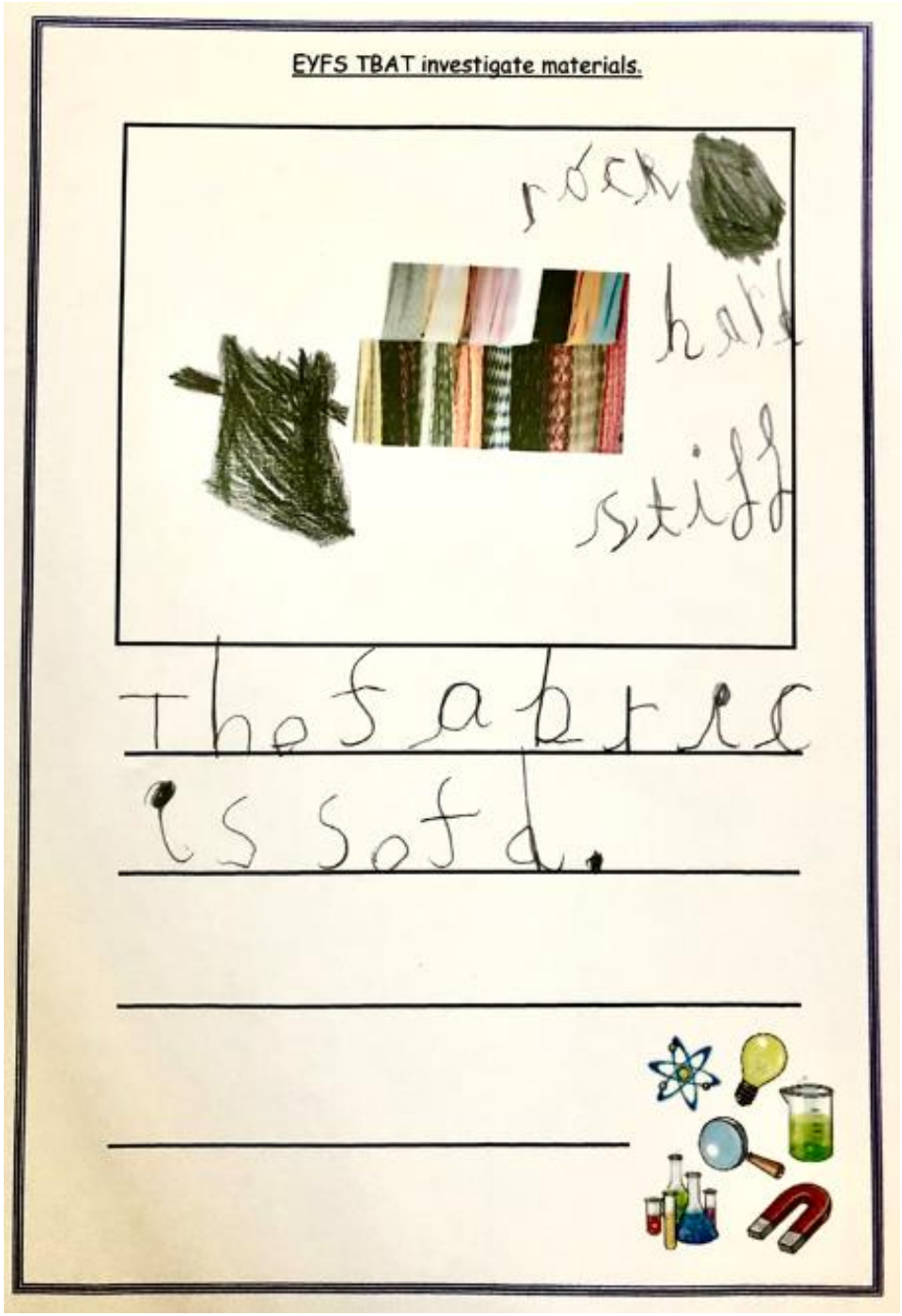
Science

Curriculum Progression

Strand – Materials

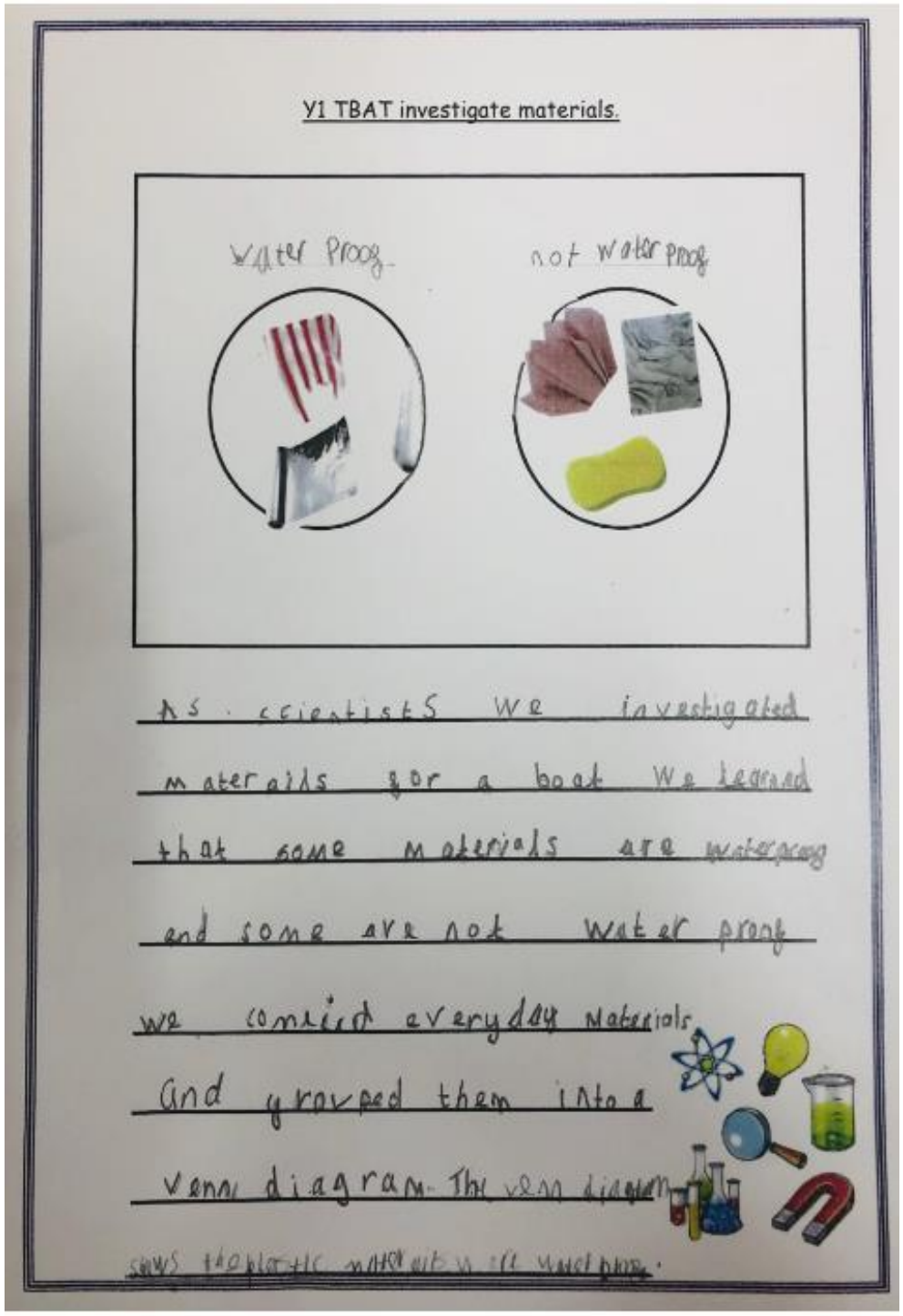


Foundation stage:

Children can identify and name a variety of simple everyday materials, including wood, plastic, glass, metal, water and rock.

Key Vocabulary

hard, soft, bendy, stiff

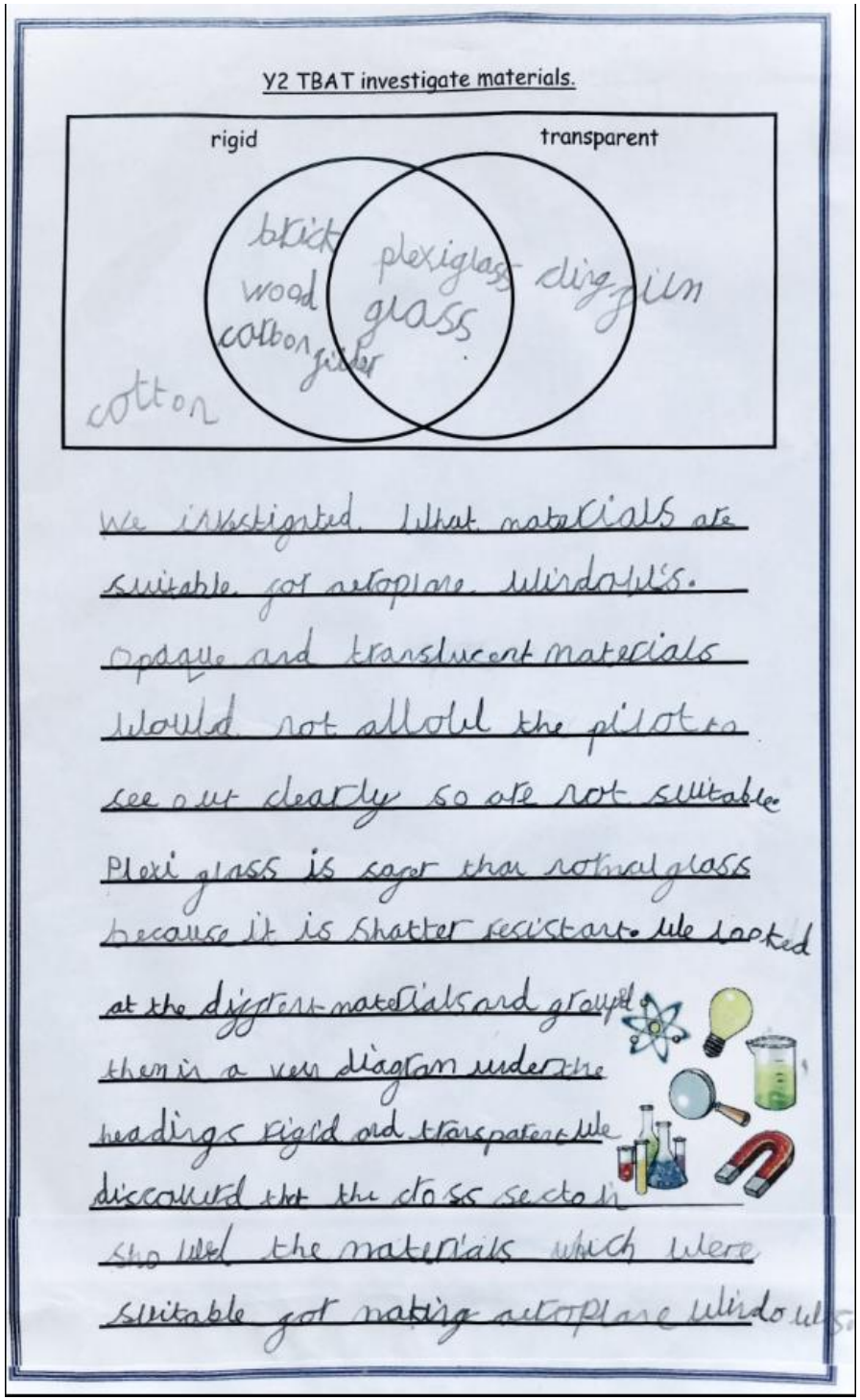


Year 1:

Children can identify and name a variety of everyday materials and describe their simple physical properties.

Key Vocabulary

waterproof, not waterproof,


Y2 TBAT investigate materials.

rigid

transparent

brick
wood
cotton
carbon fibre
plexiglass
glass
cling film
cotton

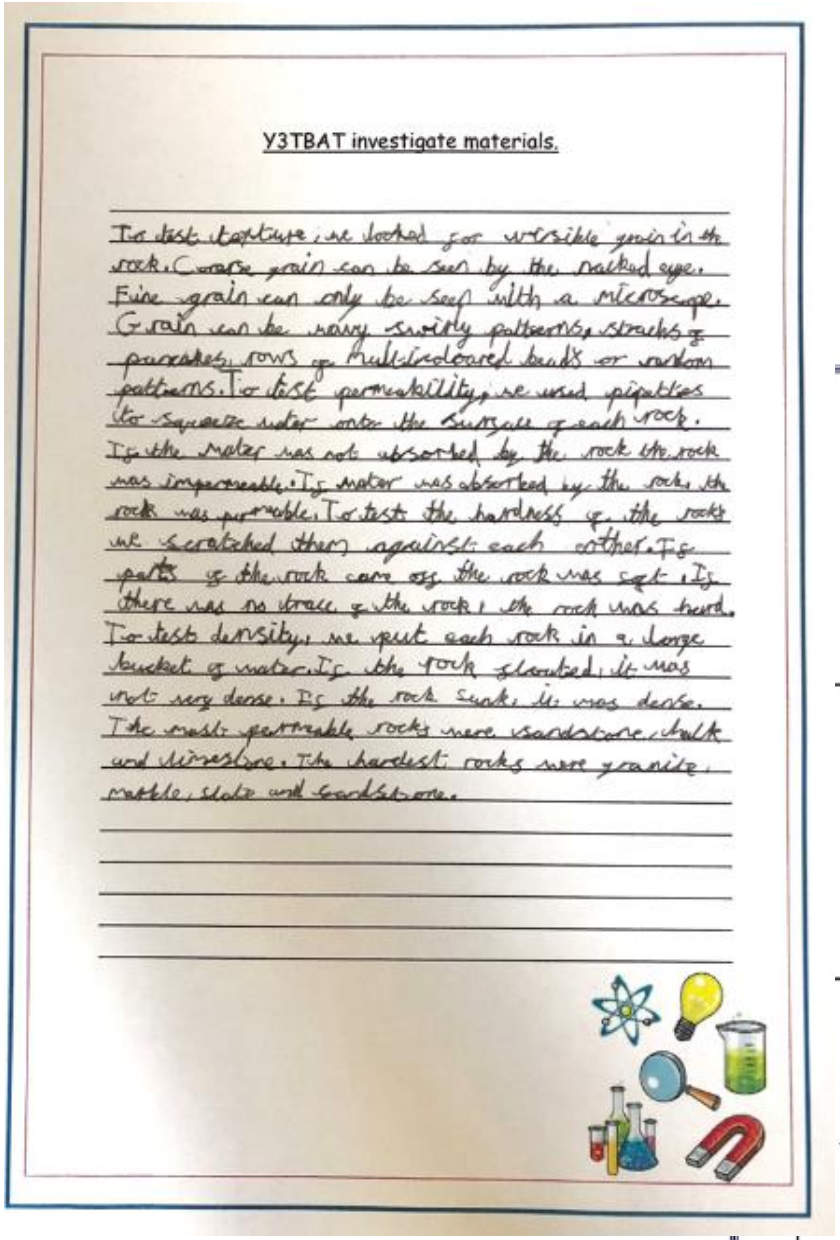
We investigated. What materials are suitable for aeroplane windows.
Opaque and translucent materials would not allow the pilots to see out clearly so are not suitable.
Plexi glass is safer than normal glass because it is shatter resistant. We looked at the different materials and grouped them in a ven diagram under the headings rigid and transparent. We discovered that the glass section should the materials which were suitable for making aeroplane windows.

Year 2:

Children can name, compare and group together a wide variety of everyday materials on the basis of their physical properties and compare their suitability for particular uses.

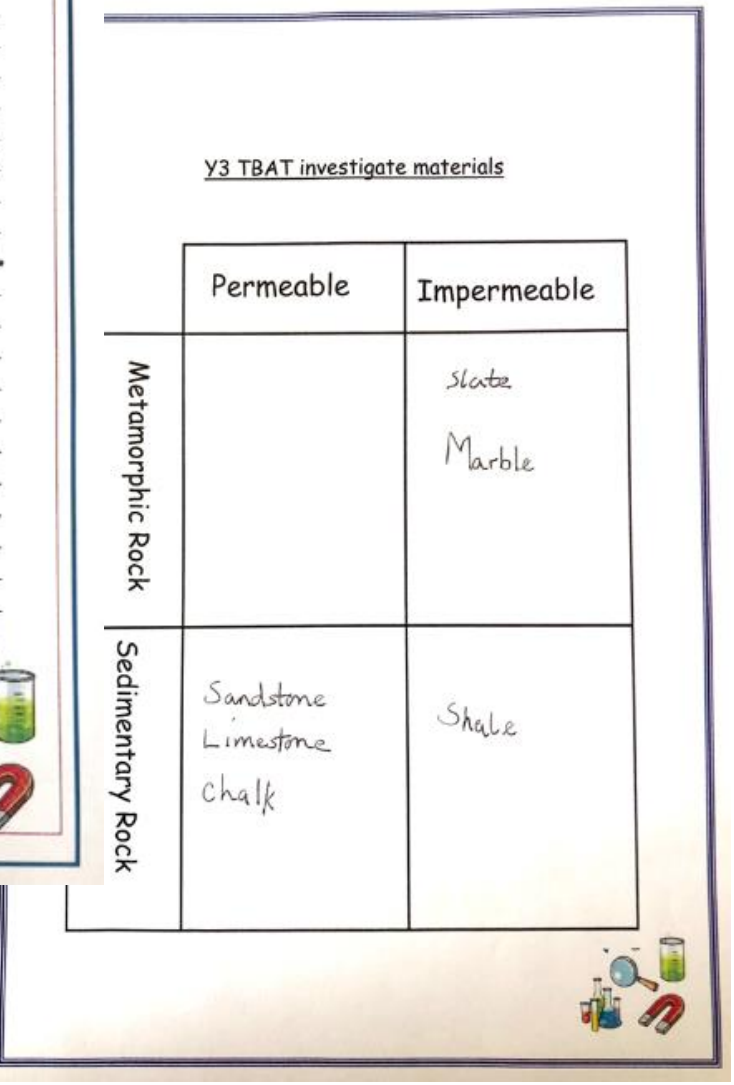
Key Vocabulary

rigid, flexible, opaque, translucent, transparent



Y3TBAT investigate materials.

To test texture, we looked for visible grain in the rock. Coarse grain can be seen by the naked eye. Fine grain can only be seen with a microscope. Grain can be wavy swirly patterns, streaks of pinstripes, rows of multicoloured bands or random patterns. To test permeability, we used pipettes to squeeze water onto the surface of each rock. If the water was not absorbed by the rock the rock was impermeable. If water was absorbed by the rock the rock was permeable. To tests the hardness of the rocks we scratched them against each other. If a part of the rock came off the rock was soft. If there was no trace of the rock the rock was hard. To tests density, we put each rock in a large bucket of water. If the rock floated it was not very dense. If the rock sunk it was dense. The most permeable rocks were sandstone, chalk and limestone. The hardest rocks were granite, marble, slate and sandstone.



Y3 TBAT investigate materials

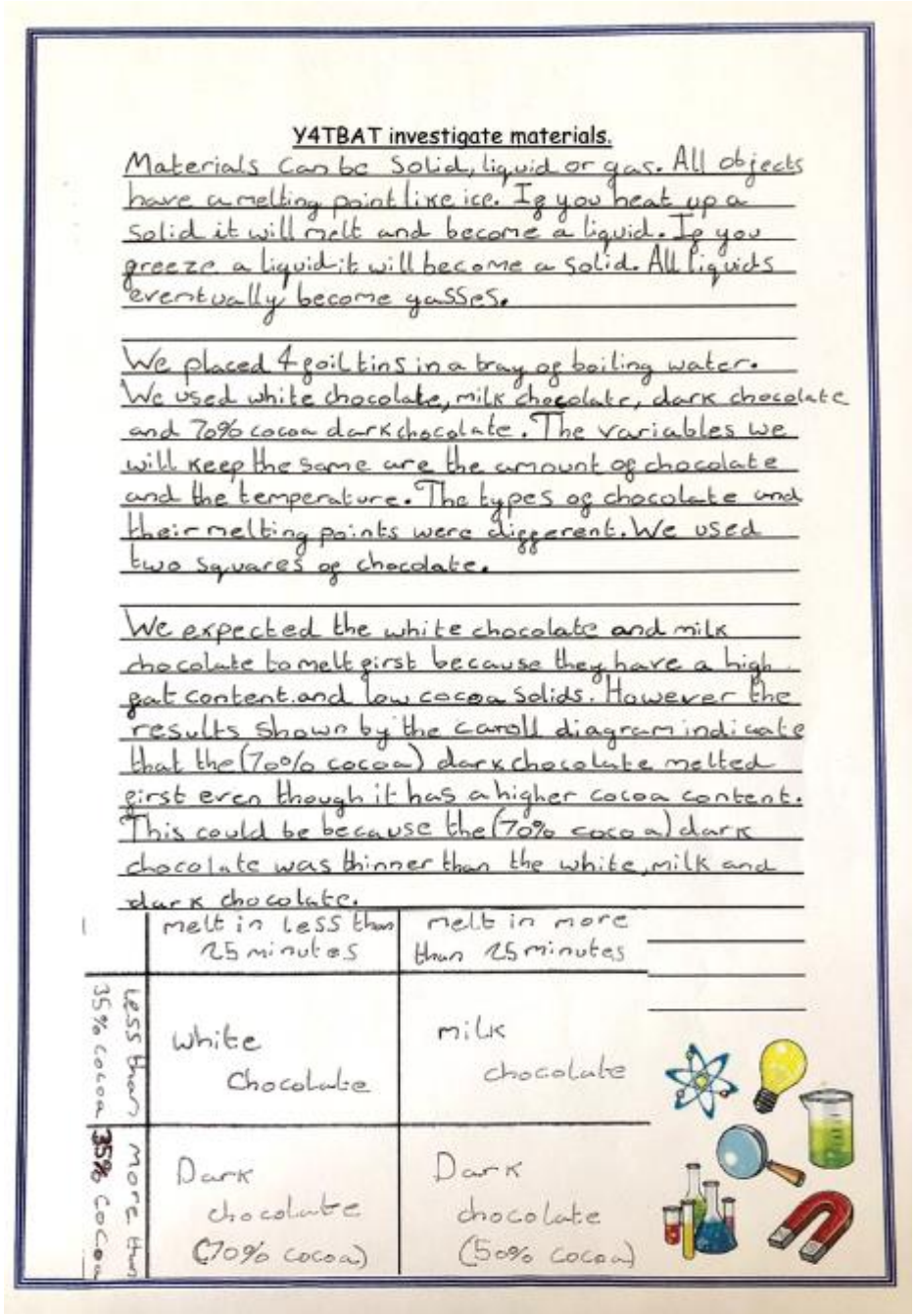
	Permeable	Impermeable
Metamorphic Rock		Slate Marble
Sedimentary Rock	Sandstone Limestone Chalk	Shale

Year 3:

Children can name, compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

Key Vocabulary

types of rocks; permeable, sedimentary and metamorphic.



Y4TBAT investigate materials.

Materials can be solid, liquid or gas. All objects have a melting point like ice. If you heat up a solid it will melt and become a liquid. If you freeze a liquid it will become a solid. All liquids eventually become gasses.

We placed 4 foil tins in a tray of boiling water. We used white chocolate, milk chocolate, dark chocolate and 70% cocoa dark chocolate. The variables we will keep the same are the amount of chocolate and the temperature. The types of chocolate and their melting points were diggerent. We used two squares of chocolate.

We expected the white chocolate and milk chocolate to melt first because they have a high fat content and low cocoa solids. However the results shown by the carroll diagram indicate that the (70% cocoa) dark chocolate melted first even though it has a higher cocoa content. This could be because the (70% cocoa) dark chocolate was thinner than the white, milk and dark chocolate.

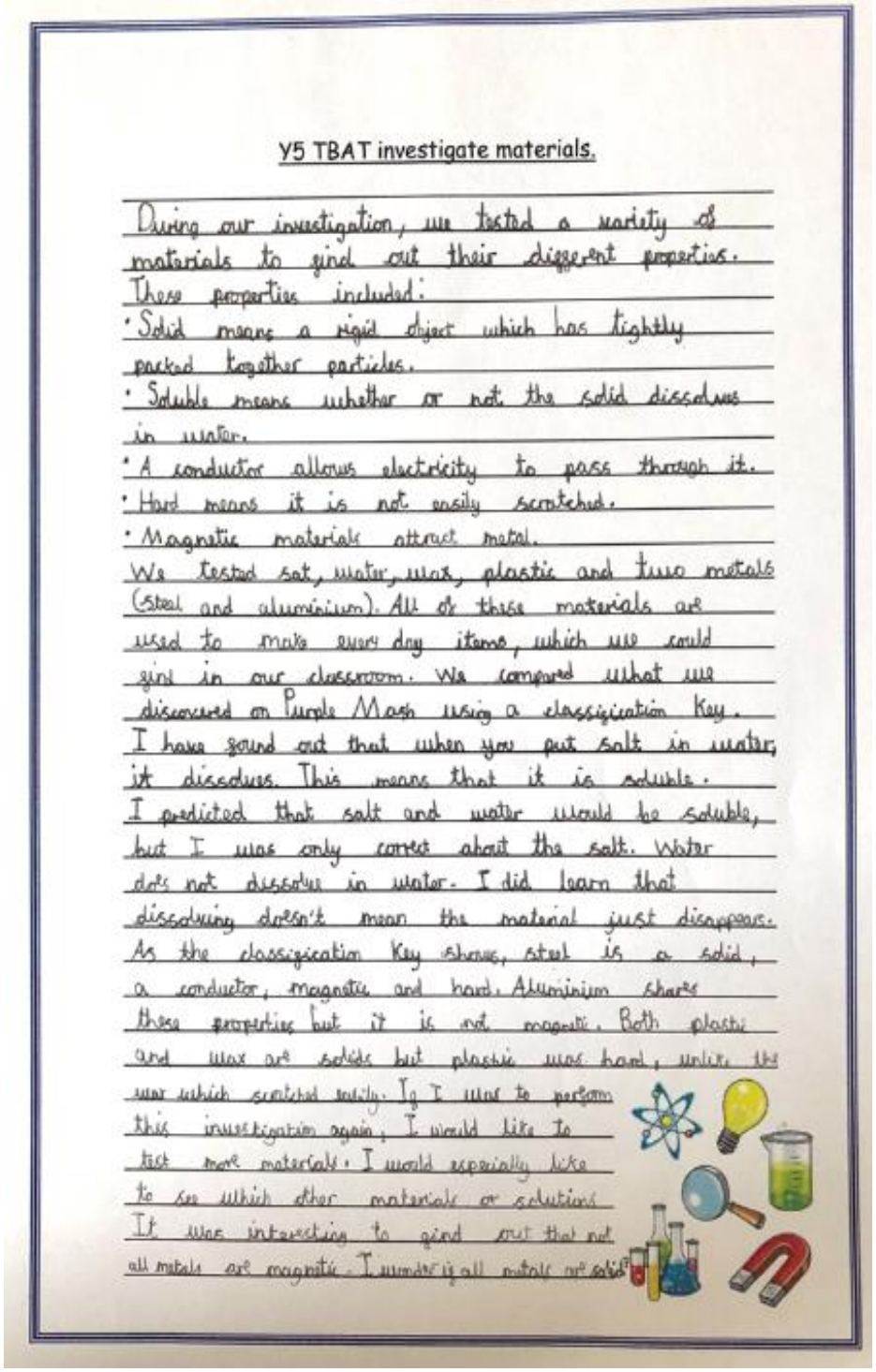
	melt in less than 25 minutes	melt in more than 25 minutes
less than 35% cocoa	White chocolate	milk chocolate
more than 35% cocoa	Dark chocolate (70% cocoa)	Dark chocolate (50% cocoa)

Year 4:

Children can name, compare and group materials together, according to whether they are solids, liquids or gases; they can also observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).

Key Vocabulary

solid, liquid, gas, melting point



Y5 TBAT investigate materials.

During our investigation, we tested a variety of materials to find out their different properties. These properties included:

- Solid means a rigid object which has tightly packed together particles.
- Soluble means whether or not the solid dissolves in water.
- A conductor allows electricity to pass through it.
- Hard means it is not easily scratched.
- Magnetic materials attract metal.

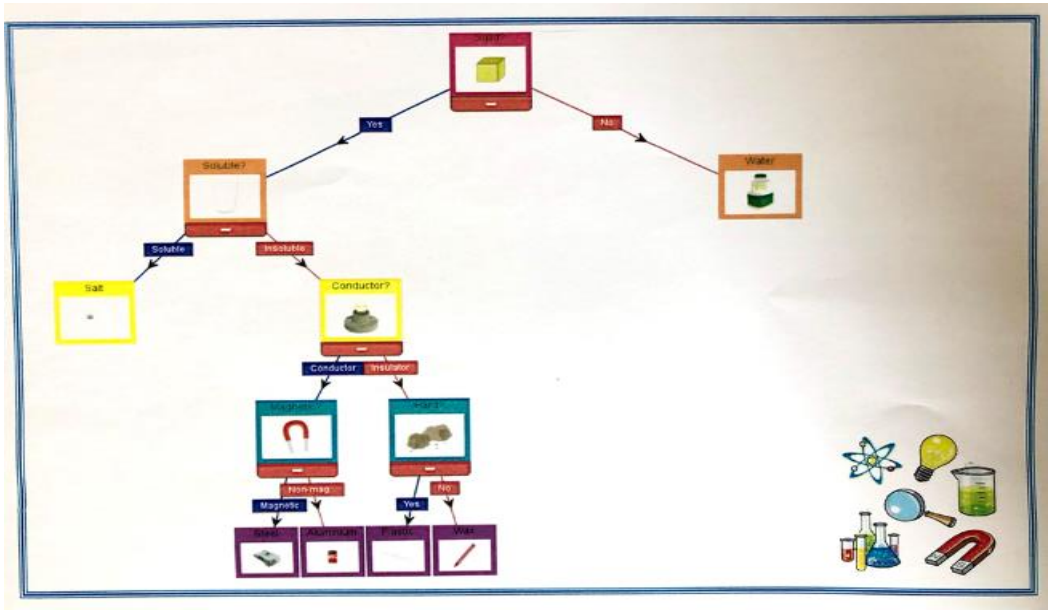
We tested salt, water, wax, plastic and two metals (steel and aluminium). All of these materials are used to make every day items, which we could find in our classroom. We compared what we discovered on Purple Mash using a classification Key. I have found out that when you put salt in water, it dissolves. This means that it is soluble. I predicted that salt and water would be soluble, but I was only correct about the salt. Water does not dissolve in water. I did learn that dissolving doesn't mean the material just disappears. As the classification Key shows, steel is a solid, a conductor, magnetic and hard. Aluminium shares these properties but it is not magnetic. Both plastic and wax are solids but plastic was hard, unlike the wax which scratched easily. If I were to perform this investigation again, I would like to test more materials. I would especially like to see which other materials or solutions. It was interesting to find out that not all metals are magnetic. I wonder if all metals are solid?

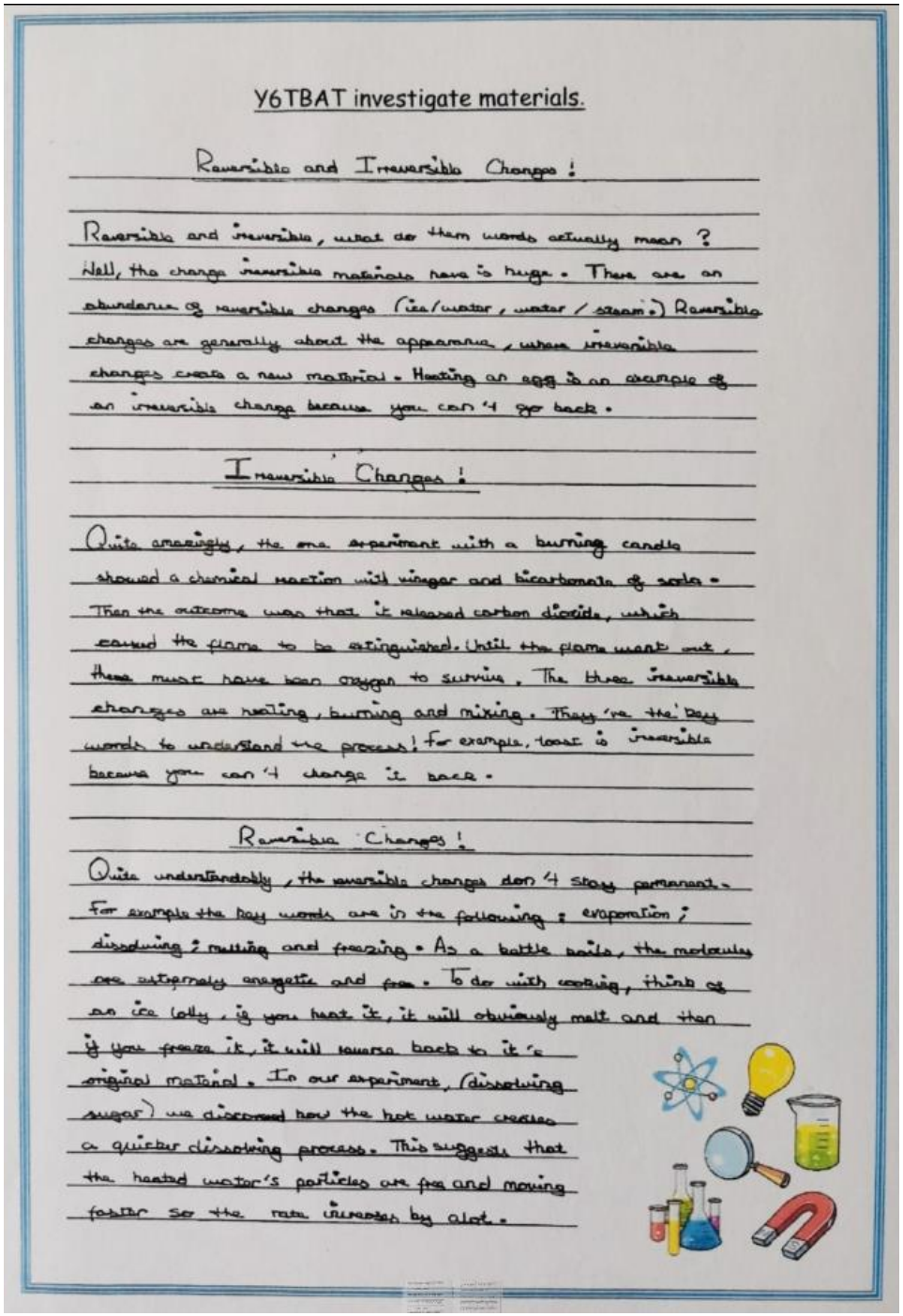
Year 5:

Children will name, compare and group together a wide variety of materials based on their properties, including their solubility, conductivity (electrical and thermal), and response to magnets.

Key Vocabulary

soluble, insoluble, conductive, insulating, magnetic, non-magnetic





Y6TBAT investigate materials.

Reversible and Irreversible Changes!

Reversible and irreversible, what do them words actually mean? Well, the change irreversible materials have is huge. There are an abundance of reversible changes (ice/water, water/steam.) Reversible changes are generally about the appearance, where irreversible changes create a new material. Heating an egg is an example of an irreversible change because you can't go back.

Irreversible Changes!

Quite amazingly, the one experiment with a burning candle showed a chemical reaction with vinegar and bicarbonate of soda. Then the outcome was that it released carbon dioxide, which caused the flame to be extinguished. Until the flame went out, there must have been oxygen to survive. The three irreversible changes are melting, burning and mixing. They're the key words to understand the process! For example, toast is irreversible because you can't change it back.

Reversible Changes!

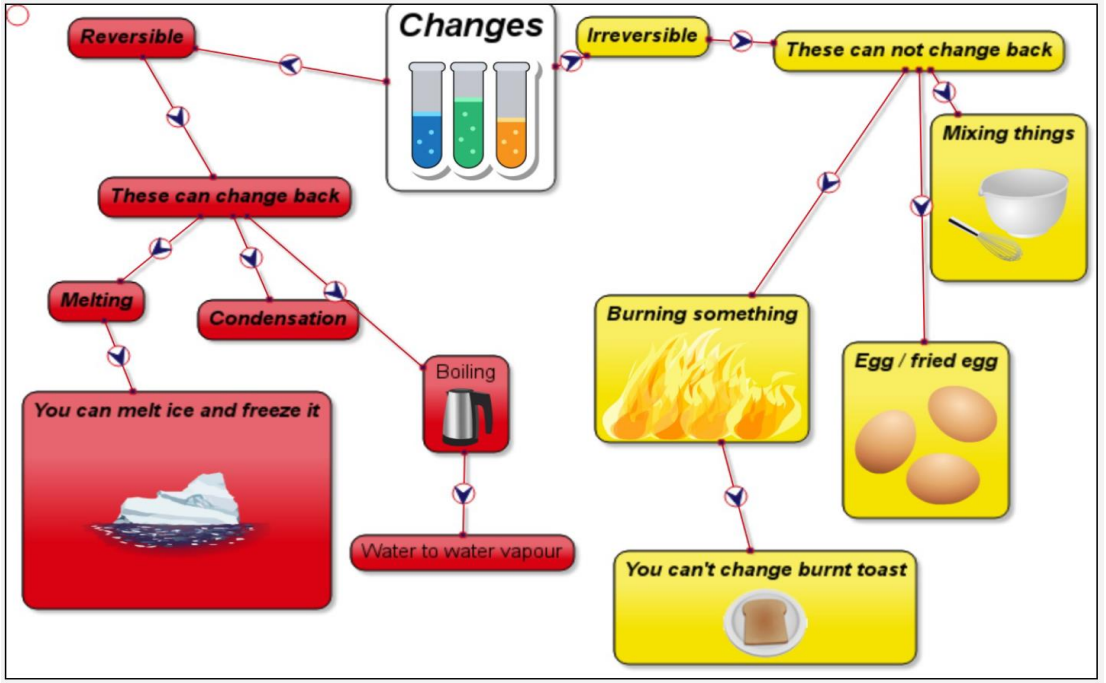
Quite understandably, the reversible changes don't stay permanent. For example the key words are in the following: evaporation; dissolving; melting and freezing. As a kettle boils, the molecules are extremely energetic and free. To do with cooking, think of an ice lolly, if you heat it, it will obviously melt and then if you freeze it, it will reverse back to it's original material. In our experiment, (dissolving sugar) we discovered how the hot water creates a quicker dissolving process. This suggests that the heated water's particles are free and moving faster so the rate increases by alot.

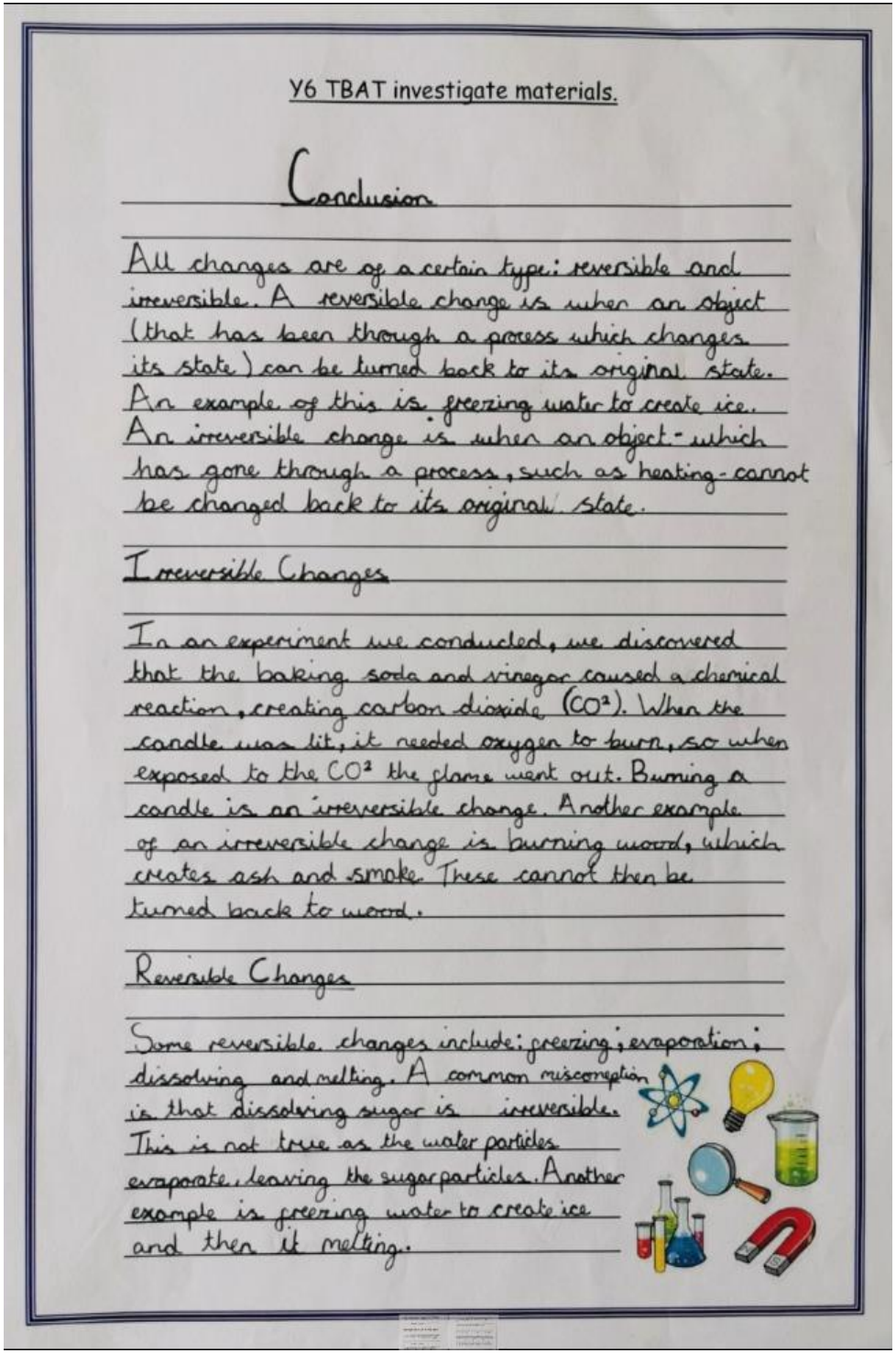
Year 6:

Children will confidently use knowledge of a variety of solids, liquids and gases to name, compare and group materials and explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.

Key Vocabulary

reversible, irreversible, dissolved, oxygen, carbon dioxide,





Y6 TBAT investigate materials.

Conclusion

All changes are of a certain type: reversible and irreversible. A reversible change is when an object (that has been through a process which changes its state) can be turned back to its original state. An example of this is freezing water to create ice. An irreversible change is when an object - which has gone through a process, such as heating - cannot be changed back to its original state.

Irreversible Changes

In an experiment we conducted, we discovered that the baking soda and vinegar caused a chemical reaction, creating carbon dioxide (CO^2). When the candle was lit, it needed oxygen to burn, so when exposed to the CO^2 the flame went out. Burning a candle is an irreversible change. Another example of an irreversible change is burning wood, which creates ash and smoke. These cannot then be turned back to wood.

Reversible Changes

Some reversible changes include: freezing; evaporation; dissolving and melting. A common misconception is that dissolving sugar is irreversible. This is not true as the water particles evaporate, leaving the sugar particles. Another example is freezing water to create ice and then it melting.

Mastery:

Children will independently use knowledge of a variety of solids, liquids and gases to name, compare and group materials and explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.

Key Vocabulary

reversible, irreversible, evaporation, dissolving, oxygen, carbon dioxide, rusting, burning