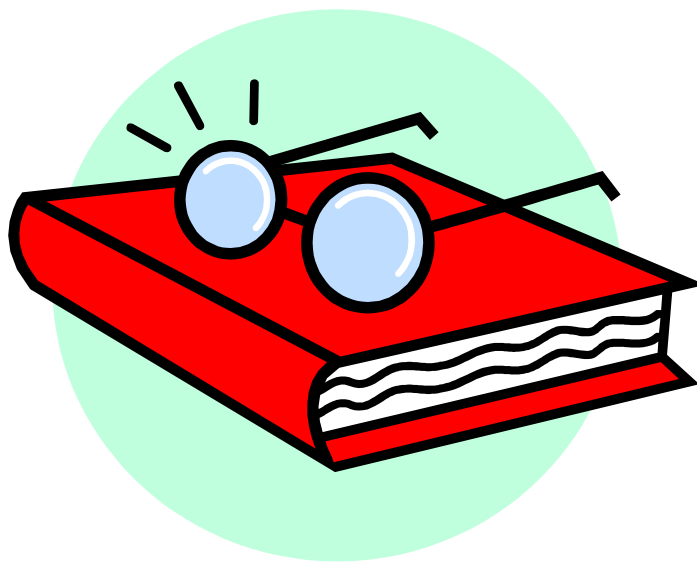


# Successful Learners



## St Mungo's Academy Literacy in Science Book 2



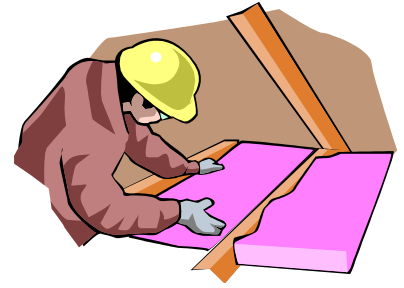
Confident Individuals

WORLDWIDE  
EDUCATION  
EXCELLENCE

RESOURCES  
FOR ALL  
LEARNERS

1 Use the information in the passage to answer the questions.

Loft insulation is an effective way of keeping houses warmer and reducing heating costs. Up to 20% of heating costs can be saved by installing effective loft insulation.



The three main types of loft insulation are blown insulation, blanket insulation and loose-fill insulation. Blanket and loose-fill insulation can be easily installed, but blown insulation must be installed by a specialist contractor.

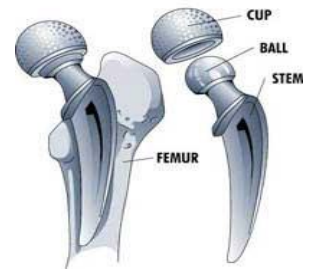
Most houses have blanket insulation. Blanket insulation can be made from mineral fibre or rock fibre and is supplied in rolls. Mineral fibre and rock fibre are non-flammable but must be treated to protect them from rot, vermin and dampness. When installing blanket insulation, protective clothing including gloves and a face mask must be worn to prevent fibres damaging skin and lungs.

Loose-fill insulation can be made from cork granules, vermiculite or cellulose fibre. This type of insulation is not advised for use in a draughty loft because the material can blow about.

- (a) By how much can heating costs be reduced with effective loft insulation?
- (b) Which type of insulation must be installed by a specialist contractor?
- (c) Why must protective clothing be worn when installing blanket insulation?
- (d) Why should loose-fill insulation not be used in a draughty loft?

2 Read the following passage and then answer the questions.

Many people suffer from painful hip joints. Cartilage in the joint wears away to expose nerve endings and this makes movement painful. In severe cases, the joint can be replaced with an artificial hip.



The materials used to make artificial hip joints must be resistant to corrosion, degradation and wear. They must also have similar mechanical properties to bone. For example, the materials must be strong enough to take the person's weight and must be able to bear stress without fracturing.

There are no materials that perfectly match the mechanical properties of bone. Metals are strong and have good resistance to fractures but are not flexible enough. Ceramics are strong but have poor resistance to fractures. Polymers have the correct flexibility and good resistance to fractures but are not strong enough. An artificial hip joint is made from a combination of these materials. This gives the best range of properties.

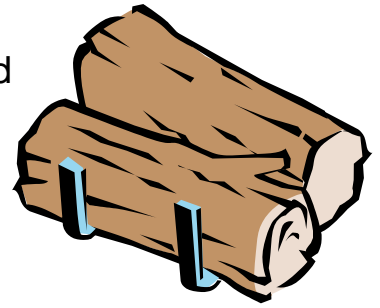
New polymers are being developed which are stronger and even more resistant to fractures. They are also highly resistant to wear. This means that artificial hip joints last longer and are less likely to need replacing.

- (a) What happens in a hip joint to make movement painful?
- (b) The materials used to make artificial hips must be resistant to degradation. What else must they be resistant to?
- (c) What are the **disadvantages** of using metals and ceramics in artificial hip joints?
- (d) Explain **fully** why artificial hip joints made from **new** polymers last longer.

3 Read the following passage and use the information to answer the questions.

Biomass fuel is the name given to renewable fuels obtained from living things.

The most commonly used biomass fuel is wood. In many parts of the world, wood is the main fuel used for domestic heating and cooking.



Charcoal and wood-alcohol are biomass fuels made from wood. Charcoal can be used in solid fuel heaters, while wood-alcohol is used as a liquid fuel. Charcoal is produced by heating wood in the absence of air. This process is called destructive distillation. The process also produces a mixture of gases which can be condensed to form an oily liquid. Wood-alcohol is obtained from this liquid.

Sugar cane can be used to produce another liquid biomass fuel called ethanol. Sugar, which is extracted from sugar cane plants, is converted to ethanol by the process of fermentation. Ethanol can be burned to produce heat energy or used in a fuel cell to produce electrical energy.

- (a) What is the most commonly used biomass fuel?
- (b) Describe how charcoal is produced.
- (c) What happens during the process of fermentation?
- (d) Name two liquid biomass fuels.