Investigating Windows

Is double glazing more effective than single glazing?

INTRODUCTION

Double glazing is common in many buildings, including homes, offices and schools. How does double glazing work and is it effective? Why do we not just have one pane of glass in windows and save resources? In this activity, children will explore whether double glazing is more effective at preventing heat loss than just a single pane of glass. It will enable children to investigate a practical application of glass that connects to the world around them – their classroom or bedroom may have double glazed windows.

LEARNING INTENTIONS

- ☑ To learn about one of the uses of glass
- ☑ To carry out a fair test
- ☑ To present results in a line graph and draw conclusions

RESOURCES (PER GROUP)

- 2 small glass jars with their lids
- 1 large glass jar that can fit over the top of the smaller jars. Alternatively use a glass measuring jug
- Warm water
- 2 thermometers
- Timing device (stopwatch or timer on a tablet)

WHAT TO DO:

Today we are going to be materials scientists

1. Begin with a discussion about why we have windows in buildings at all. Ask the group to share their ideas about why windows are made of glass and why some windows have a single pane whilst others have double (or even triple) glazing (focus on the retention of heat).
2. Ask the children to predict which form of glazing might be more effective at retaining heat in a building.
3. Explain how the resources provided could be used to model double glazing, and test their ideas.
4. Fill the two smaller jars with warm water.
5. Take the temperature of the water in each jar and record this.
6. Screw the lids on top of the jars.
7. Place the larger jar upside down over the top of one of the jars.
8. Leave for 5 minutes, then remove the larger jar and take/record the temperature of the water in both smaller jars. Replace their lids and put the larger jar over the same smaller jar as before.
9. At five-minute intervals (for half an hour) repeat point 5.
10. Present results in a line graph.

KEY QUESTIONS

1. Did the temperature increase or decrease in each jar?
2. By how much did the temperature change in each jar?
3. Which jar had the greater change in temperature (the one covered by the larger jar or the one that wasn't)?
4. Why does the temperature of the water change over time?
5. Do your results suggest one or two panes of glass would be effective at retaining heat in a building?

KEY VOCABULARY

- Temperature
- Thermometer
- Material
- Conductor/ conduction
- Insulator/ insulation
- Heat energy
- Circulate
- Convection*

*not expected at primary but useful to explain in simple terms

EXTENSION / FOLLOW UP ACTIVITIES

This activity could lead to a wider discussion about the impact that poorly insulated buildings have on the environment. Children could explore ways to improve the insulation of their school/home to reduce the amount of energy that is needed to heat them.

Children could investigate the effect of triple glazing using a third glass container to cover one of the jars.

Children could learn about how windows have changed over time.

ADDITIONAL RESOURCES (IF REQUIRED):

- Jars of varying shapes and sizes

ANTICIPATED ACTIVITY TIME: **45 MINS**