

GREAT GLASS SHARE



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Science
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Are double glazed windows more effective than single?

AGE RANGE: 7-11 years

OVERVIEW

Pupils gather data in a comparative test to analyse the thermal properties of a single layer of glass in comparison to a double layer. They develop skills in measuring and analysis of data to answer scientific questions. The enquiry inspires curiosity about glass being used in contemporary innovations to save energy supporting climate action.



LEARNING OBJECTIVES

- To compare and group together materials on the basis of their properties
- To carry out tests to answer questions
- To give reasons, based on evidence from comparative tests, for uses of everyday materials

WORKING SCIENTIFICALLY FOCUS

- To record data and results of increasing complexity using tables and line graphs
- To use test results to make predictions to set up further comparative and fair tests
- To report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms



RESOURCES

FOR EACH GROUP (2/3 pupils)

- 2 small glass jars with lids
- 1 large glass jar that can fit over the top of the smaller jars
- warm water
- 2 x thermometers (or a data logger)
- stopwatch



KEY WORDS

See Slide 11 of the teaching slide deck



VIDEOS



Great Science Skills Starters will support pupils to develop their skills at **Planning enquiries, Interpreting data** and **Drawing conclusions**

See page 37 of the PSTT **Bringing back glass** resource



TO SUPPORT TEACHING

- Supporting teaching slides deck
- [7-11 Conclusion Creator](#)
- Video - Inspire further questions with this video from BBC Teach: Chemistry Curious Cat: [How is glass made? Chemistry](#).



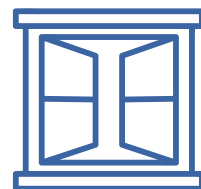
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Encourage pupils to discuss the purpose of windows and window-dressings, e.g. curtains, shutters, blinds to elicit **preconceptions** and ideas about glass, light, transparency, insulation, retention of heat etc. Challenge them to make **predictions** about the difference that double or triple glazing has on their ideas about how heat can be retained in buildings.



Demonstrate how to use the equipment to model single and double glazing by filling two small glass jars with equal quantities of warm water. Using a thermometer, or a data logger, measure the starting temperature in each jar. Screw the lids onto both jars. Place the larger jar upside down over one of the two small jars. Ask pupils to discuss what type of enquiry this is. They can consider and define the enquiry question they will be answering. Encourage them to identify the independent, dependent and control variables. **What effect does the number of layers of glass have on keeping water warm?**

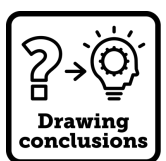


Pupils collaborate to set up their own comparative tests. Pupils measure the temperature in both jars and then record in a table every 5 minutes for half an hour.



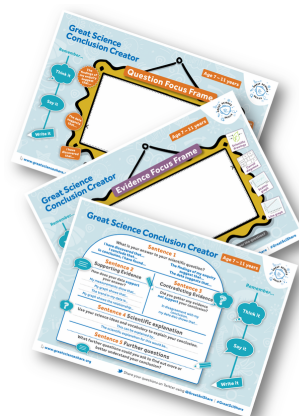
Pupils analyse the data in their tables by creating line graphs with time (min) on the x-axis and temperature (degree Celsius) on the y-axis. They can plot both sets of data on the same graph to compare the temperature changes in each of the jars, using dots to plot the data for single glazing and crosses to plot the data for double glazing.

Enhance this by using simple spreadsheets!



Pupils draw conclusions to respond to the scientific question. They should consider how their conclusions can be used to understand whether double glazing is more effective than single glazing. They should explain how their data supports their ideas and use scientific vocabulary to link their answer to the scientific ideas.

*Enhance this by using the **GSSfS Conclusion Creators***



Encourage pupils to evaluate how useful this model was at representing the double glazed windows and what it does well and not so well.



Pupils have choice about how to share their questions and enquiries. They could consider how new audiences may be informed about methods to reduce the effects of global warming. They may like to:

- give a presentation to the Governors' estate committee or Site Manager in school
- write an email to their MP
- design a poster campaign to be displayed in the local library or supermarket



As an extension or possible home activity, encourage pupils to be curious about the different ways that heat is lost from our homes and how we could prevent this. Link to topical news on the cost of energy and how energy saving methods at home can help with climate action. Have pupils got any ideas for further scientific questions for enquires they could undertake?

*Enhance this by using **Question Makers** to inspire question-asking.*