

Saving Energy with Air

Teacher Notes

Secondary (7-10)

ACTIVITY DESCRIPTION

We know that double and triple glazing our windows with glass saves energy and lowers heating costs, and the cool thing is, air is the magic in between the glass! But how much of a difference does glazing make?

In the Saving Energy with Air activity, students develop simple models demonstrating single and double-glazing and measure the temperature change over a 10 minute period. Before beginning the activity students make a prediction about what they think may happen and analyse their results providing an explanation as to how double-glazing windows can reduce energy loss and heat gain in a house.

INSTRUCTIONS

1. Tuning in

1. Ask students how they can reduce heat loss in winter and heat gain in summer in their homes
2. Focus on heat escaping through windows to explore the concept of double-glazing
3. Outline the activity - see Student Worksheet for instructions
4. Ask students to predict what they think will happen to the temperature in the two beakers after 10 minutes.

2. Double-glazing activity

Students to complete the activity and fill in the results table in their worksheet

3. Discussion

Work through as a class group for younger students or in their groups for older students

1. What happened to the water temperature in the single-glazed jar compared to the water temperature in the double-glazed jar?
2. Did what you think would happen, actually happen? Was your prediction right?
3. Why does the water in the double-glazed jar stay warmer than in the single-glazed jar?
4. How does the double-glazed jar allow less heat to escape?

SUGGESTIONS FOR ASSESSMENT

Formative

1. Making a prediction about the outcome of the activity
2. Setup and completion of the double-glazing activity and working in a group
3. Participation in the Discussion questions above

BACKGROUND NOTES

We use energy to do many tasks in the home and if we live in an area that experiences winter and summer extremes, regulating our homes can be a major energy user. One way that we can reduce our energy consumption, and therefore our greenhouse gas emissions, is by making simple changes to our houses to help keep the temperature stable.

Windows can be a major source of heat loss in winter and heat gain in summer as they are often made from a single sheet of glass. A single sheet of glass is a poor insulator, allowing heat from inside a warm house to easily transfer to the cooler outside or the reverse in summer. A solution to this issue is to install double (or tripe) glazing to reduce temperature change. Double glazing consists of two sheets of glass with air gap between which acts as an insulating layer. Because air is a poor conductor of heat, this prevents heat from escaping through the glass.

In this activity students will explore if double glazing can make a difference to temperatures inside a model 'house'.

ResourceSmart Schools can access Energy Auditing Kits from the Alternative Energy Association (ATA) at a discounted rate. Speak to your facilitator to find out more.

ACCESS THIS ACTIVITY

Visit the **CERES School of Nature and Climate** website to download the activity - <https://sustainability.ceres.org.au/education-resources/curriculum-activities/>

Curriculum and RSS Links

KEY CONCEPTS

Energy Use, Energy Efficiency, Passive Solar, Sustainable Design

KEY LEARNING INTENTIONS

1. Students will be able to identify where heat loss and heat gain occurs in a house
2. Students will be able to setup a simple experiment, make a prediction, collect and analyse the results
3. Students will be able to explain the effect of double-glazing in a house

VICTORIAN CURRICULUM

Science

<p>7 - 8</p> <p>Energy appears in different forms including movement (kinetic energy), heat, light, chemical energy and potential energy; devices can change energy from one form to another (VCSSU104)</p>	<p>9 - 10</p> <p>Energy flow in Earth's atmosphere can be explained by the processes of heat transfer (VCSSU132)</p>
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Design and Technology

<p>7 - 8</p> <p>Investigate the ways in which designed solutions evolve locally, nationally, regionally and globally through the creativity, innovation and enterprise of individuals and groups. (VCDSTS044)</p>	<p>9 - 10</p> <p>Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (VCDSTS055)</p>
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SUGGESTED RESOURCESMART SCHOOLS MODULE LINKS



Undertaking the activity as described above links to the *ResourceSmart Schools Energy Module - actions B1.2, B1.3*

Below is a list of extension activities that link to additional actions of the Energy module:

1. Develop an action plan to implement energy saving actions and systems at home based on your recommendations. Survey parents on their attitudes to energy saving at home (*ResourceSmart Schools Energy Module - actions B1.1, B1.3, C3.4*)
2. Construct a pie or bar graph to present and compare your data. Present your findings and energy saving recommendations in a school newsletter or at assembly (*ResourceSmart Schools Energy Module - actions B1.3, B1.4, C1.1, C1.3*)
3. Investigate energy efficient strategies for the home and then include Energy Saving Tips in your school newsletter for families. You can explore Sustainability Victoria's site on [Energy Saving At Home](#) for ideas (*ResourceSmart Schools Energy Module - actions C1.1, C1.3, B1.3*)
4. Extend investigation to audit electricity use in the school classroom and develop a recommendation report to present to school leadership or council (*ResourceSmart Schools Energy Module - action B1.3*)
5. Invite a local indigenous group to share their traditional perspectives on the seasons, as well as different forms of energy used to meet their needs for comfort and everyday tasks (*ResourceSmart Schools Energy Module - actions B1.5, B1.6*)
6. Engage with students from other school(s) interstate or overseas to compare their energy use at school and home, to your own. Reflect on how different places and people adapt their behaviours, including their use of electricity, or the ways different cultures dress, in response to the weather and seasons (*ResourceSmart Schools Energy Module - action C3.7*)
7. Investigate other sustainable building design ideas through the design and building of a model passive solar house, using everyday materials. See <http://tryengineering.org/lesson-plans/solar-structures> (*ResourceSmart Schools Energy Module - actions B1.1, B1.3, B1.4*)

Speak to your CERES ResourceSmart Schools Facilitator about further links to the Energy module.