

EXPLORING PASSIVE SOLAR ENERGY AND OUR CLASSROOM

Teacher-led Activity

In this activity, students have the opportunity to investigate two aspects of passive solar energy design (the positioning of the classroom in relation to the passage of the sun, and the placement and use of windows) and relate these aspects to their classroom. Students may identify actions that could be taken to improve the energy efficiency of their classroom. They can then research and prepare a case for classroom improvement and present it to the Principal or Board of Trustees. This activity may lead to student inquiry [Designing an Energy Efficient House in Word](#) or [PDF](#) format.

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EXPLORING PASSIVE SOLAR ENERGY AND OUR CLASSROOM

1. INTENDED LEARNING OUTCOMES

The students will be able to:

- Explain how the positioning of a room and the placement and nature of windows can affect the room's capacity to absorb passive solar energy
- Explain how well their classroom utilises passive solar energy
- Prepare and present a case for improvements to their classroom that enable the classroom to better utilise passive solar energy.

2. WHAT YOU NEED

- A copy of the energy efficient rating sheet for each student
- Several compasses
- Several copies of the factsheet [Using Passive Solar Energy](#)
- Several outdoor thermometers

3. FOCUS

Ask the students questions like:

- What do you think is an energy efficient room?
- What would it be like in summer?
- What would it be like in winter?
- What features of the room's design and construction would be significant in making it energy efficient?

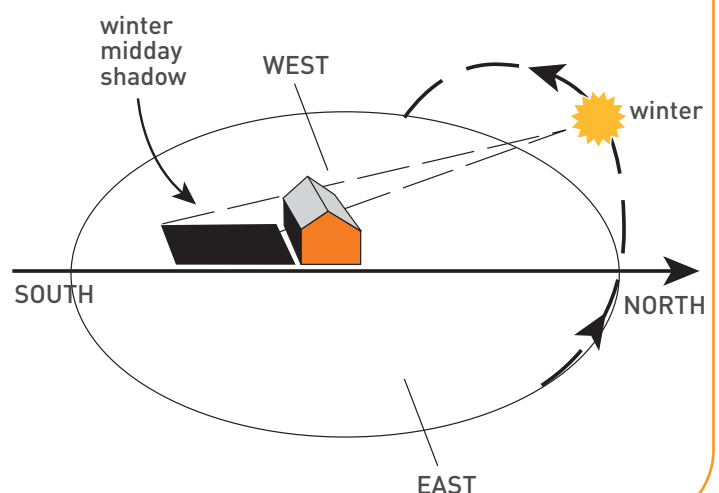
4. MANAGING THE ACTIVITY

- (i) Ask the students to work in groups to give the classroom an energy efficiency rating using the scale below:

1-----2-----3-----4-----5
very low low average high very high

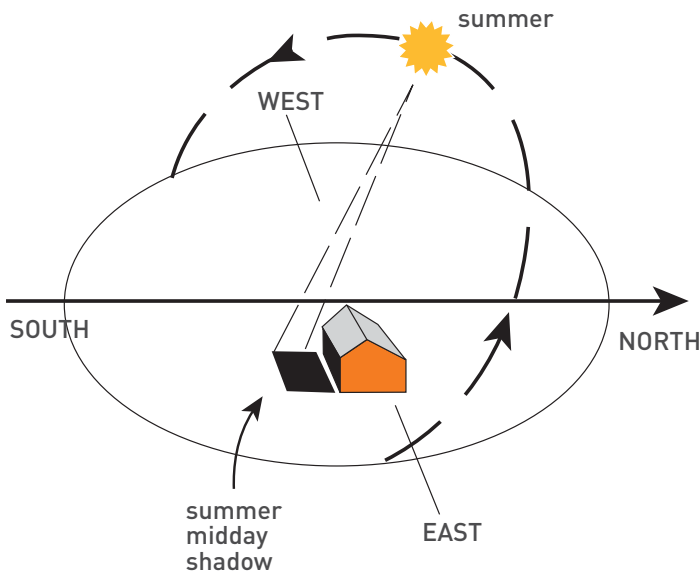
- (ii) Ask each group to describe the factors they considered and explain their ratings. Lead the class in a discussion of the students' responses.
- (iii) Give each group the factsheet [Using Passive Solar Energy](#) and ask the students to read it. Also give each group a compass and teach or review the use of a compass.
- (iv) Ask each group to establish the orientation of the classroom, and then make a drawing of the classroom showing its orientation and the position of windows and doors. (For examples of how the drawings may be presented, see Figures 1 and 2.)

Figure 1



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Figure 2



- (v) Have students consider the time of year and the position of the sun in relation to the classroom early in the morning, at interval, lunchtime and at the end of the school day.
- (vi) Ask students to track on their classroom drawing the passage of the sun in the sky during summer and in winter.
- (vii) Ask the students to make some conclusions about how the positioning of the classroom utilises passive solar energy.
- (viii) Give each group an outdoor thermometer.
- (ix) Have the students work in groups to record the temperature immediately outside and just inside accessible classroom windows.

- (x) Have each group use their temperature recordings and the information on the factsheet to draw some conclusions about the:
 - (a) Positioning of the windows
 - (b) Size of the windows
 - (c) Construction and treatment of the windows (e.g. double glazed, tinted, with curtains, etc.)
 - (d) Capacity of the windows to provide an appropriate amount of passive solar energy to the classroom.

The focus of this investigation will vary from classroom to classroom, depending on the design of the school. Some classes may have a primary focus on reducing the amount of heat absorbed through the windows in summer, with a lesser focus on reducing heat loss during winter. Other classes may have a primary focus on reducing winter heat loss.

5. REFLECTION

- Ask the students to review the energy efficiency rating they have given the classroom and make any required changes following the acquisition of new information.
- Ask the students to consider ways passive solar energy could be used to warm their classroom and/or ways the effects of over-warming from passive solar energy could be reduced.

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6. EXTENSION

- If students raise significant issues with practical solutions, ask them to research their solutions and present a case to the Principal and Board of Trustees to have changes made to the classroom.
- Have students complete the same process with other sites in the school like the library and/or selected rooms at home.
- Ask the students to complete the student inquiry Designing an Energy Efficient House in [Word](#) or [PDF](#) format.

7. SAFETY GUIDE

Use only outdoor thermometers. Mercury thermometers are not suitable for this activity.

8. RESOURCES

Factsheet

[Using Passive Solar Energy](#)

Books

- Ministry of Education, *Building Science Concepts Book 29, Solar Energy: Sun Power on Earth*, Learning Media, Wellington, 2003
- Ministry of Education, *Building Science Concepts Book 47, Insulation: Keeping Heat Energy In*, Learning Media, Wellington, 2003.

Websites

- An interactive guide to passive solar energy house design provided by Western Australia's Electricity Retail Corporation's retail provider, Synergy: <http://www.synergy.net.au/ResidentialSegment/SmartWaysToSave/SmartWaysToSave.html> (click on 'Launch Energy Efficient Home Design')
- The Energy Efficiency and Conservation Authority's (EECA) factsheet on passive solar design in New Zealand: <http://www.eeca.govt.nz/eeca-library/renewable-energy/solar/factsheet/passive-solar-design-factsheet.pdf>