



Lesson 8: How does a house stand up?

This lesson investigates technical problem-solving, focusing on different parts of a house's construction.

Support material: Information Sheet 9 "Section of a House", Information Sheet 10 "Bearing the Load", Worksheet A6, PL 11 "A Guide to the Building Regulations" (available free from the Department of the Environment, ENFO or any Local Authority office).



Spotlight

Structure



Key Concepts

Gravity. Load. Support.

Review of work

Discuss Worksheets A4 and A5. Use questions such as the following.

- What range of materials did students discover in their houses?
- Did they notice any materials which are unsuitable for the purpose for which they are being used? For example: a rotting wooden bath/shower surround; a hard-to-clean floor covering; kitchen counters which stain easily?

Discussion

Distribute copies of Information Sheet 9 "Section of a House" and Information Sheet 10 "Bearing the Load". Use questions like the following to lead the discussion on **structural features**.

- The weight of everything *in* a house and *on* a house must be supported by something below it.
- What holds up a ridge tile? *Answer:* The tiles below it.
- And what hold up the roof tiles? *Answer:* The roof battens.
- And what holds up the battens?

Use Information Sheet 9 to continue this process until students have traced the load from the roof right down to the ground. Remember that the load from one object may be shared between several supports — for example, the weight of a floor is usually carried by at least two walls.

- What about the ground on which a house is built? What does it usually consist of? Are some kinds of ground better at carrying the weight of a house than others? What about rock, bog, clay, mud? The students are not expected to test this, but to think about and discuss the characteristics of different types of ground.
- Study Information Sheet 10. Comment on the structure of the castle and the



lighthouse. Can students think of two reasons why the walls of these buildings get wider towards the bottom?

Answer 1 — The top of a wall only has to carry the weight of the roof. The wall near the base has to carry the roof *and* the weight of the wall between the roof and the base.

Answer 2 — Making walls wide at the base helps to prevent the building from sinking into the ground — just as snowshoes prevent a person's feet from sinking into deep snow.



Activity — Constructing walls and roofs

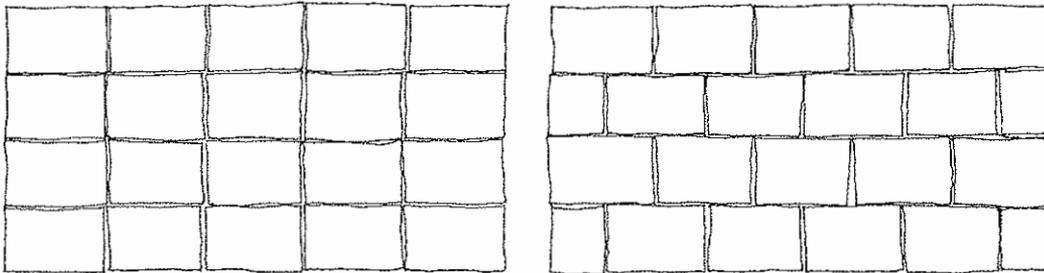
Materials

If the teacher can provide several sets of materials, different teams can work in parallel, making their own discoveries and comparing notes as they go.

- Walls — Bricks, wooden blocks or cardboard boxes. The boxes should all be the same size and taped shut — shoe boxes are ideal.
- Lintels — A few pieces of wood planking (or wood sections 20 mm x 50 mm) 600 mm to 1000 mm long.
- Roofs — Lollipop sticks, wooden cocktail sticks, panel pins, glue

Task 1

1. Ask some volunteers to build walls in different ways, using only the bricks, blocks or cardboard boxes. Push the middle of each wall. Which seems strongest?



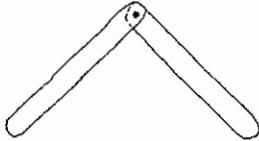
Two ways of building the box wall

2. Now rebuild the walls and make an opening for a door or window. What happens? How can you support the wall above the opening?
3. Teacher now gives students the wood planking/sections. They have a lintel — so what can they do? Can students think of other ways of supporting the wall above an opening.

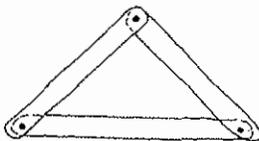


Task 2

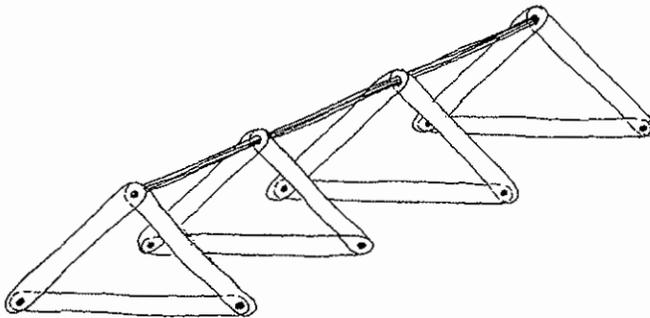
1. Ask other volunteers to pin two lollipop sticks together at the end with a single pin. What happens when they try to make them stand up in an inverted V? The Vs either “do the splits” or fall over sideways. What could they do to prevent this?



2. Tell them they can use one more lollipop stick and two more pins. What can they do now?



3. If they can use cocktail sticks as well, what can they do? They should now be able to solve all their structural problems.



Roof structure

Discussion

Distribute copies of PL 11 “A Guide to the Building Regulations”.

Since 1 June 1992, every new house or extension built in Ireland has to comply with the Building Regulations. Why do you think the Government made this law? Study the Department of the Environment’s leaflet about the building regulations and work it out.

Homework

1. Distribute copies of Worksheet A6. Discuss the assignments.
2. Remind students to check the **Scrapbook** requirements and to update **Vocabulary Files**.

Cross-Curricular Connections

1. Construction Studies — Get permission to visit a building site in your area. *Visit the*



site only under adult supervision. Photograph the stages of the site's development. Arrange the photographs in order and give each one a descriptive caption. Then organise a class display of your study.

2. Design/Careers/Construction Studies — Invite an architect or site foreman to visit your class to talk about his/her work.
3. Career Guidance — Investigate the career possibilities related to designing and building a house. These include, among others, architect, architectural technician, interior designer, surveyor, builder, bricklayer, carpenter, plumber and electrician. Students may wish to negotiate their own visits to and from interviews.
4. Home Economics — Investigate the various services which are supplied to your home — water, gas, electricity, telephone. Who provides these services? How are they connected to the house? How are they metered and paid for? Learn how to read an electricity bill and a telephone bill.
5. History/Construction Studies — Investigate structural systems used in buildings from the past: columns, arches, buttresses...
6. Science/Environmental Studies — How “green” can a building be? Are some building materials “greener” than others? Are there other aspects of buildings which have an impact on energy consumption, air quality or water pollution?
7. Woodwork/Construction Studies/Technical Graphics: Your school needs a new snack bar. It has to be fitted into an existing room and it must be possible to install it and remove it without causing any damage to the fabric of the school. Draw up a brief. Then develop a design and a complete set of working drawings, schedule of materials and costings, excluding labour.