Important Concepts . . .

Preview Review

Science *Grade 7* *TEACHER KEY*

W3 - Lesson 2: Structural Forms

V5-07

Important Concepts of Grade 7 Science

W1 - Lesson 1 ..... Interactions and Interdependencies
W1 - Lesson 2 ..... Nutrient Cycles, Energy Flows, and Changes in Ecosystems
W1 - Lesson 3A ..... Environmental Impacts of Human Activities
W1 - Lesson 3B ..... The Particle Model of Matter, Temperature, Heat, and Change of State
W1 - Lesson 4 ..... Heat Transfer
W1 - Lesson 5 ..... Understanding Heat and Temperature in Nature and Technology
W1- Quiz
W2 - Lesson 1 ..... Life Processes and Structure of Plants
W2 - Lesson 2 ..... Plant Propagation and Reproduction
W2 - Lesson 3 ..... Plant Needs and Growing Conditions
W2 - Lesson 4 ..... Role of Plants and Controlling Plant Growth
W2 - Lesson 5 ..... Review of Plant Management
W2 - Quiz
W3 - Lesson 1 ..... Forces on and within Structures
W3 - Lesson 2 ..... Structural Forms
W3 - Lesson 3A ..... Materials Used in Structures
W3 - Lesson 3B ..... Rocks, Weathering, and Erosion - The Rock Cycle
W3 - Lesson 4 ..... Plate Tectonics and Related Events
W3 - Lesson 5 ..... Fossils
W3 - Quiz.....

Materials Required.
Textbook:
Science in Action 7

Science Grade 7
Version 5
Preview/Review W3 - Lesson 2 TEACHER KEY

Publisher: Alberta Distance Learning Centre
In-House Teacher: Barb Philips
Reviewer: Norene Pinder

Project Coordinator: Dennis McCarthy
Preview/Review Publishing Coordinating Team: Nina Johnson, Laura Renkema, and Donna Silgard

The Alberta Distance Learning Centre has an Internet site that you may find useful. The address is as follows: **http://www.adlc.ca**

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Preview/Review Concepts
for
Grade Seven Science

TEACHER KEY

W3 - Lesson 2:
Structural Forms

OBJECTIVES

By the end of this lesson, you should be able to

- name and describe the basic building shapes
- describe how materials can be strengthened
- explain different ways of joining parts

GLOSSARY

beam - flat, narrow structure supported at its ends

bonding - hooking two surfaces together with a different material between them

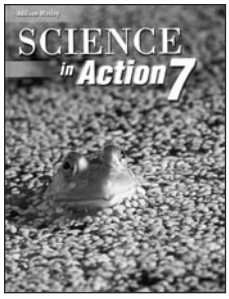
column - a vertical support structure

corrugation - material with wave-like ridges or folds, e.g. corrugated cardboard

W3 - Lesson 2: Structural Forms

Typically, we see structures in many different shapes. Even among those built for the same purpose, a great variety of shapes is possible.

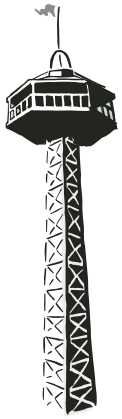
Shapes and Forms for Building



Read pages 290 to 291 and 301 to 303 of *Science in Action 7*. Although numerous shapes can be used in structures, some are stronger than others. As a result, those shapes are commonly used when making objects. Some shapes that are seen frequently in structures are triangles, arches, domes, beams, and columns.

1. If you had only single beams to support a load, which way would you position them for greatest strength – flat, or on edge?

   on edge; they will not bend as much

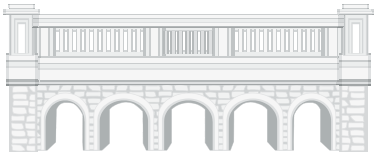


2. Why are arches stronger than columns and beams?

   Arches are stronger because the force of the load is carried through the arch to the foundation, which spreads the load. In a column and beam arrangement, the force acts on a much smaller area where the column meets the beam.

3. What is a simple way of strengthening a rectangular-shaped gate?

   Put a cross-brace diagonally in it. This makes two triangles that are stronger than a rectangle.



4. How could you use triangles to make a strong roof?

interlock them to make trusses

5. Why might you use an I-beam rather than a solid beam to fit in the same space?

The I-beam has less mass than a solid beam

6. If you could make two equally strong bridges, one a truss bridge, and the other an arch bridge, which would you choose and why?

Probably the truss bridge because it is lighter than an arch bridge.

7. Describe a cautileur.

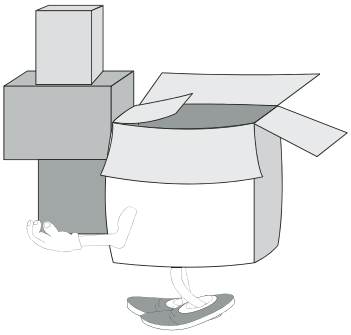
It is a beam supported at one end only.

Strengthening Materials

Sometimes materials are formed in ways that will strengthen them. For example, a reasonably firm material such as cardboard or plastic can be strengthened by **corrugating** it. That means one layer of it is folded into a number of triangles. The folded layer is then often attached between two flat layers of the same material. Another method of strengthening a material is **lamination**, or bonding multiple layers of it together. Read pages 329, 330, and 332 of the textbook.

8. Name a piece of sports equipment that is made stronger through lamination.

Answers will vary–skis, hockey sticks, etc.



9. Where might you find corrugated material in buildings?

Answers will vary–corrugated roofing material.

10. What type of force does a strut on a sign resist? (Hint: See picture on page 330 of your textbook.)

compression

Joining Parts

Structures are rarely made of just one part. This leads to the need to join the parts in ways that allow them to work properly for as long as needed. The type of join must suit the use of the object. Some joints rely on friction and others on bonding, to hold parts together. Some joints are rigid or fixed; they do not move. Others are flexible and can move. Read pages 313 to 315 and 318 of *Science in Action 7*.

11. How does the force of friction create strong joints?

It prevents pieces of the joint from slipping apart.

12. How does a bond work to hold parts together?

The surfaces attach to the bonding material. Because the material is between the parts, they are held together.

13. What are two different ways you could join the parts of a cupboard?

Answers may vary. An example of the friction methods is a wood screw, and an example of bonding is glue.

14. Give an example of a fixed joint.

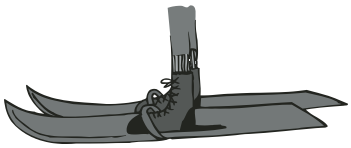
where parts are held together by glue, cement, nails, welding, etc.

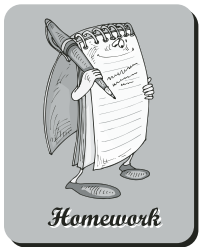
15. Give an example of a moveable joint.

wrists, etc. on body, where parts are held together by hinges, etc.

16. If you had your choice of a nail or a screw to join two parts securely together, which would you use and why?

Probably the screw. There will be more friction and it would be harder to get the pieces apart.





Homework

17. Experiment with some materials you have around home, such as paper, straws or toothpicks. Make a simple structures such as a bridge using the shapes you learned about. Sketch it and describe how it performed when a load was put on it.

Answers will vary.