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# TEACHER'S GUIDE

*Maths in the Real World of Architecture* consists of seventeen lessons dealing with multiplication, measurement, and geometry. You may choose to teach all or some of the lessons. The lesson on capacity may be considered an optional lesson. A lesson may take one or more periods to instruct depending upon the length of instructional time and the group of students involved. The Architectural Journal in the back of the book may be used as an enrichment project for advanced students or may be incorporated into the regular classroom lessons.

This book has been designed to create an open-ended progression of skill instruction to meet the needs of a wide variety of student abilities. Each level in Bloom's taxonomy is covered as students synthesise their knowledge while working towards producing their own architectural drawing and model. Gardner's Multiple Intelligences are also attended to as students work in a variety of styles, for a number of purposes. It is product-oriented and allows each student to design an architectural plan, thereby incorporating maths into a real-life experience. *Maths in the Real World of Architecture* is based upon maths strategies and the philosophy of National Maths Standards.

Materials needed for each lesson are listed. Be sure to duplicate an Architectural Journal for each student in your group. Vocabulary for each unit has been included. An Architecture Challenge of the Day is attached for students more capable in maths. Also, the journal provides a variety of experiences that will facilitate flexible groups or whole class instruction.

## Objectives

1. To review multiplication by one- to three-digit numbers
2. To measure and compare length using customary and metric measurements and fractions thereof
3. To choose appropriate measurement units
4. To find the perimeter and the area of a shape
5. To distinguish between plane and solid figures
6. To identify polygons and their properties
7. To identify acute, right, and obtuse angles
8. To identify lines, line segments, rays, and angles
9. To make use of strategies:
  - Work Backward
  - Graph
  - Guess and Check
  - Make a Model

# Lesson 1

## Introduction to Architecture

### Materials Needed:

- Pictures of a variety of structures
- Introduction to Architecture handout (p. 8)
- Mystery Architect handouts for Challenge of the Day (p. 9-10)
- “Patterns in Architecture” handout (p. 11)
- Webbing-game pages and directions as needed for each group of students (p. 12-15)

### Vocabulary:

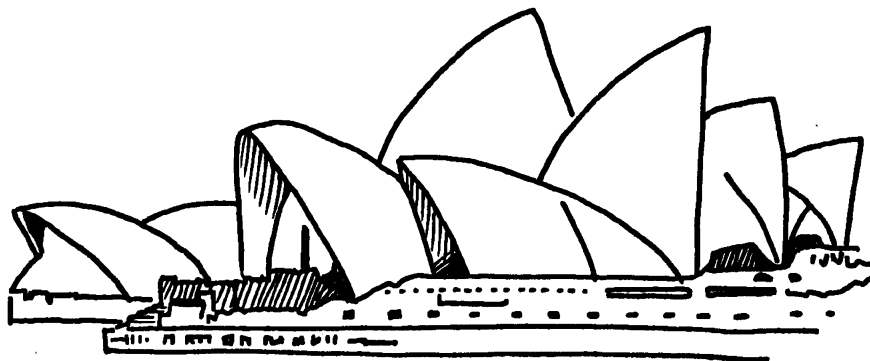
factor  
product  
area  
perimeter

### Teacher Instructions:

1. Introduce students to architecture by using the “Introduction to Architecture” handout. Share pictures of a variety of architectural styles as you go through the handout with the students.
2. Introduce students to “pattern” (“Patterns in Architecture” handout).
3. Webbing rules are provided for cooperative groups. Use the webbing pages as necessary.

### Architectural *Journal*:

Five problems accompany this lesson. While advanced students work on these problems, the teacher can practice multiplication with the students who need additional reinforcement.



# Introduction to Architecture

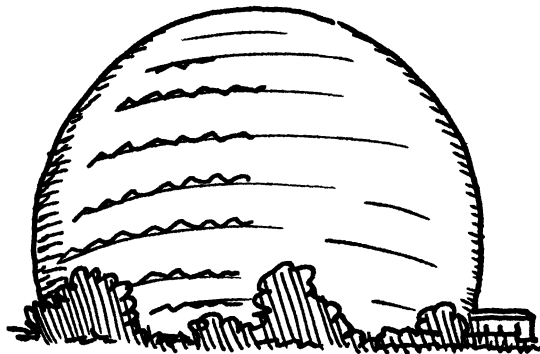
Architecture is the art and science of designing buildings. These buildings include houses, skyscrapers, museums, churches, schools, and office buildings. By looking around our block, town, state, country, and world we know that buildings do not always look the same from one place to another. The architectural style of a building is controlled by such things as climate, the time period of construction, access to building materials, advancement in building techniques, the needs and values of the culture or segment of society, the function of the building, the location of the building, or simply personal preference.

Architecture can be compared to writing. When we write, we put letters together to form words and then put words together to make complete thoughts. In architecture, we put building parts together to create whole buildings. Roofs, walls, floors, and windows become structures. Structures then become neighbourhoods or blocks, which in turn become towns and cities.

An architect is a dreamer, an artist, a realist, a mathematician, a scientist, and an important contributor to the world in which we live. Keep an eye on the world around you, use your best maths skills, and do a little dreaming. The sky is the limit. Who knows? You may become the next Greenaway or Frank Lloyd Wright. During Wright's lifetime, he was required to appear before an American congressional hearing. It is reported that when he was sworn in, he introduced himself as Frank Lloyd Wright, the world's greatest architect. After you become a more accomplished architect, you can determine if you agree with Wright's evaluation of himself or not.

Look at pictures of some of the buildings found around the world. Determine what you like and dislike about the buildings you see. Pay careful attention to the design work. How is pattern used?

Throughout the course of this unit, you will be working on a design of your own, so everything you learn will be of great value to you. Stay alert!



# Patterns in Architecture

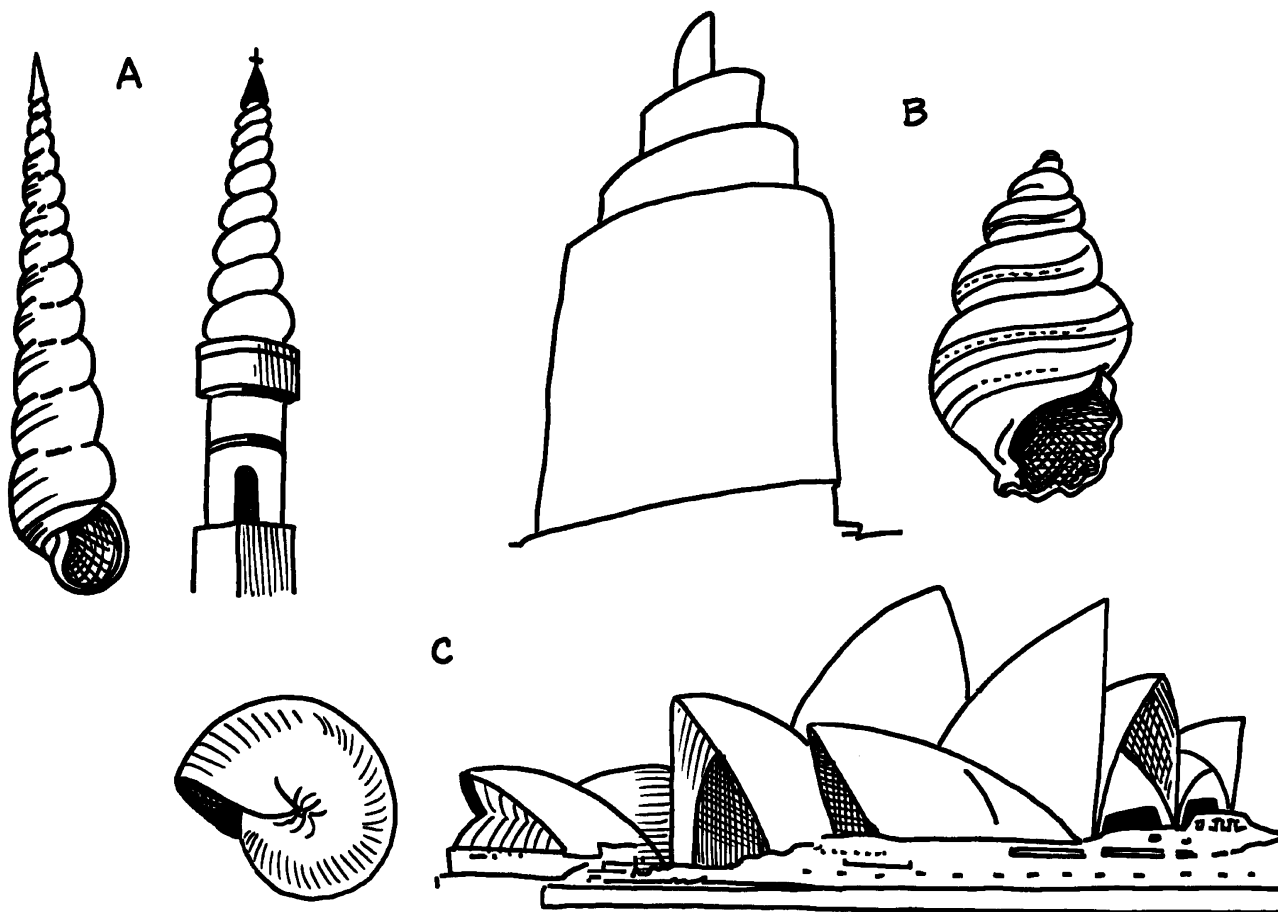
Architects often pattern structures or parts of structures after things found in nature. Look at some of the examples shown below. Do you see any similarity between the way the building is patterned and the object found in nature? What do these objects from nature have in common?

As you become aware of the architecture around you, see if you can find patterns of nature in any of the structures you see.

Architects will often repeat lines, textures, or shapes to create patterns within their structures. During the Neoclassic Period of architecture, columns were often repeated in the construction of buildings.

What kinds of architectural patterns do you see in your school?

How is pattern used in your home or the homes around you?



# Webbing:

## Directions:

Two to four students may complete this activity in a small group. Begin with a Webbing Sheet. Do not look at the sheet until the game actually begins. Begin in the centre of the web and multiply the centre number with the one next to it, then take that answer and multiply it by the number in the outermost ring.

You will compete with your team members for time and accuracy. Four points are awarded for each correct problem completed by the person finishing first, three points for each correct problem for the person finishing second, and so on. (The answers to the web are found on the answer sheet on page 15 for easy correcting by the members of the team.) Each time someone gets an incorrect answer, the same number of points that he or she is earning is subtracted from his or her score. For example, if John finished first, he would get 4 points for each problem he completed correctly. If he correctly answered 6 problems and incorrectly answered 2 problems, his score would be:  $6 \times 4 = 24$  minus  $2 \times 4 = 8$ .

$24 - 8 = 16$ . John's score for that game would be 16. The student scoring the most points is the winner.

Example:

