6.3 Create Nets, Plans, and Patterns

Student Text Pages
318–326

Suggested Timing
80–160 min

Tools
- empty cereal boxes
- scissors
- rulers
- tape
- empty tissue rolls
- old T-shirts or other simple items of clothing
- newsprint
- computers
- *The Geometer's Sketchpad®*

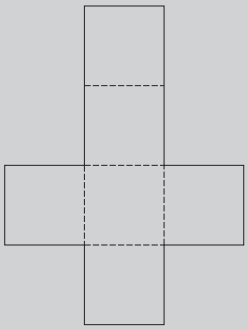
Related Resources
BLM 6-8 Section 6.3 Create Nets, Plans, and Patterns
BLM 6-9 Section 6.3 Net for an Octahedron
BLM 6-10 Section 6.3 Net for Question 5
BLM 6-11 Section 6.3 Net for a Dodecahedron
BLM T-2 *The Geometer's Sketchpad®* 3
BLM T-3 *The Geometer's Sketchpad®* 4

Link to Prerequisite Skills

Students should complete Prerequisite Skills questions 4 to 9 before proceeding with this section.

Warm-Up

1. A cereal box has a height of 30 cm, a width of 20 cm, and a depth of 5 cm. Anton has a measuring cup filled with 2 L of oatmeal. Will all the oatmeal fit into the box? Explain.
2. A piece of paper is 28 cm long and 22 cm wide. Sunita rolled it along its length to form a cylinder with a height of 22 cm. Find the radius of the cylinder.
3. Consider the net shown. If you cut it out and fold it along the dotted lines to form a closed geometric object, what is the object?



Warm-Up Answers

1. Yes. The volume of the box is 3000 cm^3, or 3 L.
2. $r \doteq 4.5$ cm
3. The object is a cube.

Teaching Suggestions

Warm-Up

- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class.

Section Opener

- Ask students to study the packaging shown in the section opener photograph. What are some of the reasons for the variety of packaging in use? How does the packaging relate to the product being sold?

Investigate

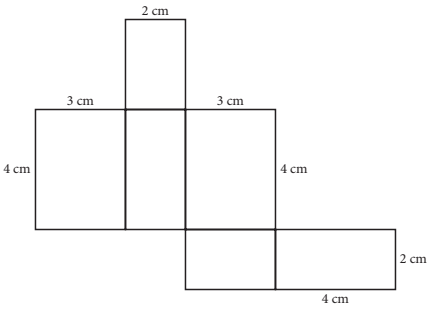
- It may take some time to collect the cereal boxes and tissue rolls needed for this investigation. Give students several days' warning.
- You can obtain used clothing cheaply from second-hand stores. Students can study the clothing, and use it to sketch the pattern on newsprint, without actually cutting it apart. Alternatively, you can keep a few cut samples for use each time this section is being taught.

Investigate Answers (pages 318-320)

Investigate 1

4. The measures of the net are the same as the measures of the cereal box. The side lengths of the shapes in the net form the edge lengths of the box.

5.



Products may vary: chocolate, makeup, paper clips.

Investigate 2

1. $h = 9.9$ cm, $d = 4.2$ cm

2. $l = 9.9$ cm; this is equal to the height of the roll.

$w = 14.2$; this is equal to the circumference of the roll.

$\frac{w}{d} = 3.38$; this is approximately equal to π.

3. The circumference of the circles must be 13.2 cm, and the diameter must be 4.2 cm.

4. The length of the net is 9.9 cm, which is equal to the height of the roll. The diameters of the congruent circles are 4.2 cm, which is the diameter of the cylinder.

5. The net should be a rectangle with a length of 10 cm and a width of approximately 18.8 cm, and two circles, both with a diameter of 6 cm.

Investigate 3 (page 320)

3. Answers may vary. Sample answer: Clothing manufacturers can use a pattern to set cutting machines. The machines can very quickly cut many pieces of the same shape.

4.

Example

- Have students work through the Example as a class before proceeding to the Discuss the Concepts. Alternatively, have students complete the Examples independently or in small groups before reviewing them as a class. Square dot paper is useful in making the drawings.

Technology

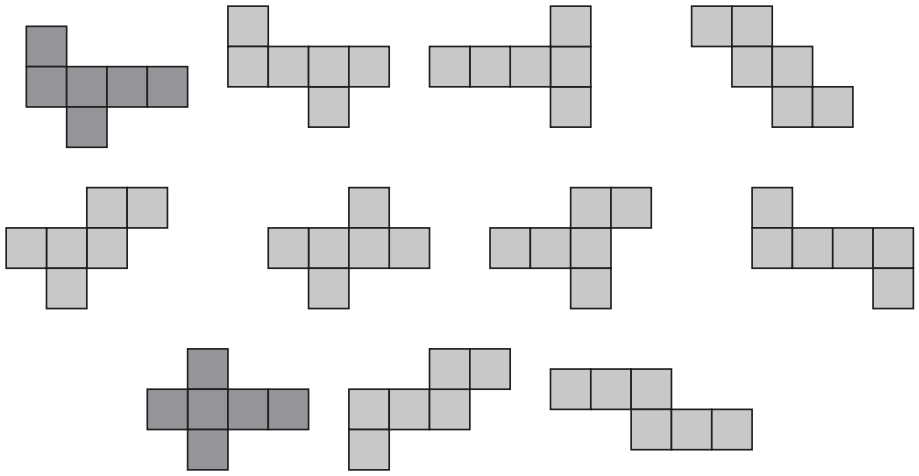
- The Use Technology on pages 325–326 is an alternative to the Example. Students can draw the floor plan and orthographic views of the cabin using *The Geometer's Sketchpad*®. Then they can change the measurements and see how the floor plan changes. Suggest using the square grid from the Graph menu as a guide when drawing the floor plan.

Key Concepts

- Hand out a more complicated net, such as **BLM 6-9 Section 6.3 Net for an Octahedron**. Ask students to cut it out and fold it to form the three-dimensional object. Alternatively, you can find nets for many different objects on the Internet.

Discuss the Concepts

- Have the students work with a partner. Discuss the answers as a class.
- There are 11 different nets that will form a cube. Ask students to sketch as many different nets as they can. As a class, discuss how you know each net forms a cube.



Discuss the Concepts Suggested Answers (page 321)

D1. Answers may vary. See the diagrams above for the 11 possible nets.

D2. A plan; it shows all the dimensions of the pieces. A model airplane is too complicated for a net or a pattern.

Practise (A)

- Encourage students to refer to the Investigates and the Example before asking for assistance.
- If possible, have a few woodworking magazines available for students to refer to as they work on **question 4**.

Apply (B)

- **Question 5** is a Literacy Connect. Supply students with **BLM 6-10 Section 6.3 Net for Question 5**. They can cut out the net and fold it so see why it will not form a cube. You may wish to assign this question as a journal entry or to discuss the question as a class.
- For **question 7**, a popular chocolate bar is also sold in a box of this shape. If possible, bring in one of these boxes and use it as a physical model when discussing this question.
- **Question 8** links to the Chapter Problem. Remind students to keep the solution to this question handy as the methods they used may help them with the Chapter Problem Wrap-Up.

Extend (C)

- Assign the Extend questions to students who are not being challenged by the questions in Apply.
- Challenge students to repeat the question 13 for a dodecahedron. You may wish to distribute copies of **BLM 6-9 Section 6.3 Net for an Octahedron** or **BLM 6-11 Section 6.3 Net for a Dodecahedron**.

Literacy Connections

- Go to the McGraw-Hill Ryerson Web-site at *www.mcgrawhill.ca/books/foundations11* and follow the links for a useful article on packaging. Have students read the article and write a response in their journals. You may wish to use **BLM A-18 Opinion Piece Checklist** to assess students' responses.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	9
Reasoning and Proving	1, 5, 12
Reflecting	1, 5–7, 12
Selecting Tools and Computational Strategies	9, 10
Connecting	6, 8
Representing	2, 3, 6–13
Communicating	4, 5

Ongoing Assessment

- While students are working, circulate and see how well each person works. This may be an opportunity to continue observing and recording individual students' learning skills.

Extra Practice

- You may wish to use **BLM 6-8 Section 6.3 Create Nets, Plans, and Patterns** for remediation or extra practice.