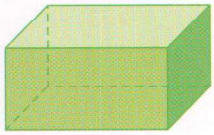
7.20 - Questions Handout #s 3 - 13 & 16

Check Your Understanding

Practise

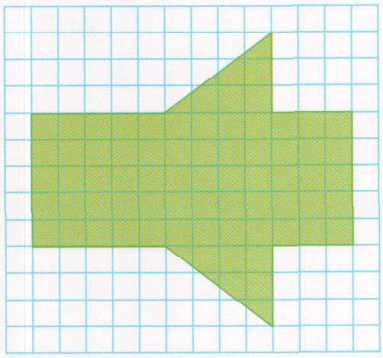
For help with questions 3 to 5, refer to Example 1.

3. Use a net to construct a model of the rectangular prism.



4. Use a net to construct a model of the square-based prism.

5. Make a copy of the net on grid paper. Add flaps and then use the net to construct a three-dimensional figure. What type of figure is it?



For help with questions 6 to 9, refer to Example 2. Use toothpicks or straws and modelling clay to make the models.

6. Sketch the skeleton of each three-dimensional figure. How many pieces of straws do you need to build each polyhedron?

a) cube
b) triangular prism
c) pentagonal prism

7. Sketch the skeleton of each three-dimensional shape. How many straws do you need to build each polyhedron?

a) hexagonal prism
b) octagonal prism
c) decagonal prism

8. Construct a skeleton of each prism. Record the number of edges and the number of vertices for each.

a) triangular prism
b) rectangular prism
c) pentagonal prism

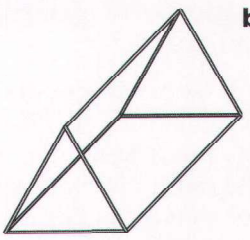
9. Construct a skeleton of each pyramid. Record the number of edges and the number of vertices for each.

a) triangular pyramid
b) square pyramid
c) pentagonal pyramid

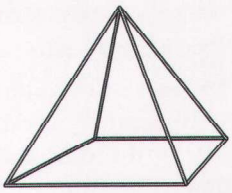
Apply

10. The frames for two different children's tents are shown. Find the number of faces, vertices, and edges of each.

a)



b)

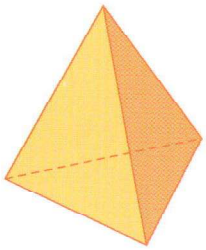


11. Sketch each real-life object. Identify which polyhedron it most resembles and draw its net.

a) an ice cube
b) a mailbox
c) a doorstop
d) a six-sided teepee

12. How many pieces of straw do you need to build a skeleton to model each real-life object in question 11?

13. Use sketches, or a polyhedron set, to draw two different nets for a triangular pyramid.



Chapter Problem

14. Build a model of the skeleton that could be used to frame a skateboard ramp.

Try This!

15. a) What three-dimensional figure has 12 edges of equal length? Build a model or draw a representation of it. Record the number of faces and vertices.

b) Try to give a second answer for part a).

Extend

16. a) Use the models you have built for earlier questions. Copy and complete the table.

Polyhedron	Number of Faces, *F*	Number of Vertices, *V*	Number of Edges, *E*
Triangular pyramid			
Square-based pyramid			
Pentagonal pyramid			
Triangular prism			
Rectangular prism			
Pentagonal prism			

b) Examine the data in your table. Find a pattern that relates the number of faces, vertices, and edges in a polyhedron. Try building more polyhedra to test your hypothesis.

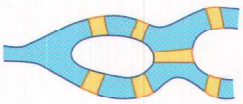
17. If you are given the number of faces, vertices, and edges of a polyhedron, can you identify the polyhedron? Provide an illustrated paragraph or model demonstration to answer.

Making Connections

The Many Faces of Euler

The relationship among faces, vertices, and edges of polyhedrons was discovered by Swiss mathematician Leonhard Euler (1707–1783). Euler (pronounced *Oiler*) is perhaps the most productive mathematician of all times. He published over 800 books and papers. Even though he lost sight in one eye at age 28 and became totally blind at age 59, he had an amazing memory and continued to dictate discoveries until his death. He was interested in all areas of mathematics, as well as related topics such as engineering and astronomy. He loved doing math puzzles

One classic puzzle, that led Euler to develop a whole new branch of mathematics called topology, is the seven bridges of Königsberg problem. Königsberg has seven bridges across the river that passes through the city. The challenge is to find a path that a person could take to walk around the city crossing each bridge exactly once. Trace the map and see if you can solve the problem.



To find out more about topology go to **www.mcgrawhill.ca/links/math8** and follow the links.

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