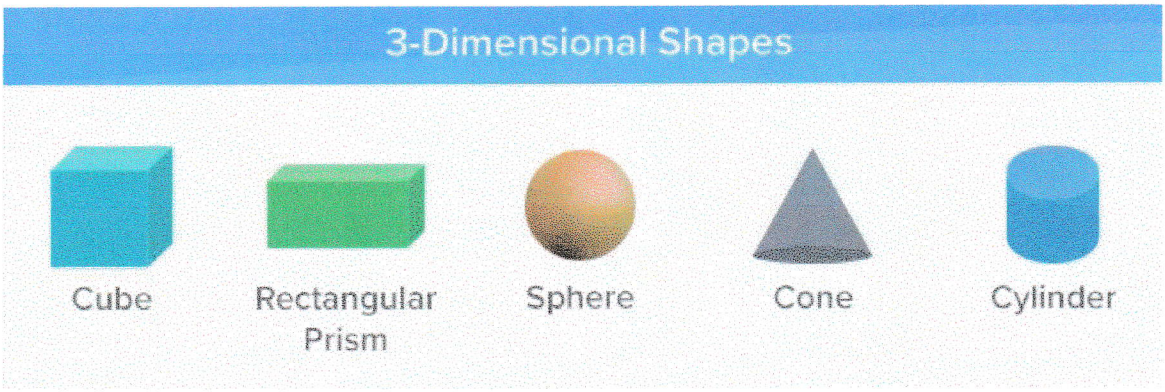
The following shapes are the most common 3 dimensional shapes that are found in our everyday lives. They are called 3 dimensional because they are solid and they have a length, width, and height. Two dimensional shapes are flat and seen as drawings on a page, but 3 dimensional shapes have a thickness or depth to them.



Last week we looked at surface area and volume of 3 dimensional shapes. This week we will review those concepts again and practice using nets and formulas to answer questions.

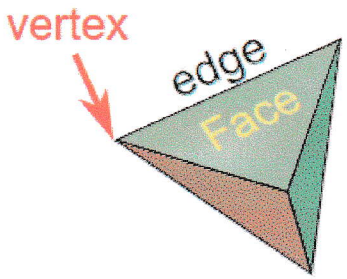
But first, some vocabulary:

NET- a 2-dimensional shape that can be folded to form a 3-dimensional shape or a solid.
A **net** is a pattern made when the surface of a three-dimensional figure is laid out flat showing each face of the figure.

EDGE- a line segment between faces of a shape

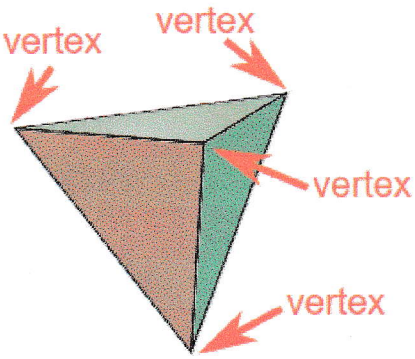
FACE- a single flat surface

VERTEX- a corner where two or more lines (edges) meet



A vertex is a corner.
An edge is a line segment between faces.
A face is a single flat surface.

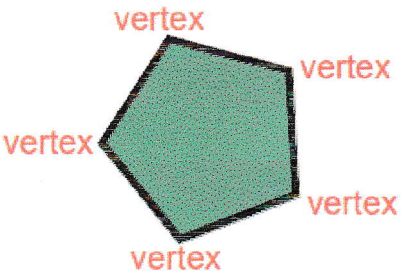
Vertices



A **vertex** (plural: **vertices**) is a point where two or more line segments meet.

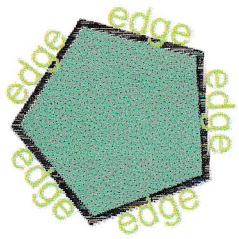
It is a Corner.

This tetrahedron has 4 vertices.



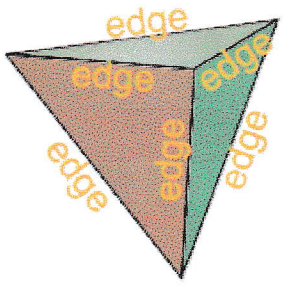
And this pentagon has 5 vertices:

Edges



This Pentagon
Has 5 Edges

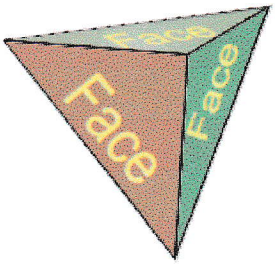
For a **polygon** an edge is a line segment **on the boundary** joining one vertex (corner point) to another.



This Tetrahedron
Has 6 Edges

For a **polyhedron** an edge is a line segment where **two faces meet**.

Faces



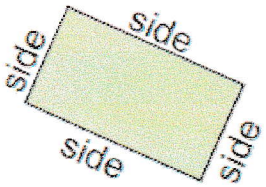
A face is any of the individual flat surfaces of a solid object.

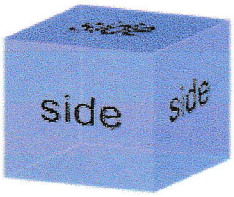
This tetrahedron has 4 faces (there is one face you can't see)

Sides

"Side" is not a very accurate word, because it can mean:

- An **edge** of a polygon, **or**
- A **face** of a polyhedron





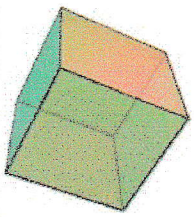
Which of the following solids has no edges?

A A cube

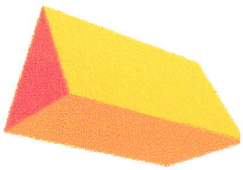
B A triangular prism

C A triangular pyramid

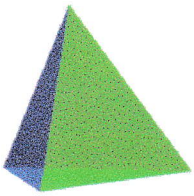
D A sphere



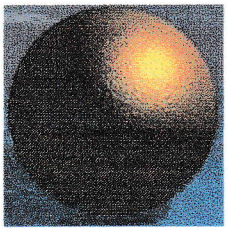
A cube



A triangular prism



A triangular pyramid



A sphere

A cube has 12 edges.
A triangular prism has 9 edges.
A triangular pyramid has 6 edges.
A sphere has no edges.

So the answer is D.

Now try a few questions on your own:

1. Which of the following solids has a curved edge?

A A cone

B A cube

C A triangular prism

D A triangular pyramid

2. How many faces does a cube have?

A 9

B 4

C 5

D 6

3. How many edges does a triangular prism have?

A 6

B 3

C 9

D 14

4. How many vertices (corners) does a cube have?

A 6

B 8

C 10

D 12

5. How many faces does a Square Pyramid have?

A 4

B 5

C 6

D 7

6. How many edges does a Triangular Pyramid have?

A 3

B 4

C 5

D 6

7. A solid that has four rectangular faces and two square faces is called a

A Square pyramid

B Cube

C Triangular prism

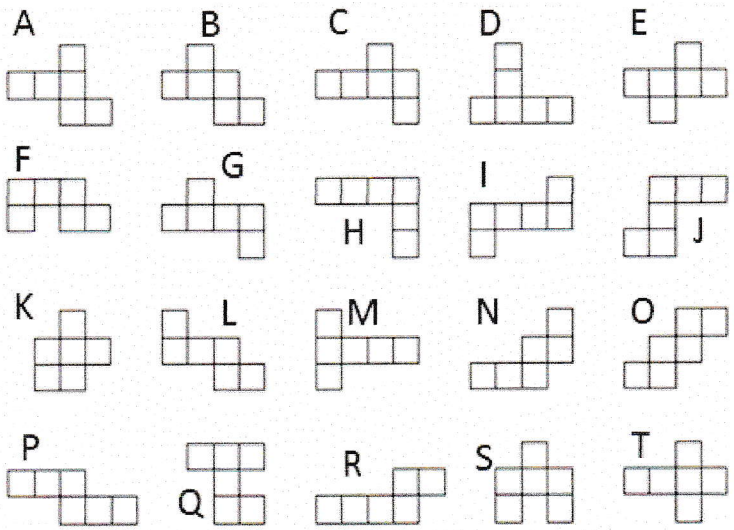
D Square prism

Lesson 15: Representing Three-Dimensional Figures Using Nets

Classwork

Exercise: Cube

1. Nets are two-dimensional figures that can be folded into three-dimensional solids. Some of the drawings below are nets of a cube. Others are not cube nets; they can be folded, but not into a cube.



a. ~~Experiment with the larger cut-out patterns provided. Shade in each of the figures above that can fold into a cube.~~ These are in school. Skip this.

b. Write the letters of the figures that can be folded into a cube. Try to find all eleven shapes.

c. Write the letters of the figures that cannot be folded into a cube.

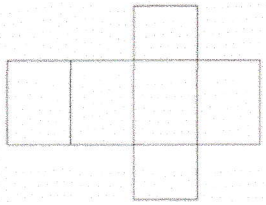
6.

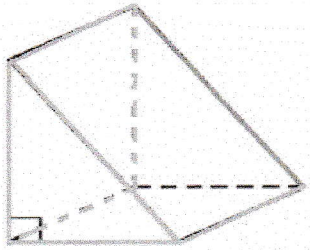
Lesson Summary

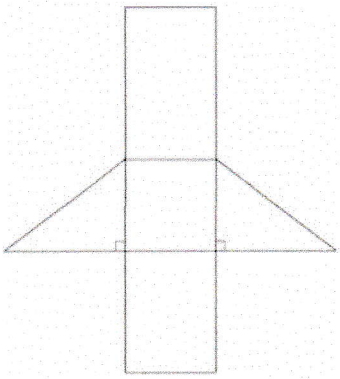
NET: If the surface of a 3-dimensional solid can be cut along sufficiently many edges so that the faces can be placed in one plane to form a connected figure, then the resulting system of faces is called a *net of the solid*.

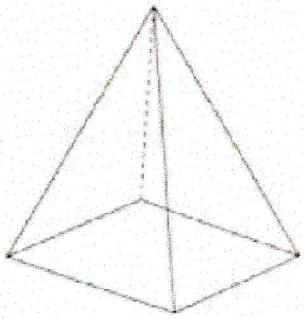
Problem Set

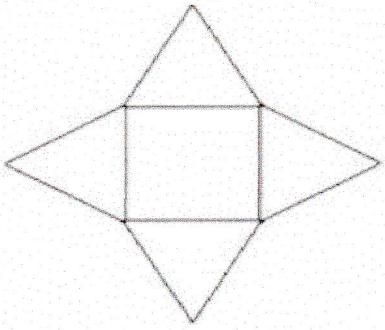
1. Match the following nets to the picture of its solid. Then, write the name of the solid.

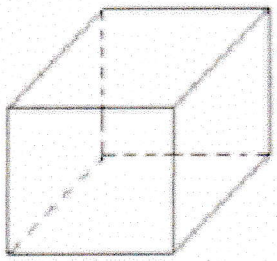
a. 

d. 

b. 

e. 

c. 

f. 

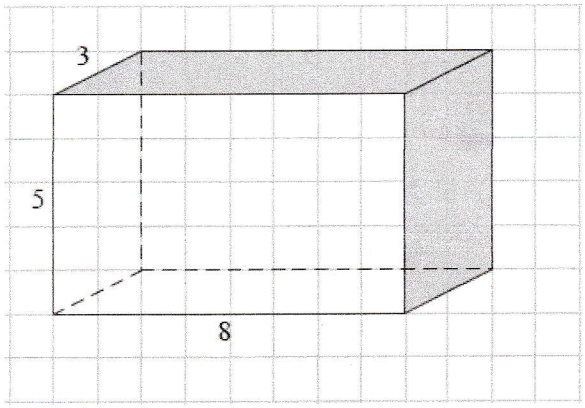
7.

Lesson 16: Constructing Nets

Classwork

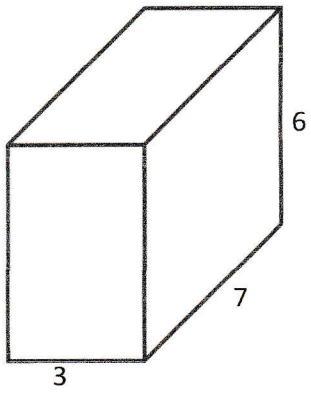
Opening Exercise

Sketch the faces in the area below. Label the dimensions.

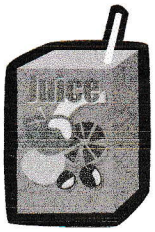


Exploratory Challenge 1: Rectangular Prisms

a. Use the measurements from the solid figures to cut and arrange the faces into a net. (Note: All measurements are in centimeters.)



b. A juice box measures 4 inches high, 3 inches long, and 2 inches wide. Cut and arrange all 6 faces into a net. (Note: All measurements are in inches.)

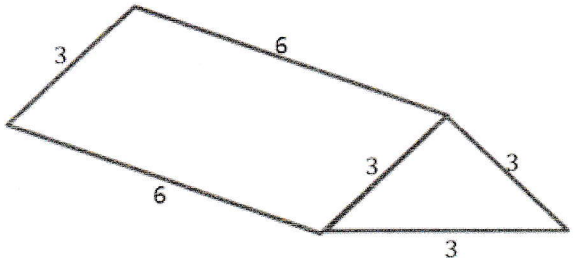


c. Challenge: Write a numerical expression for the total area of the net for part (b). Explain each term in your expression.

Exploratory Challenge 2: Triangular Prisms

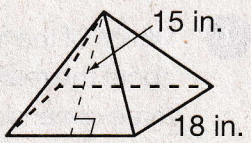
Use the measurements from the triangular prism to cut and arrange the faces into a net. (Note: All measurements are in inches.)

Draw the net of the shape below.



2 COACHED EXAMPLE

The Great Pyramid of Giza is a square pyramid. Madhi is making a model of the pyramid. He has sketched a picture of his model on the right. Madhi will make each side out of cardboard. What is the least amount of cardboard Madhi will need?



To find out how much cardboard Madhi needs, you need to find the _____ of the pyramid.

The pyramid has _____ square face(s) and 4 _____ faces.

The _____ faces are congruent.

Draw a net of the pyramid. Include measurements in your drawing.

Start with the _____ base. Then attach _____ to each of the 4 edges.

Find the area of each shape.

The square base measures _____ inches on each side.

A(square base) = _____ × _____ = _____

Each triangle has a base of _____ inches and a height of _____ inches.

A(triangular face) = $\frac{1}{2}$ × _____ × _____ = _____

Write and solve an equation for the surface area.

SA = area of the square + _____ × area of the triangle

= _____ + _____ × _____

= _____ + _____

= _____

The pyramid is measured in _____, so the surface area is measured in _____.

The least amount of cardboard Mahdi needs is _____.

11.

3 LESSON PRACTICE

1. Which of the following statements about the relationship between a three-dimensional figure's surface area and the area of its net is most correct?

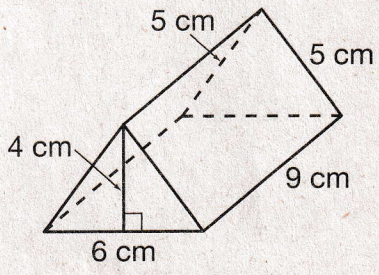
   A. The surface area of the figure is always less than the area of the net.

   B. The surface area of the figure is always the same as the area of its net.

   C. The surface area of the figure is always more than the area of its net.

   D. The surface area of the figure can be more than, less than, or the same as the area of its net.

Use the figure below to answer questions 2–4.



2. What type of three-dimensional figure is shown in the diagram?

   A. rectangular prism

   B. triangular prism

   C. rectangular pyramid

   D. square pyramid

3. What combination of two-dimensional shapes makes up the net of the figure in the diagram?

   A. 2 congruent rectangles and 3 congruent triangles

   B. 3 non-congruent rectangles and 2 congruent triangles

   C. 2 non-congruent rectangles and 3 non-congruent triangles

   D. 3 congruent rectangles and 2 non-congruent triangles

4. What is the surface area of the figure in the diagram?

   A. 147 cm^2

   B. 168 cm^2

   C. 180 cm^2

   D. 207 cm^2

5. Which statement about three-dimensional figures is correct?

   A. A rectangular prism has 6 rectangular faces that are all congruent.

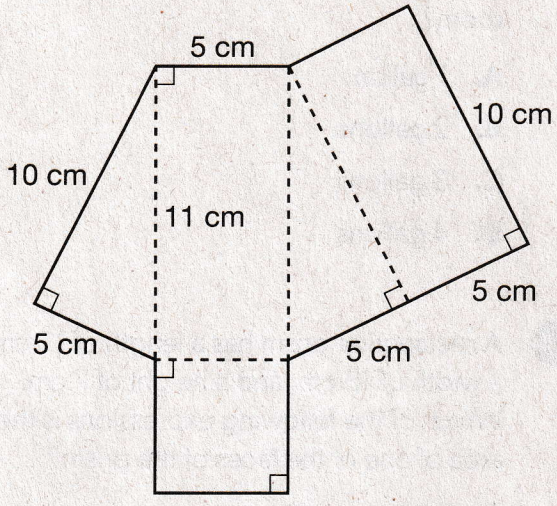
   B. The surface area of a three-dimensional figure is measured in cubic units.

   C. The surface area of a three-dimensional figure is equal to the area of its base.

   D. A rectangular prism's surface area is equal to the sum of the areas of its faces.

12.

Use the figure below to answer questions 6–8.



6 Which of the following statements about the net is true?

A. The net is for a square pyramid.

B. The net has two congruent rectangles.

C. The net has two congruent triangles.

D. The net is for a three-dimensional figure with six faces.

7 Which of the following is **not** the area of one of the faces of the three-dimensional figure the net represents?

A. 20 cm^2

B. 25 cm^2

C. 50 cm^2

D. 55 cm^2

8 What is the surface area of the three-dimensional figure represented by the net?

A. 105 cm^2

B. 130 cm^2

C. 155 cm^2

D. 180 cm^2

9 Which of the following three-dimensional shapes has the greatest number of faces?

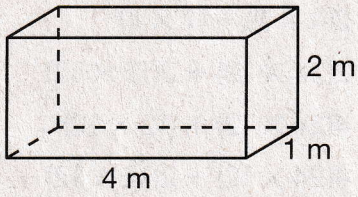
A. rectangular prism

B. triangular prism

C. rectangular pyramid

D. square pyramid

10 What is the surface area of the rectangular prism shown below?



A. 8 cm^2

B. 14 cm^2

C. 24 cm^2

D. 28 cm^2

13.