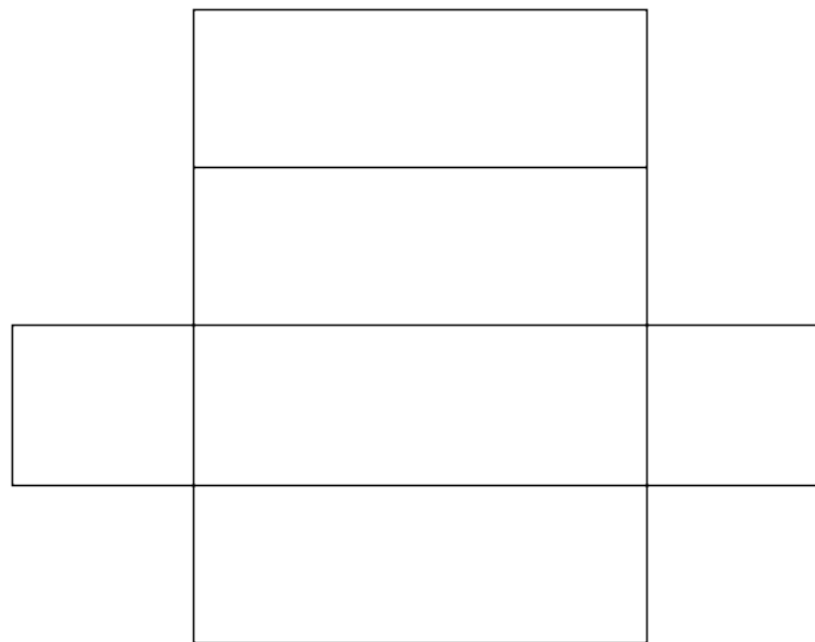
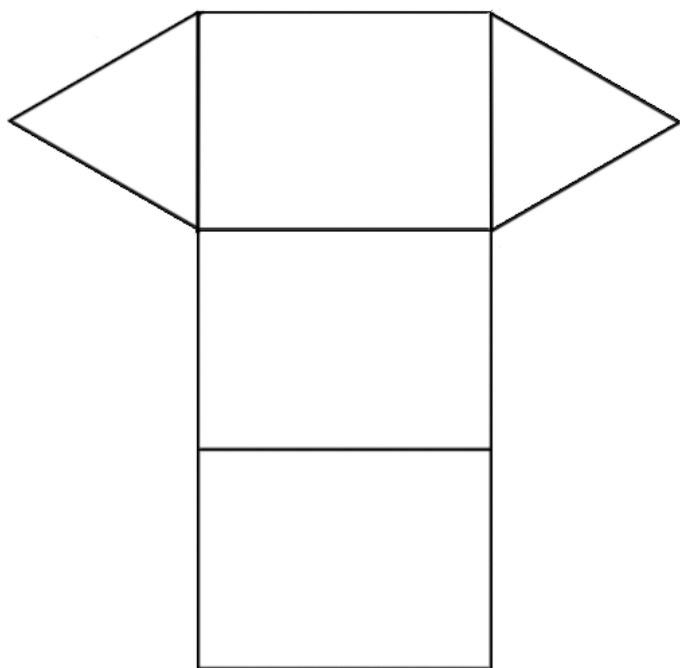


Copy the outcome in your scribbler.

SS2 : Draw and construct nets for 3-D objects.

Achievement Indicators

- Match a given net to the 3-D object it represents.
- Construct a 3-D object from a given net.
- Draw nets for a given right circular cylinder, right rectangular prism and right triangular prism, and verify by constructing the 3-D objects from the nets.
- Predict 3-D objects that can be created from a given net and verify the prediction.



Launch

1) Take an overview of pages 168 et 169.

2) Discuss the questions on page 168.



UNIT 4

Measuring Prisms and Cylinders

Most products are packaged in boxes or cans. Think about how a box or can is made. How do you think the manufacturer chooses the shape and style of package? Why do you think tennis balls are sold in cylinders but golf balls are sold in rectangular prisms?

Look at the packages on these pages. Choose one package. Why do you think the manufacturer chose that style of packaging?

What You'll Learn

- Draw and construct nets of 3-D objects.
- Determine the surface areas of prisms and cylinders.
- Develop formulas for the volumes of prisms and cylinders.
- Solve problems involving prisms and cylinders.

Why It's Important

- We need measurement and calculation skills to design and build objects to meet our needs.
- Calculating the surface area and volume of prisms and cylinders is an extension of the measuring you did in earlier grades.

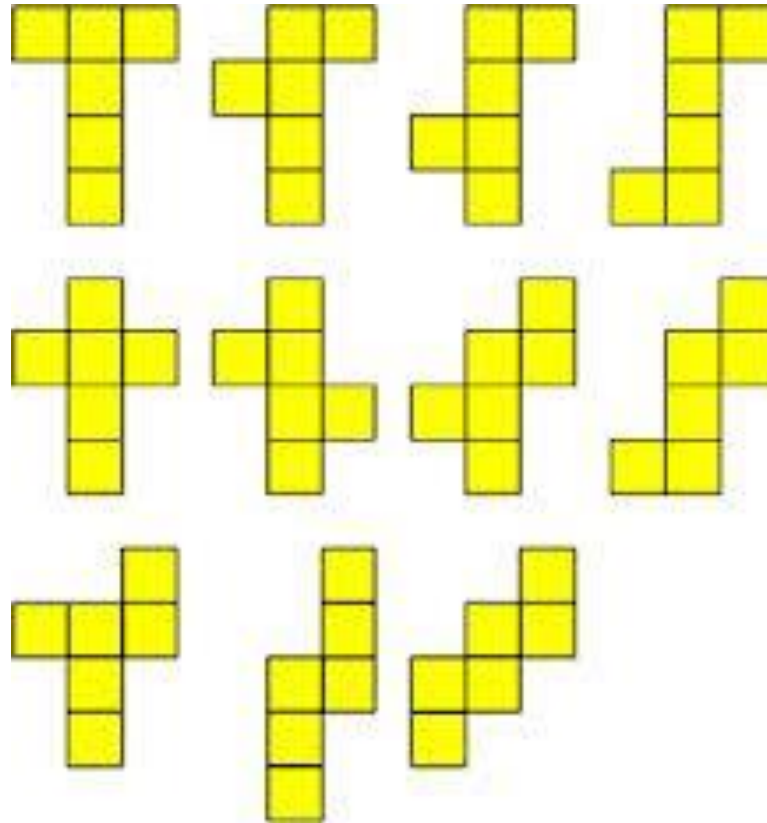
Key Words

- net
- polyhedron
- regular prism
- regular pyramid
- regular dodecagon
- surface area
- volume
- capacity

168

169

What is a net?



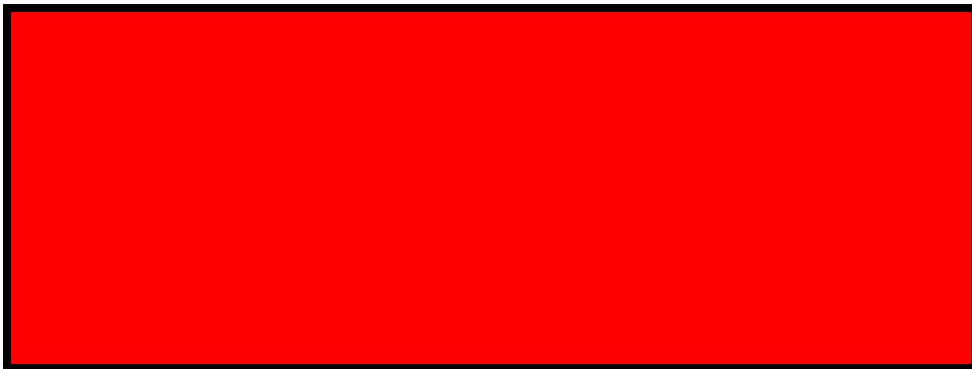
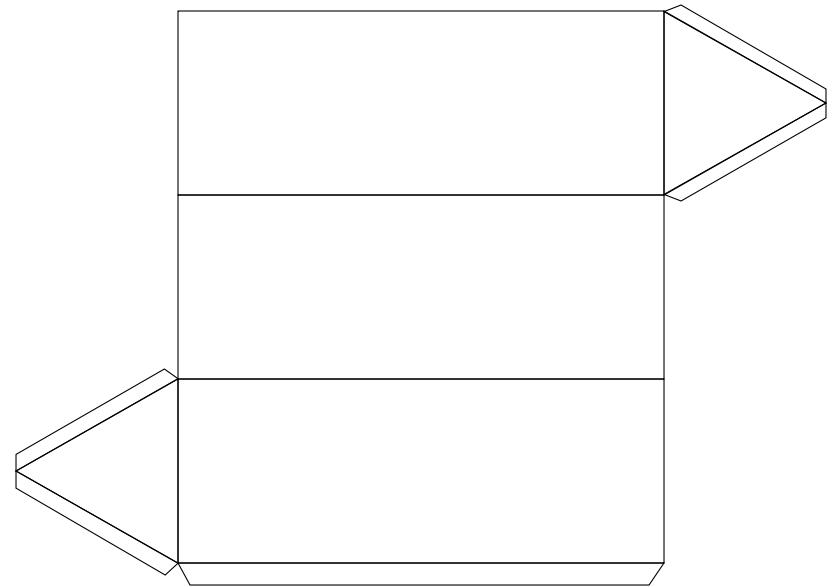
- 1) <https://www.geogebra.org/m/pCv2EvwD> - **Watch** the video at the beginning of the website then **explore** the different nets and **try to create** your own at the end.
- 2) <https://www.geogebra.org/m/xmpEWDrJ> - **Watch** the video at the beginning of the site then **explore** the different nets before **trying to answer** the questions below.

Answer the following questions in your scribbler.

Suppose this diagram was cut out and folded along the dotted lines to make an object.

1) Which object do you think would be made? Why do you think so?

*There are two more questions behind the red rectangle.



Activity:

- 1) **Choose** a package.
- 2) **Predict** the net for this package.
Draw the net.
- 3) **Cut** along the edges to determine the net for the package.



Connect – Read page 171.

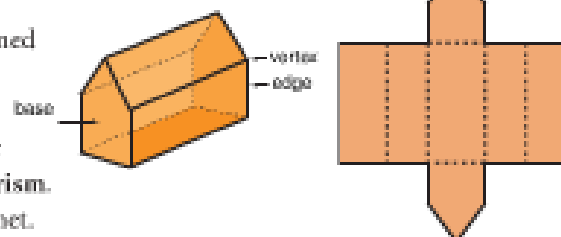
Copy the following definitions in your scribbler: net, polyhedron, face, edge, vertex, right prism, regular prism, regular pyramid.

Connect

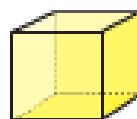
A net is a diagram that can be folded to make an object.
A net shows all the faces of an object.

A net can be used to make an object called a polyhedron.
A polyhedron has faces that are polygons.
Two faces meet at an *edge*.
Three or more edges meet at a *vertex*.

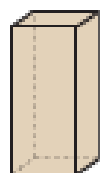
- A *prism* has 2 congruent bases and is named for its bases.
When all its faces, other than the bases, are rectangles and they are perpendicular to the bases, the prism is called a **right prism**.
Here is a right pentagonal prism and its net.



A regular prism has regular polygons as bases.

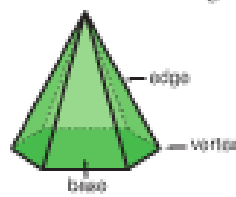


cube



square prism

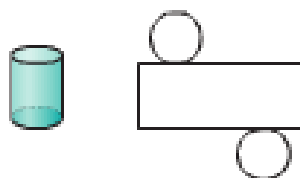
A regular pyramid has a regular polygon as its base.
Its other faces are triangles.



regular hexagonal pyramid

A regular polygon has all sides equal and all angles equal.

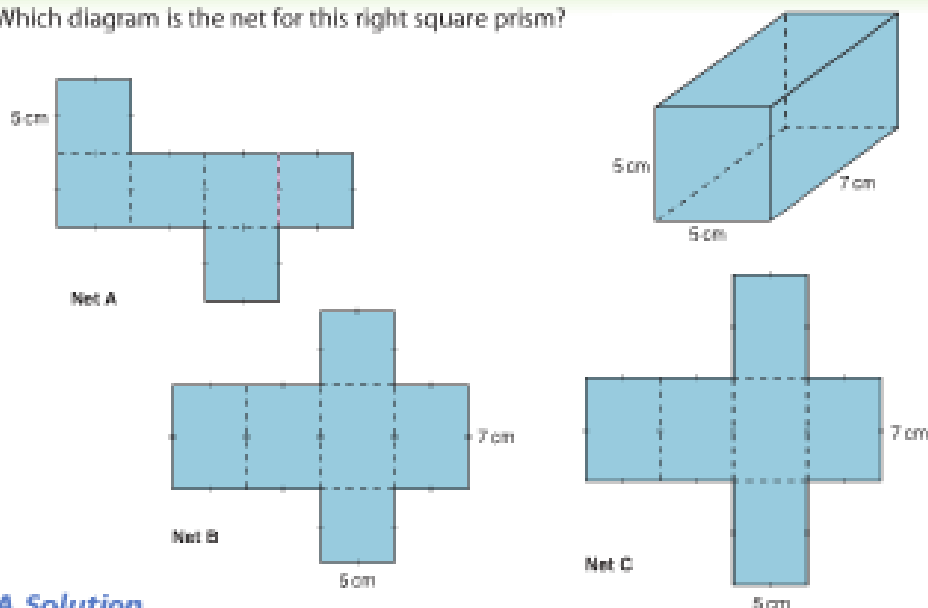
- Here is a right cylinder and its net.
The line joining the centres of the circular bases is perpendicular to the bases.



The two congruent circles are on opposite sides of the rectangle.

Example 1

Which diagram is the net for this right square prism?



A Solution

This square prism has 2 square bases and 4 rectangular faces that are not squares.

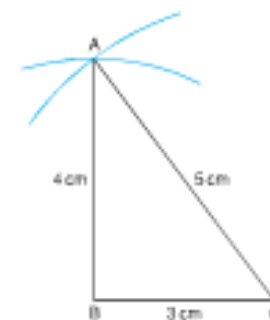
Net A has 6 square faces, so it is not the correct net.

Net B has 2 square faces and 4 rectangular faces, so it is the correct net.

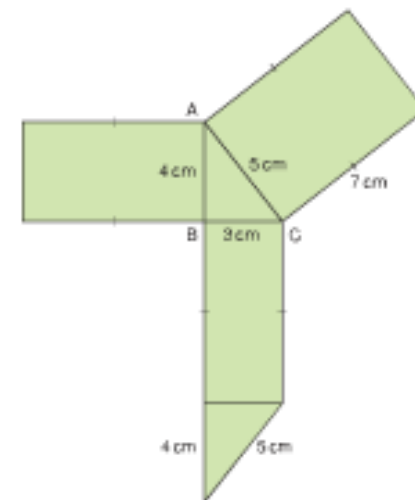
Net C has all rectangular faces, so it is not the correct net.

Construct the net of the prism.

- Start by constructing a base, $\triangle ABC$. Use a ruler to draw $BC = 3$ cm. With the compass point and pencil 5 cm apart, put the compass point on C and draw an arc. With the compass point and pencil 4 cm apart, put the compass point on B and draw an arc. Mark point A where the arcs intersect. Join AB and AC. Label each side with its length.



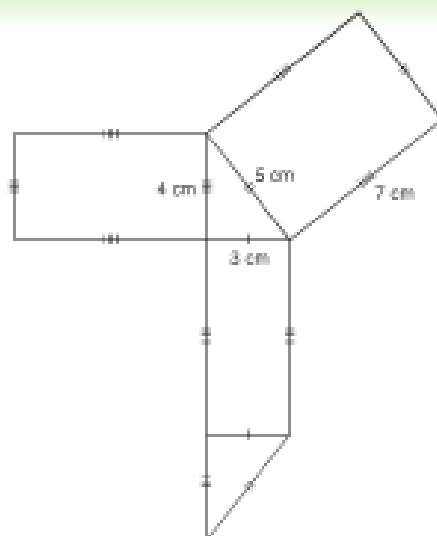
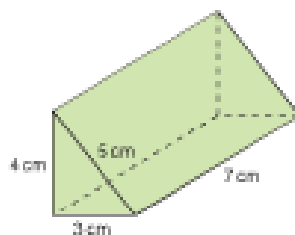
- Use what you know about parallel and perpendicular lines to:
 - Construct a rectangle on AB with length 7 cm.
 - Construct a rectangle on AC with length 7 cm.
 - Construct a rectangle on BC with length 7 cm.
 - Construct a triangle congruent to $\triangle ABC$ on the rectangle on BC.



Example 2

Use a ruler and compass.

Construct a net of this right triangular prism.



A Solution

The prism has 2 congruent triangular bases and 3 rectangular faces.

Sketch the net of the triangular prism.

Read Example 1 and 2 on pages 172 et 173. Take notes as needed.

Practice

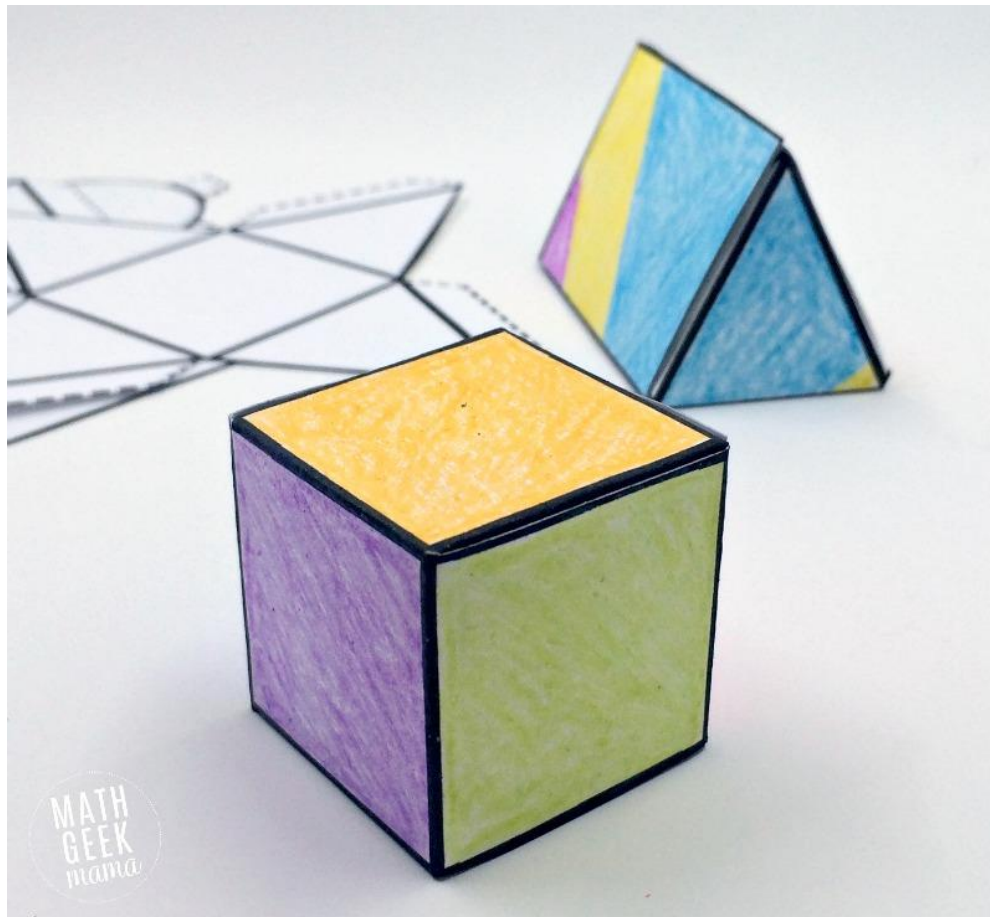
1) **Complete** the following questions on pages 174 to 176:

4, 6, 9, 10, 13 et 14

2) **Worksheet 4.1** – Exploring Nets (pages 76 and 77 from the Practice and Homework Book)

3) **Activity** – “From Cards to Solids Card Sorts” The directions are on the page.

4) [Cube Nets \(nctm.org\)](http://nctm.org) – Visit this site and explore the nets of cubes.



Journal Question – SS2 #1

Review

Identify the number of **faces, edges and vertices** for each polyhedron below. Next, **draw** a sketch of the 3D object and its net. Finally, **include** a real-life example for each.

Cube

Cylinder

Rectangular prism

Triangular prism

Square-based pyramid

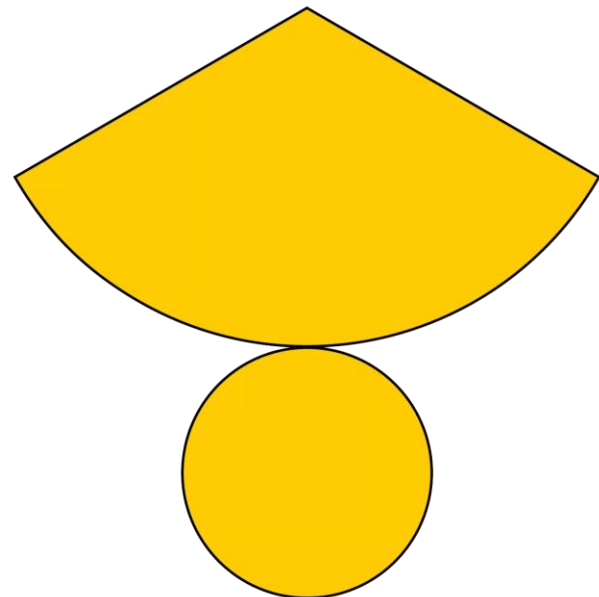
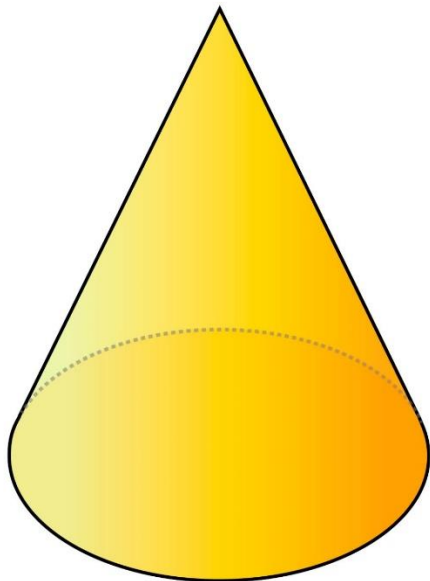
Tetrahedron

Rectangular pyramid

Example – **copy**

Cone: 2 faces, 0 edges, 1 vertex

We see cones when we eat ice-cream out of one.



4.2 Creating Objects from Nets

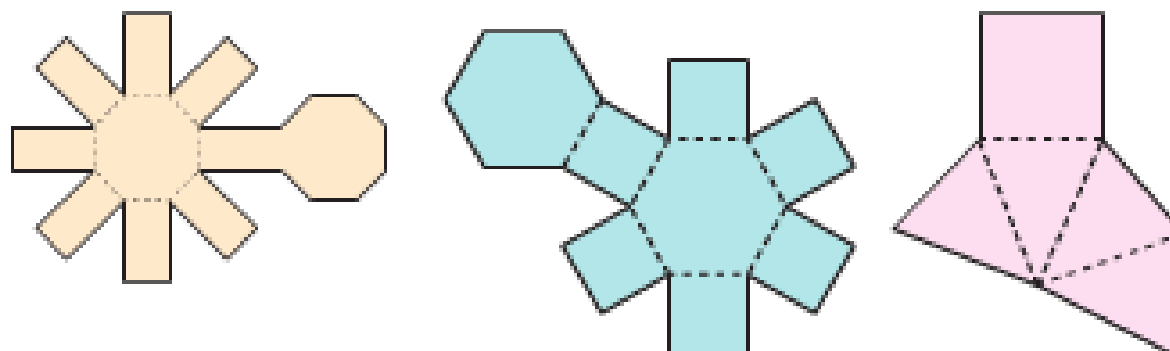
Complete the Investigate activity on page 177 in pairs. You **must ask** for a copy of the nets enlarged.

Investigate

Work with a partner.

You will need scissors and tape.

Your teacher will give you large copies of the nets below.



- Predict the object that can be formed from each net above.
- Use a copy of each net.
Fold, then tape the net to verify your prediction.



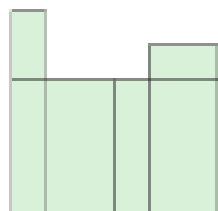
Compare the three objects you made with those of another pair of classmates. What do you notice? What does this tell you about nets of different objects?

Connect – Read pages 178 and 179 (look at the Examples too). Take notes as needed.

Connect

To determine if a diagram is a net for an object, look at each shape and at how the shapes are arranged.

- ▶ This is *not* a net for a rectangular prism. If this diagram was folded, it would form a box that is open at one end. At the opposite end, two rectangles would overlap.



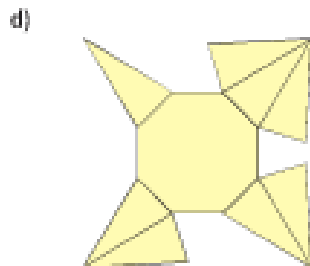
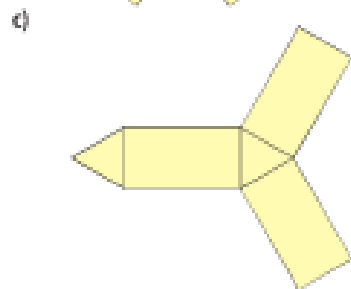
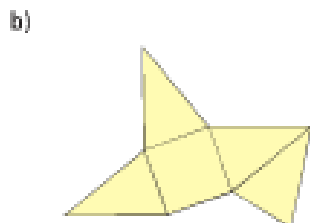
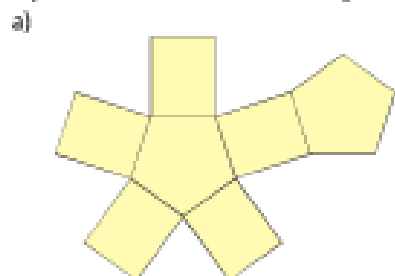
Example 1

Look at the diagrams below.

Is each diagram the net of an object?

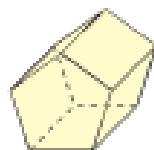
If your answer is yes, name and describe the object.

If your answer is no, what changes could you make so it could be a net?



A Solution

- a) This diagram has 2 congruent regular pentagons and 5 congruent rectangles. When it is folded, congruent sides join to form edges. The diagram is a net of a right pentagonal prism.



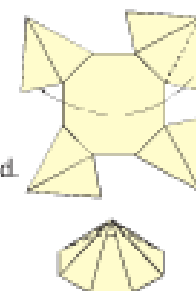
- b) This diagram has 1 square and 4 congruent isosceles triangles. The diagram is a net of a square pyramid.



- c) This diagram has 2 congruent equilateral triangles and 3 congruent rectangles. The diagram is a net of a right triangular prism. It has equilateral triangular bases.



- d) This diagram is not a net. When it is folded, 2 triangular faces overlap, and the opposite face is missing. To make a net, move one triangular face from the top right to the top left. The diagram is now a net of an octagonal pyramid.

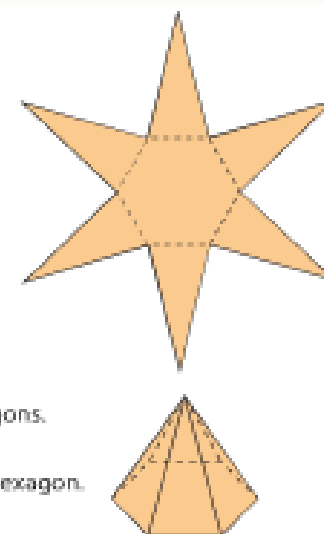


Example 2

- Predict the object this net will form.
- Fold a copy of the net to verify your prediction.
- Describe the object.

A Solution

- The net has one regular hexagon and 6 congruent triangles. So, the net probably makes a hexagonal pyramid.
- When the net is folded, it forms a hexagonal pyramid.
- The object is a polyhedron because its faces are polygons. The object is a regular hexagonal pyramid. This means that the base of the pyramid is a regular hexagon. The pyramid has 6 congruent triangular faces.

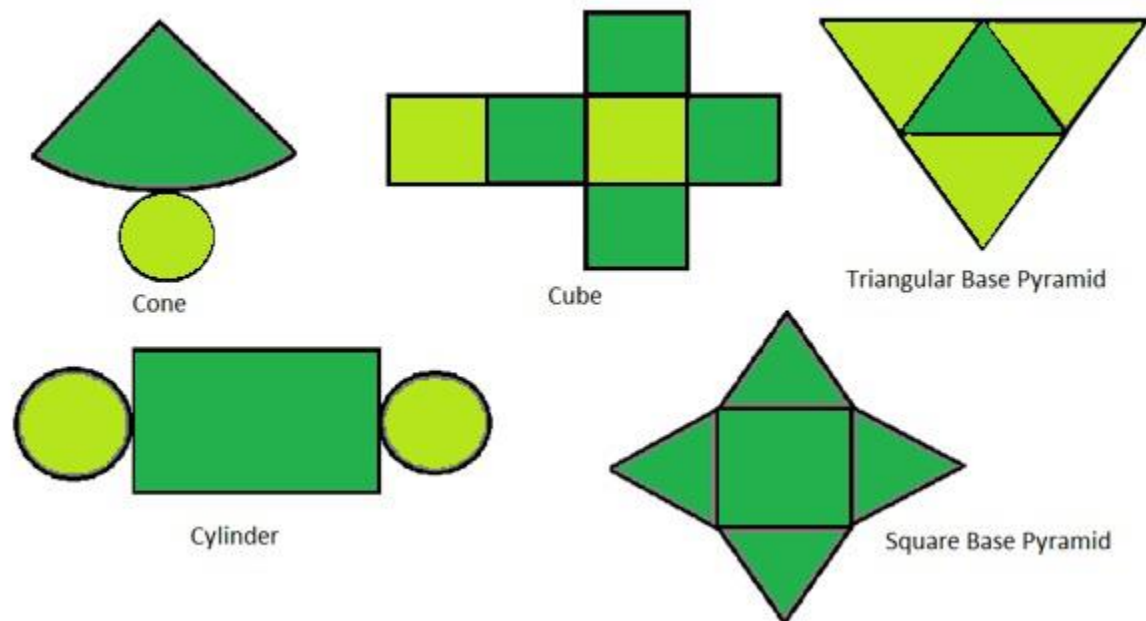


Videos -

Watch the following videos about nets of 3D objects.
Take notes as needed.

https://www.youtube.com/watch?v=Vt_nKQ3JgLM

<https://www.youtube.com/watch?v=s7GrS0b3FRw>

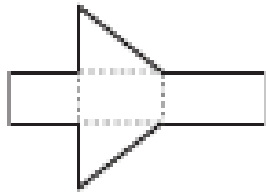


Practice

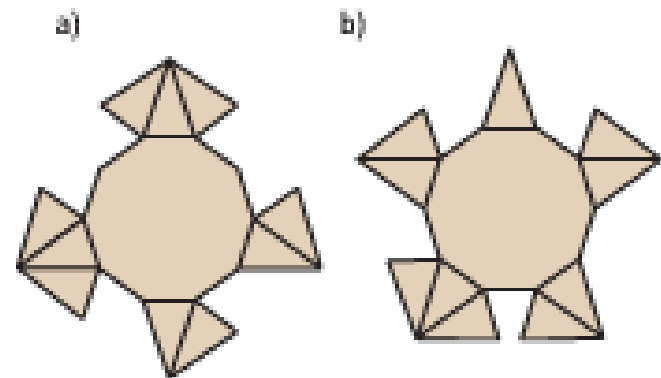
1) **Complete** the following questions on pages 180-182: #4, 5, 10 et 11.

2) **Worksheet 4.2** – Creating Objects from Nets (pages 78-80 from the Practice and Homework Book)

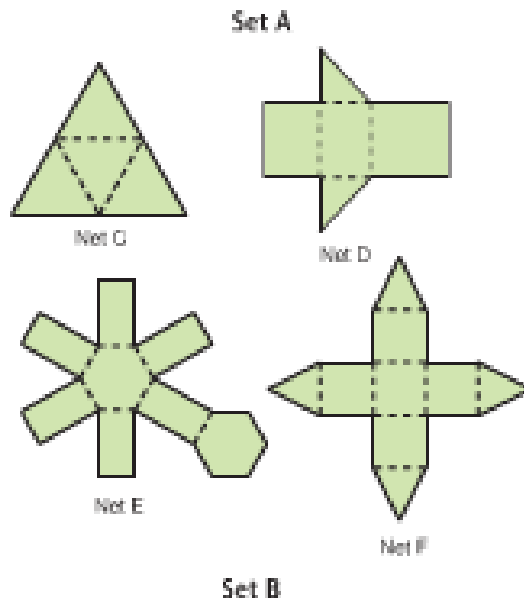
4. a) Predict the object this net will form.
 b) Fold the net to verify your prediction.
 c) Describe the object.



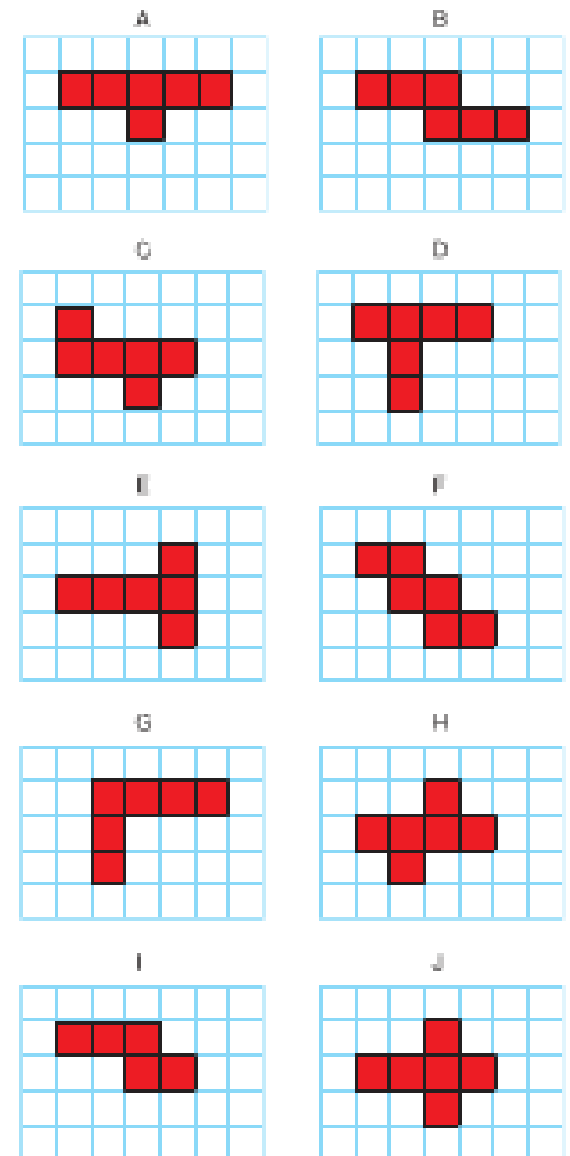
10. One diagram below is the net of this decagonal pyramid. Predict which diagram is a net. Cut out the diagrams. Fold them to confirm your prediction.



5. a) Predict the object in Set B that each net in Set A will form.
 b) Fold each net to verify your prediction.



11. Which diagrams below are nets of a cube? Explain how you know.



Journal Question SS2 #2 – Extra Practice 4.2