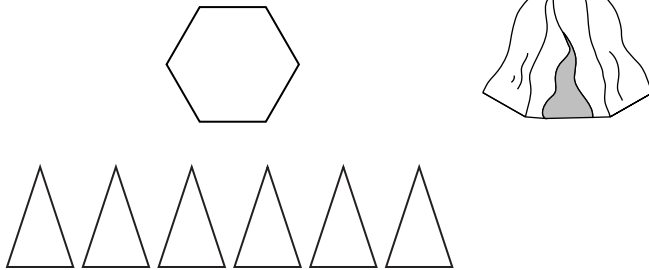# 1 Making 3-D Shapes

Goal **Draw and build 3-D shapes.**

1. a) Sketch all the faces of the tent. The base has been drawn for you.
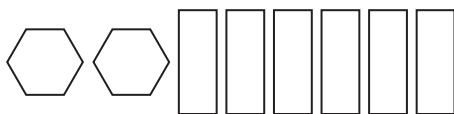
b) What shape is the base? _____hexagon_____

c) What shape are the other faces? _____triangles_____

d) Use modelling clay to make the 3-D object. Make the base first and then the faces that join at the top vertex.

e) Draw the model starting with the base. Locate the top vertex and join the vertices.
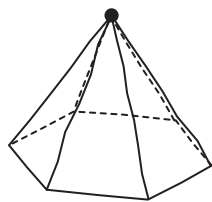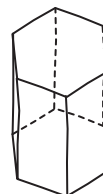
f) What is the shape of the tent?

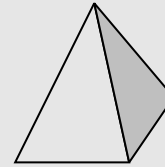hexagon-based pyramid

At–Home Help

Steps to draw and build 3-D objects
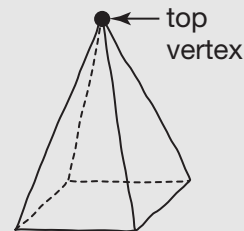• Find a model.

• Sketch all the faces.

A pyramid has a base and 3 or more triangular faces.

A prism has a base and top that are congruent, and 3 or more rectangular faces.
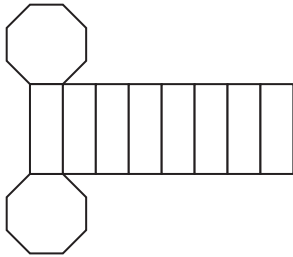
• Use modelling clay to make the object. Always start with the base.
• Draw the model. Always start with the base.

top vertex

2. a) Draw the faces of a hexagon-based prism.

b) Draw the model of the prism.

2 Making Nets

Goal Make nets for 3-D shapes.

1.

a) Is this the net of a pyramid or a prism? Explain.

It is a prism because there is a top and base that
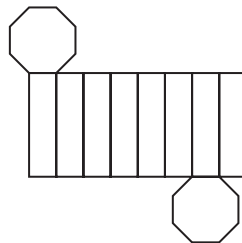
are congruent, and the other faces are rectangles.

A pyramid would have a base but no top, and the

other faces would be triangles.

b) Name the 3-D object.

octagon-based prism
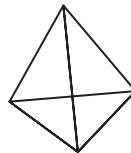
c) Draw another net for this object.

Suggested answer:

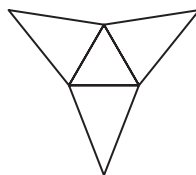**d)** Trace it on another piece of paper. Cut it out and fold to check.

2. a) Name the 3-D object.

triangle-based pyramid

b) Draw a net for this object.

Suggested answer:

At-Home Help

When you make nets from 3-D objects
• make sure all the faces are traced only once
• make sure the faces are connected in the drawing
• check that the appropriate faces are the same size and shape
• cut out the net and fold to check

This net of a pyramid has triangles attached to the base.
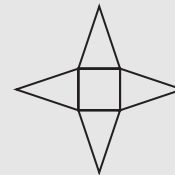
This net of a prism has rectangles all connected. The base and top are congruent, and are attached to opposite sides of the rectangles.

Answers Chapter 11: 3-D Geometry and 3-D Measurement

CHAPTER 11

3
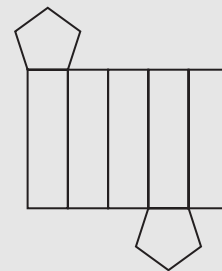
Identifying Nets

Goal **Match 3-D shapes with their nets.**

A   B   C   D

E   F   G   H

a   b   c   d

e   f   g   h

1. a) Identify the nets of the pyramids. _____ B, D, E, and H
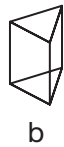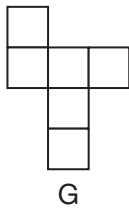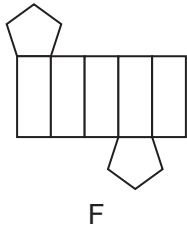
   b) Explain how you know they are nets of pyramids.
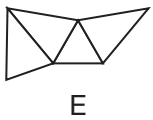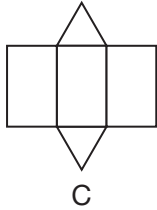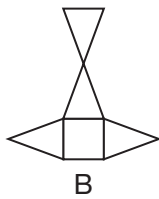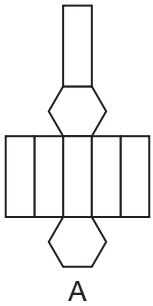
      The nets of pyramids have a base but no top, and the other faces are triangles.

2. a) Identify the nets of the prisms. _____ A, C, F, and G

   b) Explain how you know they are nets of prisms.

      The nets of prisms have a top and a base that are congruent,

      and the other faces are rectangles.

3. Match each pyramid with its net. _____ a and E, c and B, e and D, and g and H

4. Match each prism with its net. _____ b and C, d and G, f and F, and h and A

4

Communicate About Building a Model

Goal **Write clear instructions for building a model from a picture.**

Wendy wrote instructions to make this cube creature.

You will need a whole bunch of cubes.
The head is like a T-shape.
The arms are sticking out, and each arm is 3 cubes.
Each hand is 1 cube, attached to the end of each arm.
The body is flat in the middle.
The legs are short, with 3 cubes each.

At-Home Help

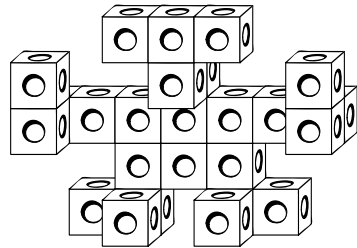When you communicate about building a model
• give clear instructions using math language
• show all the steps needed to build the model
• give directions in the correct order
• give the right amount of detail for each step
• do not give information that is not useful, such as the colour of the cubes

Communication Checklist
☑ Did you show all the steps?
☑ Did you use the right amount of detail?
☑ Did you use math language?

1. Go over Wendy's instructions. Revise and improve each line if necessary.

Suggested answer:
You will need 25 cubes to build the model.
The head has 3 cubes all connected in a row.
The neck has 2 cubes connected in a row directly below the head.
The body has 6 cubes, arranged in 2 rows of 3 cubes each.
There are 2 arms. Each arm has 2 cubes that are connected, extending from the top row of the body.
There are 2 hands. Each hand has 2 cubes that are connected, attached to the end of each arm.
There are 2 feet. Each foot has 2 cubes that are connected, attached below the bottom row of the body.
There are decorations on both feet. Each foot has 1 cube on the outer side.

2. Check your instructions using the Communication Checklist.

Suggested answer:
I showed all the steps.
I used the right amount of detail.
I used math language.

3. How can you improve your instructions?

Suggested answer:
I can improve my instructions by giving the orientation of the cubes in the neck, hands, and feet.

Answers Chapter 11: 3-D Geometry and 3-D Measurement **101**

5
Measuring and Comparing Capacity

Goal **Estimate, measure, and compare capacities, and determine relationships among units.**

1. a) Choose two cups of different sizes in your home. Label them A and B.

b) Would you use millilitres or litres to measure the capacity of each cup? Write your choices in the chart and explain your thinking.

	Capacity unit
Cup A	Suggested answer: mL I would use millilitres because the cup is small in size.
Cup B	Suggested answer: L I would use litres because the cup can easily hold a litre.

2. Use a big spoon or a soup ladle to compare the capacity of the two cups in Question 1.

a) Estimate the number of spoonfuls that will fill each cup. Then measure and record the number in the table.

	My estimate: capacity in spoonfuls	Actual capacity in spoonfuls
Cup A	Suggested answer: 5	Suggested answer: 6
Cup B	Suggested answer: 9	Suggested answer: 10

b) Which cup has a larger capacity? Explain how you know.

(using suggested answer given) Cup B because it can hold 10 spoonfuls while Cup A can hold only 6 spoonfuls.

c) Describe another method you could use to compare the capacity of the two cups.

Suggested answer: Fill one of the cups with water. Then pour the water into the other cup. If the water overflows, then the second cup has a smaller capacity. If the water does not fill the cup, then the second cup has a larger capacity.

At-Home Help

The **capacity** of a container refers to how much the container can hold. Capacity can be measured using millilitres or litres.

Compare the capacities of two containers using one of these ways.
• Fill each container with water. Then pour the water into a graduated pitcher to measure the capacity. The container with the larger capacity can hold the most liquid.
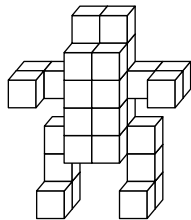

• Use a spoon or small cup. Record the number of spoonfuls needed to fill each container. The container with the larger capacity can hold the most spoonfuls.
• Fill one container with water. Then pour the water into the other container. If the water overflows, then the first container has a larger capacity. If the water does not fill the container, then the first container has a smaller capacity.
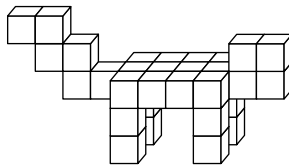
CHAPTER 11

6   Measuring and Comparing Volume

Goal   **Estimate, measure, and compare volumes using cubic centimetres.**

Tanisha's
cube creature

Nicole's
cube creature

At-Home Help

Volume is the space taken up by an object.

To measure the volume of a 3-D object made from centimetre cubes, count the total number of cubes using one of these two ways.
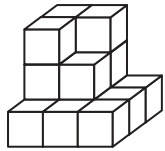• Count the number of cubes in each section. Then find the total number of cubes for all sections.
• Look at the object from above. Count the number of cubes in each column. Then find the total number of cubes for all columns.

The unit for volume is cubic centimetres (cm^3).

Both creatures were made using centimetre linking cubes.

1. a) For Tanisha's creature, count and record the number of cubes in each body part.

Body part	Number of cubes
head	2
body	16
2 arms	4 (2 for each arm)
2 hands	2 (1 for each hand)
2 legs	6 (3 for each leg)
2 feet	2 (1 for each foot)

b) What is the volume of Tanisha's creature in cubic centimetres? Show your work.

Volume = total number of cubes
= 2 + 16 + 4 + 2 + 6 + 2
= 32 cm^3

2. a) For Nicole's creature, imagine you are looking at the creature from above. Count and record the number of cubes in each column.

0	0	0	0	3	1	1	3	0	0
1	2	2	1	1	1	1	1	2	2
0	0	0	0	3	1	1	3	0	0

b) What is the volume of Nicole's creature in cubic centimetres? Show your work.

Volume = total number of cubes
= 1 + 2 + 2 + 1 + 7 + 3 + 3 + 7 + 2 + 2
= 30 cm^3

Answers Chapter 11: 3-D Geometry and 3-D Measurement   **103**
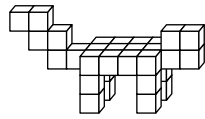
CHAPTER 11

7 Relating Capacity Units to Volume

Goal Identify the relationship between capacity units and volume units.

A

16 cm^3

B

30 cm^3
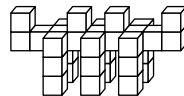
C

31 cm^3

D

22 cm^3

E

100 cm^3

F

36 cm^3

At–Home Help

The units of volume and capacity are related.

$1 \text{ cm}^3 = 1 \text{ mL}$

The volume of a 3-D object can be measured using water displacement.
- Record the volume of water in the measuring cup at the start.
- Then put the object under water.
- Record the volume of water with the object in the measuring cup.
- The difference between the 2 volumes is equal to the volume of the object.

For example, the water level went from 400 mL to 430 mL when this object was put under water. So the volume of the object is 30 mL or 30 cm^3.

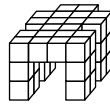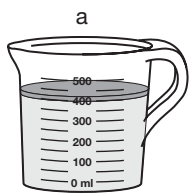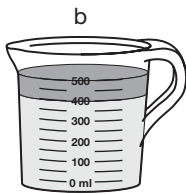**Models A to F were made using centimetre linking cubes.**

1. Find the volume of each model in cubic centimetres. Write your answer below each model.

2. Each of the models A to F was put under water in a measuring cup to measure its volume.
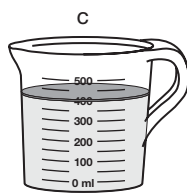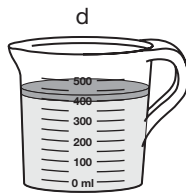
a

before 400 mL
after 422 mL

22 mL

b

before 400 mL
after 500 mL

100 mL

c

before 400 mL
after 416 mL

16 mL

d

before 400 mL
after 430 mL

30 mL

e

before 400 mL
after 436 mL

36 mL

f
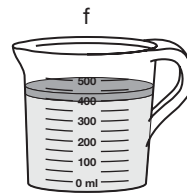
before 400 mL
after 431 mL

31 mL

Find the capacity of displaced water in millilitres. Write your answer below each measuring cup.
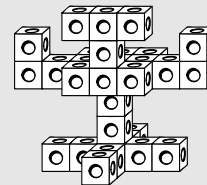
3. Match each model with the correct measuring cup.

Model	Measuring cup
A	c
B	d
C	f
D	a
E	b
F	e

CHAPTER 11

8 Measuring and Comparing Mass

Goal **Estimate, measure, and compare the masses of objects using appropriate units.**
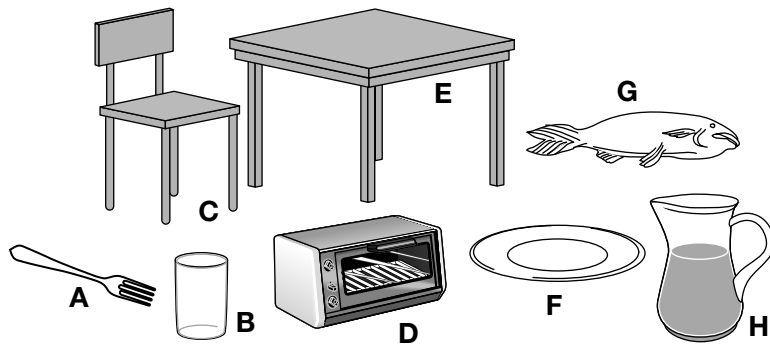
At-Home Help

The mass of most objects we can carry can be measured in grams or kilograms.

1 kg = 1000 g

1. Circle the unit you would use to measure the mass of the objects in the picture.

A (g,) kg **B** (g,) kg **C** g, (kg) **D** g, (kg)

E g, (kg) **F** (g,) kg **G** g, (kg) **H** g, (kg)

2. Match the masses below with the objects in the picture. There may be more than one possible answer for some masses.

a) 7 kg _____C, D, G_____ **b)** 30 g _____A, B_____

c) 10 kg _____C_____ **d)** 150 g _____B, F_____

e) 4 kg _____D, G, H_____ **f)** 35 kg _____E_____

g) 250 g _____B, F_____ **h)** 3 kg _____D, G, H_____

3. List three objects you can find in your home that would have a mass in grams.
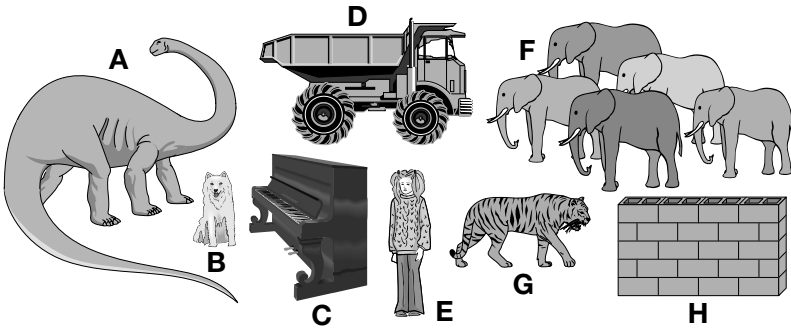
Suggested answer: spoon, hat, and CD

4. List three objects you can find in your home that would have a mass in kilograms.

Suggested answer: vacuum cleaner, lawn mower, and TV

Answers Chapter 11: 3-D Geometry and 3-D Measurement **105**

CHAPTER 11

9 Using Tonnes

Goal **Relate tonnes to kilograms.**

1. Circle the unit you would use to measure the mass of the animals or objects in the picture.

A kg,(t)   **B** (kg,)t   **C** (kg,)t   **D** kg,(t)

E (kg,)t   **F** kg,(t)   **G** (kg,)t   **H** kg,(t)

2. Match the masses below with the animals or objects in the picture. There may be more than one possible answer for some masses.

a) 6 t _____F, H_____   **b)** 70 t _____A_____

c) 65 kg _____G_____   **d)** 10 t _____F, H_____

e) 45 kg _____B, E_____   **f)** 150 kg _____C_____

g) 30 t _____D_____   **h)** 40 kg _____B, E_____

3. List three other objects that would have a mass in tonnes.

_____Suggested answer: garbage truck, fire truck, and ocean liner_____

_____

CHAPTER 11

Test Yourself

Circle the correct answer.

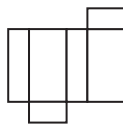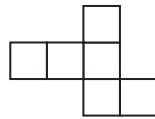**Models**
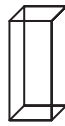
A   B   C   D   E   F   G
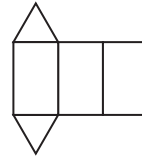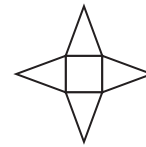
Nets
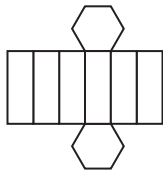
a   b   c   d   e   f   g

Use the pictures to answer Questions 1 to 5.

1. Which picture is the net of a pyramid?

   A. net e   **B.** net a   **C.** net c   **D.** net f

2. Which net matches with model D?

   A. net b   **B.** net g   **C.** net d   **D.** net c

3. Which model has no parallel edges?

   A. model B   **B.** model G   **C.** model E   **D.** model C

4. Which model has 4 faces?

   A. model F   **B.** model D   **C.** model G   **D.** model A

5. Which model matches with net e?

   A. model A   **B.** model F   **C.** model C   **D.** model E

6. What is the most likely mass for a school backpack?

   A. 2 g   **B.** 2 t   **C.** 50 kg   **D.** 2 kg

7. What is the most likely mass for a piano?

   A. 150 t   **B.** 150 g   **C.** 150 kg   **D.** 15 kg

8. What is the most likely volume for an apple?

   A. 450 cm^3 **B.** 45 cm^3 **C.** 4500 cm^3 **D.** 4 cm^3

9. How much water would likely be displaced if a pencil were put under water?

   A. 150 mL   **B.** 150 L   **C.** 15 L   **D.** 15 mL