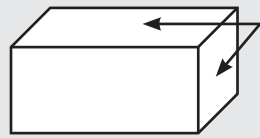


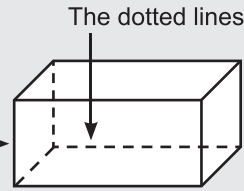
ME8-9 Right Prisms

Prisms have faces, edges, vertices, and bases.



The faces are the flat surfaces.

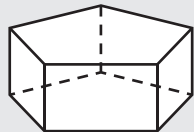
Faces meet at edges.



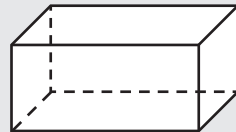
The dotted lines show hidden edges.

Edges meet at vertices.

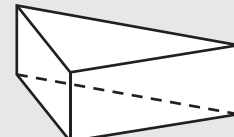
Every prism has two **bases**. The bases of a prism are always congruent polygons. The prism is named for the shape of the base.



pentagonal prism

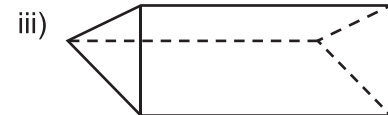
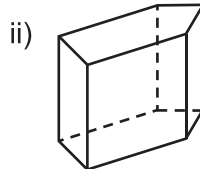
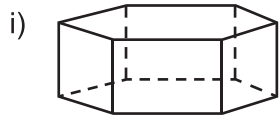


rectangular prism



triangular prism

1. a) Shade one base of the prism, then name the prism.



b) What shape are the faces that are not bases? _____

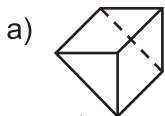
c) How many faces that are not bases does each prism have?

i) _____

ii) _____

iii) _____

2. How many of each type of face would you need to make the prism shown?



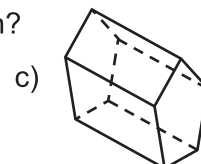
= _____

= _____



= _____

= _____

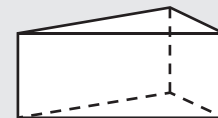


= _____

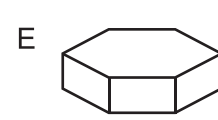
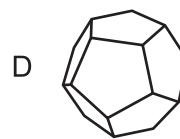
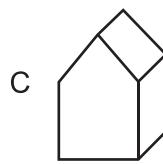
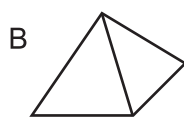
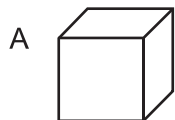
= _____

When a prism stands on one base, the other base becomes the top face.

In a **right prism**, the top face is directly above the bottom face. The side edges are vertical.



3. a) Sort the 3-D shapes.



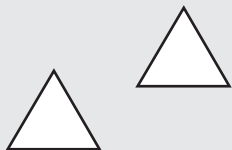
Right prisms: A, _____

Not prisms: _____

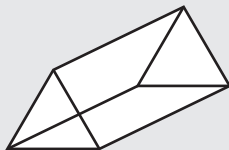
b) Choose one 3-D shape that you said was not a prism and explain why it is not a prism.

How to sketch a right prism

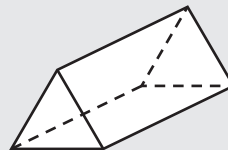
Step 1: Sketch two congruent bases.



Step 2: Join the corresponding vertices.

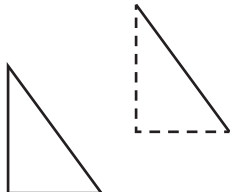


Step 3: Use an eraser to make the hidden edges dashed.

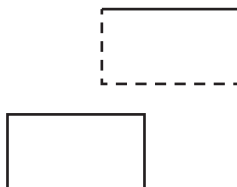


4. Finish sketching the right prism.

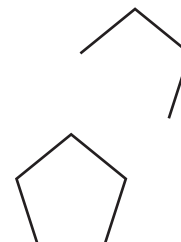
a)



b)



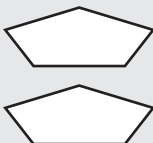
c)



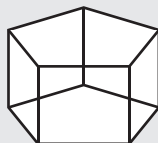
5. Now sketch two different rectangular prisms. Make the hidden edges dashed, and make sure none of your edges overlap!

How to sketch a right prism standing on its base

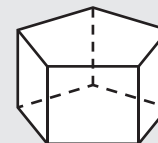
Step 1: Sketch two congruent polygons, one directly above the other.



Step 2: Join the corresponding vertices.

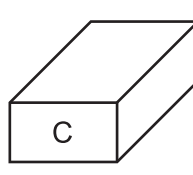
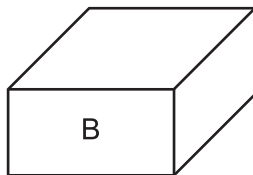
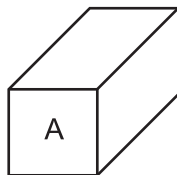


Step 3: Use an eraser to make the hidden edges dashed.



6. Follow the steps above to sketch three prisms with bases of different shapes.

7. Match each set of dimensions to the sketch that fits best. Then mark the length, height, and width of each prism on the sketch.



_____ 5 m, 3 m, 7 m

_____ 3 cm, 3 cm, 4 cm

_____ 2 km, 4 km, 4 km

8. a) Write 200 as a multiple of three numbers in three different ways.

200 = _____ × _____ × _____

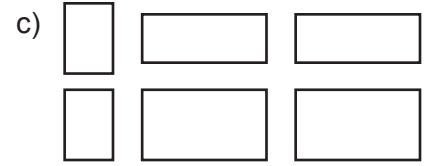
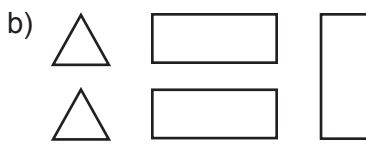
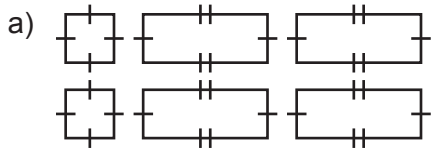
200 = _____ × _____ × _____

200 = _____ × _____ × _____

b) Use the numbers from part a) to sketch three rectangular prisms with volume 200 cm³.

ME8-10 Nets of Right Prisms

1. The polygons below are faces of a prism. Mark the equal sides on all the faces. Name the prism you could make if you assembled the faces.

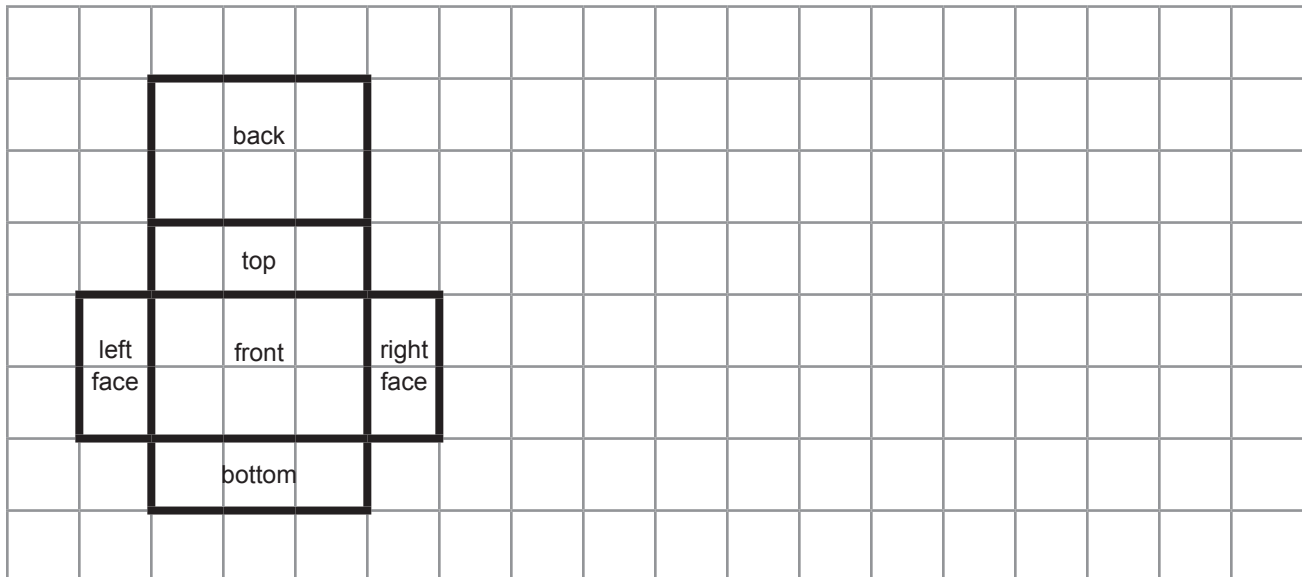
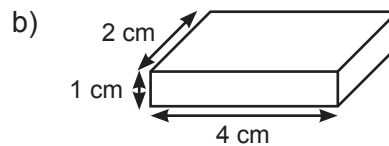
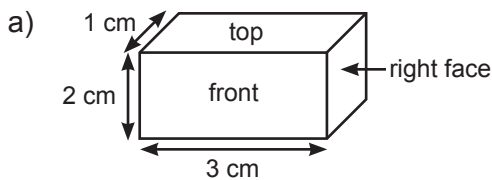


2. Shade the bases of each shape and then complete the chart.

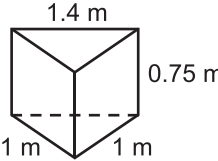
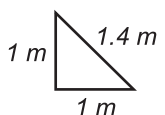
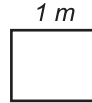

Number of sides on base				
Number of (non-base) rectangular faces				

What relationship do you see between the number of sides on the base of a prism and the number of (non-base) rectangular faces? _____

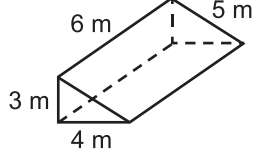

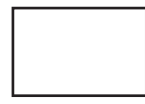
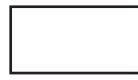

3. Draw a net for the box on the grid and label each face.



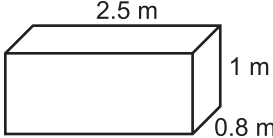

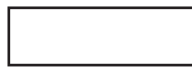

4. How many copies of each face do you need to make the prism? Mark the dimensions on each face.

a)    

_____ 2 _____ copies _____ 2 _____ copies _____ 1 _____ copies

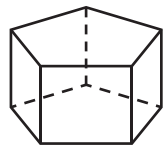
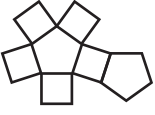
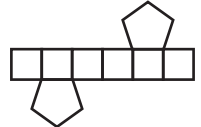

b)     

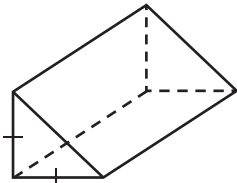
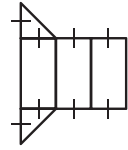
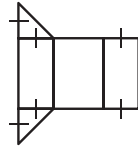
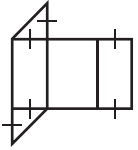
_____ copies _____ copies _____ copies _____ copies

c)    

_____ copies _____ copies _____ copies

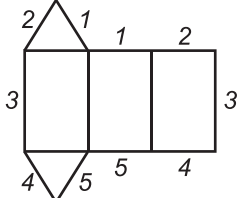
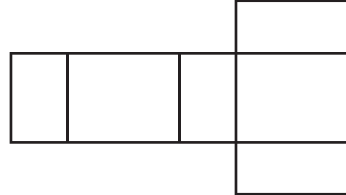
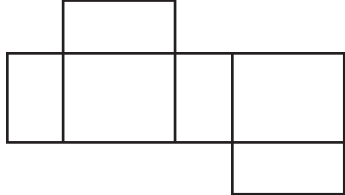
5. Circle the sketch or sketches that could be the net for the prism.

a)    

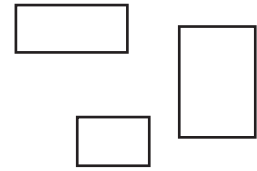
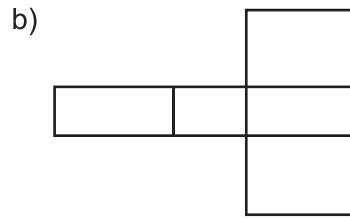
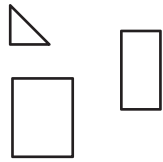
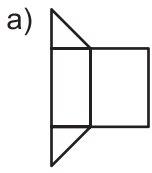
b)    

c) Explain what is wrong with the sketches you did not circle.

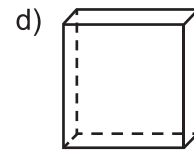
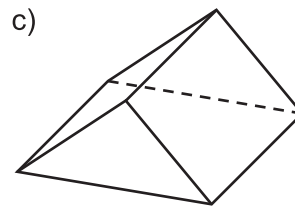
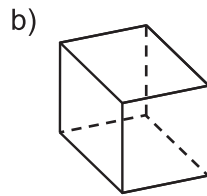
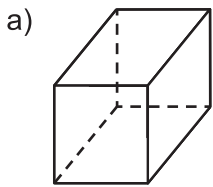
6. Mark the edges that will be glued together with the same number.

a)   

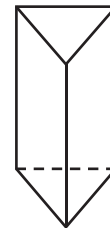
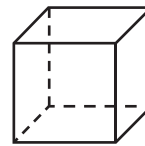
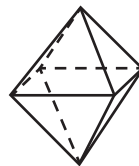
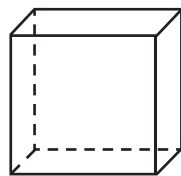
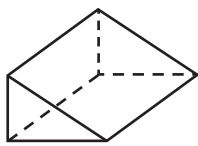
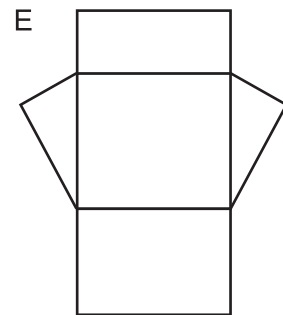
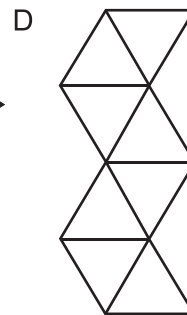
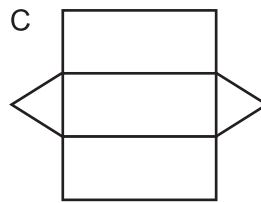
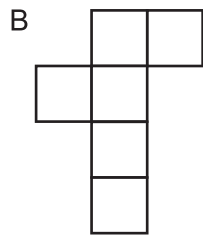
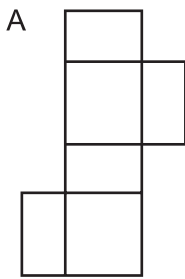
7. Circle the shape that could be the missing face for the net. Then add this face to the net.



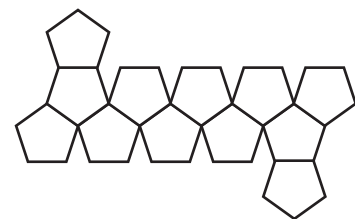
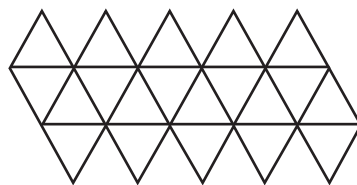
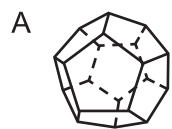
8. Sketch a net for the prism. Name the prism.



9. Match each net to a 3-D shape.



BONUS ▶ Match the 3-D shapes to the nets.

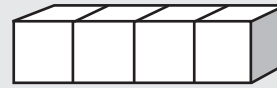
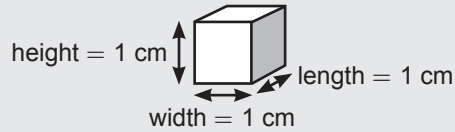


ME8-11 Volume of Rectangular Prisms

Volume is the amount of space taken up by a three-dimensional object.

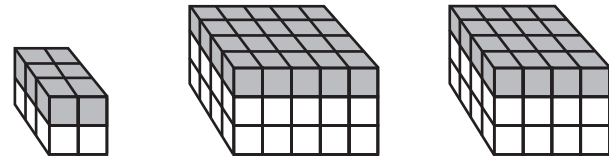
To measure volume, we can use 1 cm^3 blocks. They are also called centimetre cubes.

1 cm^3 block



This object, made of centimetre cubes, has a volume of 4 cubes or 4 cubic centimetres (written 4 cm^3).

1. Blocks are stacked to make boxes.

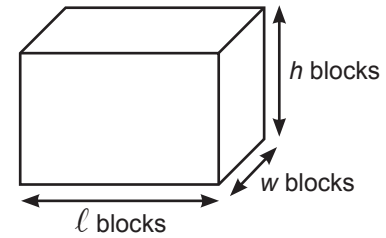


- How many blocks are in the shaded layer?
- How many blocks are in each layer?
- How many horizontal layers are there?
- How many blocks are in the whole box?

$3 \times 2 = 6$	_____	_____
6	_____	_____
2	_____	_____
$6 \times 2 = 12$	_____	_____

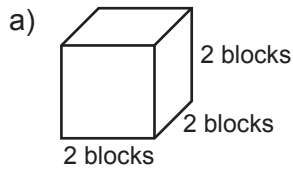
2. A box is ℓ blocks long, w blocks wide, and h blocks tall.

- How many blocks are in each horizontal layer? _____
- How many layers are there? _____
- How many blocks are in the whole box? _____
- Write a formula for the volume of the box (V) using the words length, width, and height.

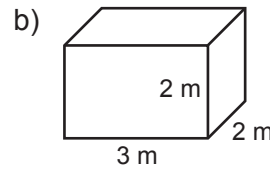


$V =$ _____

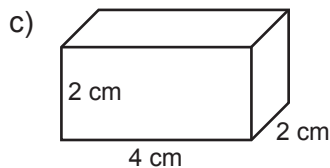
3. Find the volume of the box.



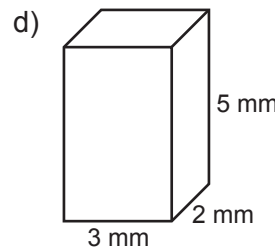
width: _____
length: _____
height: _____
volume = _____



width: _____
length: _____
height: _____
volume = _____



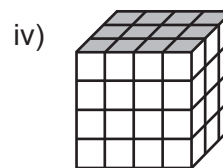
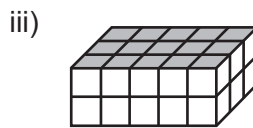
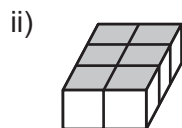
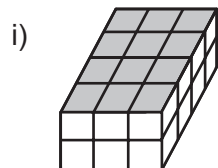
width: _____
length: _____
height: _____
volume = _____



width: _____
length: _____
height: _____
volume = _____

INVESTIGATION ► In a rectangular prism made of blocks, how is the area of the base related to the volume?

These prisms are made from 1 cm^3 blocks:



A. The base is shaded. What is the area of the base in each prism?

i) 12 cm^2 ii) iii) iv)

B. What is the volume of one horizontal layer of blocks in each prism?

i) 12 cm^3 ii) iii) iv)

C. How are the answers in A and B related? Are the numbers the same? The units?

D. How many horizontal layers are in each prism?

i) ii) iii) iv)

E. What is the height of each prism?

i) ii) iii) iv)

F. How are the answers in D and E related? Are the numbers the same? The units?

G. The volume of a prism = (volume of one horizontal layer) \times (number of horizontal layers).

Find the volume of each prism.

i) ii) iii) iv)

H. What can you multiply by the area of the base to get the volume of a prism?

$V = (\text{area of base}) \times$

4. The base of a rectangular prism has area 15 cm^2 . The volume of one horizontal layer is cm^3 .

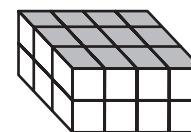
The height of the prism is 4 cm. How many 1 cm layers are there?

The volume of the prism is $\text{cm}^3 \times$ = cm^3 .

5. Find the volume of the rectangular prism at right in two ways.

Volume of one layer \times number of layers = $\text{cm}^3 \times$ = cm^3

Area of base \times height = $\text{cm}^2 \times$ $\text{cm} =$ cm^3



The volume of a rectangular prism = area of base \times height.

6. Look at the prism at right.

a) What is the area of the left side? _____ cm^2

What is the volume of the leftmost layer? _____ cm^3

Compare your answers. Are the numbers the same? Are the units the same? Explain.

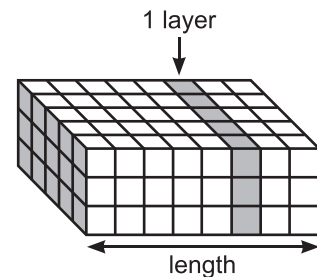
b) How many vertical layers are there? _____

What is the length of the prism? _____ cm

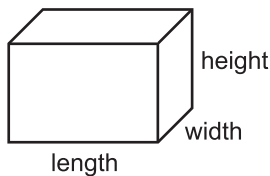
Compare your answers. Are the numbers the same? Are the units the same? Explain.

c) The volume of a right rectangular prism made of centimetre cubes is (number of layers in prism) \times (number of cubes in each layer).

Explain why this formula gives the same answer as (length of prism) \times (area of left face of prism).

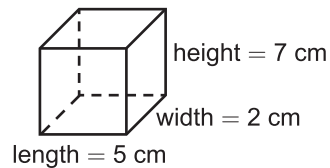


7. What do you multiply each area by to find the volume of a rectangular prism — length, width, or height?



- area of top \times _____
- area of right side \times _____
- area of bottom \times _____
- area of back \times _____
- area of left side \times _____
- area of front \times _____

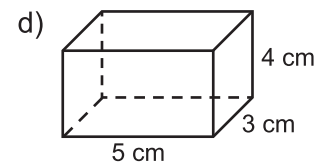
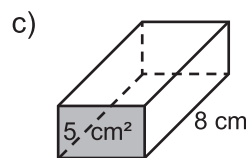
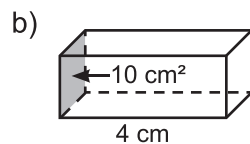
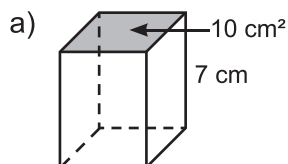
8. Find the volume of the prism in three different ways.



- area of top \times *height*
= _____ $\text{cm}^2 \times$ _____ $\text{cm} =$ _____ cm^3
- area of front \times _____
= _____ $\text{cm}^2 \times$ _____ $\text{cm} =$ _____ cm^3
- area of right side \times _____
= _____ $\text{cm}^2 \times$ _____ $\text{cm} =$ _____ cm^3

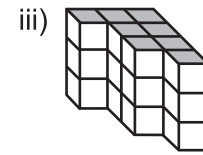
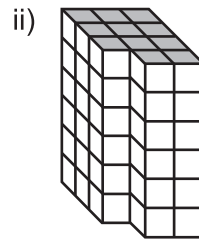
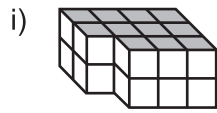
Did you get the same answer all three ways?

9. Find the volume of each right rectangular prism. Include the units in your answer.



ME8-12 Volume of Polygonal Prisms

INVESTIGATION 1 ▶ Does the volume of any prism made from centimetre cubes = area of base × height?



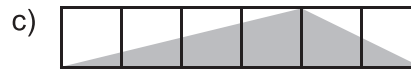
A. Complete the chart for each prism shown.

Figure	i)	ii)	iii)
Volume of one layer (cm ³)	11		
Number of layers	2		
Volume of structure (cm ³)	22		
Area of base (cm ²)	11		
Height of structure (cm)	2		

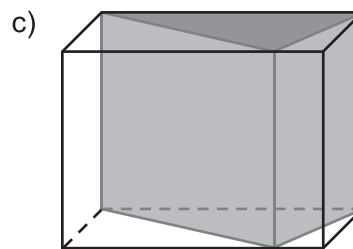
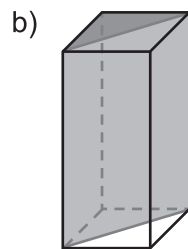
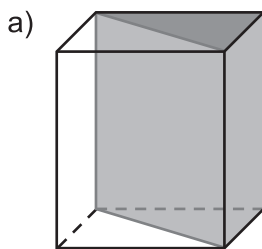
B. Is the volume of any prism made from blocks equal to (area of base) × (height)? _____

INVESTIGATION 2 ▶ Does the volume of a triangular prism = area of base × height?

A. What fraction of the rectangle is the triangle? Explain.



B. What fraction of the rectangular prism is the triangular prism? Explain.



C. How can you use the volume of the rectangular prisms to find the volume of the triangular prisms?

volume of triangular prism = (volume of rectangular prism) ÷ _____

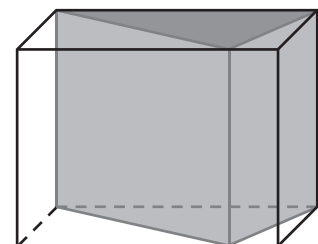
D. The volume of the rectangular prism at right is

(area of rectangle) × (_____ of prism)

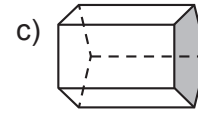
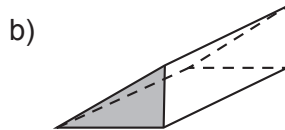
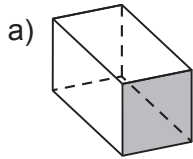
= 2 × (area of _____) × (_____ of prism)

So the volume of a triangular prism is

(area of _____) × (_____ of prism)

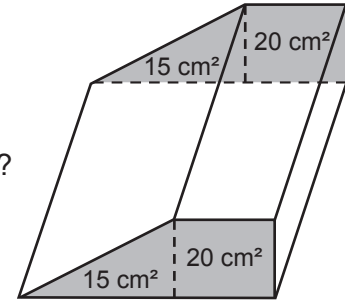


1. Imagine rotating the prism so that the shaded base is on the bottom. Trace an edge that shows the height.

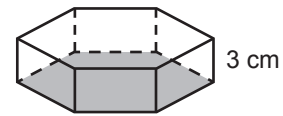
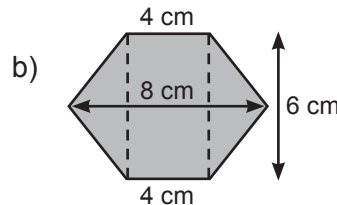
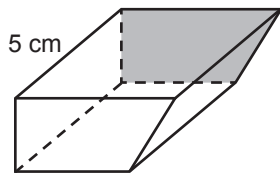
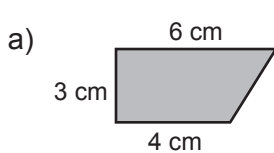


2. The bases of the prism are shaded.

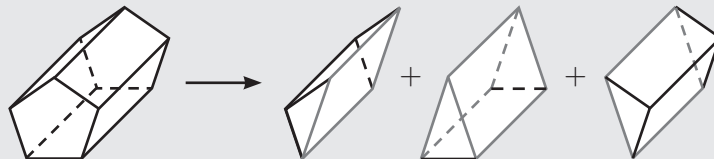
- a) Label the height h along one of the edges.
 b) Explain why the volume of the prism is $15 \times h + 20 \times h$.
 c) Is the expression $15 \times h + 20 \times h$ equal to the expression $(15 + 20) \times h$?
 Check for $h = 1$, $h = 2$, and $h = 3$.
 d) How do your answers to parts b) and c) show that the volume of the prism is equal to **area of base** \times **height**?



3. Decompose the base into triangles and rectangles. Then find the area of the base and the volume of the prism.



Any polygon can be decomposed into triangles. The volume of a polygonal prism is the sum of the volumes of the triangular prisms.

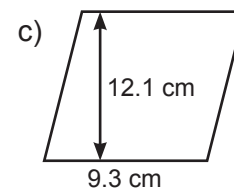
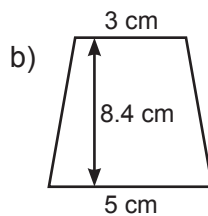
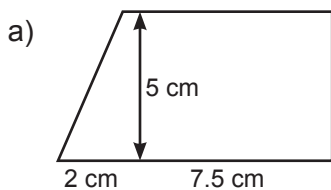


Example: Volume of pentagonal prism

$$= \text{area of } \triangle \times \text{height} + \text{area of } \triangle \times \text{height} + \text{area of } \triangle \times \text{height} = \text{area of } \text{pentagon} \times \text{height}$$

So **volume of polygonal prism** = **area of base** \times **height**

4. Estimate, then calculate, the volume of a prism with height 10 cm and the base shown.

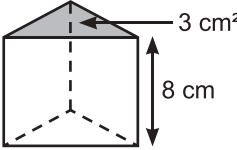


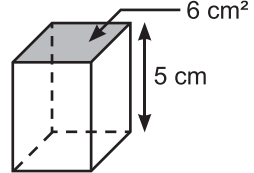
5. Sketch and label two prisms with different heights that have volume 300 cm^3 .

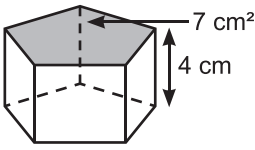
6. The volume of a right triangular prism is 600 cm^3 . Its height is 15 cm. What is the area of the base of this prism? Explain how you found your answer.

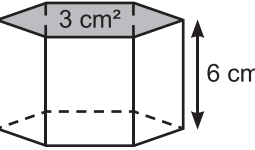
ME8-13 Volume of Cylinders

1. Calculate the volume of the prism.

a)  $V = \underline{\hspace{2cm}} \text{ cm}^3$

b)  $V = \underline{\hspace{2cm}} \text{ cm}^3$

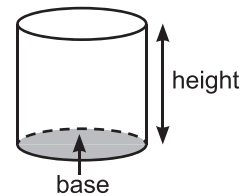
c)  $V = \underline{\hspace{2cm}} \text{ cm}^3$

d)  $V = \underline{\hspace{2cm}} \text{ cm}^3$

A **cylinder** is like a prism, but with circles for bases.

INVESTIGATION ► What is the formula for the volume of a cylinder?

A. Predict the formula for the volume of a cylinder in terms of its base and height. Explain your prediction.



B. The volume of a can of food is given on the label. Bilal estimates the inside radius and inside height of four cans, and creates this table.

Can	Inside Radius (r)	r^2	Inside Height (h)	$h \times r^2$	Volume of Food (V)	$\frac{V}{hr^2}$
pea soup	4.8 cm		11 cm		796 cm ³	
pasta sauce	4.1 cm		13 cm		680 cm ³	
mixed beans	4 cm		10.8 cm		540 cm ³	
tomato paste	2.5 cm		8 cm		156 cm ³	

Bilal measured the outside height of the pea soup can to be 11.8 cm. Why did he estimate a smaller number for the inside height? _____

Bilal measured the outside diameter of the pea soup can to be 10 cm. What is the outside radius? _____ Why did he estimate 4.8 cm for the inside radius? _____

C. Complete Bilal's table.

D. Which column has values always close to $\pi \approx 3.14$? _____

E. Use your answer in part D to write a formula for the volume of a can.

$\pi \approx V \div (\underline{\hspace{2cm}})$ so the formula is: $V = \pi \times \underline{\hspace{2cm}}$

F. The base of a cylinder is a circle with radius r . The area of the circle is _____.

G. Use your answer in F to rewrite your formula from E for the volume of a cylinder:

$V = (\text{area of base circle}) \times \underline{\hspace{2cm}}$

H. How is the formula for the volume of a cylinder like the formula for the volume of a prism? Why does this make sense? Hint: Think about how cylinders are like prisms.

I. Was your prediction in part A correct? _____

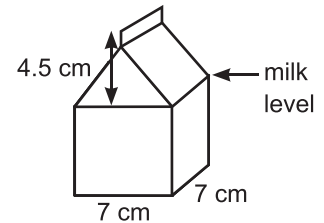
ME8-14 Capacity

A centimetre cube has **volume** 1 cm^3 . It can hold 1 mL of water, so its **capacity** is 1 mL.

1. a) $1 \text{ L} =$ _____ mL b) A 1 L jar has volume _____ cm^3 .

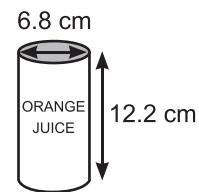
2. A juice carton has a capacity of 1.89 L. What is its volume? _____

3. A rectangular juice carton can hold 2 L of juice. It is 25 cm tall. What is the area of the base of the carton?

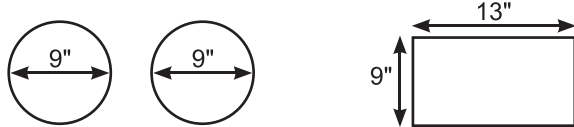


4. A small milk carton holds 250 mL of milk. Use the measurements given on the sketch to find the total height of the carton.

5. a) Find the volume of the can of orange juice.
b) To make orange juice, you add 3 cans of water for each can of concentrate. How much juice (in L) will you have if you use 2 cans of concentrate?



6. A cake recipe calls for the use of either 2 round pans or 1 rectangular pan:



a) If you use the same recipe, in which type of pan will the cake mix reach a higher level?
b) You need to bake thicker cakes for longer. In which type of pan will you need to bake the cake for longer?

7. A recipe says to mix $\frac{1}{4}$ cup butter, 5 cups miniature marshmallows, 6 cups crisp rice cereal and pour the mixture in a pan 20 cm by 30 cm by 6 cm. If 1 cup = 240 mL, how high will the mixture be in the pan?

8. Tegan just bought an aquarium. The aquarium is 90 cm long, 45 cm high, and 40 cm wide.

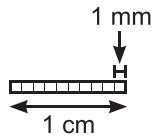
a) 1 L of water weighs 1 kg. Can Tegan fill her aquarium at a water source and then carry it to where she wants it? Explain.
b) If Tegan has a 6 L pail, how many trips will she need to make from the water source to the aquarium to fill it with water?
c) Do an Internet search to find reasons why Tegan might need to know the volume of her aquarium. Some things that might depend on volume include:

- the number of fish Tegan can put in the aquarium,
- the amount of medication she needs to provide if her fish get sick,
- the amount of water she must occasionally replace with fresh tap water.

ME8-15 Changing Units of Area and Volume

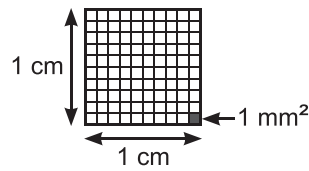
1. Use the picture to fill in the blanks.

a)



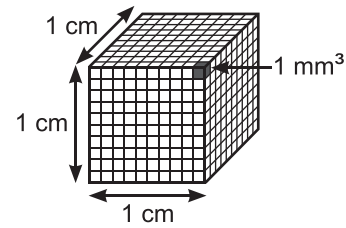
$$1 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$$

b)



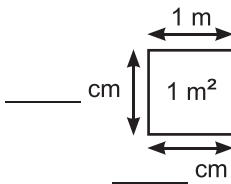
$$1 \text{ cm}^2 = \underline{\hspace{2cm}} \text{ mm}^2$$

c)



$$1 \text{ cm}^3 = \underline{\hspace{2cm}} \text{ mm}^3$$

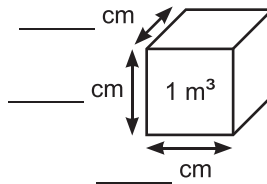
d)



$$1 \text{ m}^2 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ cm}^2$$

$$= \underline{\hspace{3cm}} \text{ cm}^2$$

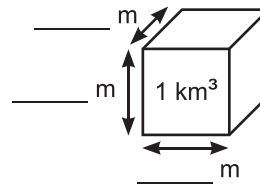
e)



$$1 \text{ m}^3 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ cm}^3$$

$$= \underline{\hspace{3cm}} \text{ cm}^3$$

f)



$$1 \text{ km}^3 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ m}^3$$

$$= \underline{\hspace{3cm}} \text{ m}^3$$

2. Change the following units.

a) 15 000 cm² to m²

The new units are 100² times bigger.
So I need 10 000 times fewer units.
So I divide by 10 000.

$$15\,000 \text{ cm}^2 = \underline{1.5} \text{ m}^2$$

b) 460 cm³ to mm³

The new units are _____ times _____.
So I need _____ times _____ units.
So I _____ by _____.

$$460 \text{ cm}^3 = \underline{\hspace{2cm}} \text{ mm}^3$$

c) 15 000 m² to km²

d) 460 mm³ to cm³

e) 4 mm² to m²

f) 0.4 m³ to cm³

g) 5.2 m² to cm²

h) 0.01 m³ to cm³

i) 0.01 m² to km²

j) 2400 cm³ to m³

3. Don says a rectangular prism with length 4 m, width 80 cm, and height 50 cm has a volume of 16 000 cm³. What mistake did he make? Explain.

4. a) A circle has circumference 0.16 m. What is its area in cm²?

b) A rectangle has perimeter 0.16 m. Can you tell its area in cm² from this information?

c) If the rectangle in part b) is a square, does that change your answer?

5. 1 cm² tiles cost 10¢ each. About how much would it cost to tile an area of 0.15 m²? Why is this only an approximation?

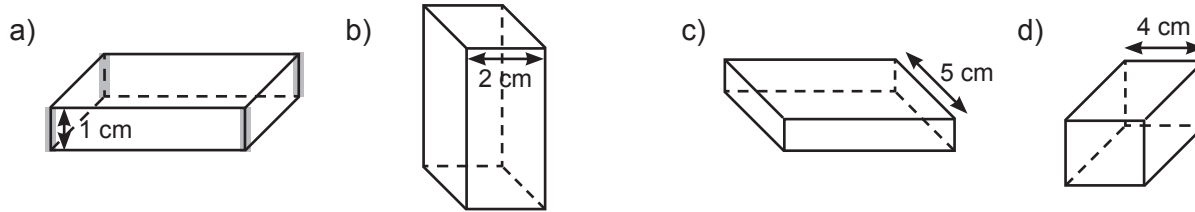
6. a) A circular pool has diameter 8 m and the water is 120 cm deep. How much water is in the pool? Write your answer in terms of m³ and L. Which unit is a more reasonable unit of measurement?

b) During a drought year in a country with very little water, water costs \$7.50/m³. How much does it cost to fill the pool in part a)?

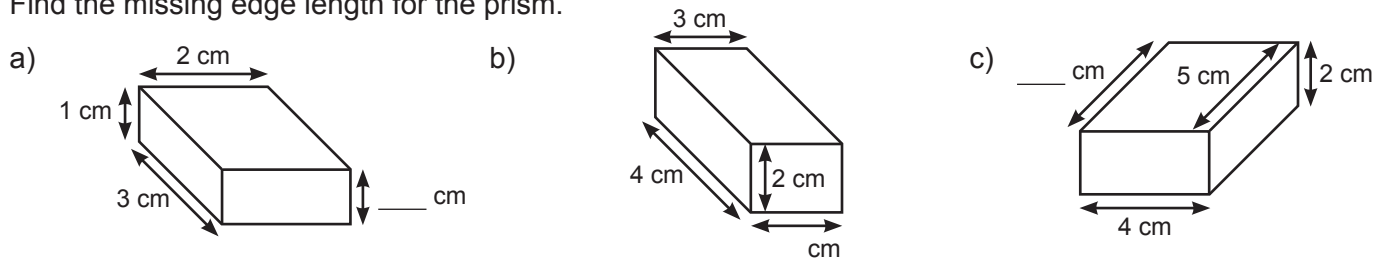
ME8-16 Surface Area of Prisms

Note: Pictures are not drawn to scale.

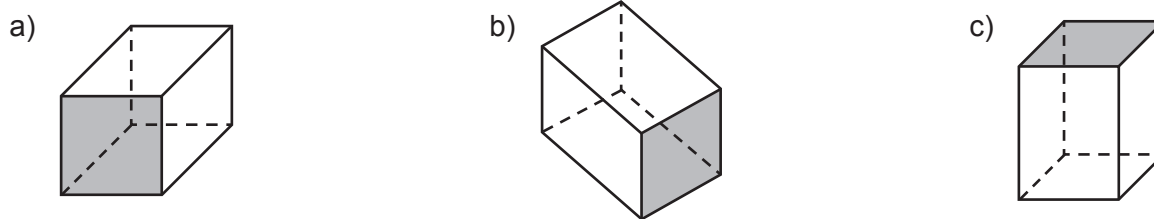
1. In each prism, shade **all** the edges that have the same length as the edge marked.



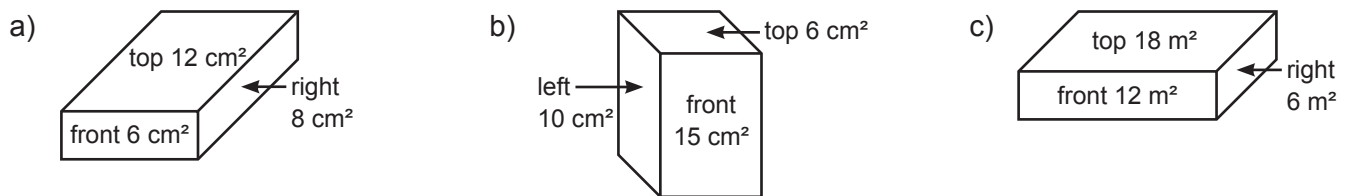
2. Find the missing edge length for the prism.



3. Shade the face that has the same area as the shaded face.



4. The area of each visible face is given. What is the area of each hidden face?

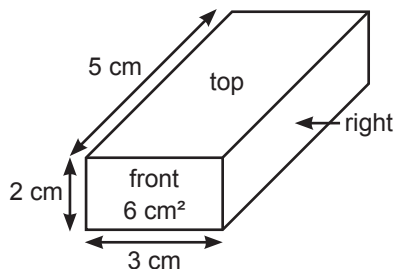


back _____
 bottom _____
 left _____

back _____
 bottom _____
 right _____

back _____
 bottom _____
 left _____

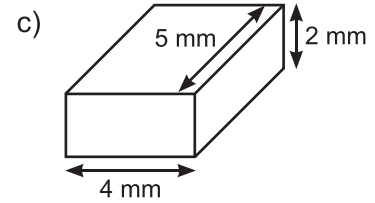
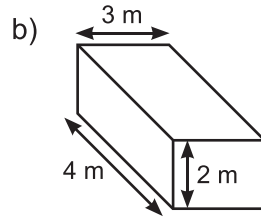
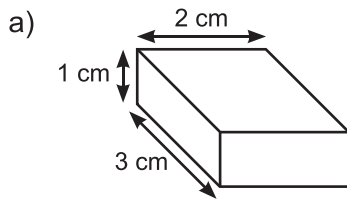
5. Write the area of each visible face directly on the face. Then double each area to find the total area of each pair of congruent faces.



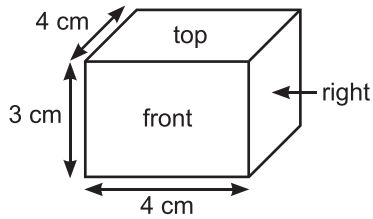
front	+	back	=	<u>6 cm² × 2</u>	=	<u>12 cm²</u>
top	+	bottom	=	_____	=	_____
_____	+	_____	=	_____	=	_____

The **surface area** of a 3-D shape is the total area of all the faces of the shape.

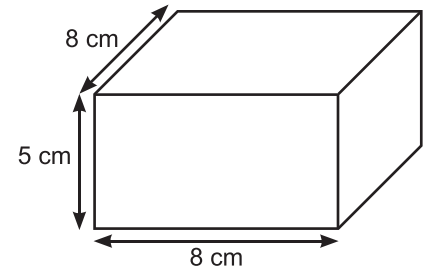
6. Calculate the surface area of the prism.



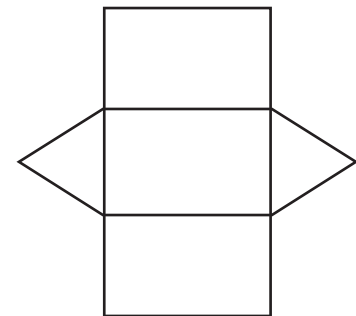
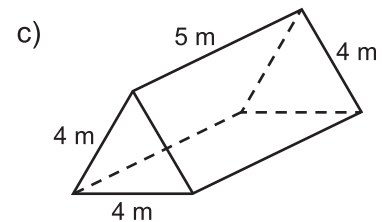
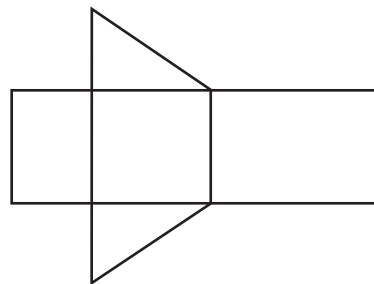
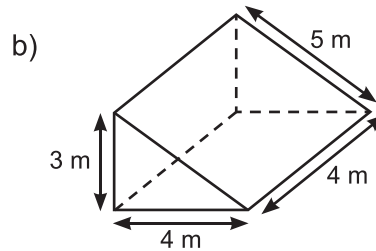
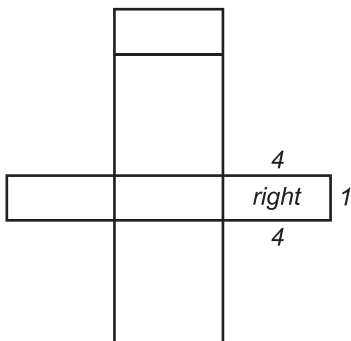
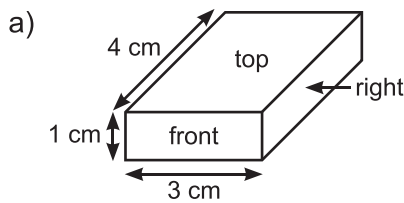
7. Miki calculates the surface area of the prism to be 40 cm^2 . What did she do wrong?



8. a) Alexandra says that she needs to find the area of only two faces of this prism to calculate the surface area. Is she correct? Explain.
 b) What is the surface area of the prism?



9. Write the name of each face of the prism on the net, then mark the length of each edge on the net.

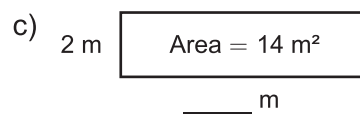
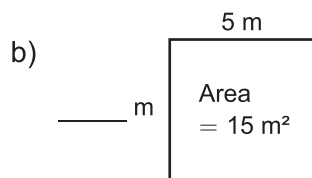
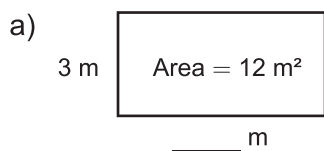


10. Find the surface area of each prism from Question 9. Include the units.

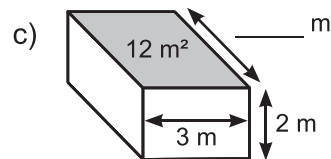
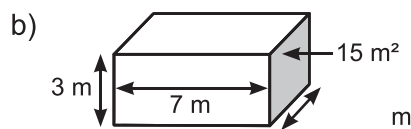
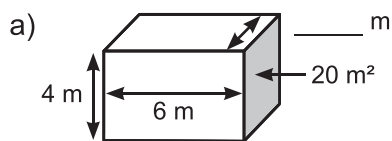
- a) _____ b) _____ c) _____

How is the surface area of a prism related to the area of its net? Explain.

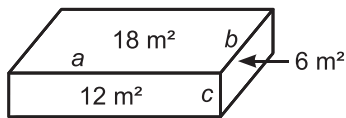
11. Find the missing length.



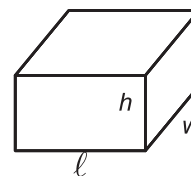
12. Find the missing edge length.



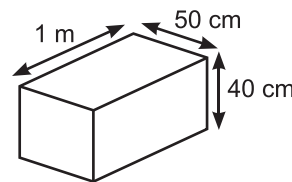
13. Edges a , b , and c have lengths that are whole numbers. The surface area of each face is written directly on the face. What are some possible lengths for edges a , b , and c ? (Hint: Why can edge a not be 4 m long?)



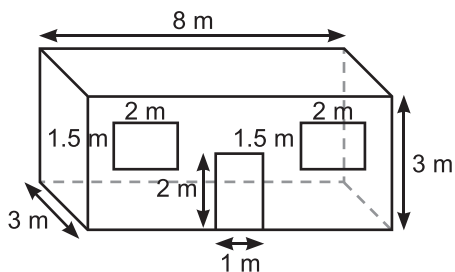
14. Write a formula for the surface area of the prism using the length (ℓ), width (w), and height (h).



15. Calculate the surface area of the prism. Be careful with the units!

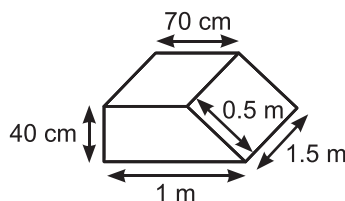


16. It costs \$0.40 per square metre to paint a room. How much would it cost to paint the walls of this room (not including the door and windows)?



17. Look at the prism at right. It is not drawn to scale.

- Draw a better sketch.
- Find the volume and surface area of this prism.



18. a) Write a rule that tells you how to calculate the surface area of the figures from the figure number. (Each cube has length, width, and height 1 cm.)

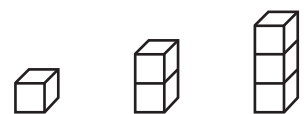
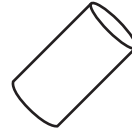
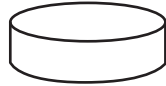


Figure 1 Figure 2 Figure 3

- Use your rule to predict the surface area of the 20th figure.

ME8-17 Surface Area of Cylinders

REMINDER ▶ A **cylinder** is like a prism, but with circles for bases.



1. A paper towel tube is a cylinder without the top and bottom circles.

a) Cut a paper towel tube vertically. What shape do you get when you open it up?

b) Cut a paper towel tube diagonally. What shape do you get when you open it up?



c) If the tube has circumference 15 cm and height 12 cm, what are the base and height of the shapes in parts a) and b)?

i) _____ ii) _____

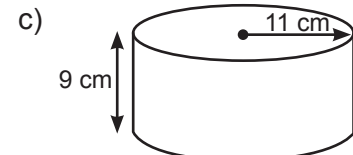
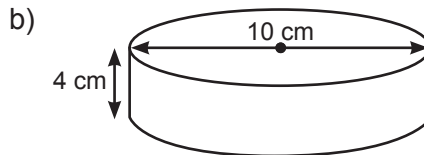
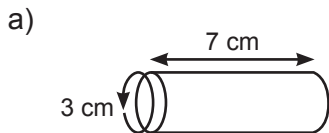
d) Do the shapes in parts a) and b) have the same area? _____

Why does this make sense? _____

e) What is the surface area of the tube? _____

REMINDER ▶ A **tube** is a cylinder without the top and bottom circles.

2. Find the surface area of the tube by finding the length and width of a rectangle with the same area.



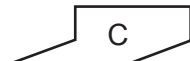
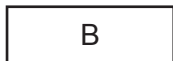
3. Write a formula for the surface area (SA) of a tube in terms of...

a) the circumference C of the circular base and the height h . $SA =$ _____

b) the diameter d of the circular base and the height h . $SA =$ _____

c) the radius r of the circular base and the height h . $SA =$ _____

4. Which of these shapes can be the net for a tube? _____ Explain.

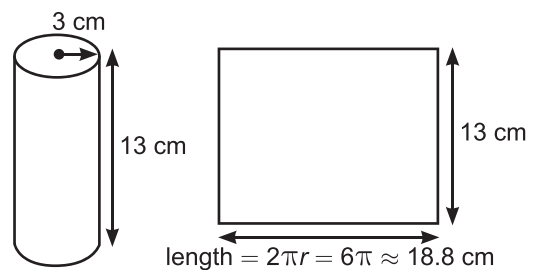


5. A can of food is a cylinder. It has both top and bottom circles.

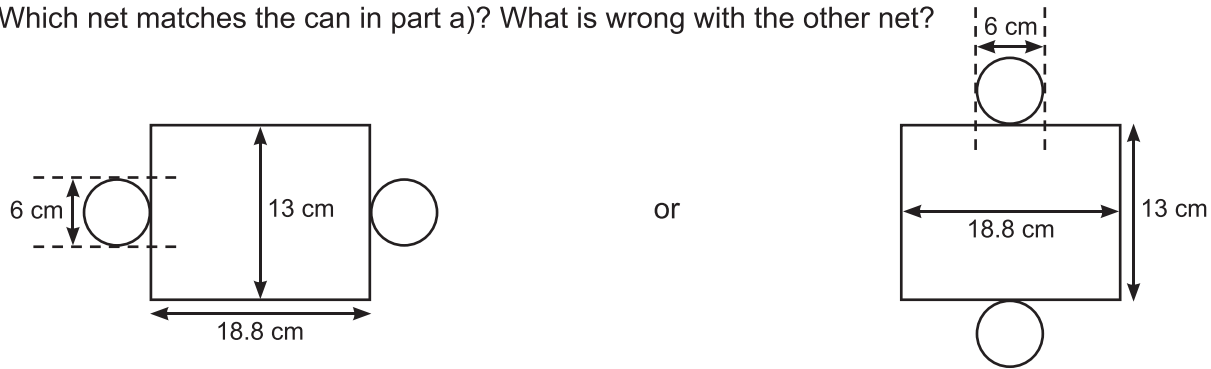
a) Find the surface area of the can.

Area of rectangle = _____
 Area of top circle = _____
 + Area of bottom circle = _____

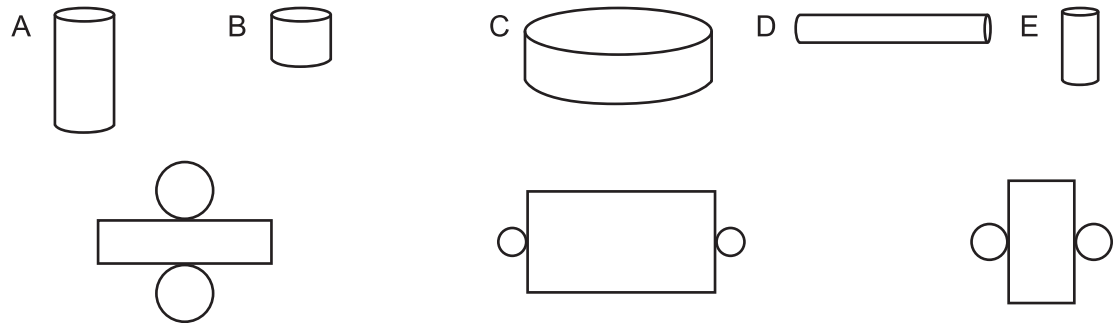
 Surface area of can = _____



b) Which net matches the can in part a)? What is wrong with the other net?

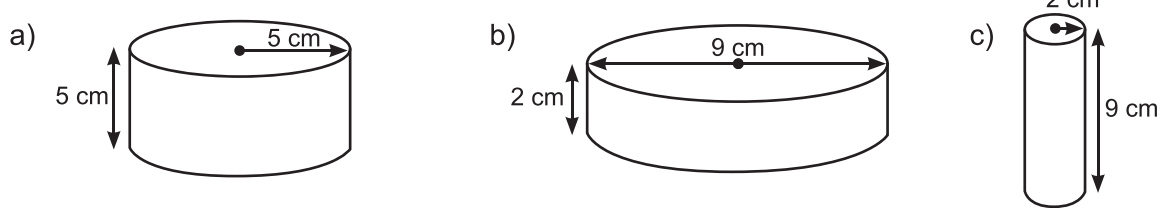


6. a) Which cylinder matches each net?



- b) Sketch nets for the two cylinders that were not matched.
- c) How does the surface area of a cylinder compare to the area of its net? Explain.

7. Find the surface area of each can by first finding the area of a rectangle and the area of the top and bottom circles.



8. A cylindrical can has a circular base of radius r and height h . Write a formula for its surface area. Do not forget to include the top and bottom.

ME8-18 Surface Area and Volume

1. Write one possible set of dimensions (length, width, and height) for a rectangular prism with the given volume.

a) 12 cm^3 b) 8 cm^3 c) 18 m^3

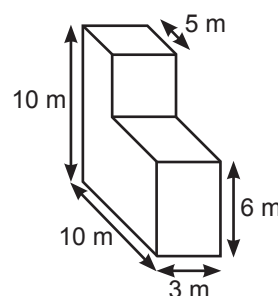
2. Find 3 possible sets of dimensions for a rectangular prism with volume 24 cm^3 . Which rectangular prism would require the least amount of material to construct?

3. This is the top view (and mat plan) of a rectangular prism made of 1 cm^3 blocks:

3	3	3
3	3	3

- a) What is its surface area in cm^2 ?
b) What is its volume in cm^3 ?

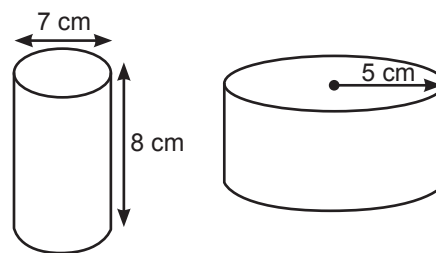
4. Find the volume and surface area of the shape. Explain your strategy.



5. a) A prism has a square base that measures 10 cm by 10 cm. A cylinder has a base with the same area as the base of the prism.
b) If both the prism and the cylinder are 20 cm high, which container will require less material to make?
c) Do both containers have the same volume? Explain.

6. The two containers shown hold the same amount of pea soup.

- a) How tall is the second container?
b) Find the surface area of each container.
c) It costs \$8 for each m^2 of metal to make a can. How much will it cost to make each can? Which can is cheaper?



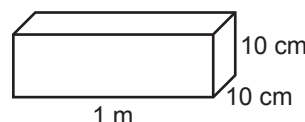
7. Each square is 3 cm by 3 cm.

- a) Find the area of the large circle.
b) Find the area of the 9 small circles.
c) Ten cylinders with height 5 cm and bases equal to the circles shown are made. Does the large cylinder hold more than, less than, or the same volume as the 9 smaller cylinders together?

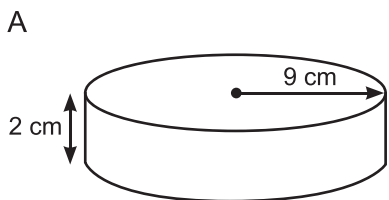


8. Crystal knows that the surface areas of the front, top, and right faces of a prism add to 20 cm^2 . How can she find the **total** surface area of the prism? Explain.

9. Determine the capacity, volume, and surface area of the box.

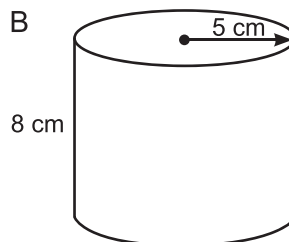


10. a) Calculate the volume and surface area of both cylinders.



Volume = _____

Surface Area = _____



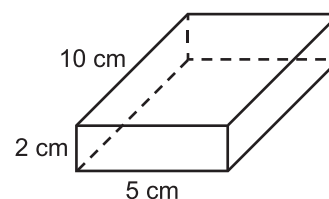
Volume = _____

Surface Area = _____

- b) Which cylinder has the larger volume? _____
 c) Which cylinder has the larger surface area? _____

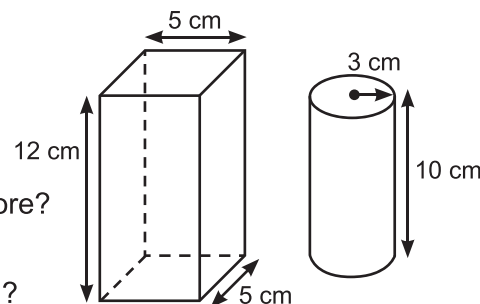
11. a) Calculate the surface area and volume of this rectangular prism.

b) Find a cube with a larger volume and a smaller surface area.

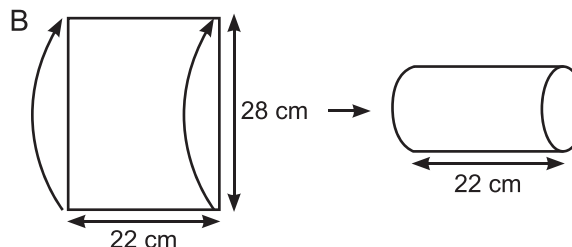
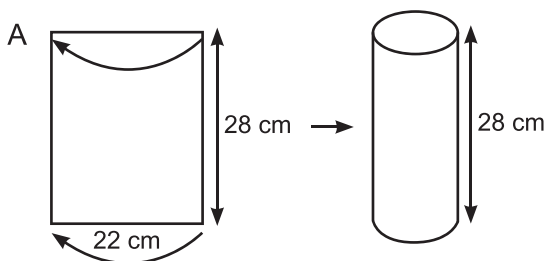


12. Satya has the two containers shown.

- a) Predict which container will hold more.
 b) Calculate the volume of each container. Which one will hold more?
 c) Satya fills the cylinder with water. How can he check which container will hold more without first finding the volume of each?



13. a) Fold a standard (22 cm by 28 cm) sheet of paper into a tube in two ways.



- b) Add a top and bottom to the tubes to make a can. Calculate the volume and surface area of each can.
 c) Which can has the larger volume and surface area?
 d) Which can has a lower cost of material per unit volume?

14. A cylinder has a radius and height that are whole numbers (measured in cm), and a volume of $36 \times \pi \text{ cm}^3$. What is the smallest surface area it can have?