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CHAPTER 1: Measurement Systems and Similar Triangles
CHAPTER 9: Volume and Surface Area

DAY	*SECTION / TOPIC*	*SEATWORK / HOMEWORK*
1	1.1 - Imperial Measure	Page 9 – 11 #2 – 6, 11, 12
2	1.2 - Conversions Between Metric and Imperial Systems	Page 16 – 18 #1abcdfhij, 2 – 5, 9 Page 38 – 39 #3ac, 6, 7, 8,
3	**QUIZ (1.1 and 1.2)** 9.1 - Volume of Prisms and Pyramids	Page 367 – 371 #1ac, 2a, 3ace, 4ac, 5a, 6b, 9, 10
4	9.1 - Volume of Prisms and Pyramids (if needed) 9.2 - Surface Area of Prisms and Pyramids	 Page 376 – 380 #1ace, 3ac, 5b, 6, 8a
5	9.3 - Surface Area and Volume of Cylinders	Page 385 – 390 #1ac, 2ac, 3ac, 5 – 8
6	9.4 - Volume of Cones and Spheres	Page 394 – 397 #1ace, 2ace, 3, 5ac, 6acd
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9	**CHAPTER 9 TEST**	

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1.1 – IMPERIAL MEASURE

KEY CONCEPTS

Some of the basic units of imperial measure are listed below:

Length and distance: foot, inch, yard, miles
Mass and weight: pounds, ounces and Tonnes
Volume and capacity: *fluid* ounces, cups, gallons and pints
Temperature: Fahrenheit

There are fixed relationships among the different units for length, volume, and weight. A conversion chart is listed below.

LENGTH	*MASS*	*VOLUME*
1 ft (foot) = 12 in (inches)	1 lb (pound) = 16 oz (ounces)	1 gal (gallon) = 4 qt (quart) = 8 pt (pints) = 128 fl oz (fluid ounces)
1 yd. (yard) = 3 ft (feet)	1 T (Tonne) = 2000 lbs (pounds)	1 qt (quart) = 2 pt (pints)
1 mi (miles) = 1 760 yd (yards)		1 pint (pt) = 16 fl oz (fluid ounces)
		1 c (cup) = 8 fl oz (fluid ounces)

EXAMPLE 1 *Basic Imperial Conversion*

Convert the following units of measure

(a) **3 feet** to **inches**

(b) **112 ounces** to **pounds**

(c) **25 gallons** to **fluid ounces**

(d) **80 fluid ounces** to **cups**

(e) **0.025 Tonnes** to **ounces**

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EXAMPLE 2 *Working With Volume*

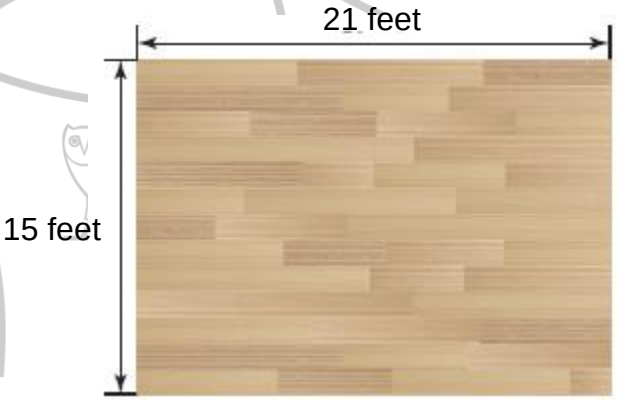
Sebastian owns a resto-bar in Woodbridge. He bought a **66 gallon** drum of mayonnaise from Costco. He needs to fill **pint size** bottles with the mayonnaise from the drum.

How many bottles will Sebastian fill?

EXAMPLE 4 *Finding the Cost to Carpet a Room*

Calculate the cost to carpet the floor shown. The carpet costs **$25 per square yard.**

Note: **Square yard (or yd^2)** is a unit of *Area*



Homework:
Page 9 – 11 #2 – 6, 11, 12

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1.2 – CONVERSIONS BETWEEN METRIC and IMPERIAL SYSTEMS

KEY CONCEPTS

There are fixed relationships among the different units for length, volume, and weight. A conversion chart is listed below.

Imperial to Metric Conversion Factors		
Length	**Area**	**Volume**
1 in. = 25.4 mm or 2.54 cm	1 $in.^2$ = 6.45 cm^2	1 $in.^3$ = 16.39 cm^3
1 ft = 0.3048 m	1 ft^2 = 0.0929 m^2	1 ft^3 = 28.32 dm^3 or 28.32 L
1 yd = 0.9144 m	1 yd^2 = 0.84 m^2	1 yd^3 = 0.76 m^3
1 mi = 1.609 km	1 acre = 4047 m^2	
Capacity	**Mass**	**Speed**
1 fl oz = 29.6 mL	1 oz = 28.35 g	1 m.p.h. = 1.609 km/h
1 qt = 0.947 L	1 lb = 0.454 kg	
(U.S.) 1 gal = 3.785 L	1 T = 0.91 t	

TEMPERATURE

°F (Fahrenheit) = [°C (Celsius) × 2] + 30 (estimate only)
°C (Celsius) = [°F (Fahrenheit) – 30] ÷ 2 (estimate only)

EXAMPLE 1 *Basic Imperial and Metric Conversion*

Convert the following units of measure

(a) **25 inches** to **centimetres**

(b) **55 Litres** to **gallons**

(c) **10 metres** to **feet**

(d) **120 pounds** to **kilograms**

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EXAMPLE 2 *Temperature Conversions*

(1) The average Fall temperature in Hamilton is **19°C**. What is the temperature in **degrees Fahrenheit**?

(2) The average Summer temperature in Orlando, Florida is **92°F**. What is the temperature in **degrees Celsius**?

EXAMPLE 3 *Measurement Lengths*

Blueprints for a new amusement park ride were prepared using imperial units. The axles are to be manufactured in a metric facility. The blueprints indicate the diameter of the axles is to be **1 ¾”**. What is the diameter of the axles in **millimetres**?

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EXAMPLE 4 *Gas Prices*

The average price of gas in San Francisco is **$4.39 per gallon**. What is the price **per litre**?

Homework
Page 16 – 18 #1abcdfhij, 2 – 5, 9

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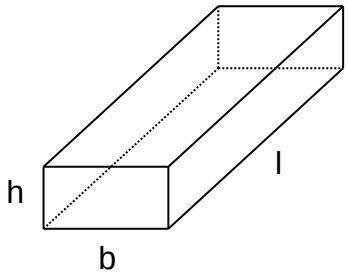
9.1 – VOLUME OF PRISMS AND PYRAMIDS

KEY CONCEPTS

The **volume** of an object is the **amount of space** occupied by the object.

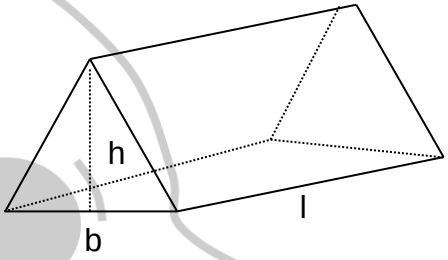
Volume is measured in **cubic units** (ie. Cubic centimetres is **cm^3**).

To find the **volume of a prism**, multiply the **base, height** and **length** together



FORMULA: **V_{Prism} = Base × Height × Length**
also
V_{Prism} = Length × Width × Height

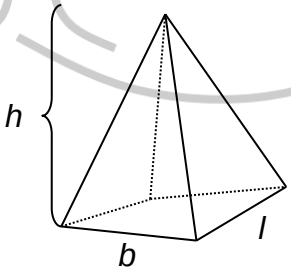
The **volume of a triangular prism**, is half the volume of a prism with the same base and height.



FORMULA:

$$V_{TRIANGULAR\ PRISM} = \frac{Base \times Height \times Length}{2}$$

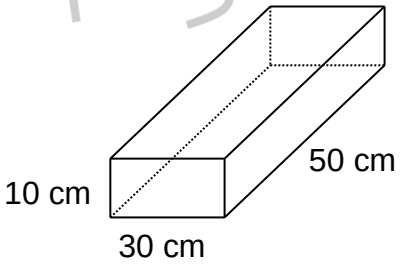
The **volume of a pyramid** is one third the volume of a prism with the same base and height.



FORMULA: $V_{PYRAMID} = \frac{Base \times Height \times Length}{3}$

EXAMPLE 1 *Volume of a Rectangular Prism*

Find the volume for the rectangular prism pictured



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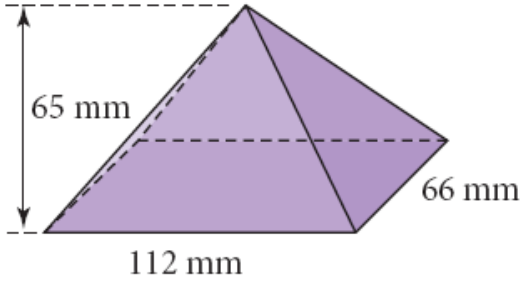
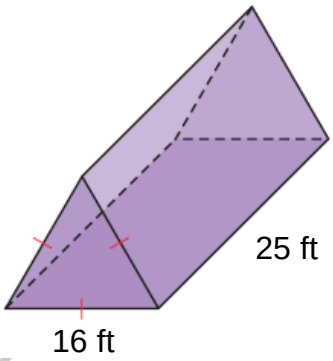
EXAMPLE 2
Volume of a Rectangular Pyramid

Find the volume of the pyramid pictured.



EXAMPLE 3 *Volume of a Triangular Prism*

Find the volume of the triangular prism shown



Step 1: Calculate the height of the triangle using the *Pythagorean Theorem*($c^2 = a^2 + b^2$)

Step 2: Calculate the volume

Homework: Page 367 – 371 #1ac, 2a, 3ace, 4ac, 5a, 6b, 9, 10

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9.2 – SURFACE AREA OF PRISMS and PYRAMIDS

KEY CONCEPTS

The surface area of an object is the **total area of the surface** of the object.

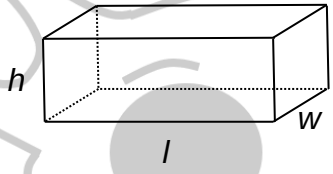
Surface area is measured in square units (ie. cm^2).

To find the surface area of a prism or pyramid, find the area of each face, then add the areas.

There are formulas which can be used to find the surface area of prisms and pyramids

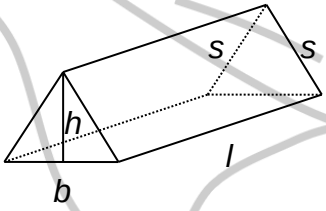
SURFACE AREA OF A RECTANGULAR PRISM

SA = 2(lw + lh + wh)
= 2lw + 2lh + 2wh



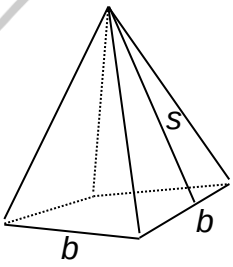
SURFACE AREA OF A TRIANGULAR PRISM

SA = 2sl + bl + bh



SURFACE AREA OF A SQUARE BASED PYRAMID

Square: SA = $2bs + b^2$



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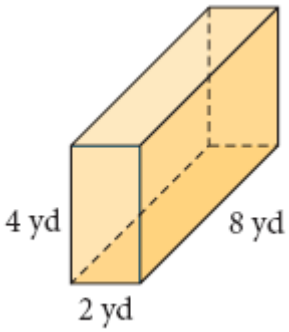
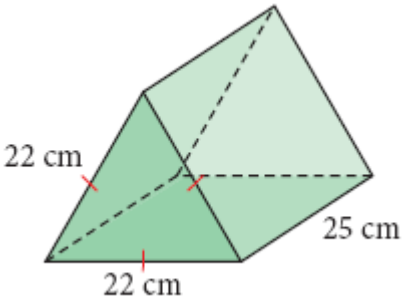
EXAMPLE 1 *Surface Area of a Rectangular Prism*

Find the surface area of the pictured rectangular prism



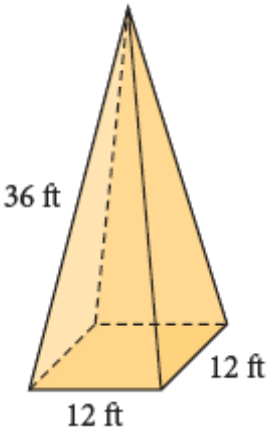
EXAMPLE 2 *Surface Area of a Triangular Prism*

Calculate the surface area of the triangular prism pictured.



EXAMPLE 3 *Surface Area of a Square Based Pyramid*

Calculate the surface area of the square based pyramid pictured.



<u>Homework</u>:
Page 376 – 380 #1ace, 3ac, 5b, 6, 8a

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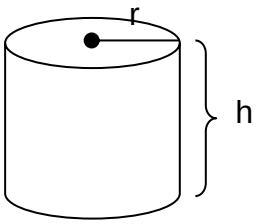
9.3 – SURFACE AREA AND VOLUME OF CYLINDERS

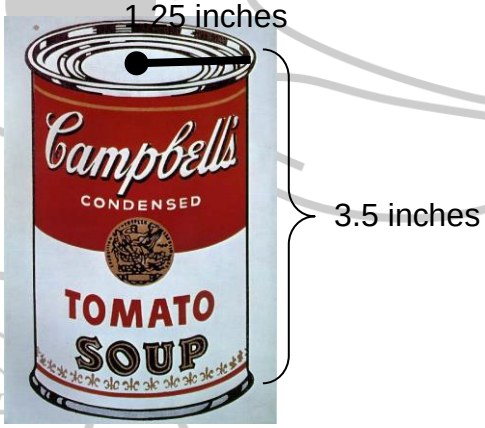
KEY CONCEPTS



SURFACE AREA	***VOLUME***
The surface area of a cylinder is the **sum of the areas of the two circular ends and the curved side.** Measured in **square units** (ie. cm^2)	The volume of a cylinder is the area of the circular base times the height of the cylinder. Measured in **cubic units** (ie. cm^3)
FORMULA: $SA = 2\pi r^2 + 2\pi rh$	***FORMULA:*** $V = \pi r^2 h$

EXAMPLE 1 *Surface Area and Volume of a Can*

(a) Calculate the **surface area** of the can



(b) Calculate the **volume** of the can

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EXAMPLE 2

Calculate the *surface area* and *volume* of a cylinder with a **diameter of 36 inches** and height of **24 inches**.

SURFACE AREA ***VOLUME***

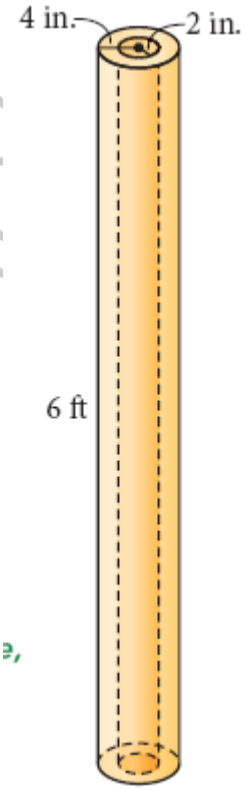
EXAMPLE 3 *A Cylinder Inside a Cylinder*

The padding around the support posts of a mesh enclosure for a trampoline is in the shape of a cylinder that has been hollowed out by removing a smaller cylinder.

The height of the padding is **6 ft** .

Each piece has an outer radius of **4 in.** and an inner radius of **2 in.**

Find the volume of one piece of foam padding in **cubic inches (in^3)**.



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EXAMPLE 4 *Solving for Specific Dimensions*

A company that manufactures fruit juice needs to make a new cylindrical container that can hold a volume of **4000 m^3** of fruit juice**.**

If the tank has a height of **25 metres**,

(a) What **radius** will the container have?

(b) What **diameter** will the container have?

Homework: Page 385 – 390 #1ac, 2ac, 3ac, 5 – 8

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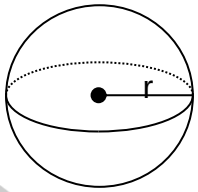
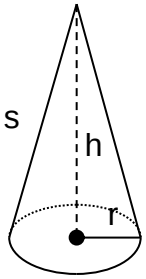
9.4 – VOLUME OF CONES AND SPHERES

KEY CONCEPTS

SPHERE	***CONE***
	
A three-dimensional ball-shaped object Every point on the surface is an equal distance from a fixed point (the centre)	The volume of a cone is <u>one third</u> the volume of a cylinder with the same base and height
FORMULA $V = \frac{4\pi r^3}{3}$ or $V = \frac{\pi d^3}{6}$	***FORMULA*** $V = \frac{\pi r^2 h}{3}$

WHERE DID THE VOLUME OF THE SPHERE COME FROM???

Volume of a sphere = Volume of a cylinder – Volume of a cone

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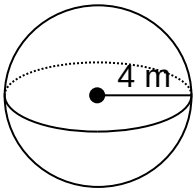
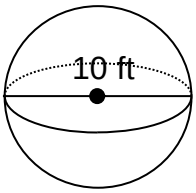
EXAMPLE 1 *Volume of a Sphere*

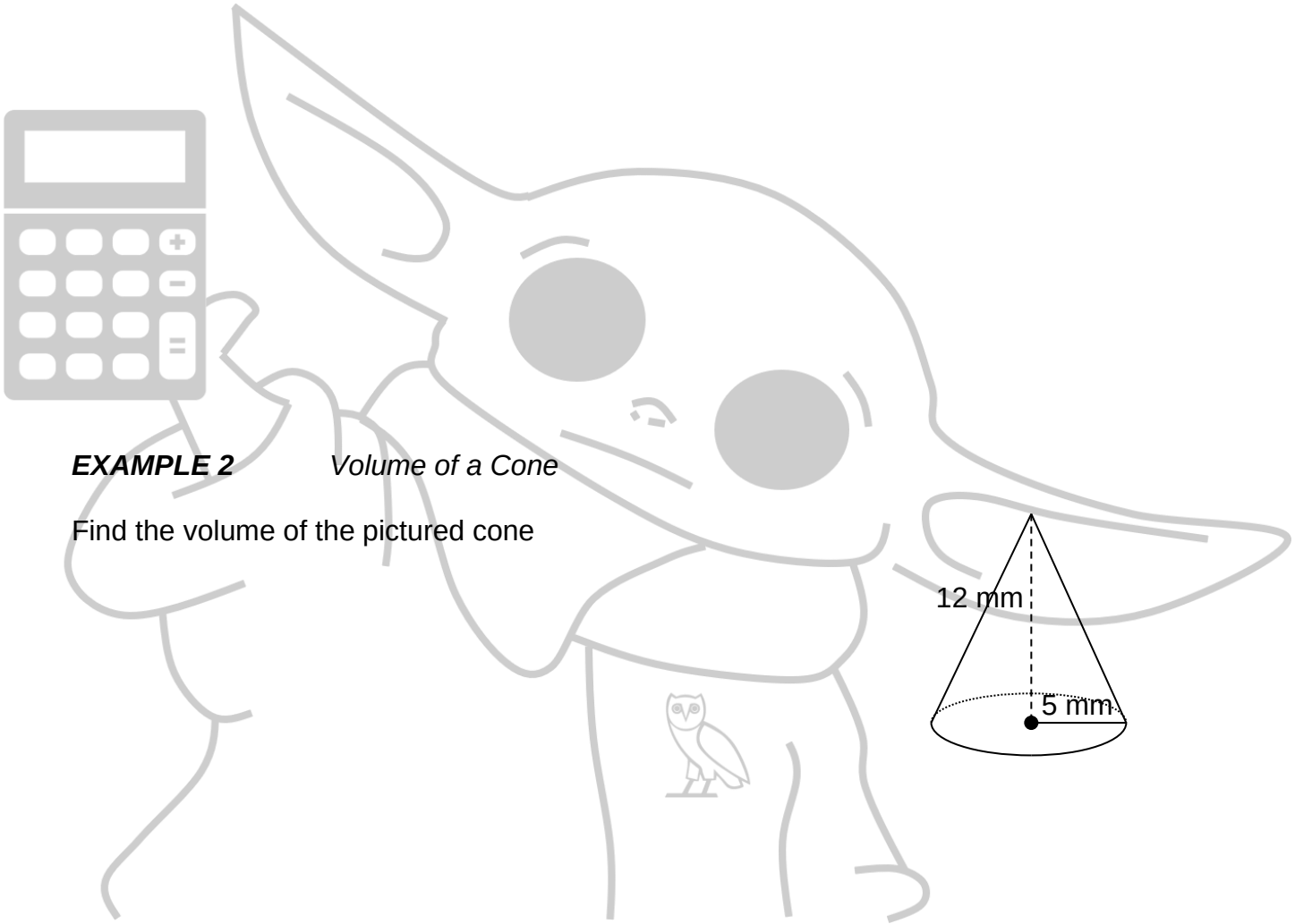
Find the volume for the pictured spheres

(a)



(b)





EXAMPLE 2 *Volume of a Cone*

Find the volume of the pictured cone

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EXAMPLE 3 *Volume of a Cone and Sphere*

An ice cream cone is made in the shape of a cone, and the scoop of ice cream is in the shape of a sphere (approximately).

The *radius* of the scoop of ice cream is **4 cm** and the *radius* of the cone is **3 cm**.

What cone **height** would be needed to hold the scoop of ice cream?

Homework:
Page 394 – 397 #1ace, 2ace, 3a, 5ac, 6acd

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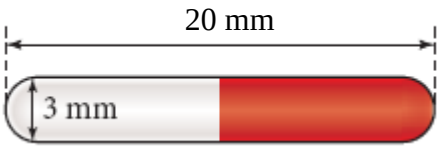
9.5 – SOLVING PROBLEMS INVOLVING SURFACE AREA AND VOLUME

KEY CONCEPTS

When a figure is made up of a combination of shapes, use the appropriate formula for each shape to find the total required quantity.

It is important to read questions carefully and to plan the steps of your solution.

EXAMPLE 1 *Volume of a Pill*



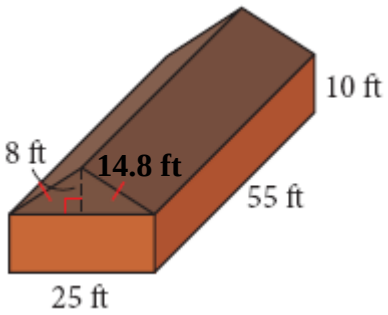
A pill capsule is in the shape of a cylinder with half of a sphere (a hemisphere) on each end.

The *length* of the *cylindrical* portion is **20 mm** and the *diameter* is **3 mm**.

Find the **volume** of the capsule.

EXAMPLE 2 *Surface Area: Painting a Barn*

The exterior walls of a barn are to be painted. The barn is in the shape of a rectangular prism with an isosceles triangular prism for a roof.



(a) Calculate the **total area** to be painted

(b) If one gallon of paint will cover **900 ft^2**, how many gallons will be required to paint this barn?

EXAMPLE 3 *Combination of Rectangular Prism and Cylinder*

A rectangular piece of wood has a **length of 8 in.**, **width of 24 in.** and **height of 1 in.**

Twelve cylindrical holes, each with a **radius** of **2 in.** and **height** of **1 in.** are drilled through the wood.

(a) What is the **volume** of the wood before the holes were drilled?

(b) What is the **volume** of the wood *after* the holes were drilled?

Homework:
Page 402 – 405 #1, 2ab, 3, 4, 6