

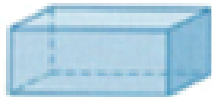
1.1

Nets and Surface Area of 3-D Objects

Remember!!!

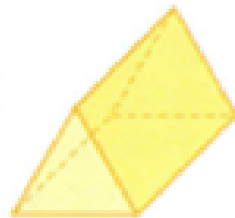
rectangular prism

- a 3-D figure with two rectangular bases that are the same size and shape



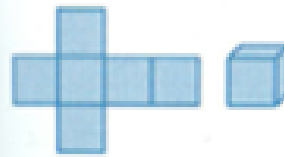
triangular prism

- a 3-D figure with only two triangular faces that are the same size and shape



net

- a 2-D diagram that can be folded to create a 3-D object



net



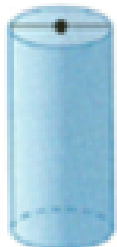
3-D object

surface area

- the sum of the areas of all the faces of a 3-D object
- measured in square units or units²

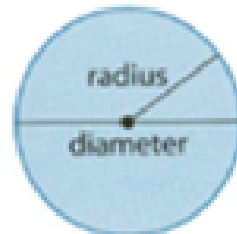
cylinder

- a 3-D object with two circular faces that are the same size and a curved surface



diameter

- the distance across a circle through its centre



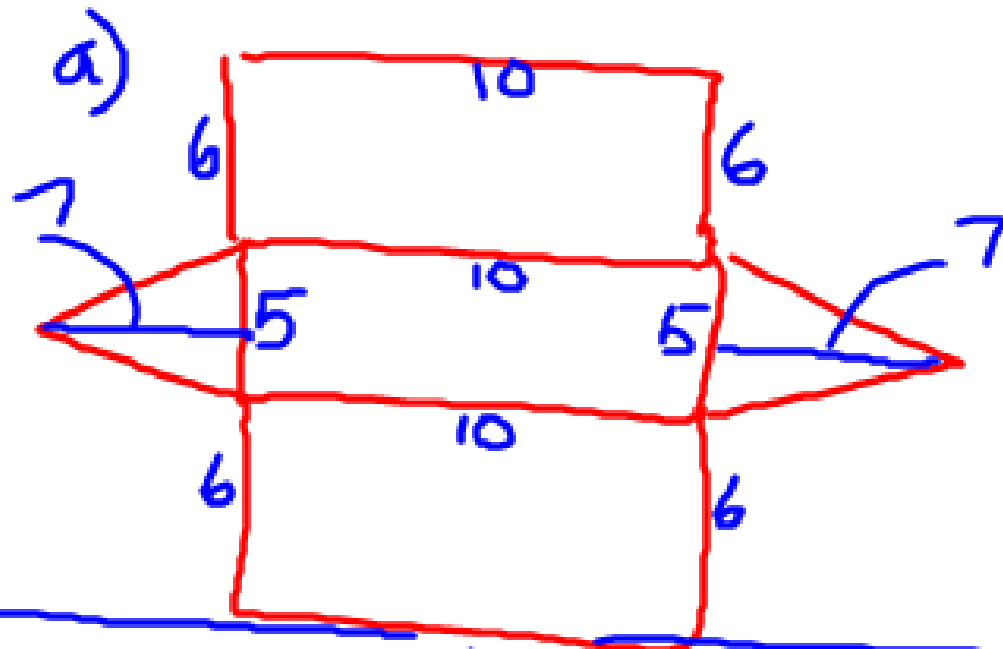
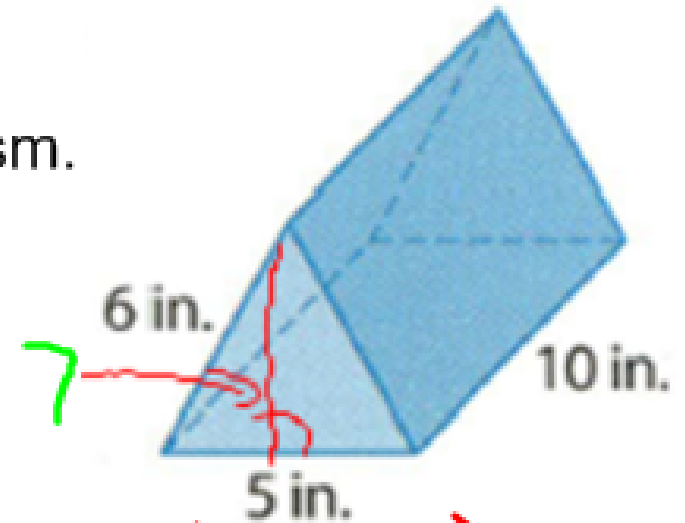
radius

- the distance from the centre of a circle to a point on the circumference

Questions from Yesterday?!

5. The triangular prism shown has an approximate height of 5.5 in.

- Sketch a net of the triangular prism.
- Calculate the surface area of the prism.



b) $SA = (2 \times \text{Ends}) + (2 \times \text{Sides}) + \text{Base}$

End = $\frac{1}{2}(b)(h)$
 $= \frac{1}{2}(5)(7)$
 $= 17.5$

Side -
 $SA = l \times w$
 $SA = 6 \times 10$
 $SA = 60$

Base
 $SA = l \times w$
 $SA = 5 \times 10 = 50$

$$SA = (2 \times \text{End}) + (2 \times \text{Side}) + \text{Base}$$

$$SA \text{ End} = 17.5$$

$$SA \text{ Side} = 60$$

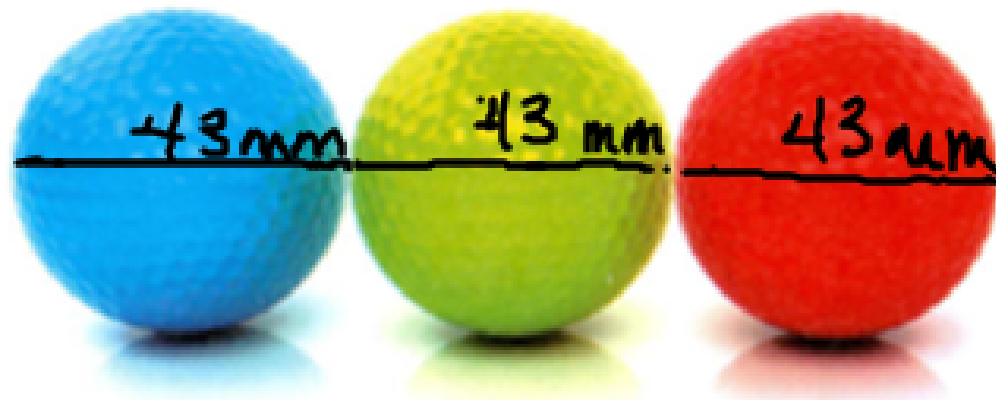
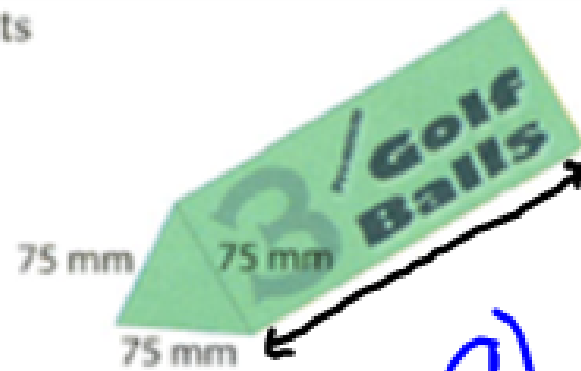
$$SA \text{ Base} = 50$$

$$SA = (2 \times 17.5) + (2 \times 60) + (50)$$

$$SA = 35 + 120 + 50$$

$$\underline{SA} = 205 \text{ in}$$

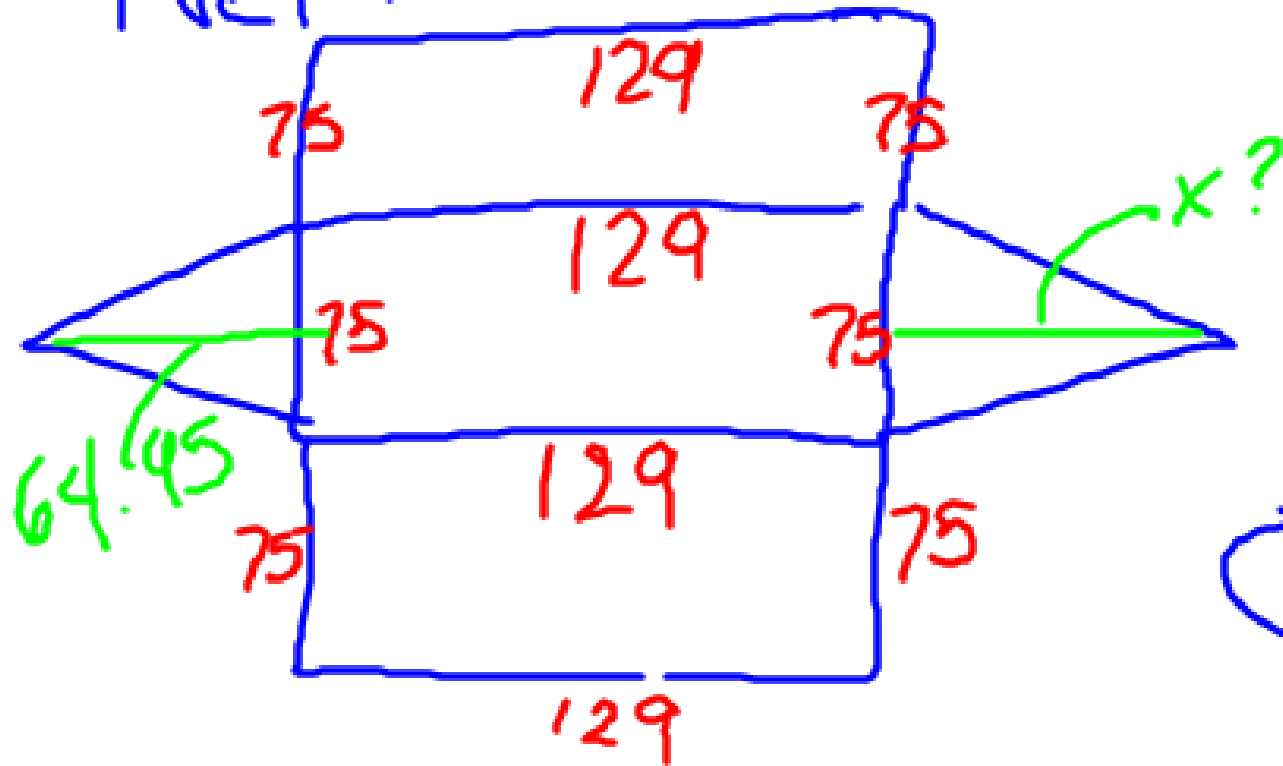
8. A company is thinking of changing its package for a set of three golf balls to a box in the shape of a triangular prism. The diameter of a golf ball is approximately 43 mm. The balls will be placed three in a row.



$$\begin{aligned} \text{a) } & 3 \times 43 \text{ mm} \\ & = 129 \text{ mm} \\ & \text{The box has to be} \\ & \text{at least } 129 \text{ mm.} \end{aligned}$$

- What is the minimum length of the longest side of the box?
- Sketch a net of the box.
- Calculate the total area of cardboard needed to make the five sides of the box. Round your answer to the nearest square millimetre. **Hint:** Use the Pythagorean relationship
- Calculate the total area of cardboard needed for a rectangular prism that would hold three golf balls.
- Give one reason why the company might *not* use the triangular prism box for its golf balls.
- Give one reason why the company might use the triangular prism box for its golf balls.

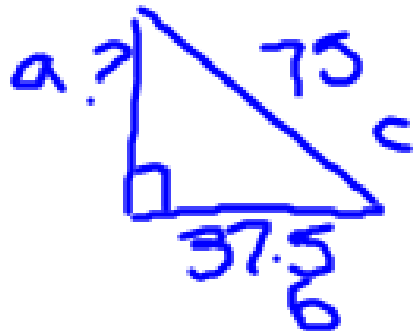
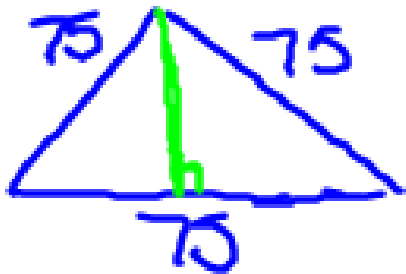
Net:



$$\begin{aligned} a &= 64.95 \\ h &= 64.95 \end{aligned}$$

Height of Triangle \rightarrow Use Pythagorean

$$a^2 + b^2 = c^2$$



$$\begin{aligned} 75^2 - 37.5^2 &= a^2 \\ 5625 - 1406.25 &= a^2 \\ \sqrt{4218.75} &= \sqrt{a^2} \end{aligned}$$



$$SA = (2 \times \text{End}) + (2 \times \text{Side}) + \text{Base}$$

S.A. Base

$$S.A. = l \times w \\ = (75)(129) = 9675$$

SA. End

$$SA = \frac{(b)(h)}{2} \quad SA = 2435.63$$

$$SA = \frac{(75)(64.95)}{2}$$

SA. Side

$$SA = l \times w \\ = (75)(129)$$

$$SA = 9675$$

$$SA = (2 \times \text{End}) + (2 \times \text{Side}) + \text{Base}$$

$$\text{End} = 2435.63$$

$$\text{Side} = 9675$$

$$\text{Base} = 9675$$

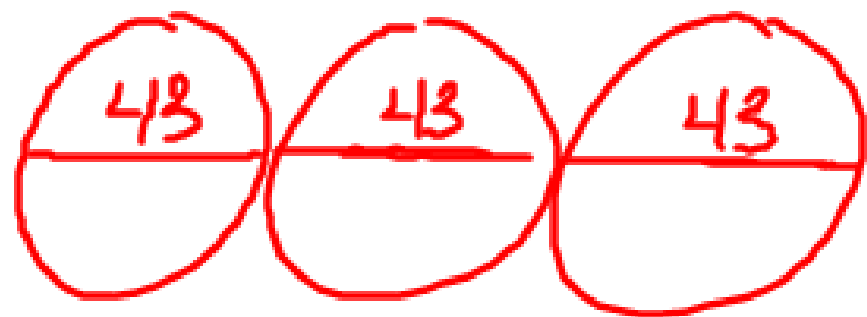
$$S.A = (2 \times 2435.63) + 2(9675)$$

$$+ 9675$$

$$S.A = 33896 \text{ mm}^2$$

Area = unit are squared!!

Rectangular Prism:



$$S.A. = (2 \times \text{End}) + (2 \times \text{Side 1}) + (2 \times \text{Side 2})$$

S.A. End

$$\begin{aligned} S.A. &= l \times w \\ &= 43 \times 43 \\ &= 1849 \text{ mm}^2 \end{aligned}$$

S.A. Side 1

$$\begin{aligned} S.A. &= l \times w \\ &= 43 \times 129 \\ &= 5547 \text{ mm}^2 \end{aligned}$$

S.A. Side 2

$$\begin{aligned} S.A. &= l \times w \\ S.A. &= 43 \times 129 \\ S.A. &= 5547 \text{ mm}^2 \end{aligned}$$

$$S.A = (2 \times \text{End}) + (2 \times \text{Side 1}) + 2(\text{Side 2})$$

$$S.A = (2 \times 1849) + (2 \times 5547) + (2 \times 5547)$$
$$= 3698 + 11094 + 11094$$

$$S.A = 25\,886 \text{ mm}^2$$

e) Cheaper! Don't switch

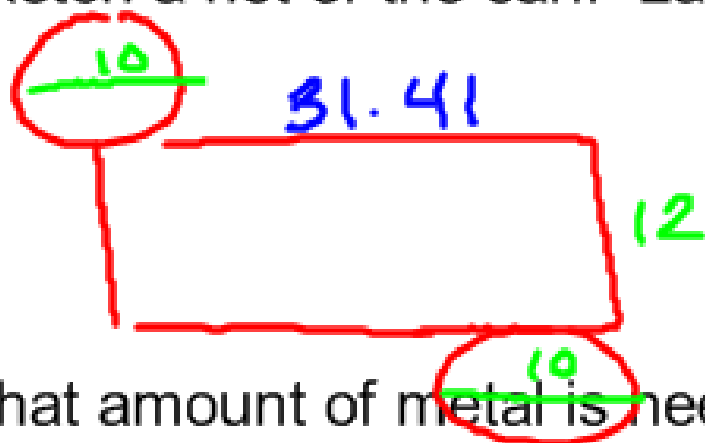
Surface Area of Cylinders

To find the surface area of cylinders, we are going to do the same thing as yesterday:

- 1) Draw a net of the 3D object
- 2) Find the area of each of the pieces
- 3) Add it all up to get the surface area

Manufacturers package many foods in cans in the shape of a **cylinder**. A can of tomatoes has a diameter of 10 cm and a height of 12 cm.

a) Sketch a net of the can. Label all dimensions.



b) What amount of metal is needed to make one can, to the nearest square centimeter.

Find S.A

S.A. Circle

$$S.A = \pi r^2$$

$$r = 5$$

$$S.A = \pi (5)^2$$

$$S.A = \pi (25)$$

$$S.A = 78.53$$

S.A Rect -

$$S.A = l \times w$$

$$= 12 \times 31.41$$

$$S.A = 376.99$$

How do we find length of Rectangle?

→ Find Circumference!

$$C = 2\pi r \quad \underline{\underline{\text{OR}}} \quad C = \pi d$$

$$d = 10$$

$$C = \pi(10)$$

$$C = 31.41$$

Surface Area

$$S.A \text{ Cyn.} = (2 \times \text{End}) + \text{Rectangle}$$

$$= (2 \times 78.53) + 376.99$$

$$= 157.07 + 376.99$$

$$= 534.06 \text{ cm}^2$$

$$\boxed{534 \text{ cm}^2}$$

TI-84 Plus C *Silver Edition*

 TEXAS INSTRUMENTS

NORMAL FLOAT AUTO REAL RADIAN MP

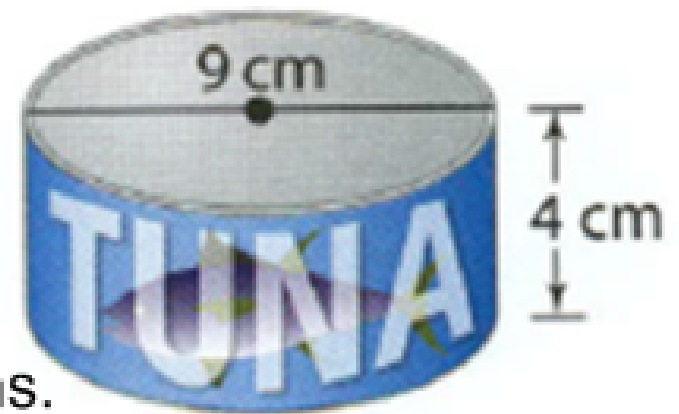


$$2\pi(5)^2 + 2\pi(5)(12)$$

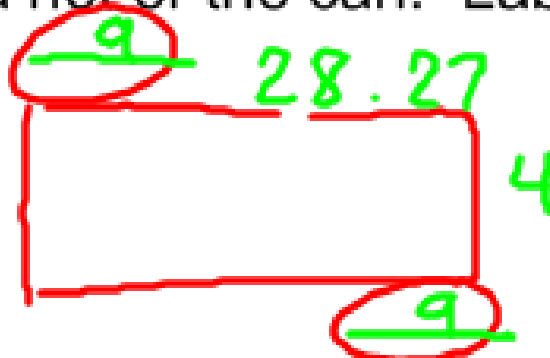
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Your Turn

Tuna is also packaged in cylindrical cans.



- a) Sketch a net of the can. Label all dimensions.



$$C = \pi d \quad C = 28.27$$
$$= \pi(9)$$

- b) Find the area of the metal needed to make one can.

$$\text{S.A Circle: } r = 4.5$$
$$\pi r^2$$

$$\text{S.A} = \pi(4.5)^2$$
$$= \pi(20.25)$$
$$\text{S.A} = 63.62 \text{ cm}^2$$

$$\text{S.A Rect.} = l \times w$$
$$\text{S.A} = (28.27)(4)$$
$$\text{S.A} = 113.08$$

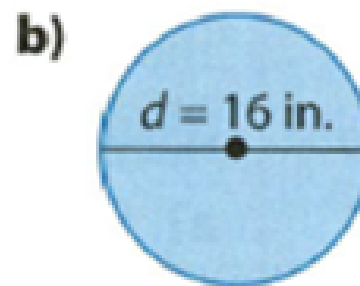
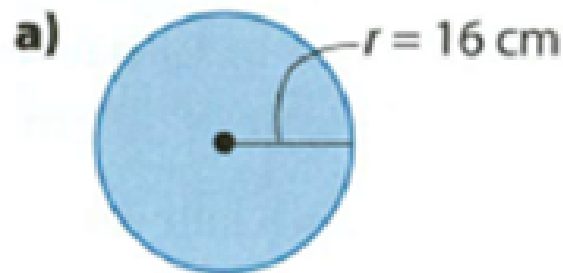
$$\text{S.A} = (2 \times \text{End}) + \text{middle}$$
$$= (2 \times 63.62) + 113.08$$

$$\text{S.A} = 127.24 + 113.08$$
$$= 240.32 \text{ cm}^2$$

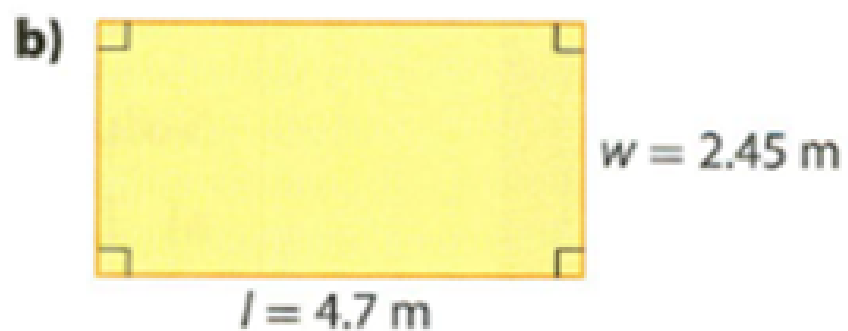
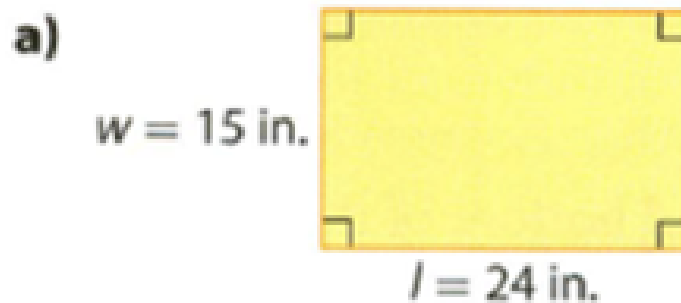
Try It

HW: Page 12, #1 - 6

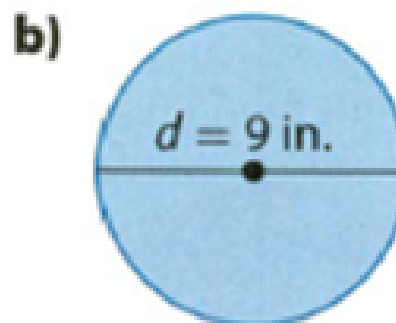
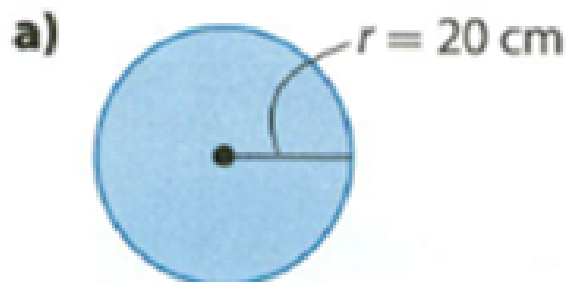
1. Calculate the area of each circle, to the nearest square unit.



2. Calculate the area of each rectangle.



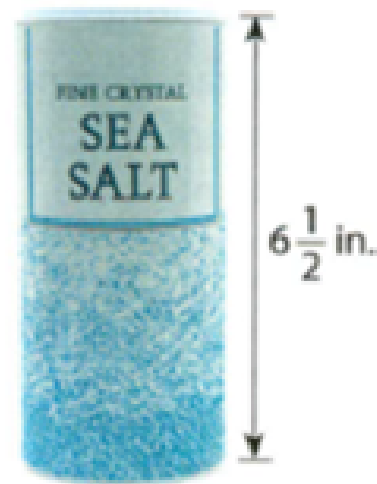
3. Calculate the circumference of each circle, to the nearest unit.





Apply It

4. Salad dressing is sold with a paper label around the neck of the bottle. Determine the area of this label, to the nearest square millimetre.
5. Sea salt is shipped in cylindrical, plastic containers. The diameter of the container is $2\frac{1}{2}$ in.
 - a) Sketch a net of the salt container. Label all dimensions.
 - b) A graphic artist is creating a new design for the label that wraps around the container. Calculate the maximum area for the label, to the nearest square inch.
 - c) Calculate the total area of the plastic needed to make one container, to the nearest square inch.



6. a) Convert the answer to #2a) to square feet.
- b) Convert the answer to #2b) to square centimetres.

F.Y.I.

1 square foot
= 144 square inches