Lesson 2.1: Surface Area of 3-D Objects

Practice – II

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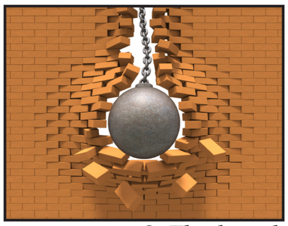
1. The soup can shown is a perfect storage container for a set of coloured pens, each 15 cm in length. The radius of the can's base is 4 cm. The surface area of the soup can is 406.8 cm^2. Is the can tall enough to fit the pens with the lid on?

Let $SA = 406.8\ \text{cm}^2$, $r = 4\ \text{cm}$

$$\begin{aligned}
SA_{\text{soup can}} &= 2\pi r^2 + 2\pi rh \\
406.8\ \text{cm}^2 &= 2\pi(4\ \text{cm})^2 + (2\pi \bullet 4\ \text{cm} \bullet h) \\
406.8\ \text{cm}^2 &= 100.530...\ \text{cm}^2 + 25.132...\ \text{cm} \bullet h \\
406.8\ \text{cm}^2 - 100.530...\ \text{cm}^2 &= \cancel{100.530...\ \text{cm}^2} - \cancel{100.530...\ \text{cm}^2} + 25.132...\ \text{cm} \bullet h \\
306.269...\ \text{cm}^2 &= 25.132...\ \text{cm} \bullet h \\
\frac{306.269...\ \text{cm}^2}{25.132...\ \text{cm}} &= \frac{\cancel{25.132...\ \text{cm}}}{\cancel{25.132...\ \text{cm}}} \bullet h \\
12.2\ \text{cm} &\doteq h
\end{aligned}$$

With a pen length of 15 cm and a can height of approximately 12.2 cm, the pens will not fit in the soup can when the lid is on.



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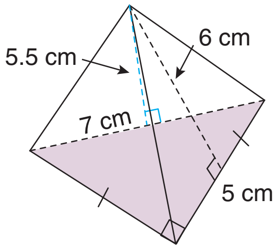
2. A 4 000 pound wrecking ball has a surface area of 2 642.01 in^2. Determine the diameter of the wrecking ball to the nearest inch.

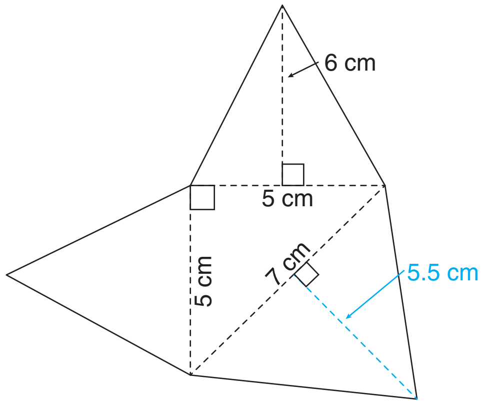
$$\begin{aligned}
SA_{\text{wrecking ball}} &= 4\pi r^2 \\
2\,642.01\ \text{in}^2 &= 4\pi r^2 \\
\frac{2\,642.01\ \text{in}^2}{4\pi} &= \frac{\cancel{4\pi}}{\cancel{4\pi}} r^2 \\
210.244\ldots\ \text{in}^2 &= r^2 \\
\sqrt{210.244\ldots\ \text{in}^2} &= \sqrt{r^2} \\
14.499\ldots\ \text{in} &\doteq r
\end{aligned}$$

$$\begin{aligned}
\text{diameter} &= 2r \\
\text{diameter} &= 2 \bullet 14.499\ldots\ \text{in} \\
\text{diameter} &= 28.999\ldots\ \text{in} \\
\text{diameter} &\doteq 29\ \text{in}
\end{aligned}$$

The diameter is 29 inches.

3. The following diagram is a tetrahedron. Sketch and label its net and determine its surface area, to the nearest hundredth.





$SA_{\text{tetrahedron}} = \text{Area of 2 identical triangles} + \text{trianglular base} + \text{back triangle}$

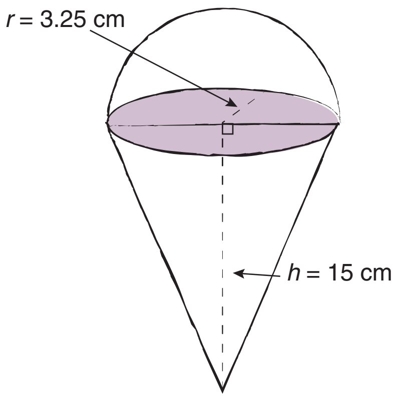
$SA_{\text{tetrahedron}} = 2\left(\frac{5\text{ cm} \cdot 6\text{ cm}}{2}\right) + \frac{5\text{ cm} \cdot 5\text{ cm}}{2} + \frac{7\text{ cm} \cdot 5.5\text{ cm}}{2}$

$SA_{\text{tetrahedron}} = 30\text{ cm}^2 + 12.5\text{ cm}^2 + 19.25\text{ cm}^2$

$SA_{\text{tetrahedron}} = 61.75\text{ cm}^2$

4. An ice cream cone with a radius of 3.25 cm and a height of 15 cm, has a scoop of ice cream sitting on it.

   a. If the visible portion of the ice cream scoop is a hemisphere, sketch and label a diagram using the measurements provided.



   b. Explain how you would determine the surface area of the ice cream cone and scoop.

   The surface area of the cone would not include the circle area part of the cone because it is not exposed. The hemisphere is half a sphere, so the surface area of the hemisphere would be the surface area of a sphere, divided by two. The total surface area would be the sum of the two parts.

Please complete *Lesson 2.1 Explore Your Understanding Assignment* located in *Workbook 2.1* before proceeding to *Lesson 2.2*.