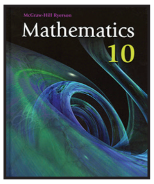


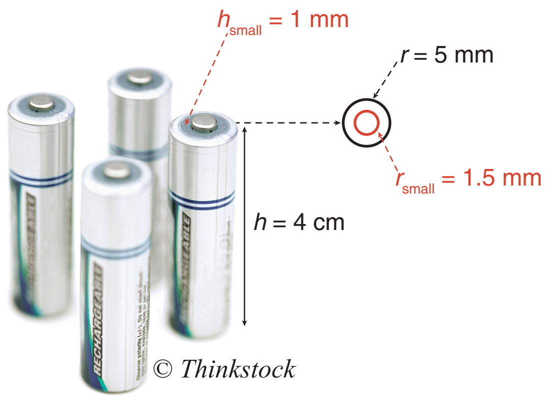
For an example about determining a missing dimension of a sphere see p. 71 of *Mathematics 10*.

Check Up

1. Calculate the surface area of a sphere with diameter 6.4 cm, to the nearest tenth of a centimetre.

2. The Great Pyramid of Giza has square base length of 230.4 m and a slant height of 186.4 m. Calculate the surface area of the portion of the pyramid that is exposed to sunlight. Round your answer to the nearest tenth.

3. Determine the combined surface area of all 4 AAA rechargeable batteries, to the nearest tenth of a millimetre.



Compare your answers.

1. Calculate the surface area of a sphere with diameter 6.4 cm, to the nearest tenth of a centimetre.

   $\text{diameter} = 6.4 \text{ cm}$

   $\text{radius} = \dfrac{\text{diameter}}{2}$

   $\text{radius} = \dfrac{6.4 \text{ cm}}{2}$

   $\text{radius} = 3.2 \text{ cm}$

   $SA = 4\pi r^2$

   $SA = 4\pi(3.2 \text{ cm})^2$

   $SA \doteq 128.7 \text{ cm}^2$

2. The Great Pyramid of Giza has square base length of 230.4 m and a slant height of 186.4 m. Calculate the surface area of the portion of the pyramid that is exposed to sunlight. Round your answer to the nearest tenth.

   The base of the pyramid is not exposed to sunlight. As such, only calculate the area of the four triangular faces.

   $SA_{\text{Giza Pyramid}} = ls + ws$

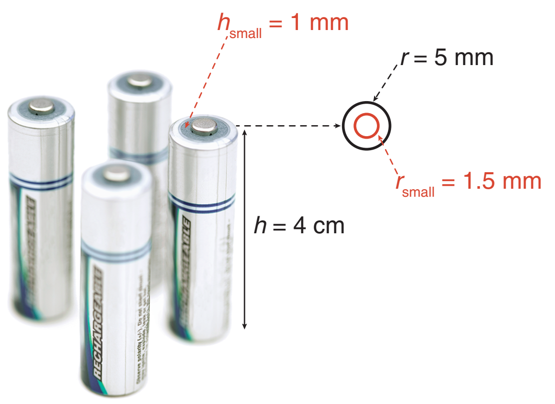
   $SA_{\text{Giza Pyramid}} = (230.4 \text{ m} \cdot 186.4 \text{ m}) + (230.4 \text{ m} \cdot 186.4 \text{ m})$

   $SA_{\text{Giza Pyramid}} = 42\,946.56 \text{ m}^2 + 42\,946.56 \text{ m}^2$

   $SA_{\text{Giza Pyramid}} = 85\,893.12 \text{ m}^2$

   The portion of the Giza Pyramid exposed to sunlight has a surface area of 85 893.12 m^2.

3. Determine the combined surface area of all 4 AAA rechargeable batteries, to the nearest tenth of a millimetre.



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   $4 \text{ cm} = 40 \text{ mm}$

   The following is one solution method for solving surface area.

   The base of the small cylinder located at the top of each battery lies on top of the large cylinder. As such, the surface area of the battery can be calculated in three parts:

1. The surface area of the large cylinder, less the surface area of its circular top:

   $SA_{\text{big}} = \pi r^2 + 2\pi rh$

2. The surface area of the small cylinder, less the surface area of its circular base:

   $SA_{\text{small}} = \pi r^2 + 2\pi rh$

3. The area of the top of the large cylinder, less the area of the base of the small cylinder (doughnut shape): $A_{\text{large top} - \text{small base}} = \pi(r_{\text{big}})^2 - \pi(r_{\text{small}})^2$

<table>
<tr>
<td>Large cylinder's surface area

$SA_{\text{big}} = \pi(r_{\text{big}})^2 + 2\pi r_{\text{big}} h$
$SA_{\text{big}} = \pi(5 \text{ mm})^2 + 2\pi(5 \text{ mm})(40 \text{ mm})$
$SA_{\text{big}} = \pi(25 \text{ mm}^2) + 2\pi(200 \text{ mm}^2)$
$SA_{\text{big}} \doteq 1\,335.2 \text{ mm}^2$</td>
<td>Small cylinder's surface area

$SA_{\text{small}} = \pi(r_{\text{small}})^2 + 2\pi r_{\text{small}} h$
$SA_{\text{small}} = \pi(1.5 \text{ mm})^2 + 2\pi(1.5 \text{ mm})(1 \text{ mm})$
$SA_{\text{small}} = \pi(2.25 \text{ mm}^2) + 2\pi(1.5 \text{ mm}^2)$
$SA_{\text{small}} \doteq 16.5 \text{ mm}^2$</td>
</tr>
<tr>
<td colspan="2">The difference between the circles' areas

$A_{\text{big circle}} - A_{\text{small circle}} = \pi(r_{\text{big}})^2 - \pi(r_{\text{small}})^2$
$A_{\text{big circle}} - A_{\text{small circle}} = \pi(5 \text{ mm})^2 - \pi(1.5 \text{ mm})^2$
$A_{\text{big circle}} - A_{\text{small circle}} = \pi(25 \text{ mm}^2) - \pi(2.25 \text{ mm}^2)$
$A_{\text{big circle}} - A_{\text{small circle}} = 71.5 \text{ mm}^2$</td>
</tr>
<tr>
<td colspan="2">Surface area of the battery

$SA_{\text{battery}} \doteq 1\,335.2 \text{ mm}^2 + 16.5 \text{ mm}^2 + 71.5 \text{ mm}^2$
$SA_{\text{battery}} \doteq 1\,423.2 \text{ mm}^2$

Total surface area of 4 batteries $\doteq SA_{\text{battery}} \times 4 \doteq 1\,423.2 \text{ mm}^2 \times 4$
Total surface area of 4 batteries $\doteq 5\,692.8 \text{ mm}^2$</td>
</tr>
</table>

The study of length, width, and height has given rise to such advancements as three-dimensional printers and virtual reality. Surface area plays a key role in these advancements, but so too does volume. In *Lesson 2.2*, the basic formulas and calculations used for determining volume will be studied.

Multimedia

Additional video examples pertaining to this lesson are available.