

# Measurement

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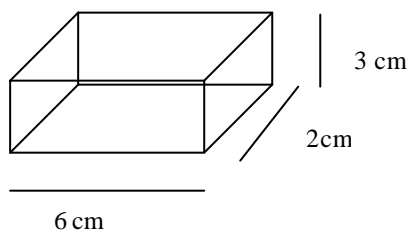
## Substrand : Indirect Measure

Use your own file paper to answer the following questions. Remember to set your work out in full and give detailed explanations.

### EFFICIENCY RATIOS

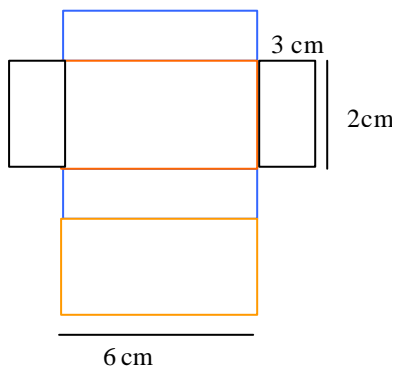
An efficiency ratio is the ratio of surface area to volume of a shape. Efficiency ratios are useful to calculate how quickly an object disperses its heat. For example a Robin disperses its body heat far more rapidly than an elephant because the ratio of its surface area to its volume is less.

For example look at the rectangular prism drawn below.



#### The volume of a rectangular prism

$$\begin{aligned}
 &= \text{length} \times \text{width} \times \text{height} \\
 &= 6\text{cm} \times 2\text{cm} \times 3\text{cm} \\
 &= 36 \text{ cm}^3
 \end{aligned}$$



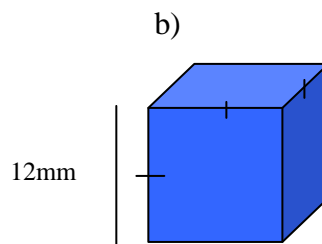
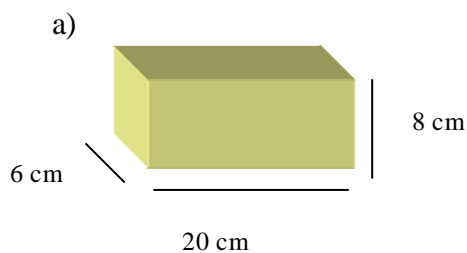
#### The surface area of rectangular prism

$$\begin{aligned}
 &= \text{total area of all rectangles} \\
 &= 2 \times (6 \times 3) + 2 \times (2 \times 3) + 2 \times (6 \times 2) \\
 &= 36 + 12 + 24 \\
 &= 72 \text{ cm}^2
 \end{aligned}$$

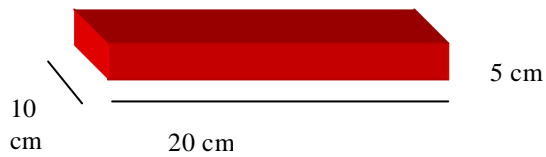
#### The efficiency ratio

$$\begin{aligned}
 &= \text{surface area} \div \text{volume} \\
 &= 72 \div 36 \\
 &= 2 \\
 &\text{expressed as a percentage} = 200\%
 \end{aligned}$$

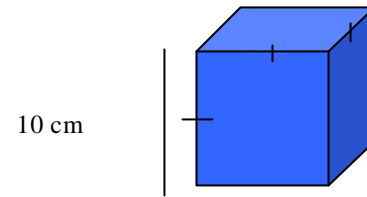
Find the efficiency ratio of the following rectangular prisms. Follow the steps above. Include the drawings of the nets.



c)



d)



2. Both the prisms in part c and part d have the same volume. Which has the greater surface area? Which has the higher efficiency ratio? Which one do you think would disperse heat more quickly? Why?

3. A Cube of length 10 cm has a volume of a litre. What is the surface area of this cube?

A cardboard milk container is almost the shape of a rectangular prism and has a capacity of 1litre. Assume that it is a rectangular prism by disregarding the top. Calculate the surface area.

Compare the efficiency ratios of each of these prisms. Can you give a reason why milk containers are the shape they are and not a cube?