Upper and Lower Bounds

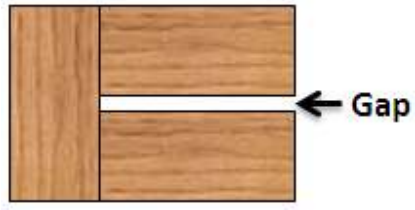
1.

The inside of a mug is cylindrical with height $8.5cm$ and diameter $7.2cm$, both correct to the nearest mm.

a) What is the maximum capacity of the mug?

b) What is the minimum capacity?

2.

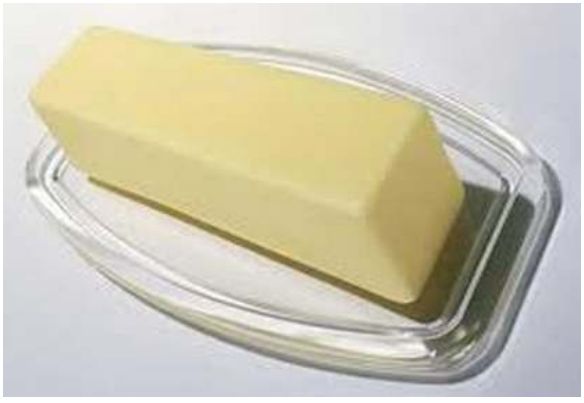


Wood flooring is made in the form of rectangles measuring $24cm$ by $11cm$, measurements correct to the nearest cm. When arranged as shown on the left:

a) What is the largest possible gap?

b) What is the smallest possible gap?

3.



A restaurant provides a stick of butter to each table. The dimensions required by the restaurant chain's management are $3cm$ by $3cm$ by $8cm$, correct to the nearest cm.

a) What is the largest possible volume?

b) What is the smallest possible volume?

c) What percentage saving would be made on butter if the smallest possible volume were provided compared to the largest?

Upper and Lower Bounds SOLUTIONS

1.

The inside of a mug is cylindrical with height $8.5cm$ and diameter $7.2cm$, both correct to the nearest mm.

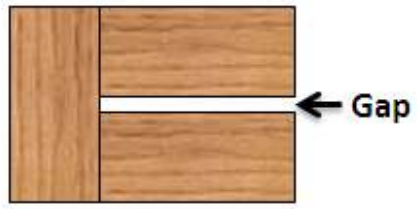
a) What is the maximum capacity of the mug?

$$\mathbf{8.55 \times \pi \times \left(\frac{7.25}{2}\right)^2 = 352.965cm^3}$$

b) What is the minimum capacity?

$$\mathbf{8.45 \times \pi \times \left(\frac{7.15}{2}\right)^2 = 339.280cm^3}$$

2.



Wood flooring is made in the form of rectangles measuring $24cm$ by $11cm$, measurements correct to the nearest cm. When arranged as shown on the left:

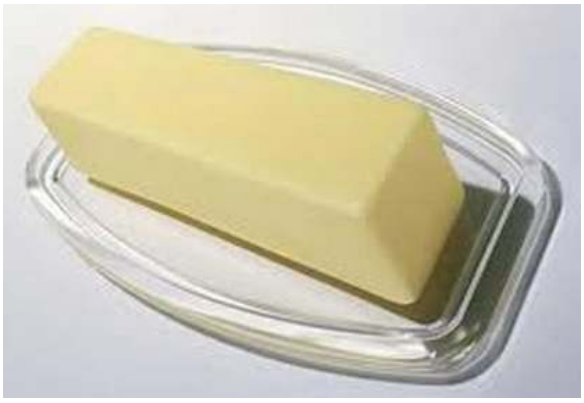
a) What is the largest possible gap?

$$\mathbf{24.5 - 2 \times 10.5 = 3.5cm}$$

b) What is the smallest possible gap?

$$\mathbf{23.5 - 2 \times 11.5 = 0.5cm}$$

3.



A restaurant provides a stick of butter to each table. The dimensions required by the restaurant chain's management are $3cm$ by $3cm$ by $8cm$, correct to the nearest cm.

a) What is the largest possible volume?

$$\mathbf{3.5 \times 3.5 \times 8.5 = 104.125cm^3}$$

b) What is the smallest possible volume?

$$\mathbf{2.5 \times 2.5 \times 7.5 = 46.875cm^3}$$

c) What percentage saving would be made on butter if the smallest possible volume were provided compared to the largest?

$$\mathbf{\frac{46.875}{104.125} = 0.450 \quad \Rightarrow \quad Min = 45\%\ of\ Max \quad \Rightarrow \quad 55\%\ saving}$$