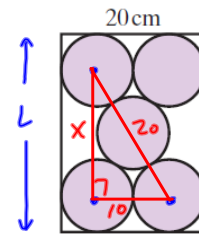


12. Five discs fit exactly into a rectangular frame of width 20 cm.
Find the area of the remaining space in the frame.



Area Circle ?

$$r = 5 \text{ cm}$$

Area 5 circles ?

$$A = \pi r^2 = \pi (5)^2 = 25\pi$$

$$5A = 5(25)\pi = 125\pi$$

Area of Rectangle ?

$$A = LB = 20L$$



$$\begin{aligned} 20^2 &= x^2 + 10^2 \\ 400 &= x^2 + 100 \\ x^2 &= 300 \\ x &= 10\sqrt{3} \end{aligned}$$

$$L = x + 10$$

$$L = 10\sqrt{3} + 10 \approx 27.3$$

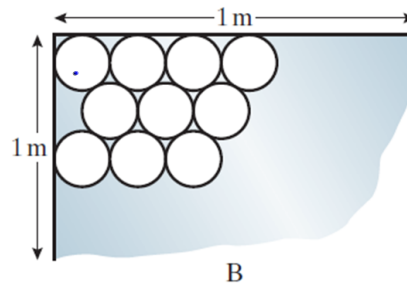
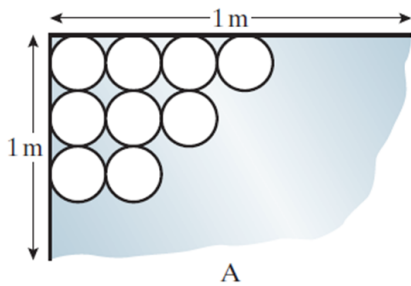
$$\begin{aligned} A_{\text{rectangle}} &= 20(10\sqrt{3} + 10) \\ &= 546.4 \end{aligned}$$

Empty Space ?

$$A = \text{rectangle} - \text{circles}$$

$$A_{\text{empty}} = 546.4 - 125\pi = 153.7$$

2.



Circular holes, of radius 1 cm, are to be cut out of a sheet of metal. The sheet of metal measures 1 m \times 1 m. Two methods, A or B, could be used, as shown above.

- (i) Calculate the number of holes possible with each method.
- (ii) Calculate the percentage waste from each piece of metal.