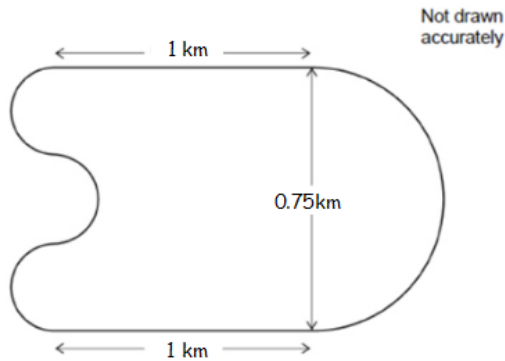


a)

A motor racing circuit consists of

- two parallel straight sections, each of length 1 km
- a semicircle of diameter 0.75km
- three equal, smaller semicircles.



The length of a motor race must be greater than 200km

What is the lowest number of full laps needed at this circuit?

You **must** show your working.

Solution

Length of Large semi-circle

diameter: 0.75km

$$\text{Length: } \frac{\pi \times 0.75}{2} = 1.18 \text{ (to 2 d.p.)}$$

Length of three small semi circles

Diameters:  $0.75\text{km} \div 3 = 0.25\text{km}$

$$\text{Length: } \frac{\pi \times 0.25}{2} \times 3 = 1.18 \text{ (to 2 d.p.)}$$

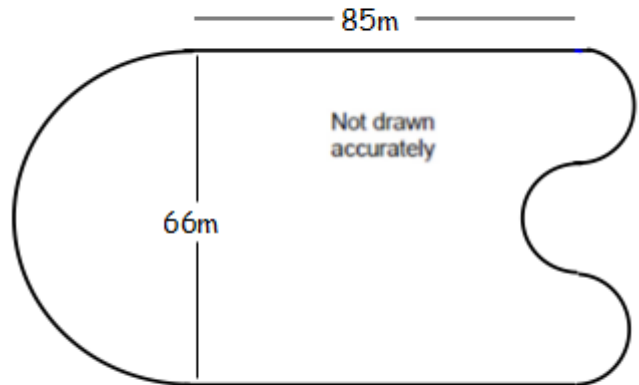
$$\begin{aligned} \text{Total length of track} &= 1 \text{ km} + 1 \text{ km} + 1.18 \text{ km} + 1.18\text{km} \\ &= 4.36\text{km} \end{aligned}$$

$$\text{Number of laps needed } 200\text{km} \div 4.36\text{km} = 45.9 \text{ laps}$$

45 laps not enough so 46 laps

b)

- A horse racing course consists of:
- two parallel straight sections, each 85m long
- a semi circle of diameter 66m
- three equal smaller semicircles.



The length of a horse race must not exceed 2000m. What is the maximum number of full laps for a race on the course?

Solution

Length of Large semi-circle

diameter: 66m

$$\text{Length: } \frac{\pi \times 66}{2} = 103.67\text{m (to 2 d.p.)}$$

Length of three small semi circles

Diameters:  $66\text{m} \div 3 = 22\text{m}$

$$\text{Length: } \frac{\pi \times 22}{2} \times 3 = 103.67 \text{ m (to 2 d.p.)}$$

$$\begin{aligned} \text{Total length of track} &= 85\text{m} + 85\text{m} + 103.67\text{m} + 103.67\text{m} \\ &= \dots\dots\dots \end{aligned}$$

$$\text{Number of laps needed } \dots\dots\dots\text{m} \div \dots\dots\dots\text{m} = \dots\dots\dots \text{ laps}$$

Maximum number of full laps is .....

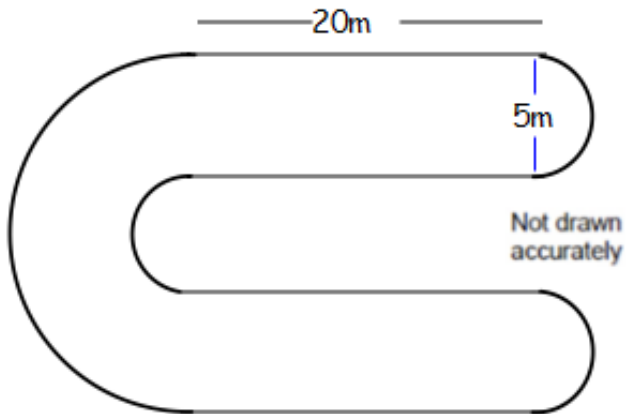
c)

A go-carting circuit consists of

Four parallel lines of equal length, 20m

A large semi-circle

Three equal sized smaller semi-circles,  
diameters 5meters



A full tank of petrol will last a cart 10,000m  
How many full laps of the circuit can the cart  
complete on a full tank?

Solution

Length of Large semi-circle

diameter:  $3 \times 5\text{m} = 15\text{m}$

Length:  $\frac{\pi \times 15}{2} = 23.56$  (to 2 d.p.)

Length of three small semi-circles

Total length of track =

Number of full laps on a full tank

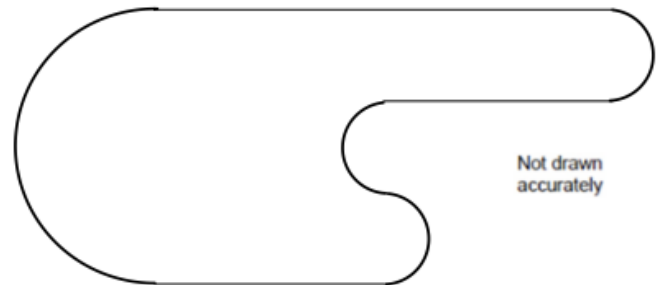
d)

A motor racing circuit consists of

three parallel straights, two at 0.6km and the other twice as long

Three equal small semi-circles

One larger semi-circle, diameter 0.6km



A race car can travel 150km before needing to re-fuel. How  
many full laps can a car travel before re-fuelling?

Solution