Exercise 13.2

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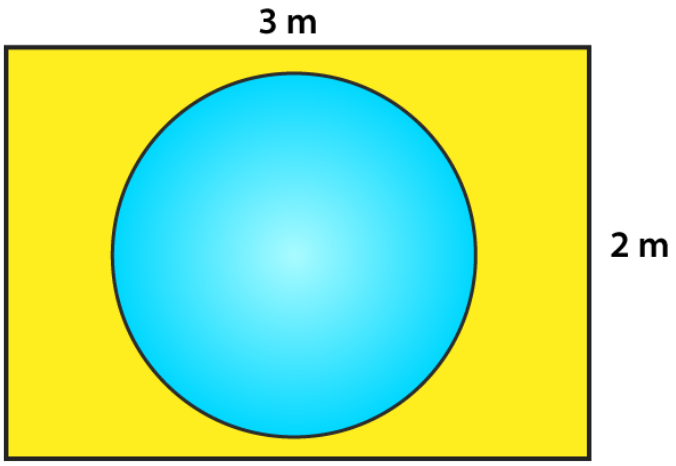
1. Suppose you drop a tie at random on the rectangular region shown in fig. below. What is the probability that it will land inside the circle with diameter 1 m?

Solution:



Area of a circle with radius 0.5 m A circle = $(0.5)^2 = 0.25\ \pi m^2$
Area of rectangle = 3 x 2 = $6m^2$

$$\text{Probability (geometric)} = \frac{\text{measure of specified region part}}{\text{measure of whole region}}$$

The probability that tie will land inside the circle with diameter 1m

$$= \frac{\text{area of circle}}{\text{area of rectangle}}$$

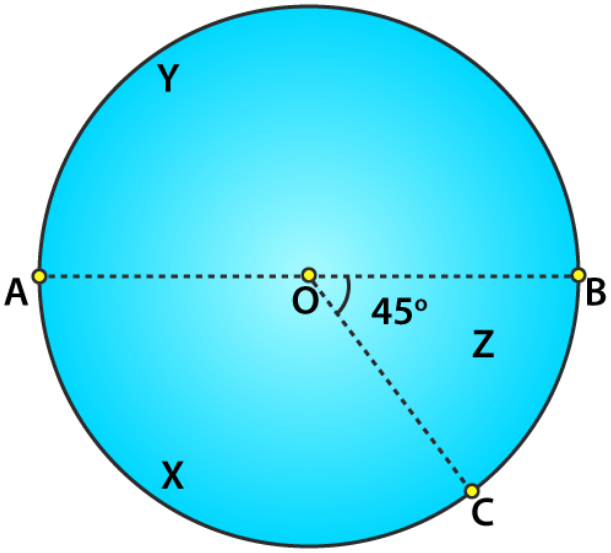
$$= \frac{0.25\pi m^2}{6m^2}$$

$$= \frac{\pi}{24}$$

Therefore, the probability that the tie will land inside the circle = $\pi/24$

2. In the accompanying diagram, a fair spinner is placed at the centre O of the circle. Diameter AOB and radius OC divide the circle into three regions labelled X, Y and Z.? If ∠BOC = 45°. What is the probability that the spinner will land in the region X?

Solution:



Given,
∠BOC = 45°
∠AOC = 180 - 45 = 135° [Linear Pair]
Area of circle = πr^2
Area of region x = $\theta/360 \times \pi r^2$
= $135/360 \times \pi r^2$
= $3/8 \times \pi r^2$
The probability that the spinner will land in the region

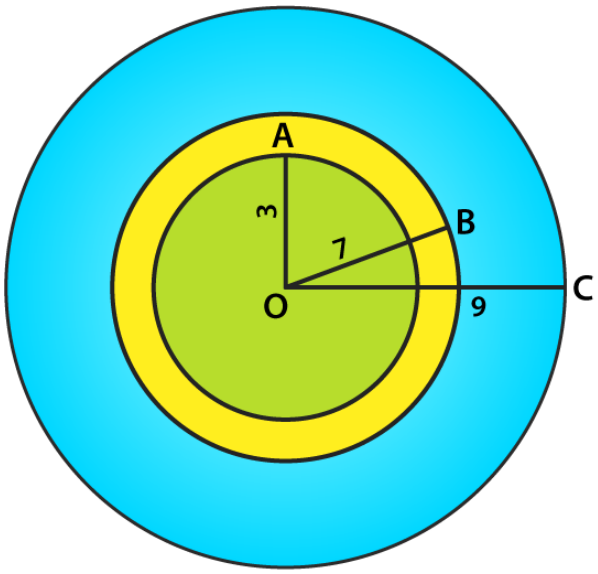
$$x = \frac{\text{Area of region x}}{\text{Total area of circle}}$$

$$x = \frac{\frac{3}{8}\pi r^2}{\pi r^2}$$

x = 3/8
Therefore, the probability that the spinner will land in region X is 3/8.

3. A target is shown in fig. below consists of three concentric circles of radii, 3, 7 and 9 cm respectively. A dart is thrown and lands on the target. What is the probability that the dart will land on the shaded region?

Solution:



We have,
1st circle - with radius 3
2nd circle - with radius 7
3rd circle - with radius 9
So, their areas would be
Area of 1st circle = $\pi(3)^2 = 9\pi$
Area of 2nd circle = $\pi(7)^2 = 49\pi$
Area of 3rd circle = $\pi(9)^2 = 81\pi$
Area of shaded region = Area of 2nd circle - Area of 1st circle
$= 49\pi - 9\pi$
$= 40\pi$
Probability that it will land on the shaded region

$$= \frac{\text{area of shaded region}}{\text{area of third circle}}$$

$$= \frac{40\,\pi}{81\pi}$$

$$= \frac{40}{81}$$

Therefore, the probability that the dart will land on the shaded region is 40/81.