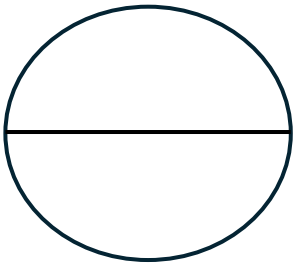
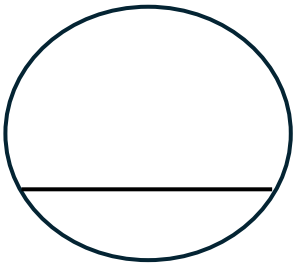
Q1.

(a)

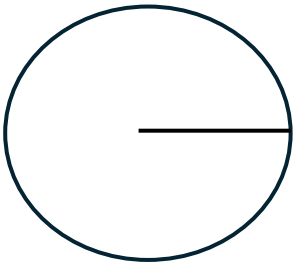


(b)



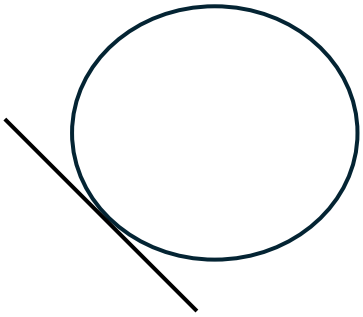
Q2.

(a)



Radius

(b)



Tangent

Q3.

$$\text{Circumference} = 2\pi r = 2 \times 3.14 \times 5 = 31.42 \text{ cm}$$

Q4.

Diameter $d = 8$ m $\implies r = \frac{d}{2} = 4$ m

$$\text{Area} = \pi r^2 = 3.14 \times 4^2 = 3.14 \times 16 = 50.3 \text{ m}^2$$

Q5.

$$\text{Diameter } d = 10 \text{ mm}$$

$$r = \frac{d}{2} = \frac{10}{2} = 5\ mm$$

$$\text{Circumference} = 2\pi r = 2\pi \times 5 = 10\pi \text{ mm}$$

Q6.

$$\text{Radius } r = 6 \text{ cm}$$

$$\text{Area} = \pi r^2 = \pi \times 6^2 = \pi \times 36 = 36\pi \text{ cm}^2$$

Q7.

Area of semi-circle $A = 32$ m²

$$A = \frac{\pi r^2}{2} \quad 32 = \frac{1}{2} \times 3.14 \times r^2 \implies$$

$$32 = 1.57\, r^2 \implies r^2 = \frac{32}{1.57} \approx 20.38$$

$$r \approx \sqrt{20.38} \approx 4.51 \text{ m}$$

Perimeter of semi-circle:

$$P = \pi r + 2r = 3.14 \times 4.51 + 2 \times 4.51 \approx 14.15 + 9.02 = 23.2m$$

Q8.

Diameter $d = 20$ m $\implies r = 10$ m

$$\text{Circumference} = 2\pi r = 2 \times 3.14 \times 10 = 62.8 \text{ m}$$

$$\text{Total cost} = 62.8 \times 12.50 = £785$$

Q9.

Diameter of semi-circle = $2r = 6$ m

So all sides of square are equal. PR = 6 m = s

$\text{Area}_{\text{square}} = s^2 = 6^2 = 36$ m²

$\text{Area}_{\text{semi-circle}} = \frac{1}{2}\pi r^2 = 0.5 \times 3.14 \times 3^2 = 0.5 \times 3.14 \times 9 \approx 14.13$ m²

Total area = 36 + 14.13 = 50.14 m²

Boxes needed = 50.14 / 20 = 2.506 $\Longrightarrow$ 3 boxes (Rounding Up)

Q10.

Radius of smaller circle: $r = 4$ cm

Radius of larger circle:

$$R = \frac{\text{diameter}}{2} = \frac{14}{2} = 7 \text{ cm}$$

$A_{\text{large}} = \pi R^2 = 3.14 \times 7^2 = 3.14 \times 49 \approx 153.86$ cm²

$A_{\text{small}} = \pi r^2 = 3.14 \times 4^2 = 3.14 \times 16 \approx 50.24$ cm²

$A_{\text{ring}} = 153.86 - 50.24 \approx 103.62$ cm²

Q11.

Three quarters of a circle:

$$\text{Curved length} = \frac{3}{4} \times 2\pi r = \frac{3}{4} \times 2 \times 3.14 \times 8 \approx 37.68 \text{ m}$$

$$\text{Two straight sides} = 2 \times r = 2 \times 8 = 16 \text{ m}$$

$$P = 37.68 + 16 \approx 53.68 \text{ m}$$

Q12.

Diameter of semi-circle: $XY = 10$ cm $\implies r = \frac{10}{2} = 5$ cm

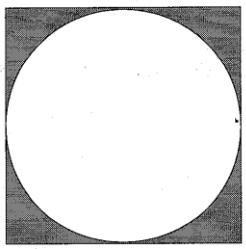
$$\text{Area of sector} = \frac{\theta}{360}\pi r^2, \theta = 90°$$

$$\text{Area of sector} = \frac{90}{360}\pi(10^2) = \frac{1}{4}\pi \times 100 = 25\pi \approx 78.5 \text{ cm}^2$$

$$\text{Area of semi-circle} = \frac{1}{2}\pi r^2 = 0.5 \times 3.14 \times 5^2 = 0.5 \times 3.14 \times 25 \approx 39.25 \text{ cm}^2$$

$$\text{Shaded area} = 78.5 - 39.25 \approx 39.25 \text{ cm}^2$$

Q13.



Side of square: $s = 10$ cm

$$A_{\text{square}} = s^2 = 10^2 = 100 \text{ cm}^2$$

$$r = \frac{s}{2} = \frac{10}{2} = 5 \text{ cm}$$

$$A_{\text{circle}} = \pi r^2 = 3.14 \times 5^2 = 3.14 \times 25 \approx 78.5 \text{ cm}^2$$

$$A_{\text{shaded}} = 100 - 78.5 = 21.5 \text{ cm}^2$$

Q14.

$$r_P = 15 \text{ cm}$$

$$A_P = \frac{1}{2}\pi r_P^2 = 0.5 \times 3.14 \times 15^2 = 0.5 \times 3.14 \times 225 = 353.25 \text{ cm}^2$$

Given that

$$A_P = 4.5 \times A_Q$$

$$A_Q = A_P = 353.25 = 78.5 \text{ cm}_2$$

4.5 4.5

Now,

$$A_Q = \pi r_{Q2}$$

$$78.5 = 3.14\, r_Q^2$$

$$r_Q^2 = 25$$

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