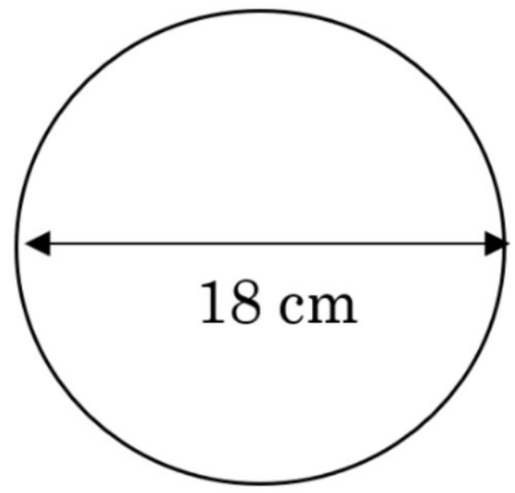
Circles Exam Practice

Q1. Work out the area of the shape below correct to 1 decimal place, stating the correct units.



Area $= \pi r^2$

$= \pi \times 9^2$

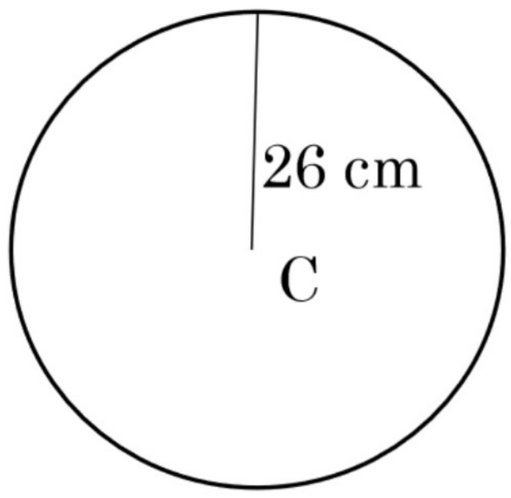
$= 254.468\ldots$

$= \underline{254.5}\ cm^2$

Answer: $254.5\ cm^2$

(2 marks)

Q2. Work out the area of the circle with centre C correct to 1 decimal place, stating the correct units.



$\text{Area} = \pi \times 26^2$

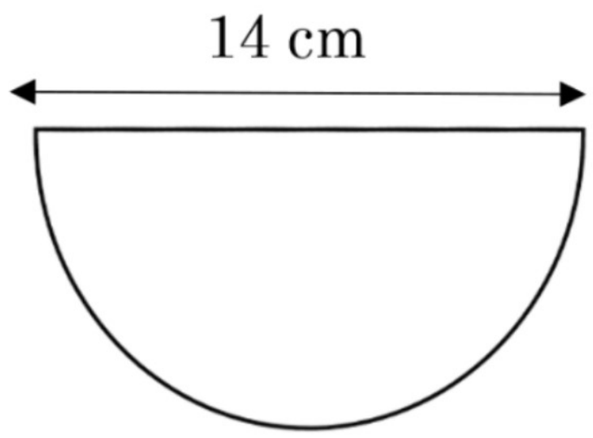
$= 2123.71...$

$= \underline{2124\text{ cm}^2}$

Answer: 2124 cm^2

(2 marks)

Q3. a) Work out the area of the semi-circle below correct to 1 decimal place, stating the correct units.



Full circle area : $\pi \times 7^2$ (using πr^2)

$= 49\pi$

Semi-circle : $\frac{49\pi}{2}$

$= 76.96..$

$= 77.0 cm^2$

Answer: $77.0 cm^2$

(2 marks)

b) Work out the perimeter of the shape.

- circumference of full circle $= \pi \times d$

$= 14\pi$

$\Rightarrow$ Curved region of semi-circle $= \frac{14\pi}{2}$

$= 7\pi$

- Total perimeter of shape is curved region + diameter

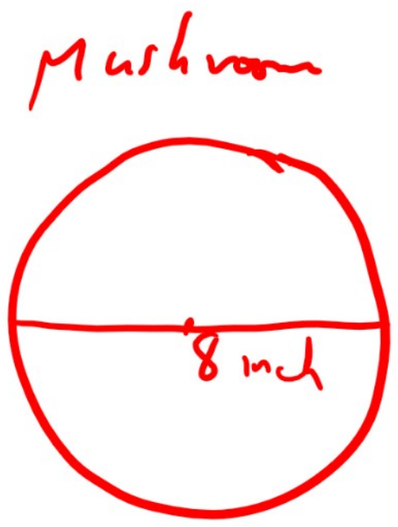
$= 7\pi + 14$

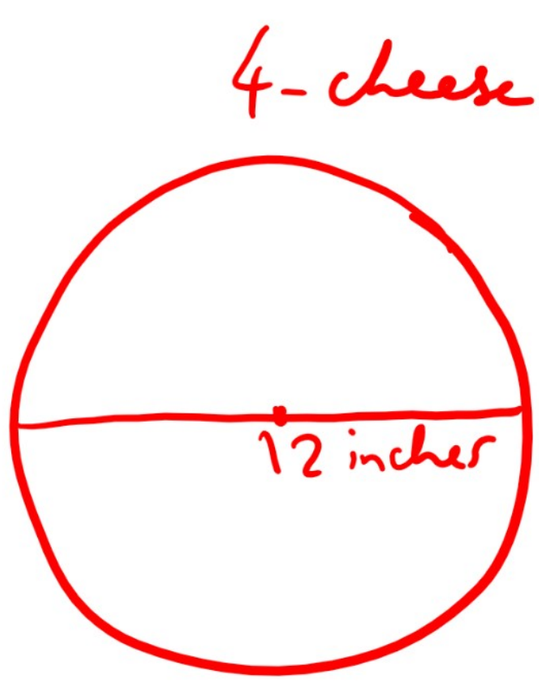
$= 36.0 cm$

Answer: $36.0 cm$

(2 marks)

Q4. Jo orders two pizzas which are in the shape of a circle: a mushroom pizza, which is 8 inches in diameter, and a four cheese pizza, which is 12 inches in diameter. If she eats half of the mushroom pizza and ¾ of the four-cheese pizza, work out what percentage of the pizzas she has left, giving your answer to the nearest whole number.





- Total area of both pizzas $= \pi \times 4^2 + \pi \times 6^2$
  $= 16\pi + 36\pi$
  $= 52\pi$

- Jo eats $\frac{1}{2}(16\pi) + \frac{3}{4}(36\pi)$
  $= 8\pi + 27\pi$
  $= 35\pi$,

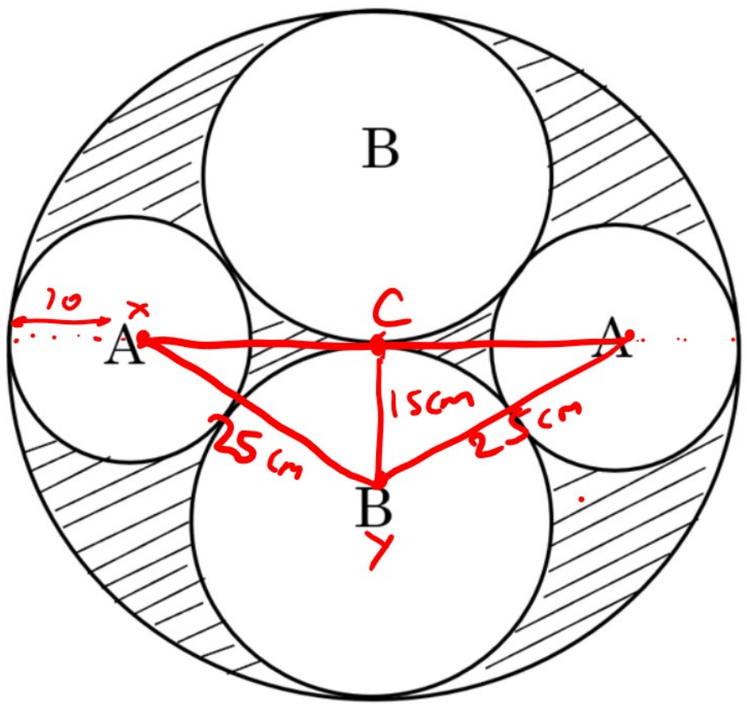
  $\Rightarrow$ she has $52\pi - 35\pi = 17\pi$ left

- % Area left $= \frac{17\pi}{52\pi} \times 100$
  $= 32.69\ldots$
  $= 33\%$

Answer: 33%.

(4 marks)

Q5. The diagram below shows a circle containing 4 touching circles.



(let X = centre of circle A;
C = centre of largest circle)

The circles marked A have radius 10 cm, whilst the radius of the circles marked B have radius 15 cm.

Find the percentage of the shape which is shaded, giving your answer to 1 decimal place.

. By Pythagoras' Theorem, $(XC)^2 = 25^2 - 15^2$

$\Rightarrow (XC)^2 = 400$

$\Rightarrow XC = \sqrt{400}$

$= 20$

. Radius largest circle $= 10 + 20$

$= 30$ cm

. shaded area = largest circle − 2 × Area of circle A − 2 × Area of circle B

$= 30^2\pi - 2\times 10^2\pi - 2\times 15^2\pi$

$= 900\pi - 200\pi - 450\pi$

$= 250\pi$

. $\%$ shaded area $= \frac{250\pi}{900\pi} \times 100$

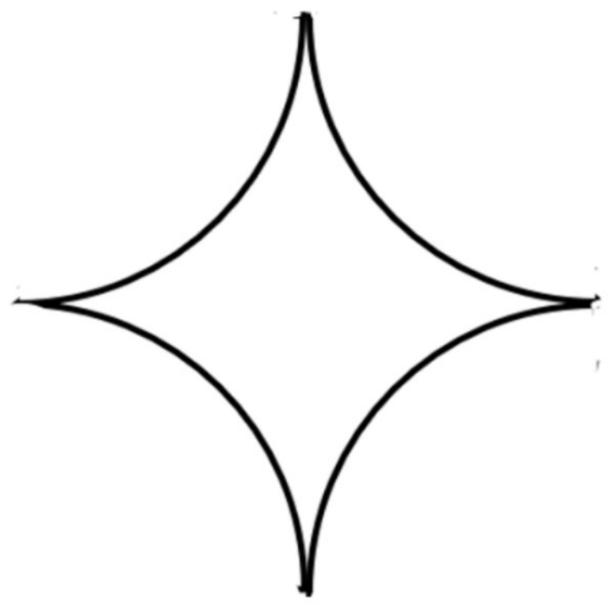
$= 27.7\ldots$

Answer: 27.8 %

(5 marks)

Q6. The shape below has been formed from 4 quarter-circles. Each full circle has a radius of 20 cm.

Find the circumference of the shape, giving your answer in terms of π.



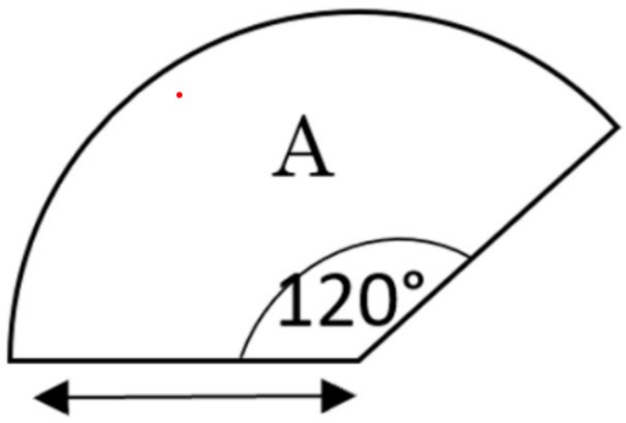
- Circumference of shape = circumference full circle, as the 4 quarters make up 1 circle
- using circumference = $\pi \times d$, we have $\pi \times 40$

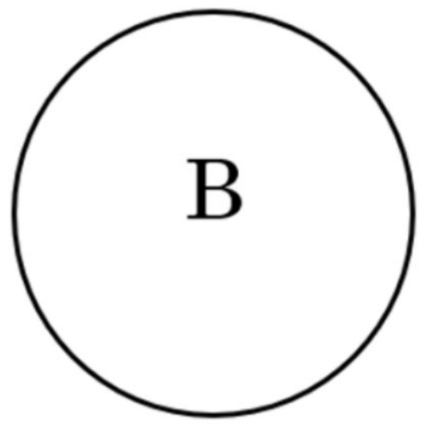
$= 40\pi$

Answer: 40π

(3 marks)

Q7. Shape A is a sector of a circle. The area of shape A is 3 times larger than shape B. Find the radius of shape B.





- Area shape $A = \frac{120}{360} \times \pi \times 6^2$

$= \frac{1}{3}\pi(36)$

$= 12\pi$

- Since area A = 3 × area B

$\Rightarrow 12\pi = 3 \times$ area B

$\Rightarrow$ area $B = \frac{12\pi}{3}$

$= 4\pi$

- Area $B = \pi r^2$

$\Rightarrow \pi r^2 = 4\pi$

$\Rightarrow r^2 = 4$

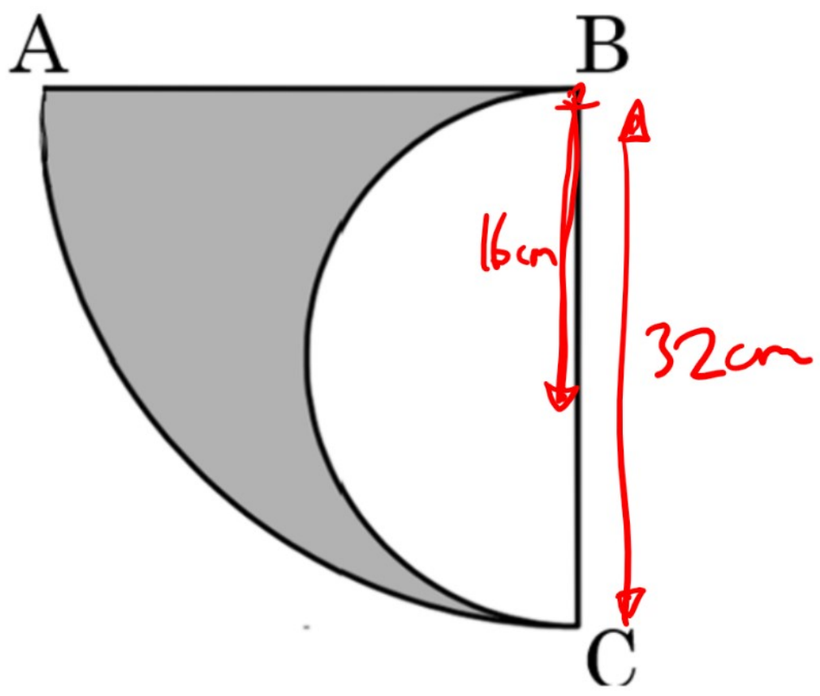
$\Rightarrow r = 2$

Answer: $r = 2$

(4 marks)

Q8. In this shape, angle ABC is a right-angle. The radius of the white semi-circle is 16 cm.

Find the circumference of the shaded region, giving your answer in terms of π.



· Length of AC = $\frac{1}{4}$ circumference of full circle, radius 16

using circumference of circle = $\pi \times d$,

$\Rightarrow AC = \frac{1}{4} \times \pi \times 64$

$= 16\pi$

· AB = 32 (= BC; both are radii)

· Curved length BC = $\frac{1}{2}$ Circumference circle, diameter 32

$= \frac{1}{2} \times \pi \times 32$

$= 16\pi$

· Total Length required = $16\pi + 32 + 16\pi$

$= 32\pi + 32$

Answer: $32\pi + 32$

(4 marks)