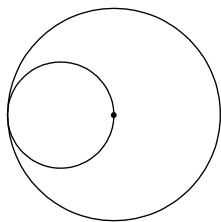


UKMT QUESTIONS ON CIRCLES

1. The smaller circle touches the larger circle, and goes through the centre of the larger circle.

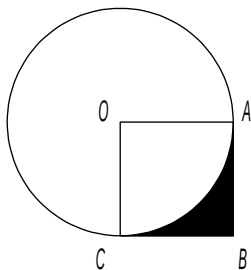
What fraction of the area of the larger circle is outside the smaller circle?



- A $\frac{2}{3}$ B $\frac{3}{4}$ C $\frac{4}{5}$ D $\frac{5}{6}$ E $\frac{7}{8}$

2. The point O is the centre of a circle of radius 1 unit, OA , OC are radii, and $OABC$ is a square.

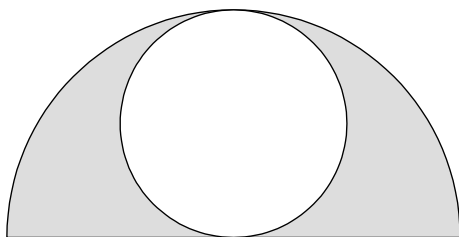
What is the area of the shaded region (in square units)?



- A $1 - \frac{\pi}{4}$ B $1 - \frac{\pi}{2}$ C $\frac{(1 - \pi)}{4}$ D $2 - \frac{\pi}{2}$ E $2 - \frac{\pi}{4}$

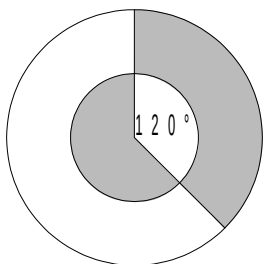
3. The diagram shows a semicircle containing a circle which touches the circumference of the semicircle and goes through its centre.

What fraction of the semicircle is shaded?



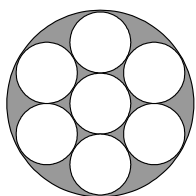
- A $\frac{2}{3}$ B $\frac{1}{2}$ C $\frac{1}{\pi}$ D $\frac{2}{\pi}$ E $\frac{3}{\pi}$

4. The diagram shows two concentric circles of radii r and $2r$ respectively.
What is the ratio of the total shaded area to the total unshaded area?



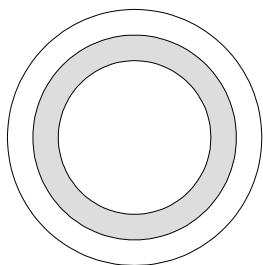
- A 5:7 B 7:5 C 1:1 D 2:3 E 3:2

5. The diagram shows seven circles of equal radius which fit snugly in the larger circle.
What is the ratio of the unshaded area to the shaded area?



- A 7:1 B 7:2 C $2\sqrt{3} : 1$ D 9:2 E 1:1

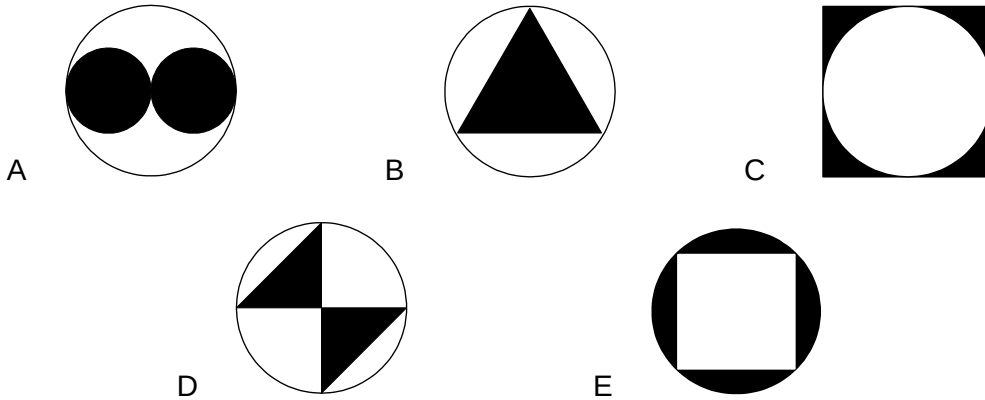
6. The three circles in the diagram have the same centre and have radii 3cm, 4cm and 5cm.
What percentage of the area of the largest circle is shaded?



- A 20% B 25% C 28% D 30% E $33\frac{1}{3}\%$

7. The large circles in each figure have the same radius.

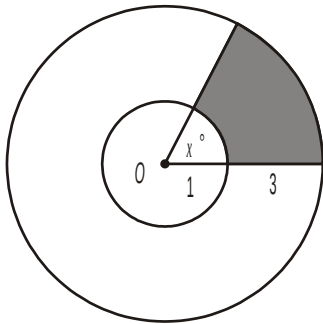
Which shaded area is the greatest?



8. The point O is the centre of both circles and the shaded area is one-sixth of the area of the outer circle.

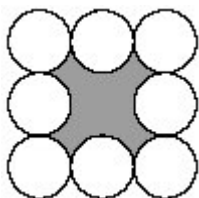
What is the value of x ?

- A 60 B 64 C 72 D 80 E 84



9. The shaded region is bounded by eight equal circles with centres at the corners and midpoints of the sides of a square. The perimeter of the square has length 8.

What is length of the perimeter of the shaded region?



- A π B 2π C 8 D 3π E 4π