



Intermediate Math Circles

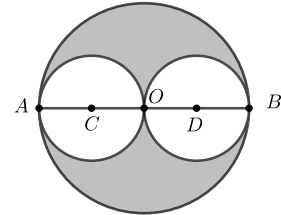
Triangles, Circles and Area

Problem Set

Express your answers as simplified exact numbers. For example, $\pi + 1$ and $1 - \sqrt{2}$ are simplified exact numbers.

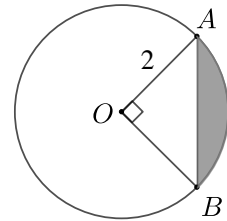
Exercise 1

Three circles are centred at C , O and D as shown. AB is a diameter of the larger circle and C and D are on AB . OA and OB are diameters of the smaller circles. The larger circle has a diameter of 12. Find the area of the shaded region.



Exercise 2

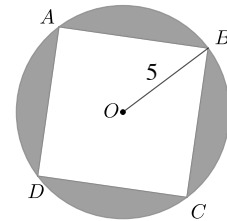
The circle with centre O has a radius of 2. Points A and B are on the circle and $\angle AOB = 90^\circ$ as shown. Find the area of the shaded region.



Exercise 3

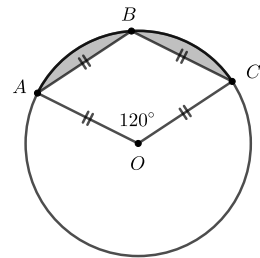
Square $ABCD$ is inscribed in the circle with centre O and radius 5 as shown. Find the area of the shaded region.

A square is inscribed in a circle if all four vertices of the square lie on the circle.



Exercise 4

A circle is centred at O . $OABC$ is a rhombus with A , B , and C on the circle. If $\angle AOC = 120^\circ$ and $OA = 10$, find the area of the shaded region. (See if you can solve this problem two ways. One using equilateral triangles and the other using properties of a rhombus.)



Exercise 5

Two circles are centred at C and O as shown. The circles intersect at points A and B with $\angle AOB = 60^\circ$ and $\angle ACB = 90^\circ$. The circle centred at O has a radius of $\sqrt{2}$. Find the area of the shaded region.

