11.3 Extension: Segment calculations

Unless otherwise instructed, round final answers to three significant figures.
Formulas
Where r is the circle's radius, D its diameter, and θ is the sector angle measured in degrees.

$$\text{Circle circumference:} \quad C = \pi D = 2\pi r$$

$$\text{Length of an arc:} \quad l = \frac{\theta}{360} \times 2\pi r$$

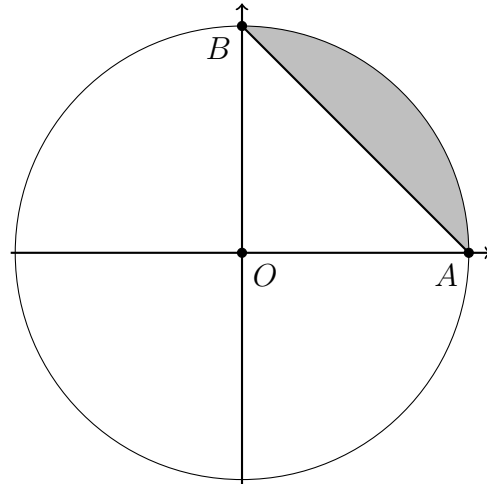$$\text{The area of a circle:} \quad A = \pi r^2$$

$$\text{Area of a sector:} \quad A = \frac{\theta}{360} \times \pi r^2$$

1. Given the circle O centered at the origin with radius $r = 10$ and $A(10, 0)$, $B(0, 10)$.

   (a) Find the circumference of circle O.

   (b) Find the area of the circle.

   (c) Find the length of the arc in the first quadrant (a quarter of the circle).

   (d) Find the area of the sector AOB (quarter circle in the first quadrant).
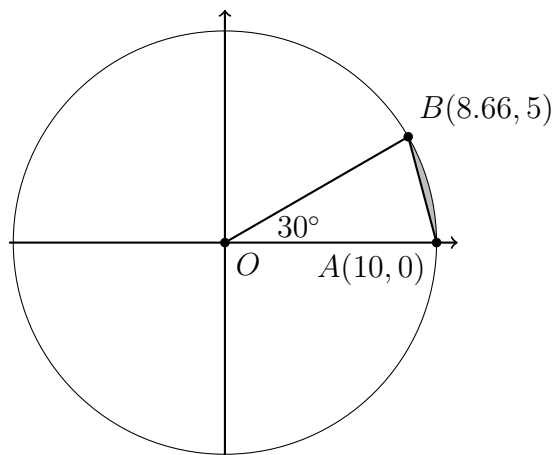
   (e) Find the area of the triangle AOB.

   (f) Find the area of the segment AB of circle O (shaded area).

2. Sector AOB of circle O has a central angle of $30°$ with $A(10, 0)$, $B(8.66, 5)$.

   (a) Find the area of the sector AOB.

   (b) Find the area of the triangle AOB.

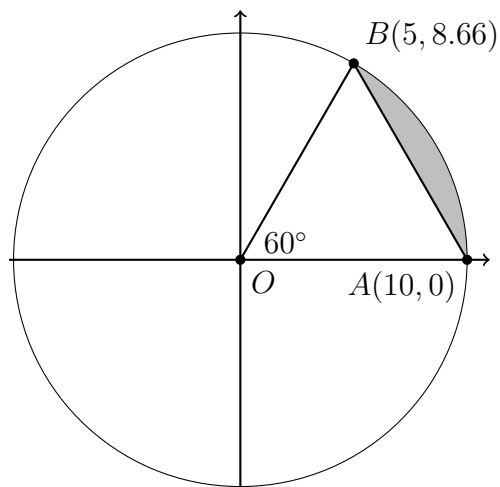   (c) Find the area of segment AB (shaded area).

3. Sector AOB of circle O has a central angle of $30°$ with $A(10, 0)$, $B(5, 8.66)$.

   (a) Find the area of the sector AOB.

   (b) Find the area of the triangle AOB.

   (c) Find the area of segment AB (shaded area).

4. Calculate the area of a $45°$ sector and its inscribed triangle and segment, given a radius of 10.