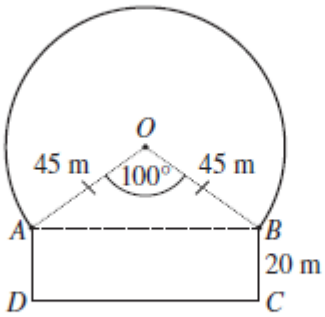
**2016 30c** A school playground consists of part of a circle, with centre $O$, and a rectangle as shown in the diagram. The radius $OB$ of the circle is 45 m, the width $BC$ of the rectangle is 20 m and $\angle AOB$ is 100°.
What is the area of the whole playground, correct to the nearest square metre?

**5**




Firstly, find the length of $AB$:

$$c^2 = a^2 + b^2 - 2ab\cos C$$
$$= 45^2 + 45^2 - 2(45)(45)\cos 100^\circ$$
$$= 4753.27512\ldots$$
$$c = 68.94399988..$$
$$= 68.94 \text{ (2 dec pl)}$$

Area of rectangle $= 68.94 \times 20$
$= 1378.88$ (2 dec pl)

Area of triangle $= \frac{1}{2} \times 45 \times 45 \times \sin 100^\circ$
$= 997.1178499\ldots$
$= 997.12$ (2 dec pl)

As $360^\circ - 100^\circ = 260^\circ$,

Area of major sector $= \frac{\theta}{360}\pi r^2$
$= \frac{260}{360} \times \pi \times 45^2$
$= 4594.579256\ldots$
$= 4594.58$ (2 dec pl)

$\therefore$ Total area $= 1378.88 + 997.12 + 4594.58$
$= 6970.58$
$= 6971$ (nearest whole) $\therefore$ the area is 6971 m$^2$.

State Mean: **2.59**

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by NESA.

### NESA: Notes from the Marking Centre

Candidates showed strength in these areas:

- calculating the area of simple composite figures (part c)
- applying the sine rule or cosine rule to find the side length of a triangle (part c)