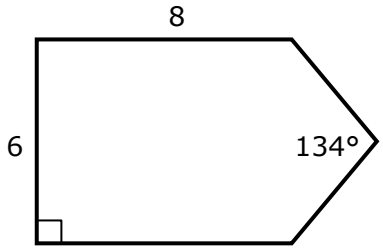
Merit+ Trigonometry Practice #3

1. The pentagon opposite has mirror symmetry.

   Find its perimeter.



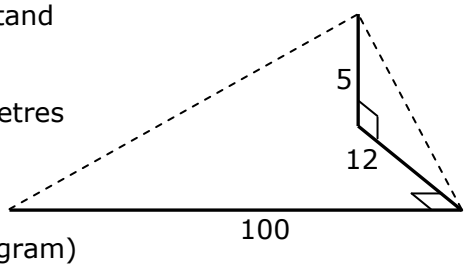
2. A boat heads South for 20 km, then on bearing 260 for 15 km, then returns to the start.

   How far did it travel in total?

3. Al is watching his son run a 100 metre race from a grandstand parallel to the track.

   His position in the stand is 5 metres higher than and 12 metres back from directly across from the start line

   What angle does his head move through as he watches his son? (i.e. the angle between the dotted lines in the diagram)

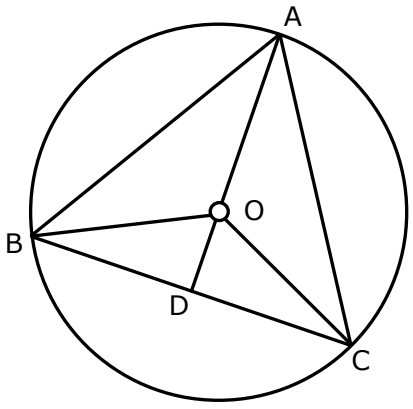


4. Δ ABC isosceles, with AB = AC

   ∠AOC = 50°

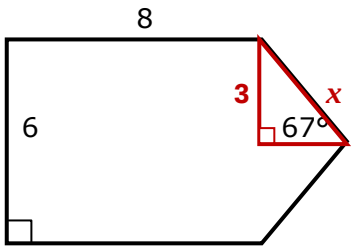
   AO is 8 cm.

   What is the distance OD?



Answers: Merit+ Trigonometry Practice #3

1. The pentagon opposite has mirror symmetry. Find its perimeter.



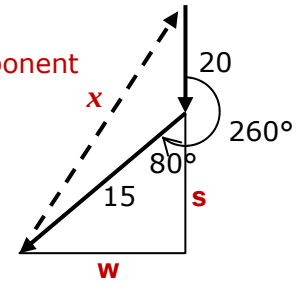
End triangle halved gives 67° angle and 6 ÷ 2 = 3 height

$x = 3 \div \sin 67° = 3.259$

Perimeter = 8 + 6 + 8 + x + x = **28.5**

2. A boat heads South for 20 km, then on bearing 260 for 15 km, then returns to the start.

How far did it travel in total?



Bearing 260 is 80° from south, shown as triangle with S and W component

Total gone South = 20 + cos 80° × 15 = 22.605

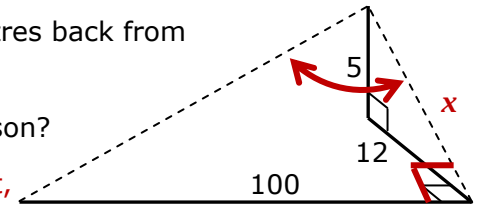
Total gone West = sin 80° × 15 = 14.772

Return trip, $x = \sqrt{22.605^2 + 14.772^2}$ = 27.00

Total travel = 20 + 15 + 27 = **62 km**

3. Al is watching his son run a 100 metre race from a grandstand parallel to the track.

His position in the stand is 5 metres higher than and 12 metres back from directly across from the start line



What angle does his head move through as he watches his son?

The key is to recognise that the dotted line to the start, x, and the 100 m are 90° (think of the base of a box, the vertical is at 90° to any line on the base.)

The original distance, $x = \sqrt{8^2 + 12^2}$ = 14.4222

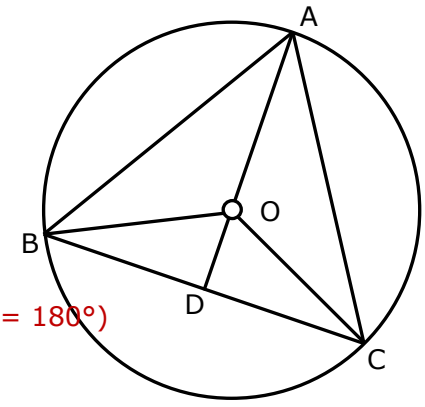
The wanted angle shown arrowed is $\tan^{-1}\left(\frac{100}{14.42}\right)$ **= 81.8°**

4. Δ ABC isosceles, with AB = AC

∠BAC = 50°

AO is 8 cm.

What is the distance OD?



∠BAC = 50° ⇒ ∠OAC = 25° half of it

∠ACO = 25° (triangle from centre is isosceles)

∠AOC = 130° (Δ = 180°) and ∠COD = 50° (∠s on line = 180°)

OC = 8, as radius same as OA

∠ODC = 90°, because AD divides the isosceles ΔABC, so we can use trig on ΔCDO

OD = cos 50° × 8 = **5.142**