

Trigonometry

Aaah, you might have thought you'd left the triangular wonders of trigonometry behind when you finished GCSE Maths. But no, they're back to bring you unbridled joy and unlimited thrills once again.

- 1 Given that $\cos \theta = \frac{5}{6}$ and $0^\circ < \theta < 90^\circ$, find the exact values of $\sin \theta$ and $\tan \theta$.

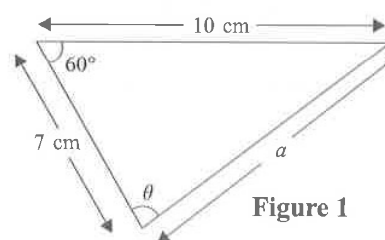
$\sin \theta = \dots\dots\dots$, $\tan \theta = \dots\dots\dots$

(4 marks)

- 2 Sketch the graphs of $y = \sin x$ and $y = \sin \frac{x}{2}$ in the range $0^\circ \leq x \leq 720^\circ$ on the same set of axes, showing the points at which the graphs cross the x -axis.

(3 marks)

- 3 Find the missing length a and angle θ in the triangle shown in Figure 1.



$a = \dots\dots\dots$ cm

$\theta = \dots\dots\dots^\circ$

(4 marks)

Trigonometry

- 4 A sheep pen is modelled as a triangle with side lengths of 50 m, 70 m and 90 m.

a) Find the area of the sheep pen to the nearest square metre.

..... m²
(5 marks)

b) Comment on the accuracy of the model.

.....
.....
(1 mark)

- 5 Adam and Bethan have each attempted to solve the equation $\sin 2t = \sqrt{2} \cos 2t$ for the range $-90^\circ < t < 90^\circ$. Their working is shown below.

Adam

$$\begin{aligned}\sin 2t &= \sqrt{2} \cos 2t \\ \tan 2t &= \sqrt{2} \\ \tan t &= \frac{\sqrt{2}}{2} \\ t &= 35.26\dots^\circ\end{aligned}$$

Bethan

$$\begin{aligned}\sin 2t &= \sqrt{2} \cos 2t \\ \sin^2 2t &= 2 \cos^2 2t \\ 1 - \cos^2 2t &= 2 \cos^2 2t \\ \cos^2 2t &= \frac{1}{3} \\ \cos 2t &= \pm \frac{1}{\sqrt{3}} \\ t &= \pm 27.36\dots^\circ\end{aligned}$$

a) Show that Adam's solution is incorrect.

.....
.....
(1 mark)

b) Identify an error made by Adam.

.....
.....
(1 mark)

c) Bethan's teacher explains that one of her solutions is incorrect. Identify and explain the error Bethan has made.

.....
.....
(2 marks)