

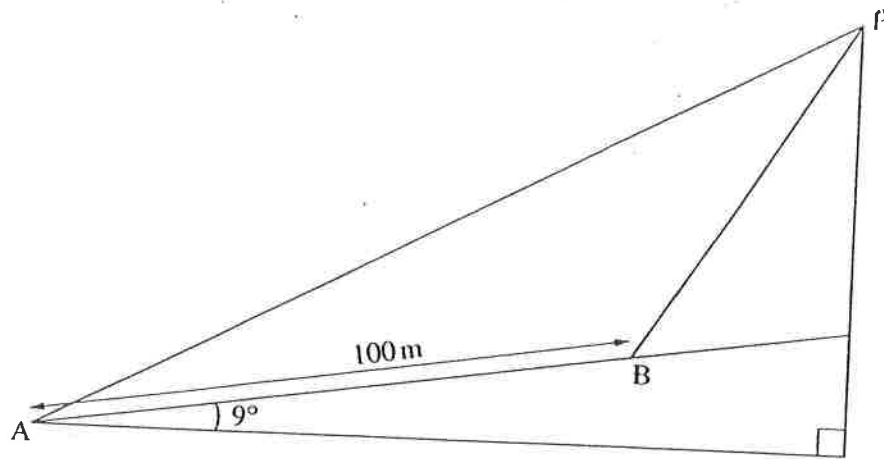
ADDITIONAL MATHS: TRIGONOMETRY ASSIGNMENT

1. Find all the angles between 0° and 360° which satisfy

(i) $\sin(2x - 30^\circ) = \cos 30^\circ$, [4]

(ii) $3 \sin y \cos y = 2 \cos^2 y$, [4]

2.



A road stretches from A 100 m uphill to B at a slope of 9° to the horizontal. P is an object beyond and above B and in the vertical plane containing AB, as shown in the diagram. The angles of elevation of P from A and B are 35° and 41° respectively. Find the vertical height of P above A, correct to three significant figures. [7]

(b) The area of a triangle FGH is 235 cm^2 . $GH = 27 \text{ cm}$ and $HF = 19 \text{ cm}$. Calculate the angle H and the length of FG. [7]

3. Solve the following equations for x , y and z , giving all the values from 0° to 360° inclusive

(i) $\sin 2x = -0.3124$ [4]

(ii) $3 \cos y = \cot y$ [5]

(iii) $3 \sin^2 z + \cos^2 z = 2$ [5]

4. (a) Find all the angles between 0° and 360° which satisfy the equation

$$8 \sin x \cos x = \sin x,$$
 [4]

(b) Find the value of z between 0 and 2π for which $\sin\left(\frac{1}{3}z + 5\right) = \frac{1}{2}$. [4]

5.

Given that

$$2 \sin A \cos A + (\cos A + \sin A)^2 - (2 \cos A + \sin A)^2 \equiv p \sin^2 A + q,$$

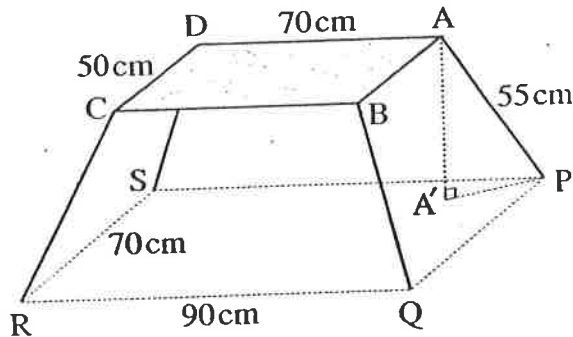
find the value of the constant p and of the constant q . [4]

6. Solve the following equations for x , y and z , giving all the values from 0° to 360° :

(i) $\tan 2x = 2$, [3]

(ii) $\sin y (3 \sin y - 4) = 4$, [5]

(iii) $\sin^2 z + 4 \cos^2 z = 2$. [6]



The diagram shows a table consisting of a thin rectangular top $ABCD$ and four legs AP , BQ , CR and DS . The foot of each leg rests on a horizontal floor at a corner of the rectangle $PQRS$. The sides AB and PQ are parallel and the sides BC and QR are parallel. The centre of $ABCD$ is vertically above the centre of $PQRS$. The point A' is on the floor vertically below A . The relevant dimensions are:

$$\begin{aligned} AP = BQ = CR = DS &= 55 \text{ cm,} \\ AB = DC &= 50 \text{ cm and } BC = AD = 70 \text{ cm,} \\ PQ = SR &= 70 \text{ cm and } QR = PS = 90 \text{ cm.} \end{aligned}$$

(i) Calculate the length PA' and hence find the height of the table top above the floor. [4]

(ii) Calculate the angle between the leg AP and the floor. [3]

The table is now tilted so that P and Q remain in contact with the floor, while R and S rest on a block of height 10 cm .

Calculate

(iii) the angle the table top now makes with the horizontal, [3]

(iv) the angle that PR now makes with the horizontal. [4]