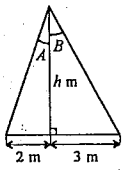
PAST EXAMINATION QUESTIONS: TRIG IDENTITIES + EQNS

1. Given that $\sin^2\theta$, $\cos^2\theta$ and $5\cos^2\theta - 3\sin^2\theta$ are in arithmetic progression, find the value of (i) $\cos^2\theta$, (ii) the common difference. (N94/P2/2b)

2. (a) By first expanding $\cos(2A + 2A)$, show that $\cos 4A \equiv 1 - 8\sin^2 A + 8\sin^4 A$.

   (b) The diagram shows a triangle of height h m. The angles A and B are such that $A + B = 45°$. By using the expansion of $\tan(A + B)$, or otherwise, find the value of h. (N94/P2/4b, c)



3. The parametric equations of a curve are $x = \sec\theta - 3$, $y = 2\tan\theta$. (i) Given that the curve cuts the x-axis at A and B, find the length of AB. (ii) Find the cartesian equation of the curve. (N94/P2/8b)

4. Prove the identity $(\cot A - \tan A)\cos A \equiv \operatorname{cosec} A - 2\sin A$. (J95/P1/5)

5. Given that $\frac{\cos(A-B)}{\cos(A+B)} = \frac{7}{3}$, evaluate $\tan A \tan B$. (J95/P2/5a)

6. Prove the identity $\frac{1}{\tan A + \cot A} \equiv \sin A \cos A$. (N95/P1/2)

7. Show that $(\operatorname{cosec} x - 1)(\operatorname{cosec} x + 1)(\sec x - 1)(\sec x + 1) \equiv 1$. (J96/P1/7)

8. Show that $\frac{2 - \operatorname{cosec}^2 A}{\operatorname{cosec}^2 A + 2\cot A} \equiv \frac{\sin A - \cos A}{\sin A + \cos A}$. (N96/P1/13b)

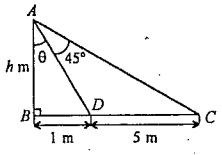
9. Given that $\cos A = p$, find an expression, in terms of p, for (i) $\tan^2 A$, (ii) $\cos 2A$, (iii) $\cos 3A$. (N96/P2/6b)

10. Prove the identity $\frac{1+\cos A}{1-\cos A} - \frac{1-\cos A}{1+\cos A} \equiv 4\cot A \operatorname{cosec} A$. (J97/P1/3)

11. Given that $\tan A = 2\tan B$, show that $\tan(A - B) = \frac{\sin 2B}{3 - \cos 2B}$. (J97/P2/3c)

12. Show that $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} \equiv 2\sec^2\theta$. (J98/P1/8)

13. The diagram shows a right-angled triangle ABC in which $AB = h$ m and $BC = 6$ m. The point D lies on BC so that $BD = 1$ m and $DC = 5$ m. The angle CAD is 45° and the angle BAD is θ. By using the expansion of $\tan(\theta + 45°)$, or otherwise, find the possible values of h. (J98/P2/4b)



1. (i) $\frac{2}{5}$ (ii) $-\frac{1}{5}$

2. (b) 6

3. (i) 2
   (ii) $y^2 = 4x^2 + 24x + 32$

5. $\frac{2}{5}$

9. (i) $\frac{1}{p^2} - 1$
   (ii) $2p^2 - 1$
   (iii) $4p^3 - 3p$

13. $h = 2$ or 3