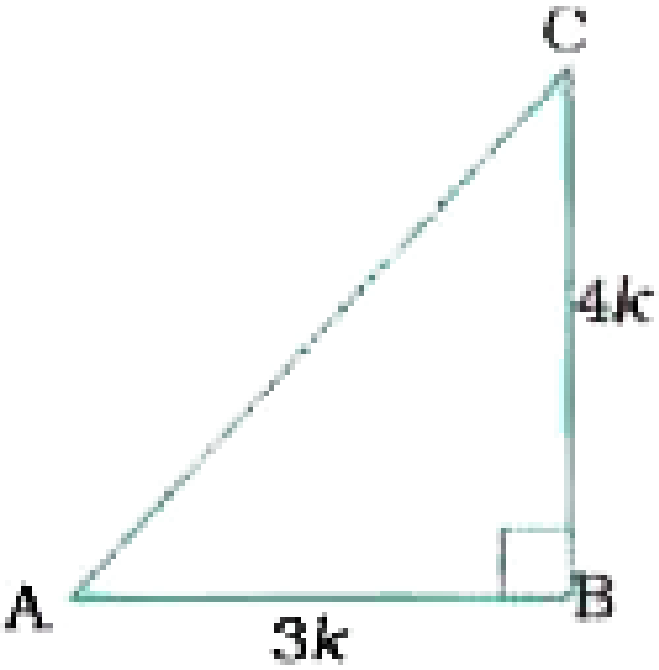
MATHS

BOOKS - KUMAR PRAKASHAN

INTRODUCTION TO TRIGONOMETRY

Textual Examples

1. Given tan $A = \frac{4}{3}$, find the other trigonometric ratios of the angle A



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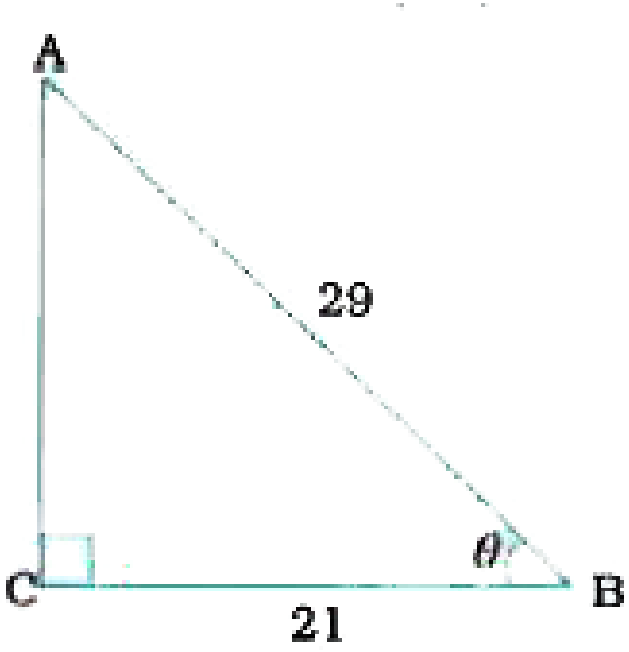
2. Consider ΔACB, right angled at C, in which AB = 29 units, BC = 21 units and $\angle ABC = \theta$ (see the given figure). Determine the

values of: $(1)\cos^2\theta + \sin^2\theta$, $(2)\cos^2\theta - \sin^2\theta$.



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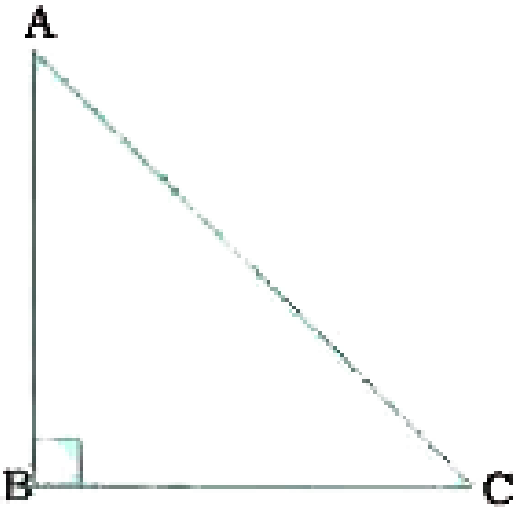
3. In a right triangle ABC, right angled at B, if $\tan A = 1$, then verify that $2\sin A\cos A = 1$.



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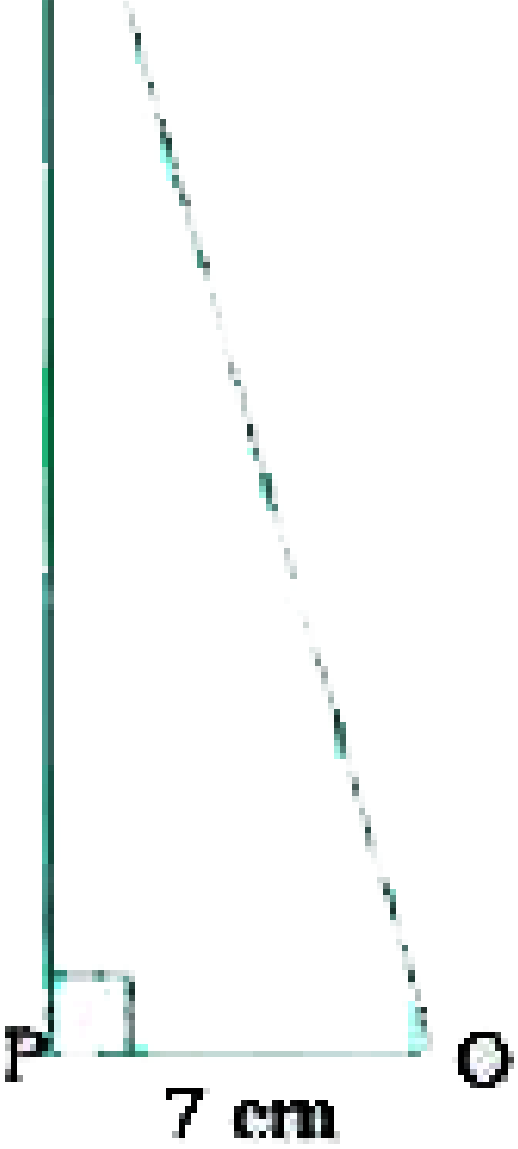
4. In ΔOPQ, right angled at P, OP = 7 cm and OQ - PQ = 1 cm (see the given figure). Determine the values of sin Q and cos Q



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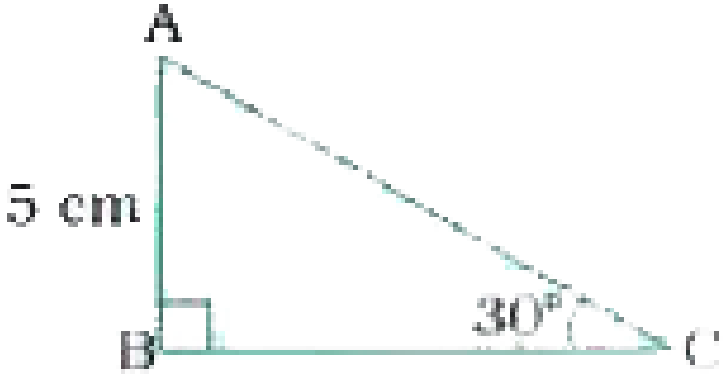
5. In ΔABC, right angled at B, AB = 5 cm and $\angle ACB = 30^\circ$ (see the given figure). Determine the lengths of the sides BC and AC.



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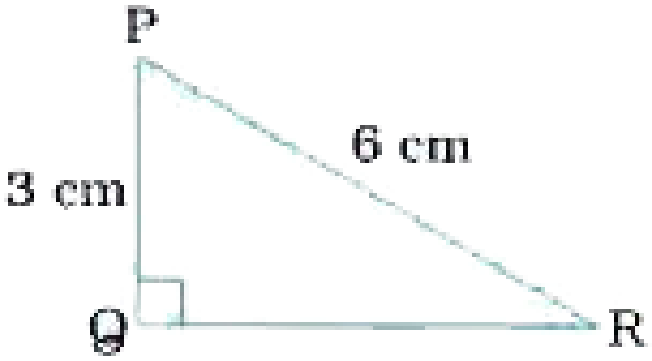
6. In ΔPQR, right angled at Q (see the given figure), PQ = 3 cm and PR= 6 cm. Determine $\angle QPR$ and $\angle PRQ$.



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7. If $\sin(A-B)=\frac{1}{2}, \cos(A+B)=\frac{1}{2}, 0^\circ < A+B \leq 90^\circ, A > B$, find A and B.

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8. Evaluate $\frac{\tan 65^\circ}{\cot 25^\circ}$

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9. If $\sin 3A = \cos(A - 26^\circ)$, where 3A is an acute ange, find the value of A.

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10. Express cot 85° + cos 75° in terms of trigonometric ratios of angles between 0 ° and 45°

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11. Express the ratios cos A, tan A and sec A in terms of sin A.

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12. Prove that sec A (1 - sin A)(sec A+ tan A) = 1.

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13. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos ecA - 1}{\cos ecA + 1}$

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14. Prove the following identities :

$$\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$$

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Other Important Examples

1. If cosecA = $\sqrt{10}$, find the other five trigonometric ratios.

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2. If sin A=$\frac{1}{3}$evaluate cos A cosec A + tan A sec A

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3. If $\sin A = \frac{1}{2}$, show that $3\cos A - 4\cos^3 A = 0$

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4. If $\sin\theta = \frac{a^2 - b^2}{a^2 + b^2}$, find the values of other five trigonometric ratios.

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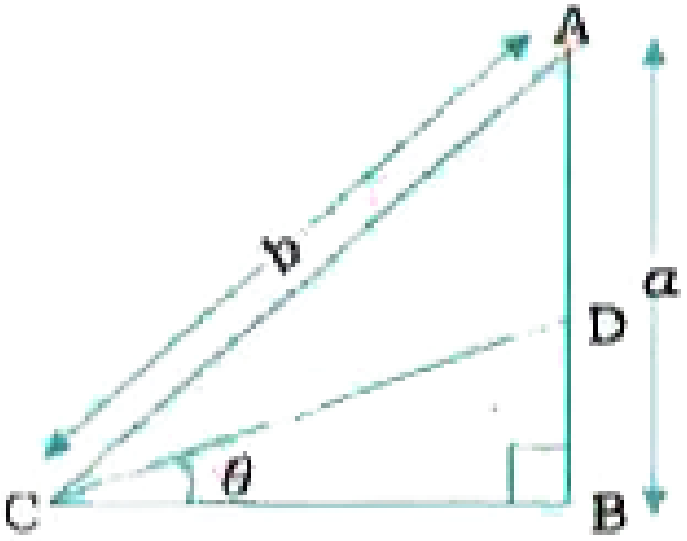
5. In the given figure , $\angle B = 90^\circ$, $\angle DCB = \theta$ and $AD = BD$.

Find the values of $\sin\theta$. $\cos\theta$. $\tan\theta$ and $\sin^2\theta + \cos^2\theta$.



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6. Evaluate each of the following :

$\sin 30^\circ \cos 45^\circ + \cos 30^\circ \sin 45^\circ$

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7. Evaluate each of the following :

$\tan 30^\circ \sec 45^\circ + \tan 60^\circ \sec 30^\circ$

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8. Evaluate each of the following :

$\tan 60^\circ \cos ec^2 45^\circ + \sec^2 60^\circ \tan 45^\circ$

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9. Evaluate each of the following :

$3\cos^2 30^\circ + \sec^2 30^\circ + 2\cos 0^\circ + 3\sin 90^\circ - \tan^2 60^\circ$

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10. Show that

$2\left(\cos^4 60^\circ + \sin^4 30^\circ\right) - \left(\tan^2 60^\circ + \cot^2 45^\circ\right) + 3\sec^2 30^\circ = \frac{1}{4}$

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11. Find the value of x in the following equation

$\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

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12. If θ is an acute angle and $\tan\theta + \cot\theta = 2$, find the value of

$\tan^{12}\theta + \cot^{12}\theta$.

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13. Given that

$\sin(A + B) = \sin A \cos B + \cos A \sin B$, find the value of $\sin 75^\circ$.

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14. Prove that :

$$\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \cos ec31^\circ = 2$$

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15. Evaluate the following :

$$\frac{2\tan 53^\circ}{\cot 37^\circ} - \frac{\cot 80^\circ}{\tan 10^\circ}$$

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16. Express $\sin 72^\circ + \cot 72^\circ$ in terms trigonometric ratios of angles between 0° sand 45°.

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17. Evaluate: $\left(\frac{\sin 47^\circ}{\cos 43^\circ}\right)^2 + \left(\frac{\cos 43^\circ}{\sin 47^\circ}\right)^2 - 4\cos^2 45^\circ$

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18. If $\sec 5A = \operatorname{cosec}(A + 36^\circ)$, where $5A$ is an acute angle, find the value of A .

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19. Prove the following : (All angles are acute angles.)

$\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta$

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20. Prove the following : (All angles are acute angles.)

$(1 + \tan^2\theta)(1 + \sin\theta)(1 - \sin\theta) = 1$

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21. Prove the following : (All angles are acute angles.)

$$\frac{\tan\theta+\sin\theta}{\tan\theta-\sin\theta}=\frac{\sec\theta+1}{\sec\theta-1}$$

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22. Prove the following : (All angles are acute angles.)

$$\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}+\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}=\frac{2}{\sin^2\theta-\cos^2\theta}$$

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23. Prove the following : (All angles are acute angles.)

$$\tan\theta-\cot\theta=\frac{2\sin^2\theta-1}{\sin\theta\cos\theta}$$

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24. If $\sin\theta + \sin^2\theta = 1$, prove that $\cos^2\theta + \cos^4\theta = 1$

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25. If $\cos\theta + \sin\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, prove that $q(p^2 - 1) = 2p$.

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26. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

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27. Prove that

$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$

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28. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$, prove that $x^2 + y^2 = 1$.

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Test Your Skills

1. If $\tan \theta = \frac{a}{b}$, find the value of $\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}$

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2. If $\sin \theta = \frac{11}{15}$, find the values of other trigonometric ratios of θ.

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3. If $\sin A = \frac{9}{41}$, find the values of cos A and tanA.

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4. In ΔABC, right angled at B, AB=35 cm and BC=12cm. Find the values of (1) sinA (2) cosA (3) sinC (4) cosC.

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5. If $\sec\theta = \frac{13}{5}$, show that $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta} = 3$

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6. If $21\tan\theta = 20$, show that $\frac{1 - \sin\theta + \cos\theta}{1 + \sin\theta + \cos\theta} = \frac{3}{7}$

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7. If $\tan\theta = \frac{1}{\sqrt{7}}$, show that $\frac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta} = \frac{3}{4}$

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8. Evaluate each of the following :-

$\sin^2 30^\circ + \sin^2 45^\circ + \sin^2 60^\circ + \sin^2 90^\circ$

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9. Evaluate each of the following :-

$2\sin^2 30^\circ - 3\cos^2 45^\circ + \tan^2 60^\circ$

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10. Evaluate each of the following :-

$\left(\cos ec^2 45^\circ \sec^2 30^\circ\right)\left(\sin^2 30^\circ + 4\cot^2 45^\circ - \sec^2 60^\circ\right)$

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11. Evaluate each of the following :-

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cos^2 45^\circ$$

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12. Evaluate each of the following :-

$$\frac{\tan^2 60^\circ + 4\cos^2 45^\circ + 3\sec^2 30^\circ + 5\cos^2 90^\circ}{\cos ec 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$$

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13. Find x if 2 sin 3x =$\sqrt{3}$

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14. Find x if $\sqrt{3}\tan 2x = \cos 60^\circ + \sin 45^\circ \cos 45^\circ$

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15. If A= 30° and B = 60°, verify that cos (A+ B) = cos A cos B - sin A sin B.

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16. Find acute angles A and B if sin (A+ 2B) = $\frac{\sqrt{3}}{2}$ and $\cos(A+4B) = 0, A > B, 0^\circ < A + 2B \leq 90^\circ, 0^\circ < A + 4B \leq 90^\circ$

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17. If A and B are acute angles such that $\tan A = \frac{1}{2}, \tan B = \frac{1}{3}$ and $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$, find A+B

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18. Evaluate the following :

$$\frac{\tan 35^\circ}{\cot 55^\circ} + \frac{\cot 78^\circ}{\tan 12^\circ} - 1$$

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19. Evaluate the following :

$$(\sin 72^\circ + \cos 18^\circ)(\sin 72^\circ - \cos 18^\circ)$$

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20. Evaluate the following :

$\sec 50^\circ \sin 40^\circ + \cos 40^\circ \cos ec 50^\circ$

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21. Express each of the following in terms of trigonometric ratios of angles lying between 0° and 45°:

$\sin 59^\circ + \cos 56^\circ$

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22. Express each of the following in terms of trigonometric ratios of angles lying between 0° and 45°:

$\sec 76^\circ + \cos ec 52^\circ$

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23. Express each of the following in terms of trigonometric ratios of angles lying between 0° and 45°:

cot 85° - tan 65°

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24. Prove that :

$\tan 20^\circ \tan 35^\circ \tan 45^\circ \tan 55^\circ \tan 70^\circ = 1$

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25. Prove that :

$\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \cos ec 31^\circ = 2$

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26. If $\sin\theta = \cos(\theta - 45^\circ)$, where θ and $\theta - 45^\circ$ are acute angles, find the degree measure of θ.

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27. Evaluate :

(1)

$\cos ec(65^\circ + \theta) - \sec(25^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)$

(2) $\frac{3\cos 55^\circ}{7\sin 35^\circ} - \frac{4(\cos 70^\circ \cos ec20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$

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28. Express all the other trigonometric ratios of $\angle A$ in terms of sin A.

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29. If $\sin\theta = \frac{1}{3}$ find the value of $2\cot^2\theta + 2$.

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30. Evaluate :

$$2\left(\sin^6\theta + \cos^6\theta\right) - 3\left(\sin^4\theta + \cos^4\theta\right) + 4\left(\sin^2\theta + \cos^2\theta\right)$$

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31. Prove the following identities :

$$\sec^2\theta - \cos^2\theta = \sin^2\theta\left(\sec^2\theta + 1\right)$$

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32. Prove the following identities :

$$\frac{\left(1 + \tan^2 A\right)\cot A}{\operatorname{cosec}^2 A} = \tan A$$

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33. Prove the following identities :

$$\frac{1}{\sec\theta - \tan\theta} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{\sec\theta + \tan\theta}$$

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34. Prove the following identities :

$$\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$$

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35. Prove the following identities :

$$\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2\cos ecA$$

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36. Prove the following identities :

$$\frac{\cot\theta + \cos ec\theta - 1}{\cot\theta - \cos ec\theta + 1} = \frac{1 + \cos\theta}{\sin\theta}$$

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37. Prove the following identities :

$$\left(\tan\theta + \frac{1}{\cos\theta}\right)^2 + \left(\tan\theta - \frac{1}{\cos\theta}\right)^2 = 2\left(\frac{1 + \sin^2\theta}{1 - \sin^2\theta}\right)$$

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38. Prove the following identities :

$$\sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} + \sqrt{\frac{1 - \sin\theta}{1 + \sin\theta}} = 2\sec\theta$$

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39. Prove the following identities :

$$\frac{1+\tan^2\theta}{1+\cot^2\theta} = \left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2$$

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40. Prove the following identities :

$$\frac{\cos^3\theta+\sin^3\theta}{\cos\theta+\sin\theta} + \frac{\cos^3\theta-\sin^3\theta}{\cos\theta-\sin\theta} = 2$$

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41. If $\tan\theta+\sin\theta=p$ and $\tan\theta-\sin\theta=q$, prove that $p^2-q^2=4\sqrt{pq}$

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Practice Thoroughly

1. If $\theta = 45^\circ$, find the value of $2\cos ec^2\theta + 3\sec^2\theta$.

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2. If $\tan\theta = \frac{1}{\sqrt{3}}$, find the value of $\sin(90^\circ - \theta)$.

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3. Find the value of

$\cos^2 15^\circ + \cos^2 25^\circ + \cos^2 65^\circ + \cos^2 75^\circ$.

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4. In ΔPQR, $\angle P = 60^\circ$, $\angle Q = 90^\circ$ and $PR = 15cm$. Find PQ.

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5. Solve the equation for θ: $\dfrac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$

[Hint: Simplify the equation as $4\cos^2\theta = 3\cot^2\theta$ which gives $\sin^2\theta = \dfrac{3}{4}$]

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6. If $\tan\theta + \cot\theta = 2$, find the value of $\tan^2\theta + \cot^2\theta$.

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7. Express $\cos 63^\circ + \cot 59^\circ - \sec 47^\circ$ in terms of trigonometric ratios of angles between 0° and 45°.

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8. Given a right triangle ABC, right angled at B, in which $\tan A = \frac{15}{8}$, find the . value of sin A cos C + cos A sin C.

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9. If $\cot\theta = \frac{15}{8}$, find the value of

$$\frac{4\cot\theta - 5\sec\theta - 8\,\mathrm{cosec}\,\theta}{5\tan\theta + \frac{4}{3}\cot\theta - 17\sin\theta}$$

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10. Prove the following identities:

$$\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \mathrm{cosec}\,\theta - \cot\theta$$

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11. Prove the following identities:

$$1+\frac{\cot^2\theta}{1+\operatorname{cosec}\theta}=\operatorname{cosec}\theta$$

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12. Prove the following identities :

$$\left(\tan\theta+\frac{1}{\cos\theta}\right)^2+\left(\tan\theta-\frac{1}{\cos\theta}\right)^2=2\left(\frac{1+\sin^2\theta}{1-\sin^2\theta}\right)$$

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13. Prove the following identities:

$$\frac{\tan^3\theta}{1+\tan^2\theta}+\frac{\cot^3\theta}{1+\cot^2\theta}=\sec\theta\operatorname{cosec}\theta-2\sin\theta\cos\theta$$

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14. Prove the following identities:

$$\tan^2\theta + \cot^2\theta = \sec^2\theta \operatorname{cosec}^2\theta - 2$$

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15. Prove the following identities:

$$\left(1+\tan^2\theta\right) + \left(1+\frac{1}{\tan^2\theta}\right) = \frac{1}{\sin^2\theta - \sin^4\theta}$$

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16. Prove the following identities:

$$\frac{1+\cos\theta+\sin\theta}{1+\cos\theta-\sin\theta} = \frac{1+\sin\theta}{\cos\theta}$$

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17. Prove the following identities:

$$(\sin\theta + \cos\theta)(\tan\theta + \cot\theta) = \sec\theta + \operatorname{cosec}\theta$$

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18. Prove the following identities:

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$$

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19. Prove the following identities :

$$\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2\operatorname{cosec} A$$

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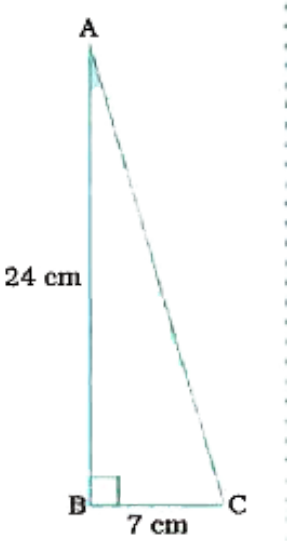
Exercise 8 1

1. In ΔABC, right angled at B, $AB = 24cm, BC = 7cm$.

Determine : $\sin A, \cos A$.



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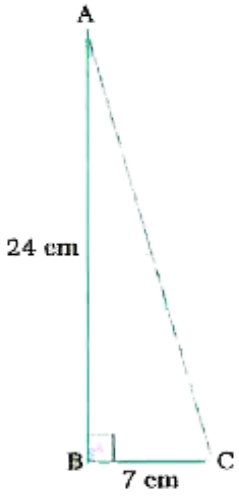
2. In ΔABC, right angled at B, $AB = 24cm, BC = 7cm.$

Determine : $\sin C, \cos C$.



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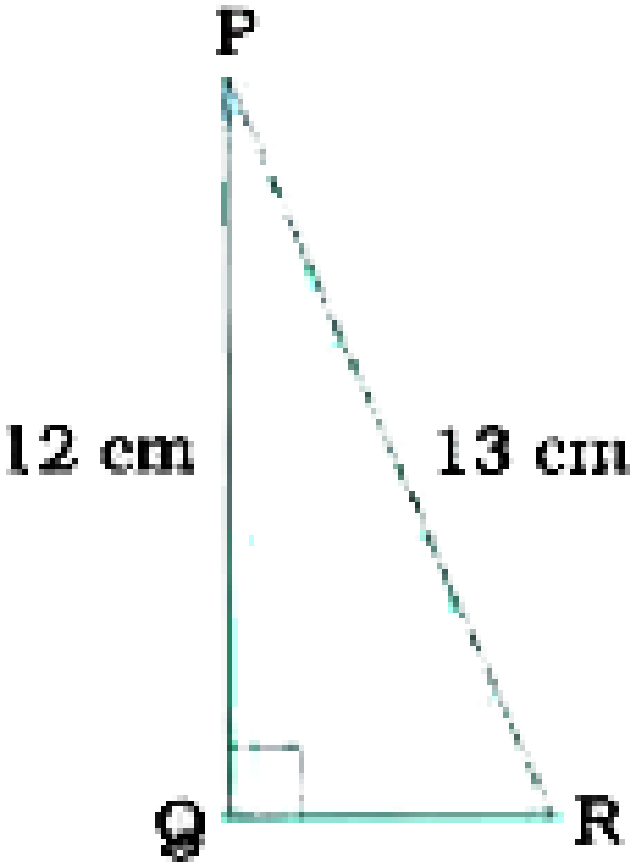
3. In the given figure, find tan P - cot R.



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4. If $\sin A = \frac{3}{4}$, calculate cos A and tan A.

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5. Given 15 cot A = 8, find sin A and sec A.

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6. Given $\sec\theta = \frac{13}{12}$, calculate all other trigonometric ratios.

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7. If $\angle A$ and $\angle B$ are acute angles such that cos A = cos B, then show that $\angle A = \angle B$

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8. If $\cot\theta = \frac{7}{8}$, evaluate:

$$\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$$

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9. If $\cot\theta = \frac{7}{8}$, evaluate:

$\cot^2\theta$

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10. If $3\cot A = 4$, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ is true or not.

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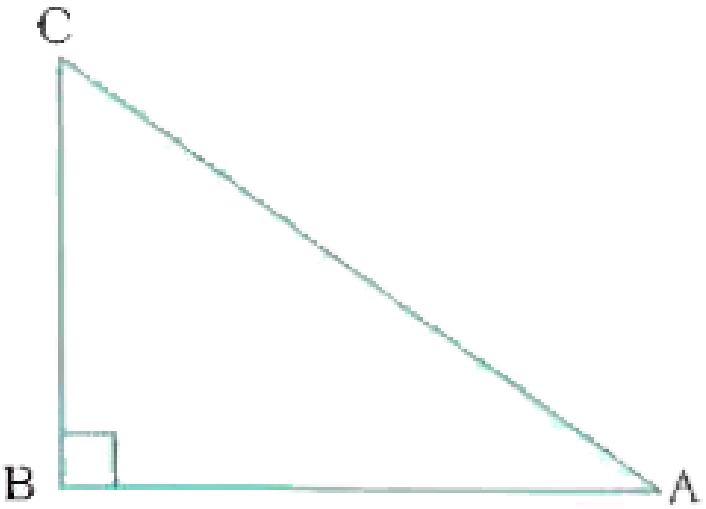
11. In triangle ABC, right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$. Find the value of

sin A cos C + cos A sin C



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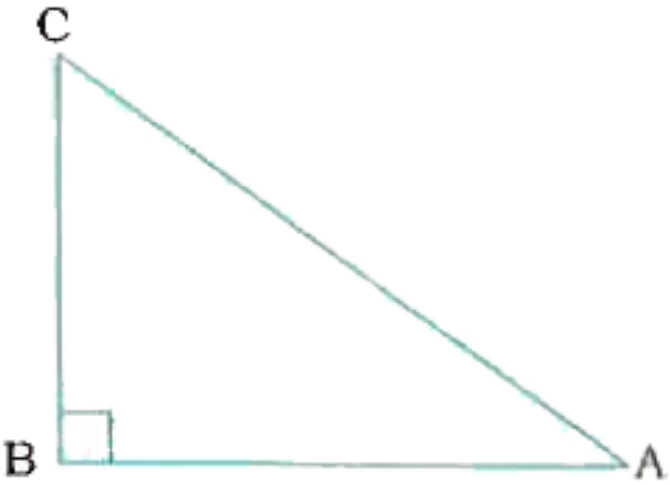
12. In triangle ABC, right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$. Find the value of

cos A cos C - sin A sin C



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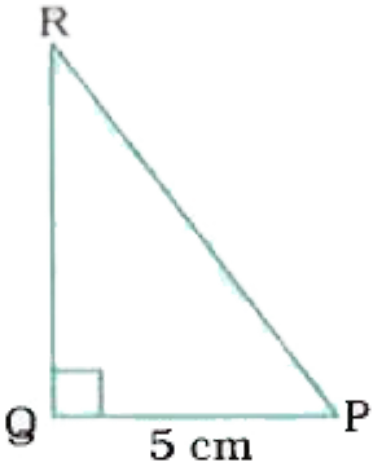
13. In ΔPQR, right angled at Q, $PR + QR = 25cm$ and $PQ = 5cm$. Determine the values of $\sin P$, $\cos P$ and $\tan P$.



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14. State whether the following are true or false. Justify your answer :

The value of tan A is always less than 1.

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15. State whether the following are true or false. Justify your answer

:

$\sec A = \frac{12}{5}$ for some value of angle A .

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16. State whether the following are true or false. Justify your answer

:

cos A is the abbreviation used for the cosecant of angle A .

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17. State whether the following are true or false. Justify your answer

:

cot A is the product of cot and A

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18. State whether the following are true or false. Justify your answer :

$\sin\theta = \frac{4}{3}$ for some angle θ .

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Exercise 8 2

1. Evaluate the following :

$\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

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2. Evaluate : $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$

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3. Evaluate the following :

$$\frac{\cos 45^\circ}{\sec 30^\circ + \cos ec30^\circ}$$

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4. Evaluate the following :

$$\frac{\sin 30^\circ + \tan 45^\circ - \cos ec60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$$

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5. Evaluate the following :

$$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$

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6. Choose the correct option and justify your choice:

$$\frac{2\tan 30^\circ}{1+\tan^2 30^\circ} = ..$$

A. $\sin 60^\circ$

B. $\cos 60^\circ$

C. $\tan 60^\circ$

D. $\sin 30^\circ$

Answer: A

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7. Choose the correct option and justify your choice:

$$\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ} = \ldots$$

A. $\tan 90^\circ$

B. 1

C. $\sin 45^\circ$

D. 0

Answer: D

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8. Choose the correct option and justify your choice:

sin 2A = 2 sin A is true when A = ...

A. 0°

B. 30°

C. 45°

D. 60°

Answer: A

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9. Choose the correct option and justify your choice:

$$\frac{2\tan 30^\circ}{1-\tan^2 30^\circ} = . .$$

A. $\cos 60^\circ$

B. $\sin 60^\circ$

C. $\tan 60^\circ$

D. $\sin 30^\circ$

Answer: C

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10. If tan (A+ B)= $\sqrt{3}$ and tan (A-B) $= \frac{1}{\sqrt{3}} : 0^\circ < A + B < 90^\circ, A > B$, find A and B.

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11. State whether the following are true or false. Justify your answer:

$\sin(A + B) = \sin A + \sin B$

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12. State whether the following are true or false. Justify your answer:

The value of $\sin\theta$ increases as θ increases.

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13. State whether the following are true or false. Justify your answer:

The value of $\cos\theta$ increases as θ increases.

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14. State whether the following are true or false. Justify your answer:

$\sin\theta = \cos\theta$ for all values of θ.

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15. State whether the following are true or false. Justify your answer:

cot A is not defined for $A = 0^\circ$

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Exercise 8 3

1. Evaluate:

$$\frac{\sin 18^\circ}{\cos 72^\circ}$$

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2. Evaluate:

$$\frac{\tan 26^\circ}{\cot 64^\circ}$$

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3. Evaluate:

$$\cos 48^\circ - \sin 42^\circ$$

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4. Evaluate:

$\cos ec 31^\circ - \sec 59^\circ$

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5. Show that :

$\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$

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6. Show that :

$\cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ = 0$

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7. If $\tan 2A = \cot(A - 18^\circ)$, where 2A is an acute angle, find the value of A.

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8. If tan A= cot B, prove that A+ B = 90°

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9. If sec 4A = cosec (A- 20°), where 4A is an acute angle, find the value of A .

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10. If A, B and C are interior angles of a triangle ABC, then show that $\sin\left(\frac{B+C}{2}\right) = \cos\left(\frac{A}{2}\right)$

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11. Express $\sin 67^\circ + \cos 75^\circ$ in terms of trigonometric ratios of angles between 0° and 45°

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Exercise 8 4

1. Express the trigonometric ratios $\sin A, \sec A$ and $\tan A$ in terms of $\cot A$.

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2. Write all the other trigonometric ratios of $\angle A$ in terms of $\sec A$.

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3. Evaluate :

$$\frac{\sin^2 63^\circ + \sin^2 27^\circ}{\cos^2 17^\circ + \cos^2 73^\circ}$$

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4. Evaluate :

$$\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ$$

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5. Choose the correct option Justify your choice :

$$9 \sec^2 A - 9 \tan^2 A = \ldots.$$

A. 1

B. 9

C. 8

D. 0

Answer: B

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6. Choose the correct option Justify your choice :

$(1+\tan\theta+\sec\theta)(1+\cot\theta-\cos ec\theta)=\ldots.$

A. 0

B. 1

C. 2

D. -1

Answer: C

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7. Choose the correct option Justify your choice :

(sec A + tan A) (1 - sin A) = ...

A. secA

B. sinA

C. cosecA

D. cosA

Answer: D

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8. Choose the correct option Justify your choice :

$$\frac{1+\tan^2 A}{1+\cot^2 A} = \ldots$$

A. $\sec^2 A$

B. -1

C. $\cot^2 A$

D. $\tan^2 A$

Answer: D

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9. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$(\cos ec\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$$

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10. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$$

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11. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\cos ec\theta$$

[Hint: Write the expression in terms of $\sin\theta$ and $\cos\theta$]

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12. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\frac{1+\sec A}{\sec A}=\frac{\sin^2 A}{1-\cos A}$$

[Hint: Simplify LHS and RHS separately]

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13. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$\frac{\cos A-\sin A+1}{\cos A+\sin A-1}=\cos ecA+\cot A$, using the identity $\cos ec^2 A=1+\cot^2 A$.

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14. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\sqrt{\frac{1+\sin A}{1-\sin A}}=\sec A+\tan A$$

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15. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$

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16. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$(\sin A + \cos ecA)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$$

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17. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$(\cos ecA - \sin A)(\sec A - \cos A) = \dfrac{1}{\tan A + \cot A}$

[Hint: Simplify LHS and RHS separately]

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18. Prove the following identities. where the angles involved are acute angles for which the expressions are defined.

$$\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$$

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19. Fill in the blanks so as to make each of the following statements true :

If $\cos A = \dfrac{4}{5}$, then tanA=....

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Objective Questions

1. Fill in the blanks so as to make each of the following statements true :

Given that $\sin\theta = \frac{a}{b}$, then $\cos\theta = \ldots$

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2. Fill in the blanks so as to make each of the following statements true :

If $\sin A + \sin^2 A = 1$, then $\cos^2 A + \cos^4 A = ..$

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3. Fill in the blanks so as to make each of the following statements true :

if $\sin\alpha = \frac{1}{2}$ and $\cos\beta = \frac{1}{2}$. Then $\alpha + \beta = \ldots$

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4. Fill in the blanks so as to make each of the following statements true :

If $\sin\theta - \cos\theta = 0$ then $\sin^4\theta + \cos^4\theta = \ldots.$

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5. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \ldots$

A. $\sec\theta + \tan\theta$

B. $\sec\theta - \tan\theta$

C. $\sec^2\theta + \tan^2\theta$

D. $\sec^2\theta - \tan^2\theta$

Answer: A::C

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6. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If $x = a\sec\theta$ and $y = b\tan\theta$, then $b^2x^2 - a^2y^2 = \ldots$

A. ab

B. $a^2 - b^2$

C. $a^2 + b^2$

D. a^2b^2

Answer: A::B

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7. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$$\frac{\sin\theta}{1-\cot\theta}+\frac{\cos\theta}{1-\tan\theta}=\ldots.$$

A. 0

B. 1

C. $\sin\theta+\cos\theta$

D. $\sin\theta-\cos\theta$

Answer: A::C

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8. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$\sin^2 29^\circ + \sin^2 61^\circ = \ldots\ldots$

A. 1

B. 0

C. $2\sin^2 29^\circ$

D. $2\cos^2 61^\circ$

Answer: A

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9. Answer each question by selecting the proper alternative from those given below each question so as to make each statement

true :

$\sec^4 A - \sec^2 A = \ldots\ldots$

A. $\tan^2 A - \tan^4 A$

B. $\tan^4 A - \tan^2 A$

C. $\tan^4 A + \tan^2 A$

D. $\cos^2 A - \cos^4 A$

Answer: A::B::D

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10. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$\frac{\sin\theta}{1+\cos\theta} = \ldots\ldots$

A. $\frac{1+\cos\theta}{\sin\theta}$

B. $\frac{1-\cos\theta}{\cos\theta}$

C. $\frac{1-\cos\theta}{\sin\theta}$

D. $\frac{1-\sin\theta}{\cos\theta}$

Answer: A::C

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11. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If $\cos 8\theta = \sin\theta$ and $8\theta < 90^\circ$, then $\tan 6\theta = \ldots\ldots$

A. $\frac{1}{\sqrt{3}}$

B. $\sqrt{3}$

C. 1

D. 0

Answer: C

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12. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$\sin(45^\circ + \theta) - \cos(45^\circ - \theta) = \ldots.$

A. $2\cos\theta$

B. 0

C. $2\sin\theta$

D. 1

Answer:

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13. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If $a\cos\theta + b\sin\theta = 4$ and $a\sin\theta - b\cos\theta = 3$, then $a^2 + b^2$=.....

A. 7

B. 12

C. 25

D. 1

Answer: B

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14. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

$(\cos ec\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = \ldots.$

A. 0

B. 1

C. -1

D. 2

Answer: B

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15. Answer the following by a number or a word or a sentence :

If $\sin A = \frac{1}{2}$, then what is the value of cotA?

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16. Answer the following by a number or a word or a sentence :

What is the value $(\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots . \tan 89^\circ)$?

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17. Answer the following by a number or a word or a sentence :

If $4\tan\theta = 3,$ then find the value of $\dfrac{4\sin\theta - \cos\theta}{4\sin\theta + \cos\theta}$

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18. Answer the following by a number or a word or a sentence :

What is the value of

$$\frac{\sin^2 22^\circ + \sin^2 68^\circ}{\cos^2 22^\circ + \cos^2 68^\circ} + \sin^2 63^\circ + \cos 63^\circ \sin 27^\circ ?$$

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19. If $\tan 7\theta = \cot(5\theta - 30^\circ)$, both angles being acute angles, find the value of θ.

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20. State weather each of the following statements is true or false :

The value of $\cos^2 23^\circ - \sin^2 67^\circ$ is positive.

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21. State weather each of the following statements is true or false :

$\sqrt{(1 - \cos^2\theta).\sec^2\theta} = \tan\theta$

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22. State weather each of the following statements is true or false :

$(\tan\theta + 2)(2\tan\theta + 1) = 5\tan\theta + \sec^2\theta$

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23. State weather each of the following statements is true or false :

The value of $2\sin\theta$ can be $\left(a + \frac{1}{a}\right)$ where a is a positive number and $a \neq 1$.

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24. State weather each of the following statements is true or false :

$\frac{\tan 47^\circ}{\cot 43^\circ} = 1$

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