

MATHS

BOOKS - PSEB

INTRODUCTION TO TRIGONOMETRY

Exercise

1. In $\triangle ABC$, right angled at B, $AB = 24$ cm , $BC = 7$ cm.

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



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2. In $\triangle ABC$, right angled at B, $AB = 24$ cm , $BC = 7$ cm.

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



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3. In Fig. 8.13, find $\tan P - \cot R$.

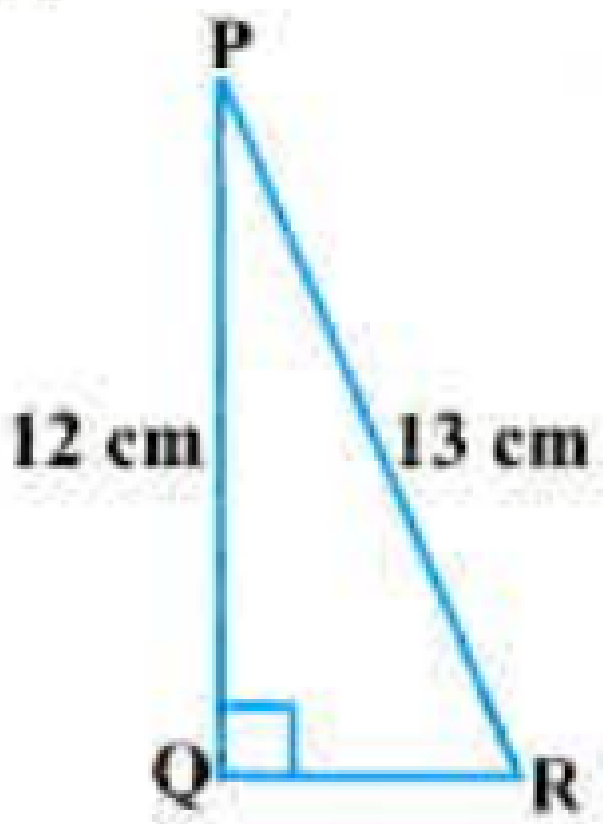


Fig. 8.13



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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 $\cos A = \cos B$, 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 $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ 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 $\triangle PQR$, right angled at Q, $PR + QR = 25$ cm and $PQ = 5$ cm. 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 abbreviation used for cosecant of angle A .

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17. State whether the following are true or false. Justify your answer. :- $\cot A$ is product of \cot and A .

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18. State whether the following are true or false. Justify your answer. :- $\sin = \frac{4}{3}$ for some angle θ .

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19. Evaluate The following : $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

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20. Evaluate The following :

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

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21. Evaluate The following : $\frac{\cos 45^\circ}{\sec 30^\circ + \csc 30^\circ}$

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22. Evaluate The following : $\frac{\sin 30^\circ + \tan 45^\circ - \csc 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$

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23. 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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24. 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:



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25. Choose the correct option and justify your choice:-

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

A. $\tan 90^\circ$

B. 1

C. $\sin 45^\circ$

D. 0

Answer:



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26. 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:



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27. 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:



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

$A > B$, find A and B .



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

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30. State whether the Following is true or false. Justify your answer:- The value of $\sin \theta$ increases as θ increases.

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31. State whether the Following is true or false. Justify your answer:- The value of $\cos \theta$ increases as θ increases.

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32. State whether the Following is true or false. Justify your

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

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33. State whether the following are true or false. Justify your

answer. :- $\cot A$ is not defined for $A = 0^\circ$.

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34. Evaluate : $\frac{\sin 18^\circ}{\cos 72^\circ}$

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35. Evaluate : $\frac{\tan 26^\circ}{\cot 64^\circ}$

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36. Evaluate : $\cos 48^\circ - \sin 42^\circ$

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37. Evaluate : $\cos ec 31^\circ - \sec 59^\circ$

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38. Show that : $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$

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39. Show that : $\cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ = 0$

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

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41. If $\tan A = \cot B$. prove that $A + B = 90^\circ$.

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42. If $\sec 4A = \operatorname{cosec}(A - 20^\circ)$, where $4A$ is an acute angle, find the value of A .

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43. If A , B and C are interior angles of a triangle ABC , then

show that $\sin\left(\frac{B + C}{2}\right) = \cos \frac{A}{2}$.

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

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

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

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47. Evaluate :- $\frac{\sin^2 63^\circ + \sin^2 27^\circ}{\cos^2 17^\circ + \cos^2 73^\circ}$.

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48. Evaluate: $\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ$



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49. Choose the correct option. Justify your choice :

$$9 \sec^2 A - 9 \tan^2 A = \text{a. } 1 \text{ b. } 9 \text{ c. } 8 \text{ d. } 0$$

A. 1

B. 9

C. 8

D. 0

Answer:



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50. Choose the correct option. Justify your choice :

$$(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \operatorname{cosec} \theta)$$

A. 0

B. 1

C. 2

D. -1

Answer:



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51. Choose the correct option. Justify your choice : $(\sec A +$

$\tan A)(1 - \sin A) = ?$ a. $\sec A$ b. $\sin A$ c. $\operatorname{cosec} A$ d. $\cos A$

A. $\sec A$

B. $\sin A$

C. $\operatorname{cosec} A$

D. $\cos A$

Answer:

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52. Choose the correct option. Justify your choice :

$$\frac{1 + \tan^2 A}{1 + \cot^2 A} \quad \text{a. } \sec^2 A \quad \text{b. } -1 \quad \text{c. } \cot^2 A \quad \text{d. } \tan^2 A$$

A. $\sec^2 A$

B. -1

C. $\cot^2 A$

$$D. \tan^2 A$$

Answer:

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53. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. :

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

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54. 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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55. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \csc \theta .$$



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56. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. :

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



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57. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. :

$$\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \sec A + \cot A, \text{ using the identity } \sec^2 A = 1 + \cot^2 A$$

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58. 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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59. 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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60. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. :

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

.



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

$$(\sec A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A} \quad [\text{Hint}$$

:Simplify LHS and RHS separately]

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62. 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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Example

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

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2. If $\angle B$ and $\angle Q$ are acute angles such that $\sin B = \sin Q$, then prove that $\angle B = \angle Q$.

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3. Consider $\triangle ACB$. right-angled at C, in which $AB = 29$ units, $BC = 21$ units and $\angle ABC = \theta$ (see Fig) Determine the

values of (i) $\cos^2 \theta + \sin^2 \theta$, (ii) $\cos^2 \theta - \sin^2 \theta$.

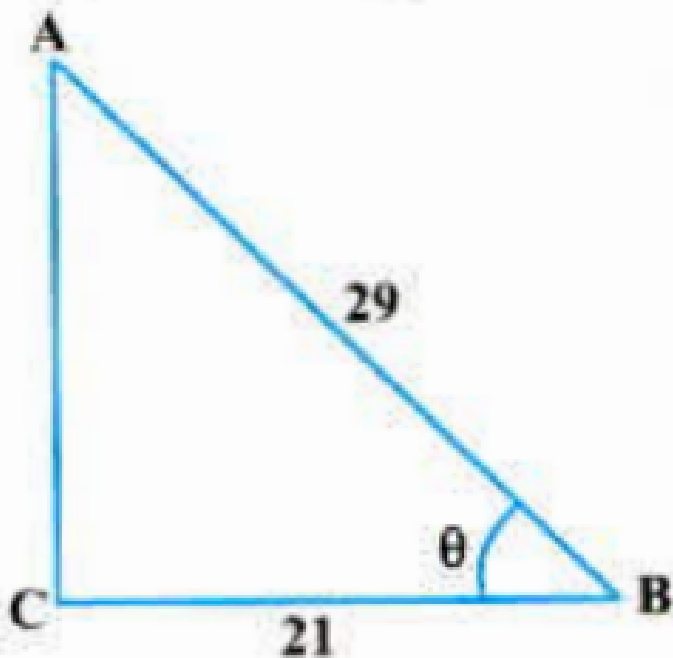


Fig. 8.10

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

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5. In $\triangle OPQ$, right-angled at P, $OP = 7$ cm and $OQ - PQ = 1$ cm (see Fig. 8.12). Determine the values of $\sin Q$ and $\cos Q$.



Fig. 8.12



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6. In $\triangle ABC$, right-angled at B. $AB = 5$ cm and $\angle ACB = 30^\circ$ (see Fig. 8.19). Determine the lengths of the sides BC and AC.

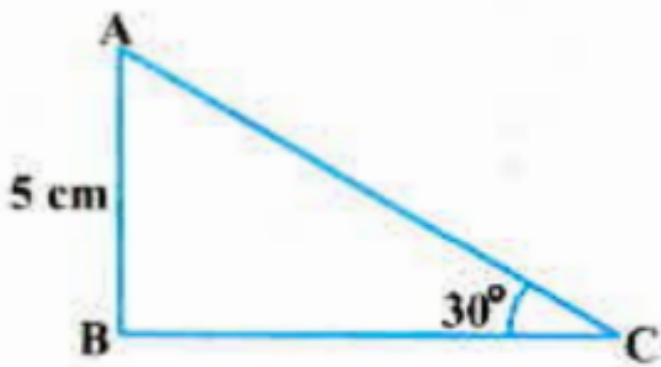


Fig. 8.19



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7. In $\triangle PQR$, right-angled at Q (see Fig), $PQ = 3$ cm and $PR = 6$ cm. Determine $\angle QPR$ and $\angle PRQ$.

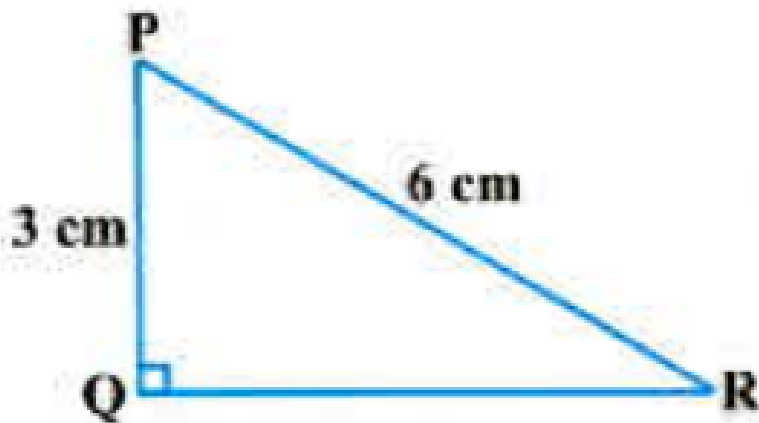


Fig. 8.20

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8. If $\sin(A-B) = \frac{1}{2}$, $\cos(A+B) = \frac{1}{2}$. Find A and B.

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



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



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11. Express $\cot 85^\circ + \cos 75^\circ$ in terms of trigonometric ratios of angles between 0° and 45° .



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12. Express the ratios $\cos A$, $\tan A$ and $\sec A$ in terms of \sin

A.

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13. Prove that $\sec A (1 - \sin A) (\sec A + \tan A) = 1$.

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14. Prove the following :
$$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos ecA - 1}{\cos ecA + 1} .$$

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15. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$, using the identity $\sec^2 \theta = 1 + \tan^2 \theta$.



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