MATHS

BOOKS - R G PUBLICATION

INTRODUCTION TO TRIGONOMETRY

Example

1. Find the values of :a.$\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$

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2. Find the values of :b.$\tan^2 30^\circ + \tan^2 45^\circ + \tan^2 60^\circ$

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3. Find the values of :c.$6\cos^2 45° - 18\cot^2 60° + 3\sec 60°$

4. Find the values of :d.$\dfrac{5\sin^2 30° + \cos^2 45° + 4\tan^2 60°}{2\sin 30° \cos 60° + \tan 45°}$

5. Find the values of :$\sin^3\left(\dfrac{\pi}{4}\right) + 4\cot^2\left(\dfrac{\pi}{4}\right) - \sec^2\left(\dfrac{\pi}{3}\right)$

6. Verify:a.$\sin 60° = \dfrac{2\tan 30°}{1 + \tan^2 30°}$

7. Verify:b.$2\cos^2 45° = \cos^2 60° + \cos^2 30°$

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8. Verify:c.

$$\tan 30°\,(\sin 60° + \sin 30° + \cos 0°) = (\cos 60° + \sin 60°)$$

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9. Verify:d. $\dfrac{\cos 30° - \sin 30°}{\cos 30° + \sin 30°} = \sec 60° - \tan 60°$

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10. Prove that:a.

$$\sec 30°\tan 60° + \sin 45°\cos ec45° + \cos 30° + \cos 30°\cot 60° = \dfrac{7}{2}$$

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11. Prove that

$$\frac{4}{3}\cot^2 30° + 3\sin^2 60° - 2\cos ec^2 60° - \frac{3}{4}\tan^2 30° = \frac{10}{3}$$

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12. Prove that.$\cos\left(\frac{\pi}{3}\right)\cos\left(\frac{\pi}{6}\right) + \sin\left(\frac{\pi}{3}\right)\sin\left(\frac{\pi}{6}\right) = \cos\left(\frac{\pi}{6}\right)$

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13. If $2\cos ec^2 30° + x\sin^2 60° - \frac{3}{4}\tan^2 30° = 10$,then the value of x is

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14. By what number should $\sin 45°\cos 45°\tan 60°$ be multiplied to get the value of $\tan^2 45° - \cos^2 60°$?

15. If $\sqrt{3}\tan\theta = 1(0° < 0 < 90°)$,find the value of $\sin^2\theta - \cos^2\theta$

16. Verify the following identities by substituting the values of the trigonometric ratios with respect to the given values of θ.(i) $\sin^2\theta + \cos^2\theta = 1(\theta = 60°)$

17. Verify the following identities by substitutihg the values of the trigonometric ratios wiyh respect to the given values of θ.(ii)

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

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18. Verify the following identities by substitutihg the values of the trigonometric ratios wiyh respect to the given values of θ.(iii)

$$1 + \cot^2 = \cos ec^2 \theta \left(\theta = \frac{\pi}{3} \right)$$

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19. If $A = 30°$ and $B = 60°$,show that

(i)sin(A+B)=sinAcosB+cosAsinB

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20. If $A = 30°$ and $B = 60°$, show that (ii) cos(A+B)=cosAcosB-sinAsinB

21. (ii) if $r \cos \theta = 1$, $r \sin \theta = 1$ find the value of r

22. (iii)Find value of r if $r \tan \theta = \sqrt{3}$ $r \cot \theta = 3\sqrt{3}$

23. If $r \cos \theta = \dfrac{1}{3}$ $r \sin \theta = \dfrac{1}{\sqrt{3}}$, find value of r

24. In $\triangle ABC$, $\angle B = 90°$. If AB=12 cm. BC=5 cm. find sinA and sinC.

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25. If $\tan\theta = \sqrt{3}$, ('θ'is acute), show that $\dfrac{1 - \cos^2\theta}{2 - \sin^2\theta} = \dfrac{3}{5}$

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26. Find the value of 'θ' $(0° \leq \theta \leq 90°)$.a.$2\cos\theta + \sec\theta = 3$

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27. Find the value of 'θ' $(0° \leq \theta \leq 90°)$b.$\sin^2\theta - \dfrac{1}{2}\sin\theta = 0$

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28. Find the value of $'\theta'(0° \le \theta \le 90°)$c.

$$\cot^2 \theta - \left(1 + \sqrt{3}\right)\cot \theta + \sqrt{3} = 0$$

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29. Find the value of $'\theta'(0° \le \theta \le 90°)$d.

$$\frac{\cos \theta}{1 - \sin \theta} + \frac{\cos \theta}{1 + \sin \theta} = 4$$

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30. Find the value of $'\theta'(0° \le \theta \le 90°)$e.$3 \tan \theta = \cot \theta$

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31. Find the value of $'\theta'(0° \le \theta \le 90°)$f.$2 \sin^2 \theta - 1 = 0$

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32. Find the value of $'\theta'(0° \leq \theta \leq 90°)$g.

$$\cos^2\theta - 3\cos\theta + 2 = \sin^2\theta$$

33. b.If sin(A+B)=1 and cos(A-B)=1,then the values of A and B are:

a)$A = 45° B = 30°$ b)$A = 60° B = 45°$ c)$A = 45° B = 45°$ d) $A = 90° B = 0°$

A. $A = 45°$ B=30^@`

B. $A = 60°$ B=45^@`

C. $A = 45°$ B=45^@`

D. $A = 90°$ B=0^@`

Answer:

34. If $\cos(40°+x) = \sin 30°$ then the value of x is ___

    A. $30°$

    B. $20°$

    C. $5°$

    D. $50°$

Answer:

35. Find the values of:a.$\cos 150°$

36. Find value of.$\sin^2 120°$

37. Find value of $\cos^2 180°$

38. Show that (without using table of trigonometric ratios) :(i)

$$\frac{\cos 18^0}{\sin 72^0} = 1$$

39. Show that (without using table of trigonometric ratios) :(ii)

$\sin^2 28° - \cos^2 62° = 0$

40. Show that (without using table of trigonometric ratios) :(iii)

$$\sin 63° \cos 27° + \cos 63° \sin 27° = 1$$

41. Show that (without using table of trigonometric ratios) :(iv)

$$\sin^2 20° + \sin^2 70° = 1$$

42. Show that (without using table of trigonometric ratios) :(v)

$$\sin 55° - \cos 35° = 0$$

43. Prove that:a.$\cos\theta\sin(90° - \theta) + \sin\theta\cos(90° - \theta) = 1$

44. Prove that:b.

$$\frac{\cos(90° - \theta)}{1 + \sin(90° - \theta)} + \frac{1 + \sin(90° - \theta)}{\cos(90° - \theta)} = 2\cos ec\theta$$

45. If A,B,C are the three angles of a triangle,show that:

(i)cos(A+B)+cosC=0

46. If A,B,C are the three angles of a triangle,show that:(ii)sin(A+B)-

sinC=0

47. If A,B,C are the three angles of a triangle,show that:(iii)

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

48. If A,B,C are the three angles of a triangle,show that:(iv)

$$\tan\left(\frac{B+C}{2}\right) = \cot\left(\frac{A}{2}\right)$$

49. If $x\sin(90° - \alpha)\cot(90° - \alpha) = \cos(90° - \alpha)$,find value of

x

50. Without taking the help of the table of tribonometric ratios,show that:(i)$\left(\dfrac{\cos 37°}{\sin 53°}\right) + \left(\dfrac{\sin 41°}{\cos 49°}\right) = 2$

51. Without taking the help of the table of trigonometric ratios,show that:(ii)$\tan 10°\tan 15°\tan 75°\tan 80° = 1$

52. Without taking the help of the table of trigonometric ratios,show that:(iii)$\sin 140° \cos 65° + \cos 50° \cos 115° = 0$

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53. Without taking the help of the table of tribonometric ratios,find the value of:(iv)$\left(\dfrac{\tan 20°}{\cos ec70°} \right)^2 + \left(\dfrac{\cot 20°}{\sec 70^{\square}} \right)^2$
+2tan15tan45tan75

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54. Without taking the help of the table of tribonometric ratios,show that:(v)$\sin 20° \cos 40° \cos ec50° \sec 70° = 1$

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1. If $\triangle ABC$ right-angled at B,AB=24cm,BC=7cm.Determine:

(i)sinA,cosA

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

(ii)sinC,cosC

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3. InFig.8.13,find tanP-cot R
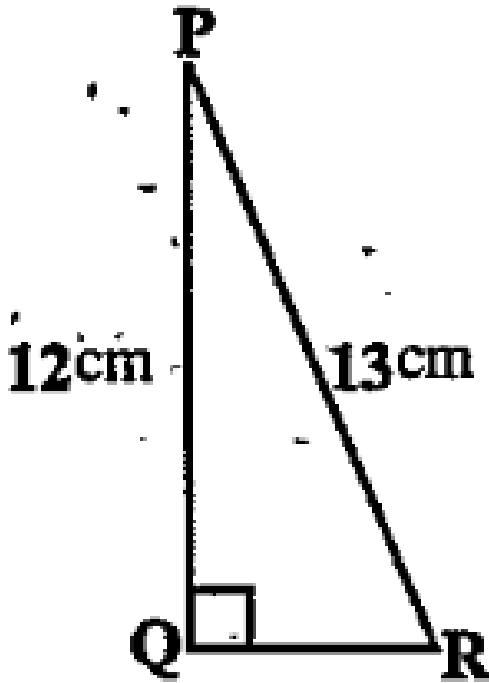
4. If sinA=3/4,calculate cosA and tanA

5. Given 15 cotA=8,find sin A and sec A.
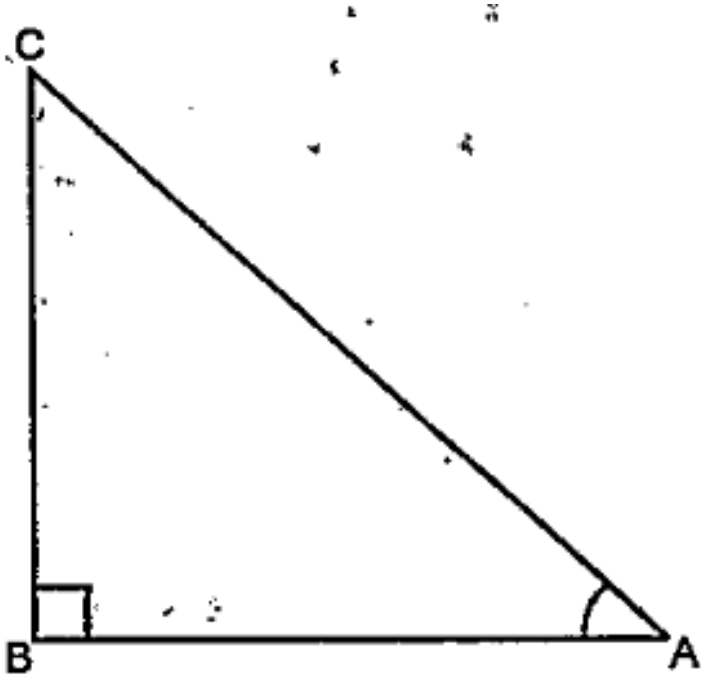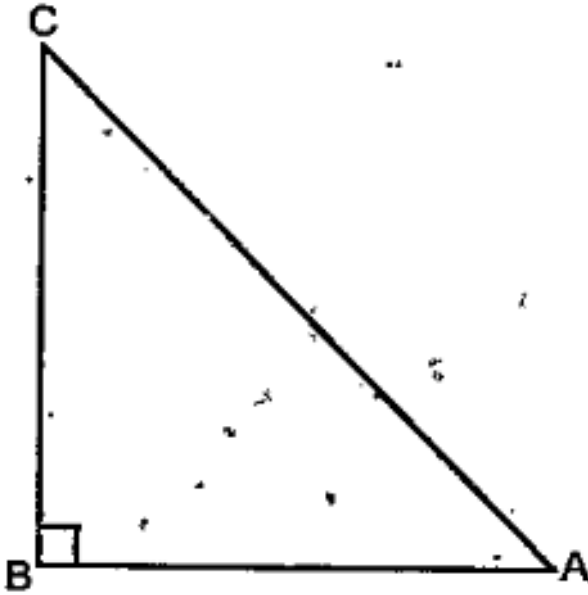
6. Given $\sec\theta = \dfrac{13}{12}$,calculate all other trigonometric ratios.
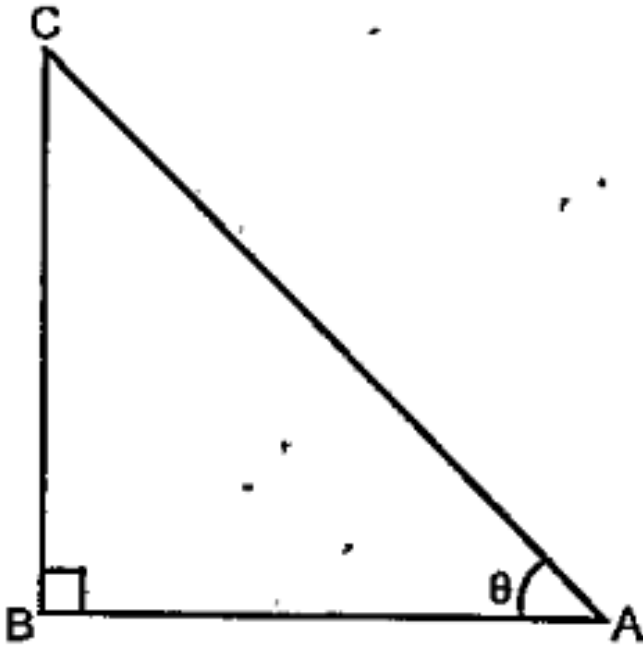
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7. If $\angle A$ and $\angle B$ are acute such that cosA=cosB,then show that

$\angle A = \angle B$

8. If $\cot\theta = \dfrac{7}{8}$ evaluate:(i) $\dfrac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

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9. If $\cot\theta = \dfrac{7}{8}$ evaluate:(ii) $\cot^2\theta$

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

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

(i)sinA cosC+cosA sinC

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

(ii)cosA cosC-sinA sinC

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13. In $\triangle PQR$, right-angled at Q,PR+QR=25cm and PQ=5cm.Determine the values of sinP,cosP and tanP.

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14. State whether the following are true or false.Justify your answer.(i)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.(ii)secA=12/5 for some value of angle A

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16. State whether the following are true or false.Justify your answer.(iii)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.(iv)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.(v)$\sin\theta = \dfrac{4}{3}$ for some angleθ

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19. Evaluate the following:(i)$\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

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20. Evaluate the following:(ii)$2\tan^\circ 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$

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21. Evaluate the following:(iii) $\dfrac{\cos 45^\circ}{\sec 30^\circ + \cos ec30^\circ}$

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22. Evaluate the following:(iv) $\dfrac{\sin 30^\circ + \tan 45^\circ - \cos ec60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$

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23. Evaluate the following:(v) $\dfrac{5\cos 60^\circ + 4\sec 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$

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24. Choose the correct option and justify your choice:(i)

$\dfrac{2\tan 30^\circ}{1 + \tan^2 30^\circ}$

A. $\sin 60^\circ$

B. $\cos 60^\circ$

C. $\tan 60^\circ$

D. $\sin 30^\circ$

Answer:

25. Choose the correct option and justify your choice:(ii) $\dfrac{1 - \tan^2 45^\circ}{1 + \tan^2 45^\circ}$

A. $\tan 90^\circ$

B. 1

C. $\sin 45^\circ$

D. 0

Answer:

26. Choose the correct option and justify your choice:(iii)sin 2A=2sin A is true when A=

A. $0°$

B. $30°$

C. $45°$

D. $60°$

Answer:

27. Choose the correct option and justify your choice:(iv)

$$\frac{2\tan 30°}{1 - \tan^2 30°}$$

A. $\cos 60°$

B. $\sin 60°$

C. $\tan 60°$

D. $\sin 30°$

Answer:

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28. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \dfrac{1}{\sqrt{3}}$:find A and B.

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29. State whether the following are true or false.Justify your answer:(i)sin(A+B)=sin A+sin B.

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30. State whether the following are true or false.Justify your answer:(ii)The value of $\sin \theta$ increases as θincreases.

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31. State whether the following are true or false. Justify your answer:(iii)The value of $\cos \theta$ increases as θ increases.

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32. State whether the following are true or false.Justify your answer:(iv)$\sin\theta = \cos\theta$for all values of θ

33. State whether the following are true or false.Justify your answer:(v)cot A is not defined for $A = 0°$

34. Evaluate:(i)$\dfrac{\sin 18°}{\cos 72°}$

35. Evaluate:(ii)$\dfrac{\tan 26°}{\cot 64°}$

36. Evaluate:(iii)$\cos 48° - \sin 42°$

37. Evaluate:(iv)$\cos ec31° - \sec 59°$

38. Show that:(i)$\tan 48° \tan 23° \tan 42° \tan 67° = 1$

39. Show that(ii)$\cos 38° \cos 52° - \sin 38° \sin 52° = 0$

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

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41. If tanA=cotB,prove that $A + B = 90°$

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42. If $\sec 4A = \cos ec(A - 20°)$,where 4A is an acute angle,find the value of A.

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43. If A,B and C are interior angle of a triangle ABC,then show that

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

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

45. Express the triangle ratio sinA,secA and tanA in terms of cotA.

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

47. Evaluate :(i) $\dfrac{\sin^2 63° + \sin^2 27°}{\cos^2 17° + \cos^2 73°}$

48. Evaluate :(ii)$\sin 25° \cos 65° + \cos 25° \sin 65°$

49. Choose the correct option.Justify your choice:(i)

$9 \sec^2 A - 9 \tan^2 A$

a)1 b)9 c)8 d)0

A. 1

B. 9

C. 8

D. 0

Answer:

50. Choose the correct option.Justify your choice:(ii)

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

A. 0

B. 1

C. 2

D. -1

Answer:

51. Choose the correct option.Justify your choice:(iii)

$(\sec A + \tan A)(1 - \sin A)$=

a)secA b)sinA c)cosecA d)cosA

A. secA

B. sinA

C. cosecA

D. cosA

Answer:

52. Choose the correct option.Justify your choice:(iv) $\dfrac{1 + \tan^2 A}{1 + \cot^2 A} =$

A. $\sec^2 A (B)$

B. -1

C. $\cot^2 A$

D. $\tan^2 A$

Answer:

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53. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(i) $\dfrac{1 - \cos\theta}{1 + \cos\theta} = (\cos ec\theta - \cot\theta)^2$

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54. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(ii)

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

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55. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(iii)

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

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56. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(iv)

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

57. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(v) $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \cos ecA + \cot A$ using the identity $\cos ec^2 A = 1 + \cot^2 A$

58. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(vi) $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

59. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(vii)

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

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60. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(viii)

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

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61. Prove the following identities,where the angles involves are acute angles for which the expressions are defined:(ix)

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

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62. Prove the following identities, where the angles involves are acute angles for which the expressions are defined:(x) $\left(\dfrac{1 + \tan^2 A}{1 + \cot^2 A}\right)^2 = \left(\dfrac{1 - \tan^2 A}{1 - \cot^2 A}\right)^2 = \tan^4 A$

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63. The maximum value of $\sin\theta, 0 \leq \theta \leq 90^\circ$ is

A. 0

B. -1

C. 1

D. $\dfrac{1}{2}$

Answer:

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64. The maximum value of $\cos\theta$, $0 \leq \theta \leq 90°$ is

A. 0

B. -1

C. 1

D. $\dfrac{1}{2}$

Answer:

65. The value of $\sin(90° - \theta)$ is

A. $\sin 90°$

B. $\cos\theta$

C. $\cos 90^\circ$

D. 1

Answer:

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66. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 180^\circ$ is

A. 0

B. 1

C. -1

D. $\dfrac{1}{\sqrt{2}}$

Answer:

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67. The value of $\sin 0^\circ \sin 1^\circ \sin 2^\circ \sin 3^\circ \ldots . \sin 90^\circ$

A. 1

B. -1

C. 0

D. $\dfrac{1}{\sqrt{2}}$

Answer:

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68. $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$ is

A. 0

B. 1

C. $\dfrac{1}{16}$

D. None of these

Answer:

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69. The value of $\tan 1° \tan 2° \tan 3° \ldots \tan 89°$

A. 0

B. 1

C. $\sin^2 \theta$

D. None of these

Answer:

70. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 90^\circ$ is

A. 0

B. 1

C. $\sin^2 \theta$

D. -1

Answer:

71. If $x \tan 45^\circ \sin 30^\circ = \cos 30^\circ \tan 30^\circ$ then the value of x will be

a)1 b)$\dfrac{1}{2}$ c)$\sqrt{3}$ d)$\dfrac{1}{\sqrt{2}}$

A. 1

B. $\dfrac{1}{2}$

C. $\sqrt{3}$

D. $\dfrac{1}{\sqrt{2}}$

Answer:

72. The maximum value of $\cos\theta$ is

a)1 b)2 c)3 d)4

A. 1

B. 2

C. 3

D. 4

Answer:

73. The maximum value of $\sin\theta$ is

A. 0

B. 1

C. $\dfrac{1}{2}$

D. 2

Answer:

74. If $x = a\cos\theta$ and $y = b\sin\theta$ then the value of $b^2x^2 + a^2y^2$ is

A. ab

B. a^2b^2

C. $a^2 + b^2$

D. a^4b^4

Answer:

75. If A,B and C are interior angle of a $\triangle ABC$,then the value of $\cos\left(\dfrac{B+C}{2}\right)$

A. $\sin\left(\dfrac{A}{2}\right)$

B. $-\sin\left(\dfrac{A}{2}\right)$

C. $\cos\left(\dfrac{A}{2}\right)$

D. $-\cos\left(\dfrac{A}{2}\right)$

Answer:

76. If $\sec\theta + \tan\theta = x$ then the value of $\sec\theta$ will be

A. $\dfrac{x^2 + 1}{2x}$

B. $\dfrac{x^2 + 1}{x}$

C. $\dfrac{x^2 - 1}{2x}$

D. $\dfrac{x^2 - 1}{x}$

Answer:

77. The value of $\sec^4 A - \sec^2 A$ is

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

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

C. $\tan^4 A + \tan^{\frac{1}{2}} A$

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

Answer:

78. If $5x = \sec\theta$ and $\dfrac{5}{x} = \tan\theta$, find the value of 5(x^2 - 1/x^2)

A. 5

B. $\dfrac{1}{5}$

C. 0

D. -1

Answer:

79. If $\cos ec\theta = 2x$ and $\cot\theta = \dfrac{2}{x}$ then the value of $2\left(x^2 - \dfrac{1}{x^2}\right)$ will be

A. 2

B. $-\dfrac{1}{2}$

C. $\dfrac{1}{2}$

D. 1

Answer:

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80. The value of $\sin 40° - \cos 50°$ is

A. 0

B. 1

C. $\sin 10°$

D. $\cos 10°$

Answer:

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81. The value of $\cos^2 37° - \sin^2 53°$ is

A. 0

B. 1

C. $\dfrac{1}{3}$

D. $\dfrac{2}{\sqrt{3}}$

Answer:

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82. The value of $\sec^2 10° - \cot^2 80°$ is

A. 0

B. 1

C. $\dfrac{3}{2}$

D. None of these

Answer:

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83. The value of $\sin^2 29° + \sin^2 61°$

A. 0

B. 1

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

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

Answer:

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84. $9\sec^2 A - 9\tan^2 A$ is equal to

A. 0

B. 1

C. 9

D. -1

Answer:

85. The value of $\dfrac{\tan 30^\circ}{\cot 60^\circ}$ is

A. 1

B. $\sqrt{3}$

C. $\dfrac{1}{\sqrt{2}}$

D. $\dfrac{1}{\sqrt{3}}$

Answer:

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86. The value of $\cos(40^\circ + \theta) - \sin(50^\circ - \theta)$ is

A. 0

B. 1

C. $\sin^2 \theta$

D. None of these

Answer:

87. The value of $\sin\theta\cos(90° - \theta) + \cos\theta\sin(90° - \theta)$ is

A. 0

B. -1

C. 1

D. 2

Answer:

88. The value of $\sec 70° \sin 20° + \cos 20° \, \cos ec 70°$ is

A. 1

B. 2

C. 3

D. 4

Answer:

89. If A and B are acute angle such that `SinA=CosB then the value of (A+B) is

A. $45°$

B. $60°$

C. $90°$

D. $180°$

Answer:

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90. If $\cos 9\alpha = \sin \alpha$ and $9\alpha < 90°$ then the value of $\tan 5\alpha$ is

A. 0

B. 1

C. $\sqrt{3}$

D. $\dfrac{1}{\sqrt{3}}$

Answer:

91. If $\sin(\theta + 34°) = \cos\theta$ and θ is acute then the value θ will be

A. $42°$

B. $28°$

C. $56°$

D. $66°$

Answer:

92. If $\tan 2A = \cot(A - 21°)$ where 2A is an acute angle then`angleA=?.

A. $27°$

B. $35°$

C. $37°$

D. $24°$

Answer:

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93. Say true (T) or False(F):(i)If $\cos \theta = x$ then $-1 \leq x \leq 1$

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94. Say true (T) or False(F):(ii)The value of $\tan \theta$ always lies between 1 and -1

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95. Say true (T) or False(F):(iii)The value of $\cot \theta$ is not defined for $\theta = 90°$

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