doubtnut
India's Number 1 Education App

MATHS

BOOKS - S CHAND MATHS (ENGLISH)

COMPOUND AND MULTIPLE ANGLES

Example

1. Computer $\sin 75^\circ, \cos 75^\circ$ and $\tan 15^\circ$, from the functions of 30° and 45°

Watch Video Solution

2. If α and β are acute angles and $\sin\alpha = \frac{3}{5}, \sin\beta = \frac{8}{17}$, find the values of $\sin(\alpha+\beta), \cos(\alpha \pm \beta)$, and $\tan(\alpha \pm \beta)$.

Watch Video Solution

3. Prove that $\sin(\alpha + 30^\circ) = \cos\alpha + \sin(\alpha - 30^\circ)$

Watch Video Solution

4. Prove that

$\sin(x+y)\sin(x-y) + \sin(y+z)\sin(y-z) + \sin(z+x)\sin(z-x) = 0.$

Watch Video Solution

5. Find the value of $\cos^2 45^\circ - \sin^2 15^\circ$.

Watch Video Solution

6. Prove that tan 11 A tan 7A tan 4A = tan 11 A - tan 7A - tan 44.

Watch Video Solution

7. Prove that $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$.

Watch Video Solution

8. If $\sin(\alpha + \beta) = \frac{4}{5}, \cos(\alpha - \beta) = \frac{12}{13} 0 < \alpha < \frac{\pi}{4}, 0 < \beta < \frac{\pi}{4}$, find $\tan 2\alpha$.

Watch Video Solution

9. Find the value of $\sin 75^\circ \sin 15^\circ$.

Watch Video Solution

10. Prove that $\sin 20^\circ \sin 40^\circ \sin 80^\circ = \frac{\sqrt{3}}{8}$.

Watch Video Solution

11. Convert the followng into products:

(i) $\sin 53^\circ + \sin 21^\circ, (ii)\cos 83^\circ - \cos 17^\circ, (iii)\sin 50^\circ - \cos 80^\circ$

Watch Video Solution

12. Prove that $\frac{\sin 7A - \sin 5A}{\cos 5A + \cos 7A} = \tan A.$

Watch Video Solution

13. Prove that

$$\frac{\cos 3A + 2\cos 5A + \cos 7A}{\cos A + 2\cos 3A + \cos 5A} = \cos 2A - \sin 2A \tan 3A.$$

Watch Video Solution

14. Prove that $\frac{\cos\theta + \cos 2\theta + \cos 3\theta + \cos 4\theta}{\sin\theta + \sin 2\theta + \sin 3\theta + \sin 4\theta} = \cot\frac{5\theta}{2}.$

Watch Video Solution

15. $\sin 10x = 2\sin 5x \cos 5x$

Watch Video Solution

16. $\cos 6x = \cos^2 3x - \sin^2 3x$

Watch Video Solution

17. $\tan 8x = \dfrac{2\tan 4x}{1 - \tan^2 4x}$

Watch Video Solution

18. Given that $\sin A = \dfrac{3}{5}$ and that A is an acute anlge, find without using talbes, the values of $\sin 2A$, $\cos 2A$ and $\tan 2A$. Hence find the value of sin 4A.

Watch Video Solution

19. Prove that

$$\sqrt{\frac{1-\cos 2x}{1+\cos 2x}} = \tan x, x \in I \text{ or } III \text{ quad.}$$

Watch Video Solution

20. Prove that

$$\tan A - \cot A = -2\cot 2A$$

Watch Video Solution

21. Prove that

$$\frac{\cos A}{1-\sin A} = \tan\left(45^\circ + \frac{A}{2}\right),$$

Watch Video Solution

22. Prove that

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

Watch Video Solution

23. Prove that

$$\sin^2\left(\frac{\pi}{8}+\frac{\theta}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{\theta}{2}\right)=\sin\frac{\pi}{4}\sin\theta.$$

Watch Video Solution

24. Prove that $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}=2\cos\theta,$ where $\theta\in\left[\frac{-\pi}{8},\frac{\pi}{8}\right]$

Watch Video Solution

25. If $7A=\pi,$ show that $\cos A\cos 2A\cos 3A=\frac{1}{8}.$

Watch Video Solution

26. Prove that $\cos\frac{\pi}{9}\cos\frac{2\pi}{9}\cos\frac{3\pi}{9}\cos\frac{4\pi}{9}=\frac{1}{2^4}.$

Watch Video Solution

27. Prove that

$$\cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) = \frac{3}{2}$$

Watch Video Solution

28. Prove that

$$\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} = \frac{3}{2}$$

Watch Video Solution

29. Prove that $\cos\theta \cos 2\theta \cos 4\theta \ldots \cos 2^{n-1}\theta = \dfrac{\sin(2^n\theta)}{2^n(\sin\theta)}$.

Watch Video Solution

30. Prove that $16\cos^5\theta - 20\cos^3\theta + 5\cos\theta = \cos 5\theta$.

Watch Video Solution

31. Prove that

$\sin 3A = 4 \sin A \sin(60^\circ - A) \sin(60^\circ + A)$.

Watch Video Solution

32. Prove that

$$\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{3\pi}{9}\sin\frac{4\pi}{9} = \frac{3}{16}.$$

Watch Video Solution

33. Prove that $\cos\theta + \cos(120^\circ + \theta) + \cos(120^\circ - \theta) = 0$.

Hence deduce that

$$\cos^3\theta + \cos^3(120^\circ + \theta) + \cos^3(120^\circ - \theta) = \frac{3}{4}\cos 3\theta.$$

Watch Video Solution

34. Find $\cos \frac{7\pi}{8}$.

Watch Video Solution

35. Using the value of $\cos 315^\circ$, find the value of $\sin 157 \frac{1}{(2)^\circ \text{ and } \cos 157\frac{1}{2}^\circ}$.

Watch Video Solution

36. Find the value of

$\sin 22\frac{1}{2}^\circ$

Watch Video Solution

37. Find the value of

$\cos 22\frac{1}{2}^\circ$

Watch Video Solution

38. Find the value of

$\tan 22\frac{1}{2}^{\circ}$

Watch Video Solution

39. Find the value of

$\sin 7\frac{1}{2}^{\circ}$

Watch Video Solution

40. Find the value of

$\cos 7\frac{1}{2}^{\circ}$

Watch Video Solution

41. Find the value of

$\tan 11\frac{1}{4}^{\circ}$

Watch Video Solution

42. Prove that

$$\tan 7\frac{1^\circ}{2} = \sqrt{2} - \sqrt{3} - \sqrt{4} + \sqrt{6} = \left(\sqrt{3} - \sqrt{2}\right)\left(\sqrt{2} - 1\right).$$

Watch Video Solution

43. Prove that

$$\cot 7\frac{1^\circ}{2} = \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6} = \left(\sqrt{3} + \sqrt{2}\right)\left(\sqrt{2} + 1\right).$$

Watch Video Solution

Exercise 5 A

1. Compute

$\sin 15^\circ$ from the functions 60° and 45°

Watch Video Solution

2. Compute

$\cos 345^\circ$ from the functions of 300° and 45°

Watch Video Solution

3. Compute

$\tan 105^\circ$ from the functions of 45° and 60°

Watch Video Solution

4. Compute

$\sin 135^\circ$ from the functions of 180° and 45°

Watch Video Solution

5. Compute

$\cos 195^\circ$ from the functions of 150° and 45°,

Watch Video Solution

6. Compute

$\cos ec(13\pi / 12)$

Watch Video Solution

7. Simplify be reducing to a single term :

$\sin 3\alpha \cos 2\alpha + \cos 3\alpha \sin 2\alpha.$

Watch Video Solution

8. Simplify be reducing to a single term :

$\cos 5\theta \cos 2\theta - \sin 5\theta \sin 2\theta.$

Watch Video Solution

9. Simplify by reducing to a single term :

$\sin 22^\circ \cos 38^\circ + \cos 22^\circ \sin 38^\circ$.

Watch Video Solution

10. Simplify be reducing to a single term :

$\sin 80^\circ \cos 20^\circ - \cos 80^\circ \sin 20^\circ$.

Watch Video Solution

11. Simplify by reducing to a single term :

$\sin(x-y)\cos x - \cos(x-y)\sin x$.

Watch Video Solution

12. Simplify be reducing to a single term :

$\cos(\theta+\alpha)\cos(\theta-\alpha) - \sin(\theta+\alpha)\sin(\theta-\alpha)$.

Watch Video Solution

13. Simplify be reducing to a single term :

$$\frac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ}$$

Watch Video Solution

14. Simplify be reducing to a single term :

$$\frac{\tan\alpha - \tan(\alpha - \beta)}{1 + \tan\alpha \tan(\alpha - \beta)}$$

Watch Video Solution

15. Prove that

$$(\sin\alpha\cos\beta + \cos\alpha\sin\beta)^2 + (\cos\alpha coa\beta - \sin\alpha\sin\beta)^2 = 1.$$

Watch Video Solution

16. $\sin(60^\circ + \theta) - \sin(60^\circ - \theta) = \sin\theta.$

Watch Video Solution

17. Prove that sin(θ+30°)+cos(θ+60°)= cos θ.

Watch Video Solution

18. $\sin(240^\circ + \theta) + \cos(330^\circ + \theta) = 0$

Watch Video Solution

19. $\sin(A - 45^\circ) = \frac{1}{\sqrt{2}}(\sin A - \cos A)$

Watch Video Solution

20. Prove that :$\cos\left(\frac{\pi}{3} + x\right) = \frac{\cos x - \sqrt{3}\sin x}{2}$

Watch Video Solution

21. Prove: $\tan(45^\circ + \theta) = \dfrac{1 + \tan\theta}{1 - \tan\theta}$

Watch Video Solution

22. Prove: $\tan(45^\circ - \theta) = \dfrac{1 - \tan\theta}{1 + \tan\theta}$

Watch Video Solution

23. $\dfrac{\sin(\theta + \phi)}{\sin\theta\cos\phi} = \cot\theta\tan\phi + 1.$

Watch Video Solution

24. $\dfrac{\sin(\theta - \phi)}{\sin\theta\sin\phi} = \cot\phi - \cot\theta.$

Watch Video Solution

25. Prove that $\frac{\sin(A-B)}{\sin A \sin B} + \frac{\sin(B-C)}{\sin B \sin C} + \frac{\sin(C-A)}{\sin C \sin A} = 0$

Watch Video Solution

26. Prove that: $\sin 105^\circ + \cos 105^\circ = \cos 45^\circ$

Watch Video Solution

27. Find the value of $\sin(\alpha+\beta), \cos(\alpha+\beta), \text{ and } \tan(\alpha+\beta),$ given $\sin\alpha = \frac{3}{5}, \cos\beta = \frac{5}{13}, \alpha \text{ and } \beta$ in Quadrant I.

Watch Video Solution

28. Find the value of $\sin(\alpha+\beta), \cos(\alpha+\beta), \text{ and } \tan(\alpha+\beta),$ given $\cos\alpha = \frac{-12}{13}, \cot\beta = \frac{24}{7}, \alpha$ in Quadrant II,β in Quadrant III.

Watch Video Solution

29. Find the value of $\sin(\alpha - \beta), \cos(\alpha - \beta)$ and $\tan(\alpha - \beta)$, given $\sin\alpha = \frac{8}{17}, \tan\beta = \frac{5}{12}, \alpha$ and β in Quadrant I.

Watch Video Solution

30. Find the value of $\sin(\alpha - \beta), \cos(\alpha - \beta)$ and $\tan(\alpha - \beta)$, given $\cos\alpha = \frac{-12}{13}, \cot\beta = \frac{24}{7}, \alpha$ in Quadrant II,β in Quadrant I.

Watch Video Solution

31. If A and B are acute angles, find $(A + B)$ given $\sin A = \frac{1}{\sqrt{5}}, \sin B = \frac{1}{\sqrt{10}}$

Watch Video Solution

32. If A and B are acute angles, find $(A + B)$ given $\tan A = \frac{5}{6}, \tan B = \frac{1}{11}.$

Watch Video Solution

33. Given that $\tan\alpha = \frac{m}{m+1}, \tan\beta = \frac{1}{2m+1}$ then what is the value of $\alpha + \beta$?

Watch Video Solution

34. In the ΔABC the foot of the perpendicular from A to BC is D. Given that $\tan B = \frac{4}{3}, \cos C = \frac{15}{17}$ and that $AB = 20cm$, calculate without using tables

(i) the lengths of the sides AC and BC,

(ii) the value of sin A.

Watch Video Solution

35. Given that $\tan(A+B) = 1$ and $\tan(A-B) = \frac{1}{7}$, find without using tables the values of tan A and tan B.

Watch Video Solution

36. If $\tan(A+B)=x$ and $\tan B=\frac{1}{2}$ prove that $\tan A=\frac{2x-1}{x+2}$ and obtain an expression for $\tan(A-B)$ in terms of x. If $\tan(A-B)=\frac{1}{3}$ and A is acute, find A without using tables,

Watch Video Solution

37. If $\sin(\alpha+\beta)=\frac{4}{5}, \sin(\alpha-\beta)=\frac{5}{13}, \alpha+\beta, \alpha-\beta$ being acute angles prove that $\tan 2\alpha=\frac{63}{16}$.

Watch Video Solution

38. Prove that $1+\tan 2\theta \tan\theta=\sec 2\theta$.

Watch Video Solution

39. Show that $4\sin\left(\frac{\pi}{3}-\theta\right)\sin\left(\frac{\pi}{3}+\theta\right)=3-4\sin^2\theta$

Watch Video Solution

40. $\frac{\cos 17^\circ + \sin 17^\circ}{\cos 17^\circ - \sin 17^\circ} = \tan 62^\circ$

Watch Video Solution

41. $\tan 3A - \tan 2A - \tan A = \tan 3A \tan 2A \tan A.$

Watch Video Solution

42. $\tan 75^\circ - \tan 30^\circ - \tan 75^\circ \tan 30^\circ = 1.$

Watch Video Solution

43. Prove that

$\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi) = \cos(2\theta + 2\phi).$

Watch Video Solution

44. If $\sin(\theta+\alpha)=\cos(\theta+\alpha)$, prove that $\tan\theta=\dfrac{1-\tan\alpha}{1+\tan\alpha}$

Watch Video Solution

45. Given that $A=B+C$. prove that

$\tan A-\tan B-\tan C=\tan A\tan B\tan C$.

Watch Video Solution

46. If $A+B=45^\circ$, show that $\tan A+\tan B+\tan A\tan B=1$.

Hence or otherwise, express $\tan 22^\circ 30'$ in surd form.

Watch Video Solution

47. Use the expansion of $\tan(A-B)$ to find $\tan 15^\circ$ without the use of tables, leaving your answer in surd form with an integral denominator.

Watch Video Solution

48. Prove that $\frac{2\tan A}{1+\tan^2 A} = \sin 2A.$

Watch Video Solution

49. If $A + B = 225^\circ$, prove that $\tan A + \tan B = 1 - \tan A \tan B$

Watch Video Solution

Exercise 5 B

1. Convert the products into sum or difference.

$2\sin 48^\circ \cos 12^\circ$

Watch Video Solution

2. Convert the products into sum or difference. If angles are given in degrees, evaluate from tables.

$2\sin 54^\circ \sin 66^\circ$

Watch Video Solution

3. Convert the products into sum or difference. If angles are given in degrees, evaluate from tables.

$2\cos 5\theta \cos 3\theta$

Watch Video Solution

4. Convert the products into sum or difference. If angles are given in degrees, evaluate from tables.

$2\cos 72^\circ \sin 56^\circ$

Watch Video Solution

5. Convert the products into sum or difference. If angles are given in degrees, evaluate from tables.

$\cos(\alpha+\beta)\cos(\alpha-\beta)$

Watch Video Solution

6. Convert the products into sum or difference. If angles are given in degrees, evaluate from tables.

$\sin\frac{A+B}{2}\cos\frac{A-B}{2}$

Watch Video Solution

7. Convert the sums or differences into products:

$\sin 12A+\sin 4A$

Watch Video Solution

8. Convert the sums or differences into products:

$\sin 37^\circ + \sin 21^\circ$

Watch Video Solution

9. Convert the sums or differences into products:

$\sin 12A - \sin 4A$

Watch Video Solution

10. Convert the sums or differences into products:

$\cos 79^\circ + \cos 11^\circ$

Watch Video Solution

11. Convert the sums or differences into products:

$\cos 12\alpha + \cos 8\alpha$

Watch Video Solution

12. Convert the sums or differences into products:

$\cos 25^\circ - \cos 37^\circ$

Watch Video Solution

13. Convert the sums or differences into products:

$\sin 61^\circ - \cos 39^\circ$

Watch Video Solution

14. Convert the sums or differences into products:

$\sin 4x + \cos 2x$

Watch Video Solution

15. Prove that: $\frac{\sin A + \sin B}{\cos A + \cos B} = \tan\left(\frac{A+B}{2}\right)$

Watch Video Solution

16. $\frac{\sin 75^\circ - \sin 15^\circ}{\cos 75^\circ + \cos 15^\circ} = \frac{1}{\sqrt{3}}$

Watch Video Solution

17. $\frac{\sin 7x + \sin 3x}{\cos 7x + \cos 3x} = \tan 5x.$

Watch Video Solution

18. $\frac{\cos 2B - \cos 2A}{\sin 2A + \sin 2B} = \tan(A - B).$

Watch Video Solution

19. $\frac{\sin(4A-2B)+\sin(4B-2A)}{\cos(4A-2B)+\cos(4B-2A)}=\tan(A+B)$

Watch Video Solution

20. $\frac{\cos\alpha+2\cos 3\alpha+\cos 5\alpha}{\cos 3\alpha+2\cos 5\alpha+\cos 7\alpha}=\cos 3\alpha\sec 5\alpha.$

Watch Video Solution

21. $\frac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}=\tan 4A.$

Watch Video Solution

22. $\cos 20^\circ+\cos 100^\circ+\cos 140^\circ=0$

Watch Video Solution

23. Prove that :

$\sin 10^\circ + \sin 20^\circ + \sin 40^\circ + \sin 50^\circ = \sin 70^\circ + \sin 80^\circ$.

Watch Video Solution

24. Prove that $\cos 15^\circ - \sin 15^\circ = \frac{1}{\sqrt{2}}$

Watch Video Solution

25. Prove that $\sin 36^\circ + \cos 36^\circ = \sqrt{2}\cos 9^\circ$.

Watch Video Solution

26. Prove that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$.

Watch Video Solution

27. $\sin 10^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{8}$.

Watch Video Solution

28. $4\cos 12^\circ \cos 48^\circ \cos 72^\circ = \cos 36^\circ$

Watch Video Solution

29. $\tan 20^\circ \tan 40^\circ \tan 80^\circ = \tan 60^\circ$

Watch Video Solution

30. $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0.$

Watch Video Solution

31. $\tan(A + 30^\circ) + \cot(A - 30^\circ) = \frac{1}{\sin 2A - \sin 60^\circ}$.

Watch Video Solution

32. $\cos A + \cos(120^\circ - A) + \cos(120^\circ + A) = 0$

Watch Video Solution

33. $\cos(A + B) + \sin(A - B) = 2\sin(45^\circ + A)\cos(45^\circ + B).$

Watch Video Solution

34. If $\cos A + \cos B = \frac{1}{3}$ and $\sin A + \sin B = \frac{1}{4}$ prove that $\tan\frac{1}{2}(A + B) = \frac{3}{4}.$

Watch Video Solution

35. What is the value of $\frac{\cos 10^\circ + \sin 20^\circ}{\cos 20^\circ - \sin 10^\circ}$?

Watch Video Solution

Exercise 5 C

1. Evaluate :

$2\sin 15^\circ \cos 15^\circ$

Watch Video Solution

2. Evaluate :

$1 - 2\sin^2 22.5^\circ$

Watch Video Solution

3. Evaluate :

$2\cos^2 157.5^\circ - 1$

Watch Video Solution

4. Evaluate :

$$\cos^2 \frac{\pi}{12} - \sin^2 \frac{\pi}{12}$$

Watch Video Solution

5. Evaluate :

$$\frac{1}{2} - \sin^2 \frac{7\pi}{12}$$

Watch Video Solution

6. Evaluate :

$$\cos \frac{\pi}{8} \sin \frac{\pi}{8}$$

Watch Video Solution

7. Evaluate :

$$\frac{2 \tan 22\frac{1^\circ}{2}}{1 - \tan^2 22\frac{1^\circ}{2}}$$

Watch Video Solution

8. Evaluate :

$8\cos^3\frac{\pi}{9} - 6\cos\frac{\pi}{9}$

Watch Video Solution

9. Find the values of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$, given :

(i) $\sin\theta = \frac{3}{5}$, θ in Quadrant I.

(ii) $\sin\theta = \frac{3}{5}$, θ in Quadrant II.

(iii) $\sin\theta = -\frac{1}{2}$, θ in Quadrant IV.

(iv) $\tan\theta = -\frac{1}{5}$, θin Quadrant II.

Watch Video Solution

10. ABC is an acute-angled triangle incribed in a circle of radius 5 cm and centre O . The sine of angle A is equal to $\frac{3}{5}$. Calculate without using tables :

(i) the length of BC

(ii) sin OBC

(iii) sin BOC

(iv) cos BOC

Watch Video Solution

11. Derive function of 120° from functions of 60° and check by using relations between functions of supplementary angles.

Watch Video Solution

12. If $\sin\theta = a$ and $\sin 2\theta = b$, find an expression for $\cos\theta$ in terms of a and b. Hence find a relation between a and b not involving θ.

Watch Video Solution

13. Given that $\tan A = \frac{1}{5}$. find the values of tan 2 A, tan 4A and $\tan(45^\circ - 4A)$.

Watch Video Solution

14. If A is an obtuse angle whose sine is $\frac{5}{13}$ and B is an acute angle whose tangent is $\frac{3}{4}$, without using tables find the values of

(a) $\sin 2B$,

(b)$\tan(A - B)$.

Watch Video Solution

15. Express $\cos 6\alpha$ in terms of $\cos 3\alpha$.

Watch Video Solution

16. $\sin 100$ in terms of functions of 5θ,

Watch Video Solution

17. $write \tan 8\alpha$ in temrs of $\tan 4\alpha$.

Watch Video Solution

18. $\cos 2\theta$ in terms of $\cos 4\theta$,

Watch Video Solution

19. $\tan 4\phi$ in terms of $\cos 8\phi$,

Watch Video Solution

20. Express $\sin \frac{5\pi}{2}$ in terms of $\cos 5\pi$,

Watch Video Solution

21. $\cos 20\theta$ in terms of $\sin 5\theta$.

Watch Video Solution

22. Using the half angle formulas, find the exact value of $(i)\sin 15^\circ\,(ii)\sin 22\frac{1}{2}^\circ$.

Watch Video Solution

23. In the triangle ABC , in which C is the right angle, prove that :

$$\sin 2A = \frac{2ab}{c^2}, \cos 2A = \frac{b^2 - a^2}{c^2}, \sin\frac{A}{2} = \sqrt{\frac{c-b}{2c}}, \cos\frac{A}{2} = \sqrt{\frac{c+b}{2c}}.$$

Watch Video Solution

24. If $\cos\alpha = \frac{3}{5}, \cos\beta = \frac{4}{5}$, find the value of $\cos\left(\frac{\alpha-\beta}{2}\right)$, assuming α and β to be acute angles.

Watch Video Solution

25. Given that $\cos\frac{A}{2}=\frac{12}{13}$, calculate without the use of tubles, the values of sin A , cos A and tan A.

Watch Video Solution

26. Given that $\tan x=\frac{12}{5}, \cos y=\frac{-3}{5}$, and the angles x and y are in the same quadrants, calcualte without the use of tables the values of $(i)\sin(x+y), (ii)\cos\frac{y}{2}$.

Watch Video Solution

27. Given that $\sin^2\beta=\sin\alpha\cos\alpha$, show that $\cos 2\beta=2\cos^2\left(\frac{\pi}{4}+\alpha\right)\Big)$.

Watch Video Solution

28. Derive formulas for the following in terms of functions of 2θ and and then of θ.

$(i)\sin 4\theta$

(ii) $\cos 4\theta$,

(iii) $\tan 4\theta$

Watch Video Solution

29. If $\sin\alpha = \frac{3}{5}$, find value of $(i)\sin 3\alpha$, $(ii)\cos 3\alpha (iii)\tan 3\alpha$.

Watch Video Solution

30. If $2\cos\theta = x + \frac{1}{x}$, prove that $2\cos 3\theta = x^3 + \frac{1}{x^3}$.

Watch Video Solution

Exercise 5 D

1. Prove: $(\sin\phi - \cos\phi)^2 = 1 - \sin 2\phi.$

Watch Video Solution

2. Prove that $\left(\cos\frac{\theta}{2} + \sin\frac{\theta}{2}\right)^2 = 1 + \sin\theta.$

Watch Video Solution

3. Prove: $\left(\sin\theta \times \tan\frac{\theta}{2}\right) = 2\sin^2\frac{\theta}{2}$

Watch Video Solution

4. $\frac{1}{\sec 2\theta} = \cos^4\theta - \sin^4\theta.$

Watch Video Solution

5. Prove: $\frac{2}{\cot\alpha\tan 2\alpha} = 1 - \tan^2\alpha.$

Watch Video Solution

6. Prove that $\frac{\sin 2A}{1-\cos 2A} = \cot A$

Watch Video Solution

7. Prove: $\frac{\sin 2A}{1+\cos 2A} = \tan A$

Watch Video Solution

8. Prove that $\frac{\sin 3\theta}{\sin \theta} - \frac{\cos 3\theta}{\cos \theta} = 2$

Watch Video Solution

9. Prove that $\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A} = \frac{2+\sin 2A}{2}$.

Watch Video Solution

10. Prove that $\frac{1-\cos 2\theta}{\sin 2\theta} = \tan\theta.$

Watch Video Solution

11. Prove that $\cot\alpha - \tan\alpha = 2\cot 2\alpha.$

Watch Video Solution

12. Prove that $\cos ecA - 2\cot 2A\cos A = 2\sin A.$

Watch Video Solution

13. $\frac{1+\sin 2x+\cos 2x}{\cos x+\sin x} = 2\cos x$

Watch Video Solution

14. Show that '(1-cos 2x + sin x)/(sin 2x + cos x) = tan x'

Watch Video Solution

15. $\frac{\sin\theta + \sin 2\theta}{1 + \cos\theta + \cos 2\theta} = \tan\theta.$

Watch Video Solution

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

Watch Video Solution

17. $\frac{\cos A + \sin A}{\cos A - \sin A} - \frac{\cos A - \sin A}{\cos A + \sin A} = 2\tan 2A.$

Watch Video Solution

18. $\frac{\cos A - \sin A}{\cos A + \sin A} = \sec 2A - \tan 2A.$

Watch Video Solution

19. Prove that $\frac{\sin 2A}{1-\cos 2A} \cdot \frac{1-\cos A}{\cos A} = \tan \frac{A}{2}$

Watch Video Solution

20. Prove that : $2\cos A = \sqrt{\left[2+\sqrt{2(1+\cos 4A)}\right]}, A \in I \text{ or } IV$ Quadrant.

Watch Video Solution

21. $\tan 2A = (\sec 2A + 1)\sqrt{(\sec^2 A - 1)}$, Abelongs to I or IV Quad.

Watch Video Solution

22. Prove that $\frac{\sec 8A - 1}{\sec 4A - 1} = \frac{\tan 8A}{\tan 2A}$.

Watch Video Solution

23. Prove that $\tan 2A - \sec A \sin A = \tan A \sec 2A$.

Watch Video Solution

24. Prove that $(\cos A + \cos B)^2 + (\sin A + \sin B)^2 = 4\cos^2\left(\frac{A-B}{2}\right)$.

Watch Video Solution

25. Prove that $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4\sin^2\left(\frac{A-B}{2}\right)$.

Watch Video Solution

26. Prove that:$\cos^4\frac{\pi}{8} + \cos^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8} = \frac{3}{2}$.

Watch Video Solution

27. $\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8} = \frac{3}{2}$.

Watch Video Solution

28. $\cos\alpha\cos(60^\circ-\alpha)\cos(60^\circ+\alpha)=\frac{1}{4}\cos 3\alpha.$

Watch Video Solution

29. $\frac{\cos^3\alpha-\cos 3\alpha}{\cos\alpha}+\frac{\sin^3\alpha+\sin 3\alpha}{\sin\alpha}=3.$

Watch Video Solution

30. $\cos^2 2\theta-\sin^2\theta=\cos\theta.\cos 3\theta.$

Watch Video Solution

31. $1+\frac{\cos 2\theta+\cos 6\theta}{\cos 4\theta}=\frac{\sin 3\theta}{\sin\theta}.$

Watch Video Solution

32. Prove that $\cos^3\left(x-\frac{2\pi}{3}\right)+\cos^3 x+\cos^3\left(x+\frac{2\pi}{3}\right)=\frac{3}{4}\cos 3x.$

Watch Video Solution

33. $\frac{1}{\sin 10^\circ}-\frac{\sqrt{3}}{\cos 10^\circ}=4.$

Watch Video Solution

34. $\tan 70^\circ-\tan 20^\circ-2\tan 40^\circ=4\tan 10^\circ.$

Watch Video Solution

35. $\tan\theta+2\tan 2\theta+4\tan 4\theta+8\cot 8\theta=\cot\theta.$

Watch Video Solution

36. $4\left(\cos^3 20^\circ+\cos^3 40^\circ\right)=3(\cos 20^\circ+\cos 40^\circ)$

Watch Video Solution

37. Prove that $4\left(\cos^3 10^\circ + \sin^3 20^\circ\right) = 3(\cos 10^\circ + \sin 20^\circ)$.

Watch Video Solution

38. Prove that $\cos^3 x \sin^2 x = \frac{1}{16}(2\cos x - \cos 3x - \cos 5x)$.

Watch Video Solution

39. $\cot A + \cot(60^\circ + A) + \cot(120^\circ + A) = 3\cot 3A$.

Watch Video Solution

40. Prove that : $\cos 36^\circ - \sin 18^\circ = \frac{1}{2}$.

Watch Video Solution

41. $\cos^2 36^\circ + \sin^2 18^\circ = \frac{3}{4}.$

Watch Video Solution

42. $3\cos 72^\circ - 4\sin^3 18^\circ = \cos 36^\circ.$

Watch Video Solution

43. $\cos^2 48^\circ - \sin^2 12^\circ = \frac{\sqrt{5}+1}{8}.$

Watch Video Solution

44. Prove that $\sin \frac{1}{10}\pi \cos \frac{1}{5}\pi = \frac{1}{4}.$

Watch Video Solution

45. $\sec 72^\circ - \sec 36^\circ = 2.$

Watch Video Solution

46. $\sin^2 24^\circ - \sin^2 6^\circ = \frac{\sqrt{5}-1}{8}$.

Watch Video Solution

47. $\sin 12^\circ \sin 48^\circ \sin 54^\circ = \frac{1}{8}$.

Watch Video Solution

48. Prove that $4\cos 6^\circ \cos 42^\circ \cos 66^\circ \cos 78^\circ = \frac{1}{4}$.

Watch Video Solution

49. $\sin\frac{\pi}{5}\sin\frac{2\pi}{5}\sin\frac{4\pi}{5}\sin\frac{3\pi}{5} = \frac{5}{16}$.

Watch Video Solution

50. Prove that $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{14\pi}{15}=\frac{1}{16}$.

Watch Video Solution

51. $\cos^2\frac{\pi}{10}+\cos^2\frac{2\pi}{5}+\cos^2\frac{3\pi}{5}+\cos^2\frac{9\pi}{10}=2$

Watch Video Solution

52. $\tan 6^\circ \tan 42^\circ \tan 66^\circ \tan 78^\circ = 1$

Watch Video Solution

53. $\cos\alpha\cos 2\alpha\cos 4\alpha\cos 8\alpha=\frac{1}{16}$, if $\alpha=24^\circ$

Watch Video Solution

54. $\cos 12^\circ \cos 24^\circ \cos 36^\circ \cos 48^\circ \cos 72^\circ \cos 84^\circ = \frac{1}{2^6}$

Watch Video Solution

55. If $\theta = \frac{\pi}{2^n + 1}$ prove that $2^n \cos\theta \cos 2\theta \cos 2^2\theta \ldots \cos 2^{n-1}\theta = 1$

Watch Video Solution

56. If $\tan\frac{x-y}{2}, \tan z, \tan\frac{x+y}{2}$ are in G.P. then show that $\cos x = \cos y . \cos 2z$

Watch Video Solution

57. If $\sin\theta$ is G.M. of $\sin\phi$ and $\cos\phi$, then prove that $\cos 2\theta = 2\cos^2\left(\frac{\pi}{4} + \phi\right)$.

Watch Video Solution

58. If $m\tan(\theta - 30^\circ) = n\tan(\theta + 120^\circ)$, show that $\cos 2\theta = \dfrac{m+n}{2(m-n)}$.

Watch Video Solution

59. If $\sin\alpha = \lambda\sin(\theta - \alpha)$ then prove that $\tan\left(\alpha - \dfrac{\theta}{2}\right) = \dfrac{\lambda - 1}{\lambda + 1}\tan\dfrac{\theta}{2}$.

Watch Video Solution

60. If $\tan\dfrac{\alpha}{2} = \sqrt{\left\{\dfrac{1-e}{1+e}\right\}}\tan\dfrac{\beta}{2}$, Prove that $\cos\beta = \dfrac{\cos\alpha - e}{1 - e\cos\alpha}$.

Watch Video Solution

Chepter Test

1. Show that $\tan 75^\circ = (\sqrt{3}) + \frac{1}{\sqrt{3}-1} = 2+\sqrt{3}$. Hence deduce that $\tan 75^\circ - \cot 75^\circ = 4\sin 60^\circ$.

Watch Video Solution

2. Prove that $\sin(n+1)x\sin(n+2)x + \cos(n+1)x\cos(n+2)x = \cos x$

Watch Video Solution

3. if $A+B+C=\pi$, and $\cos A = \cos B\cos C$, show that $2\cot B\cot C = 1$.

Watch Video Solution

4. Show that $\frac{\sin(\alpha+\beta)}{\sin(\alpha+\beta)} = 2$, given that $\tan\alpha = 2\tan\beta$.

Watch Video Solution

5. Show that $\frac{\cos 10^\circ + \sin 10^\circ}{\cos 10^\circ - \sin 10^\circ} = \tan 55^\circ$.

Watch Video Solution

6. If $\sin 2A = \frac{4}{5}$, find the value of $\tan A$, $\left(0^\circ \leq A \leq \frac{\pi}{3}\right)$

Watch Video Solution

7. Express $\cot A$ in terms of $\cos 2A$

Watch Video Solution

8. Write $\cos 4\theta$ in terms of $\cos \theta$.

Watch Video Solution

9. A positive acute angle is divided into two parts whose tangents are $\frac{1}{2}$ and $\frac{1}{3}$. Show that the angle is $\frac{\pi}{4}$.

Watch Video Solution

10. Show that $\cos 10^\circ + \cos 110^\circ + \cos 130^\circ = 0$

Watch Video Solution

11. Show that $\frac{\sin 5A + 2\sin 8A + \sin 11A}{\sin 8A + 2\sin 11A + \sin 14A} = \frac{\sin 8A}{\sin 11A}$.

Watch Video Solution

12. Show that $\frac{1}{2\sin 10^\circ} - 2\sin 70^\circ = 1.$

Watch Video Solution

13. Show that $\sin 19^\circ + \sin 41^\circ + \sin 83^\circ = \sin 23^\circ + \sin 37^\circ + \sin 79^\circ$.

Watch Video Solution

14. If $\sin A = \frac{1}{\sqrt{3}}$ and $\sin B = \frac{1}{\sqrt{5}}$ find the value of $\tan \frac{1}{2}(A+B).\cot \frac{1}{2}(A-B)$.

Watch Video Solution

15. If $\sin\theta = n\sin(\theta + 2\alpha)$, show that $(n-1)\tan(\theta+\alpha) + (n+1)\tan\alpha = 0$.

Watch Video Solution

16. If $\tan\frac{\alpha}{2}$ and $\tan\frac{\beta}{2}$ are the roots of the equation $8x^2 - 26x + 15 = 0$, then find the value of $\cos(\alpha+\beta)$.

Watch Video Solution

17. Prove that

$$\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=\begin{cases}2\cot^n\left(\frac{A-B}{2}\right) & \text{,if n is even}\\ 0 & \text{,if n is odd.}\end{cases}$$

Watch Video Solution

18. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in each of the case:

$\sin x=\frac{1}{4}$, x in II quadrant.

Watch Video Solution

19. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in each of the case:

$\tan x=\frac{-4}{3}$, x in II quadrant.

Watch Video Solution

20. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$.

Watch Video Solution

21. Prove that $\sin^2 72^\circ - \sin^2 60^\circ = \frac{\sqrt{5}-1}{8}$.

Watch Video Solution

22. If tan x, tan y, tan z are in G.P., show that $\cos 2y = \frac{\cos(x+z)}{\cos(x-z)}$.

Watch Video Solution

23. If $\tan\frac{\alpha}{2} : \tan\frac{\beta}{2} = 1 : \sqrt{3}$ show that $\cos\beta = \frac{2\cos\alpha - 1}{2 - \cos\alpha}$.

Watch Video Solution