# TRANSFORMATIONS

## OBJECTIVES

**1.** $\sin 21^o \operatorname{cis} 9^o - \cos 84^o \cos 6^o =$

a) ¼ b) 1/8 c) 3/2 d) 3/8

**2.** $\sin 47^o + \sin 61^o - \sin 11^o - \sin 25^o =$

a) $\sin 7^o$ b) $\cos 7^o$ c) $\tan 7^o$ d) sub $14^o$

**3.** $A + C = 2B$ then $\frac{\cos C - \cos A}{\sin A - \sin C} =$

a) cot B b) cot 2B c) tan 2B d) tan B

**4.** $\cos 12^o + \cos 84^o + \cos 132^o + \cos 156^o =$

a) ½ v) ¼ c) – ¼ d) – ½

**5.** $\cos 6^o \sin 24^o \cos 72^o =$

a) – 1/8 b) – ¼ c) 1/8 d) ¼

**6.** If $\sin x + \sin y = ¼$, $\cos x + \cos y = 1/3$ then $\tan\left(\frac{x+y}{2}\right) =$

a) ¼ b) ½ c) ¾ d) None

**7.** $\left(\frac{\cos A + \cos B}{\sin A - \sin B}\right)^{2008} + \left(\frac{\sin A + \sin B}{\cos A - \cos B}\right)^{2008} =$

a) $2\cot^{2008}\left(\frac{A+B}{2}\right)$ b) $2\cot^{2008}\left(\frac{A-B}{2}\right)$

c) $2\tan^{2008}\left(\frac{A+B}{2}\right)$ d) $2\tan^{2008}\left(\frac{A-B}{2}\right)$

**8.** If $\alpha + \beta = \gamma$ then $\cos^2\alpha + \cos^2\beta + \cos^2\gamma - 2\cos\alpha\cos\beta\cos\gamma =$

a) 1 b) 0 c) – 1 d) 2

**9.** If $A + B + C = 270^o$ then $\cos 2A + \cos 2B + \cos 2C + 4\sin A \sin B \sin C =$

a) 0 b) 1 c) 2 d) 3

**10.** $\cos(\alpha + \beta + \gamma) + \cos(\alpha - \beta - \gamma) + \cos(\beta - \gamma - \alpha) + \cos(\gamma - \alpha - \beta) =$

a) $2\cos\alpha\cos\beta\cos\gamma$ b) $3\cos\alpha\cos\beta\cos\gamma$

c) $4\cos\alpha\cos\beta\cos\gamma$ d) $6\cos\alpha\cos\beta\cos\gamma$

**11.** If $a = \frac{\pi}{21}$ then $\frac{\sin 3a - \sin 7a}{\sin 24a + \sin 14a} =$

a) 0 b) 1 c) – 1 d) 2

**12.** If $\frac{\sin A - \sin C}{\cos C - \cos A}$ = cot B then angles A, B, C are in

a) A.P. b) G.P. c) H.P. d) A.G.P.

**13.** $\sin x + \sin y = ¾$ and $\sin x - \sin y = 2/5$ then $\frac{\tan\left(\frac{x-y}{2}\right)}{\tan\left(\frac{x+y}{2}\right)} =$

a) 15/8 b) 8/15 c) 3/10 d) 10/3

**14.** $2\sin^2(8½^o) + 4\cos 16^o \sin(7½^o)\sin(8½^o) + \cos 32^o =$

a) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ b) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ c) $2 - \sqrt{3}$ d) $2 + \sqrt{3}$

**15. If 2 cos x + 2 cos 3x = cos y and 2 sin x + 2 sin 3x = sin y then cos 2x =**

a) – 7/8 b) – 1/8 c) 1/8 d) 7/8

**16. $\cot 16^o \cot 44^o + \cot 44^o \cot 76^o - \cot 76^o \cot 16^o$ =**

a) 0 b) 1 c) 3 d) 4

**17.** $\frac{1+\cos 56^o+\cos 58^o-\cot 66^o}{\cos 28^o \cos 29^o \sin 33^o}$ =

a) 0 b) 2 c) 4 d) 1

**18.** $\frac{\cos 20^o+8\sin 10^o \sin 50^o \sin 70^o}{\sin^2 80^o}$ =

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

**19.** $\frac{\sin 5\alpha-\sin 3\alpha}{\cos 5\alpha+2\cos 4\alpha+\cos 3\alpha}$ =

a) cot α/2 b) cot α c) tan α/2 d) none

**20. If 3 sin α = 5 sin β then** $\frac{\sin\left(\frac{\alpha+\beta}{2}\right)}{\tan\left(\frac{\alpha-\beta}{2}\right)}$ =

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

**21. m tan (θ – 30) = n tan(θ + 120) then** $\frac{m+n}{m-n}$ =

a) cos 2θ b) 2cos 2θ c) sin 2θ d) 2sin 2θ

**22. If** $\frac{\cos x}{a} = \frac{\cos(x+\theta)}{b} = \frac{\cos(x+2\theta)}{c} = \frac{\cos(x+3\theta)}{d}$ **then** $\frac{b+d}{a+c}$ =

a) d/a b) a/d c) c/b d) b/c

**23. If** $\frac{x}{y} = \frac{\cos A}{\cos B}$ **then** $\frac{x\tan A+y\tan B}{x+y}$ **is equal to**

a) $\cot\left(\frac{A+B}{2}\right)$ b) $\tan\left(\frac{A+B}{2}\right)$

c) cot(A + B) d) tan(A + B)

**24. If** $\frac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)} + \frac{\cos(\theta_3+\theta_4)}{\cos(\theta_3-\theta_4)} = 0$ **then** $\tan\theta_1 \tan\theta_2 \tan\theta_3 \tan\theta_4$ =

a) 1 b) 2 c) – 1 d) 0

**25. If** $\cos 2B = \frac{\cos(A+C)}{\cos(A-C)}$ **then Tan A, Tan B, Tan C are in**

a) A.P. b) G.P. c) H.P. d) A.G.P.

**26. If an angle α is divided into two parts A and B such that A – B = x and Tan A : Tan B = k : 1 then sin x =**

a) $\frac{k+1}{k-1}\sin\alpha$ b) $\frac{k}{k+1}\sin\alpha$

c) $\frac{k-1}{k+1}\sin\alpha$ d) $\frac{k+1}{k}\sin\alpha$

**27. sin α = sin β, cos α = cos β then**

a) $\sin\left(\frac{(\alpha+\beta)}{2}\right) = 0$ b) $\cos\left(\frac{(\alpha+\beta)}{2}\right) = 0$ c) $\sin\left(\frac{(\alpha-\beta)}{2}\right) = 0$ d) $\cos\left(\frac{(\alpha-\beta)}{2}\right) = 0$

**28. The value of sin x + sin y = a and cos x + cos y = b then cos(x – y) =**

a) $\frac{a^2+b^2+2}{2}$ b) $\frac{a^2-b^2+2}{2}$

c) $\frac{a^2+b^2-2}{2}$ d) $\frac{b^2-a^2+2}{2}$

**29.** $\frac{\sin 7\theta+6\sin 5\theta+17\sin 3\theta+12\sin\theta}{\sin 6\theta+5\sin 4\theta+12\sin 2\theta}$ =

a) 2cos θ b) cos θ c) 2sin θ d) sin θ

**30. If** $\frac{x}{\tan(\theta+\alpha)} = \frac{y}{\tan(\theta+\beta)} = \frac{z}{\tan(\theta+\gamma)}$ **then** $\sum\frac{x+y}{x-y}$ **sin²(α– β)**

a) 1 b) –1 c) 0 d) None

**31. If α + β + γ = 2θ, then cos θ + cos(θ – α) + cos(θ – β) + cos(θ – γ) =**

a) $4\sin\frac{\alpha}{2}.\cos\frac{\beta}{2}.\sin\frac{\gamma}{2}$ b) $4\cos\frac{\alpha}{2}.\cos\frac{\beta}{2}.\cos\frac{\gamma}{2}$

c) $4\sin\frac{\alpha}{2}.\sin\frac{\beta}{2}.\sin\frac{\gamma}{2}$ d) 4sinα .sinβ.sinγ

**32. If A + B + C = 2S then cos² S + cos²(S – A) + cos²(S – B) + cos²(S – C) =**

a) 2sinAcosBsinC b) 4cosA/2cosB/2cosC/2

c) 2 + 2cosAcosBcosC d) sinAsinB

**33. If A + B + C = 0° then cos²A + cos²B + cos²C =**

a) 1 – 2cosAcosBcosC b) 1 + 2cosAcosBcosC

c) 2(1 + cosAcosBcosC) d) None

**34. If A + B + C = 90° then sin²A + sin²B + sin²C =**

a) 1 – 2sinAsinBsinC b) 1 + 2sinAsinBsinC

c) 1 + 2cosAcosBcosC d) 1 – 2cosAcosBcosC

**35. If A + B + C = 90°, then cos²A + cos²B + cos²C =**

a) 1 + 2cosAcosBcosC b) 1 + 2sinAsinBsinC

c) 2(1 + cosAcosBcosC) d) 2(1 + sinAsinBsinC)

**36. If A + B + C = 180° then cos2A + cos2B + cos2C + 1 =**

a) –4sinAsinBcosC b) –4cosAcosBsinC

c) –4cosAcosBcosC d) –4sinAcosBcocS

**37. If A + B + C = 180° then** $\frac{\sin 2A+\sin 2B+\sin 2C}{\cos A+\cos B+\cos C-1}$ =

a) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ b) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

c) $8\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ d)$1 + 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

**38. cos x + cos y = 1/3, sin x + sin y = ¼ then sin(x + y) =**

a) 7/25 b) 24/25 c) 25/24 d) 25/7

**39. tan θ tan(θ + 60°) + tan θ tan(θ – 60°) + tan(θ + 60°) tan(θ – 60°) =**

a) 0 b) – 1 c) – 2 d) – 3

**40. The value of cos2θ + 2sin²55 – 1 –** $\sqrt{2}$ **sin 65 =**

a) 0 b) 1 c) – 1 d) ½

**41.** $\cos\alpha \sin(\beta-\gamma) + \cos\beta . \sin(\gamma-\alpha) + \cos\gamma \sin(\alpha-\beta) =$

a) 1 b) $4\cos\alpha\cos\beta\cos\gamma$

c) 0 d) ½

**42. If sin(y + z – x), sin(z + x – y), sin(x + y – z) are in A.P. then tan x. tan y and tan z are in**

a) A.P. b) G.P. c) H.P. d) A.G.P.

**43. If Sin A + sin B = *l* and cos A – cos B = m, then cos(A – B) =**

a) $\frac{l^2-m^2}{l^2+m^2}$ b) $\frac{l^2+m^2}{l^2-m^2}$ c) $\frac{2lm}{l^2+m^2}$ d) $\frac{2lm}{l^2-m^2}$

**44. cos(x – y) = 3 cos(x + y) then cot x . cot y =**

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

**45. If** $\cos\theta = \frac{\cos\alpha-\cos\beta}{1-\cos\alpha\cos\beta}$ **then** $\tan^2\left(\frac{\theta}{2}\right)\tan^2\left(\frac{\beta}{2}\right) =$

a) $\tan\frac{\alpha}{2}$ b) $\tan^2\frac{\alpha}{2}$ c) $\cot\frac{\alpha}{2}$ d) $\cot^2\frac{\alpha}{2}$

**46. If sin 2x = n sin 2y then** $\frac{\text{Tan}(x+y)}{\text{Tan}(x-y)} =$

a) $\frac{n-1}{n+1}$ b) $\frac{1-n}{1+n}$ c) $\frac{1+n}{1-n}$ d) $\frac{n+1}{n-1}$

**47. If** $\tan\beta = \cos\theta \tan\alpha$ **then** $\cot^2\frac{\theta}{2} =$

a) $\frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$ b) $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)}$

c) $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ d) $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)}$

**48. If** $\frac{\cos A}{\cos B} = \frac{\sin(C-\theta)}{\sin(C+\theta)}$ **then tan θ is equal to**

a) $\tan(\frac{A+B}{2})\tan\frac{A-B}{2}\tan\frac{C}{2}$ b) $\tan(\frac{A+B}{2})\tan\frac{A-B}{2}\tan C$

c) $\sin(\frac{A+B}{2})\sin\frac{A-B}{2}\sin\frac{C}{2}$ d) $\cos(\frac{A+B}{2})\cos\frac{A-B}{2}\cos\frac{C}{2}$

**49. If A + B + C = 180° then cos A + cos B – cos C =**

a) $-1 + 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$ b) $-1 + \cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

c) $-1 + 4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ d) $-1 + 4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

**50. If A + B + C = 270° then sin 2A + sin 2B + sin 2C =**

a) 4sinAsinBsinC b) 4cosacosBcosC

c) –4sinAsinBsinC d) –4cosAcosBcosC

**51. If A + B + C = 2S, then sin(S – A) + sin(S – B) + sin(S – C) – sin S is**

a) $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ b) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

c) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$ d) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

**52.** $\cos 22^o + \cos 78^o + \cos 80^o =$

a) $4\sin 11^o \sin 39^o \sin 40^o$ b) $1 + 4\cos 11^o \cos 39^o \cos 40^o$

c) $1 + 4\sin 11^o \sin 39^o \sin 40^o$ d) $4\cos 11^o \cos 39^o \cos 40^o$

**53.** If $\frac{\sin(\theta+\alpha)}{\cos(\theta-\alpha)} = \frac{1-M}{1+M}$ then $\tan\left(\frac{\pi}{4}-\theta\right)\tan\left(\frac{\pi}{4}-\alpha\right) =$

a) $\frac{1}{M}$ b) M c) $-\frac{1}{M}$ d) 2M

**54.** If $\alpha, \beta$ are acute angles and $\cos 2\alpha = \frac{3\cos 2\beta - 1}{3 - \cos 2\beta}$ then

a) $\tan\alpha = 2\tan\beta$ b) $\tan\alpha = \sqrt{2}\tan\beta$

c) $\tan\beta = \sqrt{2}\tan\alpha$ d) $\tan\beta = 2\sqrt{2}\tan\alpha$

**55.** If $A + B + C = 180^o$ then $\sin 3A + \sin 3B + \sin 3C =$

a) $4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$ b) $-4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$

c) $1 - 4\cos\frac{3A}{2}\cos\frac{3B}{2}\cos\frac{3C}{2}$ d) $1 - 4\sin\frac{3A}{2}\sin\frac{3B}{2}\sin\frac{3C}{2}$

**56.** $1 + \sec 20^o =$

a) $\tan 40^o \tan 30^o$ b) $\cot 40^o \cot 30^o$

c) $\tan 40^o \tan 60^o$ d) $\cot 40^o \cot 60^o$

**57.** If $\cos\alpha + \cos\beta = a$, $\sin\alpha + \sin\beta = b$ and $\alpha - \beta = 2\theta$, then $\frac{\cos 3\theta}{\cos\theta} =$

a) $a^2 + b^2 - 2$ b) $a^2 + b^2 - 3$ c) $3 - a^2 - b^2$ d) $\frac{a^2+b^2}{4}$

**58.** If $\tan(x^o + 100^o) = \tan(x^o + 50^o)\tan x^o \tan(x - 50^o)$ then the least positive value of x is

a) $20^o$ b) $30^o$ c) $40^o$ d) none

**59.** $\frac{1}{\cos\alpha + \cos 3\alpha} + \frac{1}{\cos\alpha + \cos 5\alpha} + \ldots\ldots\ldots + \frac{1}{\cos\alpha + \cos(2n+1)\alpha} =$

a) $\operatorname{cosec}\alpha[\tan(n+1)\alpha - \tan\alpha]$ b) $\sec\alpha[\tan(n+1)\alpha - \tan\alpha]$

c) $\frac{1}{2}\sec\alpha[\tan(n+1)\alpha - \tan\alpha]$ d) $\frac{1}{2}\operatorname{cosec}\alpha[\tan(n+1)\alpha - \tan\alpha]$

**60.** In $\Delta ABC$, $\sin^3 A.\cos^3(B - C) + \sin^3 B.\cos^3(C - A) + \sin^3 C.\cos^3(A - B) =$

a) 2sinAsinBsinC b) 3cosAcosBcosC

c) 2cosAcosBcosC d) 3sinAsinBsinC

**61.** Let $\alpha, \beta$ be such that $\pi < \alpha - \beta < 3\pi$. If $\sin\alpha + \sin\beta = \frac{-21}{65}$ and $\cos\alpha + \cos\beta = \frac{-27}{65}$ then the value of $\cos\frac{\alpha-\beta}{2}$ is

a) $\frac{-3}{\sqrt{130}}$ b) $\frac{-6}{65}$ c) $\frac{6}{65}$ d) $\frac{3}{\sqrt{130}}$

**62. If xy + yz + zx = 1 then $\frac{x}{1+x^2} + \frac{y}{1+y^2} + \frac{z}{1+z^2} =$**

a) $\frac{2}{\sqrt{(1+x^2)(1+y^2)(1+z^2)}}$

b) $\frac{2}{\sqrt{(1-x^2)(1+y^2)(1+z^2)}}$

c) $\frac{2}{\sqrt{(1+x^2)(1-y^2)(1-z^2)}}$

d) $\frac{2}{\sqrt{(1-x^2)(1+y^2)(1-z^2)}}$

## ANSWERS

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|---|---|---|---|---|---|---|---|---|---|
| 1. a | 2. b | 3. d | 4. d | 5. c | 6. c | 7. b | 8. a | 9. b | 10. c |
| 11. c | 12. a | 13. b | 14. b | 15. a | 16. c | 17. c | 18. b | 19. c | 20. d |
| 21. b | 22. c | 23. b | 24. c | 25. b | 26. c | 27. c | 28. C | 29. a | 30. c |
| 31. b | 32. c | 33. b | 34. a | 35. d | 36. c | 37. c | 38. B | 39. d | 40. a |
| 41. c | 42. a | 43. a | 44. b | 45. b | 46. d | 47. a | 48. B | 49. b | 50. d |
| 51. d | 52. c | 53. b | 54. b | 55. b | 56. b | 57. b | 58. B | 59. d | 60. d |
| 61. a | 62. a | | | | | | | | |