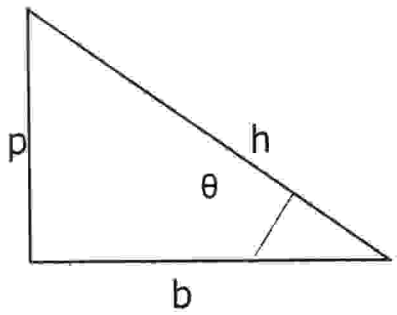
BALABHADRA SKILL DEVELOPMENT ACADEMY
MATHS FORMULA - 11

TRIGONOMETRY

1. 1 right angle = 90^0
2. 1^0 = 60 min
3. 1^1 (min) = 60" (sec)
4. $\pi = \frac{\text{circumference of circle}}{\text{diameter}}$
5. $180^0 = \pi^c$ (radians)
6. $90^0 = 100^g$ (grade)
7. $\theta° = \theta \times \frac{\pi}{180}$ radians
8. θ radians $= \theta \times \frac{180}{\pi}$ degrees
9. 1 radian $= 57°17'448''$
10. $\pi = 3.14$
11. 1 right angle $= 100^g$ $(100\ grade)$
    1g= 100 min
    1 min = 100 sec
12. In sexagesimal system, one right angle is equal to 90 degrees.
13. In Centesimal system one right angle is equal to 100 grades.

Ratios of an acute angle in a Right Angled Triangle

14. $\text{Sin } \theta = \frac{\text{Opposite side}}{\text{Hypotenuse}} = \frac{\text{Perpendicular}}{\text{hypotenuse}} = \frac{p}{h}$
15. $\text{Cos } \theta = \frac{\text{Adjacent side}}{\text{Hypotenuse}} = \frac{b}{h}$
16. $\tan \theta = \frac{\text{Opposite side}}{\text{Adjacent side}} = \frac{p}{b}$
17. $\text{Cosec } \theta = \frac{\text{Hypotenuse}}{\text{Opposite side}} = \frac{h}{p}$
18. $\text{Sec } \theta = \frac{\text{Hypotenuse}}{\text{Adjacent side}} = \frac{h}{b}$
19. $\text{Cot } \theta = \frac{\text{Adjacent side}}{\text{Opposite side}} = \frac{b}{p}$



20. Sin θ= Cos (90- θ)
21. Cos θ= Sin (90- θ)
22. tan θ= Cot (90- θ)
23. Cot θ= tan (90- θ)
24. Cosec θ= Sec (90- θ)
25. Sec θ = Cosec (90- θ)

Relation Between Trigonometric Ratios

26. Cosec θ = $\frac{1}{\sin\theta}$
27. Sec θ = $\frac{1}{\cos\theta}$
28. Cot θ = $\frac{1}{\tan\theta}$
29. tan θ = $\frac{\sin\theta}{\cos\theta}$
30. Sin θ = $\frac{1}{\text{cosec}\,\theta}$
31. Cos θ = $\frac{1}{\sec\theta}$

Relation Between Trigonometric Ratios

32. Cosec θ x Sin θ = 1
33. Sec θ x Cos θ = 1
34. Cot θ x tan θ = 1

Even/Odd Identities

35. Sin(-θ)= - Sin θ
36. Cos(-θ)= Cos θ
37. tan (-θ) = - tan θ
38. Cosec (-θ) = - Cosec θ
39. Sec (-θ) = Sec θ
40. Cot(-θ) = - Cot θ

Double Angle Identities

41. Sin (2θ) = 2sin θ cos θ
42. Cos(2θ) = $\text{Cos}^2\theta - \text{Sin}^2\theta$ = 2 $\text{Cos}^2\theta$-1=1-2 $\text{Sin}^2\theta$
43. tan(2θ) = $\frac{2\tan\theta}{1-\tan^2\theta}$

Pythagorean Identities

44. $\text{Sin}^2\theta + \text{Cos}^2\theta = 1$
44(a) Sin θ= $\sqrt{1-\text{Cos}^2\theta}$
44(b) Cos θ = = $\sqrt{1-\text{Sin}^2\theta}$
45. $\tan^2\theta + 1 = \sec^2\theta$
45(a) $\text{Sec}^2\,\theta - \tan^2\theta = 1$
46. $\cot^2\theta + 1 = \text{Cosec}^2\theta$
46(a) $\text{Cosec}^2\theta - \text{Cot}^2\theta = 1$

Half Angle Identities

47. $\text{Sin}\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos\theta}{2}}$

48. $\text{Cos}\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1+\cos\theta}{2}}$

49. $\tan\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$

50. $\text{Sin}^2\frac{\theta}{2} = \frac{1-\cos\theta}{2}$

51. $2\text{Sin}^2\frac{\theta}{2} = 1 - \cos\theta$

52. $\cos\theta = 1 - 2\text{Sin}^2\frac{\theta}{2}$

Sum to Product Identities

53. $\sin\alpha + \sin\beta = 2\text{Sin}\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

54. $\sin\alpha - \sin\beta = 2\text{Cos}\left(\frac{\alpha+\beta}{2}\right)\text{Sin}\left(\frac{\alpha-\beta}{2}\right)$

55. $cos\alpha + cos\beta = 2Cos\left(\frac{\alpha+\beta}{2}\right)\ cos\left(\frac{\alpha-\beta}{2}\right)$

56. $cos\alpha - cos\beta = 2Sin\left(\frac{\alpha+\beta}{2}\right)Sin\left(\frac{\alpha-\beta}{2}\right)$

Product Sum to Identities

57. $Sin\,\alpha\,Sin\,\beta = \frac{1}{2}\,[\cos(\alpha-\beta) - \cos(\alpha+\beta)]$

58. $Cos\,\alpha\,Cos\,\beta = \frac{1}{2}\,[\cos(\alpha-\beta) + \cos(\alpha+\beta)]$

59. $Sin\,\alpha\,Cos\,\beta = \frac{1}{2}\,[Sin(\alpha+\beta) + Sin\,(\alpha-\beta)]$

60. $Cos\,\alpha\,Sin\,\beta = \frac{1}{2}[Sin(\alpha+\beta) - Sin\,(\alpha-\beta)]$