# Geometry & Trigonometry

Triangles | Circles | Trig Ratios | Mensuration

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**Topics:**

1. Triangles & Properties
2. Circles & Sectors
3. Trigonometry Ratios
4. MCQ Practice

## 1. Geometry — Triangles

Key formulas for Triangles:

**Q. Area of Triangle?**
Ans: (1/2) x Base x Height. Also: sqrt[s(s-a)(s-b)(s-c)] where s=(a+b+c)/2 (Heron's Formula)

**Q. Pythagorean Theorem?**
Ans: In right triangle: a^2 + b^2 = c^2 (c = hypotenuse). Common triplets: 3-4-5, 5-12-13, 8-15-17

**Q. Sum of angles in triangle?**
Ans: 180 degrees always. Exterior angle = sum of two non-adjacent interior angles.

**Q. Properties of Equilateral Triangle?**
Ans: All sides equal, all angles = 60 degrees. Area = (sqrt(3)/4) x a^2. Height = (sqrt(3)/2) x a

## 2. Circles

**Q. Area and Circumference of Circle?**
Ans: Area = pi x r^2. Circumference = 2 x pi x r. (pi = 22/7 or 3.14)

**Q. Area of Sector?**
Ans: (theta/360) x pi x r^2 where theta is the angle in degrees

**Q. Tangent property of circle?**
Ans: Tangent is perpendicular to radius at point of contact. Two tangents from external point are equal in length.

## 3. Trigonometry — Key Ratios

In right triangle: sin = Perpendicular/Hypotenuse, cos = Base/Hypotenuse, tan = Perpendicular/Base. Memory trick: SOH-CAH-TOA

**Q. sin 0, 30, 45, 60, 90 degrees?**
Ans: 0, 1/2, 1/sqrt(2), sqrt(3)/2, 1

**Q. cos 0, 30, 45, 60, 90 degrees?**
Ans: 1, sqrt(3)/2, 1/sqrt(2), 1/2, 0

**Q. tan 0, 30, 45, 60, 90 degrees?**
Ans: 0, 1/sqrt(3), 1, sqrt(3), undefined (infinity)

**Q. Important identity: sin^2 + cos^2 = ?**
Ans: sin^2(x) + cos^2(x) = 1 (always). Also: 1+tan^2 = sec^2. 1+cot^2 = cosec^2

## 4. MCQ Practice

**Q. Area of circle with radius 7 cm (pi=22/7):**
(a) 144 sq cm
(b) 154 sq cm
(c) 164 sq cm
(d) 174 sq cm
**Answer: (b) 154 sq cm**

**Q. Pythagorean triplet from: 5,12,13?**

(a) Yes
(b) No
(c) Sometimes
(d) Cannot determine
**Answer: (a) Yes**

**Q. sin 45 degrees = ?**

(a) 1/2
(b) sqrt(3)/2
(c) 1/sqrt(2)
(d) 1
**Answer: (c) 1/sqrt(2)**

**Q. Sum of all angles in a quadrilateral:**

(a) 180
(b) 270
(c) 360
(d) 420
**Answer: (c) 360**