Arithematic Progression

1. If the ratio of the sum of the first n terms of two A.Ps is $(7n+1) : (4n+27)$, then find the ratio of their 9^{th} terms.

Trignometry

1. From the top of the tower, 100 m high, a man observes two cars on the opposite sides of the tower and in same straight line with its base, with angles of depression $30°$ and $45°$. Find the distance between the cars. [Take $\sqrt{3} = 1.732$]

Aptitude

1. A takes 6 days less than B to do a work. If both A and B working together can do it in 4 days, how many days will B take to finish it ?

Probability

1. Two different dice are thrown together. Find the probability that the numbers obtained have

   (i) even sum,and

   (ii) even product.

Algebra

1. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $\frac{a}{b} = \frac{c}{d}$.

2. If the points $A(k + 1, 2k)$, $B(3k, 2k + 3)$ and $C(5k - 1, 5k)$ are collinear, then find value of k.

3. Solve for x:
   $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2$, where $x \neq -\frac{1}{2}, 1$

Geometry

1. Construct a triangle ABC with side $BC = 7$ cm, $\angle B = 45°$, $\angle A = 105°$. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the Δ ABC.

2. In a rain-water harvesting system, the rain-water from a roof of 22 m x 20 m drains into a cylindrical tank having diameter of base 2 m and height 3.5 m. If the tank is full, find the rainfall in cm. Write your views on water conservation.

3. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

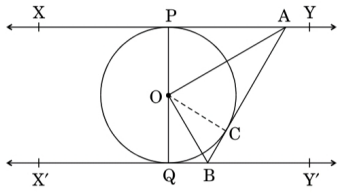

Figure 1: fig.jpg

4. In the given figure, XY and $X'Y'$ are two parallel tangents to a circle with center O, and another tangent AB with point of contact C is intersecting XY at A and $X'Y'$ at B. Prove that $\angle AOB = 90°$.

5. In the given figure, O is the centre of the circle with $AC = 24$ cm, $AB = 7$ cm and $\angle BOD = 90°$. Find the area of the shaded region.

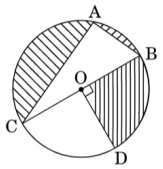

Figure 2: fig.jpg