

Answer any 20 questions-

1. A two digit positive number is such that the product of its digits is 6. If 9 is added to the number, the digits interchange their places. Find the number.
2. If $(x - 9) : (3x + 6)$ is the sub-duplicate ratio of $2 : 3$, find the value of x .
3. Using componendo and dividendo, find the value of x -

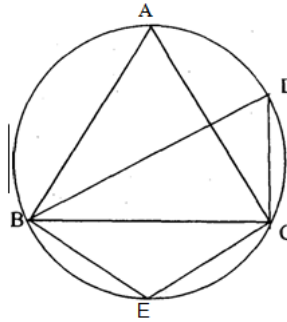
$$\frac{\sqrt{3x+4}+\sqrt{3x-5}}{\sqrt{3x+4}-\sqrt{3x-5}} = 9$$
4. If $\frac{x^2+y^2}{x^2+y^2} = \frac{17}{8}$ then find the value of
 - i. $x : y$
 - ii. $\frac{x^3+y^3}{x^3-y^3}$
5. If $x = \frac{\sqrt{b+1}+\sqrt{b-1}}{\sqrt{b+1}-\sqrt{b-1}}$ using properties of proportion show that $x^2 - 2bx + 1 = 0$.
6. The sum of the 2nd term and the 7th term of an A.P. is 30. If its 15th term is 1 less than twice of its 8th term, find the A.P.
7. Find the sum of all natural numbers between 250 and 1000 which are divisible by 9.
8. Second term of a geometric progression is 6 and its fifth term is 9 times of its third term. Find the geometric progression. Consider that each term of the G.P. is positive.
9. Find the sum of n terms of the series: $0.8 + 0.88 + 0.888 + \dots$
10. ABC is a right angled triangle with $\angle ABC = 90^\circ$. D is any point on AB and DE is perpendicular to AC. Prove that:
 - (i) $\triangle ADE \sim \triangle ACB$
 - (ii) If $AC = 13$ cm, $BC = 5$ cm and $AE = 4$ cm. Find DE and AD.
 - (iii) Find. Area of $\triangle ADE$: area of quadrilateral BCED.
11. Construct a triangle ABC, with $AB = 7$ cm, $BC = 8$ cm and $\angle ABC = 60^\circ$. Locate by construction the point P such that:
 - (i) P is equidistant from B and C.
 - (ii) P is equidistant from AB and BC. Measure and record the length of PB
12. A straight line AB is 8 cm long. Draw and describe the locus of a point which is:
 - (i) Always 4 cm from the line AB

(ii) Equidistant from A and B.

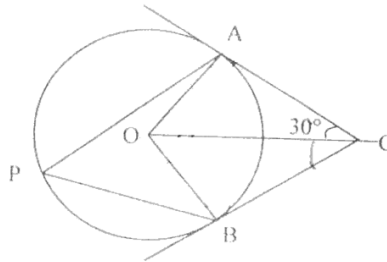
Mark the two points X and Y, which are 4 cm from AB and equidistant from A and B. Describe the figure AXBY.

13. In the figure, $\angle DBC = 58^\circ$. BD is the diameter of the circle. Calculate:

- (i) $\angle BDC$
- (ii) $\angle BEC$
- (iii) $\angle BAC$



14. In the given figure O is the centre of the circle. Tangents A and B meet at C. If $\angle ACO = 30^\circ$, find (i) $\angle BCO$ (ii) $\angle AOB$ (iii) $\angle APB$



15. Construct a $\triangle ABC$ with $BC = 6.5$ cm, $AB = 5.5$ cm, $AC = 5$ cm. Construct the incircle of the triangle. Measure and record the radius of the incircle.

16. Draw a circle of radius 3.5 cm. Mark a point P outside the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent.

17. A solid cone of radius 5 cm and height 8 cm is melted and made into small spheres of radius 0.5 cm. Find the number of spheres formed.

18. The surface area of a solid metallic sphere is 2464 cm^2 . It is melted and recast into solid right circular cones of radius 3.5 cm and height 7 cm. Calculate:

- (i) the radius of the sphere.
- (ii) the number of cones recast. (Take $\pi = 22/7$)

19. Show that (i) $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \frac{\sin\theta}{1-\cos\theta}$

(ii) Evaluate $\frac{\sec 29^\circ}{\operatorname{cosec} 61^\circ} + 2\cot 8^\circ \cot 17^\circ \cot 45^\circ \cot 73^\circ \cot 82^\circ - 3(\sin^2 38^\circ + \sin^2 52^\circ)$

20. A man observes the angle of elevation of the top of a building to be 30° . He walks towards it in a horizontal line through its base. On covering 60 m the angle of elevation changes to 60° . Find the height of the building correct to the nearest metre.

21. The mean of the following distribution is 50 and the sum of all the frequencies is 120. Find the values of p and q.

Class- interval	0-20	20-40	40-60	60-80	80-100
frequency	17	p	32	q	19

22. The daily wages (in rupees) of 19 workers are:

41, 21, 38, 31, 27, 45, 23, 26, 29, 30, 28, 25, 35, 42, 47, 53, 29, 31, 35.

Find the:

- (i) The median
- (ii) Lower quartile
- (iii) Upper quartile
- (iv) Inter quartile range

23. From the following frequency distribution, find:

- (i) The median
- (ii) Lower quartile
- (iii) Upper quartile
- (iv) Inter quartile range

Variate	15	18	20	22	25	27	30
Frequency	4	6	8	9	7	8	6

24. The following table gives the weekly wages (in Rs.) of workers in a factory:

Weekly wages (in Rs.)	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
No. of workers	5	20	10	10	9	6	12	8

Calculate:

- (i) The mean
- (ii) Modal class
- (iii) The number of workers getting weekly wages below Rs. 80
- (iv) The number of workers getting weekly wages Rs.65 or more but less than Rs. 85 as weekly wages.

25. The daily pocket expenses of 200 students in a school are given below:

<i>Pocket expenses (in Rs.)</i>	<i>Number of students (Frequency)</i>
0-5	10
5-10	14
10-15	28
15-20	42
20-25	50
25-30	30
30-35	14
35-40	12

Draw a histogram representing the above distribution and estimate the mode from the graph.