

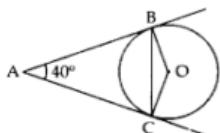
Instructions to the Students

- Write only question numbers clearly outside the margin (1, 2, 3.i, 5.b, 4.c.ii, etc.).
- Do not write questions or any titles. (For ex. - Do not write **II. Answer the following**).
- After every answer, give a one-line space.
- For Multiple choice Questions - Both Option and Answer should be written.
- Bullet points & Sub-points should be written inside the margin.
- Do not fold / staple the paper.

Section A

Multiple Choice Questions:

$$(20 \times 1 = 20)$$



5. a) 140° b) 40° c) 180° d) 90°
 If $\sin \theta + \cos \theta = \sqrt{2}$, then $\tan \theta + \cot \theta =$
 a) 4 b) 3 c) 2 d) 1

6. If one zero of a quadratic polynomial $(kx^2 + 3x + k)$ is 2, then the value of k is
 a) $\frac{5}{6}$ b) $-\frac{5}{6}$ c) $\frac{6}{5}$ d) $-\frac{6}{5}$

7. In making 1000 revolutions a wheel covers 88 km, the diameter of the wheel in metres is
 a) 14 m b) 24 m c) 28 m d) 40 m

8. Two dice are thrown simultaneously and the product of the numbers appearing on the tops is noted. The probability of the product to be less than 6 is :
 a) $\frac{1}{6}$ b) $\frac{1}{4}$ c) $\frac{5}{18}$ d) $\frac{7}{18}$

9. If $3 \tan \alpha = 4$ then, evaluate $\frac{3 \sin \alpha + 2 \cos \alpha}{3 \sin \alpha - 2 \cos \alpha}$
 a) 3 b) 4 c) 12 d) 11

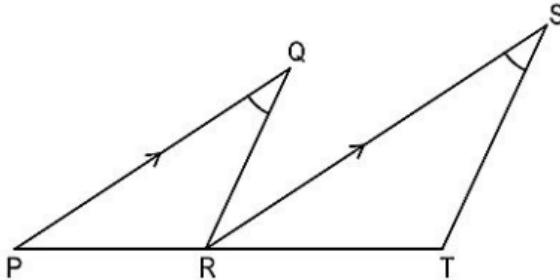
10. Which of the following cannot be the unit digit of 8^n where n is a natural number?
 a) 4 b) 2 c) 0 d) 6

11. A solid piece of iron in the form of a cuboid of dimensions $49 \text{ cm} \times 33 \text{ cm} \times 24 \text{ cm}$, is moulded to form a solid sphere. The radius of the sphere is
 a) 21 cm
 b) 23 cm
 c) 25 cm
 d) 19 cm

12. If -2 and 3 are the zeros of the quadratic polynomial $x^2 + (a+1)x + b = 0$ then a & b = ?
 a) $a, b = -2, 6$ b) $a, b = 2, -6$ c) $a, b = -2, -6$ d) $a, b = 2, 6$

13. In a circle of radius 14 cm , an arc subtends an angle of 30° at the centre, the length of the arc is
 a) 44 cm b) 28 cm c) 11 cm d) $\frac{22}{3} \text{ cm}$

14. In the given figure, PT is a line segment, R is a point on PT , PQ is parallel to RS and $\angle PQR = \angle RST$.



Which of the following criteria can be used to prove that $\triangle PQR$ and $\triangle RST$ are similar?

a) Side-Side-Side similarity criterion
 b) Side-Angle-Side similarity criterion
 c) Angle-Angle-Angle similarity criterion
 d) (None of these, as $\triangle PQR$ and $\triangle RST$ are not similar)

15. The table below shows all the possible outcomes when two dice are thrown together.

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

Study the table and answer the following question.

What is the probability of getting 6 as the sum of the two numbers that turn up?

a) $\frac{7}{36}$ b) $\frac{6}{36}$ c) $\frac{5}{36}$ d) $\frac{4}{36}$

16. The line segment joining $P(3, -4)$ and $S(1, 2)$ is trisected by the point $R(\frac{5}{3}, k)$. What is the value of k ?
 a) -2 b) 0 c) $\frac{8}{3}$ d) 8

17. The mean of 10 observations is 25. If one observation 40 is replaced by 50, the new mean is:
 a) 26 b) 25.5 c) 27 d) 24

18. The area of a sector of a circle of radius 14 cm is 154 cm^2 . Find the angle of the sector.
 a) 90° b) 160° c) 140° d) 150°

19. **Assertion (A):** If $\sin A = \frac{1}{3}$, ($0^\circ < A < 90^\circ$), then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$.

Reason (R): For every angle θ , $\sin^2 \theta + \cos^2 \theta = 1$

a) Both A and R are true and R is the correct explanation of A.
 b) Both A and R are true but R is not the correct explanation of A.
 c) A is true but R is false.
 d) A is false but R is true

20. Assertion (A) : $\frac{13}{3125}$ is a terminating decimal fraction.

Reason (R) : If $q = 2^m 5^n$ where m, n are non-negative integers, then $\frac{p}{q}$ is a terminating decimal fraction.

- a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- c) (A) is correct but (R) is wrong
- d) (A) is wrong but (R) is correct

Section B

Very Short Answer Type Questions:

(5 x 2 = 10)

21.a. The 4th term of an AP is zero. Prove that the 25th term of the AP is three times its 11th term.

(OR)

21.b. Find the 9th term from the end (towards the first term) of the A. P. 5, 9, 13,, 185.

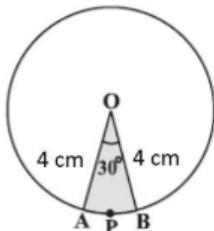
22. Prove that $\frac{1}{\sec A - 1} + \frac{1}{\sec A + 1} = 2 \operatorname{cosec} A \cdot \cot A$

23. Prove that tangents from an external point to circle are equal in length

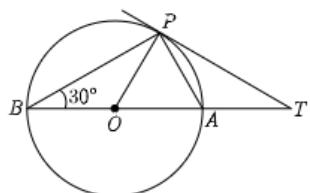
24.a. A piece of wire 22 cm long is bent into the form of an arc of a circle subtending an angle of 60° at its centre. Find the radius of the circle.

(OR)

24.b. Find the area of the sector of a circle with radius 4 cm and of angle 30° .



25. In the given figure, BOA is a diameter of a circle and the tangent at a point P meets BA when produced at T. If $\angle PBO = 30^\circ$, what is the measure of $\angle PTA$?

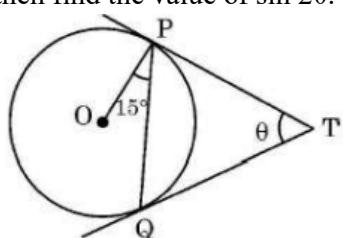


Section C

Short Answer Type Questions:

(6 x 3 = 18)

26. In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If $\angle OPQ = 15^\circ$ and $\angle PTQ = \theta$, then find the value of $\sin 2\theta$.



27. Two tankers contain 850 liters and 680 liters of petrol. Find the maximum capacity of a container which can measure the petrol of each tanker in the exact number of times.

28. Zeros of the quadratic polynomial $p(x) = (a^2 + 10)x^2 - 74x + 7a$ are reciprocal of each other and they are rational. Find the value of 'a'.

29.a. Find the value of $\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ$ is it equal to $\sin 90^\circ$ or $\cos 90^\circ$?

(OR)

29.b. Prove that $\frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^2 \theta}{1 - \cot \theta} = 1 + \sin \theta \cos \theta$

30. Cards marked with numbers 2 to 101 are placed in a box and mixed. One card is drawn at random, find the probability that the number is

- an even number
- a number less than 14
- a number which is a perfect square

31.a. Solve the following pair of linear equations :

$$\begin{aligned} 8x + 5y &= 9 \\ 3x + 2y &= 4 \end{aligned}$$

(OR)

31.b. Find whether the following pair of linear equations has a unique solutions. If yes, find the solution :
 $7x - 4y = 49, 5x - 6y = 57$

Section D

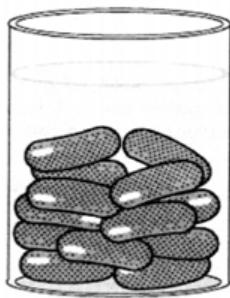
Long Answer Type Questions:

(4 x 5 = 20)

32. Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.

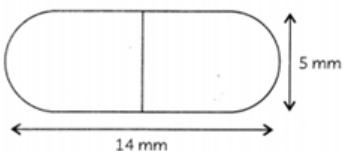
33. If AD and PM are medians of triangles ΔABC and ΔPQR , respectively where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$

34.a. A Gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 Gulab jamuns, each shaped like cylinder with two hemispherical ends with Length 5 cm and diameter 2.8 cm.



(OR)

34.b. A medicine capsule is in the shape of a cylinder with two hemispheres stuck at each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.



35.a. The median of 80 observations given in the following table is 138. Find the values of 'a' and 'b'.

Class Interval	Frequency
65 – 85	5
85 – 105	a
105 – 125	13
125 – 145	20
145 – 165	b
165 – 185	10
185 – 205	7

(OR)

35.b. A survey regarding heights (in cm) of 51 girls of class X of a school was conducted and the following data was obtained:

Heights (in cm)	Number of girls
less than 140	04
less than 145	11
less than 150	29
less than 155	40
less than 160	46
less than 165	51

Find the median height of girls. If mode of the above distribution is 148.05, find the mean using empirical formula.

Section E

Case Based Questions:

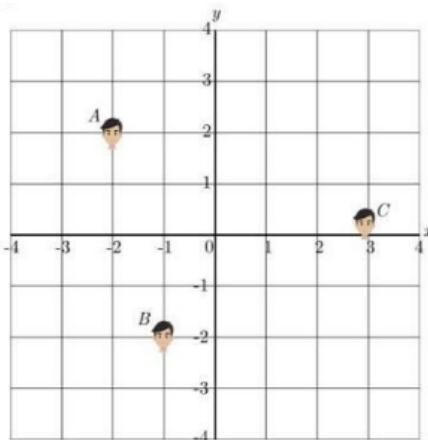
(3 x 4 = 12)

36. Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the maximum distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress.



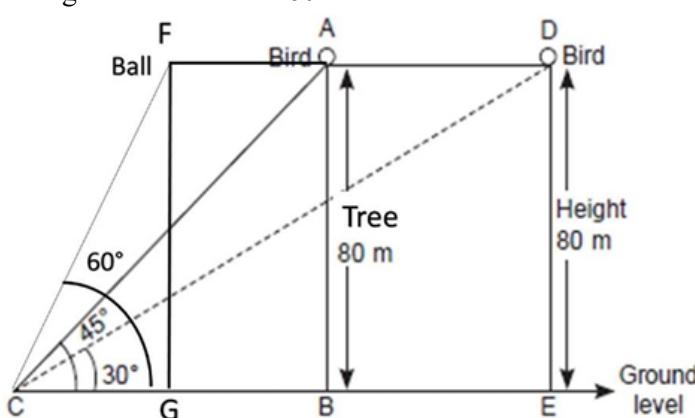
36.i. How many throws Sanjitha practiced on 11th day of the camp? [1]
 36.ii. How many throws did she do during the entire camp of 15 days? [1]
 36.iii.a. When will she be able to achieve a throw of 11.16 m? [2]
(OR)
 36.iii.b. What would be Sanjitha's throw distance at the end of 6 weeks? [2]

37. Aditya, Ritesh and Damodar are fast friends since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row- wise everyday. Ritesh is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Ritesh make the following diagram of their seating position marked Aditya as A, Ritesh as B and Damodar as C.



37.i. What is the distance between A and B? [1]
 37.ii. What is the distance between B and C? [1]
 37.iii.a. A point D lies on the line segment between points A and B such that $AD : DB = 4 : 3$. What are the the coordinates of point D? [2]
(OR)
 37.iii.b. If the point P(k, 0) divides the line segment joining the points A(2, -2) and B(-7, 4) in the ratio 1: 2, then find the value of k. [2]

38. One evening, Kaushik was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80m. He observed a bird on the tree at an angle of elevation of 45° . When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of 30° and the ball flying towards him at the same height at an angle of elevation of 60° .



38.i. At what distance from the foot of the tree was he observing the bird sitting on the tree? [1]
 38.ii. What is the speed of the bird in m/min if it had flown $20(\sqrt{3} + 1)$ m? [1]
 38.iii.a. After hitting the tree, how far did the ball travel in the sky when Kaushik saw the ball? [2]
(OR)
 38.iii.b. How far did the bird fly in the mentioned time? [2]