Directorate of Education, GNCT of Delhi

Practice Paper (Session: 2023-24)

Class – X

Subject – Mathematics

Max. Marks: 80 **Duration: 3 hours**

General Instructions:

1. This Question Paper has 5 Sections 'A', 'B', 'C', 'D' and 'E'.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based questions (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
9. Use of calculator is not permitted.

Please do write down the Serial Number of the question before attempting it.

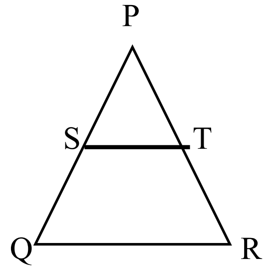
SECTION – A

Section A consists of 20 questions of 1 mark each.

1. HCF of $a^4 \times b^3 \times c$ and $a^7 \times b^2 \times c^3$ is :
   (a) $a^4 \times b^2 \times c$ (b) $a^4 \times b^3 \times c$ (c) $a^7 \times b^3 \times c^3$ (d) $a^4 \times b^3 \times c^3$

2. The linear equation $3x - 7y = 10$ when expressed in terms of x becomes:
   (a) $10 + 7y$ (b) $3x - 10$ (c) $\frac{10+7y}{3}$ (d) $\frac{3x-10}{7}$

3. In the given figure, $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$ then type of ΔPQR is :



   (a) isosceles (b) right-angled
   (c) scalene (d) Equilateral

4. Which of the following number is irrational?

(a) $\sqrt{36}$ (b) 0.85 (c) 31.480152…… (d) 1.434343……

5. The roots of the quadratic equation $x^2 + 4x + 5 = 0$ are:

(a) Real (b) not real (c) real and distinct (d) real and equal

6. A die is thrown once. The probability of getting an odd number is:

(a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

7. In a ΔABC, D and E are points on sides AC and BC respectively such that DE ∥ AB and AD = 2x, DC = x + 3, BE = 2x-1 and CE = x. The value of x is:

(a) $\frac{5}{3}$ (b) $\frac{2}{5}$ (c) $\frac{5}{2}$ (d) $\frac{3}{5}$

8. PQ is tangent to a circle centred at O, touching the circle at point P. If the radius of the circle is 5 cm and OQ = $5\sqrt{3}$ cm, then the length of the tangent PQ is:

(a) $5\sqrt{2}$ cm (b) $\frac{10}{\sqrt{3}}$ cm (c) 10 cm (d) $\frac{5}{\sqrt{3}}$ cm

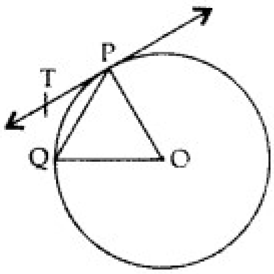
9. The 30th term of the A.P. 10, 7, 4……. is:

(a) -97 (b) -77 (c) -87 (d) -107

10. "The product of two consecutive even integers is 528". The quadratic equation for the above statement is:

(a) x(x+2) =528 (b) 2x(2x+1) =528 (c) 2x(x+4) =528 (d) 2x(x+1) =528

11. In the given figure, O is the centre of a circle, PQ is a chord and PT is the tangent at P. If $\angle POQ = 70°$, then $\angle TPQ$ is:



(a) 70^0 (b) 55^0 (c) 35^0 (d) 40^0

12. The sum and product of the zeroes of a polynomial are $\frac{2}{5}$ and $\frac{1}{4}$ respectively then the value of coefficient c is :

(a) 1 (b) 5 (c) 2 (d) 4

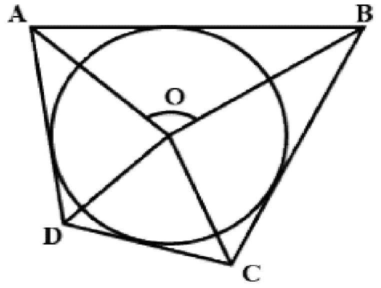
13. If $\Delta ABC \sim \Delta DEF$, 4AB=DE and BC=2.5 cm , then the value of EF is:

(a) 25 cm (b) 10 cm (c) 2.5 cm (d) 5 cm

14. The value of 'b' if $\propto$ and $\frac{1}{\propto}$ are zeroes of polynomial $ax^2 + bx + c = 0$ is:

(a) $\frac{1}{1+\alpha}$ (b) $\frac{\alpha+1}{\alpha}$ (c) 1 (d) $\frac{\alpha^2+1}{\alpha}$

15. In the given figure, if $\angle AOB$= 125^0, then value of ∠COD is:



(a) 70^0 (b) 55^0 (c) 105^0 (d) 85^0

16. BM is the median of △BCD. Which is the false statement of the following:

(a) M, is the mid-point of CD (b) ar (△BCM) = ar (△BDM)

(c) ar (△BCM) < ar (△BDM) (d) ar (△BCM) < ar (△BCD)

17. The value of $tan30^0\ tan60^0 - cot30^0\ cot60^0$ is :

(a) $\sqrt{3}$ (b) 1 (c) 0 (d) $\frac{\sqrt{3}}{2}$

18. A vertical stick 15 m long casts a shadow $5\sqrt{3}$ m long on ground. At the same time , the angle of elevation of the sun is:

(a) 60^0 (b) 45^0 (c) 30^0 (d) 90^0

Directions for Q 19 & 20 : There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (a),(b),(c) and (d) given below :

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

19. Assertion (A): $\frac{16}{15}$ is a rational number.

Reason (R): The denominator of $\frac{16}{15}$ has 3 as one of its prime factor.

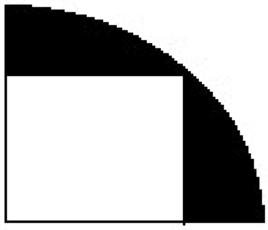
20. Assertion (A): The angle of the quadrant of a circle is 60°.

Reason (R): A quadrant is $\frac{1}{4}$ part of a circle.

SECTION – B

Section B consists of 5 questions of 2 marks each.

21. In the figure, the radius of the circle is 21 cm and side of the inscribed square is 13 cm. Find the area of the shaded region.



OR

Find the area of the quadrant of a circle whose circumference is 22 cm.

22. There are 8 rotten apples in a carton and the probability of getting a rotten apple out of the carton is $\frac{2}{5}$. Find the total number of apples in the carton.

23. Find the value of a, if the distance between the points A (-3, -14) and B (a, -5) is 9 units.

OR

Find a relation between x and y such that the point (x, y) is equidistant from the point (3,6) and (-3,4).

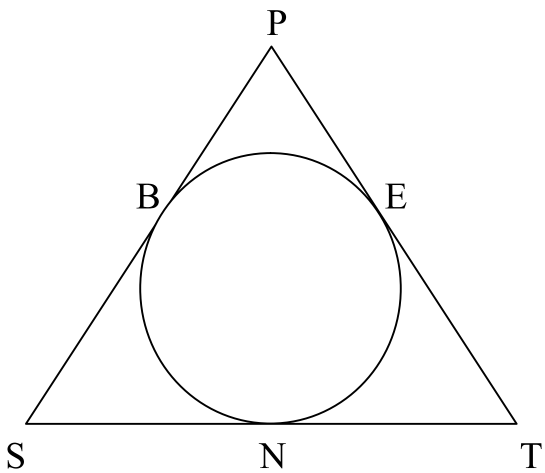
24. Find the discriminant of the quadratic equation $5x^2 + 7x + 2 = 0$.

25. If $7 \tan \emptyset = 4$, then find the value of $\frac{7sin\emptyset - 3\ cos\emptyset}{7sin\emptyset + 3\ cos\emptyset}$.

SECTION – C

Section C consists of 6 questions of 3 marks each.

26. In the given figure, $\triangle PST$ is an isosceles triangle having PS = ST , touching a circle at points E ,B and N . Prove that the point N is midpoint of ST.



27. Show that $3 + \sqrt{7}$ is an irrational number, given that $\sqrt{7}$ is an irrational number.

OR

Check whether 15^n can end with the digit 0 for any natural number n.

28. How many multiples of 11 lie between 10 and 650?

29. From the top of a vertical tower, the angles of depression of two cars, in the same straight line with the base of the tower, at an instant are found to be 30^0 and 45^0. If the cars are 83 m apart and on the same side of the tower, find the height of the tower.

30. A spherical glass vessel has a cylindrical neck 8 cm long and of 1 cm radius. The radius of spherical part is 9 cm. Find the amount of water, it can hold, when filled completely.

OR

A hemispherical depression is cut off from one face of a cubical wooden block such that the diameter of the hemisphere is equal to the edge of the cube. The edge of the cube is 14 cm. Determine the surface area of the remaining solid.

31. Find the median weight of the 30 students as per the distribution given below.

Weight (in kg)	40- 45	45- 50	50- 55	55- 60	60- 65	65-70	70- 75
No. of students	2	3	8	6	6	3	2

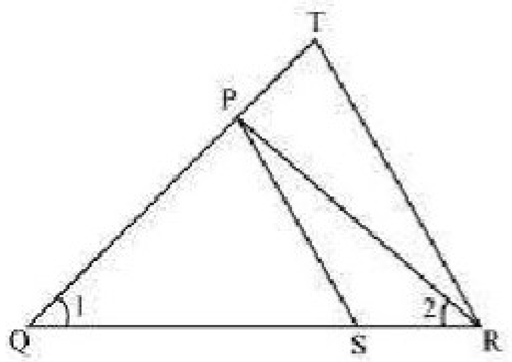
SECTION – D

Section D consists of 4 questions of 5 marks each.

32. If AD and PM are medians of triangles ABC and PQR respectively where $\triangle ABC \sim \triangle PQR$. Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

OR

In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$ then show that $\triangle PQS \sim \triangle TQR$.



33. Evaluate $\dfrac{5\cos^2 60° + 4\cot^2 45° - \sec 60°}{\operatorname{cosec} 30° + \tan 60° + \sin 45°}$

OR

Prove that $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

34. Find the missing frequencies f_1 and f_2, if the mean of 50 observations given below is 38.2.

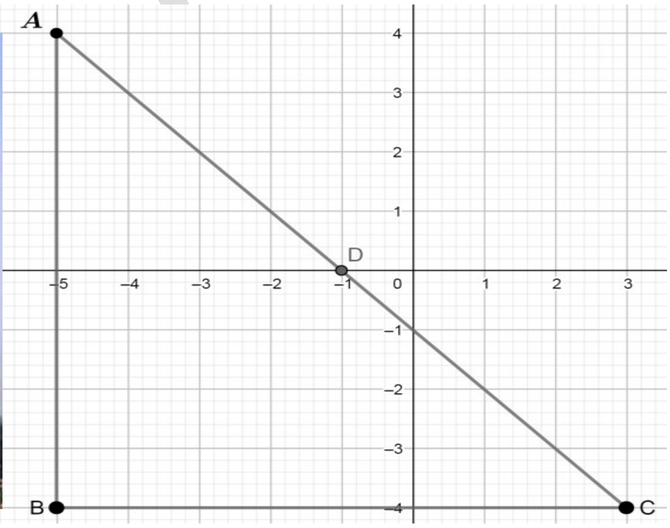
Class interval	Frequency
0 – 10	4
10 - 20	4
20 – 30	f_1
30 - 40	10
40 - 50	f_2
50 - 60	8
60 – 70	5

35. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - p(x+1) - c$ then show that $(\alpha+1)(\beta+1) = 1 - c$. If $p = 1$ and $c = 5$ then find α and β.

SECTION – E

Section E has 3 case based questions of 04 marks each.

36. Sunit went to India-gate in one fine evening. He observed the top of the India-gate standing on the ground. The position of India-gate as AB and Anil as C is drawn in the cartesian plane as shown in the figure.



Based on the above information, answer the following questions:

i) Find the distance between Sunit and the top of India-gate. 1

ii) In which ratio point D divides the line-segment AC ? 1

iii) Suresh was standing exactly in between the Sunit and India-gate. 2
What are the coordinates of position of Suresh ?

OR

Find the value of sin C.

37. A company deals in casting and moulding of metal on orders received from its clients. In one such order, company is supposed to make 50 toys in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of hemisphere. The radius of the base of the cone is 21 cm and height is 28 cm.

Based on the above information, answer the following questions:

i) Find the surface area of the conical part. 1

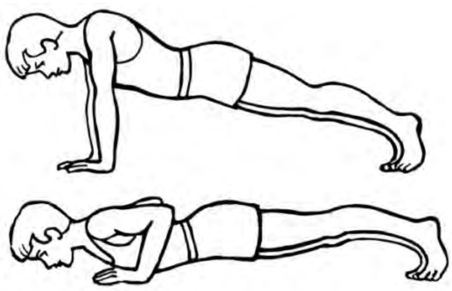
ii) Find the surface area of the hemispherical part. 1

iii) Find the volume of 50 toys. 2

OR

Find the ratio of the volume of hemisphere to the volume of cone.

38. Pankaj wants to participate in the push-up challenge. He can currently make 3000 push-ups in one hour. But he wanted to achieve a target of 3900 push-ups in one-hour. With each day of practice, he is able to make 5 more push-ups in one hour as compared to the previous day. On first day of practice, he do 3000 push-ups and continues to practice regularly till his target is achieved.



Based on the above information, answer the following questions:

i) Form an AP representing the number of push-ups per day. 1

ii) Find the total number of push-ups performed by Pankaj in starting first week. 1

iii) Find the minimum number of days Pankaj needs to practice before his goal is achieved. 2

OR

On which day, Pankaj performed 3500 push-ups?