CLASS–X
Pre–Board Test–1

SET-1

कोड नं.
Code No. **041**

Series HRK

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर–पुस्तिका के मुख–पृष्ठ पर अवश्य लिखें।
Candidates must write the Code on the title page of the answer-book.

- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 40 questions.
- Please write down the serial number of the question before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed at 09:00 a.m. From 09:00 to 09:15 a.m., the students will read the question paper only and will not write any answer on the answer-script during this period.

(MATHEMATICS–1)

Time : 3 hours **M.M. : 80**

General Instructions:

- All the questions are **compulsory**.
- The question paper consists of **40** questions divided into **4** sections **A**, **B**, **C** and **D**.
- Section **A** comprises of **20** questions of **1** mark each. Section **B** comprises of **6** questions of **2** marks each. Section **C** comprises of **8** questions of **3** marks each. Section **D** comprises of **6** questions of **4** marks each.
- There is no overall choice. However an internal choice has been provided in two questions of **1** mark each, two questions of **2** marks each, three questions of **3** marks each, and three questions of **4** marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculators is **not** permitted.

(Every Sunday)

SECTION - A

Q. 1 – Q. 10 are multiple choice questions. Select the most appropriate answer from the given options. **[10 × 1 = 10]**

1. I. The L.C.M of x and 18 is 36.

II. The H.C.F of x and 18 is 2.

What is the number x?

(a) 1 (b) 2 (c) 3 (d) 4

2. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observation of the set is increased by 2, then the median of the new set

(a) is increased by 2 (b) is decreased by 2

(c) is two times the original median (d) remains the same as that of the original set

3. Which of the following will have a terminating decimal expansion?

(a) $\frac{77}{210}$ (b) $\frac{23}{30}$ (c) $\frac{125}{441}$ (d) $\frac{23}{8}$

4. The pair of equations $5x - 15y = 8$ and $3x - 9y = \frac{24}{5}$ has

(a) one solution (b) two solutions

(c) infinitely many solutions (d) no solution

5. If $\tan 15° = 2 - \sqrt{3}$, then the value of $\cot^2 75°$ is

(a) $7 + \sqrt{3}$ (b) $7 - 2\sqrt{3}$ (c) $7 - 4\sqrt{3}$ (d) $7 + 4\sqrt{3}$

6. Given that $\sin\theta = \frac{a}{b}$, then $\cos\theta$ is equal to

(a) $\frac{b}{\sqrt{b^2 - a^2}}$ (b) $\frac{b}{a}$ (c) $\frac{\sqrt{b^2 - a^2}}{b}$ (d) $\frac{a}{\sqrt{b^2 - a^2}}$

7. C is the mid-point of PQ, if P is (4, x), C is (y, –1) and Q is (–2, 4), then x and y respectively are

(a) – 6 and 1 (b) – 6 and 2 (c) 6 and –1 (d) 6 and –2

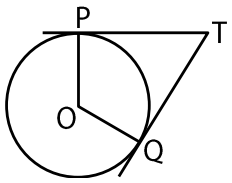
8. The distance between two points (0, 0) and (x, 3) is 5. Then x is:

(a) 5 (b) –5 (c) –4 (d) none

9. If $\sin\theta - \cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is

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

10. In the adjoining figure, TP and TQ are the two tangents to a circle with centre O. If $\angle POQ = 110°$, then $\angle PTQ$ is



(a) 60° (b) 70° (c) 80° (d) 90°

(Q. 11 – Q. 15) Fill in the blanks: **[5 × 1 = 5]**

11. Volume of a frustum of a cone = ……

12. If a, b are the roots of $x^2 + x + 1 = 0$, then $a^2 + b^2 =$ ……

OR

The zeroes of a polynomial p(x) are precisely the x-coordinates of the points, where the graph of y = p(x) intersects the …… axis.

13. The perimeters of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If PQ = 10 cm, then AB = ……

14. The sum of n terms of an A.P. is $4n^2 - n$. The common difference = …… .

15. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is ……

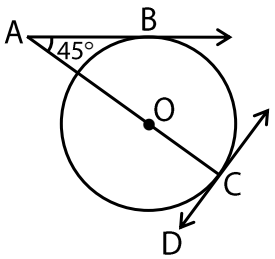
(Q. 16 – Q. 20) Answer the following **[5 × 1 = 5]**

16. Write the H.C.F of the smallest composite number and the smallest prime number.

17. Given $\Delta ABC \sim \Delta DEF$. If AB = 2DE and area of ΔABC is 56 cm^2. Find the area of ΔDEF.

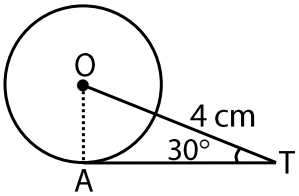
18. The diagram shows a circle with centre O. Line AB is tangent to the circle at point B and line DC is tangent to the circle at point C.

If the radius of the circle is 2 cm, what is the measure of AC?



OR

In the given figure, AT is a tangent to the circle with centre O such that OT = 4 cm and $\angle OTA = 30°$. Find the length of AT.



19. Which term of the sequence 4, 9, 14, 19, … is 124?

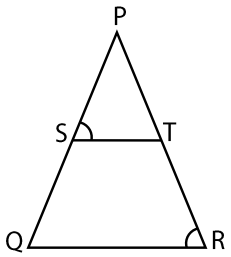
20. If α and β are the roots of the equations $x^2 - 3x + p = 0$, find p such that $\alpha = 2\beta$

SECTION - B

21. Check whether – 150 is a term of the A.P. : 11, 8, 5, 2… **[2]**

22. Two concentric circles are of radii 5 cm and 3 cm. find the length of the chord of the larger circle which touches the smaller circle. **[2]**

23. In the figure, $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that PQR is an isosceles triangle. **[2]**



OR

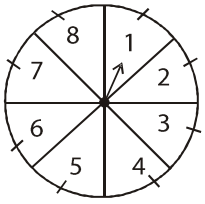
ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

24. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower. **[2]**

25. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see Fig.), and these are equally likely outcomes. What is the probability that it will point at

(i) a number greater than 2?

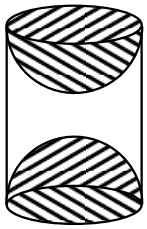
(ii) a number less than 9? **[2]**



OR

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number.

26. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in Fig. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article. **[2]**



SECTION - C

27. Use Euclid's division algorithm to find the HCF of 876 and 255 **[3]**

OR

Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.

28. If the sum of the first n terms of an AP is $4n - n^2$, what is the sum of first two terms? What is the second term? Find the n^{th} term. **[3]**

29. Solve the following pair of equations by reducing them to a pair of linear equations: **[3]**

$$\frac{1}{3x+y}+\frac{1}{3x-y}=\frac{3}{4}$$

$$\frac{1}{2(3x+y)}-\frac{1}{2(3x-y)}=\frac{-1}{8}$$

OR

A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and that of the boat in still water

30. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$. **[3]**

31. If A(–5, 7), B(– 4, –5), C(–1, –6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD. **[3]**

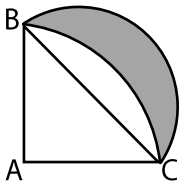
32. Prove that **[3]**

$$\frac{\cos A-\sin A+1}{\cos A+\sin A-1}=\text{cosec}\,A+\cot A$$

OR

If $\angle A$ and $\angle B$ are acute angles such that cos A = cos B, then show that $\angle A = \angle B$.

33. In the figure, ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region. **[3]**



34. The following table gives production yield per hectare of wheat of 100 farms of a village. **[3]**

Production yield (in kg/ha)	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75	75 – 80
Number of farms	2	8	12	24	38	16

Change the distribution to a more than type distribution, and draw its ogive.

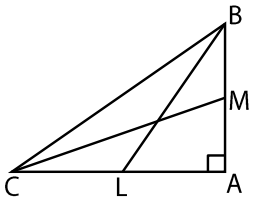
SECTION - D

35. Draw a triangle ABC with side BC = 7 cm, $\angle B = 45°, \angle A = 105°$. Then, construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC. **[4]**

OR

Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle 60°.

36. BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5\,BC^2$. **[4]**



37. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two trains. **[4]**

OR

Find the roots of the following equation:

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30},\ x \neq -4, 7$$

38. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of the milk which can completely fill the container, at the rate of Rs 20 per litre. Also find the cost of metal sheet used to make the container, if it costs Rs 8 per 100 cm^2. (Take $\pi = 3.14$) **[4]**

OR

A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

39. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point. **[4]**

40. The following distribution gives the state-wise teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data. **[4]**

Number of students per teacher	**Number of states/U.T.**
15 - 20	3
20 – 25	8
25 – 30	9
30 – 35	10
35 – 40	3
40 – 45	0
45 – 50	0
50 – 55	2