Brain International School
Vikas Puri, New Delhi

Session 2026-27
PRACTICE PAPER 1
Class X
SUBJECT: - MATHEMATICS (041 & 241)

GENERAL INSTRUCTIONS

1. This question paper contains 38 questions. All questions are compulsory.
2. The paper is divided into five sections: A, B, C, D and E.
3. Section A contains Questions 1–20 of 1 mark each. Questions 19 and 20 are Assertion–Reason questions.
4. Section B contains Questions 21–25 of 2 marks each.
5. Section C contains Questions 26–31 of 3 marks each.
6. Section D contains Questions 32–35 of 5 marks each.
7. Section E contains Questions 36–38, each based on a case study and carrying 4 marks.
8. Internal choices are provided in selected questions. Attempt only one alternative wherever an OR is given.
9. Use $\pi = 22/7$ wherever required, unless stated otherwise. Calculators are not permitted.
10. Draw neat figures wherever necessary. Diagrams are not necessarily drawn to scale.

SECTION A

Questions 1 to 20 are multiple-choice questions. Select the correct option. (20 × 1 = 20)

1. If α and β are the zeroes of $2x^2 - 7x + 3$, then $\alpha^2 + \beta^2$ is:

(A) 25/4 (B) 37/4 (C) 43/4 (D) 49/4

2. The HCF of two positive integers is 12 and their product is 864. Their LCM is:

(A) 60 (B) 72 (C) 84 (D) 96

3. For what value of k will the pair $3x + 2y = 5$ and $6x + ky = 10$ have infinitely many solutions?

(A) 2 (B) 4 (C) 6 (D) 8

4. The 10th term of an AP is 31 and its 15th term is 46. The sum of its first 20 terms is:

(A) 610 (B) 620 (C) 630 (D) 640

5. If the roots of $x^2 - (p+1)x + p = 0$ are equal, then p is:

(A) 0 only (B) 1 only (C) 0 or 1 (D) −1 or 1

6. A point P divides the line segment joining A(−2, 5) and B(4, −1) internally in the ratio 2:1. The x-coordinate of P is:

(A) 0 (B) 1 (C) 2 (D) 3

7. If $\tan\theta + \cot\theta = 4$, then $\tan^2\theta + \cot^2\theta$ equals:

(A) 12 (B) 14 (C) 16 (D) 18

8. A chord of a circle of radius 10 cm is at a distance 6 cm from its centre. Its length is:

(A) 8 cm (B) 12 cm (C) 16 cm (D) 20 cm

9. The probability that a leap year selected at random has 53 Sundays is:

(A) 1/7 (B) 2/7 (C) 3/7 (D) 4/7

10. If the zeroes of $3x^2 - 5x + k$ are reciprocals of each other, then k is:

(A) 1 (B) 3 (C) 5 (D) 9

11. The distance between the points (a, 2) and (3, 6) is 5 units. The possible values of a are:

(A) 0 or 6 (B) 1 or 5 (C) −1 or 7 (D) 2 or 4

12. If the areas of two similar triangles are in the ratio 49:64, the ratio of their corresponding sides is:

(A) 7:8 (B) 49:64 (C) 14:16 (D) 8:7

13. A solid sphere of radius r is melted to form 8 identical smaller spheres. The radius of each smaller sphere is:

(A) r/8 (B) r/4 (C) r/2 (D) 2r

14. The median of the observations 3, 7, 8, x, 12, 15, 19 arranged in ascending order is 10. The value of x is:

(A) 9 (B) 10 (C) 11 (D) 12

15. If $\sec\theta + \tan\theta = 3$, then $\sec\theta - \tan\theta$ is:

(A) 1/3 (B) 1/2 (C) 2/3 (D) 3

16. The angle of elevation of the top of a tower from a point 30 m away is 60°. The height of the tower is:

(A) $10\sqrt{3}$ m (B) $15\sqrt{3}$ m (C) $30\sqrt{3}$ m (D) 60 m

17. A quadratic polynomial whose zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ is:

(A) x^2-4x+1 (B) x^2+4x+1 (C) x^2-2x+1 (D) x^2-4x-1

18. A tangent PA is drawn to a circle with centre O. If $\angle AOP = 35°$, then $\angle OAP$ is:

(A) 35° (B) 45° (C) 55° (D) 90°

19. Assertion (A): If the discriminant of a quadratic equation is negative, its roots are real and distinct.
Reason (R): The nature of roots of $ax^2 + bx + c = 0$ is determined by $D = b^2 - 4ac$.

Choose: (A) Both A and R are true and R explains A. (B) Both A and R are true but R does not explain A. (C) A is true but R is false. (D) A is false but R is true.

20. Assertion (A): The tangent at any point of a circle is perpendicular to the radius through the point of contact.
Reason (R): The perpendicular from the centre of a circle to a chord bisects the chord.

Choose the same codes (A)–(D) as given in Question 19.

SECTION B

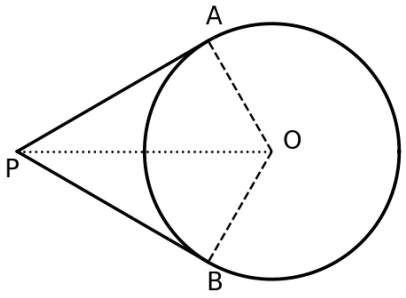
Very Short Answer Questions (5 × 2 = 10)

21. Find the value(s) of k for which the quadratic equation $2x^2 - 5x + k = 0$ has equal roots.

22. The 5th and 11th terms of an AP are 18 and 42 respectively. Find its first term and common difference.

23. A point P(x, 3) is equidistant from A(2, −1) and B(−2, 5). Find x.

24. From an external point P, two tangents PA and PB are drawn to a circle with centre O. If OP = 13 cm and the radius is 5 cm, find PA. (A labelled figure is provided.)



25. If $\sin\theta = 3/5$, where θ is acute, evaluate $(1 + \cos\theta)/(1 - \cos\theta)$.

OR

Evaluate: $(\tan 30° + \tan 60°) / (\sec 60° + \operatorname{cosec} 30°)$.

SECTION C

Short Answer Questions (6 × 3 = 18)

26. A train travels 360 km at a uniform speed. If its speed had been 5 km/h more, it would have taken 1 hour less for the journey. Find its original speed.

27. Prove that the lengths of tangents drawn from an external point to a circle are equal. Hence, in the figure for Question 24, if PA = 2x + 3 and PB = 5x − 9, find x.

28. The points A(−1, 4), B(3, 2) and C(5, 6) are three vertices of a parallelogram ABCD. Find the coordinates of D and the area of the parallelogram.

29. Prove the identity: $(1 - \sin A)/\cos A = \cos A/(1 + \sin A)$, for all values of A for which both sides are defined.

30. A solid toy is in the form of a hemisphere surmounted by a cone, both having the same radius 3 cm. If the height of the cone is 4 cm, find the total surface area of the toy.

31. Find the median of the data: 12, 18, 7, 25, 16, 21, 9, 14, 30, 11, 19.

OR

The following distribution shows the marks obtained by 40 students. Find the mean using the assumed mean method.

Marks	Frequency
0–10	3
10–20	7
20–30	12
30–40	10
40–50	8

SECTION D

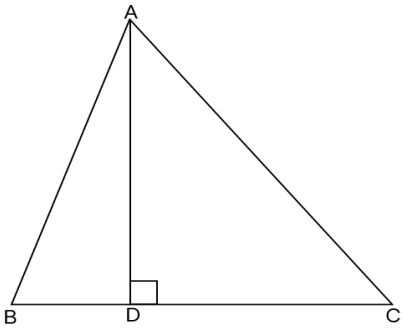
Long Answer Questions (4 × 5 = 20)

32. A two-digit number is such that the product of its digits is 18. When 27 is added to the number, its digits are interchanged. Form the required equations and find the number.

OR

The sum of the reciprocals of a person's ages (in years) 3 years ago and 5 years from now is 1/6. If the person's present age is x years, form a quadratic equation and determine the possible present age(s).

33. In ΔABC, AD is perpendicular to BC. If $AD^2 = BD \times DC$ and hence Prove that ∠A is 90°. Give a reasoned conclusion.



34. A solid is made by placing a cylinder of radius 3 cm and height 10 cm on a hemisphere of the same radius.

Find (i) the total exposed surface area and (ii) the volume of the solid. Use π = 22/7.

35. A survey of 100 households gives the following monthly expenditure on electricity (in ₹): 0–500: 12 households; 500–1000: 18; 1000–1500: 30; 1500–2000: 25; 2000–2500: 15. Calculate the median expenditure. Show the cumulative frequency table and identify the median class.

OR

A card is drawn from a well-shuffled deck of 52 cards. Find the probability that it is (i) a red king, (ii) neither a queen nor a jack, and (iii) a face card or an ace.

SECTION E

Case Study-Based Questions (3 × 4 = 12)

36. CASE STUDY 1 –

A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height..



(i) What is the angle of elevation if they are standing at a distance of 42m away from the monument? [1]

(ii) They want to see the tower at an angle of 60^o. So, they want to know the distance where they should stand and hence find the distance. [1]

(iii) If the altitude of the Sun is at 60^o, then the height of the vertical tower that will cast a shadow of length 20 m is [2]

OR

(iii The ratio of the length of a rod and its shadow is 1:1. The angle of elevation of the Sun is. [2]

37. CASE STUDY 2 –

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month , answer the following:



(i) Find the amount paid by him in 30th installment [1]

(ii) What amount does he still have to pay offer 30th installment. [1]

(iii) If total installments are 40 then amount paid in the last installment?. [2]

OR

(iii) The ratio of the 1st installment to the last installment is [2]

38. CASE STUDY 3 –

Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete the journey of 400 km.



(i) What will be the distance co vered by Ajay's car in two hours?. [1]

a) 2(x + 5)km b) (x – 5)km

c) 2(x + 10)km d) (2x + 5)km

(ii) Which of the following quadratic equation describe the speed of Raj's car? [1]

a) $x^2 – 5x – 500 = 0$ b) $x^2 + 4x – 400 = 0$

c) $x^2 + 5x – 500 = 0$ d) $x^2 – 4x + 400 = 0$

(iii) What is the speed of Raj's car?. [2]

OR

(iii) How much time took Ajay to travel 400 km?

Session 2026-27
PRACTICE PAPER II
Class X
SUBJECT: - MATHEMATICS (041 & 241)

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five Sections – A, B, C, D and E.
3. In Section A, Questions 1 to 18 are Multiple Choice Questions (MCQs) and Questions 19 and 20 are Assertion–Reason based questions of 1 mark each.
4. In Section B, Questions 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Questions 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.
6. In Section D, Questions 32 to 35 are Long Answer (LA) type questions, carrying 5 marks each.
7. In Section E, Questions 36 to 38 are case study based questions, carrying 4 marks each, with sub-parts of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C and 2 questions in Section D. An internal choice has been provided in the 2-mark sub-part of each question in Section E.
9. Draw neat and clean figures wherever required. Take $\pi = 22/7$ wherever required, if not stated.
10. Use of calculators is not allowed.

SECTION A

This section comprises 18 multiple-choice questions and two assertion–reason questions of 1 mark each.

1. The HCF of two numbers is 18 and their product is 12960. Their LCM is:

(A) 144 (B) 360 (C) 540 (D) 720

2. If the sum of the zeroes of the polynomial $p(x) = (k^2 - 14)x^2 - 2x - 12$ is 1, then the value of k is:

(A) ±4 (B) 4 (C) −4 (D) ±2

3. The pair of linear equations $3x + 2ky - 2 = 0$ and $2x + 5y + 1 = 0$ has no solution when k is equal to:

(A) 4/15 (B) 15/2 (C) 15/4 (D) 3/10

4. The value(s) of k for which the quadratic equation $2x^2 + kx + 2 = 0$ has equal roots is/are:

(A) 4 only (B) ±4 (C) 16 (D) 0

5. The 11th term from the end of the A.P. 7, 11, 15, …, 187 is:

(A) 139 (B) 143 (C) 147 (D) 151

6. If $\Delta ABC \sim \Delta PQR$, $ar(\Delta ABC)/ar(\Delta PQR) = 16/25$ and AB = 6 cm, then PQ is equal to:

(A) 4.8 cm (B) 7.5 cm (C) 9.6 cm (D) 15 cm

7. PA and PB are tangents drawn from an external point P to a circle with centre O. If $\angle APB = 70°$, then $\angle POA$ is equal to:

(A) 35° (B) 70° (C) 110° (D) 55°

8. The distance between the points $(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$ is:

(A) $\sqrt{(a^2 + b^2)}$ (B) $a^2 + b^2$ (C) $a + b$ (D) $a^2 - b^2$

9. The value of $2\tan^2 45° + \cos^2 30° - \sin^2 60°$ is:

(A) 0 (B) 1 (C) 2 (D) 3

10. $(1 + \tan^2\theta)(1 - \sin\theta)(1 + \sin\theta)$ is equal to:

(A) $\sec^2\theta$ (B) $\tan^2\theta$ (C) 0 (D) 1

11. The perimeter of a sector of a circle of radius 7 cm and central angle 90° is:

(A) 25 cm (B) 11 cm (C) 36 cm (D) 14 cm

12. A metallic sphere of radius 6 cm is melted and recast into spherical balls, each of diameter 3 cm. The number of balls so formed is:

(A) 16 (B) 64 (C) 32 (D) 128

13. A cylinder, a cone and a hemisphere have equal base radii and equal heights. The ratio of their volumes, in the order cylinder : cone : hemisphere, is:

(A) 1 : 2 : 3 (B) 3 : 2 : 1 (C) 3 : 1 : 2 (D) 2 : 1 : 3

14. A card is drawn at random from a well-shuffled deck of 52 playing cards. The probability that it is neither a king nor a heart is:

(A) 4/13 (B) 3/13 (C) 10/13 (D) 9/13

15. The class marks of a frequency distribution are 15, 20, 25, 30, … The class corresponding to the class mark 20 is:

(A) 17.5 – 22.5 (B) 12.5 – 17.5 (C) 18 – 22 (D) 19.5 – 20.5

16. In ΔABC, D and E are points on AB and AC respectively such that $DE \parallel BC$. If AD = 2 cm and DB = 3 cm, then $ar(\Delta ADE) : ar(\text{trapezium } DBCE)$ is:

(A) 4 : 25 (B) 4 : 21 (C) 2 : 3 (D) 4 : 9

17. A quadrilateral ABCD is drawn to circumscribe a circle. If AB = 6 cm, BC = 7 cm and CD = 4 cm, then AD is equal to:

(A) 2 cm (B) 4 cm (C) 3 cm (D) 17 cm

18. The point on the x-axis which is equidistant from the points (2, −5) and (−2, 9) is:

(A) (7, 0) (B) (0, −7) (C) (0, 7) (D) (−7, 0)

Directions (Questions 19 and 20): Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below:

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

(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of 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): The pair of linear equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has a unique solution.

Reason (R): If $a_1/a_2 = b_1/b_2 \neq c_1/c_2$, then the pair of linear equations has no solution.

20. Assertion (A): If $\Delta ABC \sim \Delta PQR$ and AB : PQ = 2 : 3, then the ratio of their perimeters is 2 : 3.

Reason (R): If two triangles are similar, then their corresponding sides are equal.

SECTION B

This section comprises 5 Very Short Answer (VSA) type questions of 2 marks each.

21. (A) Find the largest number which divides 245 and 1029 leaving remainder 5 in each case.

OR

(B) Two joggers start together from the same point of a circular park and run in the same direction. They complete one round in 18 minutes and 12 minutes respectively. After how many minutes will they meet again at the starting point?

22. (A) The areas of two similar triangles ABC and PQR are 64 cm^2 and 121 cm^2 respectively. If QR = 15.4 cm, find BC.

OR

(B) A vertical pole of length 6 m casts a shadow 4 m long on the ground. At the same time, a tower casts a shadow 28 m long. Find the height of the tower.

23. If $\sin\theta = a/b$, find the value of $\sec\theta + \tan\theta$ in terms of a and b.

24. Find the area of the minor segment of a circle of radius 14 cm, if the angle subtended by the corresponding minor arc at the centre is 90°.

25. A natural number is selected at random from the numbers 1 to 30 (both inclusive). Find the probability that it is (i) a prime number, (ii) a multiple of 7.

SECTION C

This section comprises 6 Short Answer (SA) type questions of 3 marks each.

26. Given that $\sqrt{5}$ is an irrational number, prove that $(2 - 3\sqrt{5})$ is an irrational number.

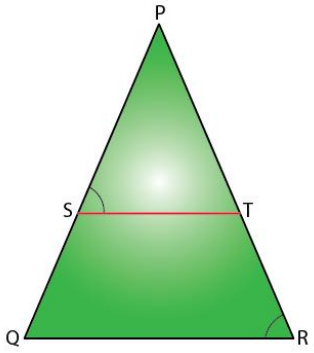
27. If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the zeroes of the polynomial and the value of k.

28. (A) Solve the pair of linear equations $2x + 3y = 11$ and $2x - 4y = -24$. Hence find the value of m for which $y = mx + 3$.

OR

(B) The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of its digits. Find the number.

29. In the given figure, PS/SQ = PT/TR and ∠ PST = ∠ PRQ. Prove that PQR is an isosceles triangle.



30. (A) Prove that $(\cos\theta - \sin\theta + 1)/(\cos\theta + \sin\theta - 1) = \operatorname{cosec}\theta + \cot\theta$.

OR

(B) If $\sin\theta + \cos\theta = \sqrt{2}$, prove that $\tan\theta + \cot\theta = 2$.

31. A box contains 90 discs numbered from 1 to 90. 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, (iii) a number divisible by 5.

SECTION D

This section comprises 4 Long Answer (LA) type questions of 5 marks each.

32. A motorboat whose speed in still water is 18 km/h takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

33. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Using the above result, solve the following: From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle.

34. (A) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Find the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy.

OR

(B) A medicine capsule is in the shape of a cylinder with two hemispheres stuck to 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) From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.

OR

(B) A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.

SECTION E

This section comprises 3 case study based questions of 4 marks each. Each case study has three sub-parts (i), (ii), (iii) of 1, 1 and 2 marks respectively.

36. A community garden club is planting saplings in rows along a rectangular plot. Row 1 has 5 saplings, Row 2 has 8 saplings, Row 3 has 11 saplings, and so on, each row having 3 more saplings than the row before it.

Based on the above information, answer the following questions:

(i) How many saplings are planted in the 10th row? [1]

(ii) Which row has 62 saplings? [1]

(iii) (A) If the club plants 15 rows, find the total number of saplings planted. [2]

OR

(iii) (B) If the club has 299 saplings in all, for how many rows can it continue this pattern? [2]

37. A city is planning a straight metro line between two stations, A and B. On the city map, which is drawn on a coordinate grid where 1 unit = 1 km, station A is at (1, 2) and station B is at (7, 10). The planners want to place a tea stall at the midpoint of AB and a new interchange station C on AB.

Based on the above information, answer the following questions:

(i) Find the distance between stations A and B. [1]

(ii) Find the coordinates of the point where the tea stall is to be placed. [1]

(iii) (A) The interchange station C is to be built on AB such that AC : CB = 1 : 3. Find the coordinates of C. [2]

OR

(iii) (B) A signal tower is located at D(5.5, 8) on AB. In what ratio does D divide AB? [2]

38. A school counsellor recorded the time (in minutes) spent on self-study per day by 40 students of Class X. The grouped data is given below:

Time (minutes)	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of students	9	7	10	7	7

The counsellor wants to find the most common study time and the central value of the data to plan study-skills sessions.

Based on the above information, answer the following questions:

(i) Identify the modal class. [1]

(ii) Find the class interval containing the median. [1]

(iii) (A) Find the median of the data. [2]

OR

(iii) (B) Find the mode of the data. [2]