Mathematics (Standard) – Code 041

CBSE Class 10 Board Examination 2027 – Practice Paper No. 1

Practice Question Paper

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

(i) This question paper contains 38 questions. All questions are compulsory.
(ii) This question paper is divided into five sections – A, B, C, D and E.
(iii) In Section A, Question numbers 1 to 18 are multiple choice questions (MCQs) and Question numbers 19 and 20 are Assertion–Reason based questions of 1 mark each.
(iv) In Section B, Question numbers 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
(v) In Section C, Question numbers 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
(vi) In Section D, Question numbers 32 to 35 are long answer (LA) type questions, carrying 5 marks each.
(vii) In Section E, Question numbers 36 to 38 are case study based questions, carrying 4 marks each.
(viii) 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 all the 2-mark sub-parts of the questions in Section E.
(ix) Draw neat and clean figures wherever required. Take $\pi = 22/7$ wherever required, if not stated.
(x) Use of calculators is not allowed.

SECTION A This section comprises 18 multiple choice questions (Q.1 to Q.18) of 1 mark each. Choose the correct option. **[18]**

1. If $p = 2^3 \times 3^2 \times 5$ and $q = 2^2 \times 3^3 \times 7$, then LCM(p, q) ÷ HCF(p, q) is:

(A) 70 (B) 105
(C) 210 (D) 420

2. The graph of y = p(x), where p(x) is a quadratic polynomial, cuts the x-axis at (−3, 0) and (5, 0) and the y-axis at (0, −30). Then p(x) is:

(A) $x^2 - 2x - 15$ (B) $2x^2 - 4x - 30$
(C) $2x^2 + 4x - 30$ (D) $-2x^2 + 4x + 30$

3. The value of k for which the pair of linear equations 3x + ky = 7 and 6x + 10y = 11 has no solution is:

(A) 5 (B) −5
(C) 10 (D) 20

4. If the quadratic equation $4x^2 - kx + 9 = 0$ has two equal real roots and k > 0, then the value of k is:

(A) 6 (B) 9
(C) 36 (D) 12

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

(A) 127 (B) 131
(C) 135 (D) 63

6. In △PQR, S and T are points on the sides PQ and PR respectively such that ST ∥ QR. If PS = 4 cm, SQ = 6 cm and PR = 15 cm, then PT is:

(A) 6 cm (B) 7.5 cm
(C) 9 cm (D) 10 cm

7. The point on the y-axis which is equidistant from the points A(5, −2) and B(−3, 2) is:

(A) (0, 2) (B) (0, −2)

(C) (−2, 0) (D) (2, 0)

8. If sin A = 8/17, where A is an acute angle, then the value of cot A + cosec A is:

(A) 4 (B) 23/8

(C) 25/8 (D) 15/17

9. A number is selected at random from the numbers 1, 2, 3, ..., 50. The probability that it is divisible by both 3 and 4 is:

(A) 2/25 (B) 12/25

(C) 1/12 (D) 7/25

10. A circular pizza of diameter 28 cm is cut into 8 equal slices by cuts through its centre. The area of the top surface of one slice is:

(A) 38.5 cm^2 (B) 77 cm^2

(C) 88 cm^2 (D) 154 cm^2

11. Two identical solid hemispheres, each of radius 3.5 cm, are joined together along their flat faces. The total surface area of the solid so formed is:

(A) 77 cm^2 (B) 115.5 cm^2

(C) 154 cm^2 (D) 231 cm^2

12. While finding the mean of a grouped frequency distribution by the assumed mean method, a student took the assumed mean a = 47.5 and obtained $\Sigma f_i = 40$ and $\Sigma f_i d_i = -60$, where $d_i = x_i - a$. The mean of the data is:

(A) 45.5 (B) 46

(C) 46.5 (D) 49

13. One letter is chosen at random from the letters of the word MAHARASHTRA. The probability that the chosen letter is A is:

(A) 4/11 (B) 3/11

(C) 7/11 (D) 4/7

14. The coordinates of the point which divides the line segment joining A(2, −5) and B(−4, 7) internally in the ratio 1 : 2 are:

(A) (0, −1) (B) (−2, 3)

(C) (−1, 1) (D) (0, 1)

15. The area of a sector of a circle of radius 6 cm is 6π cm^2. The angle of the sector is:

(A) 30° (B) 45°

(C) 60° (D) 90°

16. For a moderately skewed distribution, the mode is 24 and the mean is 30. Using the empirical relationship between the three measures of central tendency, the median is:

(A) 26 (B) 27

(C) 28 (D) 29

17. A drone is hovering vertically above a point A on level ground. From a point B on the ground, 45 m away from A, the angle of elevation of the drone is 60°. The height of the drone above the ground is:

(A) $15\sqrt{3}$ m (B) 45 m

(C) 90 m (D) $45\sqrt{3}$ m

18. A bag contains 7 red balls, 9 blue balls and some green balls. If the probability of drawing a blue ball at random is 3/8, then the number of green balls in the bag is:

(A) 6 (B) 8

(C) 9 (D) 24

Q.19–20 Assertion–Reason based questions. Directions: In Question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Select the correct answer from the options (A), (B), (C) and (D) given below each question. (1 mark each) **[2]**

19. **Assertion (A):** The points A(1, 2), B(4, 6) and C(7, 10) are collinear.

Reason (R): If for three points A, B and C, AB + BC = AC, then the points A, B and C are collinear.

(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.

20. **Assertion (A):** The quadratic equation $3x^2 - 4x + 2 = 0$ has two distinct real roots.

Reason (R): A quadratic equation $ax^2 + bx + c = 0$ has two distinct real roots if $b^2 - 4ac > 0$.

(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.

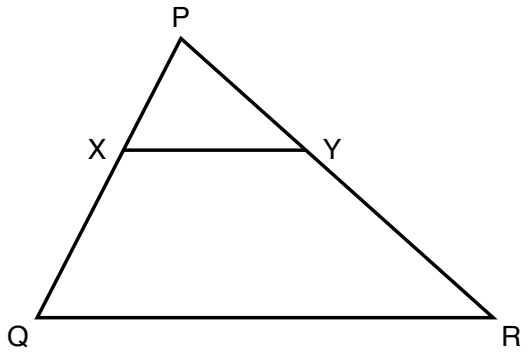
SECTION B This section comprises 5 very short answer (VSA) type questions of 2 marks each. **[10]**

21. (A) A florist in Pune has 132 roses and 198 marigolds. She wants to make identical bouquets using all the flowers, with each bouquet having the same number of roses and the same number of marigolds. Using prime factorisation, find the greatest number of bouquets she can make. How many roses and marigolds will each bouquet have?

OR

(B) When the students of a school are made to stand in rows of 18, 24 or 30, exactly 5 students are left over each time. Using prime factorisation, find the least possible number of students in the school.

22. (A) In the given figure, X and Y are points on the sides PQ and PR of $\triangle PQR$ such that XY ∥ QR. If PX = 3 cm, XQ = 4.5 cm and YR = 6 cm, find PY and PR.



OR

(B) PA and PB are tangents drawn from an external point P to a circle with centre O and radius 5 cm. If OP = 13 cm, find the length of the tangent PA and the perimeter of the quadrilateral OAPB.

23. If 7 sec θ = 25, where θ is an acute angle, find the value of $(\sin\theta - \cos\theta)/(\sin\theta + \cos\theta)$.

24. A circular rangoli of radius 14 cm with centre O is drawn on the floor of a school hall. A square ABCD is marked inside it with all four vertices on the circle, so that each side of the square subtends a right angle at O. The four segments of the circle lying outside the square are filled with white colour. Find the total area of the region filled with white colour.

25. Ria and Kabir play a board game in which two dice are thrown together. Ria wins a round if the sum of the numbers on the two dice is a multiple of 5. Kabir wins a round if the two numbers differ by exactly 3. Who has the greater chance of winning a round? Justify by finding both probabilities.

SECTION C This section comprises 6 short answer (SA) type questions of 3 marks each. **[18]**

26. Given that $\sqrt{2}$ is an irrational number, prove that $(7 - 3\sqrt{2})/5$ is an irrational number.

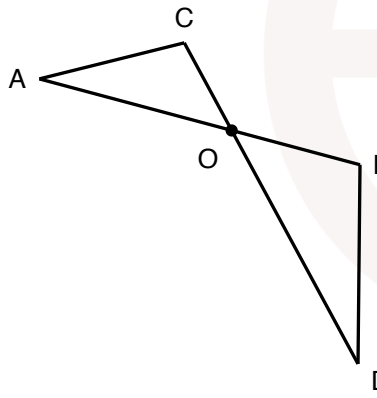
27. If α and β are the zeroes of the quadratic polynomial $p(x) = 2x^2 - 3x - 5$, find a quadratic polynomial whose zeroes are $(2\alpha + 1)$ and $(2\beta + 1)$.

28. (A) A housing society in Satara collects old newspapers for recycling. It collects 5 kg in the first week, 8 kg in the second week, 11 kg in the third week, and so on, the collection increasing by 3 kg every week. In how many weeks will the society collect 1025 kg in all? How much newspaper is collected in the last of these weeks?

OR

(B) The 4th term of an A.P. is 18 and its 11th term exceeds three times its 3rd term by 4. Find the A.P. and the sum of its first 20 terms.

29. In the given figure, the line segments AB and CD intersect at the point O such that OA = 6 cm, OB = 4 cm, OC = 3 cm and OD = 8 cm. Prove that $\triangle AOC \sim \triangle DOB$. If AC = 4.5 cm, find the length of DB.



30. Find the ratio in which the point P(m, 6) divides the line segment joining the points A(−1, 3) and B(9, 8). Also find the value of m.

31. (A) Sahil was asked to simplify the expression $\tan\theta/(\sec\theta - 1) + \tan\theta/(\sec\theta + 1)$, where θ is acute. He wrote:

$\tan\theta/(\sec\theta - 1) + \tan\theta/(\sec\theta + 1)$

$= \tan\theta[(\sec\theta + 1) + (\sec\theta - 1)] / [(\sec\theta - 1)(\sec\theta + 1)]$ ...(Step 1)

$= 2\tan\theta\sec\theta / (\sec^2\theta - 1)$ ...(Step 2)

$= 2\tan\theta\sec\theta / \tan^2\theta$ ...(Step 3)

$= 2\tan\theta / \sec\theta$ ...(Step 4)

$= 2\sin\theta$ ...(Step 5)

Identify the step in which Sahil made an error, if any. Correct it and find the correct simplified form of the expression in terms of a single trigonometric ratio.

OR

(B) If $\cos\theta - \sin\theta = 1/2$, where θ is an acute angle, find the value of $\tan\theta + \cot\theta$.

SECTION D This section comprises 4 long answer (LA) type questions of 5 marks each. **[20]**

32. A stationery shop owner in Nagpur bought some notebooks for ₹1200. If the price of each notebook had been ₹10 less, he could have bought 10 more notebooks for the same amount. Find the number of notebooks he bought and the price of each notebook.

33. Prove that the lengths of the tangents drawn from an external point to a circle are equal.
Using the above result, solve the following: In a park, a circular fountain is surrounded by a triangular lawn ABC whose sides AB, BC and CA touch the circular boundary of the fountain at F, D and E respectively. The gardener measures AF = 5 m and BD = 7 m, and the perimeter of the lawn is 36 m. Find the lengths of the three sides of the lawn.

34. (A) A grain silo at a farmers' cooperative in Latur is in the shape of a cylinder of diameter 14 m and height 10 m, surmounted by a conical roof of the same diameter and height 2.4 m. Find (i) the area of metal sheet needed to make the curved surface of the cylinder and the conical roof (the floor is made of concrete), and (ii) the capacity (volume) of the silo.

OR

(B) A solid wooden trophy base is made by fixing a solid cylinder of radius 3.5 cm and height 14 cm centrally on the flat face of a solid hemisphere of radius 10.5 cm. Find (i) the volume of wood used, and (ii) the total surface area of the trophy base.

35. (A) A weather balloon is released from a point A on level ground and rises vertically upwards. Vikram, standing at a point O on the same level ground, 120 m from A, observes the balloon at an angle of elevation of 30°. Exactly one minute later, he observes it at an angle of elevation of 60°. Find (i) the height of the balloon at each observation, (ii) the distance between Vikram and the balloon at the second observation, and (iii) the average speed at which the balloon rose, in metres per minute. (Take Vikram's eye level at the ground and use $\sqrt{3} = 1.73$.)

OR

(B) A 6 m long ladder is placed against a vertical wall of a Ganeshotsav pandal so that it makes an angle of 60° with the level ground. The foot of the ladder is then pulled away from the wall along the ground until the ladder makes an angle of 30° with the ground, its top still touching the wall. Find (i) the height reached by the top of the ladder on the wall in each position, (ii) the distance through which the top of the ladder slides down, and (iii) the distance through which the foot of the ladder is moved. (Use $\sqrt{3} = 1.73$)

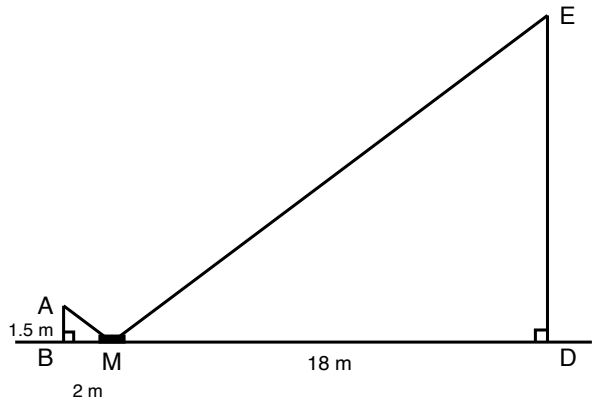
SECTION E This section comprises 3 case study based questions of 4 marks each. Each case study has three sub-parts (i), (ii) and (iii) of 1, 1 and 2 marks respectively. **[12]**

36. The canteen of a school in Kolhapur sells vada pav and samosas. On Monday it sold 40 vada pav and 30 samosas and collected ₹960. On Tuesday it sold 25 vada pav and 50 samosas and collected ₹975. Let the price of one vada pav be ₹x and the price of one samosa be ₹y.
Based on the above information, answer the following questions:
(i) Form a linear equation in two variables representing Monday's sale. (1 mark)
(ii) Form a linear equation in two variables representing Tuesday's sale. (1 mark)
(iii) (A) Find the price of one vada pav and the price of one samosa. (2 marks)

OR

(iii) (B) On Wednesday, the canteen sold 120 items in all (vada pav and samosas), and the number of vada pav sold was 6 more than the number of samosas sold. Find how many vada pav and how many samosas were sold on Wednesday. (2 marks)

37. Riya, a Class X student in Nashik, wants to find the height of a tall neem tree without climbing it. She places a small flat mirror M on the level ground and walks back along the line joining the foot of the tree and the mirror until she just sees the top of the tree in the mirror. Her eyes A are 1.5 m above the ground, her feet B are 2 m from the mirror and the mirror is 18 m from the foot D of the tree, whose top is E (see figure). Since the angle of incidence equals the angle of reflection, ∠AMB = ∠EMD.



Based on the above information, answer the following questions:

(i) Name the similarity criterion by which △ABM ~ △EDM. (1 mark)

(ii) Find the height DE of the tree. (1 mark)

(iii) (A) Riya's friend Om, whose eyes are 1.2 m above the ground, uses the same mirror (kept at the same place) to see the top of the same tree. How far from the mirror must Om stand? (2 marks)

OR

(iii) (B) A lamp post 6 m tall stands on the same straight line, on the other side of the mirror from Riya. Standing 2 m from the mirror, Riya just sees the top of the lamp post in the mirror. How far is the foot of the lamp post from the mirror? (2 marks)

38. A housing society in Thane recorded the daily water consumption (in litres) of its 50 households to plan a water-saving campaign. The data are given below:

Daily consumption (litres)	100–150	150–200	200–250	250–300	300–350	350–400
Number of households	4	6	14	12	9	5

Based on the above information, answer the following questions:

(i) Write the modal class of the data. (1 mark)

(ii) Write the median class of the data. (1 mark)

(iii) (A) Find the mean daily water consumption per household. (2 marks)

OR

(iii) (B) Find the mode of the data. (2 marks)

All the best for your exam!