

Full Practice Exam — Set 2

Mathematics · Class 10 · Full Syllabus Practice Exam

TIME 60 minutes	QUESTIONS 50	TOTAL MARKS 60	MAX. SCORE ___ / 60
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

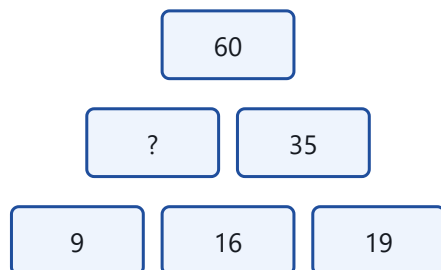
- There are **50 questions** in this paper. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–45 carry **1 mark** each. Questions 46–50 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Take $\pi = 22/7$ wherever it is needed. Rough work may be done in the space at the side of each page.

Section 1 — Logical Reasoning

Q1–Q10 · 1 mark each

- What comes next in the series? 2, 5, 10, 17, 26, ____
 (A) 35 (B) 36
 (C) 37 (D) 38
- What comes next in the series? ABD, EFH, IJL, ____
 (A) MNP (B) MNO
 (C) LMO (D) NOQ
- In a certain code, '253' means 'books are old', '546' means 'man is old' and '378' means 'buy good books'. Which digit stands for 'books'?
 (A) 2 (B) 3
 (C) 5 (D) 8
- Find the **odd one out**: 8, 27, 64, 100
 (A) 8 (B) 27
 (C) 64 (D) 100
- Complete the analogy: Square : 4 :: Hexagon : ____
 (A) 5 (B) 6
 (C) 7 (D) 8
- A girl facing north turns 135° clockwise and then 180° anticlockwise. Which direction is she facing now?
 (A) North-west (B) North-east
 (C) South-east (D) South-west
- How is your mother's brother's son related to you?
 (A) Brother (B) Nephew
 (C) Uncle (D) Cousin

8. In a class, Sunil ranks 9th from the top and 34th from the bottom. How many students are there in the class?
- (A) 41 (B) 42
(C) 43 (D) 44
9. If 1 January 2024 was a Monday, what day of the week was 1 February 2024?
- (A) Thursday (B) Wednesday
(C) Tuesday (D) Friday
10. In the number pyramid below, each block holds the sum of the two blocks directly beneath it. What number belongs in the block marked ?



A number pyramid in which each block is the sum of the two below it

- (A) 23 (B) 25
(C) 27 (D) 29

Section 2 — Mathematical Reasoning

Q11–Q28 · 1 mark each

11. When a positive integer a is divided by 5, the remainder r can take the values ____.
- (A) 1, 2, 3, 4 (B) 1, 2, 3, 4, 5
(C) 0, 1, 2, 3, 4, 5 (D) 0, 1, 2, 3, 4
12. The product of the zeroes of $4x^2 - 8x + 3$ is ____.
- (A) $\frac{3}{4}$ (B) 2
(C) $-\frac{3}{4}$ (D) $\frac{8}{4}$
13. If α and β are the zeroes of $x^2 - 4x + 3$, then $\alpha + \beta$ equals ____.
- (A) -4 (B) 3
(C) $\frac{4}{3}$ (D) 4
14. The equation $3x^2 - 6x + 2 = 0$ has ____.
- (A) Two distinct real roots (B) Two equal real roots
(C) No real roots (D) Exactly one root
15. Solving $x + y = 10$ and $x - y = 4$ gives ____.
- (A) $x = 3, y = 7$ (B) $x = 6, y = 4$
(C) $x = 7, y = 3$ (D) $x = 5, y = 5$
16. Which term of the AP 3, 8, 13, ... is 78?
- (A) 14th (B) 15th
(C) 18th (D) 16th

17. The sum of the first 20 terms of the AP 2, 5, 8, ... is _____.
 (A) 590 (B) 600
 (C) 610 (D) 620
18. The distance of the point $(-6, 8)$ from the origin is _____.
 (A) 10 units (B) 2 units
 (C) 14 units (D) 48 units
19. The point dividing the segment joining $(-1, 7)$ and $(4, -3)$ in the ratio 2 : 3 is _____.
 (A) (3, 1) (B) (2, 1)
 (C) (1, 3) (D) (1, 5)
20. $\triangle ABC$ is similar to $\triangle DEF$ with $AB = 4$ cm and $DE = 6$ cm. If the area of $\triangle ABC$ is 16 cm^2 , the area of $\triangle DEF$ is _____.
 (A) 24 cm^2 (B) 32 cm^2
 (C) 48 cm^2 (D) 36 cm^2
21. The angle between a tangent to a circle and the radius drawn to the point of contact is _____.
 (A) 90° (B) 60°
 (C) 45° (D) 180°
22. The value of $\sin^2 30^\circ + \cos^2 30^\circ$ is _____.
 (A) $\frac{1}{2}$ (B) $\frac{3}{4}$
 (C) 1 (D) $\frac{5}{4}$
23. If $\cos \theta = \frac{1}{2}$ and θ is acute, then $\theta =$ _____.
 (A) 30° (B) 45°
 (C) 90° (D) 60°
24. The value of $\cot 45^\circ$ is _____.
 (A) 1 (B) 0
 (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt{3}}$
25. The perimeter of a semicircular protractor of radius 7 cm is _____.
 (A) 22 cm (B) 36 cm
 (C) 29 cm (D) 44 cm
26. The curved surface area of a hemisphere of radius 7 cm is _____.
 (A) 154 cm^2 (B) 462 cm^2
 (C) 308 cm^2 (D) 616 cm^2
27. The median of the data 5, 7, 9, 11, 13 is _____.
 (A) 7 (B) 9
 (C) 11 (D) 45
28. If the probability of an event happening is 0.3, the probability of it **not** happening is _____.
 (A) 0.3 (B) 0.5
 (C) 1.3 (D) 0.7

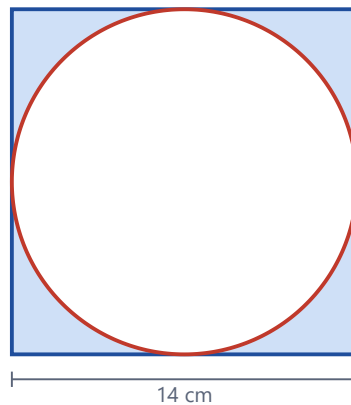
29. Three warning lights flash at intervals of 15, 20 and 25 seconds. If they flash together at 8:00:00 a.m., they will next flash together after _____.
 (A) 5 minutes (B) 3 minutes
 (C) 10 minutes (D) 15 minutes
30. The sum of the squares of two consecutive odd numbers is 394. The smaller number is _____.
 (A) 11 (B) 13
 (C) 15 (D) 17
31. The angle of elevation of the top of a building from a point 25 m from its foot is 45° . The height of the building is _____.
 (A) 12.5 m (B) 25 m
 (C) $25\sqrt{3}$ m (D) 50 m
32. In a garden, the rows of rose plants hold 23, 21, 19, ... plants, and the last row has 5 plants. The number of rows is _____.
 (A) 8 (B) 9
 (C) 10 (D) 12
33. The point on the y-axis that is equidistant from (2, 3) and (-4, 1) is _____.
 (A) (0, 2) (B) (0, 1)
 (C) (0, -1) (D) (-1, 0)
34. A circular path forms a ring between two concentric circles of radii 7 m and 14 m. The area of the path is _____.
 (A) 154 m^2 (B) 308 m^2
 (C) 616 m^2 (D) 462 m^2
35. Silver coins of diameter 1.75 cm and thickness 2 mm are melted to form a cuboid $5.5 \text{ cm} \times 10 \text{ cm} \times 3.5 \text{ cm}$. The number of coins melted is _____.
 (A) 200 (B) 300
 (C) 400 (D) 500
36. The table shows the number of hours 30 students spent on homework in a week. The mean number of hours is _____.

Hours	2	4	6	8
Number of students	6	9	10	5

Table 2.1 — Weekly homework hours of 30 students

- (A) 4.8 hours (B) 5.0 hours
 (C) 5.2 hours (D) 6.0 hours
37. Two dice are thrown together. The probability that the sum of the numbers is 8 is _____.
 (A) $\frac{1}{9}$ (B) $\frac{5}{36}$
 (C) $\frac{1}{6}$ (D) $\frac{7}{36}$

38. From the top of a cliff 60 m high, the angle of depression of a boat is 30° . The boat's distance from the foot of the cliff is _____.
 (A) $20\sqrt{3}$ m (B) 60 m
 (C) $60\sqrt{3}$ m (D) 120 m
39. A hemispherical dome of radius 14 m is to be painted on the outside at ₹5 per square metre. The cost is _____.
 (A) ₹3080 (B) ₹12 320
 (C) ₹9240 (D) ₹6160
40. A day of the week is chosen at random. The probability that it is a Sunday is _____.
 (A) $\frac{1}{7}$ (B) $\frac{1}{6}$
 (C) $\frac{2}{7}$ (D) $\frac{1}{2}$
41. A circle is inscribed in a square of side 14 cm, as shown. The area of the shaded region between them is _____.
 _____.



A circle inscribed in a square of side 14 cm

- (A) 44 cm^2 (B) 42 cm^2
 (C) 154 cm^2 (D) 196 cm^2
42. A taxi charges ₹15 for the first kilometre and ₹8 for every kilometre after that. The fare for a 10 km ride is _____.
 (A) ₹80 (B) ₹83
 (C) ₹87 (D) ₹95
43. A pole 5 m high casts a shadow 3 m long at the moment a tower casts a shadow 24 m long. The height of the tower is _____.
 (A) 30 m (B) 36 m
 (C) 45 m (D) 40 m
44. The mean of 12 observations is 15. If one observation, 20, is removed, the mean of the remaining observations is _____.
 (A) 14.55 (B) 14.5
 (C) 15 (D) 15.5

45. A cylindrical pipe has inner radius 3.5 cm. Water flows through it at 2 metres per second. The volume of water delivered in one second is _____.

(A) 3850 cm^3

(B) 7700 cm^3

(C) 2450 cm^3

(D) 1925 cm^3

Achievers Section

Q46–Q50 · 3 marks each

46. Two dice are thrown together. The probability that the sum of the numbers is 9 is _____.

(A) $\frac{1}{12}$

(B) $\frac{5}{36}$

(C) $\frac{1}{9}$

(D) $\frac{1}{6}$

47. The expression $(\sec A + \tan A)(1 - \sin A)$ simplifies to _____.

(A) $\sin A$

(B) 1

(C) $\tan A$

(D) $\cos A$

48. In $\triangle ABC$, the right angle is at B, $AB = 6 \text{ cm}$ and $BC = 8 \text{ cm}$. If BD is the altitude drawn to the hypotenuse AC, then $BD =$ _____.

(A) 4.8 cm

(B) 4 cm

(C) 5 cm

(D) 6.4 cm

49. A bucket is in the shape of a frustum with radii 15 cm and 5 cm and a vertical height of 24 cm. Its capacity is about _____.

(A) 5.5 litres

(B) 8.17 litres

(C) 12.3 litres

(D) 24.5 litres

50. Consider the three statements below.

(i) If the discriminant of a quadratic equation is a perfect square, its roots are rational.

(ii) The mid-point of a line segment divides it in the ratio 2 : 1.

(iii) The mode of a set of data is the observation that occurs most often.

Which of them are **true**?

(A) (i) and (ii) only

(B) (i) and (iii) only

(C) (ii) and (iii) only

(D) All three

Answer Key

1	C	2	A	3	B	4	D	5	B
6	A	7	D	8	B	9	A	10	B
11	D	12	A	13	D	14	A	15	C
16	D	17	C	18	A	19	C	20	D
21	A	22	C	23	D	24	A	25	B
26	C	27	B	28	D	29	A	30	B
31	B	32	C	33	C	34	D	35	C
36	A	37	B	38	C	39	D	40	A
41	B	42	C	43	D	44	A	45	B
46	C	47	D	48	A	49	B	50	B

Solutions

1. Answer: (C) 37

Each term is one more than a perfect square: 1^2+1 , 2^2+1 , 3^2+1 , 4^2+1 , 5^2+1 . The next is $6^2+1 = \mathbf{37}$. (The differences 3, 5, 7, 9, 11 give the same answer.)

2. Answer: (A) MNP

Each group takes two consecutive letters and then skips one: A, B, (C), D. The groups start four letters apart: A, E, I, **M**. So the next group is **MNP**.

3. Answer: (B) 3

'Books' appears in the first and third statements, whose only shared digit is **3**. (The digit 5, shared by the first two statements, must stand for 'old'.)

4. Answer: (D) 100

$8 = 2^3$, $27 = 3^3$ and $64 = 4^3$ are perfect cubes. **100** is a perfect square but not a cube, so it is the odd one out.

5. Answer: (B) 6

A square has 4 sides, so the analogy asks for the number of sides of a hexagon, which is **6**.

6. Answer: (A) North-west

The two turns give a net rotation of $135^\circ - 180^\circ = 45^\circ$ anticlockwise from north. Turning 45° anticlockwise from north faces her **north-west**.

7. Answer: (D) Cousin

Your mother's brother is your maternal uncle, and his son is therefore your **cousin**, not your brother.

8. Answer: (B) 42

Total = $9 + 34 - 1 = \mathbf{42}$, subtracting 1 so that Sunil is not counted twice.

9. Answer: (A) Thursday

January has 31 days, so 1 February is 31 days later. Since $31 = 4 \times 7 + 3$, the day advances by 3 from Monday, giving **Thursday**.

10. Answer: (B) 25

The marked block sits above 9 and 16, so it holds $9 + 16 = \mathbf{25}$. Checking the rest: $16 + 19 = 35$, and $25 + 35 = 60$ as the top block shows.

11. Answer: (D) 0, 1, 2, 3, 4

By the division algorithm $a = 5q + r$ with $0 \leq r < 5$, so the remainder is one of **0, 1, 2, 3, 4**. A remainder of 5 would mean the quotient was too small.

12. Answer: (A) $\frac{3}{4}$

The product of the zeroes is $\frac{c}{a} = \frac{\mathbf{3}}{\mathbf{4}}$. (The zeroes are $\frac{1}{2}$ and $\frac{3}{2}$, whose product is $\frac{3}{4}$.)

13. Answer: (D) 4

The sum of the zeroes is $\frac{-b}{a} = \mathbf{4}$. Indeed the zeroes are 1 and 3.

14. Answer: (A) Two distinct real roots

The discriminant is $(-6)^2 - 4(3)(2) = 36 - 24 = 12$, which is positive, so the equation has **two distinct real roots**.

15. Answer: (C) $x = 7$, $y = 3$

Adding the equations gives $2x = 14$, so $x = 7$, and then $y = 10 - 7 = 3$. Hence **$x = 7$ and $y = 3$** .

16. Answer: (D) 16th

With $a = 3$ and $d = 5$, set $3 + (n - 1)5 = 78$, so $5(n - 1) = 75$ and $n - 1 = 15$. Therefore 78 is the **16th** term.

17. Answer: (C) 610

Here $a = 2$, $d = 3$ and $n = 20$, so $S = \frac{20}{2} [4 + 19(3)] = 10 \times 61 = \mathbf{610}$.

18. Answer: (A) 10 units

Distance $= \sqrt{(-6)^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = \mathbf{10 \text{ units}}$. The signs disappear on squaring.

19. Answer: (C) (1, 3)

By the section formula, the point is $(\frac{2(4) + 3(-1)}{5}, \frac{2(-3) + 3(7)}{5}) = (\frac{5}{5}, \frac{15}{5}) = \mathbf{(1, 3)}$.

20. Answer: (D) 36 cm²

The area ratio is the square of the side ratio: $\frac{\text{area DEF}}{16} = (\frac{6}{4})^2 = \frac{9}{4}$. So the area of $\triangle DEF$ is $16 \times \frac{9}{4} = \mathbf{36 \text{ cm}^2}$.

21. Answer: (A) 90°

The radius drawn to the point of contact is always perpendicular to the tangent, so the angle is **90°**.

22. Answer: (C) 1

By the identity $\sin^2\theta + \cos^2\theta = 1$ the value is **1** for any angle, and substituting $\frac{1}{4} + \frac{3}{4}$ confirms it.

23. Answer: (D) 60°

From the standard values, $\cos 60^\circ = \frac{1}{2}$, so $\theta = \mathbf{60^\circ}$. ($\cos 30^\circ$ would be $\frac{\sqrt{3}}{2}$.)

24. Answer: (A) 1

$\cot 45^\circ = \frac{1}{\tan 45^\circ} = \frac{1}{1} = \mathbf{1}$.

25. Answer: (B) 36 cm

The curved part is $\pi r = \frac{22}{7} \times 7 = 22$ cm, and the straight edge is the diameter 14 cm. So the perimeter is $22 + 14 = \mathbf{36 \text{ cm}}$.

26. Answer: (C) 308 cm²

The curved surface of a hemisphere is $2\pi r^2 = 2 \times \frac{22}{7} \times 49 = \mathbf{308 \text{ cm}^2}$. Including the flat circular face would add another 154 cm².

27. Answer: (B) 9

The data is already in order, and with five values the median is the third, which is **9**.

28. Answer: (D) 0.7

The two probabilities always add to 1, so $P(\text{not E}) = 1 - 0.3 = \mathbf{0.7}$.

29. Answer: (A) 5 minutes

They coincide after LCM(15, 20, 25) seconds. Since $15 = 3 \times 5$, $20 = 2^2 \times 5$ and $25 = 5^2$, the LCM is $2^2 \times 3 \times 5^2 = 300$ seconds, that is **5 minutes**.

30. Answer: (B) 13

Let the numbers be x and $x + 2$. Then $x^2 + (x + 2)^2 = 394$, so $2x^2 + 4x - 390 = 0$ and $x^2 + 2x - 195 = 0$, which factorises as $(x - 13)(x + 15) = 0$. Taking the positive value, $x = \mathbf{13}$, and $13^2 + 15^2 = 169 + 225 = 394$.

31. Answer: (B) 25 m

Since $\tan 45^\circ = 1$, the height equals the horizontal distance: $h = 25 \times 1 = \mathbf{25 \text{ m}}$.

32. Answer: (C) 10

The counts form an AP with $a = 23$ and $d = -2$. Setting $23 + (n - 1)(-2) = 5$ gives $2(n - 1) = 18$, so $n - 1 = 9$ and there are **10** rows.

33. Answer: (C) (0, -1)

A point on the y-axis is (0, y). Equating the squared distances: $4 + (y - 3)^2 = 16 + (y - 1)^2$, which simplifies to $13 - 6y = 17 - 2y$, so $-4 = 4y$ and $y = -1$. The point is **(0, -1)**.

34. Answer: (D) 462 m²

The path is the difference of the two circular areas: $\pi(14^2 - 7^2) = \frac{22}{7} \times (196 - 49) = \frac{22}{7} \times 147 = \mathbf{462 \text{ m}^2}$.

35. Answer: (C) 400

The cuboid's volume is $5.5 \times 10 \times 3.5 = 192.5 \text{ cm}^3$. Each coin is a cylinder of radius 0.875 cm and height 0.2 cm, of volume $\frac{22}{7} \times 0.765625 \times 0.2 = 0.48125 \text{ cm}^3$. Dividing, $192.5 \div 0.48125 = \mathbf{400}$ coins.

36. Answer: (A) 4.8 hours

The total is $2(6) + 4(9) + 6(10) + 8(5) = 12 + 36 + 60 + 40 = 148$ hours over 30 students, so the mean is $\frac{148}{30} = \mathbf{4.8}$ hours to one decimal place.

37. Answer: (B) $\frac{5}{36}$

The 36 equally likely outcomes include five that total 8: (2,6), (3,5), (4,4), (5,3) and (6,2). So the probability is $\frac{5}{36}$.

38. Answer: (C) $60\sqrt{3} \text{ m}$

The angle of depression equals the angle of elevation from the boat, so $\tan 30^\circ = \frac{60}{d}$. Hence $d = 60 \div \frac{1}{\sqrt{3}} = \mathbf{60\sqrt{3} \text{ m} \approx 103.9 \text{ m}}$.

39. Answer: (D) ₹6160

The curved surface is $2\pi r^2 = 2 \times \frac{22}{7} \times 196 = 1232 \text{ m}^2$. At ₹5 per square metre the cost is $1232 \times 5 = \mathbf{₹6160}$.

40. Answer: (A) $\frac{1}{7}$

There are 7 equally likely days and just one of them is Sunday, so the probability is $\frac{1}{7}$.

41. Answer: (B) 42 cm²

The circle touches all four sides, so its diameter is 14 cm and its radius 7 cm. Shaded area = square - circle = $14^2 - \frac{22}{7} \times 49 = 196 - 154 = \mathbf{42 \text{ cm}^2}$.

42. Answer: (C) ₹87

The fares form an AP with $a = 15$ and $d = 8$, so the 10 km fare is $15 + 9(8) = 15 + 72 = \mathbf{₹87}$.

43. Answer: (D) 40 m

The two height-shadow triangles are similar, so $\frac{h}{24} = \frac{5}{3}$ and $h = \mathbf{40 \text{ m}}$.

44. Answer: (A) 14.55

The original total is $12 \times 15 = 180$. Removing 20 leaves 160 spread over 11 observations, so the new mean is $\frac{160}{11} = \mathbf{14.55}$ to two decimal places.

45. Answer: (B) 7700 cm³

In one second the water forms a cylinder of radius 3.5 cm and length 200 cm. Its volume is $\frac{22}{7} \times 3.5 \times 3.5 \times 200 = 38.5 \times 200 = \mathbf{7700 \text{ cm}^3}$, that is 7.7 litres.

46. Answer: (C) $\frac{1}{9}$

Of the 36 equally likely outcomes, four give a total of 9: (3,6), (4,5), (5,4) and (6,3). So the probability is $\frac{4}{36} = \frac{1}{9}$.

47. Answer: (D) $\cos A$

Write $\sec A + \tan A = \frac{1 + \sin A}{\cos A}$. Multiplying by $(1 - \sin A)$ gives $\frac{(1 + \sin A)(1 - \sin A)}{\cos A} = \frac{1 - \sin^2 A}{\cos A} = \frac{\cos^2 A}{\cos A} = \cos A$.

Checking at $A = 60^\circ$: $(2 + \sqrt{3})(1 - \frac{\sqrt{3}}{2}) = \frac{1}{2} = \cos 60^\circ$.

48. Answer: (A) 4.8 cm

The hypotenuse is $AC = \sqrt{36 + 64} = 10$ cm. The triangle's area can be found two ways: $\frac{1}{2} \times 6 \times 8 = \frac{1}{2} \times 10 \times BD$. So

$48 = 10 \times BD$ and $BD = \mathbf{4.8 \text{ cm}}$.

49. Answer: (B) 8.17 litres

The volume of a frustum is $\frac{1}{3} \pi h(R^2 + r^2 + Rr) = \frac{1}{3} \times \frac{22}{7} \times 24 \times (225 + 25 + 75) = \frac{1}{3} \times \frac{22}{7} \times 24 \times 325 = 8171.4 \text{ cm}^3$.

Dividing by 1000 gives about **8.17 litres**.

50. Answer: (B) (i) and (iii) only

Statement (i) is true: with rational coefficients and a perfect-square discriminant the square root in the formula is rational. Statement (ii) is false — the mid-point divides a segment in the ratio 1 : 1. Statement (iii) is true by definition of the mode. So **(i) and (iii)** hold.