

Full Practice Exam — Set 3

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

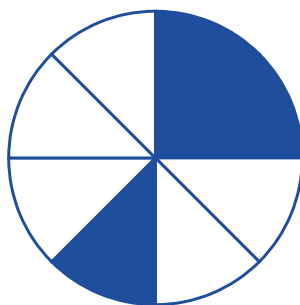
- There are **50 questions** in this paper. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–45 carry **1 mark** each. Questions 46–50 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use 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? 1, 8, 27, 64, ____
 (A) 81 (B) 100
 (C) 125 (D) 216
- What comes next in the series? CAT, DBU, ECV, ____
 (A) FDX (B) FCW
 (C) EDW (D) FDW
- If $A = 2$, $B = 4$, $C = 6$ and so on, then the value of the word CAB is _____.
 (A) 10 (B) 12
 (C) 14 (D) 18
- Find the **odd one out**: triangle, rectangle, circle, pentagon
 (A) Circle (B) Rectangle
 (C) Triangle (D) Pentagon
- Complete the analogy: $144 : 12 :: 225 : \underline{\hspace{1cm}}$
 (A) 13 (B) 14
 (C) 15 (D) 25
- One evening a man walks straight towards his own shadow. In which direction is he walking?
 (A) South (B) West
 (C) North (D) East
- Pointing to a photograph, a man said, "I have no brother or sister, but that man's father is my father's son." Whose photograph is it?
 (A) His son's (B) His own
 (C) His father's (D) His nephew's

8. In a queue, Ravi is 10th from the front and Sunita is 7th from the back. If exactly 5 people stand between them, how many people are in the queue?
- (A) 20 (B) 21
(C) 22 (D) 23
9. If $5 \# 3 = 34$ and $7 \# 2 = 53$, then $6 \# 4 = \underline{\hspace{2cm}}$
- (A) 42 (B) 48
(C) 52 (D) 56
10. The circle below is divided into eight equal sectors, of which some are shaded. What fraction of the circle is shaded?



A circle divided into eight equal sectors, with three shaded

- (A) $\frac{1}{4}$ (B) $\frac{5}{8}$
(C) $\frac{1}{2}$ (D) $\frac{3}{8}$

Section 2 — Mathematical Reasoning

Q11–Q28 · 1 mark each

11. Which of the following is an **irrational** number?
- (A) $\sqrt{11}$ (B) $\sqrt{9}$
(C) $\sqrt{4}$ (D) $\sqrt{16}$
12. The zeroes of the polynomial $x^2 - 3$ are _____.
(A) 3 and -3 (B) 9 and -9
(C) $\sqrt{3}$ only (D) $\sqrt{3}$ and $-\sqrt{3}$
13. If one zero of $x^2 + kx - 8$ is 2, then $k = \underline{\hspace{2cm}}$.
(A) 2 (B) -2
(C) 4 (D) -4
14. The roots of $2x^2 + x - 6 = 0$ are _____.
(A) $\frac{1}{2}$ and -6 (B) $-\frac{3}{2}$ and 2
(C) 3 and -2 (D) $\frac{3}{2}$ and -2
15. The pair of equations $2x + 3y = 7$ and $4x + 6y = 14$ has _____.
(A) Infinitely many solutions (B) No solution
(C) A unique solution (D) Exactly two solutions

16. The common difference of the AP 100, 90, 80, ... is _____.
(A) 10 (B) -100
(C) -10 (D) 90
17. The 20th term of the AP 5, 8, 11, ... is _____.
(A) 59 (B) 62
(C) 65 (D) 68
18. The distance between the points (0, 5) and (-5, 0) is _____.
(A) 5 units (B) 25 units
(C) 10 units (D) $5\sqrt{2}$ units
19. The points (1, 1), (2, 2) and (3, 3) are _____.
(A) Collinear (B) The vertices of a right triangle
(C) The vertices of an equilateral triangle (D) All on the x-axis
20. If two triangles are similar, the ratio of their perimeters equals the ratio of _____.
(A) Their areas (B) The squares of their corresponding sides
(C) Their corresponding sides (D) Their heights squared
21. Two circles of radii 5 cm and 3 cm touch each other externally. The distance between their centres is _____.
(A) 2 cm (B) 4 cm
(C) 15 cm (D) 8 cm
22. The value of $\sin 45^\circ \times \cos 45^\circ$ is _____.
(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$
(C) 1 (D) $\frac{\sqrt{3}}{2}$
23. If $\sec \theta = 2$ and θ is acute, then $\theta =$ _____.
(A) 30° (B) 60°
(C) 45° (D) 90°
24. The value of $\tan 30^\circ \times \tan 60^\circ$ is _____.
(A) $\frac{1}{3}$ (B) $\sqrt{3}$
(C) 1 (D) 3
25. The area of a quadrant of a circle of radius 14 cm is _____.
(A) 77 cm^2 (B) 616 cm^2
(C) 308 cm^2 (D) 154 cm^2
26. The volume of a cuboid measuring $8 \text{ cm} \times 6 \text{ cm} \times 5 \text{ cm}$ is _____.
(A) 240 cm^3 (B) 192 cm^3
(C) 120 cm^3 (D) 480 cm^3
27. The mean of 2, 4, 6, 8, 10 and 12 is _____.
(A) 6 (B) 7
(C) 8 (D) 42

28. A bag contains 4 red and 6 green balls. The probability of drawing a green ball is _____.

(A) $\frac{2}{5}$

(B) $\frac{3}{5}$

(C) $\frac{1}{2}$

(D) $\frac{2}{3}$

Section 3 — Everyday Mathematics

Q29–Q45 · 1 mark each

29. An army contingent of 616 members is to march behind a band of 32 members, with both groups in the same number of columns. The maximum number of columns is _____.

(A) 4

(B) 8

(C) 14

(D) 16

30. A rectangular park has a perimeter of 80 m and an area of 400 m². Its length is _____.

(A) 10 m

(B) 25 m

(C) 20 m

(D) 40 m

31. A kite is flying at the end of a taut string 100 m long, which makes an angle of 60° with the horizontal ground. The height of the kite above the ground is _____.

(A) 50 m

(B) $\frac{100}{\sqrt{3}}$ m

(C) 100√3 m

(D) 50√3 m

32. A factory's yearly production of television sets increases by the same number each year. In the 3rd year it made 600 sets and in the 7th year 700 sets. Its production in the 10th year is _____.

(A) 725

(B) 750

(C) 775

(D) 800

33. The wiper blade of a car sweeps through an angle of 120° and its blade is 21 cm long. The area it cleans in one sweep is _____.

(A) 462 cm²

(B) 231 cm²

(C) 693 cm²

(D) 1386 cm²

34. The table shows the weights of 40 students. The median class is _____.

Weight (kg)	30–35	35–40	40–45	45–50	50–55
Number of students	4	9	13	10	4

Table 3.1 — Weights of 40 students

(A) 35–40

(B) 40–45

(C) 45–50

(D) 50–55

35. One card is drawn from a well-shuffled pack of 52 cards. The probability that it is **not** a face card is _____.

(A) $\frac{3}{13}$

(B) $\frac{1}{13}$

(C) $\frac{10}{13}$

(D) $\frac{4}{13}$

36. A conical tent has base radius 7 m and slant height 15 m. The area of canvas needed for it is _____.

(A) 154 m²

(B) 660 m²

(C) 462 m²

(D) 330 m²

37. A tree casts a shadow 15 m long at the same time a 2 m pole casts a shadow 3 m long. The height of the tree is _____.
 (A) 10 m (B) 5 m
 (C) 22.5 m (D) 30 m
38. The mode of the data 4, 6, 6, 7, 9, 6, 11, 4 is _____.
 (A) 4 (B) 6
 (C) 7 (D) 9
39. A well of diameter 14 m is dug 10 m deep. The volume of earth removed is _____.
 (A) 770 m^3 (B) 1540 m^3
 (C) 3080 m^3 (D) 440 m^3
40. A shopkeeper sells an article for ₹1200, which is 20% above its cost price. The cost price is _____.
 (A) ₹960 (B) ₹1080
 (C) ₹1000 (D) ₹1440
41. The angle of depression of a car from the top of a 50 m tower is 45° . The car's distance from the foot of the tower is _____.
 (A) 25 m (B) 100 m
 (C) $50\sqrt{3}$ m (D) 50 m
42. In a survey of 500 families, 300 own a two-wheeler. The probability that a family chosen at random does **not** own one is _____.
 (A) $\frac{2}{5}$ (B) $\frac{3}{5}$
 (C) $\frac{1}{5}$ (D) $\frac{1}{2}$
43. A cylindrical glass of radius 3.5 cm is filled with juice to a height of 10 cm. The volume of juice is _____.
 (A) 192.5 cm^3 (B) 385 cm^3
 (C) 770 cm^3 (D) 110 cm^3
44. The sum of the first 12 terms of the AP 4, 7, 10, ... is _____.
 (A) 246 (B) 250
 (C) 254 (D) 258
45. A ladder reaches a window 8 m above the ground when its foot stands 6 m from the wall. The length of the ladder is _____.
 (A) 9 m (B) 12 m
 (C) 10 m (D) 14 m

Achievers Section

Q46–Q50 · 3 marks each

46. If $x = 3$ is a root of $x^2 - 8x + k = 0$, then the value of k and the other root are _____.
 (A) $k = 24$, other root 8 (B) $k = -15$, other root 5
 (C) $k = 15$, other root -5 (D) $k = 15$, other root 5
47. If $\tan \theta + \cot \theta = 2$ and θ is acute, then the value of $\tan^2 \theta + \cot^2 \theta$ is _____.
 (A) 1 (B) 2
 (C) 3 (D) 4

48. Two concentric circles have radii 13 cm and 5 cm. The length of the chord of the larger circle that touches the smaller one is _____.
(A) 24 cm (B) 18 cm
(C) 12 cm (D) 26 cm
49. A well of diameter 7 m is dug 22.5 m deep, and the earth taken out is spread evenly to form a ring-shaped embankment of width 10.5 m around it. The height of the embankment is _____.
(A) 2 m (B) 1.5 m
(C) 2.5 m (D) 3 m
50. Consider the three statements below.
(i) Two similar triangles are always congruent.
(ii) The value of $\sin \theta$ increases as θ grows from 0° to 90° .
(iii) The HCF of two different prime numbers is always 1.
Which of them are **true**?
(A) (i) and (ii) only (B) (ii) and (iii) only
(C) (i) and (iii) only (D) All three

Answer Key

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

Solutions

1. Answer: (C) 125

The terms are the cubes $1^3, 2^3, 3^3, 4^3$, so the next is $5^3 = 125$.

2. Answer: (D) FDW

Every letter of each group moves forward one step: $C \rightarrow D \rightarrow E \rightarrow \mathbf{F}$, $A \rightarrow B \rightarrow C \rightarrow \mathbf{D}$ and $T \rightarrow U \rightarrow V \rightarrow \mathbf{W}$. So the next group is **FDW**.

3. Answer: (B) 12

Each letter is twice its position, so $C = 6$, $A = 2$ and $B = 4$. Adding, $6 + 2 + 4 = 12$.

4. Answer: (A) Circle

The triangle, rectangle and pentagon are polygons bounded by straight sides. A **circle** has no sides or vertices, so it is the odd one out.

5. Answer: (C) 15

12 is the square root of 144, so the rule is $n \rightarrow \sqrt{n}$. Since $15^2 = 225$, the answer is **15**.

6. Answer: (D) East

In the evening the sun is in the west, so shadows fall towards the east. Walking towards his shadow means walking **east**.

7. Answer: (A) His son's

Having no brothers, "my father's son" must be the speaker himself. So the man in the photograph has the speaker as his father, which makes the photograph **his son's**.

8. Answer: (C) 22

Counting from the front: 10 people up to and including Ravi, then the 5 between, then Sunita and the 6 behind her, that is 7 more. The total is $10 + 5 + 7 = 22$.

9. Answer: (C) 52

The operation adds the squares: $5^2 + 3^2 = 34$ and $7^2 + 2^2 = 53$. So $6 \# 4 = 36 + 16 = 52$.

10. Answer: (D) $\frac{3}{8}$

Three of the eight equal sectors are shaded, so the shaded fraction is $\frac{3}{8}$, that is 0.375 of the circle.

11. Answer: (A) $\sqrt{11}$

$\sqrt{4} = 2$, $\sqrt{9} = 3$ and $\sqrt{16} = 4$ are whole numbers. Since 11 is not a perfect square, **$\sqrt{11}$** cannot be written as a ratio of integers and is irrational.

12. Answer: (D) $\sqrt{3}$ and $-\sqrt{3}$

Setting $x^2 - 3 = 0$ gives $x^2 = 3$, so $x = \mathbf{\sqrt{3} \text{ or } -\sqrt{3}}$. Both are irrational, which a polynomial with integer coefficients certainly allows.

13. Answer: (A) 2

Substituting $x = 2$ gives $4 + 2k - 8 = 0$, so $2k = 4$ and $k = \mathbf{2}$. The polynomial $x^2 + 2x - 8$ factorises as $(x - 2)(x + 4)$.

14. Answer: (D) $\frac{3}{2}$ and -2

Splitting the middle term: $2x^2 + 4x - 3x - 6 = 2x(x + 2) - 3(x + 2) = (2x - 3)(x + 2)$. The roots are therefore $\frac{3}{2}$ and $\mathbf{-2}$.

15. Answer: (A) Infinitely many solutions

All three ratios agree: $\frac{2}{4} = \frac{3}{6} = \frac{7}{14} = \frac{1}{2}$. The second equation is just twice the first, so the lines coincide and there are **infinitely many solutions**.

16. Answer: (C) -10

Subtracting consecutive terms: $90 - 100 = -10$. A negative common difference means the terms are decreasing.

17. Answer: (B) 62

With $a = 5$ and $d = 3$, $a_{20} = 5 + 19(3) = 5 + 57 = 62$.

18. Answer: (D) $5\sqrt{2}$ units

Distance $= \sqrt{((-5 - 0)^2 + (0 - 5)^2)} = \sqrt{(25 + 25)} = \sqrt{50} = 5\sqrt{2}$ units ≈ 7.07 .

19. Answer: (A) Collinear

Every one of these points satisfies $y = x$, so they all lie on that single straight line and are **collinear**. No triangle can be formed from them.

20. Answer: (C) Their corresponding sides

A perimeter is a sum of lengths, and every length scales by the same factor, so the perimeter ratio equals the ratio of **corresponding sides**. Areas scale by the square of that ratio.

21. Answer: (D) 8 cm

When circles touch externally, the point of contact lies on the line of centres, so the distance is the sum of the radii: $5 + 3 = 8$ cm. Touching internally would give the difference, 2 cm.

22. Answer: (A) $\frac{1}{2}$

Both ratios equal $\frac{1}{\sqrt{2}}$, so the product is $\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{1}{2}$.

23. Answer: (B) 60°

$\sec \theta = 2$ means $\cos \theta = \frac{1}{2}$, which for an acute angle gives $\theta = 60^\circ$.

24. Answer: (C) 1

$\tan 30^\circ = \frac{1}{\sqrt{3}}$ and $\tan 60^\circ = \sqrt{3}$, so the product is **1**. This reflects the fact that the two angles are complementary.

25. Answer: (D) 154 cm^2

A quadrant is a 90° sector, that is a quarter of the circle: $\frac{1}{4} \times \frac{22}{7} \times 196 = 154 \text{ cm}^2$.

26. Answer: (A) 240 cm^3

Volume = length $\times$ breadth $\times$ height $= 8 \times 6 \times 5 = 240 \text{ cm}^3$.

27. Answer: (B) 7

The six values add to 42, so the mean is $42 \div 6 = 7$. For evenly spaced data the mean is midway between the extremes, and $(2 + 12) \div 2 = 7$ agrees.

28. Answer: (B) $\frac{3}{5}$

There are 10 balls in all and 6 of them are green, so the probability is $\frac{6}{10} = \frac{3}{5}$.

29. Answer: (B) 8

The number of columns must divide both 616 and 32, and be as large as possible, so it is $\text{HCF}(616, 32)$. Since $616 = 2^3 \times 7 \times 11$ and $32 = 2^5$, the HCF is $2^3 = 8$.

30. Answer: (C) 20 m

If the sides are l and b then $l + b = 40$ and $lb = 400$, so l and b are the roots of $x^2 - 40x + 400 = 0$, that is $(x - 20)^2 = 0$. Both sides are **20 m**, so the park is actually a square.

31. Answer: (D) $50\sqrt{3}$ m

The height is the side opposite the 60° angle: $h = 100 \sin 60^\circ = 100 \times \frac{\sqrt{3}}{2} = 50\sqrt{3} \text{ m} \approx 86.6 \text{ m}$.

32. Answer: (C) 775

The productions form an AP. From $a_7 - a_3 = 4d = 100$ we get $d = 25$, and then $a_3 = a + 2(25) = 600$ gives $a = 550$. So $a_{10} = 550 + 9(25) = \mathbf{775}$ sets.

33. Answer: (A) 462 cm^2

The swept region is a sector of angle 120° , that is $\frac{1}{3}$ of a circle of radius 21 cm: $\frac{1}{3} \times \frac{22}{7} \times 441 = \frac{1}{3} \times 1386 = \mathbf{462 \text{ cm}^2}$.

34. Answer: (B) 40–45

The median class is the one containing the $\frac{n}{2} = 20\text{th}$ observation. The cumulative frequencies are 4, 13, 26, 36 and 40, so the 20th observation falls in the class **40–45**.

35. Answer: (C) $\frac{10}{13}$

A pack has 12 face cards (jack, queen and king of each suit), so $P(\text{face card}) = \frac{12}{52} = \frac{3}{13}$. Hence $P(\text{not a face card}) = 1 -$

$$\frac{3}{13} = \frac{10}{13}.$$

36. Answer: (D) 330 m^2

A tent needs only the curved surface: $\pi rl = \frac{22}{7} \times 7 \times 15 = 22 \times 15 = \mathbf{330 \text{ m}^2}$.

37. Answer: (A) 10 m

The two triangles are similar, so $\frac{h}{15} = \frac{2}{3}$, giving $h = \mathbf{10 \text{ m}}$.

38. Answer: (B) 6

The value **6** occurs three times, more often than any other, so it is the mode.

39. Answer: (B) 1540 m^3

The well is a cylinder of radius 7 m and depth 10 m, so the earth removed is $\pi r^2 h = \frac{22}{7} \times 49 \times 10 = \mathbf{1540 \text{ m}^3}$.

40. Answer: (C) ₹1000

If the cost price is x , then $1.2x = 1200$, so $x = \mathbf{₹1000}$. Subtracting 20% of ₹1200 would wrongly give ₹960.

41. Answer: (D) 50 m

The angle of depression equals the angle of elevation from the car, and $\tan 45^\circ = 1$, so the distance equals the height: **50 m**.

42. Answer: (A) $\frac{2}{5}$

Families without a two-wheeler number $500 - 300 = 200$, so the probability is $\frac{200}{500} = \frac{2}{5}$.

43. Answer: (B) 385 cm^3

Volume = $\pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 10 = 11 \times 3.5 \times 10 = \mathbf{385 \text{ cm}^3}$.

44. Answer: (A) 246

With $a = 4$, $d = 3$ and $n = 12$, $S = \frac{12}{2} [8 + 11(3)] = 6 \times 41 = \mathbf{246}$.

45. Answer: (C) 10 m

The wall, the ground and the ladder form a right triangle, so the ladder is $\sqrt{(8^2 + 6^2)} = \sqrt{100} = \mathbf{10 \text{ m}}$ long.

46. Answer: (D) $k = 15$, other root 5

Substituting $x = 3$: $9 - 24 + k = 0$, so $k = 15$. The sum of the roots is 8, so the other root is $8 - 3 = 5$. Hence **$k = 15$ and the other root is 5**, and their product 15 matches k .

47. Answer: (B) 2

Squaring the given relation: $\tan^2\theta + 2(\tan\theta)(\cot\theta) + \cot^2\theta = 4$. Since $\tan\theta \times \cot\theta = 1$, this is $\tan^2\theta + \cot^2\theta + 2 = 4$, so the value is **2**. (The condition forces $\theta = 45^\circ$.)

48. Answer: (A) 24 cm

The chord touches the inner circle, so the perpendicular distance from the common centre to it is 5 cm, and that perpendicular bisects the chord. Half the chord is $\sqrt{169 - 25} = 12$ cm, so the whole chord is **24 cm**.

49. Answer: (B) 1.5 m

Earth dug out = $\frac{22}{7} \times 3.5^2 \times 22.5 = 866.25 \text{ m}^3$. The embankment is a ring of inner radius 3.5 m and outer radius $3.5 + 10.5 = 14$ m, so its base area is $\frac{22}{7} \times (196 - 12.25) = 577.5 \text{ m}^2$. The height is $866.25 \div 577.5 = \mathbf{1.5 \text{ m}}$.

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

Statement (i) is false: similar triangles share a shape but may differ in size, so congruence is only the special case of equal size. Statement (ii) is true, since $\sin\theta$ rises steadily from 0 to 1 across that range. Statement (iii) is true, because two *distinct* primes share no factor beyond 1. So **(ii) and (iii)** hold.