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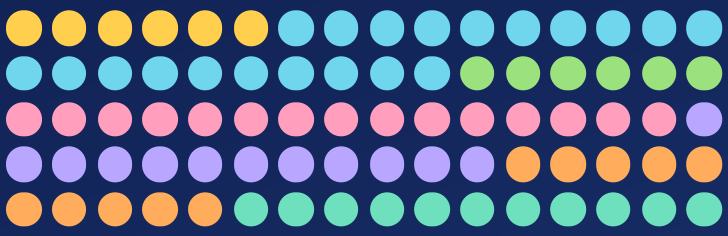
Class 10 Mathematics Crash Course

Blueprint 2027

Cheat sheet: kis chapter se kitne marks, kaun se sawaal pakke karne hain (poore question ke saath), saare formulas

Maths board paper: Wednesday, 17 February 2027 · 10:30 AM – 1:30 PM · Standard (041) aur Basic (241) dono same din



Unit	Chapters (NCERT)	Marks
Number Systems	Ch 1 Real Numbers	6
Algebra	Ch 2 Polynomials · Ch 3 Linear Equations · Ch 4 Quadratic · Ch 5 AP	20
Coordinate Geometry	Ch 7	6
Geometry	Ch 6 Triangles · Ch 10 Circles	15
Trigonometry	Ch 8 Intro · Ch 9 Applications	12
Mensuration	Ch 11 Areas related to Circles · Ch 12 Surface Areas & Volumes	10
Statistics & Probability	Ch 13 · Ch 14	11
Total (theory)	**+ Internal 20 = pen-paper test & multiple assessment 10 · portfolio 5 · lab practical 5**	**80**

Paper pattern (CBSE sample paper 2026-27)

Section	Questions	Marks
A	18 MCQ + 2 Assertion-Reason × 1	20
B	5 × 2 (VSA)	10
C	6 × 3 (SA)	18
D	4 × 5 (LA)	20
E	3 case studies × 4	12

38 questions · 3 hours · calculator nahi. Internal choice: 2 questions each in B, C, D aur case studies ke 2-mark parts.

Basic vs Standard

Syllabus aur blueprint same. Sirf sawaalon ka mix alag:

	Standard	Basic
Yaad + samajh	43 (54%)	60 (75%)
Apply	19 (24%)	12 (15%)
Analyse · evaluate · create	18 (22%)	8 (10%)

Sources: CBSE date sheet 06.11.2026 · CBSE syllabus 041/241 (2026-27) · CBSE sample papers 2026-27 · NCERT Class 10 (2026-27) · CBSE PYQs

Real Numbers Ch 1

6 marks

★ Ye sawaal pakke karo

1★	Prove that $\sqrt{5}$ is irrational. (3 marks)	Ex 1.2 Q1
2★	Prove that $\sqrt{2}$ is irrational. (3 marks)	Theorem 1.3
3★	Prove that $\sqrt{3}$ is irrational.	Example 5
4★	Prove that $3 + 2\sqrt{5}$ is irrational.	Ex 1.2 Q2
5.	Prove that the following are irrationals: (i) $\frac{1}{\sqrt{2}}$ (ii) $7\sqrt{5}$ (iii) $6 + \sqrt{2}$	Ex 1.2 Q3
6.	Prove that $\sqrt{2} + \sqrt{3}$ is irrational.	PYQ type
7.	Find the LCM and HCF of the following pairs of integers and verify that LCM × HCF = product of the two numbers. (i) 26 and 91 (ii) 510 and 92 (iii) 336 and 54	Ex 1.1 Q2
8.	Find the LCM and HCF of the following integers by applying the prime factorisation method. (i) 12, 15 and 21 (ii) 17, 23 and 29 (iii) 8, 9 and 25	Ex 1.1 Q3
9.	Given that HCF (306, 657) = 9, find LCM (306, 657).	Ex 1.1 Q4
10★	Check whether 6^n can end with the digit 0 for any natural number n. (2 marks)	Ex 1.1 Q5
11.	Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.	Ex 1.1 Q6

Word problems (PYQ)

12★	In a teachers' workshop, the number of teachers teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same number of teachers are seated and all of them are of the same subject.	PYQ · HCF
13.	Three alarm clocks ring their alarms at regular intervals of 20 min, 25 min and 30 min respectively. If they first beep together at 12 noon, at what time will they beep again for the first time? (A) 4:00 pm (B) 4:30 pm (C) 5:00 pm (D) 5:30 pm	PYQ MCQ · LCM
14.	Three bells ring at intervals of 4, 7 and 14 minutes. All three rang at 6 AM. When will they ring together again?	CBSE SQP · LCM

"Bada" sawaal (phir kab saath mein) → LCM · "chhota / maximum size / minimum rooms" → HCF.

Formulas

HCF × LCM = a × b

Sirf do numbers ke liye. Co-prime (HCF = 1) ho to LCM = a × b.

- HCF = common primes ki chhoti power
- LCM = saare primes ki badi power
- Fundamental Theorem of Arithmetic: har composite = primes ka unique product ($140 = 2^2 \times 5 \times 7$)
- p prime aur $p \mid a^2 \Rightarrow p \mid a$ (Theorem 1.2)
- Rational + irrational = irrational; rational ($\neq 0$) × irrational = irrational
- 0 pe khatam ⇔ factors mein 2 aur 5 dono. $6^n = 2^n \times 3^n$ → 5 nahi → kabhi 0 nahi

√2 proof ki seedhi

- Maan lo $\sqrt{2} = \frac{a}{b}$ (a, b co-prime)
- Square: $2b^2 = a^2 \Rightarrow 2 \mid a \Rightarrow a = 2c$
- $2b^2 = 4c^2 \Rightarrow b^2 = 2c^2 \Rightarrow 2 \mid b$
- a, b dono ka factor 2 → contradiction → $\sqrt{2}$ irrational

✗ Syllabus mein nahi (2026-27)

✗ Euclid's division lemma

✗ Ex 1.1 Q7 (Sonia–Ravi) NCERT mein "not from the examination point of view" marked hai

Algebra (1/2): Polynomials + Linear Equations

Ch 2 · Ch 3

20 marks

★ Polynomials

1★ Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients. — Ex 2.2 Q1

(i) $x^2 - 2x - 8$ (ii) $4s^2 - 4s + 1$ (iii) $6x^2 - 3 - 7x$ (iv) $4u^2 + 8u$ (v) $t^2 - 15$ (vi) $3x^2 - x - 4$

2★ Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively. — Ex 2.2 Q2

(i) $\frac{1}{4}, -1$ (ii) $\sqrt{2}, \frac{1}{3}$ (iii) $0, \sqrt{5}$ (iv) $1, 1$ (v) $-\frac{1}{4}, \frac{1}{4}$ (vi) $4, 1$

3★ If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is -3, then find the value of k. — Exemplar · PYQ

4★ If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is the reciprocal of the other, find the value of a. — PYQ

5★ If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 5x + 4$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$. — PYQ

6. The graphs of $y = p(x)$ are given in Fig. 2.10 (NCERT), for some polynomials p(x). Find the number of zeroes of p(x), in each case. — Ex 2.1 Q1

★ Linear equations

7. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the lines representing the following pairs of linear equations intersect at a point, are parallel or coincident: — Ex 3.1 Q2

(i) $5x - 4y + 8 = 0, 7x + 6y - 9 = 0$ (ii) $9x + 3y + 12 = 0, 18x + 6y + 24 = 0$

(iii) $6x - 3y + 10 = 0, 2x - y + 9 = 0$

8. For which value of k will the following pair of linear equations have no solution? $3x + y = 1$; $(2k - 1)x + (k - 1)y = 2k + 1$ — PYQ type

9. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of 'm' for which $y = mx + 3$. — Ex 3.2 Q2

10★ Form the pair of linear equations and find the solution: 5 pencils and 7 pens together cost ₹50, whereas 7 pencils and 5 pens together cost ₹46. Find the cost of one pencil and that of one pen. — Ex 3.1 Q1 (ii)

Ex 3.3 Q2: Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method:

11★ Meena went to a bank to withdraw ₹2000. She asked the cashier to give her ₹50 and ₹100 notes only. Meena got 25 notes in all. Find how many notes of ₹50 and ₹100 she received. — Ex 3.3 Q2 (iv)

12★ If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes $\frac{1}{2}$ if we only add 1 to the denominator. What is the fraction? — Ex 3.3 Q2 (i)

13★ Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu? — Ex 3.3 Q2 (ii)

14★ 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 the digits. Find the number. — Ex 3.3 Q2 (iii)

15. A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid ₹27 for a book kept for seven days, while Susy paid ₹21 for the book she kept for five days. Find the fixed charge and the charge for each extra day. — Ex 3.3 Q2 (v)

Formulas

$\alpha + \beta = \frac{-b}{a}$ $\alpha\beta = \frac{c}{a}$

Sum mein minus, product mein nahi.

Polynomial = $k[x^2 - (\alpha + \beta)x + \alpha\beta]$

"Minus sum, plus product." Fraction ho to k = LCM.

$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$

$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta}$ $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$

- Degree 1 linear, 2 quadratic, 3 cubic
- Graph x-axis ko jitni jagah kaate = utne zeros (max = degree)
- Split: product = ac, sum = b

> $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ → **ek solution (intersecting)**

> $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ → **no solution (parallel)**

> $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ → **infinite (coincident)**

Elimination: coefficients equal karo; same sign → subtract, alag sign → add.

✗ Syllabus mein nahi (2026-27)

✗ Division algorithm for polynomials

✗ Cross-multiplication method

✗ Equations reducible to linear form

Algebra (2/2): Quadratic + AP

Ch 4 · Ch 5

20 marks

★ Quadratic equations

1. Find the roots of the following quadratic equations by factorisation: — Ex 4.2 Q1

(i) $x^2 - 3x - 10 = 0$ (ii) $2x^2 + x - 6 = 0$ (iii) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$ (iv) $2x^2 - x + \frac{1}{8} = 0$

(v) $100x^2 - 20x + 1 = 0$

2★ Find the nature of the roots of the following quadratic equations. If the real roots exist, find them: — Ex 4.3 Q1

(i) $2x^2 - 3x + 5 = 0$ (ii) $3x^2 - 4\sqrt{3}x + 4 = 0$ (iii) $2x^2 - 6x + 3 = 0$

3★ Find the values of k for each of the following quadratic equations, so that they have two equal roots. — Ex 4.3 Q2

(i) $2x^2 + kx + 3 = 0$ (ii) $kx(x - 2) + 6 = 0$

4★ A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train. — Ex 4.1 Q2 (iv) · CBSE 2025

5. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find Rohan's present age. — Ex 4.1 Q2 (iii)

6. Find two consecutive positive integers, sum of whose squares is 365. — Ex 4.2 Q4

7. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides. — Ex 4.2 Q5

PYQ word problems

8★ A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more, it would have taken 30 minutes less for the journey. Find the original speed of the train. — CBSE 2006C, 2024

9★ Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. — old NCERT · RD Sharma

10. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately, find the time in which each pipe would fill the tank separately. — CBSE 2010

11★ In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects. — CBSE 2008, 14, 19

12. A student scored a total of 32 marks in class tests in Mathematics and Science. Had he scored 2 marks less in Science and 4 marks more in Mathematics, the product of his marks would have been 253. Find his marks in the two subjects. — CBSE 2025

★ Arithmetic progressions

13. How many three-digit numbers are divisible by 7? — Ex 5.2 Q13

14. Find the 20th term from the last term of the AP: 3, 8, 13, ..., 253. — Ex 5.2 Q17

15. If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms. — Ex 5.3 Q9

16★ 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on. In how many rows are the 200 logs placed and how many logs are in the top row? — Ex 5.3 Q19

17★ In a school, students thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be the same as the class, in which they are studying, e.g., a section of Class I will plant 1 tree, a section of Class II will plant 2 trees and so on till Class XII. There are three sections of each class. How many trees will be planted by the students? — Ex 5.3 Q17

18. Subba Rao started work in 1995 at an annual salary of ₹5000 and received an increment of ₹200 each year. In which year did his income reach ₹7000? Ex 5.2 Q19

19. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find: Example 16
(i) the production in the 1st year (ii) the production in the 10th year
(iii) the total production in first 7 years

20. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line. A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run? [Hint: To pick up the first potato and the second potato, the total distance (in metres) run by a competitor is $2 \times 5 + 2 \times (5 + 3)$] Ex 5.3 Q20 · Standard

Formulas

$D = b^2 - 4ac$ $x = \frac{-b \pm \sqrt{D}}{2a}$

- D > 0: do alag real roots · D = 0: equal roots ($\frac{-b}{2a}$) · D < 0: real roots nahi
- Speed = $\frac{\text{distance}}{\text{time}}$; time = $\frac{\text{distance}}{\text{speed}}$; upstream = s − r, downstream = s + r
- Taps/pipes: 1 ghante mein kaam = $\frac{1}{\text{time}}$; dono milke = $\frac{1}{x} + \frac{1}{y}$
- Negative age/speed/length/time → "discard" likho

$a_n = a + (n-1)d$ $d = a_2 - a_1$

$S_n = \frac{n}{2}[2a + (n-1)d] = \frac{n}{2}(a + l)$

- End se nth term = l − (n − 1)d
- $a_n = S_n - S_{n-1}$
- a, b, c AP mein ⇔ 2b = a + c
- $1 + 2 + \ldots + n = \frac{n(n+1)}{2}$

✗ Syllabus mein nahi (2026-27)

✗ Completing the square method
✗ Ex 5.4 (optional, "not from the examination point of view")

Coordinate Geometry Ch 7

6 marks

★ Ye sawaal pakke karo

1.	Find the distance between the following pairs of points: (i) (2, 3), (4, 1) (ii) (–5, 7), (–1, 3) (iii) (a, b), (–a, –b)	Ex 7.1 Q1
2.	Find the distance between the points (0, 0) and (36, 15). Can you now find the distance between the two towns A and B discussed in Section 7.2?	Ex 7.1 Q2
3★	Determine if the points (1, 5), (2, 3) and (–2, –11) are collinear.	Ex 7.1 Q3
4.	Check whether (5, –2), (6, 4) and (7, –2) are the vertices of an isosceles triangle.	Ex 7.1 Q4
5.	In a classroom, 4 friends are seated at the points A, B, C and D as shown in Fig. 7.8 [A(3, 4), B(6, 7), C(9, 4), D(6, 1)]. Champa and Chameli walk into the class and after observing for a few minutes Champa asks Chameli, "Don't you think ABCD is a square?" Chameli disagrees. Using distance formula, find which of them is correct.	Ex 7.1 Q5
6★	Find the point on the x-axis which is equidistant from (2, –5) and (–2, 9).	Ex 7.1 Q7
7★	If Q(0, 1) is equidistant from P(5, –3) and R(x, 6), find the values of x. Also find the distances QR and PR.	Ex 7.1 Q9
8★	Find a relation between x and y such that the point (x, y) is equidistant from the point (3, 6) and (–3, 4).	Ex 7.1 Q10
9.	Find the coordinates of the point which divides the join of (–1, 7) and (4, –3) in the ratio 2 : 3.	Ex 7.2 Q1
10.	Find the coordinates of the points of trisection of the line segment joining (4, –1) and (–2, –3).	Ex 7.2 Q2
11.	Find the ratio in which the line segment joining the points (–3, 10) and (6, –8) is divided by (–1, 6).	Ex 7.2 Q4
12.	Find the ratio in which the line segment joining A(1, –5) and B(–4, 5) is divided by the x-axis. Also find the coordinates of the point of division.	Ex 7.2 Q5
13★	If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.	Ex 7.2 Q6
14★	If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, find the value of p.	Example 10

Formulas

AB = $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$

P = $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$

Midpoint = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

- Origin se distance = $\sqrt{(x^2 + y^2)}$
- Ratio nikalna ho to k : 1 lo
- x-axis par point = (x, 0); y-axis par = (0, y)
- Collinear: AB + BC = AC
- Square: 4 sides + diagonals equal · Rhombus: 4 sides equal · Parallelogram: diagonals ke midpoints same

✗ Syllabus mein nahi (2026-27)

✗ Area of a triangle (coordinate formula)

Triangles + Circles Ch 6 · Ch 10

15 marks

★ Prove karna hai (sirf 3 theorems)

1★ Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. (Basic Proportionality Theorem) **5 marks** — Theorem 6.1

2★ Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. — Theorem 10.1

3★ Prove that the lengths of tangents drawn from an external point to a circle are equal. — Theorem 10.2

State karna hai (proof nahi)

4. If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side. (Converse of BPT) — Theorem 6.2

5. If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar. (AAA) — Theorem 6.3

6. If in two triangles, sides of one triangle are proportional to (i.e., in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar. (SSS) — Theorem 6.4

7. If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar. (SAS) — Theorem 6.5

Aur zaroori

8. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. — Ch 10 Example 2

9. 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. The radius of the circle is
(A) 7 cm (B) 12 cm (C) 15 cm (D) 24.5 cm — Ex 10.2 Q1

10. If TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then $\angle PTQ$ is equal to
(A) 60° (B) 70° (C) 80° (D) 90° — Ex 10.2 Q2

11. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then $\angle POA$ is equal to
(A) 50° (B) 60° (C) 70° (D) 80° — Ex 10.2 Q3

Formulas

$$DE \parallel BC \Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$$

$$\triangle ABC \sim \triangle PQR \Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP}$$

Naam ka order hi pair batata hai: A↔P, B↔Q, C↔R.

- Similar = same shape (angles equal, sides same ratio)
- Parchhaai: $\frac{\text{height}_1}{\text{shadow}_1} = \frac{\text{height}_2}{\text{shadow}_2}$
- Tangent length = $\sqrt{(d^2 - r^2)}$
- Angle between tangents + angle at centre = 180°

✗ Syllabus mein nahi (2026-27)

✗ Areas of similar triangles theorem
✗ Pythagoras theorem proofs
✗ Constructions (poora chapter hata)

Trigonometry Ch 8 · Ch 9

12 marks

★ Aman sir ke pakke picks

1★ If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, $0° < A + B \le 90°$, $A > B$, find A and B. — Example 8

2★ If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; $0° < A + B \le 90°$; $A > B$, find A and B. — Ex 8.2 Q3

3★ Prove that $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$. — Ex 8.3 Q4 (ii)

4★ Prove that $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$. [Hint: Write the expression in terms of $\sin \theta$ and $\cos \theta$] — Ex 8.3 Q4 (iii)

5★ Prove that $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$, using the identity $\operatorname{cosec}^2 A = 1 + \cot^2 A$. — Ex 8.3 Q4 (v)

6. Evaluate the following: — Ex 8.2 Q1

(i) $\sin 60° \cos 30° + \sin 30° \cos 60°$ (ii) $2 \tan^2 45° + \cos^2 30° - \sin^2 60°$ (iii) $\frac{\cos 45°}{\sec 30° + \operatorname{cosec} 30°}$

(iv) $\frac{\sin 30° + \tan 45° - \operatorname{cosec} 60°}{\sec 30° + \cos 60° + \cot 45°}$ (v) $\frac{5 \cos^2 60° + 4 \sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$

Ex 8.3 Q4 poora aise likha hai: "Prove the following identities, where the angles involved are acute angles for which the expressions are defined."

Heights & distances: ek triangle (2–3 marks)

7. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30°. — Ex 9.1 Q1

8. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree. — Ex 9.1 Q2

9. A contractor plans to install two slides for the children to play in a park. For the children below the age of 5 years, she prefers to have a slide whose top is at a height of 1.5 m, and is inclined at an angle of 30° to the ground, whereas for elder children, she wants to have a steep slide at a height of 3 m, and inclined at an angle of 60° to the ground. What should be the length of the slide in each case? — Ex 9.1 Q3

10. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30°. Find the height of the tower. — Ex 9.1 Q4

11. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string. — Ex 9.1 Q5

★ Heights & distances: do triangles (3–5 marks)

12★ From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P. (You may take $\sqrt{3} = 1.732$) — Example 4 · flagstaff

13★ 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. — Ex 9.1 Q6

14★ 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. — Ex 9.1 Q7

15. A statue, 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal. Ex 9.1 Q8

16. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building. Ex 9.1 Q9

17. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30°, respectively. Find the height of the poles and the distances of the point from the poles. Ex 9.1 Q10

18. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower and the width of the canal. Ex 9.1 Q11

19. 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. Ex 9.1 Q12

20. As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. Ex 9.1 Q13

21. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After some time, the angle of elevation reduces to 30°. Find the distance travelled by the balloon during the interval. Ex 9.1 Q14

22. 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. Ex 9.1 Q15

23. The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°. Find the height of the tower. Example 5

24. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45°, respectively. Find the height of the multi-storeyed building and the distance between the two buildings. Example 6

25. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45°, respectively. If the bridge is at a height of 3 m from the banks, find the width of the river. Example 7

5-mark trig question mein aksar choice: ek heights & distances, ek identity proof. Dono taiyar rakho.

Formulas

$\sin = \frac{P}{H}$ $\cos = \frac{B}{H}$ $\tan = \frac{P}{B} = \frac{\sin}{\cos}$

- cosec = 1/sin · sec = 1/cos · cot = 1/tan

	0°	30°	45°	60°	90°
sin	0	½	1/√2	√3/2	1
cos	1	√3/2	1/√2	½	0
tan	0	1/√3	1	√3	—

$\sin^2 A + \cos^2 A = 1$

$1 + \tan^2 A = \sec^2 A$ $1 + \cot^2 A = \text{cosec}^2 A$

- H&D: height + zameen → tan · height + rassi → sin · zameen + rassi → cos
- Angle hamesha horizontal se; elevation (neeche se) = depression (upar se)
- Syllabus: sirf 30°, 45°, 60° aur max 2 right triangles

✗ Syllabus mein nahi (2026-27)

✗ Complementary angles (sin(90° − A) wala section)

Mensuration Ch 11 · Ch 12

10 marks

★ Areas related to circles (NCERT: unless stated otherwise, use π = 22/7)

1. Find the area of a quadrant of a circle whose circumference is 22 cm. — Ex 11.1 Q2

2★ The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes. — Ex 11.1 Q3

3★ A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find — Ex 11.1 Q8
(i) the area of that part of the field in which the horse can graze.
(ii) the increase in the grazing area if the rope were 10 m long instead of 5 m. (Use π = 3.14)

4★ A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors. Find: — Ex 11.1 Q9
(i) the total length of the silver wire required. (ii) the area of each sector of the brooch.

5. An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella. — Ex 11.1 Q10

6. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades. — Ex 11.1 Q11

Segment sirf 60°, 90°, 120° wale (syllabus limit).

★ Surface areas & volumes (2 solids ka combination) (π = 22/7 unless stated)

7. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid. — Ex 12.1 Q1

8★ A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy. — Ex 12.1 Q3

9. 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. — Ex 12.1 Q6

10. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of ₹500 per m^2. (Note that the base of the tent will not be covered with canvas.) — Ex 12.1 Q7

11. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π. — Ex 12.2 Q1

5-marker yahin se lagbhag pakka. RD Sharma ke SA&V questions bhi practice karo.

Formulas

Solid	CSA	TSA	Volume
Cuboid	2h(l + b)	2(lb + bh + hl)	lbh
Cube	$4a^2$	$6a^2$	a^3
Cylinder	2πrh	2πr(r + h)	$\pi r^2 h$
Cone	πrl	πr(l + r)	$\frac{1}{3}\pi r^2 h$
Sphere	$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
Hemisphere	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$

Arc = $\frac{\theta}{360} \times 2\pi r$ Sector = $\frac{\theta}{360} \times \pi r^2$

Segment = sector − triangle

- θ = 90°: triangle = $\frac{1}{2}r^2$ · θ = 60°: triangle = $\frac{\sqrt{3}}{4}r^2$
- Clock: 1 minute = 6°, har number = 30°
- Pahiye ka 1 chakkar = circumference
- $l = \sqrt{(r^2 + h^2)}$
- Combined surface: sirf bahar dikhne wala hissa
- Volume: joda to add, scoop kiya to minus

✗ Syllabus mein nahi (2026-27)

✗ Frustum of a cone
✗ Conversion of solids (melt & recast)

Statistics & Probability

Ch 13 · Ch 14

11 marks

★ Statistics

1★ A survey was conducted by a group of students as a part of their environment awareness programme, in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house. Ex 13.1 Q1

Number of plants	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10	10 – 12	12 – 14
Number of houses	1	2	1	5	6	2	3

Which method did you use for finding the mean, and why?

2. The following table shows the ages of the patients admitted in a hospital during a year: Ex 13.2 Q1

Age (in years)	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
Number of patients	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

3★ The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median, mean and mode of the data and compare them. Ex 13.3 Q1

Monthly consumption (in units)	65 – 85	85 – 105	105 – 125	125 – 145	145 – 165	165 – 185	185 – 205
Number of consumers	4	5	13	20	14	8	4

4★ If the median of the distribution given below is 28.5, find the values of x and y. Ex 13.3 Q2

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
Frequency	5	x	20	15	y	5	60

★ Probability

5★ One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting Ex 14.1 Q14

(i) a king of red colour (ii) a face card (iii) a red face card (iv) the jack of hearts

(v) a spade (vi) the queen of diamonds

6. A die is thrown once. Find the probability of getting Ex 14.1 Q13

(i) a prime number; (ii) a number lying between 2 and 6; (iii) an odd number.

7. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is Ex 14.1 Q8

(i) red? (ii) not red?

8★ A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game. Ex 14.1 Q23

9★ A die is thrown twice. What is the probability that Ex 14.1 Q24

(i) 5 will not come up either time? (ii) 5 will come up at least once?

[Hint: Throwing a die twice and throwing two dice simultaneously are treated as the same experiment]

Sabse aasaan marks: passing ke liye sabse pehle yahi chapters.

Formulas

Mean $= \frac{\Sigma f_i x_i}{\Sigma f_i} = a + \frac{\Sigma f_i d_i}{\Sigma f_i} = a + h \times \frac{\Sigma f_i u_i}{\Sigma f_i}$

Median $= l + \left(\frac{n/2 - cf}{f} \right) \times h$

Mode $= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$

3 Median = Mode + 2 Mean (empirical)

$$P(E) = \frac{\text{favourable outcomes}}{\text{total outcomes}} \qquad P(E) + P(\text{not } E) = 1$$

- $0 \le P(E) \le 1$; sure event = 1, impossible = 0
- 2 coins = 4 outcomes · 3 coins = 8 · 2 dice = 36 · cards = 52
- Cards: 4 suits × 13; face cards = J, Q, K × 4 = 12 (Ace nahi)
- Die pe prime: 2, 3, 5

✗ Syllabus mein nahi (2026-27)

✗ Ogive / cumulative frequency graph
✗ Bimodal data

Exam se pehle ka plan

Kaise padhna hai

- NCERT pehle: har example + har exercise khud se (zyada tar sawaal wahin se ya thode badle hue).
- ★ wale sawaal kam se kam 3 baar khud likho, dekh ke nahi.
- Ek "mistake notebook" banao: har galti ek line mein.
- Paper milte hi rough mein trig table + identities likh lo.
- Answer mein pehle formula, fir values; aakhri mein "Hence ..." poore statement ke saath.
- Bade marks wale sawaal pehle, MCQ aakhir mein (time ka dhyan).

✗ 2026-27 syllabus mein nahi (time mat lagao)

- ✗ Real Numbers: Euclid's division lemma
- ✗ Polynomials: division algorithm
- ✗ Linear Eq.: cross-multiplication, reducible equations
- ✗ Quadratic: completing the square
- ✗ Coordinate: area of a triangle
- ✗ Triangles: areas of similar triangles, Pythagoras proofs
- ✗ Constructions: poora chapter
- ✗ Trigonometry: complementary angles
- ✗ Surface Areas: frustum, conversion of solids
- ✗ Statistics: ogive (cumulative frequency graph)

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