

Class 10 Mathematics

Complete Revision • Solved Examples • Practice

A practical revision companion

Learn the concept, understand the method, practise with guided examples, and revise with confidence.

Concept Clarity • Guided Practice • Exam Confidence

01 Real Numbers

Core idea

Real numbers include rational and irrational numbers. Prime factorisation is useful for HCF and LCM; Euclid's algorithm gives HCF efficiently.

Key formulas / rules

Euclid: $a = bq + r$, $0 \leq r < b$. For two positive integers, $\text{HCF} \times \text{LCM} = \text{product of the integers}$.

Guided solved examples

Example 1. Find HCF of 135 and 225.

Solution. $225 = 135 \times 1 + 90$; $135 = 90 \times 1 + 45$; $90 = 45 \times 2$. HCF = 45.

Example 2. Is $\sqrt{5}$ rational?

Solution. No. $\sqrt{5}$ cannot be expressed as p/q in lowest terms; assuming it can leads to 5 dividing both p and q , a contradiction.

Common mistakes

Common errors include stopping Euclid's algorithm too early or confusing HCF with LCM.

Exam tip

Write each division step clearly and check the remainder.

Practice

1. Find HCF of 96 and 404.
2. Use Euclid's algorithm to find the HCF of 96 and 404.
3. Express 0.375 as a rational number.

02 Polynomials

Core idea

A polynomial is an algebraic expression in which the powers of the variable are non-negative integers. Zeros are values that make the polynomial equal to zero.

Key formulas / rules

For ax^2+bx+c , sum of zeros = $-b/a$ and product of zeros = c/a .

Guided solved examples

Example 1. Find the zeros of $x^2 - 5x + 6$.

Solution. Factorise: $(x-2)(x-3)=0$. Zeros are 2 and 3.

Example 2. For $2x^2-7x+3$, find the sum and product of zeros.

Solution. Sum = $7/2$; product = $3/2$.

Common mistakes

Do not change the sign of the coefficient ratio accidentally.

Exam tip

Use the coefficient relations as a quick verification after solving.

Practice

1. Find the zeros of $x^2+2x-15$.
2. For $3x^2-10x+7$, find the sum and product of zeros.
3. Construct a quadratic with zeros 4 and -1.

03 Pair of Linear Equations

Core idea

Two linear equations can have one solution, no solution or infinitely many solutions. Graphically these correspond to intersecting, parallel or coincident lines.

Key formulas / rules

For $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$, compare a_1/a_2 , b_1/b_2 and c_1/c_2 .

Guided solved examples

Example 1. Solve $x+y=7$ and $x-y=1$.

Solution. Adding gives $2x=8$, so $x=4$; $y=3$.

Example 2. Solve $2x+3y=13$ and $x+y=5$.

Solution. From $x=5-y$; $10-2y+3y=13$, so $y=3$ and $x=2$.

Common mistakes

Watch signs when adding or subtracting equations.

Exam tip

Elimination is often fastest when coefficients can be made equal.

Practice

1. Solve $3x+2y=12$ and $x-y=1$.
2. Determine the nature of $2x+4y=8$ and $x+2y=6$.
3. Form two equations from a word problem of your choice.

04 Quadratic Equations

Core idea

A quadratic equation has the form $ax^2+bx+c=0$, $a \neq 0$. It can be solved by factorisation or the quadratic formula.

Key formulas / rules

$D=b^2-4ac$. Roots = $(-b \pm \sqrt{D})/(2a)$. $D>0$: distinct real roots; $D=0$: equal roots; $D<0$: no real roots.

Guided solved examples

Example 1. Solve $x^2-7x+12=0$.

Solution. $(x-3)(x-4)=0$, so $x=3$ or 4 .

Example 2. Solve $2x^2-3x-2=0$.

Solution. $(2x+1)(x-2)=0$, so $x=2$ or $-1/2$.

Common mistakes

For the formula, substitute a, b and c with their signs.

Exam tip

Check roots by substitution when time permits.

Practice

1. Solve $3x^2-5x-2=0$.
2. Determine the nature of roots of $2x^2+4x+5=0$.
3. Create a quadratic with roots 2 and -5.

05 Arithmetic Progressions

Core idea

An AP has a constant difference between consecutive terms. The first term is a and common difference is d.

Key formulas / rules

nth term: $a_n=a+(n-1)d$. Sum: $S_n=n/2[2a+(n-1)d]$.

Guided solved examples

Example 1. Find the 20th term of 5,9,13,...

Solution. $a=5, d=4$. $a_{20}=5+19\times 4=81$.

Example 2. Find the sum of first 10 terms of 3,7,11,...

Solution. $a=3, d=4$. $S_{10}=5[6+36]=210$.

Common mistakes

Confusing nth term with sum is common.

Exam tip

Identify a, d and n before writing the formula.

Practice

1. Find the 15th term of 8,13,18,...
2. Find S_{20} for 2,5,8,...
3. If the 7th term is 25 and $d=3$, find a.

06 Triangles & Coordinate Geometry

Core idea

Similar triangles have equal corresponding angles and proportional corresponding sides. Coordinate methods help verify distances and midpoints.

Key formulas / rules

Distance = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$. Midpoint = $((x_1+x_2)/2, (y_1+y_2)/2)$.

Guided solved examples

Example 1. Find distance between (2,3) and (8,11).

Solution. $\sqrt{6^2+8^2}=10$.

Example 2. Find midpoint of (2,4) and (10,12).

Solution. $((2+10)/2, (4+12)/2)=(6,8)$.

Common mistakes

Do not forget to square both coordinate differences.

Exam tip

Keep coordinate order consistent.

Practice

1. Find the distance between (-1,2) and (5,10).
2. Find the midpoint of (-4,7) and (6,-3).
3. Check whether three points can form a right triangle.

07 Trigonometry

Core idea

For an acute angle in a right triangle, trigonometric ratios connect sides to the angle.

Key formulas / rules

$\sin\theta=P/H$, $\cos\theta=B/H$, $\tan\theta=P/B$. $\sin^2\theta+\cos^2\theta=1$. $1+\tan^2\theta=\sec^2\theta$.

Guided solved examples

Example 1. If $\tan\theta=3/4$, find $\sin\theta$ and $\cos\theta$.

Solution. Take $P=3, B=4, H=5$. Therefore $\sin\theta=3/5$ and $\cos\theta=4/5$.

Example 2. Simplify $\sin^2\theta+\cos^2\theta$.

Solution. Using the identity, the result is 1.

Common mistakes

Do not mix opposite and adjacent sides.

Exam tip

Draw a quick right triangle when needed.

Practice

1. If $\sin\theta=5/13$, find $\cos\theta$ for an acute angle.
2. Prove a simple identity using $\sin^2\theta+\cos^2\theta=1$.
3. Find $\tan\theta$ when $\sin\theta=8/17$.

08 Circles, Areas & Mensuration

Core idea

Circle geometry connects radius, tangent properties and standard area/volume formulae.

Key formulas / rules

Circumference= $2\pi r$; area= πr^2 ; cylinder volume= $\pi r^2 h$; cone volume= $(1/3)\pi r^2 h$.

Guided solved examples

Example 1. Find area of a circle of radius 7 cm using $\pi=22/7$.

Solution. Area= $22/7 \times 49 = 154 \text{ cm}^2$.

Example 2. Find cylinder volume for $r=3 \text{ cm}, h=10 \text{ cm}$.

Solution. $V = \pi \times 9 \times 10 = 90\pi \text{ cm}^3$.

Common mistakes

Check whether the question asks curved or total surface area.

Exam tip

Write units for area and volume.

Practice

1. Find circumference for $r=14 \text{ cm}$.
2. Find volume of a cone with $r=3, h=4$.
3. A tangent is drawn at a point on a circle. State its relation with the radius.

09 Statistics & Probability

Core idea

Statistics summarises data; probability measures how likely an event is under the stated model.

Key formulas / rules

Mean = sum of observations / number of observations. $P(E) = \text{favourable outcomes} / \text{total equally likely outcomes}$.

Guided solved examples

Example 1. Find mean of 4,6,8,12.

Solution. Mean= $30/4 = 7.5$.

Example 2. Probability of rolling a number greater than 4 on a fair die.

Solution. Favourable outcomes 5,6: $P = 2/6 = 1/3$.

Common mistakes

Use the correct denominator for equally likely outcomes.

Exam tip

Write favourable outcomes explicitly before calculating.

Practice

1. Find mean of 5,7,9,11,13.
2. A card is selected from a standard deck. Find the probability of a heart.
3. Check that every probability lies between 0 and 1.

Rapid Revision Sheet

Algebra
Quadratic formula, discriminant, AP nth term and sum, coefficient relations for zeros.
Geometry
Similarity criteria, coordinate distance and midpoint, circle tangent property.
Trigonometry
Core ratios and identities; use a right-triangle sketch when useful.
Mensuration
Area, circumference, surface area and volume formulae with units.
Statistics & Probability
Mean and basic probability; always define the sample space clearly.

Mixed Practice Test

1. Solve $x^2 - 9x + 20 = 0$.
2. Find the 18th term of 4, 7, 10, ...
3. Find distance between (1, 2) and (7, 10).
4. If $\tan\theta = 5/12$, find $\sin\theta$ and $\cos\theta$.
5. Find the probability of getting an even number on a fair die.
6. Find the area of a circle of radius 14 cm using $\pi = 22/7$.

Answer Key

1. 4,5.
2. 55.
3. 10.
4. $\frac{5}{13}$ and $\frac{12}{13}$.
5. $\frac{1}{2}$.
6. 616 cm^2 .

Ready to Learn with Clarity?

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