



Question-wise Chapter & Concept Analysis

STUDENT GUIDE FOR CLASSES 7, 8 AND 9

TIME
60 minutes

QUESTIONS
32

MAX. MARKS
120

PAPER CODE 51

All 32 questions are mapped to chapter, concept, skill and revision target.

HOW TO USE THIS GUIDE

First identify the chapter. Then learn the idea and solve one similar question without looking at the answer.

- Class 7: Learn the basic science words, units, diagrams and number skills behind each question.
- Class 8: Connect ideas from two chapters and begin short Olympiad-style numerical problems.
- Class 9: Attempt the full 60-minute paper and record every mistake by chapter.
- Dropped questions: Questions 11 and 12 are not scored, but their concentration and molar-mass ideas are still useful.

BIOLOGY 8 questions	CHEMISTRY 8 questions	PHYSICS 8 questions	MATHEMATICS 8 questions
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At a glance

WHAT THE PAPER REWARDS	HOW TO BUILD THE SKILL
Careful modelling - many questions need only one or two equations, but choosing the right equation is the main challenge.	Write the known values, principle and units before substituting numbers.
Clue reading - biology questions combine several small facts into one identification.	Underline each clue and ask which option it supports or rules out.
Diagram interpretation - circuits, circle packing, biomass and magnetic direction carry essential information.	Redraw the figure and label nodes, directions, distances or trophic levels.
Multiple-correct discipline - Questions 25-32 require every statement to be judged separately.	Write True or False beside each option and give a one-line reason.

PHYSICS

Question-wise chapter and concept map.

Question 1 Gravitation - Surface Gravity

NUMERICAL + GRAVITATION

What this question tests: Newton's law of gravitation; surface gravity; unit conversion; astronomical mass and radius
What to revise: Revise $g = GM/R^2$ and practise converting kilometres to metres before substitution.

Question 2 Mechanical Properties of Fluids - Pressure

NUMERICAL + FLUIDS

What this question tests: Hydrostatic pressure; pressure-force relation; area of a circle
What to revise: Write $F = \rho ghA$ and check that the diameter is converted to radius.

Question 3 Ray Optics - Thin Lens

NUMERICAL + OPTICS

What this question tests: Lens formula; objects on opposite sides; common image position; quadratic equation
What to revise: Revise sign conventions and practise forming one equation for the same image position.

Question 4 Nuclear Energy and Power

NUMERICAL + MODERN PHYSICS

What this question tests: Efficiency; power; MeV-to-joule conversion; fission rate
What to revise: Revise efficiency = useful output/input and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.

Question 5 Laws of Motion - Contact Force

DIAGRAM + NEWTON LAWS

What this question tests: Treating blocks as one system; common acceleration; isolating one block
What to revise: First find acceleration of the whole system, then draw a free-body diagram of the block pushed only through contact.

Question 6 Current Electricity - Resistor Networks

DIAGRAM + CIRCUIT

What this question tests: Series-parallel reduction; equivalent resistance; voltage division
What to revise: Redraw a complex network after each reduction and mark which points are common nodes.

Question 25 Moving Charges and Magnetism

MULTIPLE CORRECT + MAGNETISM

What this question tests: Magnetic field of a straight wire; right-hand rule; current as charge per time; electron flow
What to revise: Practise deciding field direction above and below a wire before using the formula.

Question 26 Charge-to-Mass Ratio

MULTIPLE CORRECT + AMBIGUITY

What this question tests: Specific charge; SI units; hydrogen isotopes; electron and alpha particle; sign versus magnitude
What to revise: Calculate q/m for electron and alpha particle and state clearly whether you compare signed values or magnitudes.

CHEMISTRY

Question-wise chapter and concept map.

Question 7 Mole Concept, Density and Polymers

MULTI-STEP NUMERICAL

What this question tests: Film thickness; volume; density; molar-mass ratio; repeating unit
What to revise: Practise changing Å to metres and m^3 to cm^3 before using density.

Question 8 Chemical Equilibrium

NUMERICAL + KEY NOTE

What this question tests: Writing K_c ; converting moles to concentration; checking printed choices
What to revise: Write the balanced-equation powers in K_c and compare your computed value with every option.

Question 9 Organic Chemistry - Alcohols and Alkenes

REACTION REASONING

What this question tests: Dehydration; alkene formation; ozonolysis; identifying an alkene from carbonyl products
What to revise: Work backwards from ozonolysis products by joining the carbonyl carbons with a $\text{C}=\text{C}$ bond.

Question 10 Metals and Reactivity Series

APPLICATION + REDOX

What this question tests: Displacement reaction; reactivity series; colour of Cu^{2+} ; limiting amount
What to revise: Learn which metals lie above copper and check whether the available moles can remove all Cu^{2+} .

Question 11 Mole Concept and Percentage Concentration

DROPPED IN FINAL KEY

What this question tests: % w/v; molar mass; converting mass to number of molecules; detecting a faulty option set
What to revise: Revise that x% w/v means x grams of solute per 100 mL of solution.
Study note: This question is not scored, but the underlying chapter remains useful for practice.

Question 12 Atomic Mass from Compound Formulae

DROPPED IN FINAL KEY

What this question tests: Molar mass; simultaneous equations; checking whether an option exists
What to revise: Convert each sample mass into molar mass, then form one linear equation per compound.
Study note: This question is not scored, but the underlying chapter remains useful for practice.

Question 27 Applied Inorganic Chemistry - Rare Earths

MULTIPLE CORRECT + APPLIED CHEMISTRY

What this question tests: Neodymium and praseodymium; special optical glass; meaning of didymium
What to revise: Learn a few common uses of lanthanoids in glass, magnets, lasers and phosphors.

Question 28 Acids and Metals

**MULTIPLE CORRECT +
EXPERIMENT**

What this question tests: Strong and weak acids; magnesium reactivity; gas evolution; oxidising acid

What to revise: Compare acid strength and remember that nitric acid may change the gaseous product.

BIOLOGY

Question-wise chapter and concept map.

Question 13 Molecular Basis of Inheritance - DNA Structure

NUMERICAL + GENETICS

What this question tests: DNA helix; rise per base pair; micrometre-to-nanometre conversion
What to revise: Remember that one base-pair step in B-DNA is about 0.34 nm.

Question 14 Principles of Inheritance - Sex Linkage

CLUE-BASED GENETICS

What this question tests: X-linked recessive inheritance; carrier mother; affected sons and daughters
What to revise: Draw a small Punnett square for a carrier mother and a normal father.

Question 15 Ecology - Ecological Pyramids

DIAGRAM + ECOLOGY

What this question tests: Biomass pyramid; aquatic ecosystem; phytoplankton turnover; inverted pyramid
What to revise: Compare pyramids of number, biomass and energy; remember that the energy pyramid is always upright.

Question 16 Plant Physiology - Transpiration

CONCEPT + PLANT PHYSIOLOGY

What this question tests: Stomatal opening; humidity gradient; soil-water availability; transpiration pull
What to revise: Revise how light, humidity, wind, temperature and soil moisture affect transpiration.

Question 17 Biodiversity and Conservation - Biopiracy

RECALL + ENVIRONMENT

What this question tests: Traditional knowledge; biological resources; patents; benefit-sharing
What to revise: Learn the difference between biopiracy, biomagnification, biodegradation and bioterrorism.

Question 18 Evolution - Living Fossils

CLUE-BASED EVOLUTION

What this question tests: Evolutionary rate; ancestral characters; fossil record; relict lineages
What to revise: Learn examples and meanings of living fossil, connecting link, extinct and endangered.

Question 29 Human Health and Disease - Vaccines

MULTIPLE CORRECT + IMMUNOLOGY

What this question tests: Live attenuated and inactivated vaccines; booster doses; conjugate vaccines; adjuvants
What to revise: Make a comparison chart of vaccine types, advantages and need for boosters.

Question 30 Human Physiology - Metabolism and Hormones

MULTIPLE CORRECT + PHYSIOLOGY

What this question tests: BMR; thyroid hormone; growth hormone; fever; malnutrition
What to revise: Revise factors that raise or lower BMR and connect them with energy demand.

MATHEMATICS

Question-wise chapter and concept map.

Question 19 Algebra - Quadratic Equations

ALGEBRAIC REASONING

What this question tests: Common root; subtracting equations; using the root in a polynomial
What to revise: When two equations share a root, substitute the same symbol in both and subtract.

Question 20 Geometry - Circle Packing

DIAGRAM + GEOMETRY

What this question tests: Equilateral triangle; 30-60-90 triangle; centres of tangent circles; vertical spacing
What to revise: Draw the centres and join them; touching equal circles form equilateral triangles between their centres.

Question 21 Algebra - Polynomial Remainders

POLYNOMIAL REASONING

What this question tests: Remainder theorem; linear remainder; evaluating at roots of divisor
What to revise: Factor the divisor and use its roots to determine the unknown remainder coefficients.

Question 22 Algebra - Rational Inequalities

INEQUALITY REASONING

What this question tests: Sign chart; critical points; excluded denominator value
What to revise: Do not multiply by an expression of unknown sign; instead make a sign chart.

Question 23 Number Sense - Powers of Ten

NUMBER PATTERN

What this question tests: Decimal form of 10^n minus a small number; digit sum; place value
What to revise: Write smaller examples such as $10^5 - 25 = 99975$ and look for the pattern.

Question 24 Geometry - Angle Bisector

GEOMETRY + INEQUALITY

What this question tests: Angle-bisector length formula; geometric inequality; square-root comparison
What to revise: Revise the internal angle-bisector formula and note why the subtracting term is positive.

Question 31 Algebra and Trigonometry - Exponential Equation

MULTIPLE CORRECT +
ALGEBRA

What this question tests: Using $\sin^2 x + \cos^2 x = 1$; substitution; quadratic equation; standard angles
What to revise: Replace one exponential term by y and use the product of the two terms.

Question 32 Algebra - Identities and Factorisation

MULTIPLE CORRECT +
ALGEBRA

What this question tests: Expanding squares; factorisation; zero-product rule; testing cases
What to revise: Move all terms to one side and factor completely before checking the statements.

CHAPTER-WISE PAPER MAP

Use these tables to see where the paper concentrated its questions.

Physics

Chapter / area	Questions	Count
Charge-to-Mass Ratio	26	1
Current Electricity - Resistor Networks	6	1
Gravitation - Surface Gravity	1	1
Laws of Motion - Contact Force	5	1
Mechanical Properties of Fluids - Pressure	2	1
Moving Charges and Magnetism	25	1
Nuclear Energy and Power	4	1
Ray Optics - Thin Lens	3	1

Chemistry

Chapter / area	Questions	Count
Acids and Metals	28	1
Applied Inorganic Chemistry - Rare Earths	27	1
Atomic Mass from Compound Formulae	12	1
Chemical Equilibrium	8	1
Metals and Reactivity Series	10	1
Mole Concept and Percentage Concentration	11	1
Mole Concept, Density and Polymers	7	1
Organic Chemistry - Alcohols and Alkenes	9	1

Biology

Chapter / area	Questions	Count
Biodiversity and Conservation - Biopiracy	17	1
Ecology - Ecological Pyramids	15	1
Evolution - Living Fossils	18	1
Human Health and Disease - Vaccines	29	1
Human Physiology - Metabolism and Hormones	30	1
Molecular Basis of Inheritance - DNA Structure	13	1
Plant Physiology - Transpiration	16	1
Principles of Inheritance - Sex Linkage	14	1

Mathematics

Chapter / area	Questions	Count
Algebra - Identities and Factorisation	32	1
Algebra - Polynomial Remainders	21	1
Algebra - Quadratic Equations	19	1
Algebra - Rational Inequalities	22	1
Algebra and Trigonometry - Exponential Equation	31	1
Geometry - Angle Bisector	24	1
Geometry - Circle Packing	20	1
Number Sense - Powers of Ten	23	1

PREPARATION ROADMAP FOR CLASSES 7, 8 AND 9

CLASS 7 - BUILD BASICS	CLASS 8 - CONNECT IDEAS	CLASS 9 - PRACTISE THE PAPER
• Learn cells, plants, forces, pressure and simple chemical changes. • Strengthen fractions, units and basic algebra. • Observe every diagram before reading options.	• Add acids-bases, mole idea, electricity, genetics and inequalities. • Explain why each wrong option is wrong. • Solve short mixed-topic questions.	• Complete Class 9 science and algebra first. • Add equilibrium, optics, magnetism and advanced ecology. • Take 60-minute mixed tests and maintain an error notebook.

A useful weekly routine

Day	Task	Time
Monday	Read one chapter and make a one-page summary.	45-60 min
Tuesday	Solve 10 basic questions from that chapter.	45 min
Wednesday	Practise one diagram, graph or experiment.	30-45 min
Thursday	Solve 5 Olympiad bridge questions.	45-60 min
Friday	Correct mistakes without seeing the solution.	30 min
Saturday	Take a mixed Science and Mathematics quiz.	60 min
Sunday	Update the chapter checklist and revise formulas.	30 min

MY NSEJS CHAPTER CHECKLIST

Tick a chapter only when you can explain the basic idea and solve at least five questions without help.

Physics

☐ Gravitation - Surface Gravity	☐ Mechanical Properties of Fluids - Pressure
☐ Ray Optics - Thin Lens	☐ Nuclear Energy and Power
☐ Laws of Motion - Contact Force	☐ Current Electricity - Resistor Networks
☐ Moving Charges and Magnetism	☐ Charge-to-Mass Ratio

Chemistry

☐ Mole Concept, Density and Polymers	☐ Chemical Equilibrium
☐ Organic Chemistry - Alcohols and Alkenes	☐ Metals and Reactivity Series
☐ Mole Concept and Percentage Concentration	☐ Atomic Mass from Compound Formulae
☐ Applied Inorganic Chemistry - Rare Earths	☐ Acids and Metals

Biology

☐ Molecular Basis of Inheritance - DNA Structure	☐ Principles of Inheritance - Sex Linkage
☐ Ecology - Ecological Pyramids	☐ Plant Physiology - Transpiration
☐ Biodiversity and Conservation - Biopiracy	☐ Evolution - Living Fossils
☐ Human Health and Disease - Vaccines	☐ Human Physiology - Metabolism and Hormones

Mathematics

☐ Algebra - Quadratic Equations	☐ Geometry - Circle Packing
☐ Algebra - Polynomial Remainders	☐ Algebra - Rational Inequalities
☐ Number Sense - Powers of Ten	☐ Geometry - Angle Bisector
☐ Algebra and Trigonometry - Exponential Equation	☐ Algebra - Identities and Factorisation

Use this page after a mock test. Record only the mistakes that taught you something useful.

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