



ZENOVA STUDY

JAMB COMPLETE STUDY GUIDE

A Zenova Scheme-of-Work Companion for UTME Candidates

Mathematics • English Language • Biology • Chemistry • Physics • Agricultural Science • Geography

STUDY SMARTER • WIN BIGGER

Welcome

This guide follows the exact Zenova scheme of work for the seven core JAMB UTME subjects: Mathematics, English Language, Biology, Chemistry, Physics, Agricultural Science, and Geography. Each subject is broken down month by month (or section by section), and every topic on the scheme comes with concise, exam-focused key points — the essential facts, formulas, and ideas you need to hold in your head before test day.

Use it as a companion to your scheme, not a replacement for practice: read a topic's key points, then immediately attempt past questions on that topic. Revisit each subject's Month 6+ section for guidance on mock exams and final revision.

How to use this guide

- Study one topic at a time — read the key points, then close the book and recall them.
- Follow the month-by-month order; later topics often build on earlier ones.
- Pair every topic with past questions from that same area before moving on.
- In the final stretch (Month 6+), prioritise timed mock tests over new content.

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ZENOVA JAMB SCHEME OF WORK

MATHEMATICS

Number Sense • Algebra • Geometry • Calculus • Statistics

Mathematics tests speed and accuracy under time pressure. Master the core techniques below, then drill past questions until each method becomes automatic.

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SECTION I

Number and Numeration

Number Bases

- A number in base n uses digits 0 to $(n-1)$; e.g. base 2 (binary) uses only 0 and 1.
- To convert base n to base 10: multiply each digit by n raised to its place-value power, then sum.
- To convert base 10 to base n : repeatedly divide by n and read the remainders from bottom to top.
- Addition/subtraction in a given base follows normal arithmetic but you 'carry' or 'borrow' in that base, not in 10.

Fractions, Decimals, Approximations and Percentages

- Convert fractions to decimals by dividing the numerator by the denominator; convert back using place value.
- Percentage = $(\text{part/whole}) \times 100\%$. Percentage increase/decrease = $(\text{change/original}) \times 100\%$.
- Approximation: round to a given number of decimal places or significant figures; for significant figures, count from the first non-zero digit.
- Simple interest $I = PRT/100$; Compound interest $A = P(1 + R/100)^T$. VAT problems use the same percentage logic applied to price.
- Ratio problems: share a quantity in the ratio $a:b$ by dividing into $(a+b)$ equal parts, then multiplying by a or b .

Indices, Logarithms and Surds

- Laws of indices: $a^m \times a^n = a^{(m+n)}$; $a^m \div a^n = a^{(m-n)}$; $(a^m)^n = a^{(mn)}$; $a^0 = 1$; $a^{-n} = 1/a^n$.
- Laws of logarithms: $\log(xy) = \log x + \log y$; $\log(x/y) = \log x - \log y$; $\log(x^n) = n \log x$; $\log_a a = 1$.
- To solve exponential equations, express both sides with the same base and equate the powers.
- A surd is an irrational root (e.g. $\sqrt{2}$). Rationalise a denominator by multiplying by the conjugate surd over itself.
- Simplify surds by extracting perfect square factors: $\sqrt{a^2b} = a\sqrt{b}$.

Sets

- A set is a well-defined collection of objects; $\cap$ means intersection (common elements), $\cup$ means union (all elements).
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$ is the key formula for two-set word problems.
- Venn diagrams represent set relationships visually — always label the universal set U and shade the required region carefully.
- A' (complement of A) is everything in U that is not in A .

SECTION II

Algebra

Polynomials

- Factorise by grouping, common factors, or the difference of two squares: $a^2 - b^2 = (a-b)(a+b)$.
- Quadratic equations $ax^2+bx+c=0$ can be solved by factorisation, completing the square, or the formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$.
- The Remainder Theorem: dividing $f(x)$ by $(x-a)$ leaves a remainder of $f(a)$. The Factor Theorem: $(x-a)$ is a factor if $f(a)=0$.
- Sum and product of roots of $ax^2+bx+c=0$: sum = $-b/a$, product = c/a — used to build new equations from roots.

Variation

- Direct variation: $y = kx$ (y increases as x increases). Inverse variation: $y = k/x$.
- Joint variation combines two or more variables, e.g. $y = kxz$. Partial variation: $y = a + bx$.
- Always find the constant k first using given values, then substitute to solve for the unknown.

Inequalities

- Solve linear inequalities like equations, but reverse the inequality sign when multiplying or dividing by a negative number.
- Quadratic inequalities: factorise, find critical values, then test intervals on a number line to determine the sign.
- Represent solution sets on a number line (open circle for $<$ or $>$, closed circle for $\leq$ or $\geq$) or shade regions for linear graphs.

Progression (Sequences and Series)

- Arithmetic Progression (AP): n th term = $a + (n-1)d$; sum of n terms $S_n = \frac{n}{2}[2a + (n-1)d]$.
- Geometric Progression (GP): n th term = $ar^{(n-1)}$; sum $S_n = \frac{a(r^n - 1)}{(r - 1)}$ for $r \neq 1$; sum to infinity = $\frac{a}{1-r}$ for $|r| < 1$.
- Identify whether a sequence is AP (common difference) or GP (common ratio) before applying formulas.

Binary Operations

- A binary operation (e.g. $a*b = a + b - ab$) combines two elements of a set to give a unique result in the set.
- Test for commutativity: $a*b = b*a$. Test for associativity: $(a*b)*c = a*(b*c)$.
- The identity element e satisfies $a*e = e*a = a$; the inverse of a satisfies $a*a^{-1} = e$.

Matrices and Determinants

- Add/subtract matrices by combining corresponding entries; matrices must have the same order.
- Multiply matrices only when the number of columns in the first equals the number of rows in the second.
- For a 2×2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$, determinant = $ad - bc$; inverse = $\frac{1}{\det} \times \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$.
- Use the inverse matrix method or Cramer's rule to solve simultaneous equations.

SECTION III

Geometry and Trigonometry

Euclidean Geometry

- Angles on a straight line sum to 180° ; angles at a point sum to 360° ; vertically opposite angles are equal.
- Angle sum of a triangle = 180° ; exterior angle = sum of the two opposite interior angles.
- Circle theorems: angle at the centre = $2 \times$ angle at the circumference; angles in the same segment are equal; angle in a semicircle = 90° .
- For polygons, sum of interior angles = $(n-2) \times 180^\circ$; sum of exterior angles is always 360° .

Mensuration

- Circle: area = πr^2 , circumference = $2\pi r$. Rectangle: area = $l \times b$. Triangle: area = $\frac{1}{2} \text{ base} \times \text{height}$.
- Cylinder: volume = $\pi r^2 h$, curved surface area = $2\pi r h$. Sphere: volume = $\frac{4}{3}\pi r^3$, surface area = $4\pi r^2$.
- Cone: volume = $\frac{1}{3}\pi r^2 h$, curved surface area = $\pi r l$ (l = slant height).
- Always check whether a question wants total surface area (include base/top) or curved/lateral surface area only.

Loci

- The locus of points equidistant from two fixed points is the perpendicular bisector of the line joining them.
- The locus of points equidistant from two lines is the angle bisector between them.
- The locus of points a fixed distance from a point is a circle; from a line, it is a pair of parallel lines.

Coordinate Geometry

- Distance between two points = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Midpoint = $((x_1 + x_2)/2, (y_1 + y_2)/2)$.
- Gradient $m = (y_2 - y_1)/(x_2 - x_1)$. Parallel lines have equal gradients; perpendicular lines have gradients that multiply to -1 .
- Equation of a line: $y - y_1 = m(x - x_1)$, or $y = mx + c$ where c is the y -intercept.

Trigonometry

- SOHCAHTOA: $\sin\theta = \text{opp/hyp}$, $\cos\theta = \text{adj/hyp}$, $\tan\theta = \text{opp/adj}$ — for right-angled triangles.
- Sine rule: $a/\sin A = b/\sin B = c/\sin C$. Cosine rule: $a^2 = b^2 + c^2 - 2bc \cdot \cos A$ — used for non-right-angled triangles.
- Key identity: $\sin^2\theta + \cos^2\theta = 1$. Know exact values of $\sin$, $\cos$, $\tan$ for 0° , 30° , 45° , 60° , 90° .
- Angles of elevation and depression are measured from the horizontal; they are equal (alternate angles) between two observers.

SECTION IV

Calculus

Differentiation

- Power rule: if $y = ax^n$, $dy/dx = anx^{(n-1)}$. Differentiate term by term for polynomials.
- The derivative gives the gradient of a curve/rate of change at a point; $dy/dx = 0$ at a turning point.
- Know the derivatives of simple trig functions: $d/dx(\sin x) = \cos x$, $d/dx(\cos x) = -\sin x$.

Application of Differentiation

- To find maxima/minima: set $dy/dx = 0$, solve for x , then use the second derivative (d^2y/dx^2) — positive means minimum, negative means maximum.
- Rate of change problems connect two related quantities via the chain rule (e.g. $dV/dt = dV/dr \times dr/dt$).
- Equation of the tangent to a curve at a point uses the gradient found from dy/dx at that point.

Integration

- Power rule for integration: $\int ax^n dx = a x^{(n+1)}/(n+1) + C$ (add a constant of integration for indefinite integrals).
- Definite integrals (with limits) give the area under a curve: evaluate the antiderivative at the upper limit minus the lower limit.
- Integration is the reverse process of differentiation — check your answer by differentiating it back.

SECTION V

Statistics

Representation of Data

- Bar charts compare discrete categories; histograms show continuous frequency distributions with no gaps between bars.
- A pie chart divides 360° proportionally: angle for a category = $(\text{frequency}/\text{total}) \times 360^\circ$.
- A cumulative frequency curve (ogive) is used to read off the median and quartiles graphically.

Measures of Location

- Mean = sum of values $\div$ number of values (for grouped data, use $\Sigma fx / \Sigma f$ with class midpoints).
- Median is the middle value when data is ordered; for grouped data, read from the ogive at the $(N/2)$ th position.
- Mode is the most frequently occurring value; a distribution can have more than one mode.

Measures of Dispersion

- Range = highest value - lowest value. Mean deviation = average of the absolute differences from the mean.
- Variance = average of squared deviations from the mean; standard deviation = $\sqrt{\text{variance}}$.
- A smaller standard deviation means data is more tightly clustered around the mean.

Permutation and Combination

- Permutation (order matters): $nPr = \frac{n!}{(n-r)!}$. Combination (order doesn't matter): $nCr = \frac{n!}{r!(n-r)!}$.
- Use permutations for arrangements (e.g. seating, passwords) and combinations for selections (e.g. choosing a team).
- Remember $0! = 1$, and $n! = n \times (n-1) \times \dots \times 1$.

Probability

- Probability of an event = number of favourable outcomes $\div$ total possible outcomes; always between 0 and 1.
- Addition rule (mutually exclusive events, 'OR'): $P(A \text{ or } B) = P(A) + P(B)$.
- Multiplication rule (independent events, 'AND'): $P(A \text{ and } B) = P(A) \times P(B)$.
- For dependent events (without replacement), the probability of the second event changes based on the first outcome.



ZENOVA JAMB SCHEME OF WORK

ENGLISH LANGUAGE

Lexis • Structure • Comprehension • Oral Forms • The Lekki Headmaster

JAMB English rewards precision — in grammar rules, in vocabulary, and in reading closely.
Build your foundation month by month, then spend Month 6+ on timed practice.

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MONTH 1

Grammar Foundations

Parts of Speech

- The eight parts of speech: noun, pronoun, verb, adjective, adverb, preposition, conjunction, interjection.
- A noun names a person, place, thing, or idea; a pronoun replaces a noun (he, she, it, they).
- Adjectives describe nouns; adverbs describe verbs, adjectives, or other adverbs and often end in -ly.
- Prepositions show relationships (in, on, at, under); conjunctions join words or clauses (and, but, because).

Tenses

- Present simple (I write), present continuous (I am writing), present perfect (I have written).
- Past simple (I wrote), past continuous (I was writing), past perfect (I had written).
- Future forms use 'will' or 'going to'; be careful with irregular verb forms (go→went→gone).
- Match tense to time markers in the sentence — words like 'yesterday', 'since', 'already' signal which tense is correct.

Concord (Subject-Verb Agreement)

- A singular subject takes a singular verb; a plural subject takes a plural verb (He runs / They run).
- Collective nouns (team, family, government) usually take a singular verb when acting as one unit.
- Two subjects joined by 'and' take a plural verb; subjects joined by 'or'/'nor' agree with the nearer subject.
- Indefinite pronouns like 'everyone', 'nobody', 'each' take a singular verb.

Sentence Patterns

- Simple sentence: one independent clause. Compound sentence: two independent clauses joined by a conjunction.
- Complex sentence: an independent clause plus one or more dependent clauses (using 'because', 'although', 'when').
- Watch for sentence fragments (incomplete thoughts) and run-on sentences (two sentences fused without proper punctuation).

MONTH 2

Vocabulary Building

Synonyms

- A synonym is a word with a similar meaning; context determines the best synonym, not just dictionary meaning.
- Build word families around common JAMB roots (e.g. words meaning 'happy': elated, jubilant, ecstatic).
- Practice replacing the underlined word with each option and check which preserves the sentence's meaning and tone.

Antonyms

- An antonym is a word with the opposite meaning; some words have more than one antonym depending on context.
- Learn prefixes that create opposites: un-, in-, dis-, im-, non- (happy/unhappy, possible/impossible).
- Be careful with 'near opposites' — JAMB often includes distractors that are only partially opposite.

Idioms

- An idiom's meaning cannot be worked out from the individual words (e.g. 'kick the bucket' = to die).
- Learn idioms in full phrases, not word-by-word, and note the correct preposition used with each.
- Common idiom categories: body parts (foot the bill), animals (let the cat out of the bag), colours (green with envy).

Vocabulary Building

- Read widely and note new words in context; a word's meaning often shifts slightly with the sentence around it.
- Learn common Latin/Greek roots (bio=life, phon=sound, tele=far) to decode unfamiliar words quickly.
- Group words by theme (emotions, professions, sizes) to recall them faster under exam pressure.

MONTH 3

Comprehension and Interpretation

Comprehension Techniques

- Skim the passage first for the general idea, then read the questions before re-reading for specific answers.
- Answers are usually paraphrased, not copied word-for-word — match ideas, not exact phrases.
- Watch for the author's tone and purpose (to inform, persuade, entertain, criticise) — this is often tested directly.

Cloze Test Practice

- Read the whole passage once before filling any gaps — later sentences often clarify earlier blanks.
- Focus on grammatical fit (tense, preposition, part of speech) as well as meaning.
- Eliminate options that are grammatically wrong first, then choose the best remaining option for meaning.

Sentence Interpretation

- Identify the literal meaning first, then consider any implied or figurative meaning.
- Look out for words that reverse meaning — negatives, contrasts ('however', 'but'), and qualifiers ('only', 'except').
- Choose the option that captures the full sense of the sentence, not just part of it.

MONTH 4

Oral English

Oral English — Overview

- Oral English tests how words are pronounced, stressed, and how sounds relate to each other — not spelling.
- Use a standard phonetic reference (like the International Phonetic Alphabet) when practising, since English spelling is not a reliable guide to pronunciation.

Vowels

- English has monophthongs (pure vowel sounds, e.g. /i:/ in 'seat') and diphthongs (two vowel sounds gliding together, e.g. /aɪ/ in 'time').
- Words that look similar can have very different vowel sounds — e.g. 'bread' /e/ vs 'bead' /i:/.
- Practice minimal pairs (words differing by one sound) to sharpen your ear: ship/sheep, cat/cut.

Consonants

- Consonants can be voiced (vocal cords vibrate, e.g. /b/, /d/, /z/) or voiceless (no vibration, e.g. /p/, /t/, /s/).
- Silent letters are common in English (e.g. 'k' in knife, 'b' in comb) — learn these as exceptions.
- Some letters represent multiple sounds depending on the word (e.g. 'c' in 'cat' vs 'city').

Stress and Intonation

- Word stress falls on one syllable more strongly than others; stress can change a word's meaning or class (e.g. 'PREsent' noun vs 'preSENT' verb).
- Intonation is the rise and fall of pitch across a sentence — rising for yes/no questions, falling for statements and wh-questions.
- Two-syllable nouns are commonly stressed on the first syllable; verbs are commonly stressed on the second.

MONTH 5

The Lekki Headmaster (Set Text)

The Lekki Headmaster — Overview

- Study the novel's plot structure, setting, and the social issues it explores in a Nigerian school context.
- Identify the central conflict driving the story and how it develops across the narrative.

Theme Analysis

- Identify major themes (e.g. leadership, integrity, corruption, tradition vs modernity) and find textual evidence for each.
- Link themes to real events in the plot — examiners reward answers that cite specific incidents, not vague statements.
- Consider how the title itself reflects a central theme of the novel.

Character Study

- Know the major characters' traits, motivations, and how they change (or fail to change) through the story.
- Be ready to compare and contrast two characters, and to explain a character's significance to the plot's resolution.
- Note the author's method of characterisation — through dialogue, action, or narration.

MONTH 6+

Exam Practice and Mastery

Past Questions

- Work through past JAMB English questions under timed conditions to build familiarity with question style.
- Review every wrong answer to understand the specific rule or reading skill you missed.

Weekly CBT Tests

- Simulate the computer-based test environment weekly to build speed and reduce exam-day anxiety.
- Track your score trends by topic to identify which areas still need review.

Mock JAMB Examinations

- Sit full-length mock exams under real time constraints to build stamina and pacing.
- In the final weeks, prioritise reviewing your weakest topics over learning new material.



ZENOVA JAMB SCHEME OF WORK

BIOLOGY

Cell Biology • Classification • Physiology • Genetics • Ecology • Evolution

Biology is a subject of precise language — examiners reward exact terms and correctly labelled diagrams. Learn definitions properly, and always link structure to function.

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MONTH 1

Introduction to Biology and Cell Biology

Characteristics of Living Things

- All living things show: nutrition, respiration, excretion, growth, reproduction, movement, sensitivity (irritability), and adaptation (often remembered as 'MRS GREN').

Cell Structure and Functions

- The cell is the basic unit of life; organelles include the nucleus (control centre), mitochondria (respiration/energy), and ribosomes (protein synthesis).
- The cell membrane controls movement of substances in and out via diffusion, osmosis, and active transport.

Plant and Animal Cells

- Plant cells have a cell wall, large vacuole, and chloroplasts; animal cells lack these but may have small vacuoles and centrioles.
- Chloroplasts contain chlorophyll for photosynthesis — found only in plant cells and some protists.

Levels of Organization

- Cells → tissues → organs → organ systems → organism, in increasing order of complexity.

Tissues, Organs and Systems

- A tissue is a group of similar cells performing a specific function (e.g. muscle tissue, epithelial tissue).
- An organ system is a group of organs working together for a common function (e.g. digestive system).

MONTH 2

Classification and Variety of Organisms

Classification of Living Things

- The hierarchy of classification: Kingdom, Phylum, Class, Order, Family, Genus, Species (a common mnemonic: King Philip Came Over For Good Soup).
- Binomial nomenclature names a species using genus + species (e.g. *Homo sapiens*), genus capitalised and italicised/underlined.

Monera, Protista and Fungi

- Monera (bacteria) are prokaryotic, unicellular, lacking a true nucleus; Protista are mostly unicellular eukaryotes (e.g. *Amoeba*, *Paramecium*).
- Fungi are eukaryotic, mostly multicellular, absorb nutrients (not photosynthetic), and have cell walls made of chitin.

Plant Kingdom

- Major plant groups: Thallophyta (algae), Bryophyta (mosses), Pteridophyta (ferns), and Spermatophyta (seed plants — gymnosperms and angiosperms).

Animal Kingdom

- Invertebrates (no backbone: e.g. Porifera, Coelenterata, Platyhelminthes, Annelida, Arthropoda, Mollusca) vs Vertebrates (with backbone: Pisces, Amphibia, Reptilia, Aves, Mammalia).

Adaptations of Organisms

- Structural, physiological, and behavioural adaptations help organisms survive in their specific habitats (e.g. desert, aquatic).

MONTH 3

Plant and Animal Physiology

Internal Structure of Plants

- Root, stem, and leaf each have specialised tissues — xylem transports water/minerals upward, phloem transports manufactured food (translocation).

Nutrition and Photosynthesis

- Photosynthesis equation: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$, occurring in chloroplasts.
- Factors affecting photosynthesis rate: light intensity, carbon dioxide concentration, and temperature (limiting factors).

Mammalian Nutrition

- Digestion breaks food into absorbable units: mechanical (chewing) and chemical (enzymes) digestion work together.
- Key enzymes: amylase (starch→sugars), protease/pepsin (proteins→amino acids), lipase (fats→fatty acids and glycerol).

Transport Systems

- In mammals, the heart pumps blood through a double circulatory system (pulmonary and systemic); blood carries oxygen, nutrients, and waste.
- In plants, transpiration pull drives water movement up the xylem from roots to leaves.

Respiration

- Aerobic respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$, occurring mainly in mitochondria.
- Anaerobic respiration occurs without oxygen, producing less energy (e.g. lactic acid in muscles, ethanol in yeast).

MONTH 4

Support, Movement and Excretion

Excretion in Plants and Animals

- Excretion is the removal of metabolic waste; mammals excrete via kidneys (urea), lungs (CO₂), and skin (sweat).
- Plants excrete waste through leaves (as gases) or store it in structures like resins and tannins.

Support Tissues

- Plants rely on turgor pressure and structural tissues (like sclerenchyma) for support; animals rely on a skeleton.

Skeleton and Joints

- The mammalian skeleton provides support, protection, movement (with muscles), and blood cell production.
- Joint types include ball-and-socket (hip), hinge (knee), and pivot (neck) — each allowing different ranges of motion.

Tropic Movements

- Tropisms are directional plant growth responses to stimuli: phototropism (light), geotropism (gravity), hydrotropism (water).

Coordination and Control

- The nervous system (fast, electrical) and endocrine system (slow, hormonal) coordinate body responses.
- A reflex arc allows a rapid, automatic response to a stimulus without conscious brain involvement.

MONTH 5

Reproduction, Growth and Genetics

Asexual Reproduction

- Involves one parent, no fusion of gametes, producing genetically identical offspring (e.g. binary fission, budding, vegetative propagation).

Sexual Reproduction

- Involves the fusion of male and female gametes, producing genetically varied offspring.
- In flowering plants, pollination (transfer of pollen) precedes fertilisation, then seed and fruit formation.

Growth and Germination

- Germination requires water, oxygen, and a suitable temperature to activate enzymes that mobilise stored food in the seed.
- Growth can be measured by increase in length, mass, or cell number over time.

Heredity and Variation

- Genes (on chromosomes) carry hereditary information; alleles are alternative forms of a gene.
- A Punnett square predicts offspring genotype/phenotype ratios from a genetic cross; dominant alleles mask recessive ones in a heterozygote.
- Variation can be continuous (e.g. height) or discontinuous (e.g. blood group), and arises from genetic and/or environmental factors.

Sex Determination

- In humans, sex is determined by sex chromosomes: XX (female), XY (male); the father's sperm determines the offspring's sex.

MONTH 6

Ecology and Environment

Ecosystems

- An ecosystem includes all living organisms (biotic) and non-living factors (abiotic — light, temperature, soil) interacting in an area.

Food Chains and Food Webs

- Energy flows from producers → primary consumers → secondary consumers → tertiary consumers; a food web links multiple interconnected food chains.
- Energy decreases at each trophic level (only about 10% is passed on), which is why food chains rarely exceed 4-5 levels.

Population Ecology

- Population size is affected by natality, mortality, immigration, and emigration.
- Carrying capacity is the maximum population size an environment can sustainably support.

Natural Habitats

- A habitat is the natural home of an organism; major habitat types include aquatic (freshwater/marine) and terrestrial (forest, savanna) habitats.

Soil and Conservation

- Soil composition includes mineral particles, organic matter (humus), water, air, and living organisms.
- Conservation practices (crop rotation, afforestation, terracing) reduce soil erosion and maintain fertility.

Humans and Environment

- Human activities (deforestation, pollution, overfishing) disrupt ecosystems; conservation and sustainable practices help mitigate this.

MONTH 6+

Evolution and Exam Mastery

Evolution Theories

- Lamarck's theory proposed inheritance of acquired characteristics (now largely discredited); Darwin's theory of natural selection proposes that favourable variations improve survival and reproduction chances.

Evidence of Evolution

- Evidence includes fossils (showing gradual change over time), comparative anatomy (homologous structures), and comparative embryology.

JAMB Past Questions and CBT Practice Tests

- Practice past questions across all topics regularly, focusing especially on diagram-based and definition-based questions.

Mock JAMB Exams, Speed and Accuracy Training

- Time yourself strictly during mock exams to build the pace needed for the full paper.

Revision Classes and Final Exam Preparation

- In final revision, focus on high-yield areas: cell biology, ecology, genetics, and classification, which recur most often.



ZENOVA JAMB SCHEME OF WORK

CHEMISTRY

Matter • Structure • Reactions • Acids & Bases • Organic Chemistry

Chemistry combines factual recall (the periodic table, definitions) with calculation (mole concept, stoichiometry). Build both strands together, month by month.

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MONTH 1

Introduction to Chemistry

Separation of Mixtures

- Filtration separates an insoluble solid from a liquid; evaporation/crystallisation recovers a dissolved solid.
- Distillation separates liquids with different boiling points; fractional distillation separates several miscible liquids.
- Chromatography separates components based on differing solubility/movement through a medium.

Purification Techniques

- A pure substance has a fixed melting/boiling point; impurities lower the melting point and raise the boiling point.
- Recrystallisation purifies a solid by dissolving in hot solvent, then cooling to reform pure crystals.

Chemical Combination

- Law of conservation of mass: mass of reactants = mass of products in a chemical reaction.
- Law of constant/definite proportions: a compound always contains the same elements in the same fixed mass ratio.

Mole Concept

- One mole of any substance contains 6.02×10^{23} particles (Avogadro's number).
- Number of moles = mass/molar mass = concentration $\times$ volume (for solutions) = volume/24 dm³ (for gases at room temperature).
- Molar mass is calculated by summing atomic masses according to the chemical formula.

Stoichiometry

- Use mole ratios from a balanced equation to calculate reacting masses, volumes, or number of moles of reactants/products.
- Always balance the chemical equation first before doing any stoichiometric calculation.

Chemical Equations

- A balanced equation has equal numbers of each atom on both sides; use state symbols (s, l, g, aq) where required.
- Ionic equations show only the species that actually react, cancelling out spectator ions.

MONTH 2

Matter and Atomic Structure

Kinetic Theory of Matter

- Particles in solids vibrate in fixed positions; in liquids they move and slide past each other; in gases they move freely and rapidly.
- Increasing temperature increases the kinetic energy and average speed of particles.

Gas Laws

- Boyle's Law, Charles' Law, and the general gas equation $PV = nRT$ relate pressure, volume, temperature, and moles of gas.
- Ideal gases are assumed to have negligible particle volume and no intermolecular forces — real gases deviate at high pressure/low temperature.

Atomic Structure

- An atom consists of protons (positive, in nucleus), neutrons (neutral, in nucleus), and electrons (negative, orbiting).
- Atomic number = number of protons; mass number = protons + neutrons; isotopes have the same atomic number but different mass numbers.

Electron Configuration

- Electrons fill shells in order of increasing energy: 2, 8, 8, 18... following the $2n^2$ rule per shell.
- The number of electrons in the outermost (valence) shell determines an element's chemical behaviour and group in the periodic table.

Periodic Table

- Elements are arranged by increasing atomic number; groups (columns) share similar valence electrons and properties.
- Across a period, atomic radius decreases and electronegativity increases; down a group, atomic radius increases and electronegativity decreases.

Chemical Bonding

- Ionic bonding: transfer of electrons between metal and non-metal, forming oppositely charged ions held by electrostatic attraction.
- Covalent bonding: sharing of electron pairs between non-metal atoms; can be single, double, or triple bonds.
- Metallic bonding: a lattice of positive metal ions held together by a 'sea' of delocalised electrons, explaining conductivity and malleability.

MONTH 3

Air, Water and Environment

Air and Its Components

- Air is mainly nitrogen (~78%) and oxygen (~21%), with small amounts of carbon dioxide, argon, and water vapour.
- Fractional distillation of liquefied air separates its components by their different boiling points.

Water and Hardness

- Hard water contains dissolved calcium/magnesium ions that reduce soap lathering and cause scale/limescale.
- Temporary hardness is removed by boiling; permanent hardness requires ion exchange or adding washing soda.

Solubility

- Solubility is the maximum mass of solute that dissolves in 100g of solvent at a given temperature.
- For most solids, solubility increases with temperature; for gases, solubility decreases as temperature rises.

Solutions and Colloids

- A true solution has particles too small to scatter light; a colloid has intermediate-sized particles that scatter light (Tyndall effect); a suspension has visibly large particles that settle.

Environmental Pollution

- Air pollutants include CO, SO₂, NO_x, and particulates — leading to acid rain and respiratory problems.
- Water pollution arises from industrial waste, sewage, and agricultural runoff (fertilisers/pesticides).

Water Treatment

- Water treatment stages typically include sedimentation, filtration, and chlorination/disinfection before distribution.

MONTH 4

Acids, Bases and Physical Chemistry

Acids, Bases and Salts

- Acids release H⁺ ions in water and turn blue litmus red; bases release OH⁻ ions and turn red litmus blue.
- A salt is formed when an acid reacts with a base (neutralisation): $\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$.
- Salts can also form via acid + metal, or acid + metal carbonate reactions.

pH and pOH

- pH scale runs from 0 (strongly acidic) to 14 (strongly basic); pH 7 is neutral.
- $\text{pH} + \text{pOH} = 14$ at room temperature; each pH unit represents a tenfold change in H⁺ concentration.

Hydrolysis

- Hydrolysis is the reaction of a substance with water, often breaking it into simpler components (e.g. salts of weak acids/bases hydrolyse to give non-neutral solutions).

Oxidation and Reduction

- Oxidation is loss of electrons (or gain of oxygen); reduction is gain of electrons (or loss of oxygen) — remember 'OIL RIG'.
- A redox reaction involves both oxidation and reduction occurring simultaneously; oxidation numbers help track electron transfer.

Electrolysis

- Electrolysis uses electrical energy to drive a non-spontaneous chemical reaction, decomposing an electrolyte.
- Cations move to the cathode (reduction occurs); anions move to the anode (oxidation occurs).

Energy Changes

- Exothermic reactions release heat to the surroundings (temperature rises); endothermic reactions absorb heat (temperature falls).
- Enthalpy change (ΔH) is negative for exothermic reactions and positive for endothermic reactions.

MONTH 5

Chemical Reactions

Rates of Chemical Reactions

- Reaction rate increases with higher concentration, higher temperature, larger surface area, and the presence of a catalyst.
- Rate can be measured by monitoring change in concentration, volume of gas produced, or mass loss over time.

Catalysts

- A catalyst speeds up a reaction by providing an alternative pathway with lower activation energy, without being consumed.
- Catalysts do not change the position of equilibrium — they help a reaction reach equilibrium faster.

Activation Energy

- Activation energy is the minimum energy required for reactant particles to collide successfully and react.
- Only particles with energy equal to or greater than the activation energy can react upon collision (collision theory).

Chemical Equilibrium

- A reversible reaction reaches dynamic equilibrium when the forward and reverse reaction rates become equal.
- At equilibrium, concentrations of reactants and products remain constant, though both reactions continue to occur.

Le Chatelier's Principle

- If a system at equilibrium is disturbed (change in concentration, pressure, or temperature), it shifts to counteract the change.
- Increasing pressure favours the side with fewer gas moles; increasing temperature favours the endothermic direction.

Industrial Applications

- The Haber process (ammonia) and Contact process (sulfuric acid) apply equilibrium principles to maximise industrial yield.

MONTH 6+

Inorganic and Organic Chemistry, and Exam Practice

Non-Metals and Their Compounds

- Know the preparation, properties, and uses of key non-metal compounds (e.g. ammonia, hydrogen chloride, carbon dioxide, sulfur dioxide).

Metals and Alloys

- The reactivity series ranks metals by how readily they react/lose electrons; more reactive metals displace less reactive ones from compounds.
- Alloys are mixtures of a metal with other elements, altering properties like strength and corrosion resistance (e.g. steel, brass).

Organic Chemistry

- Organic chemistry is the study of carbon compounds; carbon's ability to form four bonds allows long chains and rings.
- A functional group is the reactive part of an organic molecule that determines its chemical behaviour (e.g. -OH for alcohols).

Hydrocarbons

- Alkanes (single bonds, saturated) follow C_nH_{2n+2} ; alkenes (contains a double bond, unsaturated) follow C_nH_{2n} .
- Alkenes decolourise bromine water (test for unsaturation); alkanes do not react readily with bromine water in the cold/dark.

Polymers

- A polymer is a large molecule made of repeating monomer units; addition polymerisation joins monomers without losing atoms (e.g. polythene from ethene).

Chemistry and Industry

- Petroleum refining uses fractional distillation to separate hydrocarbons by boiling point for different uses (petrol, diesel, kerosene).

JAMB Revision, CBT Practice Tests and Mock Exams

- Consolidate the periodic table, common formulas, and reaction equations into a single revision sheet.
- Practice balancing equations and mole calculations repeatedly — these appear across nearly every JAMB Chemistry paper.



ZENOVA JAMB SCHEME OF WORK

PHYSICS

Measurement • Mechanics • Heat • Waves • Electricity • Modern Physics

Physics rewards understanding over memorisation. Learn the concept behind each formula, practice unit conversions carefully, and always sketch a diagram before solving.

STUDY SMARTER • WIN BIGGER

MONTH 1

Measurements and Motion

Measurements and Units

- SI base units: metre (length), kilogram (mass), second (time), ampere (current), kelvin (temperature).
- Derived units are combinations of base units (e.g. speed = m/s, force = kg·m/s² = Newton).
- Always convert to consistent units before calculating, and express final answers to appropriate significant figures.

Scalars and Vectors

- Scalars have magnitude only (mass, speed, distance, time); vectors have magnitude and direction (velocity, force, displacement).
- Add vectors using the parallelogram law, triangle method, or by resolving into perpendicular (x and y) components.
- Resultant of two perpendicular vectors: $R = \sqrt{A^2 + B^2}$, direction $\theta = \tan^{-1}(B/A)$.

Motion

- Equations of motion (constant acceleration): $v = u + at$; $s = ut + \frac{1}{2}at^2$; $v^2 = u^2 + 2as$.
- Speed = distance/time (scalar); velocity = displacement/time (vector); acceleration = change in velocity/time.
- On a velocity-time graph, gradient = acceleration and area under the graph = distance travelled.
- Projectile motion combines constant horizontal velocity with vertical motion under gravity ($g \approx 9.8 \text{ m/s}^2$).

Gravitational Field

- Newton's law of gravitation: $F = G \frac{m_1 m_2}{r^2}$, where G is the universal gravitational constant.
- Weight = mass $\times$ gravitational field strength ($W = mg$); mass is constant but weight varies with location.
- Escape velocity is the minimum speed needed to overcome a planet's gravitational pull.

MONTH 2

Forces and Energy

Equilibrium of Forces

- A body is in equilibrium when the net force and net torque (moment) acting on it are both zero.
- Principle of moments: sum of clockwise moments = sum of anticlockwise moments about a pivot.
- Resolve forces into components to check equilibrium along each axis independently.

Work, Energy and Power

- Work done = Force $\times$ distance moved in the direction of the force ($W = Fd$); measured in Joules.
- Kinetic energy = $\frac{1}{2}mv^2$; Potential energy = mgh ; the law of conservation of energy states total energy remains constant.
- Power = work done/time taken = Fv ; measured in Watts.

Friction

- Friction opposes relative motion between surfaces; limiting friction = $\mu \times$ normal reaction.
- Static friction (before motion starts) is generally greater than kinetic/dynamic friction (during motion).
- Friction can be reduced using lubricants, rollers, or streamlining; it is useful for walking, braking, and gripping.

Simple Machines

- Mechanical Advantage (MA) = Load/Effort; Velocity Ratio (VR) = distance moved by effort/distance moved by load.
- Efficiency = $(MA/VR) \times 100\%$; always less than 100% due to friction and other energy losses.
- Common machines: levers, pulleys, inclined planes, wheel and axle — know the VR formula for each type.

Elasticity

- Hooke's Law: extension is proportional to applied force within the elastic limit ($F = ke$, k = spring constant).
- Beyond the elastic limit, a material undergoes permanent deformation and no longer obeys Hooke's Law.
- Elastic potential energy stored in a spring = $\frac{1}{2}ke^2$.

MONTH 3

Thermal Physics

Pressure and Liquids at Rest

- Pressure = Force/Area; liquid pressure $P = h\rho g$ (depth $\times$ density $\times$ gravitational field strength).
- Pascal's principle: pressure applied to an enclosed fluid is transmitted equally in all directions (basis of hydraulic machines).
- Archimedes' principle: upthrust on a submerged object equals the weight of fluid displaced — explains floating and sinking.

Temperature and Thermal Expansion

- Temperature measures the degree of hotness; thermometers use properties like the expansion of mercury/alcohol.
- Linear expansivity describes how much a solid expands per unit length per degree rise in temperature.
- Solids generally expand more than liquids, which expand more than gases, for the same temperature rise.

Gas Laws

- Boyle's Law (constant temperature): $PV = \text{constant}$. Charles' Law (constant pressure): $V/T = \text{constant}$.
- Pressure Law (constant volume): $P/T = \text{constant}$. Combined: $P_1V_1/T_1 = P_2V_2/T_2$.
- Temperature must always be converted to Kelvin ($K = ^\circ\text{C} + 273$) when using gas law equations.

Quantity of Heat

- Heat energy $Q = mc\Delta\theta$, where c is specific heat capacity (energy needed to raise 1 kg by 1°C).
- Specific latent heat is the energy needed to change the state of 1 kg of a substance without changing its temperature.
- Heat flows from a hotter body to a colder one until thermal equilibrium is reached.

Change of State and Vapours

- The four states of matter change via melting, boiling/evaporation, condensation, and freezing/solidification.
- Evaporation occurs at any temperature at the liquid's surface; boiling occurs throughout the liquid at a fixed temperature.
- Saturated vapour pressure increases with temperature; boiling occurs when vapour pressure equals atmospheric pressure.

MONTH 4

Waves and Optics

Heat Transfer

- Conduction (mainly in solids, via particle vibration), convection (in fluids, via density-driven currents), and radiation (via electromagnetic waves, needs no medium).
- Dark, matte surfaces are good absorbers/emitters of radiation; shiny, light surfaces are good reflectors.

Waves

- Wave equation: $v = f\lambda$ (speed = frequency $\times$ wavelength); period $T = 1/f$.
- Transverse waves (particles move perpendicular to travel direction, e.g. light) vs longitudinal waves (particles move parallel, e.g. sound).
- Properties of waves: reflection, refraction, diffraction, and interference.

Sound Waves

- Sound is a longitudinal wave requiring a material medium; it cannot travel through a vacuum.
- Speed of sound is fastest in solids, slower in liquids, slowest in gases; echo problems use distance = speed $\times$ time / 2.
- Pitch relates to frequency; loudness relates to amplitude.

Light Energy

- Light travels in straight lines (rectilinear propagation), demonstrated by shadow formation and pinhole cameras.
- The electromagnetic spectrum ranges from radio waves (long wavelength) to gamma rays (short wavelength), with visible light in between.

Reflection of Light

- Laws of reflection: angle of incidence = angle of reflection; incident ray, reflected ray, and normal lie in the same plane.
- Mirror formula: $1/f = 1/u + 1/v$ (f = focal length, u = object distance, v = image distance).
- Concave mirrors converge light (real or virtual images); convex mirrors diverge light (always virtual, diminished images).

Refraction of Light

- Refraction is the bending of light as it passes between media of different densities, due to a change in speed.
- Snell's Law: $n = \sin(i)/\sin(r)$; refractive index n = speed in vacuum/speed in medium.
- Total internal reflection occurs when light travels from a denser to a less dense medium beyond the critical angle.

Optical Instruments

- The human eye focuses light using the cornea and lens onto the retina; common defects are short-sightedness (myopia) and long-sightedness (hypermetropia), corrected with diverging/converging lenses.
- Simple microscopes and telescopes use converging lenses to magnify images — know the basic ray diagrams for each.

MONTH 5

Electricity and Magnetism

Electrostatics

- Like charges repel, unlike charges attract; charge is measured in Coulombs.
- Coulomb's Law: $F = kq_1q_2/r^2$ — force between two point charges.
- Charging occurs by friction, induction, or contact; charge resides on the outer surface of a conductor.

Capacitors

- A capacitor stores electric charge; capacitance $C = Q/V$ (charge stored per unit voltage), measured in Farads.
- Capacitors in parallel: $C_{\text{total}} = C_1 + C_2 + \dots$; capacitors in series: $1/C_{\text{total}} = 1/C_1 + 1/C_2 + \dots$

Electric Cells

- A cell converts chemical energy to electrical energy; EMF is the total energy per unit charge including internal resistance.
- Cells in series add up their EMFs; cells in parallel keep the same EMF but can supply more current for longer.

Current Electricity

- Ohm's Law: $V = IR$ (voltage = current $\times$ resistance), valid for conductors at constant temperature.
- Resistors in series: $R_{\text{total}} = R_1 + R_2 + \dots$; in parallel: $1/R_{\text{total}} = 1/R_1 + 1/R_2 + \dots$
- Electrical power $P = VI = I^2R = V^2/R$; energy consumed = power $\times$ time.

Magnetism and Magnetic Fields

- Magnetic field lines run from north to south outside a magnet; like poles repel, unlike poles attract.
- A current-carrying conductor produces a circular magnetic field around it (right-hand grip rule).
- Magnetic materials (iron, cobalt, nickel) can be magnetised and demagnetised; permanent vs temporary magnets.

Electromagnetic Induction

- Faraday's Law: an EMF is induced when magnetic flux through a circuit changes.
- Lenz's Law: the induced current opposes the change that produced it (conservation of energy).
- This principle underlies generators (mechanical to electrical energy) and transformers (changing AC voltage).

Simple A.C. Circuits

- Alternating current (AC) periodically reverses direction, unlike direct current (DC) which flows one way.
- Transformers use mutual induction: $V_p/V_s = N_p/N_s$ (primary/secondary voltage ratio equals turns ratio).

Modern Physics, Electronics and Exam Practice

Conduction of Electricity Through Liquids and Gases

- Electrolytes conduct electricity via ion movement; electrolysis separates compounds using electric current.
- Gases conduct electricity at low pressure or high voltage, producing effects used in fluorescent tubes and neon lights.

Elementary Modern Physics

- Radioactivity involves the emission of alpha, beta, or gamma radiation from unstable nuclei; each has different penetrating power and charge.
- Half-life is the time taken for half of a radioactive sample to decay.
- The photoelectric effect shows light can behave as particles (photons), supporting the dual wave-particle nature of light.

Introductory Electronics

- A diode allows current to flow in one direction only; used for rectification (converting AC to DC).
- A transistor can act as a switch or amplifier; basic types are NPN and PNP.

Practical Skills and Experimental Methods

- Know how to read instruments correctly (ammeter, voltmeter, metre rule) and avoid/minimise parallax and zero errors.
- Understand common circuit setups for verifying Ohm's Law and determining resistivity.

Data Analysis and Graphs

- Plot graphs with clear axes labels and units; the gradient and intercept often represent physical constants.
- Practice extracting values (like g , resistance, or refractive index) from a straight-line graph.

Revision and Past Questions

- Work through past JAMB Physics questions to identify recurring formula-based questions.
- Keep a formula sheet and review it daily during revision.

Mock Tests and Exam Strategy

- Practice under timed conditions; skip and return to time-consuming calculation questions.
- Double-check unit conversions (cm to m, g to kg) before final calculations — a common source of error.



ZENOVA JAMB SCHEME OF WORK

AGRICULTURAL SCIENCE

Soils • Crop Production • Animal Production • Agric Economics • Technology

Agricultural Science blends biology, economics, and practical farm knowledge. Learn the 'why' behind each practice — examiners favour reasoning over rote facts.

STUDY SMARTER • WIN BIGGER

MONTH 1

General Agriculture

Meaning and Scope of Agriculture

- Agriculture is the science and practice of cultivating crops and rearing animals for food, raw materials, and economic purposes.
- Branches include crop production, animal production, agricultural economics, extension, and engineering.

Importance of Agriculture

- Agriculture provides food, raw materials for industry, employment, foreign exchange, and raw materials for research.

Agricultural Ecology

- Agro-ecology studies the interaction between crops/livestock and their environment (climate, soil, biotic factors).
- Ecological factors like rainfall, temperature, and light determine which crops or animals thrive in a region.

Genetics (in Agriculture)

- Selective breeding and hybridisation improve desirable traits in crops and livestock (e.g. yield, disease resistance).

Farm Inputs

- Key inputs include land, labour, capital, seeds/seedlings, fertilisers, and farm implements.

History of Agricultural Development

- Agriculture has evolved from traditional/subsistence farming to mechanised and technology-driven commercial farming.

MONTH 2

Government, Soil Science

Government and NGOs in Agriculture

- Government agencies and NGOs support farmers through extension services, subsidies, research, and credit facilities.

Rocks and Soil Formation

- Soil forms from the weathering (physical, chemical, biological) of parent rock material over time, combined with organic matter.
- The three main rock types are igneous, sedimentary, and metamorphic.

Soil Water

- Soil water exists as gravitational (drains away), capillary (available to plants), and hygroscopic (tightly bound, unavailable) water.

Soil Conservation

- Methods include contour ploughing, terracing, cover cropping, mulching, and afforestation, to prevent erosion and nutrient loss.

Soil Fertility

- Fertility depends on nutrient content, organic matter, pH, and soil structure; it is maintained via manuring, fertiliser application, and crop rotation.

Land Preparation and Tillage

- Tillage operations (ploughing, harrowing, ridging) loosen soil, control weeds, and prepare a good seedbed.

MONTH 3

Crop Production

Plant Forms and Functions

- Roots anchor the plant and absorb water/nutrients; stems support and transport; leaves photosynthesise; flowers enable reproduction.

Growth and Reproduction (Crops)

- Crops reproduce sexually (via seeds) or asexually (via vegetative parts like cuttings, tubers, suckers).

Plant Propagation

- Vegetative propagation methods include cuttings, budding, grafting, and layering, used to preserve desirable genetic traits.

Cropping Systems

- Monocropping grows a single crop; mixed/intercropping grows multiple crops together to maximise land use and reduce pest risk.
- Crop rotation alternates different crop types on the same land across seasons to maintain soil fertility.

Planting Patterns

- Common patterns include row planting, broadcasting, and dibbling — chosen based on crop type and mechanisation level.

Plant Density

- Optimum plant density (spacing) balances competition for light, water, and nutrients against maximising total yield per hectare.

MONTH 4

Agronomy and Crop Management

Crop Husbandry

- Involves the full set of practices — planting, weeding, fertilising, irrigation, and harvesting — needed to raise a healthy crop.

Pasture and Forage Crops

- Pasture (grasses/legumes grown for grazing) and forage crops (cut and fed to animals) support livestock nutrition.

Floriculture

- Floriculture is the cultivation of flowers and ornamental plants for aesthetic and commercial purposes.

Weeds

- Weeds compete with crops for light, water, and nutrients; controlled by cultural (weeding, mulching), mechanical, biological, or chemical (herbicide) methods.

Crop Diseases

- Crop diseases are caused by fungi, bacteria, viruses, or nematodes; controlled through resistant varieties, crop rotation, and chemical treatment (fungicides).

Crop Pests

- Pests (insects, rodents, birds) damage crops directly or spread disease; controlled via cultural, biological, and chemical (pesticide) methods.

Forest Management

- Sustainable forest management balances timber/resource extraction with conservation and reforestation.

Crop Improvement

- Crop improvement uses selection, hybridisation, and biotechnology to develop higher-yielding, disease-resistant varieties.

MONTH 5

Animal Production

Farm Animal Classification

- Farm animals are classified by function (dairy, beef, poultry), by stomach type (ruminants vs monogastric), or by size.

Animal Anatomy and Physiology

- Ruminants (cattle, goats, sheep) have a four-chambered stomach (rumen, reticulum, omasum, abomasum) adapted to digesting fibrous plant material.

Reproduction in Farm Animals

- Reproductive efficiency depends on breeding methods (natural mating, artificial insemination) and proper management of gestation periods.

Animal Nutrition

- Feed nutrients include carbohydrates, proteins, fats, vitamins, minerals, and water — each essential for growth, energy, and health.

Livestock Management

- Good management covers housing, feeding schedules, health monitoring, and record-keeping to maximise productivity.

Animal Health

- Preventive measures (vaccination, sanitation, quarantine) reduce disease incidence; common livestock diseases have specific causes and control methods.

Fisheries and Wildlife

- Fisheries involve rearing/harvesting fish (aquaculture or capture fisheries); wildlife management focuses on conservation of wild animal populations.

Bee Keeping (Apiculture)

- Bee keeping produces honey and beeswax and supports crop pollination, boosting yields of many fruit and vegetable crops.

Animal Improvement

- Selective breeding and cross-breeding improve desirable traits like milk yield, growth rate, and disease resistance in livestock.

MONTH 6+

Agricultural Economics and Technology

Factors of Production

- The four factors are land, labour, capital, and management (entrepreneurship) — each earning a specific reward (rent, wages, interest, profit).

Demand and Supply

- Demand is the quantity of a product buyers are willing to purchase at a given price; supply is the quantity producers are willing to sell — price is set where they meet (equilibrium).

Farm Management

- Farm management involves planning, organising, and controlling farm resources to achieve maximum profitable output.

Agricultural Marketing

- Marketing covers the processes of moving agricultural produce from farm to consumer, including grading, storage, transport, and sales.

Agricultural Extension

- Extension services transfer research findings and improved practices from research institutions to farmers.

Farm Surveying

- Surveying measures and maps farmland to guide planning, boundary demarcation, and resource allocation.

Farm Machinery and Mechanization

- Mechanisation (tractors, harvesters) increases efficiency and scale but requires capital investment and maintenance skills.

Biotechnology

- Agricultural biotechnology includes techniques like tissue culture and genetic modification to improve crop/livestock traits.

ICT in Agriculture

- ICT tools support precision farming, market information access, and data-driven decision-making for farmers.

Agricultural Statistics

- Basic statistical tools help analyse yield data, costs, and returns to guide farm decisions.

Mock CBT Tests and Past Questions Practice

- Practice past JAMB Agricultural Science questions regularly, paying close attention to definitions and classification-style questions.



ZENOVA JAMB SCHEME OF WORK

GEOGRAPHY

Maps • The Earth • Physical Processes • Climate • Human Geography • Regional Geography

Geography connects map skills with an understanding of both physical processes and human activity. Practice map reading regularly and always link a place's geography to how people live there.

SECTION 1

Practical Geography

Maps

- A map is a scaled, symbolic representation of an area; know common map symbols, direction (compass points, bearings), and conventional signs.

Scale and Measurement

- Map scale can be a statement (1cm to 1km), a ratio (1:50,000), or a linear scale bar.
- Distance on the ground = distance on map $\times$ scale; area calculations use the scale squared.

Map Reading and Interpretation

- Contour lines join points of equal height; closely spaced contours indicate steep slopes, widely spaced ones indicate gentle slopes.
- Practice identifying relief, drainage patterns, and settlement/vegetation features from topographic maps.

Statistical Data and Diagrams

- Geographic data is represented using bar graphs, pie charts, line graphs, and choropleth (shading) maps — know how to read and construct each.

Elementary Surveying

- Basic surveying measures land features and distances using tools like chains, tapes, and compasses to produce accurate maps.

Geographic Information System (GIS)

- GIS is a computer-based system for capturing, storing, analysing, and displaying geographically referenced data, used in modern planning and mapping.

SECTION 2

The Earth and Earth Crust

The Earth as a Planet

- The Earth is the third planet from the sun, nearly spherical, and rotates on its axis (causing day/night) while orbiting the sun (causing seasons/year).

Latitudes, Longitudes and Time

- Latitudes are horizontal lines measuring distance north/south of the Equator (0°); longitudes are vertical lines measuring distance east/west of the Greenwich Meridian (0°).
- The Earth rotates 360° in 24 hours, so 15° of longitude equals a 1-hour time difference; places east of Greenwich are ahead in time.

Rocks: Types and Formation

- Igneous rocks form from cooled magma/lava; sedimentary rocks form from compressed layers of sediment; metamorphic rocks form when existing rocks are altered by heat and pressure.

Earth Movements

- Tectonic plate movements cause folding (mountain formation), faulting (rock fracture and displacement), and volcanic/seismic activity.

Major Landforms

- Key landforms include mountains, plateaus, plains, and valleys — each formed by specific combinations of earth movement, erosion, and deposition.

SECTION 3

Physical Processes

Volcanism

- Volcanism is the movement of molten rock (magma) to the Earth's surface, forming volcanoes; can be active, dormant, or extinct.

Earthquakes

- Earthquakes result from the sudden release of energy along a fault line, often at tectonic plate boundaries; measured using the Richter scale.

Weathering

- Weathering breaks down rock in place: physical (temperature changes, frost action), chemical (reaction with water/acids), and biological (plant roots, organisms).

Erosion

- Erosion is the removal and transport of weathered material by agents like rivers, wind, waves, and ice.

Mass Movement

- Mass movement is the downhill movement of rock/soil under gravity (e.g. landslides, soil creep, rockfalls), often triggered by heavy rainfall.

Deposition

- Deposition occurs when an erosional agent loses energy and drops its transported material, forming features like deltas, sand dunes, and floodplains.

SECTION 4

Climate and Environment

Water Bodies (Oceans, Lakes, Rivers)

- Oceans cover most of the Earth's surface and regulate global climate; rivers follow a course from source to mouth, shaped by erosion, transportation, and deposition.

Weather and Climate

- Weather is the day-to-day state of the atmosphere; climate is the average weather pattern of a region over a long period (30+ years).
- Key climate elements: temperature, rainfall, humidity, pressure, and wind — measured with specific instruments (thermometer, rain gauge, barometer).

Vegetation

- Natural vegetation types (rainforest, savanna, desert, etc.) are determined mainly by climate, especially rainfall and temperature.

Soils

- Soil types and fertility vary with climate, parent rock, vegetation, and time — directly shaping agricultural potential of a region.

Environmental Resources

- Natural resources are classified as renewable (forests, water, solar energy) or non-renewable (minerals, fossil fuels).

Environmental Hazards and Conservation

- Hazards include flooding, drought, desertification, and pollution; conservation strategies include afforestation, regulated resource use, and protected areas.

SECTION 5

Human Geography

Population

- Population studies cover distribution, density, growth rate, and structure (age-sex composition, often shown on population pyramids).

Settlement

- Settlements are classified by size/function (rural vs urban) and pattern (nucleated, dispersed, linear), influenced by relief, water supply, and economic activity.

Economic Activities

- Primary (extraction — farming, mining), secondary (manufacturing), tertiary (services), and quaternary (information/research) sectors describe the structure of an economy.

Agriculture (Geographic Perspective)

- Agricultural systems vary with climate, soil, and economic development — from subsistence farming to large-scale commercial agriculture.

Transport and Communication

- Transport networks (road, rail, water, air) and communication systems link production areas to markets, driving economic development.

Trade and Tourism

- Trade involves the exchange of goods/services domestically and internationally; tourism generates income and employment through the movement of visitors to attractive destinations.

SECTION 6+

Regional Geography and Exam Practice

Nigeria: Physical and Human Features

- Know Nigeria's major relief regions, river systems (Niger, Benue), climate zones, and vegetation belts from south to north.

Natural Resources (Nigeria)

- Nigeria's key resources include petroleum, natural gas, agricultural land, and various solid minerals distributed across different regions.

Economic Geography of Nigeria

- Nigeria's economy spans agriculture, oil and gas, manufacturing, and services — know the major produce and industries by region.

ECOWAS

- ECOWAS (Economic Community of West African States) promotes regional economic integration and cooperation among West African nations.

Revision, Past Questions and Mock Tests

- Practice map reading and past JAMB Geography questions regularly to strengthen both physical and human geography recall.

Exam Strategy

- Read map-based questions carefully and refer directly to the given map/data before answering — many marks are lost through rushed map interpretation.



About Zenova Study

Zenova Study is an educational platform dedicated to helping students prepare effectively for JAMB and other academic examinations.

We provide structured learning resources, revision materials, practice questions, expert-led classes, and study guides designed to make learning simpler, smarter, and more effective.

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