

5TH GRADE SCIENCE

TABLE OF CONTENTS

CHAPTER 1— CHARACTERISTICS OF LIVING & NONLIVING THINGS

TOPIC A: Characteristics of Plants, Animals, and Single-Celled Organisms	
PART 1: Cellular Basis of Life.....	1
PART 2: Cellular Function.....	3
PART 3: Comparisons of Plant and Animal Cells.....	3
PART 4: Comparisons of Single-Celled and Multicellular Organisms.....	6
PART 5: Levels of Cellular Organization.....	7
PART 6: Plants.....	7
PART 7: Animals.....	10
PART 8: Biological Classification System.....	11
TOPIC B: Functions and Interactions of the Major Human Organ Systems	
PART 1: Basic Function and Interaction of Organ Systems.....	13
PART 2: Digestive System.....	13
PART 3: Respiratory System (Gas Exchange).....	15
PART 4: Excretory System.....	15
PART 5: Circulatory System (Movement of Substances to and from Cells).....	16
PART 6: Skeletal and Muscular Systems (Locomotion).....	16
PART 7: Nervous and Endocrine Systems (Regulation and Response).....	17
PART 8: Reproductive System.....	17
PART 9: Immune System and Germ Theory.....	18
TOPIC C: Writing Prompts.....	18

CHAPTER 2— HEREDITY & GENETICS

TOPIC A: Sexual and Asexual Mechanisms of Reproduction	
PART 1: Genes, DNA, and Chromosomes.....	19
PART 2: Asexual Reproduction.....	21
PART 3: Sexual Reproduction.....	22
TOPIC B: Mechanisms Related to Inheritance	
PART 1: Genetic Traits.....	23
PART 2: Dominant and Recessive Genes.....	25
PART 3: Models of Genetic Inheritance.....	26
TOPIC C: Writing Prompts.....	27

CHAPTER 3— EVOLUTION

TOPIC A: Mechanisms for Evolution	
PART 1: Variation Resulting from Sexual Reproduction and Mutation.....	29
PART 2: Environmental Change and Adaptation for Survival.....	31
PART 3: Selective Breeding and Genetic Engineering.....	34
TOPIC B: Competition between Species.....	35
TOPIC C: Extinction and the Fossil Record.....	38
TOPIC D: Writing Prompts.....	41

CHAPTER 4— CONTINUITY OF LIFE

TOPIC A: Variations in Reproductive Patterns	
PART 1: Asexual Reproduction.....	43
PART 2: Sexual Reproduction.....	45
TOPIC B: Role of Sperm and Egg Cells in Sexual Reproduction.....	46
TOPIC C: Developmental Patterns in Plants and Animals	
PART 1: Cellular Division.....	47
PART 2: Embryo Development and Growth.....	47
PART 3: Body Structure and Function Change.....	48
PART 4: Different Patterns of Development Among Animals (Metamorphosis).....	48
PART 5: Different Patterns of Development among Plants.....	51
TOPIC D: Cell Division at the Microscopic Level.....	53

TOPIC E: Writing Prompts	56
CHAPTER 5— DYNAMIC EQUILIBRIUM	
TOPIC A: Basic Life Functions and Maintaining Dynamic Equilibrium	
PART 1: Animal/Plant Structures and Body Plan for Homeostasis	59
PART 2: Body Plan and Environment Determine Life Functions.....	60
PART 3: Energy	61
PART 4: Producers and Consumers	61
PART 5: Herbivores, Carnivores, Omnivores, and Decomposers.....	63
PART 6: Regulation and Feedback Mechanism.....	64
PART 7: Sense of and Response to the External Environment.....	65
TOPIC B: Nutrients, Vitamins, and Minerals	
PART 1: Food is Fuel Life Needs for Life Processes.....	68
PART 2: Important Nutritional Compounds Needed for Survival	68
PART 3: Metabolism.....	71
PART 4: Energy is Measured by Calories.....	71
PART 5: Results of a Balanced Diet or a Nutritional Imbalance	72
PART 6: Disruption of Dynamic Equilibrium (Disease, Toxicity, Pregnancy)	75
TOPIC C: Writing Prompts.....	75
CHAPTER 6— INTERACTIONS BETWEEN PLANTS & ANIMALS IN THEIR ECOSYSTEMS	
TOPIC A: Flow of Energy and Matter	
PART 1: Flow of Energy in Food Chains or Energy Pyramids.....	79
PART 2: Feeding Relationships in Food Webs.....	83
PART 3: Cycle of Matter between the Living and Nonliving Environment	
Section a: Decomposers.....	89
Section b: Nitrogen Cycle.....	90
Section c: Oxygen and Carbon Cycles.....	94
Section d: Water Cycle	97
TOPIC B: Photosynthesis	
PART 1: Process of Photosynthesis	99
PART 2: Exchange of Gases in the Atmosphere.....	103
PART 3: Niche of Plants as Producers.....	103
TOPIC C: Writing Prompts.....	105
CHAPTER 7— HUMAN IMPACT ON THE PHYSICAL & LIVING ENVIRONMENT	
TOPIC A: Dependence of Living Things on Their Environment	
PART 1: Environmental Organization	107
PART 2: Factors Affecting Population Sizes	109
PART 3: Interactions of Organisms in the Environment.....	114
PART 4: Dependency on Microorganisms.....	118
PART 5: Effects of Pollutants on the Environment.....	119
TOPIC B: Changes in an Ecosystem	
PART 1: Balance in an Ecosystem.....	121
PART 2: Ecological Succession	122
PART 3: Impact of Overpopulation and Habitat Destruction	124
PART 4: Impact of Humans on the Environment.....	126
TOPIC C: Writing Prompts.....	127
CHAPTER 8— OUR EARTH & CELESTIAL PHENOMENA	
TOPIC A: Observations of Earth and Our Solar System	129
PART 1: The Nature of Our Sun and Other Stars	130
PART 2: Celestial Bodies in Our Solar System	132
PART 3: Gravitational Orbits.....	135
PART 4: Observation of Predictable Motion from the Earth	135
PART 5: Latitude/Longitude Coordinate System and Time.....	137
PART 6: Our Moon and Its Phases	139
PART 7: Earth's Rotation and Revolution.....	144
PART 8: Tilt of Earth's Axis and Duration of Sunlight.....	146
TOPIC B: Writing Prompts.....	148

CHAPTER 9— EARTH'S NONLIVING INTERACTIONS

TOPIC A: Interactions between Earth's Atmosphere, Hydrosphere, and Lithosphere	
PART 1: Earth's Atmosphere	151
PART 2: Atmospheric Altitude versus Pressure	151
PART 3: Lithosphere	152
PART 4: Hydrosphere	153
PART 5: Earth's Minerals	154
PART 6: Earth's Fossils	156
PART 7: Chemical and Mechanical Weathering	157
PART 8: Sediment and Soil	160
PART 9: Erosion	165
PART 10: Water Cycle	175
TOPIC B: Earth's Dynamic Crust and Rocks	
PART 1: Earth's Dynamic Crust	177
PART 2: Earth's Rocks and Rock Cycle	179
TOPIC C: Earth's Weather and Climate	182
TOPIC D: Writing Prompts	190

CHAPTER 10— CHEMISTRY & REACTIVITY OF MATTER

TOPIC A: Properties of Materials	
PART 1: Properties of Substances	195
PART 2: Solubility and Reaction Rates	198
PART 3: Particle Motion and Attraction	199
PART 4: Phases of State	202
PART 5: Separation of Mixtures	203
PART 6: Density and Comparative Density (Buoyancy)	204
TOPIC B: Chemical and Physical Change	
PART 1: Physical Change	206
PART 2: Mixtures	207
PART 3: Chemical Change	208
PART 4: Classification of Substances	209
PART 5: Law of Conservation of Mass	209
TOPIC C: Atomic Concepts	
PART 1: Atomic Nature of Matter	210
PART 2: Chemical Reactions	211
PART 3: Elements and Compounds	211
PART 4: Periodic Table of Elements	212
TOPIC D: Writing Prompts	213

CHAPTER 11— ENERGY

TOPIC A: Sources and Transformations of Energy	
PART 1: The Sun, Nuclear Energy, and Geothermal Energy	215
PART 2: Non-Renewable and Renewable Energy	217
PART 3: Transformations of Energy	219
PART 4: Types of Energy	221
PART 5: Kinetic and Potential Energy	222
TOPIC B: Nature of Heat	
PART 1: Flow of Heat	223
PART 2: Conduction, Convection, and Radiation	226
PART 3: Change of Phase When Energy is Absorbed or Released	227
PART 4: Expansion and Contraction Caused by Heat Transfer	228
PART 5: Temperature's Effect on Solubility	229
TOPIC C: Energy Changes in Chemical Reactions	229
TOPIC D: Properties of Sound, Light, Electricity, and Magnetism	
PART 1: Wavelengths of Electromagnetic Energy	231
PART 2: Movement of Light through Materials	232
PART 3: Vibrational (Sound) Waves	236
PART 4: Sources and Transformations of Electrical Energy	237
PART 5: Electrical Circuits Transfer Electrical Energy	238

PART 6: Attraction and Repulsion in Electrically-Charged Materials.....	240
PART 7: Attraction and Repulsion in Magnets.....	242
TOPIC E: Conservation of Energy.....	244
TOPIC F: Writing Prompts.....	247

CHAPTER 12— FORCE & MOTION

TOPIC A: Patterns of Motion of Objects	
PART 1: Perspective of Motion.....	249
PART 2: Force's Effect on Motion.....	249
PART 3: Magnitude of Force as Related to Mass and Acceleration.....	252
PART 4: Equal and Opposite Reactions.....	254
TOPIC B: Effect of Forces on Motion	
PART 1: Gravitational Force and Gravity.....	255
PART 2: Force of Electric Currents and Magnets.....	256
PART 3: Friction and Methods of Reducing Friction.....	256
PART 4: Simple Machines.....	258
TOPIC C: Writing Prompts.....	262

CHAPTER 13— SCIENTIFIC INQUIRY & THE SCIENTIFIC METHOD

TOPIC A: Field and Laboratory Safety Procedures and Ethical Practices	
PART 1: Field Investigations.....	265
PART 2: Laboratory Investigations.....	267
TOPIC B: Scientific Inquiry Methods	
PART 1: Planning and Implementing Descriptive and Simple Experimental Investigations.....	270
PART 2: Collecting Information through Observation and Measurement.....	277
PART 3: Constructing Reasonable Explanations from Direct and Indirect Evidence.....	284
PART 4: Forming Valid Conclusions.....	293
PART 5: Constructing Simple Graphs, Tables, Maps, and Charts to Organize, Examine, and Evaluate Data.....	303
TOPIC C: Critical Thinking and Scientific Problem Solving Skills	
PART 1: Analyzing, Reviewing, and Critiquing Scientific Explanations.....	318
PART 2: Drawing Inferences Based on Models and Promotional Materials.....	327
PART 3: Representing the Natural World Using Models and Identifying Their Limitations.....	338
TOPIC D: Tools and Methods Necessary to Conduct Scientific Inquiry	
PART 1: Determining the Correct Tool to Use for Collecting and Analyzing Information.....	349
PART 2: Using Tools and Verifying the Reliability of Results.....	358
TOPIC E: Writing Prompts.....	366

APPENDIX—ELEMENTARY SCIENCE CHART.....	371
---	------------