

Science In Action 7 - Year-End Summary - Study Guide

Unit 1 – Interactions and Ecosystems

1.0 Relationships in an Ecosystem

- ❖ Ecosystems are where **biotic** and **abiotic** factors interact
- ❖ Symbiotic relationships include: **Commensalism** (One benefit – other no effect), **Mutualism** (Both benefit), **Parasitism** (One benefits – one harmed)
- ❖ Basic Needs include: Water, Energy, Food, Exchange of gases, Space (Habitat), Waste disposal
- ❖ Responsible Environmental Decision-making is made with scientific information and considers the impact such decisions have on the environment

2.0 Energy Flow

- ❖ **Food Webs** allow energy (supplied by the Sun) to flow
- ❖ Matter continuously moves from non-living to living and back to non-living in two cycles: **Water cycle** and **Carbon Cycle**
- ❖ Changes in a food web affect all living things in that ecosystem

3.0 Environmental Monitoring

- ❖ Ecosystems provide all needs for living things
- ❖ Ecosystems change because of: Human activity, Bio-Invasion, Resource competition, Predation, Weather

4.0 Sustainability in an Ecosystem

- ❖ Pesticides can be deadly, as they enter and move through an ecosystem
- ❖ Human actions can impact the local and global communities
- ❖ Scientific information can help in decision-making, but cannot explain everything
- ❖ Local environmental problems require input from many sources before a final informed decision can be made

Unit 2 – Plants For Food And Fibre

1.0 Structures and Life Processes

- ❖ Seed plants have roots, stems, leaves and either flowers or cones
- ❖ Each structure performs a specific function
- ❖ Life processes in plants include: **Photosynthesis, Transpiration Gas exchange (cellular respiration)**
- ❖ Seed plant life cycle includes three stages: **Seed stage, Seedling stage, and Adult stage**
- ❖ **Pollination** is the joining of pollen and ovary
- ❖ Seed plants can also reproduce in ways not involving seeds: **Runners, rhizomes, suckers, cuttings and grafting**
- ❖ Adaptations help plants get what they need from the environment
- ❖ Growing conditions varies between and among plants, and can be modified using technology

2.0 Role of Plants to Meet Human Needs

- ❖ Plants supply oxygen and food
- ❖ Plants are used for food, fibre (to make things), medicine, and other products
- ❖ Natural resources vs Managed resources

3.0 Soil

- ❖ Minerals and organic matter in different amounts make clay, sandy soil or loam
- ❖ Growing and harvesting methods can improve or degrade soil

4.0 Growing and Using Plants - Sustainability

- ❖ **Selective breeding** provides specific desirable traits
- ❖ New varieties may lead to environmental problems
- ❖ **Resistance**, loss of species or pollution can occur with long term use of herbicides and pesticides
- ❖ **Sustainability** – balancing out needs with the needs of the environment and the consequences (social and economic)

Unit 3 – Heat and Temperature

1.0 Technologies for Obtaining and Controlling Heat

- ❖ Heat technologies have evolved over time
- ❖ Culture and technology are linked
- ❖ Evolution has integrated heat-related materials and technologies
- ❖ Choices about the environment involves individuals and society

2.0 Heat Affects Matter

- ❖ Transferring heat to and from matter can cause a change in state
- ❖ The **Particle Model of Matter** explains changes in state and volume
- ❖ **Conduction** (in contact), **Convection** (circular motion) and **Radiation** (waves)
- ❖ **Thermal energy** is the total kinetic energy of the particles in a substance – heat is transferred from an area of high kinetic energy to an area of low kinetic energy

- ❖ **Temperature** is the measure of the average kinetic energy of the particles in a substance

3.0 Natural Phenomena and Technology Devices

- ❖ Thermal energy is produced by the Sun, decay, fire and geothermal
- ❖ **Passive** and **Active** solar heating systems use the sun's energy and are environmentally friendly
- ❖ **Thermostats** control temperature in heating systems
- ❖ Insulation helps block unwanted heat transfer (heat loss)
- 4.0 **Benefits and Costs of Heat Technologies**
- ❖ Non-renewable resources have a limited supply
- ❖ Fossil fuels are the major sources of heating, but degrade the environment
- ❖ Costs of using natural resources: **economic, environmental and societal**
- ❖ Energy Alternatives: **solar, wind, geothermal, nuclear and hydro-electric (gravitational)**

Unit 4 – Structures and Forces

1.0 Natural and man-made (Manufactured)

- ❖ Structural forms can be **shells, frames** or **solids**
- ❖ Each structure performs a specific function and can vary in its design
- ❖ Climate, culture, tradition, technology and economics influence the design of a structure

2.0 External and Internal Forces act on structures

- ❖ Effect of a force on a structure depends on **magnitude, direction** and **location** of the force
- ❖ **External** force is applied on the outside of a structure
- ❖ **Stability** is affected by the changes in the mass distribution and the design of its foundation
- ❖ A structure's ability to withstand a load depends on its overall strength and stability
- ❖ Performance standards are included in the overall structural design
- ❖ **Internal** forces include **compression, tension** and **shear**.
- ❖ Material shape and properties determine resistance to internal forces acting on them
- ❖ Structures undergo **structural stress, fatigue** and **failure**
- 3.0 **Strength and Stability**
- ❖ Natural and synthetic materials are classified by a range of properties
- ❖ Strength and flexibility of materials can be tested – **deformation**
- ❖ **Joints** – fixed or movable – friction, bonding or flexibility
- ❖ **Stability, strength** and **function** rely on the proper use of materials
- 4.0 **Designing, Evaluating and Improving to Meet Human Needs**
- ❖ Environmental factors can affect the stability and safety of a structure
- ❖ **Corrugation** and **Lamination** can strengthen materials
- ❖ Structural evaluation criteria: **costs, benefits, safety** and **potential environmental impact**

Unit 5 – Planet Earth

1.0 Changes on the Earth's Surface

- ❖ Layers: **Crust, Mantle, Core** (Inner and Outer)
- ❖ **Earthquakes** and **Volcanoes** can suddenly change the Earth's surface
- ❖ Scientists' use a variety of tools and technologies to investigate the Earth's forces
- ❖ Wind, water and ice change the Earth's surface slowly

2.0 Rock Cycle

- ❖ Rocks are composed of minerals and have distinctive characteristics
- ❖ Three classes include: **igneous, metamorphic** and **sedimentary**
- ❖ Breaking down and transforming rock is explained in the **rock cycle**
- ❖ Sedimentary rocks are the most common found in Alberta

3.0 Landforms change

- ❖ The **Theory of Plate Tectonics** describes the huge chunks of rock called plates that move on the Earth's surface
- ❖ Continents and Ocean floors are carried on the plates which are moving on the partly melted mantle
- ❖ The collisions and rubbing together of these plates forms the mountains

4.0 Fossils – Evidence of Earth's Changes over Time

- ❖ **Fossils** are living or non-living things preserved in stone
- ❖ Fossil evidence is interpreted and conclusions are based mostly on inferences because the fossil remains are incomplete
- ❖ **Geological Time** divides the history of the Earth into four periods, called **Eras**.
- ❖ Determining what animals and plants looked like from fossil records is often based on inferences