

STEM TRAINING

UNIT 2 – ASSIGNMENT # 2 – ANSWERS

Task 1: Unpacking Content Standards

Unpack this content standard taking from science subject: ***Students will be able to explain the nature and the processes of scientific inquiry and use the modes of scientific inquiry and habits of mind to investigate and interpret the world around them.***

1. Student Should

- Explain the nature and the processes of scientific inquiry.
- Investigate and interpret the world around them

Students should

- Use different approaches and ways to investigate and interpret the world around them.
- Use different habits of mind to investigate and interpret the world around them.

2 BENCH MARKS

- Demonstrate understanding on the processes of science inquiry and investigate the world around them
- Evaluate factors that affect the world around them..
- Propose actionable strategies for maintaining a healthy environment.

3 Demonstrate understanding on the processes of inquiry and investigate the world around them.

- What Makes A Healthy Soil
- Apply convection current as a cooling down system
- Disposal of Waste
- Explain Buoyancy using Archimede's Principal

4. Project Plan/ Lesson Plan: What Makes a Healthy Soil

Content Standards

Students will be able to:

- Understand and explain the components and functions of soil in ecosystems,
- Analyze the impact of human activities on soil health.
- Identify sustainable practices that promotes soil conservation.

BENCH MARKS

- Demonstrate understanding of soil composition and it's role in supporting life
- Evaluate factors that contribute to or degraded soil health.
- Propose actionable strategies for maintaining healthy soil n their local environment.

KEY QUESTIONS

1. What are the physical, chemical and biological components of soil?
2. Why is soil important for ecosystems and agriculture?
3. What practices help maintain or restores soil health?
4. How does soil degradation affect food security and biodiversity.

OBJECTIVES

Students will:

- Identify the components of healthy soil (organic matter, minerals, organisms, moisture, pH).
- Compare soil samples and asses their health.
- Understand the role of soil in supporting plant life and ecosystems.
- Develop a soil health improvement plan.

VOCABULARY

Health, Soil, Ecosystem, Environment, Biodiversity, Physical , Chemical, Biological.

KNOWLEDGE

Students will learn

- Soil layers (horizons) and their functions.
- Nutrient cycles and organic matter.
- Role of microorganisms and fauna in soil health.
- Effects of erosion, pollution and deforestation on soil.

SKILLS

Students will develop

- Observation and data collection techniques
- Soil testing methods (pH, texture, moisture , organic content).
- Critical thinking and problem- solving,
- Communication and collaboration through group project and presentations.

ATTITUDE

Students will cultivate

- Curiosity about natural systems.
- Responsibility towards environment.
- Appreciation for the complexity and importance of soil.

VALUES

Students will embrace

- Stewardship of natural resources.
- Respect for indigenous and traditional knowledge about land and soil .
- Commitment to sustainable living and agriculture.

CONCLUSION

Healthy soil is the foundation of life, it supports plants, filters water, stores carbon and sustains biodiversity. Through this project, students will not only understand what makes soil healthy but also recognise their role in protecting it. Their findings and proposals can be shared with local communities or environmental to inspire real world impact.

LESSON PROCEDURE

Activity Background Knowledge

- Key characteristics of Healthy soil are:
 - Good Structure: A balanced mix of sand, silt and clay allows for proper aeration, water infiltration and root growth.
 - Nutrient Cycling: Efficient exchange and availability of essential nutrients like nitrogen, phosphorus and potassium support plant growth

Materials: Testing and Observation Tools

- **Soil Samples** from different locations (e.g. garden, forest, roadside)
- **Magnifying glass or microscope** to examine soil particles and organisms.
- **pH test strips or soil test kits** to measure acidity, nutrients and moisture.
- **Thermometer** to check soil temperature.
- **Water spray bottle** to moisture testing.

P3

Organic and inorganic Components

- **Compost** to compare with regular soil.
- **Sand, clay and silt** to study soil texture and composition.
- Mulch or leaf litter to observe organic matter.
- Earthworms or other soil organisms (if available) to study biodiversity.

Recording and Analysis Materials

- **Notebook or worksheets** for recording observations.
- **Rulers or measuring tapes** for depths and structure measurements.

- **Digital camera or phone** to document findings.
- **Chart paper or poster board markers notebooks** for presenting results.
- **Gloves, towels, containers.**

Introduction

- Begin with a question: “What do you think makes soil healthy?”
- Show images of healthy vs degraded soil.
- Brief discussion on why soil health matters (plants, food, climate, water)

Activity 1: Soil Sample investigation

Students work in small groups to:

1. Observe soil texture, colour and smell.
2. Use magnifying glasses to look for organisms or organic matter.
3. Record observations in a worksheet

Activity 2: Soil Testing

Each group tests their soil for:

- pH level
- Moisture content
- Nutrient levels (NPK)
- Compare results with compost and sand/clay/ samples

Activity 3: Soil Life & Biodiversity

- Introduce earthworms and other soil organisms.
- Discuss their role in aeration and decomposition.
- Optional: create a mini worm habitat or observe compost bin.

Wrap-Up & Presentation

- Groups create posters or slides showing:
 - Their soil sample results
 - What makes their soil healthy or unhealthy.
 - Suggestion for improving soil health
- Present findings to the class.

P4

Discussion & Reflection

- What surprised you about your soil?
- Why is biodiversity important in soil?
- How can we protect soil in our community?

- Assessment
 - Participation in group activities.
 - Completed worksheets and soil analysis.
 - Poster or presentation quality.
 - Reflection responses

**Rubrics for “ What Makes Soil Healthy” Project/Lesson
Knowledge & Understanding (25 points)**

Criteria	Excellent (21 – 25)	Good (3) (16 – 20)	Satisfactory (11-15)	Needs (0-10)		
Identifies components of healthy soil	Clearly identifies all major components (organic matter, mineral, air, organisms)	Identifies most components with minor errors	Identify some components but lacks clarity	Few or no components identified		
Explain importance of soil health	Provides detailed explanation with examples	Gives general explanation with some examples	Basic explanation with limited detail.	Incomplete or inaccurate explanation		
Scientific Inquiry and Observation (20) points						
Criteria	Excellent (17 – 20)	Good (3) (13 – 16)	Satisfactory (9-12)	Needs (0-8)		
Conduct soil investigation	Thorough and accurate observations uses appropriate tools.	Mostly accurate with minor errors	Basic or limited use of tools observations:	Incomplete or inaccurate observations		
Draw conclusions from data	Insightful conclusions supported by evidence	Reasonable conclusions with some support	Simple conclusions with limited evidence	Conclusions unclear or unsupported		
Application and Problem solving (20 points)						
Criteria	Excellent (17-20)	Good (13-15)	Satisfactory (9-12)	Needs improvement (0-8)		
Suggest ways to improve soil health	Multiple well explained strategies	Several strategies with general reasoning	Few strategies with limited explanation	Little or no understanding of		

	with scientific reasoning			improvement methods		
Connect soil health to environmental impact	Strong connection with examples (e,g erosion , agriculture	General connection with some examples	Basic connection with minimal examples	No clear connection		
Communication and Presentation (15 points)						
Criteria	Excellent (13-15)	Good (10-12)	Satisfactory (7-9)	Needs improvement (0-6)		
Clarity and organisation	Information is well organised, clear and engaging	Mostly clear with minor organisation	Some clarity, presentation lacks flow	Disorganised or difficult to understand.		
Use of visuals or examples	Effective use of visuals and real life examples	Some visuals/examples used appropriately	Limited use of visual /examples	No visuals or examples used		
Collaboration and Participation (20 points)						
Criteria	Excellent (17-20)	Good (13-16)	Satisfactory (9-12)	Needs improvement (0-8)		
Teamwork and cooperation	Actively contributes and support peers	Participates and cooperate with minor issues	Participates occasionally minimal collaboration	Rarely participates or disrupts group work		
Engagement in learning	Highly engaged and curious throughout	Generally engaged with some interest	Shows occasional interest	Disengaged or off-task frequently		

End of Assignment 2