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GO WITH THE FLOW

UNIT: ENVIRONMENTAL & AGRICULTURAL CONCEPTS – ACTIVITY 1

THE PROBLEM

Collaborate with teammates to design and build a working soil erosion prevention model that replicates a real-world erosion prevention technique and retains the most soil possible during a simulated rainfall.

CONSTRAINTS AND CRITERIA

1. Choose one or more of the following erosion prevention methods as inspiration for your soil model.
   - Strip & Contour Farming
   - Terracing
   - Planting Trees & Vegetation
   - Drainage Systems & Energy Dissipators
   - Retention Ponds & Underground Detention Systems
2. Sketch a top view plan of your hillside including labels of materials to be used. Choose from the materials listed below, following any constraint limits set by your teacher.
3. Build according to your plan and present your design. Explain why you chose your method(s) and materials.
4. Observe during the simulated rainfall. Reflect on the effectiveness of your model and compare the results of other methods and designs.

MATERIALS

- Garden Soil (Different soil types could be tested a to represent different regions – sand, potting soil, cactus potting soil, clay, mixtures, etc.)
- Sprinkle Style Watering Can to simulate rainfall
- Paint Roller Trays (one per group – can be propped up for more incline)

Structure material options:

- Pipe Cleaners
- Straws (standard drinking & smoothie sizes)
- Small Plastic or Paper Cups
- Cardboard (different thicknesses - food and packaging boxes work well)
- Paper (different thicknesses – construction, copy, tissue, etc.)
- Aluminum Foil & Coffee Filters
- Popsicle Sticks & Toothpicks

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TOOLS:

- ✓ Pencil
- ✓ Scissors

Be sure to check off each step ☑ as you progress.

☐ **Step#1** – Define the Problem

Read along and listen to your teacher explain the **problem** listed above.

☐ **Step#2** – Define the Criteria

Read along and listen as your teacher reads through and explains the **constraints** and **criteria**.

☐ **Step#3** – Develop Ideas (p. 3)

Brainstorm as a team how the materials could be used in different ways to simulate one or more of the listed erosion prevention methods. Plan what materials you wish to include in your plan. List at least 3 different materials on the chart. Include how it may be used in your model and any pros or cons you predict.

☐ **Step #4** – Develop Solutions (p. 4)

Make a plan about what method(s) and materials you will use. **Sketch** a top view drawing of your hillside and erosion prevention features. **Label** the materials used and draw the amounts you plan to use in the appropriate places. **Predict** what will happen in the simulation.

☐ **Step #5** – Present and Produce (p. 5)

Build your model according to your plan. **Present** your model to the class sharing which erosion prevention method(s) you followed, what materials you chose, and how you predict water to flow through your model. Observe how much soil gets carried away and accumulates in the bottom area of the paint tray. Watch for any structures that become moved or damaged and if any changes happen to your soil landscape during the rainfall. Let the model settle overnight. Compare the soil loss in your model with the others in your class. **Reflect** by answering the questions on page 6.

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STEP 3: Develop Ideas - Use this chart to brainstorm about the materials you may wish to use. You must include at least 3 different materials.

Material	Pros – advantages	Cons - disadvantages
1.		
2.		
3.		

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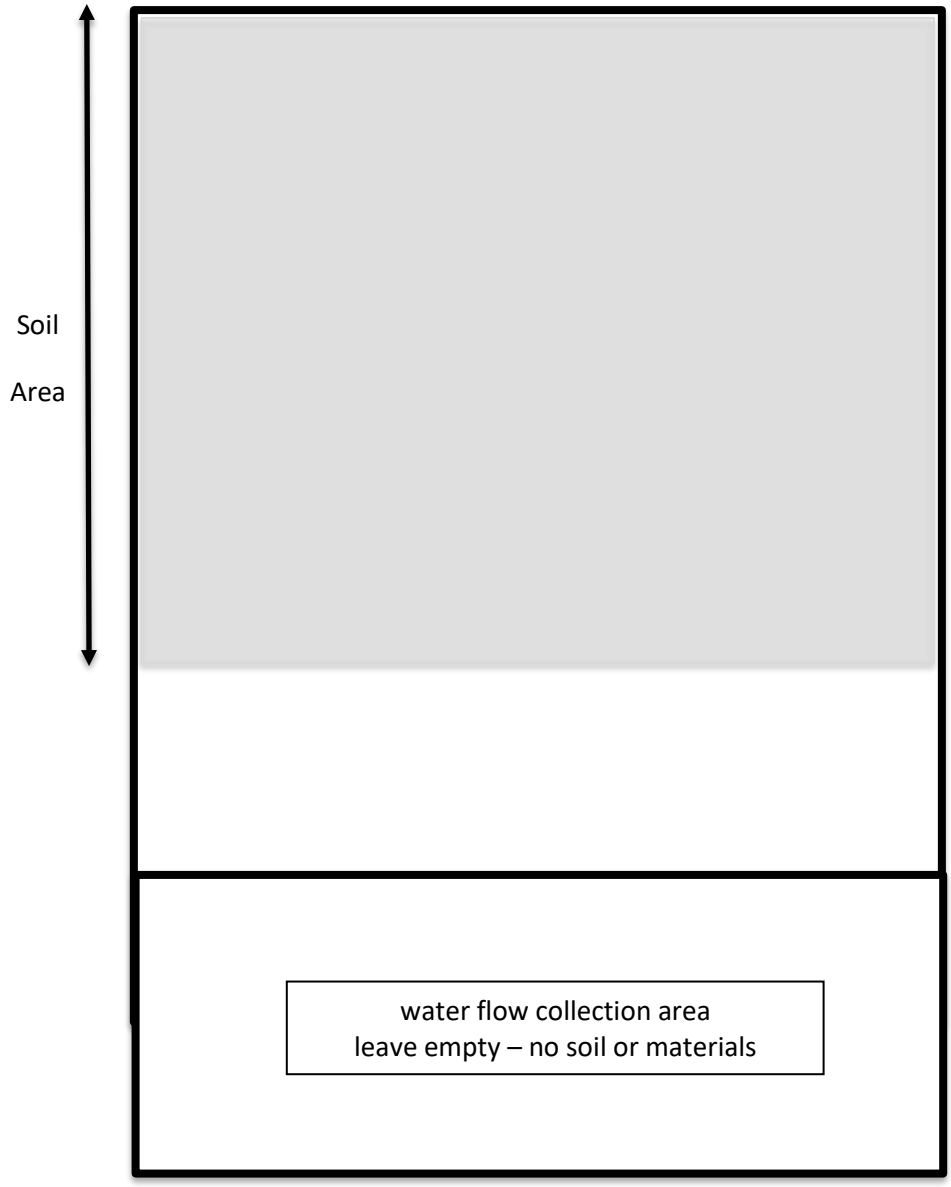
STEP 4: Develop Solutions – The soil will fill the top gray area of the tray. Draw and label each of the materials you plan to include in your model. Include any other labels you feel appropriate. List the method(s) your team is planning to model. Write at least 2 sentences about how you predict the water to flow through your model when sprinkled from the water can at the top of the tray.

Erosion Prevention Method(s):

Predicted Result:



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REFLECTION – Compare the outcome of your erosion model with others in your class.

1. Describe the success of your model after the rainfall.
    - How much soil washed away compared to other models in your class?
    - Did your structures stay in place? Were any of them damaged?
    - Did the landscape of your hillside change? If yes how?
2. View the models in your class.
    - Which erosion prevention technique(s) seemed most successful? Explain.
    - Which materials seemed to work the best and keeping the soil intact during the rainfall? Explain.
3. Describe a real-life location where you've personally seen one of the erosion prevention methods in action. Include the name of the method(s), what is in the surrounding area (homes, farmland, businesses, etc.) and how that prevention method is helping that landscape.

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GRADING RUBRIC:

	Indicator not demonstrated	Indicator partially demonstrated	Indicator adequately demonstrated	Indicator effectively demonstrated
Design Brief & Refection Questions Points ____/4	**Incomplete** Less than 50% complete 1	**Inadequate** Mostly complete; Criterion not met 2	**Adequate** Criterion met; more attention to neatness or detail needed 3	**Exceptional** Meets or exceeds expectations; high effort, attention to detail 4
Material Brainstorming & Sketch Points ____/4	**Incomplete** Incomplete or missing more than one constraint requirement 1	**Inadequate** Mostly complete; Criterion not fully met 2	**Adequate** Brainstorming Chart & Sketch are complete and meet expectations 3	**Exceptional** Excellent details in Brainstorming Chart, Sketch and Labeling 4
Model Build Points __ /4	**Incomplete** Incomplete; No technique modeled or unable to be tested 1	**Inadequate** Technique modeled is unclear or build differs greatly from sketch 2	**Adequate** Models one or more techniques; build differs from slightly from sketch 3	**Exceptional** Models one or more techniques; build matches sketch 4
Model Presentation Points __ /4	**Incomplete** Team did not present 1	**Inadequate** Not all required information was presented or not presented seriously 2	**Adequate** All required information presented; more detail needed 3	**Exceptional** Exceeds expectations; engaging delivery & much detail 4
Effort & Teamwork Points ___ /4	**Incomplete** Team member refused to participate 1	**Inadequate** Frequent reminders needed from teacher and teammates to stay on task 2	**Adequate** Very minimal prompting needed from teacher or teammates to stay on task 3	**Exceptional** Team completed all tasks using effective teamwork strategies 4