Waterproof the Roof

UNIT: Environmental and Agricultural Concepts

The Problem:

Develop a system of roofing to cover a miniature house and prevent water from leaking.

CONSTRAINTS:

1. Completely cover the top of the house.
2. Utilize no single pieces larger than 2 square inches.
3. Prevent any water from a 1-liter rainstorm from getting into the house.

# MATERIALS:

* White craft fluffs
* Paper towels
* Twine
* Paper clips
* Card stock
* Tape
* Chenille pipe cleaners
* Foil
* Planter (the “house” to be

protected from water)

* Twist ties

# TOOLS:

* Measuring cup
* Large bin (to place planter in)
* Water
* Scissors

# DIRECTIONS:

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

* **Step#1** – Read through the design brief.
* **Step#2** – Listen as your teacher reviews constraints, the materials, and specific testing procedures. If necessary, write down any additional constraints.
* **Step#3** – Brainstorm some ideas for your roof. Write these ideas in the space provided. Discuss your ideas with your group. Write down the materials you would need for your designs.
* **Step#4** – With your group, determine which idea you will use and sketch your final solution in the space provided. Write down the materials you will need.
* **Step#5** – Construct your roof.
* **Step#6** – Test your roof by placing it in the bin and pouring a liter of water over it.

**Note: Follow your teacher’s directions for testing.**

* **Step#7** – If your roof leaks, discuss with your group what you need to do to make it better. Make and write down your modifications then retest your design. Repeat this step until it works or until you reach the number of trials allotted by your teacher.
* **Step#8** – Read the reflection questions and write down your answers in complete sentences. Write a formal report addressing and answering the questions.

# GENERATE IDEAS

# Draw pictures of your ideas here. Be sure to include the materials you expect to need to build your design!

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| Materials Required for Building: |

# FINAL SOLUTION

# Draw a picture of your group’s final roof design here.

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|  |

# REFLECTION:

Answer the following questions in complete sentences. Write a formal report addressing and answering the

questions.

1. How much did you feel your ideas impacted the final group design?

2. Did your group make revisions as you were building? If so, what?

3. Did you have any extra materials leftover that you thought you would need?

4. What would happen in a real construction job if there were leftover materials?

5. Did you test your roof at all during construction? If so, how did your roof fare?

6. Do you think engineers often change their original plans during the construction process?

7. What do you think this might do to their construction budget?

# GRADING RUBRIC

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| **Effort/Task****Commitment**Points 4/\_\_\_\_\_ | Resistant1 | Inadequate effort observed for task and /or did not meet most criterion2 | Appropriate effort and time on- task, also followed criterion.3 | Extensive effort; uses time well; self-motivated, surpassed criterion4 |
| **Appearance**Points 4/\_\_\_\_\_ | Inadequate; not neat, little care evident1 | Adequate; needs more attention to detail2 | Attractive & visually appealing; neatly completed 3 | Eye catching; aesthetically pleasing, beyond expectations 4 |
| **Creativity**Points 4/\_\_\_\_\_ | Uses others ideas1 | Typical responses; little creativity2 | Creative: added to more typical idea3 | Unique ideas or responses4 |
| **Time** **Management**Points 4/\_\_\_\_\_ | Did not complete task 1 | Needed frequent assistance 2 | Used time appropriately3 | Autonomous; mature time management4 |
| **Carried Out** **Plan** Points 4/\_\_\_\_\_ | Did not complete plan or lacked plan1 | Completed with frequent assistance and prompting2 | Completed plan; limited prompting needed3 | Followed through well; autonomous; exceeded expectations4 |