Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Partner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Water Absorption Capacity of Clothing

**Research question:** Outdoor activities can often be high intensity, leading to perspiration as the body attempts to cool down. Different clothing fabrics and weaves absorb different amounts of water which may be more or less appropriate for different outdoor situations. Which fabric material will absorb the most water?

**Hypothesis:** If different fabrics are soaked in water then they should absorb different amounts of water.

**Materials:**

* 4 graduated cylinders (25 mL)
* 4 clothing pieces (~2x10 cm) – cotton, merino wool, nylon, polyester
* Tweezers/ pencil
* 40 mL water (4 x 10 mL)

**Procedure:**

1. Measure 10 mL of water into each graduated cylinder
2. Obtain tweezers/ pencil and clothing pieces
3. Record the how each fabric feels in results section before getting wet
4. Submerge each of the four clothing pieces in each of the four graduated cylinders
5. Poke at each of the fabrics to remove some of the air pockets
6. Let clothing pieces sit in water for 5 minutes
7. Pull clothing pieces to the top of the cylinders and let drip for 1 minute
8. Measure the quantity of water that remains in each graduated cylinder
9. Record how each fabric feels in results section after getting wet

**Results:**

Table 1: Amount of water absorbed by different 2 x 10 cm clothing pieces

|  |  |  |
| --- | --- | --- |
| Clothing fabric | Amount of water remaining in graduated cylinder (mL) | Amount of water absorbed by material (mL) |
| Cotton |  |  |
| Merino wool |  |  |
| Nylon |  |  |
| Polyester |  |  |

A picture containing table

Description automatically generated

8

7

6

5

4

3

2

1

0

Amount of water absorbed (mL)

Cotton Wool Nylon Polyester

Material type

Figure 1: Amount of water absorbed by different 2 x 10 cm clothing pieces

Table 2: Descriptions of fabric textures before and after getting wet

|  |  |  |
| --- | --- | --- |
| Clothing fabric | Fabric texture before getting wet | Fabric texture after getting wet |
| Cotton |  |  |
| Merino wool |  |  |
| Nylon |  |  |
| Polyester |  |  |

**Analysis:**

1. What were some of the challenges you faced in following the procedure?
2. Summarize your observations on clothing fabric and water absorption.
3. What was the independent variable in this experiment?
4. What was the dependent variable in this experiment?
5. What were the controlled variables in this experiment?
6. Did you gather qualitative or quantitative data in this experiment? Explain.

**Conclusion**:

1. The results of this experiment \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (write either support or refute) the hypothesis that if different fabrics are soaked in water, they should absorb different amounts of water.
2. Were you surprised by any of your findings? Explain.
3. Discuss the implications of your findings with respect to which fabrics should be used for different layers in outdoor clothing (base layer, mid layer, shell layer)
4. List any sources of error and how they impacted your findings.
5. What are the limitations of your study?

**Applying Knowledge:**

1. How does merino wool (and wool in general) keep you warm even when wet? Use 3 sources of information to support your answer and list them below.

Source 1:

Source 2:

Source 3:

1. When is cotton an appropriate choice for use in outdoor clothing? Use 2 sources of information to support your answer and list them below.

Source 1:

Source 2:

**Assessment**:

Circle where you think you are at for the following curricular competencies connected to this activity. A description of “Proficient” is given for each as a reference guide.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Curricular competency | Extending | Proficient | Developing | Emerging |
| Planning and conducting |  | I work with my lab partner to complete the experiment in a timely and safe manner |  |  |
| Processing and analyzing |  | I record and represent data in the spaces provided and my responses show that I have a good understanding of variables/ data types |  |  |
| Evaluating |  | I make connections between my conclusions and my data; I can identify sources of error and limitations of experiments |  |  |
| Applying and innovating |  | I can use research skills to apply my learning to related topics |  |  |
| Communicating |  | I clearly communicate my learning |  |  |