Due by the end of 10th grade.

Analytical Techniques Level 1	Badge Graphic Goes Here

Related Badges: Analytical Techniques 2, Analytical Techniques 3

Expectations

You can :

- Choose the appropriate tool for a task involving mass or volume measurements.
    - Tools include:
        - Table top balance
        - Analytical balance
        - Graduated Cylinder
        - Pipet
        - Micropipet
- Accurately and precisely measure mass and volume using analytical balances, graduated cylinders, pipettes, and micropipettes
- Quickly convert between units when dealing with mass or volume measurements (e.g., convert 5mg to grams or 250uL to mL)

Why Earn This Badge?

This is cited as the most important skill set when entering a laboratory internship or place of employment. You must know your tools!

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How Do You Earn This Badge?

<table>
<tr><th>Evidence tasks:</th><th>Validation Criteria:</th></tr>
<tr><td>Artifact 1: Graduated Cylinder Check
1. Measure 12.5mL of water in a graduated cylinder and record a photo of the volume at eye level.

2. Measure the mass on a table top balance to demonstrate that it weighs 12.5g. Record a photo.

3. Explain how accurate and precise measurements are important in science or engineering research.</td><td>1. The meniscus must be exactly at 12.5mL
2. Photo should read show that the mass is 12.5 +/- 0.1g.
3. Reflection should adequately capture the importance of accurate and precise measurements in reducing error.</td></tr>
<tr><td>Artifact 2: Pipette Check
Using teacher provided solutions, prepare each of the tubes using the table below. Match to the assessor’s standard. Take a photo of your samples next to the assessor’s standards.

<table>
<tr><th>Tubes</th><th>Solution 1 (mL)</th><th>Solution 2 (mL)</th><th>Solution 3 (mL)</th><th>Solution 4 (mL)</th><th>Solution 5 (mL)</th></tr>
<tr><td>A</td><td>6.3</td><td>1.5</td><td>0.25</td><td>-</td><td>-</td></tr>
<tr><td>B</td><td>2.4</td><td>1.08</td><td>-</td><td>0.19</td><td>0.73</td></tr>
</table>
</td><td>Assessor prepares standards using matrix.

Scholar’s samples in the photo must be next to the assessor’s standards and be within one meniscus.</td></tr>
<tr><td>Artifact 3: Micropipette Check</td><td></td></tr>
</table>

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1. Dispense 3.5 microliters of water on a weigh boat on an analytical balance to demonstrate that it is 0.0035g. Record a photo of the balance reading. 2. Dispense 35 microliters of water on a weigh boat on an analytical balance to demonstrate that it is 0.035g. Record a photo of the balance reading. 3. Dispense 350 microliters of water on a weigh boat on an analytical balance to demonstrate that it is 0.35g. Record a photo of the balance reading.	1. Photo should show that the mass is 0.0035 +/- 0.0002g. 2. Photo should show that the mass is 0.035 +/- 0.001g. 3. Photo should show that the mass is 0.35 +/- 0.005g.
Artifact 4: Analytical Instruments Test ● Identify appropriate tool for a task. ● Record proper volume or mass from an image of the tool. ● Convert between units.	Must score at 80% or above. Assessor see Answer Key for scoring guidelines.

Resources:

Video Tutorials

Analytical Balance Tutorial

Micropipet Tutorial

Pipet Tutorial