



pets in the  
classroom

# Weighing the Wily Hamster: A Design Challenge

Adapted from	<a href="#">Small animals 3-5: Hamster   Pets in the Classroom</a>
Pet: Hamster	Class: 3-5

<p><b>Brief Overview:</b> Students will design and build a safe and accurate way to weigh a hamster. This hands-on project integrates science, engineering, math, and language arts as students explore measurement, balance, and animal care.</p> <p><i>This lesson can be easily adapted for other pets or grades.</i></p>	<p><b>Lesson Breakdown</b> <b>Lesson 1:</b> Why do we need to weigh our hamster? <b>Lesson 2:</b> Make the design <b>Lesson 3:</b> Test the design</p>
<p><b>Essential Question</b> How can we design a tool or system that accurately measures the weight of a hamster without harming it?</p>	

<p><b>Subjects</b></p> <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Science</li><li><input checked="" type="checkbox"/> ELA</li><li><input checked="" type="checkbox"/> Math</li><li><input checked="" type="checkbox"/> STEM</li><li><input type="checkbox"/> Art</li><li><input type="checkbox"/> Other</li></ul>	<p><b>Stem Connections</b></p> <p><b>Science:</b> importance of healthy eating <b>Technology:</b> use of digital scales <b>Engineering:</b> creating of a device to weigh the hamster <b>Math:</b> understanding units of mass</p>
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## Performance Expectations/ Standards

### NGSS

**3-LS1-1** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

**3-5-ETS1- 1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

**3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

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### CCSS.

#### ELA-Literacy.W.3.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

**ELA-Literacy.SL.5.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners

**3.RI3.7** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text

**3.MD.A.2.** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).

## I CAN statements

- explain the importance of measuring the weight of animals.
- identify the challenges of weighing a small animal like a hamster.
- brainstorm and sketch potential solutions for weighing a hamster.
- work in a team to build a prototype weighing system.
- test and evaluate the accuracy and safety of my weighing system.
- communicate my design process and findings through writing and presentations.

## Materials

- [Weighing the Wily Hamster: A Design Challenge Student Worksheet](#)
- (optional) Henry Gets Moving by Chaz Nielsen, Pierre Rouzier
- Scale
- Building materials (cardboard, paper, tubes, straws, glue, tape)
- Objects of similar weights of your hamster for the students to use when they are testing.

## Teacher Background

Knowing the weight of your classroom pet is crucial for several important reasons:

### Health and Well-being:

- **Monitoring Growth and Development:** Tracking weight over time helps identify healthy growth patterns and potential issues like malnutrition or obesity. Sudden weight changes can be early indicators of underlying health problems, allowing for prompt veterinary intervention.
- **Proper Diet and Nutrition:** Knowing your pet's weight is essential for tailoring its diet to its specific needs. This ensures they receive the right amount of nutrients to stay healthy and active.
- **Medication Dosage:** Some medications, like dewormers, are based on animal weight. Accurate weight ensures safe and effective dosage, preventing over- or under-dosing.

### Safety and Comfort:

- **Choosing Appropriate Housing:** Proper cage or enclosure size is crucial for animal welfare. Knowing your pet's weight helps you select an appropriate environment that provides enough space for movement and comfort.
- **Handling and Exercise:** Understanding your pet's weight informs safe handling techniques and prevents accidental injuries. Additionally, it allows you to tailor exercise regimes to their capacity and avoid overexertion.

### Education and Responsibility:

- **Engaging Students in Science:** Monitoring and discussing your pet's weight provides a tangible context for learning about animal health, measurement, and data analysis. This sparks curiosity and fosters responsible pet ownership attitudes.
- **Building Empathy and Caring:** Regularly checking your pet's weight encourages students to be observant and attentive to their needs. This cultivates empathy and a sense of responsibility for the well-being of the animal in their care.

Overall, knowing your classroom pet's weight goes beyond mere curiosity. It serves as a valuable tool for maintaining its health, ensuring its safety and comfort, and providing students with engaging learning opportunities. By incorporating weight monitoring into your pet care routine, you invest in the well-being of your furry friend and foster a responsible and caring learning environment for your students.

## Lesson 1: Why do we need to weigh our hamster?

Time	Materials	Activity
15 mins		<p>(optional) Read <i>Henry Gets Moving</i> by Chaz Nielsen, Pierre Rouzier</p> <p>Ask students why they think that it is important to know how much their hamster weighs.</p> <p>Discuss the importance of weight in animal health and how proper measurement helps monitor well-being</p>
10 mins		<p>Ask students to think of reasons why it might be difficult to weigh the hamster. (hamster's small size, potential stress, moves a lot, etc.).</p>
5 mins		<p>Ask the students to make predictions about how much the hamster weighs. Keep track of their guesses. This is a good time to review units of mass to help students understand units such as ounces and grams vs inches and centimeters.</p>
20 mins	<p><a href="#">Weighing the Wily Hamster: A Design Challenge Student Worksheet</a></p>	<p>Brainstorming: Divide students into teams and encourage them to think creatively. Have them sketch and describe various designs for weighing the hamster, considering balance, safety, and ease of use.</p>

## Lesson 2: Make the Design

Time	Materials	Activity
15 mins		<p>Before the students begin building, have them share their ideas with the class and discuss some of the pros and cons of the designs, focusing on the safety of the hamster. The major problem will be that the hamster might walk away or fall off the balance plate.</p> <p>Here is a guideline for some ideas students might suggest: Possible solutions:</p>

		Solution	Pros	Cons
		Nothing	Hamster has more space. It is not confined.	Might fall off or move too much for the measurement to be exact.
		Put the pet in a box	Safer for the hamster	Calculations required: weight of the hamster = (weight of hamster + box) – weight of the box.
		Hold the hamster and use the bigger balance in the nurse's office	The hamster does not mind to be held. It won't run around.	Calculations required: weight of the hamster = (weight of the child holding the hamster) – weight of the child. There is such a big difference of weight, it might lack precision.
		Weigh the whole cage	The hamster won't even notice.	Same calculations. Might have the same problem as above
30 mins	<a href="#">Weighing the Wily Hamster: A Design Challenge Student Worksheet</a> Building materials (cardboard, paper, tubes,	Teams construct their weighing systems using readily available materials like cardboard, straws, popsicle sticks, and plastic cups. Encourage them to be resourceful and consider weight distribution, stability, and accessibility for the hamster.		

	straws, glue, tape)	
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<b>Lesson 3: Test the Design</b>		
<b>Time</b>	<b>Materials</b>	<b>Activity</b>
		<b>Before class:</b> weigh your hamster! Find objects of similar weights for the students to use when they are testing. Average hamsters weigh between 1oz – 1.5oz (25g – 40g).
25 mins	<a href="#">Weighing the Wily Hamster: A Design Challenge Student Worksheet</a>	Students test their prototypes with objects of similar weight to a hamster. Have them observe the ease of use, and identify areas for improvement. Teams refine their designs based on testing results
10 mins	<a href="#">Weighing the Wily Hamster: A Design Challenge Student Worksheet</a>	Have the students present their final weighing systems to the class. Encourage them to explain their design choices, challenges encountered, and improvements made.
10 mins	<a href="#">Weighing the Wily Hamster: A Design Challenge Student Worksheet</a>	Choose one of the best (safest) designs and weigh your hamster! (You will need to direct the students to subtract the weight of the design from the overall weight.) How close were the students?

<p><b>Differentiation</b></p> <p><b>For students who need additional support:</b></p> <ul style="list-style-type: none"> <li>• Provide scaffolding for struggling teams by offering pre-designed templates or suggesting simpler material options.</li> </ul> <p><b>For students who need additional challenges:</b></p> <ul style="list-style-type: none"> <li>• Challenge advanced students with additional constraints, such as using only recycled materials or the solution can only be a certain weight or size</li> <li>• Challenge students to design a way to weigh a large animal (horse, cow, etc.)</li> <li>• Have students convert ounces to grams, etc.</li> </ul>
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Assessment				
Category	Exemplary (4 points)	Proficient (3 points)	Developing (2 points)	Needs Improvement (1 point)
<b>Understanding</b>	Clearly explains the role of weight in animal health and the need for accurate measurement.	Describes some importance of weight in animal health, but explanation may be incomplete or inaccurate.	Limited understanding of the importance of weighing animals.	Shows little or no understanding of the importance of weighing animals.
<b>Challenge Identification</b>	Clearly identifies and explains several challenges posed by the small size and potential stress of a hamster.	Identifies some challenges, but explanations may be limited or lack detail.	Limited identification of challenges, or focus on non-essential aspects.	Fails to identify significant challenges associated with weighing a hamster.
<b>Brainstorming &amp; Design</b>	Generates numerous and diverse ideas for weighing solutions, demonstrating originality and flexibility in thinking.	Presents several potential solutions with some variety, but may lack creativity or thoroughness.	Limited ideas or repetitive, unoriginal solutions.	Few or poorly defined design ideas.
<b>Prototype Construction &amp; Safety</b>	Prototype is built meticulously using appropriate materials, ensuring	Prototype is functional, but may have minor construction flaws	Prototype has noticeable construction flaws or poses potential	Prototype is poorly constructed or unsafe for the hamster.

	balance, stability, and hamster safety.	or safety concerns.	safety risks to the hamster.	
<b>Testing &amp; Evaluation</b>	Conducts systematic testing, collecting and analyzing data accurately to evaluate prototype accuracy and ease of use.	Tests prototype with some weights, but data collection or analysis may be incomplete or inaccurate.	Limited testing or inaccurate data collection/analysis hinders evaluation.	Fails to conduct proper testing or analyze results effectively.
<b>Communication &amp; Reflection</b>	Presents design process, challenges encountered, and results effectively in a well-organized and engaging manner.	Presentation conveys information clearly, but may lack some organization or detail.	Presentation unclear or poorly organized, with limited explanation of findings.	Presentation poorly delivered or fails to explain design and testing procedures.
<b>Overall Design Effectiveness</b>	Final design successfully weighs the hamster accurately and safely, demonstrating consideration for animal welfare.	Design functions with some limitations, requiring adjustments for accuracy or safety.	Design has significant functional flaws or raises safety concerns for the hamster.	Design fails to function effectively or compromises the hamster's well-being.

#### Extension

- Research different types of animal scales used in zoos, shelters, or research labs.
- Design a miniature measurement tools for other very small animals/insects
- Invite a veterinarian or animal shelter representative to talk about the importance of animal weight management and the tools they use.