

Measuring Up: Math in the Wild

Grade 3 - 6

Students become outdoor mathematicians as they explore measurements in the natural world. Working in teams, they use sticks, stones, and leaves to create shapes with specific areas, then design and test balance contraptions to compare the weight of natural objects. Blending math, problem-solving, and creativity, this lesson challenges learners to think critically, build collaboratively, and discover how measurement connects to the world around them.

<p>Learning Objectives</p>	<p>By the end of the activity, students will:</p> <ul style="list-style-type: none"> • Apply measurement skills to estimate and calculate area. • Use natural objects to construct geometric representations. • Compare and estimate weights of objects. • Design and test a balance contraption using simple machines and found materials. • Work cooperatively to solve open-ended math challenges.
<p>Curriculum Connections</p>	<p>Math</p> <ul style="list-style-type: none"> • Measurement: Estimating, measuring, and comparing area (Grades 3–6). • Measurement: Comparing and estimating mass using non-standard and standard tools (Grades 2–5). • Geometry & Spatial Sense: Constructing and describing shapes in real contexts (Grades 2–5). • Mathematical Process Expectations: Problem-solving, reasoning, communication, representing, and connecting. <p>Science</p> <ul style="list-style-type: none"> • Forces Acting on Structures and Mechanisms (Grade 5). • Properties of materials (Grade 3). <p>Phys Ed</p> <ul style="list-style-type: none"> • Cooperative group work, safe tool/material handling, active exploration.
<p>Materials</p>	<ul style="list-style-type: none"> • Measuring tapes, meter sticks • Rope, pulleys, twine, coat hangers, carabiners, scissors • Natural materials: rocks, sticks, pinecones, leaves, etc.
<p>Prep/Pre Set-up required</p>	<ul style="list-style-type: none"> • Identify and mark safe areas for collecting natural objects. • Set clear boundaries for exploration. • Gather and organize math tools and building supplies.
<p>Introduction</p>	<p>Gather students together in a circle outdoors. Explain that today they will become mathematicians and engineers in nature. Instead of working with paper and pencils, they'll be using natural objects, measuring tools, and simple machines to solve two challenges:</p>

	<ol style="list-style-type: none"> 1. Shape Challenge – Using sticks, rocks, and leaves to create shapes with a given area. 2. Balance Challenge – Finding two objects of similar weight and building a contraption to prove which one is heavier. <p>Tell students: <i>“Mathematicians don’t just work indoors — math is all around us, even in the forest! Today you’ll measure, build, and test ideas the way real engineers and scientists do.”</i></p>
<p>Main Activities</p>	<p>Activity 1: Nature Shapes & Area</p> <ul style="list-style-type: none"> • Assign students a specific area (e.g., 1 square metre, 50 cm²- based on grade level). • Choose a shape appropriate for grade level (rectangle, triangle, irregular and composite shapes etc) • Using measuring tools and natural objects, they create a shape with this approximate area. • Groups check each other’s work and discuss strategies used. <p>Prompt Questions:</p> <ul style="list-style-type: none"> • How did you decide where to place your objects? • Did you determine the size of objects you would need before searching? • What challenges did you face? <hr/> <p>Activity 2: Nature Balance Scales</p> <ul style="list-style-type: none"> • In small groups, students find two natural objects that feel similar in weight. • Challenge students to create a device that test whether the objects are in fact the same weight using the available materials. (Giving as little instruction on what type of device to create allows students to use their creativity and problem solving skills). • Students test and adjust their balance, demonstrating which object is heavier. • Challenge groups to refine designs for accuracy. <p>Prompt Questions:</p> <ul style="list-style-type: none"> • How do you know one object is heavier? • What changes did you make to balance your contraption? • Why is balance important in design and engineering?
<p>Free/Inquiry Play Focus</p>	<p>Students may continue exploring by testing multiple objects, creating more complex balances, or combining both challenges (e.g., weighing the materials used to build a shape).</p>
<p>Closing and Wrap-up</p>	<ul style="list-style-type: none"> • Discuss what was hardest: estimating area, finding equal weights, or building a balance. • What did you learn about measurement today? • How did teamwork help your success? • Where do you see balance and measurement in the real world?

<p>Social/Emotional Skills Targeted</p>	<p>Leadership, Cooperation, Teamwork, Communication</p> <ul style="list-style-type: none"> • Teamwork and problem-solving in open-ended challenges. • Communication and negotiation during design decisions. <p>Resiliency, Accountability, Adaptability</p> <ul style="list-style-type: none"> • Building resilience through trial-and-error and iterative testing.
<p>Application Next Steps, Connections, applications, variations, extensions</p>	<p>Math Connections</p> <ul style="list-style-type: none"> • Create and solve real-life word problems based on their activities (e.g., “If our shape is 1 m² and another group’s is 2 m², how much larger is theirs?”). • Introduce perimeter measurement alongside area. • Weigh objects with an actual scale after testing balance contraptions to compare predictions to precise measurements. <p>Science & Engineering Connections</p> <ul style="list-style-type: none"> • Link the balance challenge to levers and forces (Grade 5 Science). • Connect area measurement to habitat design (e.g., “How much space would a turtle need for a basking area?”). • Investigate how Indigenous technologies and traditional knowledge use balance, measurement, and natural materials. <p>Outdoor Learning Applications</p> <ul style="list-style-type: none"> • Use snow in winter to create measured areas and test volume (snow cubes, snow walls). • In autumn, create leaf shapes or mosaics and calculate their approximate area. • Extend to a mapping activity, where students measure and draw a simple map of their exploration space using natural markers. <p>Variations</p> <ul style="list-style-type: none"> • Give groups different areas to calculate so students can compare results. • Challenge students to create the largest shape possible with a fixed number of sticks or rocks. • Modify the balance activity by having students build a pulley system or lever to test heavier objects. <p>Extensions</p> <ul style="list-style-type: none"> • Record data from all groups and create a class bar graph showing shapes built and objects weighed. • Journal reflection: “<i>What was the trickiest part of making your balance work?</i>” or “<i>Where else in the world do we need to compare areas or weights?</i>” • Literacy link: <ul style="list-style-type: none"> ○ Read stories that highlight measurement in the natural world (“<i>Measuring Penny</i>” by Loreen Leedy or “<i>Actual Size</i>” by Steve Jenkins). • Art integration: <ul style="list-style-type: none"> ○ Students design and decorate their balance contraptions or create geometric patterns with natural objects.