

STEM

Title: Goldilocks Needs a Bed

Grade Level: 1

Duration: Four 45 Minute Inquiry Monday Classes



<p>Objective: Teams of engineers will create a model of a new bed for Goldilocks.</p>	<p>Focus Concept/s: Describe objects in terms of weight. Investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.</p>
<p>Essential Question/s: How can we build a bed for Goldilocks that will not break when she lies on it?</p>	<p>Connected Benchmark/s SC.1.N.1.1 – Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations. SC.1.N.1.2 – Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others. SC.1.N.1.3 – Keep records as appropriate – such as pictorial and written records – of investigations conducted.</p>
<p>Vocabulary:</p> <ul style="list-style-type: none"> • Blueprint • Model • Request for Proposal • Prototype • Client 	<p>Suggested Materials: Quantities listed are the maximum number allowed per group</p> <ul style="list-style-type: none"> • Paper • Scissors • Glue • Tape • Index cards (4) • Weights, paperclips or pennies • Craft sticks (4) • Straws (4)

Problem/Challenge (Engage):

Goldilocks was looking for the bed that is “just right”; however, she needs her own bed, not a bear’s bed. She has asked you to create a new bed just for her. You are able to use any of the materials from the “tool box” to create this new bed. The bed must be able to hold 8 pennies (or 15 large paperclips) which is a model of the weight of Goldilocks. She really hopes you can build her a new bed because she doesn’t want to disturb the Three Little Bears ever again.

Brainstorm/Investigate (Focus Concepts):

*(10 min- day 1) Logon to Myon.com- read the book: Goldilocks and the Three Bears (or use another copy of Goldilocks and the Three Bears)

Discuss the problem: Goldilocks does not have a comfortable bed of her own. She needs one so she won't wander off and try beds at other homes again.

Goldilocks weighs the same as 8 pennies (or 15 paperclips) [teacher choose either paperclips, pennies, or 15 grams of weight]

Discuss with students the video from last week and the engineering they had to use to build the house for little mouse.

Plan/Design (Blueprint):

- As the head of the 3 Bears Structural Engineering Company, I, _____ (Teacher Name) am requesting a proposal for the best design for a bed for Goldilocks. (Teacher Note- A **Request for Proposal (RFP)** is an invitation to suppliers or builders to submit a plan or proposal to provide a product or service to a client.)
- Read the RFP paper for the students
- Put students in pairs or triads of structural engineers.

Discuss with your students:

Who is your client?

What type of product do we need to create?

Why should we create a model as the prototype for the client?

- Have each student draw 2 possible solutions to the problem of building a bed for Goldilocks. Ask them to list the strengths and weaknesses of each design.
- Students should discuss their designs with their engineering teams of 2-3 students decide on a design, and then create a blueprint.
- Once the blueprint is created the teams may build and test their bed designs.

Build/Test:

Reference the Request for Proposal (RFP) for directions on building and testing.

Students will be building in groups of two or three.

In order for students to get materials they must have them drawn and labeled on their blueprint. Students may "shop" once for their initial design and then again when they are ready to redesign. (If students finish their blueprint on day one, they may begin building then.)

They must build their first design based off their blueprint.

Collect/Analyze Data:

Engineers must collect qualitative data as they test. They can then redesign and retest. Each time they make changes, they must reflect on their design and give the reasons why they are making the changes as well as record the results of their new build.

Engineers will perfect their prototypes, then as a class you will test the effectiveness of each product.

Engineering teams should have now picked their most effective design. Allow engineers to do a gallery walk of the different designs in the classroom. Have engineers walk around with their notebook so they can take notes on the different products.

Have each engineering team test their final design in front of the class. As a class, have students collect observations of the effectiveness of the different products.

Reflect on Improvements:

Have students reflect on their own designs as they go through the process- (see the student Design Challenge Planning Sheet).

As the products (beds) are being presented, have engineering teams reflect on the strengths of the designs and the improvements that they would make to each others. Discuss with engineers why some product designs (beds) were more effective than others.

Evaluate/Justify:

Have engineers defend their product. Have them write a summary of why their prototype is the most effective and why should the 3 Bears Engineering Company select their proposal.

Have engineers think about what their materials represented in their prototype. Ask students if they had the opportunity to do this again, what materials would they choose to improve their model?

* Extension - Let students use a balance to explore what items are heavier and lighter than Goldilocks. Keep open as a center. Students can sort objects in the room as lighter or heavier than Goldilocks. (Tape. 8 pennies or 15 large paperclips together to use as a model of Goldilocks.)



Request for Proposal

Proposal must be submitted as a model.

The "3 Bears Structural Engineering" firm is requesting proposals for a bed for Goldilocks. Goldilocks needs her own bed that is "just right" so that she will stop sleeping in the bear's beds. 3 Bears Structural Engineering asked you to create a new bed just for her. You are able to use one sheet of paper, one index card, and a combination of up to ten popsicle sticks and straws. The bed must be able to hold 8 pennies (or 15 large paperclips) which is a model of the weight of Goldilocks. I really hope you can build her a new bed so she will stop sneaking into the Three Bear's home.

Engineers will develop a model of a bed that will not break when Goldilocks lies on it. As a structural engineer you want to think about how to build a strong structure.

Item Specifications:

- All bed prototypes must be made from paper, one index card, popsicle sticks, and straws.
- They may be held together with any combination of tape and glue.
- No more than 4 straws, 4 popsicle sticks and 4 index cards may be used by each engineering team for each prototype.
- No more than one sheet of paper may be used by each engineering team for each prototype.
- Engineering teams will create a prototype of their product to present to the Project Manager (your teacher).
- Blueprint must be drawn with the materials labeled.

Will your engineering team win the bid from
3 Bears Structural Engineering
for Goldilock's bed?

After the final prototype has been selected from your engineering team, explain why the 3 Bears Structural Engineering Firm should choose your design.



Engineer: _____

Teacher: Provide one copy of this page for each student or use student notebooks for planning.



Design Challenge Planning Sheet



Problem/Challenge:

How can we build a bed for Goldilocks that will not break when she lies on it?

Investigate/Brainstorm: *Draft possible solutions.*

A.

Strengths (what is good about this design)

Weaknesses (what is not good about this design)

B.

Strengths (what is good about this design)

Weaknesses (what is not good about this design)

Plan/Design: Sketch your blueprint.

Build/Test: Build and then test your bed.

Collect and Analyze Data:





Teacher: 1 copy per engineering team.

Reflect/Improve:

Was it the best solution? Would one of the other ideas have been better?

What would you have done differently?

How would you improve your bed design?

Evaluate and Justify your Answer.

Discuss your findings with the other engineers in the classroom. Draw a conclusion using the

Use the data and collected observations to design and test a NEW prototype.

Becoming a Structural Engineer....



Structural Engineering is the study of how to make build things so they are strong and don't break easily. You probably don't stop to worry about whether the building you are in right now can withstand a force of nature like a hurricane or an earthquake. But if you were a structural engineer, you would design and plan houses, schools, bridges, and skyscrapers to resist these powerful forces.

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