

Rescue Mission: Save Emmett!

Mission Brief:

Emmett has fallen into a deep pit, and President Business is about to use the Cragle to seal him forever! As Master Builders, your mission is to design and build a crane that can rescue Emmett safely and quickly. You must work together, use your creativity, and follow the engineering design process to complete the task. The fate of Bricksburg depends on you!

Your Challenge:

Design and build a functional crane using the materials provided. The crane must:

1. Lift Emmett (a LEGO minifigure) out of the pit.
2. Safely place him on a marked safe zone outside the pit.
3. Be built within the provided time and material constraints.



Mission Objectives:

- Successfully lift Emmett from the pit.
 - Ensure the crane is stable and functional.
 - Work effectively as a team.
 - Document your design process.
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Materials:

Each team will receive:

- Cardboard
- String

- Toothpicks
 - Drinking straws
 - Masking tape
 - Hot glue (use sparingly, if available)
 - Brass paper fasteners
 - Scissors
 - LEGO Emmett minifigure
 - A box/container (pit)
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Rules:

1. Use only the materials provided.
 2. Your crane must operate manually (no motors).
 3. The arm of the crane should pivot to move Emmett to the safe zone.
 4. You have 3 days to design, build, and test your crane.
 5. Record your ideas, sketches, and reflections in your engineering notebook.
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The Engineering Design Process:

Follow these steps to complete your mission:

1. **Ask:** What does your crane need to do? What are the constraints?
 2. **Imagine:** Brainstorm ideas with your team. Sketch your design.
 3. **Plan:** Choose the best design and decide how to build it.
 4. **Create:** Build your crane using the materials provided.
 5. **Test:** Try lifting Emmett with your crane. What works? What doesn't?
 6. **Improve:** Make changes to improve your crane.
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Rescue Day:

On the final day, each team will have 5 minutes to:

- Demonstrate their crane.
- Explain how it works.

- Reflect on their design and teamwork.

Grading Criteria:

Category	Excellent	Good	Needs Improvement
Creativity	Unique and innovative design	Thoughtful design	Basic or incomplete design
Functionality	Crane works flawlessly	Crane works with minor issues	Crane struggles to operate
Teamwork	Excellent collaboration	Good collaboration	Minimal teamwork evident
Reflection	Thoughtful and detailed	Some insights	Limited or no reflection

Tips for Success:

- Test your crane often and make small adjustments.
- Communicate and collaborate with your teammates.
- Focus on stability and balance—your crane must not tip over!
- Use the materials wisely; plan before you build.

Reflection Questions (After Rescue Day):

1. What was the most challenging part of this project?
2. How did your team solve problems during the design process?
3. If you could start over, what would you do differently?
4. How does this project relate to real-world engineering and cranes?

Good luck, Master Builders! The future of Bricksburg depends on you. 🌟

Step 1: Define the Problem and Brainstorm

Task:

- Discuss the challenge as a team: What does the crane need to do?
- Brainstorm ideas for the crane's design, considering the materials available.
- Create at least two quick sketches of potential designs in your engineering notebook.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. What are the most important features our crane needs to have?
 2. What design challenges do we think we'll face?
 3. Which of our brainstormed ideas seems the most promising, and why?
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Step 2: Plan the Design

Task:

- Select a final design as a team.
- Create a detailed sketch with labels for each part of the crane (base, tower, arm, pulley system, counterweight).
- Write a list of the materials you'll need and assign team roles for building.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. Why did we choose this design over the others?
 2. How will we divide the work to make the most of our time?
 3. What is our biggest concern about this design, and how can we address it?
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Step 3: Build the Prototype

Task:

- Use the provided materials to build your crane.
- Focus on creating a stable base and a working arm with a pulley system.
- Check for alignment and make sure all parts are secure.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. What part of building the crane went well, and why?
 2. What part was challenging, and how did we solve the problem?
 3. Did we use our materials effectively? Why or why not?
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Step 4: Test the Crane

Task:

- Attempt to lift LEGO Emmett out of the pit using your crane.
- Observe how the crane performs: Is it stable? Does the arm and pulley system work?
- Take notes on what works and what needs improvement.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. Did our crane successfully lift Emmett? If not, what went wrong?
 2. How stable is our crane? How can we improve its stability?
 3. What is one specific improvement we want to make next?
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Step 5: Improve the Design

Task:

- Make changes to address the issues identified during testing.
- Strengthen weak areas and adjust the pulley system if necessary.
- Test the crane again and document the results.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. What changes did we make to our design, and why?
 2. How did these changes improve the crane's performance?
 3. If we had more time, what additional features would we add to our crane?
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Step 6: Present the Final Crane

Task:

- Demonstrate your crane in front of the class.
- Explain how it works and describe the design process, including the challenges you faced and how you overcame them.

Reflection Assignment:

- Answer the following questions in your notebook:
 1. What are we most proud of about our final crane?
 2. What would we do differently if we could start the project over?
 3. How does this project relate to real-world engineering and problem-solving?
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Final Reflection:

- Write a one-page summary of your experience with the project. Include:
 - What you learned about teamwork and the design process.
 - How you applied problem-solving skills.
 - How this project changed your understanding of engineering.