

Kiewit Build Like a Girl: Spaghetti Tower

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Discover the exciting world of construction and engineering with Girl Scouts of Colorado's Build Like a Girl program, powered by Kiewit. In partnership with one of North America's leading engineering and construction organizations, this unique on-demand experience brings hands-on activities led by Kiewit experts through engaging video tutorials. Girl Scouts will explore concrete crafting, structural design with spaghetti towers, and/or bridge construction to learn critical engineering concepts—all while gaining insight into careers in this dynamic field. Upon completion of one activity, Girl Scouts will earn their exclusive Build Like a Girl patch, but Girl Scouts may complete as many of the Build Like a Girl Activities as they would like.

Introduction

Objectives:

- Recognize the importance of teamwork and learning from failure in science and engineering.
- Understand that certain shapes provide greater structural strength than others.
- Learn how weak materials can be reinforced through effective design techniques, with an emphasis on the distribution of mass when constructing towers.
- Grasp how compression and tension forces impact the stability of structures.
- Compare their tower models to others to identify why some designs are stronger.
- Comprehend why engineers account for tension and compression forces when designing buildings and structures.

The Challenge:

Construct the tallest possible tower using only the following materials. This tower must hold the weight of a large marshmallow at the top.

- 25 pieces of spaghetti
- Masking tape
- String
- 1 large marshmallow

Watch this video explaining the activity: <https://vimeo.com/1031298656>

Challenge Rules

Challenge Rules:

1. Your tower must be completely free-standing (no leaning or support from external objects).
2. The marshmallow must be placed on the very top of your structure.
3. You may use as much or as little of the provided materials as you'd like.
4. You are free to break or cut the spaghetti, tape, and string as needed.
5. Masking tape may be adhered to the tabletop if desired.
6. You have 20 minutes to complete your tower.
7. When time is up, teams must not be touching or supporting the structure. Any structure being held or supported at the end will result in disqualification.
8. The team with the tallest structure, measured from the tabletop to the top of the marshmallow, will be declared the winner.

Expert Challenges*:

- Limit amount of tape you use
- Use mini marshmallows to hold spaghetti together instead of tape
- Add more weight at the top of the structure

Facilitator Directions

Facilitator read through directions before beginning

1. **Start the Clock and Music:** Begin the countdown timer and play music to kick off the challenge.
2. **Walk Around the Room:** Observe the teams as they develop their structures, noting the innovation patterns that emerge.
3. **Announce Time Updates:** Periodically remind teams of the time remaining. Suggested intervals are at 12 minutes, 9 minutes (halfway point), 7 minutes, 5 minutes, 3 minutes, 2 minutes, 1 minute, 30 seconds, and give a final 10-second countdown.
4. **Give Progress Updates:** Call out team progress to the group, especially when a team has successfully built a standing structure. Encourage friendly competition and energize the atmosphere by highlighting how teams are doing.
5. **Remind Teams About Disqualification for Holding Structures:** Emphasize that structures must stand on their own by the end of the challenge. Warn teams that holding their structure at the end, especially if the marshmallow causes it to buckle, will result in disqualification. The winning structure must be stable without assistance.
6. **End the Challenge:** When the time is up, ask everyone to sit down to observe the standing structures. Typically, just over half of the teams will have completed structures.
7. **Measure the Structures:** Measure each standing structure, starting from the shortest to the tallest. Announce each structure's height, and have someone record the results.
8. **Identify the Winning Team:** Celebrate the team with the tallest structure by giving them a standing ovation and presenting a prize, if applicable.

Solo Challenge

Build the tallest possible free-standing tower that can support the weight of a large marshmallow at the top.

You can only use the following materials:

- 25 pieces of spaghetti
- Masking tape
- String
- 1 large marshmallow

Challenge Rules:

1. Your tower must stand completely free without leaning on anything for support.
2. The marshmallow must be placed at the very top of your tower.
3. You may use as much or as little of the materials as you choose.
4. You are free to break or cut the spaghetti, tape, and string as needed.
5. Masking tape can be attached to the tabletop to secure your tower.
6. You have 20 minutes to complete your tower.
7. Once time runs out, the tower must stand on its own without you holding or supporting it. If it cannot, it is considered disqualified.
8. Measure the height of your tower from the tabletop to the top of the marshmallow. The goal is to achieve the tallest stable structure.
- 9. Bonus Challenge*: Reflect on your previous creation and redo the challenge to see if you can make a better tower.**

Expert Challenges*:

- Limit amount of tape you use
- Use mini marshmallows to hold spaghetti together instead of tape
- Add more weight at the top of the structure

Facilitator-less Directions for the Solo Challenge

Participant read through directions before beginning

1. **Start the Timer and Music:** Set a 20-minute countdown timer and start some upbeat music to keep yourself energized throughout the challenge.
2. **Check Your Progress:** Periodically glance at the timer to stay on track. You can follow these checkpoints: 12 minutes remaining, 9 minutes (halfway), 7 minutes, 5 minutes, 3 minutes, 2 minutes, 1 minute, and a final 10-second countdown.
3. **Stay Focused:** Observe how your structure develops, experimenting with different shapes and designs. Consider compression, tension, and balance in your design to achieve the best results.
4. **Final Stability Check:** As the timer runs down, ensure your tower is standing on its own without support. Any tower that requires holding after time is up does not count as a successful structure.
5. **Measure Your Tower:** Once time is up, measure your structure from the base to the top of the marshmallow. If possible, compare your result to others who have completed the same challenge.
6. **Reflect on the Outcome:** Celebrate your effort, whether your tower was the tallest or not. Reflect on the design choices you made, and consider how you might improve next time.

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Congratulations! You finished the Kiewit Build Like a Girl patch program. We hope you take this information you learned about engineering and share it with your friends and family.

Click [here](#) to request your FREE Kiewit Build Like a Girl patch!



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