

01. Gingerbread Quake Proof House

Holiday STEM Challenge

Goal

Build a cracker/icing house that survives a shake test.

Constraints

Base fits on a paper plate; 10 minutes to build.

Test

Shake the tray for 10 seconds—no collapses or major cracks.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

02. Candy Cane Crane

Holiday STEM Challenge

Goal

Lift a small ornament using a hand operated crane.

Constraints

Only candy canes, straws, string, and tape; reach ≥ 30 cm.

Test

Lift and set the ornament down without dropping.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

03. Sleigh Zipline

Holiday STEM Challenge

Goal

Send a 'sleigh' down a string with a marshmallow rider.

Constraints

Start height ≥ 1.5 m; stop within 20 cm of a target.

Test

Time the run; rider must arrive intact.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

04. Snowball Catapult

Holiday STEM Challenge

Goal

Launch a cotton ball 3+ meters.

Constraints

Use sticks/spoons/rubber bands only; angle should be adjustable.

Test

Longest accurate shot wins.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

05. Silent Night Parachute Drop

Holiday STEM Challenge

Goal

Slow a penny in cup 'gift' from 2 meters.

Constraints

Parachute made from paper or bag + string only.

Test

Longest airtime with minimal spin.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

06. Warm Cocoa Insulator

Holiday STEM Challenge

Goal

Keep hot water warm for 10 minutes.

Constraints

No lid over the opening; use foil, felt, bubble wrap, etc.

Test

Measure temperature drop (ΔT); smallest drop wins.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

07. Reindeer Glider

Holiday STEM Challenge

Goal

Paper glider that flies far and lands softly on a 'roof'.

Constraints

Must carry a paperclip payload.

Test

Distance plus target-landing accuracy score.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

08. Ornament Hanger Strength

Holiday STEM Challenge

Goal

Make a paper and tape hook that holds the most weight.

Constraints

Must hang on a 1 cm dowel/rod.

Test

Add pennies until the hook fails; record maximum.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

09. Holiday Bridge

Holiday STEM Challenge

Goal

Span 30 cm and hold the most pennies.

Constraints

Sticks/straws/paper/tape only; bridge $\leq$ 5 cm thick.

Test

Load to failure; record maximum pennies.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

10. Light-Up Greeting Card

Holiday STEM Challenge

Goal

Create a simple circuit card with one LED.

Constraints

Copper tape + coin cell; include a switch or pull tab.

Test

Does the LED light reliably on every try?

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

11. Ice Lantern Meltdown

Holiday STEM Challenge

Goal

Compare de-icers to see which melts ice fastest.

Constraints

Use equal masses of salt, sugar, and sand; tunnel a 5 cm hole.

Test

Time to breakthrough; shortest time wins.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

12. North Pole Wind Car

Holiday STEM Challenge

Goal

Balloon or fan-powered car travels 2 meters straight.

Constraints

Body from recyclables; wheels must roll.

Test

Measure straightness and total time.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

13. Jingle Bell Pitch Lab

Holiday STEM Challenge

Goal

Explore pitch using water-filled glasses or shakers.

Constraints

Tune the first three notes of a simple melody.

Test

Can others recognize the tune?

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

14. Package Protection

Holiday STEM Challenge

Goal

Protect a cookie from a 2 m drop.

Constraints

Paper, straws, tape, cotton only—no rigid boxes.

Test

Cookie intact (no cracks) after the drop.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

15. Snowflake Symmetry

Holiday STEM Challenge

Goal

Create a 6-fold symmetric snowflake with 10+ cuts.

Constraints

Be ready to explain lines of symmetry.

Test

Peer check plus estimate the area removed.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

16. Santa Signal Tower

Holiday STEM Challenge

Goal

Free standing tower with a star on top. equal to or greater than 45 cm.

Constraints

Index cards and tape only.

Test

Survive 10 seconds in front of a desk fan.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

17. Peppermint Path Marble Run

Holiday STEM Challenge

Goal

Build the slowest marble run (no stalls).

Constraints

Track fits 30×30 cm; use canes/straws/cardboard.

Test

Longest time from start to finish.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

18. Cookie Conveyor

Holiday STEM Challenge

Goal

Move a cookie 30 cm using only Hand-Cranked device.

Constraints

Use spools/string/sticks/cardboard; no direct pushes.

Test

Distance reached and control (no drops).

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

19. Frosty's Hat Thermals

Holiday STEM Challenge

Goal

Find the best fabric to keep an ice cube from melting.

Constraints

Equal layers for each fabric; 15 minute test.

Test

Measure mass lost in grams; least loss wins.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

20. Tree Topper Balance

Holiday STEM Challenge

Goal

Create a topper that balances on a pencil point.

Constraints

Cardboard, clay, and skewers only.

Test

Spin for 3+ seconds without falling.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

21. Holiday Coding (Unplugged)

Holiday STEM Challenge

Goal

Write an algorithm so a partner can draw a tree image.

Constraints

Use arrows and simple commands only; then debug.

Test

Compare the drawing to the intended image.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

22. Candy Cane Chromatography

Holiday STEM Challenge

Goal

Separate marker pigments for candy-cane art.

Constraints

Coffee filters; test water vs. isopropyl alcohol.

Test

Measure color spread distance for each solvent.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

23. Snowplow Design

Holiday STEM Challenge

Goal

Push 'snow' (cotton balls) across 50 cm quickly.

Constraints

Cardboard plow; optional toy car base.

Test

Time to clear plus number of pushes.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

24. New Year Confetti Launcher

Holiday STEM Challenge

Goal

Launch paper confetti from height of 1.5+ meters safely.

Constraints

Cup, balloon, and tape; add a safety shield.

Test

Measure maximum height; check safe operation.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes:

25. Sleigh Runners: Friction Lab

Holiday STEM Challenge

Goal

Build a mini sled that slides the farthest and most predictably down a ramp.

Constraints

Sled fits an index card; choose ONE runner material (straws, cardboard, foil, felt); payload 8–10 pennies; tape only; no glue / no wheels.

Test

Release from the same height; 30°ish ramp; record distance/time on three landing surfaces (table, towel, foil). Compare averages to identify low friction combos.

■ Built ■ Tested ■ Results Recorded ■ Retest

Notes: