GALILEO MAKERS
CAMP GALILEO
2015 NEBULA SCIENCE

(For rising kindergarten grade campers)

This curriculum was developed by Galileo Learning in collaboration with the Maker Education Initiative.

About Galileo Learning

Galileo Learning (Galileo) creates and operates Innovation Camps for kids. Their mission is "to develop innovators who envision and create a better world" and this mission comes to life each summer at nearly 60 imagination-sparking locations (40 in the Bay Area, 15 in SoCal locations and 4 in Chicagoland.) They also train and employ more than 2100 educators and aspiring educators as summer staff. Galileo's programs serve campers from pre-K through 8th grade.

In all of Galileo's programs, the curricula focuses on helping campers (and staff) develop 21st Century skills and mindsets through understanding and applying the Galileo Innovation Approach (GIA). The GIA is inspired by the Stanford d.school's design thinking process and mindsets and fine tuned for 5-14 year old campers who are especially open to absorbing new ways to think, explore and create. Click here for more information about Galileo Learning.

The Galileo Innovation Approach

The Galileo Innovation Approach (GIA) is our unique approach to teach and learning. It is designed to develop Galileo Innovators – campers and staff who imagine and create a better world. Galileo Innovators approach their work with an Innovator's Mindset, do their work with an Innovator's Process, and seek/leverage Innovator's Knowledge.

Galileo Innovator's Mindset

Galileo Innovators have dispositions that support breakthrough thinking and creative work. The Galileo Innovator's Mindset has five elements:

BE VISIONARY
- I envision a better world.
- I imagine things that don't yet exist.
- I believe that it is my place to turn ideas into reality.

BE COURAGEOUS
- I freely share my creative thoughts.
- I stretch myself to try new things.
- I embrace challenges.

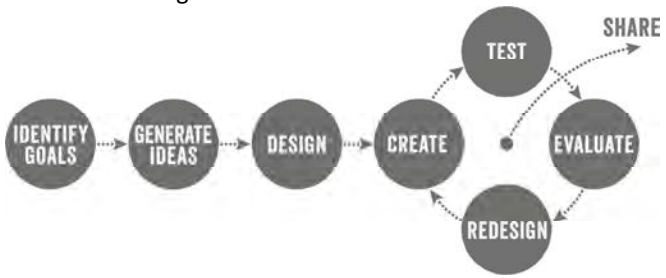
BE COLLABORATIVE
- I value the unique perspectives of others.
- I build on the ideas of others.
- I use my strengths to support the work of others.

BE DETERMINED
- I persevere until I achieve my goal.
- I recognize setbacks as opportunities to learn.
- I know that innovation and mastery require effort.

BE REFLECTIVE
- I take time to think about what is and isn't working in my design.
- I think about how my work impacts other people and the world.
- I seek feedback to improve myself and my work.

Galileo Innovator's Process

Galileo Innovators learn and practice an iterative process to bring the best ideas to fruition. The diagram below shows the Galileo Innovator's Process:



Galileo Innovator's Knowledge

Galileo Innovators require subject-specific knowledge to creatively solve problems and make their visions a reality. Galileo Innovator's Knowledge lies in the following four categories:

CONCEPTS AND FACTS
Galileo Innovators understand the big ideas, principles, and facts relevant to their work.
Examples: Adding more tension to a rubber band creates a higher pitch when it's plucked

HISTORICAL CONTEXT
Galileo Innovators understand the contributions, objectives, and processes of relevant movements, artists, scientists, designers, and other experts who came before them.
Examples: Kandinsky uses a variety of brushstrokes and line types to represent music visually

SKILLS AND TECHNIQUES
Galileo Innovators understand how to use relevant materials, tools, and technology so they can effectively build, test, and share their ideas.
Examples: Manipulating cardboard by cutting, curling, bending, folding, scoring, tabbing, and fastening; taping techniques; watercolor resist

AUDIENCE AND ENVIRONMENT
Galileo Innovators understand the needs, beliefs, and circumstances of their users and the physical context in which their work will be received.
Examples: Engineers need to design buildings in a specific way when constructing in an earthquake prone area

Galileo Innovation Approach and the Curriculum

Our curriculum is designed to support you in teaching the Galileo Innovation Approach and nurturing Galileo Innovators. Below are some ways in which the curriculum fosters your development as an Innovation Educator.

First, you'll find that the components of the GIA literally leap off the page.

- The GIA terms are emphasized throughout the curriculum in ALL CAPS to help you easily identify opportunities to integrate the GIA.
- An overview of the **key Innovator's Knowledge, Process,** and **Mindset** for each lesson appears in the Instructional Priorities & Supporting Innovation section. Think of these as the blueprint of a successful lesson. Starred sections in the curriculum are connected to these priorities and should not be skipped.

Second, the curriculum includes a daily **Innovator's Mindset Challenge**. The Mindset Challenge helps campers focus on developing a different part of the Innovator's Mindset each day and shows how practicing this element can help them develop as innovators. The challenge is introduced near the beginning of the lesson, supported with details in the facilitation notes and debriefed as part of the lesson wrap up.

Third, each day concludes with a **Lesson Wrap Up** that provides a forum for you to go deep on innovation themes with campers. Prompts are provided to support project sharing, reviewing key Innovator's Knowledge and debriefing the day's Mindset Challenge. Use this time to help campers solidify what they learned, notice how practicing the mindset helped them with their project and recognize the innovator in themselves and in others. Familiarize yourself with the discussion questions before each lesson so you can best guide campers to develop as innovators throughout the rotation.

Additionally, these general practices can help you to bring the GIA to life:

- Think about what it means to you to be an Innovation Educator and find ways to realize that vision.
- Pace your class to allow time for campers to engage with each project, giving ample time for the TEST, EVALUATE and REDESIGN phase so that campers can thoughtfully evaluate how they can improve their designs, and then implement the modifications.

- Model the Mindset in your teaching. When you make a mistake, celebrate it! Tell the campers that your teaching or the project didn't go as planned, and that you'll learn from that and try it a different way in the next rotation.
- Help campers understand what it means to be a Galileo Innovator and strive to shape their self-images as such.
- Recognize campers as they exhibit the Innovator's Mindset as relevant throughout the day—in addition to this focus during the Wrap Up. (E.g., *I see that you're BEING REFLECTIVE, thinking about what is and isn't working with prosthetic hand design. That's a great way to start developing an innovative solution!*)
- Refer to the steps of the Innovator's Process (and your Galileo Innovator's Process Poster) as you describe the day's activities and as campers work.

Finally, the curriculum supports your own innovations for how to integrate the GIA in your classroom. Please apply the Innovator's Mindset and Process to this end and SHARE your learning with your colleagues!

Galileo Makers – Nebula (Pre-K – Kindergarten)

Real-World Inventions

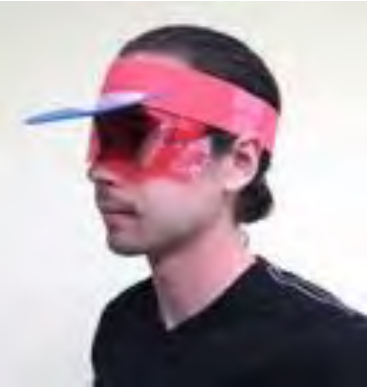
Project Overviews

Galileo Makers Day 1 – *Tents*

Project Description
This week, Nebulas are focusing on building things that are useful for adventuring outdoors. Today, campers will build a tent frame by learning and using a key building technique – overlap and wrap – that will be repeated throughout the week.

Instructional Priorities and Supporting Innovation
Demo & Discussion: Overlap and Wrap
- ★ **Introduce the CONCEPT of overlap.**
- ★ **Demonstrate the taping TECHNIQUE of "overlap and wrap" for creating strong connections.**

Throughout the Lesson
- ★ **Support the Innovator's Mindset Challenge: BE COLLABORATIVE – Campers help one another tape beams and construct the tent.**



Galileo Makers Day 2 – *Sunhat*

Project Description
Any outdoor adventure requires some protection from the sun! Today campers each make a sun hat.

Instructional Priorities and Supporting Innovation
Demo & Discussion: Brim and Visor Intro

- ★ **Demo the TECHNIQUE of using a template to trace and then cut out a brim.**
- ★ **Model the TECHNIQUE of placing the headband flat on the table and then taping the brim and visor to it.**
- ★ **Explain the procedure to TEST, EVALUATE AND REDESIGN the sunhat, and how to rearrange the sunhat components.**

Throughout the Lesson

- ★ **Support the Innovator's Mindset Challenge: BE DETERMINED – Campers stay focused to accomplish all the different steps necessary to create each part of their sunhats.**

Galileo Makers Day 3 – *Fishing Pole*

Project Description
The next thing campers will make for their DIY outdoor adventure kit is a magnetic fishing pole. They'll use it to attempt to catch fish of varying weights.

Instructional Priorities and Supporting Innovation
Do-With-Me: Pole and Spools

- ★ **Review the TECHNIQUE of overlap and wrap to create a sturdy fishing pole and attach the spools.**

Demo & Discussion: Fishing line, Magnet, and Reel

- ★ **Focus on how to EVALUATE the fishing pole when it bends or breaks.**

Throughout the Lesson

- ★ **Support the Innovator's Mindset Challenge: BE REFLECTIVE – Campers watch closely as they use their fishing poles to determine if they are bending or breaking, and if so, how to fix them.**

Galileo Makers Day 4 – *Handcart, Part 1 of 2*

Project Description
Carrying a bunch of outdoor gear in your hands can be tiresome. Today, campers begin building working handcarts to help transport their outdoor equipment, lunchboxes, or anything else!

Instructional Priorities and Supporting Innovation
Demo & Discussion: Handcart Handle

- ★ **Review the TECHNIQUE of overlapping and wrapping to create a strong handcart handle.**
- ★ **Model what it looks like to TEST AND EVALUATE the handcart.**
- ★ **Demonstrate the TECHNIQUE of wrapping and pressing down tape around the corner of the box to secure the handcart handle.**

Throughout The Lesson

- ★ **Support the Innovator's Mindset Challenge: BE REFLECTIVE – After every test, campers think about the design goal (the handle not breaking or bending too much) and decide what they need to work on next to meet the goal.**

Galileo Makers Day 5 – *Handcart, Part 2 of 2*

Project Description
Campers will finish their handcarts by adding wheels, as well as straps to hold their other projects and baskets to hold small miscellaneous items.

Instructional Priorities and Supporting Innovation
Demo & Discussion: Wheels

- ★ **Demo the TECHNIQUE of using a straw and tape flags to build a set of wheels.**
- ★ **Demo how to TEST AND EVALUATE the handcart wheels.**

Demo & Discussion: Straps and Baskets

- ★ **Demo the taping TECHNIQUES to attach straps that will hold a sunhat and fishing pole.**
- ★ **Demo how to TEST AND EVALUATE the strap placement and extra baskets and whether or not they're attached in a good place.**

Throughout the Lesson

- ★ **Support the Innovator's Mindset Challenge: BE DETERMINED – Campers think about and act on what they can do to improve their handcarts.**

This Week's Story

Each week at camp a story will unfold though a series of skits done at opening and closing ceremonies. The story provided to your Camp Director for this theme has been included here so that you can incorporate the story into your classroom this week. We've provided some suggestions in the curriculum for how to tie activities into the storyline, and we also encourage you to bring the story to life in your own way!

Galileo Makers Story Overview

Website Teaser

Galileo Makers: DIY Art and Real-World Inventions

Flex your maker muscle and put a creative spin on everyday objects. Design a personalized stool, clock or pillowcase for your room. Build useful inventions to take home like a vacuum or a secret lock box with an alarm that really works. Harness your innovative energy and join the marvelous maker movement as you transform intriguing ideas into functional, faire-ready reality.

Characters

- **Storyteller**
  Our narrator, who reads Monday's story and parts of Wednesday's and Friday's—this role can be played by anyone who is a clear-spoken, engaging reader of stories
- **Lucy**, a girl who lives in Land Land
  A curious, potentially creative human stuck in a world of dull sameness—a situation that has resulted in a state of constant restlessness, as she never quite knows what to do with herself
- **Finn**, a boy who lives on Cardboard Island
  A super-enthusiastic kid who's always up for a challenge and has ideas to spare—an I-have-an-awesome-idea-so-what-are-we-waiting-for kind of guy
- **Lucy's parents**
  Formerly creative folks who have lived in Land Land so long they don't remember what it's like to make things themselves
- **The makers of Cardboard Island**
  Assorted creative folks—including our Camp G campers—who live and make on Cardboard Island

Setting

Land Land and Cardboard Island

- *Land Land: A place where everyone is the same—everyone dresses the same (in dull colors), decorates the same (minimally, also in dull colors), has the same haircut and says all the same things (e.g.: Person 1: "Welcome to Land Land"; Person 2: "Welcome to Land Land")*
- *Cardboard Island: An alternate world that's covered in cardboard as far as the eye can see—its inhabitants spend their days transforming its vast cardboard reserves into awesome hand-made gizmos, gadgets and pieces of furniture, all wildly colored and wonderfully personalized*

Plot

Restless in her Land Land existence (and dreading an upcoming move to a new house that's just like her current house), Lucy draws a doorknob on the back wall of her closet, which opens a portal to Cardboard Island, a land covered in cardboard and inhabited entirely by marvelously creative makers. There she meets Finn, who introduces her to the fabulous, fearless creativity of the Cardboard Islanders. They offer to help her make items to personalize her new room. When Lucy gets stuck back in Land Land, she and the Cardboard Islanders work together to reopen the portal and stage a mini-Maker Faire featuring items for Lucy's new room.

Conflict

Lucy's dad paints over the "doorknob" in Lucy's closet, sealing the portal and locking her in Land Land before she can realize her vision for her new room. She and the Cardboard Islanders need to reopen the portal and stage their Faire before Friday's move and without upsetting Lucy's parents, who might not approve of such un-Land Land-like creations.

Resolution

Lucy and the Cardboard Islanders reopen the portal between the lands and put on an awesome Maker Faire on the island. Lucy's parents follow her through the portal to the Faire, but instead of being upset, as Lucy feared, they're impressed and inspired by her VISION.

What We Want Campers to Learn

- The Maker Movement is all about making things and getting people together to learn and create.

- Maker Faire is an all-ages gathering of makers who come together to collaborate, get inspired and share what they've made and learned.
- As long as you have an imagination (and a little cardboard) you never have to be bored.
- Innovators are VISIONARY and COLLABORATIVE.

Galileo Makers: Monday

The storyteller reads:
Once upon a time, so long ago that nobody but the storytellers remember, there lived a girl named Lucy. Lucy lived in a place called Land Land where everything was the same. In Land Land, everyone wore the same clothes, ate the same food, drove the same cars and lived in rows of identical houses. And this is how it had been in Land Land for generations. Year after year, it was the same, and that sameness had been the same for Lucy's parents, her grandparents and her great-great grandparents, all the way back as long as anyone could remember.

It wasn't such a bad place to live, but Lucy couldn't help but feel a little tired of all the sameness. Sure, it made it easy to pick out her clothes in the morning and decide what to eat for lunch, but she couldn't help but feel like there was something… missing.

On the day our story begins, Lucy was sitting in her room doodling, thinking about her family's big move to a new house later that week. She wanted to be excited about moving, but she just couldn't muster up any enthusiasm, because in Land Land, new houses were pretty much just the same as old houses. Which meant that her new room would look pretty much the same as her old room, which, in turn, looked exactly the same as her brother's room… and her best friend's room… and her best friend's brother's room…

"UGH!" Lucy exclaimed, rising to her feet. She was suddenly so fed up with the dreary, tedious BORINGNESS of it all. "Why does EVERYTHING I own have to look exactly the same as everything everyone else owns?" she wondered out loud, waving her pencil around for emphasis. Throwing open her closet door, she scanned racks and shelves stuffed with identical shirts, shoes, toys, books and sports equipment, all in drab, sensible colors. Pushing them aside, she stood considering the back wall of her closet. "Well," she said, looking at the pencil in her hand, "maybe I there's SOMETHING I can make look a little different."

And with that, she drew a big, round, ornate-looking doorknob on the wall in front of her, right where a doorknob would go if the back of her closet were a door instead of a wall. When she was done, she stood back, pleased with her handiwork. In fact, her doorknob looked so real, she almost felt like she could reach out and grab hold of it… so she did. And to her surprise, the knob turned in her hand and her closet wall swung open in front of her like a big door. Speechless and more than a little curious, she took a deep breath and stepped through it.

Lucy blinked in the bright sunlight. As her eyes started to adjust, she noticed three things about her surroundings:

Number one: She wasn't inside her closet anymore. The warm, dazzling sun and fresh, salty-smelling air made that part pretty obvious.

Number two: She was surrounded by cardboard as far as the eye could see. But not just cardboard boxes and tubes and scraps—cardboard EVERYTHING. There were cardboard trees and flowers, cardboard benches and streetlights, cardboard houses and bicycles… and they were all so DIFFERENT. Every last flower petal and bicycle spoke was different from the one next to it—brightly painted, adorned with trims and tassels, some even wired with lights and switches. She'd never seen anything so intriguing or beautiful in her whole life… certainly not in Land Land.

And the third thing she noticed was the people—because there were plenty of people in this strange new place, and they had started to notice this new, drably dressed visitor. The people here were a little like the place itself: decked out in a variety of colors and cool embellishments, every one totally, marvelously different from the last. There was even a whole batch of kids about her age, sitting right in front of her, who seemed to be campers of some kind…

One of these utterly unique individuals—a boy about her age, wearing a wildly cool, totally wacky cardboard hat and a backpack covered in buttons and lanyards—walked right up to her and stuck out his hand. "Finn's the name," he announced cheerfully, "it's awesome to meet you!" Lucy took his

hand tentatively. "Hello, hello. I'm Lucy," she said, nodding her head twice, as was traditional in Land Land. And then, before she could stop herself, she blurted out, "Um… I'm sorry, but I… I'm just a little confused. Where am I?" Finn laughed. "Oh, how silly of me," he said, "where are my manners? Lucy, welcome to Cardboard Island!"

Galileo Makers: Wednesday

1. Lucy and Finn learn about each other's homes

The storyteller reads: *"Now, where did we leave off? Ah yes! There Lucy was, on the other side of a mysterious door in the back of her closet, surrounded by bright people and their bright creations, talking to a boy named Finn…"*

- Finn tells Lucy about Cardboard Island, a place covered in cardboard and inhabited by makers, including this group (i.e., the campers), who only just arrived Monday.
- Lucy explains how different this place is from her home and tells Finn what led her here: She's tired of everything being so same-y in Land Land, especially the idea of her not-so-new "new" room in the house she's moving to.

2. Finn and his Cardboard Island friends offer to help

- Excitedly, Finn says that he and his friends are experts at personalizing special spaces—they can help her make stuff for her room!
- Lucy gets excited too, confessing that she sometimes sketches ideas for inventions.
- The pair makes a plan: On Friday, Lucy, Finn and the Cardboard Islanders (including the campers) will put on a Maker Faire (an event Finn has to explain to Lucy) on the island, full of creations she can use in her new room.
- Lucy is thrilled, but she muses that she probably shouldn't tell her parents *yet*, since she's not sure how they'll feel about all these unique creations in their Land Land home.

3. Lucy gets stuck back in Land Land

The storyteller reads: *"A few days passed, with Lucy traveling back and forth between Land Land and Cardboard Island, sharing her sketches and starting to learn how to bring them to life. But one day, when she came rushing home from school, excited to head to the island with a new batch of ideas, she got an awful shock…"*

- Lucy finds her dad in her closet, just having painted over her doorknob (an innocent mistake—he saw something out of order and thought he'd fix it).
- Once her dad leaves, Lucy confirms that the door is, in fact, gone.
- She tries redrawing the doorknob but it's no use—she bangs on the door helplessly.

4. The Cardboard Island folks reopen communication

- Just then, a note arrives through the closet wall (the Cardboard Island gang heard her banging and fashioned a quick mail slot), which Lucy reads aloud: "Pretty cool mail slot, huh? We think we can figure out a new door, too. We just need a little time…"

5. The Cardboard Island folks convince Lucy to stay the course

- Lucy is skeptical, but then she hears Finn calling faintly through her wall: He tells her that nothing is impossible if they COLLABORATE—they'll keep planning and making for the Friday Faire (sending plans through the mail slot), plus work on ideas to help them reopen the portal between the two lands.

Galileo Makers: Friday

1. Lucy wraps up the finishing touches on her Maker Faire project

The storyteller reads: *"It had been a busy few days since the door in Lucy's closet—the one between her home in Land Land and Finn's home on Cardboard Island—had been accidentally sealed shut. Lucy had been spending that time hard at work, communicating with her friends on Cardboard Island, sending plans back and forth as they generated ideas and creating her own project for Friday's Maker Faire…"*

- Lucy finishes her project and holds it up to inspect it, looking proud, then sighs, wondering aloud if she'll ever be able to go to Cardboard Island again—was this all a big waste of time?

2. Lucy reopens the door to Cardboard Island

- Just then, she hears something coming from her closet and walks over to check it out.
- "Is that you, Finn?" she asks.
- "Yup," he responds, and then: "Draw a new doorknob!"

- She doesn't hear him clearly at first, and once she does, she has to remind him that she already tried redrawing the doorknob with no luck.
- Finn explains that they figured out the secret to unlocking the portal: She can't just draw the same doorknob again: "We're *makers*—it has to be a totally reimagined thing… something the world has never seen before!"

3. Lucy attends her first Maker Faire

The storyteller reads: *"Lucy picked up her pencil and studied the wall for a moment, then began to draw a completely new kind of doorknob, this one square and modern-looking with broad stripes running across it. When she was done, she picked up her project, took a few steadying breaths and reached out to turn her new doorknob. And once again, there she was, standing in the dazzling sun of Cardboard Island. But before she could celebrate her successful arrival, she was stopped in her tracks by what she saw: Everywhere she looked, there was a different maker with a different incredible thing—chairs and beds and beanbags; nightlights and desk lamps and fairy lights; clocks and door hangings and murals. It was all so overwhelmingly, astonishingly amazing that she almost couldn't take it all in… but she wanted to try…"*

- Lucy runs around the Faire delightedly, meeting makers, hearing about their projects and sharing her own.

4. Some unexpected visitors show up

- As Lucy begins to run to another booth, she runs smack into her mom and dad.
- Lucy is at a loss for words, but begins to stammer an excuse for what she's doing and why she's there, trying to hide her project behind her back.
- Her parents (a little speechless themselves) slowly explain that they're not mad… they're *impressed*—in fact, they remember a time, long ago, when they used to make things, too…
- They ask to see Lucy's project and marvel at it—they're inspired by her VISION.
- Overjoyed, Lucy says that she couldn't have done any of it without the COLLABORATIVE efforts of Finn and her other Cardboard Island friends—the community of makers that welcomed her.

5. The storyteller wraps things up

The storyteller reads: *"Lucy, her parents, Finn and the rest of the Cardboard Island makers spent hours together at the Faire that day, showing each other what they made and sharing what they learned making it. The Land Landers started to truly understand the power of creating things the world has never seen before and of working together with interesting, innovative people. And they learned a lesson that Cardboard Islanders, Galileo campers and makers all over the world have known for many years: As long as you have an imagination—and maybe a little cardboard—your life will never be boring.*

By the end of the day, Lucy and her parents were so utterly inspired and full of ideas for what else they could make—objects to decorate their new house, to solve everyday problems, to give as gifts—that they couldn't wait to show everyone back home in Land Land. And that's exactly what they did. And from that day forward, to their delight, Land Land was never the same again."

Notes and Additional Ideas

- Your other actors can act out the read-out-loud scenes as the storyteller reads them.
- As inhabitants of Cardboard Island, campers can submit their own ideas/plans for a new door between their land and Land Land.
- Lucy and Finn not being able to hear each other through the wall can be played for comedy: They can stand directly next to each other (with either a cardboard or an imaginary wall between them), shouting as loud as they can, but barely able to make each other out.
- Lucy's project for the Faire can be anything—a camper project or something entirely different.
- On Wednesday or Friday, Lucy can meet real makers (played by staffers) that campers have been learning about, who can share their projects with her.
- On Friday, campers can stage the Maker Faire that Lucy discovers on the other side of her door.
- Feel free to turn Friday's Faire into a deeper exploration of campers' work throughout the week—look at each project and call out (or have campers identify) the Mindset elements and Process steps they used in making it.

Preparation for the Week

This section contains preparation of materials such as cutting paper and cardboard. Give this list to Summer Interns (SIs) who have some time to help Lead Instructors (LIs) or to Team Leaders (TLs) who help LIs do prep work after camp. It also helps you get a sense of the prep needed for the week. It does not include tasks such as setting out materials or preparing a place to store projects. Those suggestions are in the prep section of each lesson.

Day 2 – *Sunhat*

Days earlier

- ⌛⌛ Create a finished example sunhat.
- ⌛ Cut hook and loop (Velcro) into pairs (1 pair per camper).
- ⌛⌛ Cut out the Sunhat Brim cardstock template copies and attach a loop of blue tape to one side of each template (make enough for each camper to use one during your biggest rotation).

Day 3 – *Fishing Pole*

Days earlier

- ⌛ Tape one paperclip each to 12 paper fish to make the paperclip fish.
- ⌛ Tape one washer each to 12 paper fish to make washer fish.
- ⌛ Tape two washers each to 6 paper fish to make double washer fish.

Day 4 – *Handcart, Part 1 of 2*

Days earlier

- ⌛⌛ Open up the boxes, tape one end closed, and fold the flaps in on the other side (1 per camper).
- ⌛⌛ Make a sample handcart.
- ⌛ Cut 1.5" x 18" cardboard into 9" lengths (1 piece per camper).

Day 5 – *Handcart, Part 2 of 2*

Days earlier

- ⌛⌛ Cut Velcro into 6" lengths (2 per camper).

Extension Activities for the Week

This is a list of theme-specific, low-impact activities campers can do throughout the week if they finish early.

Materials

- ☐ box, corrugated, 30" x 24" x 12" (1 per 4 campers)
- ☐ block, wood, asst. shape and size, 150 pack (1 per classroom)
- ☐ Lego, brick, asst., 405 pc set (1 per classroom)
- ☐ book, *Rosie Revere, Engineer*, Andrea Beaty
- ☐ book, *Going Places*, Peter and Paul Reynolds
- ☐ assorted books

Maker Theme Books

If a majority of the class finishes early, you or your TL can read the books to the group. Alternatively, individual campers can look through the books themselves.

Tent Building, Part 2

Reuse the materials from Day 1 and allow campers to build another tent.

Cardboard Box Adventure

Give cardboard boxes and an adventure prompt, such as a journey through space, underwater submarine, or castle fortress. Campers may also draw on the boxes to make windows, doors, etc.

Lego Inventions

Challenge campers to be visionary by using the Lego set to build a new invention. Tell campers that an invention is something new that solves a problem. In other words, they should make something and be able to explain what it does (e.g., a remote control that can open any door in your house).

Block Building

If campers have tried all the other Extension activities, then they may simply play with blocks and/or LEGO.

Day 1

Tents

This week, Nebulas are focusing on building things that are useful for adventuring outdoors. Today, campers will build a tent frame by learning and using a key building technique – overlap and wrap – that will be repeated throughout the week.

A sample tent with four corners and a pitched center

The Big Picture

Lesson Breakdown

Welcome to Science	5 min
Introduction	5 min
Demo & Discussion: Overlap and Wrap	15 min
Camper Work Time: Build a Tent Tape paint stirrers together using the overlap and wrap technique to create strong horizontal and vertical beams. The beams must support the weight of a cloth sheet. Testing: drape a cloth sheet over the complete beam to see if it can support the weight	30 min
Clean Up	5 min
Wrap Up	5 min
Transition	5 min

GIA Focus

Innovator's Knowledge Focus: SKILLS AND TECHNIQUES

Innovator's Mindset Focus: BE COLLABORATIVE – I use my strengths to support the work of others.

How to Create Today's Project

Step-by-Step Pictorial

This is intended to help you understand how to create today's project. It doesn't describe how you'll facilitate this lesson for campers. You'll need to read the "Play-by-Play" section for this information.

Camper Work Time

Fig. 1

The tent begins with four chairs or tables arranged in a rectangular to square shape.

Fig. 2

- Start the tent frame by taping a part stirrer to the chair/desk/table.
- Work with a partner to overlap paint stirrers and then tightly wrap them together with wide blue tape.

Fig. 3

Create a set of beams opposite (parallel to) the first.

Fig. 4

- Create a vertical beam by taping one stick onto the water jug and then adding another stick to it.
- Repeat to create a vertical beam on the other side of the water jug.
- Tape the beams at the top for stability (you'll help campers with this step).

Fig. 5
Together, the tent frame holds up a sheet, although at this point the tent is sagging in several places.

Fig. 6
Use clothespins to secure the sheet and prevent it from sagging.

Fig. 7

The tent is finished, but there's still some extra sheet hanging off the side that can be utilized.

Fig. 8

Building more beams can expand the tent cover.

Fig. 9

The tent is expanded.

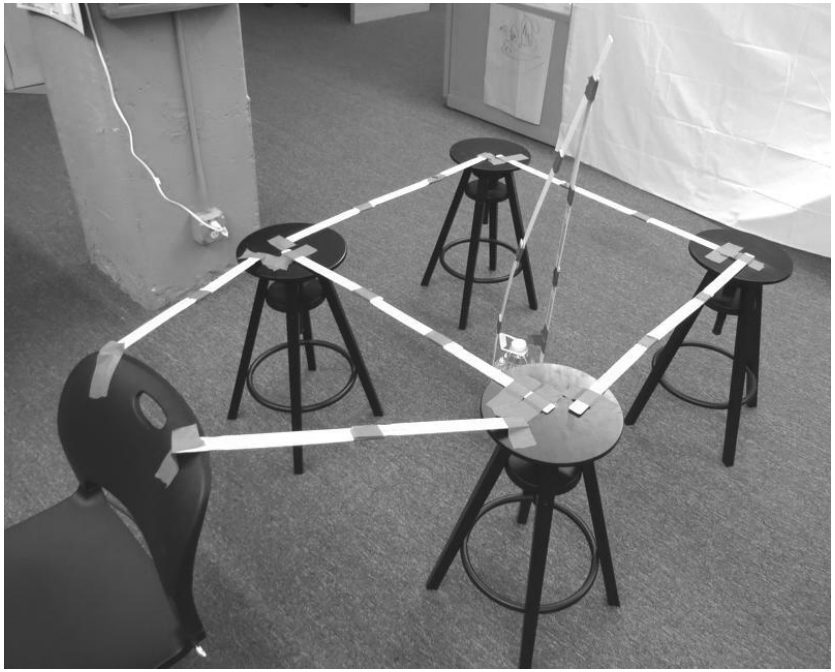


Fig. 10

This particular tent frame includes beams on all four sides, a vertical support, and additional framework to expand the tent.

Get Ready!

Lesson Materials

* (starred) items are choice materials; un-starred items are required for each camper

Demo & Discussion: Overlap and Wrap

☐ paint stirrer, wood, 12" (8 per classroom)
☐ tape, blue, 2" wide (50" per rotation)
☐ copy, color, Tent Example (1 per 4 campers)

Camper Work Time: Build a Tent

☐ paint stirrer, wood, 12" (24 per 4 campers)
☐ clothespin, wood (6 per 4 campers)
☐ water, drinking, 1 gal. (1 per 4 campers)
☐ sheet, flat, white, queen (1 per 4 campers)
☐ tape, blue, 2" wide (125" per 4 campers)

Preparation

Day before

- ⌛ Set up at least four chairs or desks at designated tent-building stations (1 station per 4 campers).
- ⌛ Place paint stirrers, a water jug, and clothespins at each building station.

Morning of

- ⌛ Designate a large area to demonstrate how to build a tent and set up four chairs as seen in the pictorial for the Demo & Discussion.
- ⌛⌛ Pre-rip 5" pieces of wide blue tape and stick them on an accessible place (25 pieces per group) for campers to use during Camper Work Time.

Suggestions for Large Classes

If you have a class with an uneven number of students, then you can create a group of three.

Check In With Your TL

Make sure your TLs are clear about their role in helping today's lesson run smoothly. Specific ways TLs can help today are listed in the dotted overview boxes throughout the lesson.

On the Board

Design Goals

The beams must support the weight of a cloth sheet.

Guiding Questions

SKILLS AND TECHNIQUES

- Are you overlapping the sticks enough?
- Are you wrapping the tape tightly around the overlap?

BE COLLABORATIVE

- What job will you have? What job will your partner have?
- How can you help your partner?
- How can you help your group finish the tent/make it even better?

Vocabulary

overlap – when something covers part of another thing

Teaching the Lesson: Overview

Instructional Priorities & Supporting Innovation

These are the key lesson elements you're expected to communicate/support today. Think of this as the blueprint of a successful lesson. When applicable we've included details about why an element is important for innovation.

Demo & Discussion: Overlap and Wrap

★ **Introduce the CONCEPT of overlap.**

★ **Demonstrate the taping TECHNIQUE of "overlap and wrap" for creating strong connections.**

Throughout the Lesson

★ **Support the Innovator's Mindset Challenge: BE COLLABORATIVE – Campers help one another tape beams and construct the tent.**
Why – Some challenges are much more difficult to do alone. In these instances, working together can help make the task easier for everyone. Sharing your time and energy can speed up a big project.

Teaching the Lesson: Play-by-Play

Welcome to Science (5 min)

It's important to set clear expectations for the whole week. Go over daily procedures you'll want campers to be familiar with (what they do when they first come in, what materials they can and can't touch, where they put projects, etc.). Have campers come up with agreements about how they can respect you, one another, and the space and materials.

Introduce the idea of being an innovator. Say: *We'll be learning about science all week, but we'll also be practicing being Galileo innovators. Being an innovator is a really important job. Innovators think of really great ideas and can turn them into something real!*

Point out your Innovator's Process poster. Say: *These are the steps that good innovators follow to help them make amazing creations. They come up with a lot of ideas, test them out, and redesign to make them better.*

Point out your Innovator's Mindset poster. Say: *This is how good innovators think and act. They try new ideas, they work together, and they don't give up!*

Say: *Are you ready to innovate?! Let's get started!*

Introduction (5 min)

Welcome campers and make a quick story connection
Did you learn about Lucy this morning? What happened to her in the story? (She traveled to a place called Cardboard Island that's covered in cool cardboard creations.) Why don't we get into the Cardboard Island spirit by making some inventions ourselves! Maybe we can inspire Lucy to build something that no one in Land Land has ever seen before.

Introduce the week's theme

- Explain that this week's theme is all about Making, which means creating things oneself.
  - This includes tools, things for games and play, and totally new inventions.

- This week, campers are making things that are useful for every day.
- Explain that people who make things are called makers. The maker community is a space where makers can come together to share ideas.
- Tell campers they'll be learning about some current-day makers who are creating things similar to the things they'll be making at camp.
- If this is your second or third Rotation you can ask campers to tell you what they know about making and makers since they will have gotten this introduction in art.

Build excitement for today's project

- Tell campers that they'll be going on an imaginary outdoor adventure this week.
- Have campers imagine that they just stepped into the woods. There's no roads, no buildings – nothing but trees. And oh no! It's starting to rain!
- Announce that campers will have to figure out how they can make something to keep them safe and dry!
- Explain that they'll be making tents inside the classroom that will be so big that they can fit inside!

Introduce the Innovator's Mindset: BE COLLABORATIVE ★

- Point to this on your Innovator's Mindset poster.
- Define the Mindset element in the context of today's lesson. Say: *This project is big! Today, we are going to be collaborative by working with other friends to make this big tent. Working together allows innovators to do big projects that would be hard to do on their own. It's also more fun to work with friends!*

Demo & Discussion: Overlap and Wrap (15 min)

What You'll Need to Cover: Overview

- Introduce the idea of making a tent frame.
- Introduce the concept of overlap. ★
- Demo how overlapping beams are stronger than end-to-end beams. ★
- Demo how to build a horizontal beam and model collaboration. ★
- Demo how to build a vertical support and model collaboration. ★
- Complete the example tent using clothespins. ★
- Generate ideas on how to expand the tent.
- Review how campers will work together and group campers.

How Your TL Can Help

Work with you to model how to collaborate while building the tent beams.

What You'll Need to Cover: Details

Introduce the idea of making a tent frame

- Show the Tent Example color copy (below).

- Ask: *What is holding this tent up?*
- Point out the sticks that are holding the tent roof off the ground.
- Tell campers that they'll be creating wooden beams similar to these to hold their tents up.

Introduce the concept of overlap ★

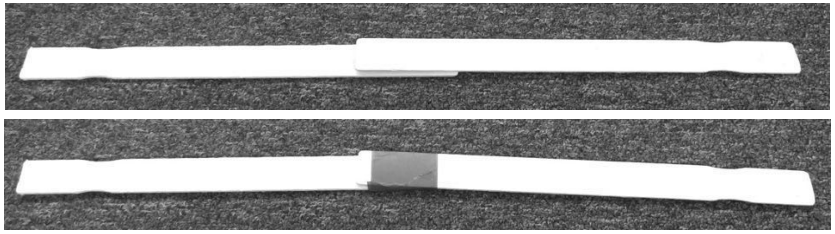
- Show campers the paint stirrers and tell them that these are the sticks they'll be using to make the tent frame.
- Point out that by itself the stick is too short to create a tent frame for a tent that they can fit inside.
- Tell campers that there is a secret building technique for combining short sticks into a strong, long stick. The technique is called "overlap and wrap."
- Have campers repeat "overlap and wrap" after you. Show campers the arm motions that go along with it.
- Overlap your arms as you say "overlap" (following).

- Move your arms around each other as you say “wrap” (below).

- Take two paint stirrers and overlap them by a few inches. Explain that this is overlapping.
- Touch the paint stirrers end to end. This is not overlapping.

Demo how overlapping beams are stronger than end-to-end beams ★

- To demonstrate the point, take two paint stirrers and tape them together end to end. This creates a wobbly connection. Does it look strong? (No!)
- Undo the tape and overlap the paint stirrers. Announce that you are going to now wrap the overlapping sticks in tape.
- Wrap the two paint stirrers tightly in tape.
- Create beams by overlapping two paint stirrers and tightly wrapping the overlap with tape (following).



- Ask: *Does this look stronger?*
  (Yes!)

Demo how to build two horizontal beams and model collaboration ★

- Demo the first step of taping a paint stirrer onto a chair as shown in the pictorial.
- Point out that it’s too short to reach to the other chair, so you’ll have to overlap and wrap to combine two sticks together.
- Point out that overlapping is good because it will make the sticks strong, but if they overlap too much the sticks won’t reach the other side. This means they’ll have to find just the right amount of overlap.
- Tell campers that it can be tricky to hold the next stick in place while you tape it.
- Ask your TL to help by either holding the paint stirrer or wrapping tape around it.
- Continue working with your TL until the beam is finished. Push down on it to confirm that it’s nice and strong.
- Build one more beam with your TL using another pair of chairs. At this point, your tent frame should look like this:

- Drape the sheet over the two beams (below). Note that the sheet is sagging in the middle. Even Nebulas need more headroom than this!

- Announce that campers will need to add a vertical (up and down) beam to hold the tent up high!

Demo how to build a vertical support and model collaboration ★

- Take the sheet off.
- Show campers the prepped tent pole anchors. Demonstrate how to start a tent pole by taping a paint stirrer to the side of the jug.
- Ask your TL for help again. Switch roles (if you were taping last time, this time have your TL tape while you hold the sticks).
- Build a pole that's four sticks tall. As you build, remind campers that you're using the overlap and wrap technique.
- Push down on the top and note how wobbly it is. Not very strong when pushed from the top!
- Build a second pole and connect the two poles at the top. Push down on the top again to show that building two poles and connecting them at the top makes a big triangle.
- Tell campers that they should also make a big triangle when making the tall tent poles.
- Support BEING COLLABORATIVE ★ – Give your TL a high five! Tell campers that the two of you were being very collaborative just then by helping each other build something that would otherwise be tricky to do alone.

Complete the example tent using clothespins ★

- Throw the sheet over your vertical and horizontal beams. It should look something like the following photo.

- Note that the ceiling is much higher! However, the sheet is still sagging in some places.
- Show campers the clothespins.
- Demo with your TL how two people can work together to stretch out the sheet. Then a third person can clip it in place to prevent it from sagging.

Generate ideas on how to expand the tent

- Ask campers to suggest some ways to make the tent bigger and better. If campers don't suggest it, lead them to the conclusion that it would help to build more beams.
- Quickly create one more horizontal beam.
- When you are finished, pull the sheet over the new beam and use clothespins to clip it in place. As you expand the tent, verbalize what you're doing so campers can follow your actions.
- Ask campers what else you could do or try. Some ideas:
  - Add beams to all four sides to make the tent stronger
  - Make the beams longer
  - Move the chairs around to different places
  - Make a triangle tent frame instead of a square/rectangular one
- By the end your tent should look something like the following photo.

Review how campers will work together and group campers

- Let campers know that they are each going to work with a partner to tape their sticks together, just like you and the TL did.
- Also let campers know that two pairs will work on one tent. That means four people will be sharing one tent.
- It might not be apparent how pairs can collaborate on a single tent, so review how pairs might work together:
  - One pair connects two chairs with a beam and the other pair connects the other two chairs with a beam.
  - Each pair makes one vertical beam and then connects them to make a strong triangle.
  - Pairs add beams to different places around the tent.
  - Everyone helps to pull the sheet tight and add clothespins where necessary.
- Pair campers up and then assign two pairs to each building area.

Camper Work Time: Build a Tent (30 min)

During Work Time Campers Will…

CREATE, TEST, EVALUATE & REDESIGN (horizontal beams)

1. Build horizontal beams that span from one chair to the other.
2. Test the strength of the beams by pushing on the beams with their hands and reinforcing them if necessary.

CREATE, TEST, EVALUATE & REDESIGN (vertical beams)

3. Build vertical beams and attach them to the water jug.
4. Connect the two beams at the top for added strength.
5. Test stability and reinforce as necessary.

CREATE

6. With the help of an adult, drape a sheet over the tent frame.
7. Use clothespins to keep the sheet in place.
8. Build additional beams or rearrange the existing ones.

How Your TL Can Help

- Help drape the sheet over the frame.
- Help coordinate groups to work meaningfully together.

Facilitate the Project Steps

CREATE, TEST, EVALUATE & REDESIGN (horizontal beams) (Steps 1-2)

- Monitor campers as they first start building and remind them of the overlap and wrap technique if they forget.
- Remind campers that the first step is for each group to start by creating beams to go across two chairs.
- If campers are unsure of how to work together, give them temporary roles (e.g., “You can hold the sticks in place while your partner wraps them in tape. After you make the first beam, you can switch jobs.”).

CREATE, TEST, EVALUATE & REDESIGN (vertical beams) (Steps 3-5)

- Remind campers to start building from the water jug to get their beams to stand vertically.
- Help campers connect their two vertical beams as necessary.

CREATE (6-8)

- Don’t pass out sheets until campers have completed sturdy horizontal and vertical beams. They’ll be less excited about redesigning these once they get their sheets!
- As campers begin adding clothespins, help coordinate their actions (e.g., “The sheet is sagging on this side. What if two of you pull on the sheet while one more friend puts the clothespins on?”).
- Remind campers they all have to fit under their group’s tent and encourage them to redesign if they can’t.

- Once campers are finished and have had some time to enjoy being in their tents, encourage them to think of ways to support the loose sides of the sheets to expand the cover of their tents. You can frame this as "adding another room" to the tents.

Support BEING COLLABORATIVE ★

Suggest strategies that help and encourage campers to be collaborative

Some specific strategies for today:

- Supporting their partners/groups by either holding a stick in place or wrapping tape around it
- Talking with the group about what jobs everyone should do next
- Talking with and listening to others about what they want the tent to look like and how they should place beams/the sheet to accomplish this
- Asking their groups for help with a particular task or asking their groups how they can help

Recognize collaborative campers

This encourages the camper and helps others see how they can be collaborative as well. Recognition can be just verbal or include some kind of physical award. Be sure to be specific about how you see campers being collaborative. Some ways you might see collaboration today:

- Using any of the strategies mentioned above
- Doing a less-preferred task for the sake of supporting the group
- Noticing what others in the group are doing so they can coordinate their actions

Ask the Guiding Questions that support being collaborative

Clean Up (5 min)

- Give campers a two-minute warning before clean up.
- Explain the clean-up procedure to campers:
  - The TL will remove the sheets.
  - The campers will gently take the sticks off of the chairs/tables.
  - Pile up the sticks in a designated area.
  - The campers do not have to undo all the overlapping connections.
  - If you have time, you can instruct campers to remove as much tape as they can and turn it into a Giant Tape Ball!

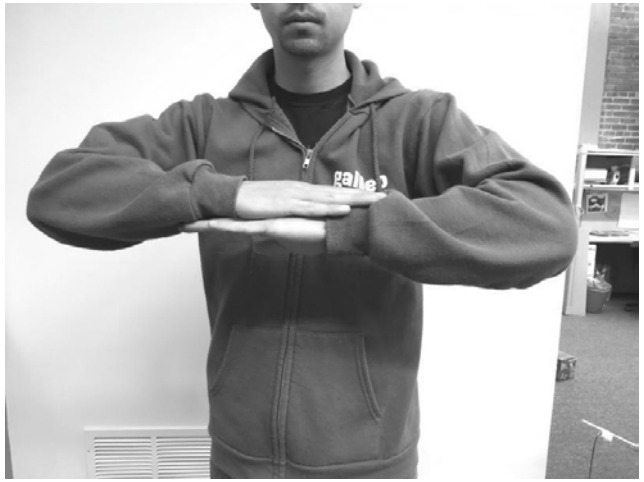
Lesson Wrap Up (5 min)

Review (SKILLS AND TECHNIQUES)

Give campers a chance to review what techniques they learned and used to make their awesome creations today.

Suggested review activity

- Tell campers that they're going to play a game called Galileo Says Overlap.
- In this game, campers will copy your body movements, but only if what you're doing is overlapping.
- For example, if you say, "Overlap your arms!" while overlapping your arms (below), campers should follow.



- However, if you say, "Overlap your fingers!" but your fingers aren't overlapping (following), then campers should not follow.

Recognition and Reflection (BE COLLABORATIVE)

Help campers see how they or others embraced the Innovator's Mindset, and why this is important for innovation.

Suggested recognition and reflection activity

- Have campers share how they helped their groups or how their groups helped them make their tents awesome.
- Reiterate that by working together they had more fun and were able to build something really big and amazing in a short amount of time.
- Have campers give everyone in their groups a high five for awesome collaboration!

Day 2

Sunhat

Any outdoor adventure requires some protection from the sun! Today campers each make a sun hat.

An example of a finished hat

An example of a redesigned hat

The Big Picture

Lesson Breakdown

Introduction	5 min
Do-With-Me: Sunhat Headband Campers place adhesive Velcro circles onto one end of a foam strip and then ask for an adult to help them fit the headbands onto their heads.	10 min
Demo & Discussion: Brim and Visor Intro	15 min
Camper Work Time: Brim and Visor Cut out and tape on a brim and visor. The sunhat must: • Have a brim that shades the camper's face • Have a visor that covers the eyes Testing: in sunlight (or under a flashlight) compare wearing the hat with not wearing it	25 min
Clean Up	5 min
Wrap Up	5 min
Transition	5 min

GIA Focus

Innovator's Process Focus: TEST AND EVALUATE

Innovator's Mindset Focus: BE DETERMINED – I persevere until I achieve my goal.

How to Create Today's Project

Step-by-Step Pictorial

This is intended to help you understand how to create today's project. It doesn't describe how you'll facilitate this lesson for campers. You'll need to read the "Play-by-Play" section for this information.

Materials

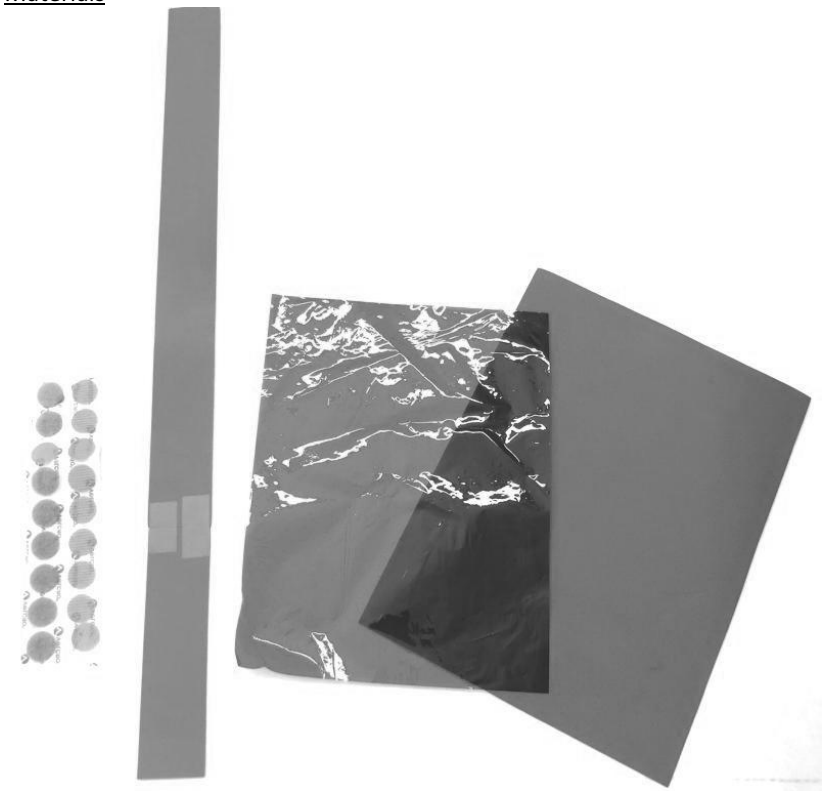


Fig. 1

The materials are a pair of Velcro circles, a 24" strip of foam, a cellophane sheet, and a foam sheet.

Headband

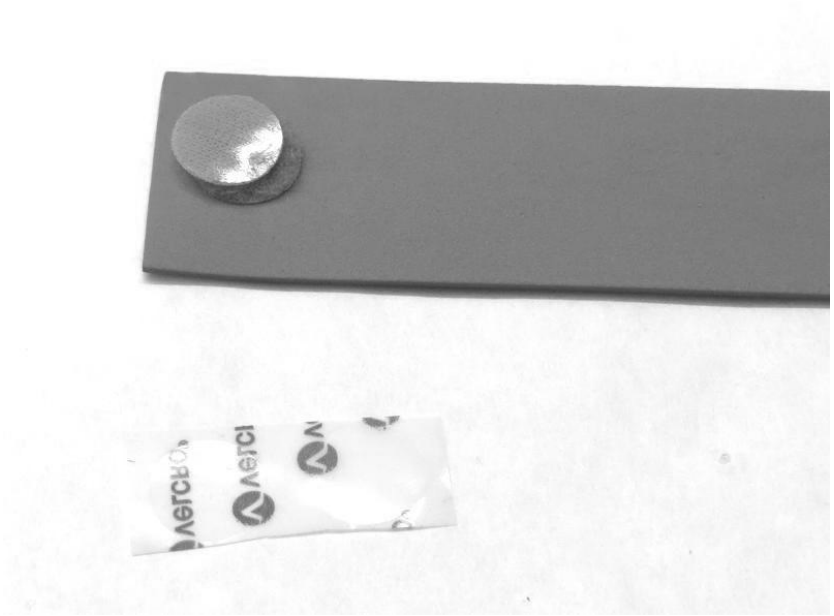


Fig. 2

Peel the Velcro circles off of the backing. Stick one onto an end of the foam strip and then attach the corresponding piece sticky side up.

Fig. 3

- Have a partner fit the headband around your head.
- Attach the other end of the foam onto the exposed adhesive Velcro backing.

Brim and Visor

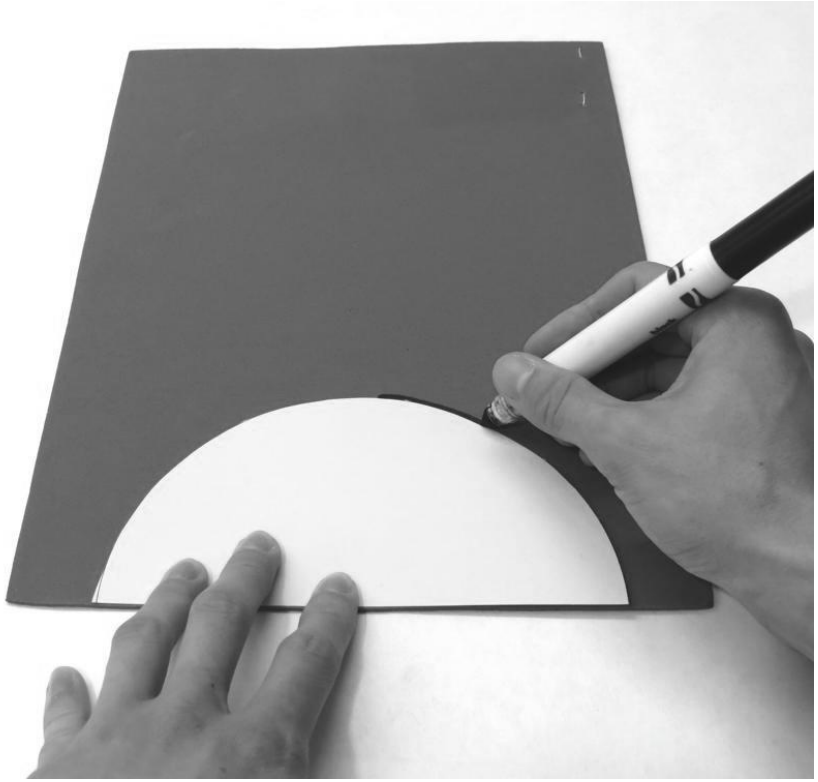


Fig. 4

Place a brim template on the edge of the foam sheet and trace the round side.

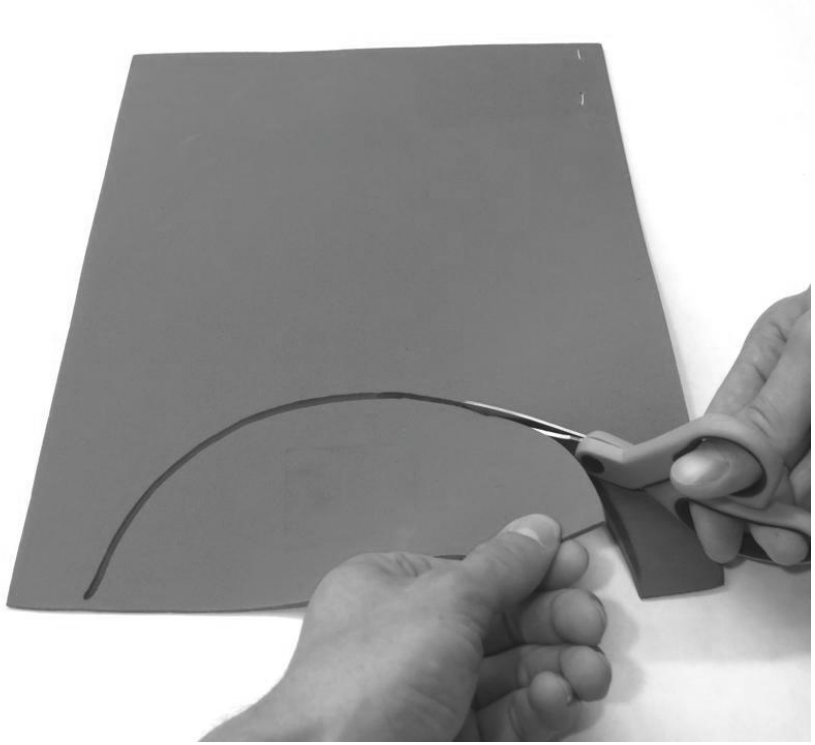


Fig. 5

Cut out the brim.

Fig. 6

Line up the brim with the middle edge of the headband and tape it in place.

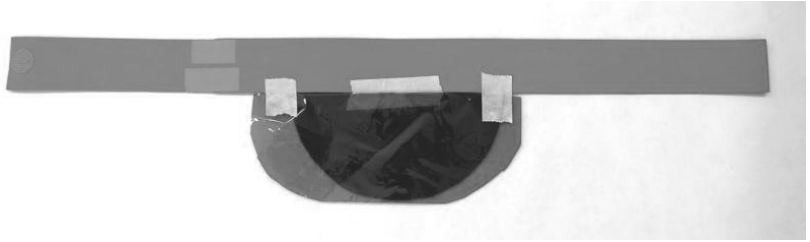


Fig. 7

Cut out a shape from the cellophane that's big enough to cover the eyes. Line it up with the middle edge of the headband and tape it in place.

Fig. 8

When the sunhat is first put on, it will look like this.

Fig. 9

Use your hands to adjust the brim so that it sticks out and away from the forehead.

Fig. 10

Finished! It’s blocking the light from above very well!

Fig. 11

Redesign! The visor is trimmed back so the nose is not covered, and several foam strips have been added to protect the ears and neck from the sun.

Get Ready!

Lesson Materials

* (starred) items are choice materials; un-starred items are required for each camper

Intro Materials

☐ copy, color, Jessie's Hat (1 per 4 campers)

Do-With-Me: Sunhat Headband

☐ foam strip, asst. colors, 2" x 24" (1 per camper)
☐ hook and loop, 3/4" round, 2 part, adhesive back (1 per camper)

Demo & Discussion: Brim and Visor Intro

☐ sample of materials from Camper Work Time (1 set per rotation)

Camper Work Time: Brim and Visor

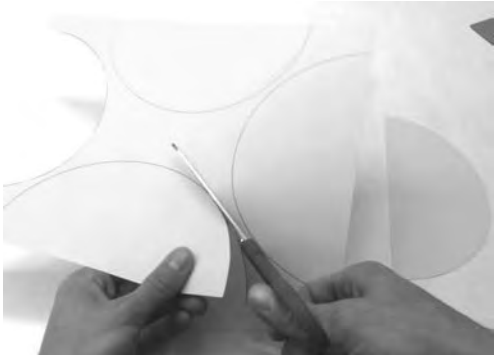
☐ copy, b&w, cardstock, Sunhat Template (1 per 4 campers)
☐ foam sheet, asst. colors, 6" x 9", *for brim and head cover* (1 per camper)
☐ cellophane, asst. colors, 8.5" x 11", *for visor* (1 per camper)
☐ flashlight, plastic, asst. colors, *for testing inside or on cloudy days* (2 per classroom)
☐ marker, washable, metallic, set of 6, *for Extension activity* (2 sets per classroom)

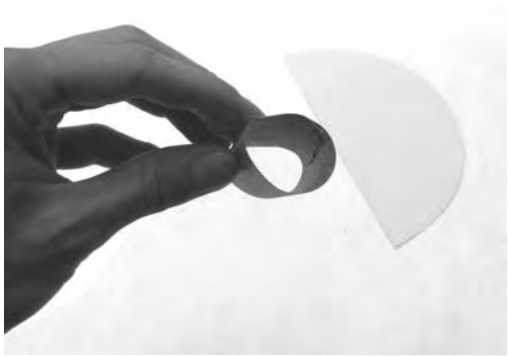
Preparation

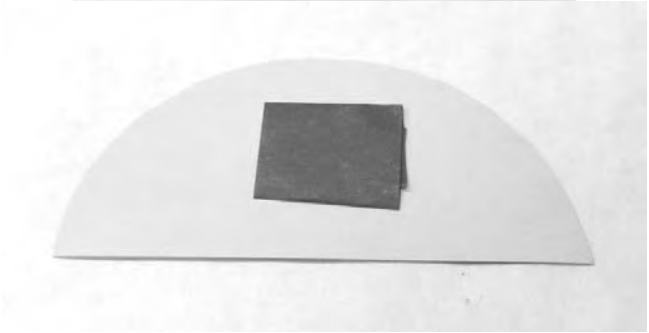
Days earlier

- ⌛⌛ Create a finished example sunhat.
- ⌛ Cut hook and loop (Velcro) into pairs (1 pair per camper) (below).

- ⌛⌛ Cut out the Sunhat Brim cardstock template copies and attach a loop of blue tape to one side of each template (make enough for each camper to use one during your biggest rotation). See below.







Morning of

- ⌛ Set out materials for the Do-With-Me at the tables.

Suggestions for Large Classes
None

Check In With Your TL
Make sure your TLs are clear about their role in helping today's lesson run smoothly. Specific ways TLs can help today are listed in the dotted overview boxes throughout the lesson.

On the Board
Design Goals
The sunhat must:
- Have a brim that shades the face
- Have a visor that covers the eyes

Guiding Questions
TEST AND EVALUATE
- What do you notice about your hat when you wear it?
- What parts of your body are protected by your hat? Which are not?

BE DETERMINED
- What else can you do to make your hat even better?
- What do you need to do next to finish your hat?

Vocabulary
brim – part of a hat that blocks sun from above
visor – part of a hat that protects the eyes from light

Teaching the Lesson: Overview

Instructional Priorities & Supporting Innovation

These are the key lesson elements you're expected to communicate/support today. Think of this as the blueprint of a successful lesson. When applicable we've included details about why an element is important for innovation.

Demo & Discussion: Brim and Visor Intro
- ★ **Demo the TECHNIQUE of using a template to trace and then cut out a brim.**
- ★ **Model the TECHNIQUE of placing the headband flat on the table and then taping the brim and visor to it.**
- ★ **Explain the procedure to TEST, EVALUATE AND REDESIGN the sunhat, and how to rearrange the sunhat components.**

Throughout the Lesson
- ★ **Support the Innovator's Mindset Challenge: BE DETERMINED – Campers stay focused to accomplish all the different steps necessary to create each part of their sunhats.**
  Why – It can be a lot for Nebulas to remember what they are creating and how they should be creating it. Help them stay focused on the task at hand and keep them excited about their final goal.

Teaching the Lesson: Play-by-Play

Introduction (5 min)

Build excitement for today's project

- Congratulate campers on the amazing tents they made yesterday.
- Announce that today they have to make something new to solve another problem. They want to explore outside but the sun is too strong and they don't have anything to protect their heads and faces!
- Show the Jessie's Hat color copy (below).

- Introduce Jessie, a maker who had a similar problem and solved it by making a sunhat to wear!
  - Her hat was not bought at the store. She made it by taking pieces of fabric (cloth) and then twisting them together.
  - Explain that campers are going to make hats to keep themselves safe from the sun just like Jessie!

Introduce the Innovator's Mindset: BE DETERMINED ★

- Point to this on your Innovator's Mindset poster.
- Define the Mindset element in the context of today's lesson. Say: *There will be a lot of different steps we need to complete to create our hats. Today we're going to practice being determined by working hard to finish each part of our sunhats and make them the way we want.*

Do-With-Me: Sunhat Headband (10 min)

What You'll Need to Cover: Overview

- Review the components of your sunhat.
- Model how to add Velcro.
- Show how the headband will get fitted.
- Have campers assemble their headbands.

How Your TL Can Help

Fit headbands onto campers.

Guiding Campers

Review the components of your sunhat

- Point to each part of your sunhat and explain what it does.
  - The brim keeps sun off of your face.
  - The visor blocks some of the light to your eyes so that it's not so bright.
  - The other strips of foam protect your neck, ears, etc. from the sun.
- Tell campers that they will be making the headband first, and then the other parts.

Model how to add Velcro

- Show campers the foam strip and the Velcro circles.
- Demo how to add the Velcro to the foam strip as shown in the pictorial.
- Emphasize that they are making a Velcro sandwich with only one piece of Velcro stuck to the foam and the other piece stuck right on top of it.

Show how the headband will get fitted

- Explain that once campers have attached both pieces of Velcro, they can raise their hands and have an adult help them fit the headbands onto their heads.
- Ask the TL to help you model this step.
- Encourage campers to leave their headbands on once you've fitted them so you know who still needs help.

Have campers assemble their headbands

- Have campers start adding Velcro to their foam strips. Remind them their Velcro pieces should be stacked on top of each other like a sandwich.

- It should take you just a second or two to attach the foam strip ends once the Velcro is on.
- Encourage campers to be patient if you can't get to them right away.
- When you are finished fitting the headbands onto all campers, have them leave their headbands on the tables and return to the circle.

Demo & Discussion: Brim and Visor Intro (15 min)

What You'll Need to Cover: Overview

- Demo how to make the brim using a template. ★
- Demo how to cut out a visor that's big enough. ★
- Demo adding additional head cover.
- Model what the testing procedure looks like. ★
- Transition to Camper Work Time.

What You'll Need to Cover: Details

Demo how to make the brim using a template ★

- Hold up a cardstock brim template and explain what it is.
- Show campers the technique of placing a template tape side down on a sheet of foam and carefully tracing around the edge.
- Cut out the brim.
- Demo how to lay the headband flat on the table and line up the edge of the brim with the edge of the headband.
- Use a 4-6" piece of tape to attach the brim to the headband. Flip it over and use another piece of tape on the other side.

Demo how to cut out a visor that's big enough ★

- Cut out a tiny piece of cellophane and ask if it's big enough to cover your eyes. (No!)
- Cut out a large piece and ask again if it's big enough. (Yes.)
- Tell campers that they must cut out a big piece that can cover the face, and they can always trim it later.
- Show campers how to attach the visor in the same way: lay it flat on the table with the edge lined up with the headband, and then use a piece of tape to attach it.
- Try it on. Show how to adjust the sunhat so that the brim sticks out away from your forehead.

Demo adding additional head cover

- Remove the sunhat. Demo how to cut foam strips into shorter lengths. Attach a few foam strips to the sides and back of the headband while explaining that these are to help cover your ears and neck.
- Campers can add this extra head cover anywhere on the hat!

Model what the testing procedure looks like ★

- Tell campers that they will test by stepping outside (if it is sunny and logistically possible) with the TL.
- If weather or other challenges prevent you from testing outside, explain that the flashlights will be kind of like the sun.
- First they'll feel what it's like outside without the sunhats, and then they will put the sunhats on and evaluate how much sun is getting on their faces, ears, necks, and eyes.
- Review the Mindset Challenge ★ – Remind campers that being determined isn't just about getting the steps done, but working to make sure each part of the hat fits, looks, and works just the way they want. If they notice that some part of them isn't protected from the sun or some part of the hat feels weird they should redesign!
- Review some ways campers might redesign after testing.
  - Cut the visors so they don't bother their noses or make new visors if they realized theirs are too small to cover their eyes.
  - Adjust the brim or visor if it's not in the right place.
  - Add additional covering to more areas (ears, neck, etc.).

Transition to Camper Work Time

- Recap the building steps:
  - Cut out a brim using a template.
  - Line up the brim with the headband and tape it on.
  - Cut out a visor.
  - Line up the visor with the headband and tape it on.
- Review the Mindset Challenge ★ – Remind campers to stay determined to complete all four steps for their hats and to redesign until their hats are just right!
- Have campers give you a thumbs-up if they think they know what to do. Campers who give a thumbs-up can start building independently.
- If there are some campers who are not sure what to do, then you can create a small Do-With-Me group to create the brim and visor.

Camper Work Time: Brim and Visor (25 min)

During Work Time Campers Will…

CREATE

1. Cut out a brim and visor.
2. Tape each component onto the sunhat.

TEST AND EVALUATE ★

3. Step outside or stand under a flashlight without the sunhat and evaluate how the face, neck, and eyes feel.
4. Put on the sunhat and reevaluate how the face, neck, and eyes feel.

REDESIGN

5. Add more cover or rearrange the sunhat components.

Extension

- Give campers glitter markers to decorate their sunhats.
- Allow campers to use extra foam and cellophane to make another brim and visor on the back to make a reversible hat.

How Your TL Can Help

Supervise campers outside, or take groups of campers to and from the classroom for testing.

Facilitate the Project Steps

CREATE (Steps 1-2)

- If campers are having trouble tracing, help them by holding the template for them while they trace. Alternatively, you can just have them cut around the template without tracing it.
- Remind campers to line up the brim with the headband while everything is flat on the table.
- Encourage faster/more advanced campers to help others by holding their brims in place while the campers tape them down.
- Allow campers to choose which color of cellophane they want. Campers can give the cellophane a preliminary test by holding a sheet up to their eyes and observing how it changes their perception of the light in the room.

TEST AND EVALUATE (Steps 3-4) ★

- Remind campers that they will need to adjust the brim so that it points away from the head instead of pointing up or down.
- Ask the Guiding Questions that support testing and evaluating.

REDESIGN (Step 5)

- If parts of the sunhat need to be removed and rearranged, you may give hands-on help, particularly if the cellophane needs adjustment, since that material can rip very easily.
- When they are finished with the main components, encourage campers to add onto their sunhats to cover other parts of their heads.

Extension

- Campers who finish very early can be given instructions on an individual basis on how to add a second brim and visor.

Support BEING DETERMINED ★

Suggest strategies that help and encourage campers to be determined

Some specific strategies for today:

- Asking for help when uncertain about what to do next.
- Celebrating and testing each part of the sunhat as it is completed is a great way to stay motivated.
- Tracking their progress so they can see how much they've done and how much more they still need to do. You can support this by having a checklist of steps on the board with illustrations.

Recognize determined campers

This encourages the camper and helps others see how they can be determined as well. Recognition can be just verbal or include some kind of physical award. Be sure to be specific about how you see campers being determined. Some ways you might see determination today:

- Using any of the strategies mentioned above
- Taking their time on each step
- Redesigning after testing to improve their hats

Ask the Guiding Questions that support being determined

Clean Up (5 min)

Make sure that the campers' names are on the hats.

Lesson Wrap Up (5 min)

Recognition and Reflection (BE DETERMINED)

Help campers see how they or others embraced the Innovator's Mindset, and why this is important for innovation.

Suggested recognition and reflection activity

- Have campers raise their hands if they were able to create hats with a headband, brim, and visor that helped keep the sun/flashlight out of their eyes and faces. Recognize campers for their determination to create something they can really use!
- Have campers raise their hands if they added or adjusted something after testing to make their hats even better. Have a few campers share and recognize them for their determination to improve their creations.

Application

Leave campers with a challenge or prompt to help them apply today's learning outside your classroom.

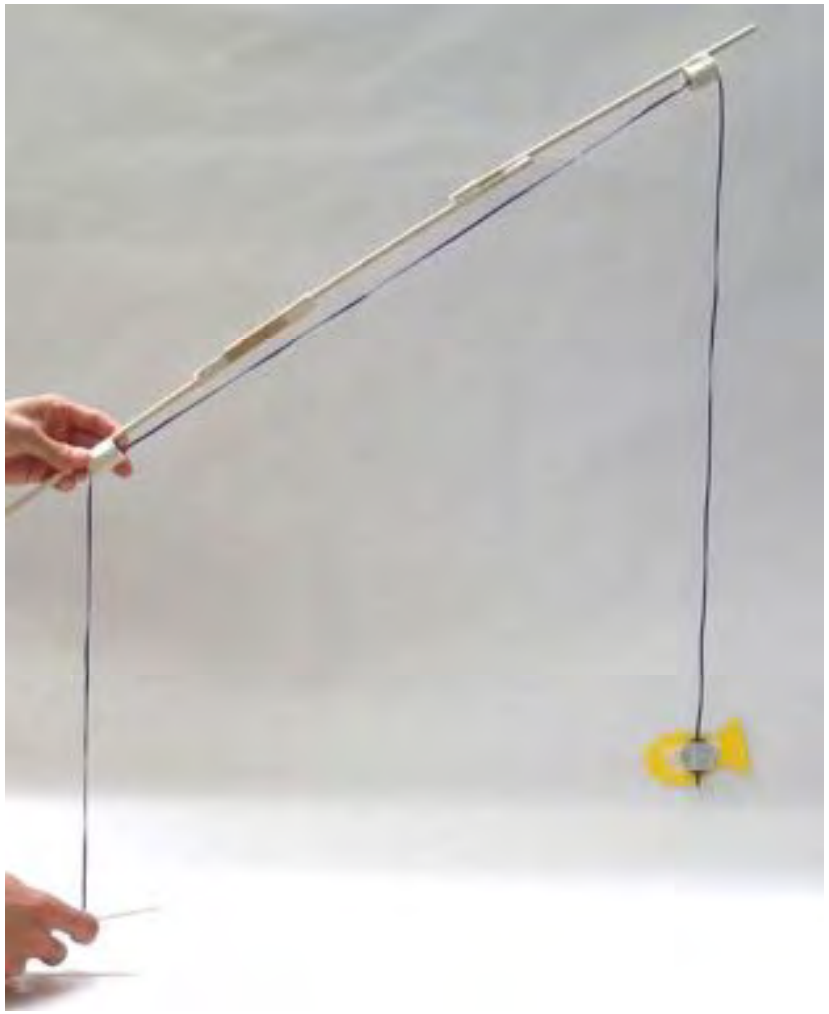
Suggested challenges/prompts

- Challenge campers to look out for headgear in the real world that uses a brim (like a hat) or a visor (like sunglasses).

Day 3

Fishing Pole

The next thing campers will make for their DIY outdoor adventure kit is a magnetic fishing pole. They'll use it to attempt to catch fish of varying weights.



The Big Picture

Lesson Breakdown

Introduction	5 min
Do-With-Me: Pole and Spools Tape three dowels together to form a sturdy pole, and then tape a spool near each end of the pole.	15 min
Demo & Discussion: Fishing Line, Magnet, and Reel	10 min
Camper Work Time: Finish the Fishing Pole Thread lacing (lanyard string) through the spools. Attach a magnet "hook" to one end and a craft stick "reel" to the other. The fishing pole must: • Be able to catch a paperclip fish and reel it in • Have overlapped joints that do not break Testing: catch paper fish of various weights and reel them in by pulling on the craft stick	20 min
Clean Up	5 min
Wrap Up	10 min
Transition	5 min

GIA Focus

Innovator's Knowledge Focus: SKILLS AND TECHNIQUES

Innovator's Process Focus: EVALUATE

Innovator's Mindset Focus: BE REFLECTIVE – I take time to think about what is and isn't working in my design.

How to Create Today's Project

Step-by-Step Pictorial

This is intended to help you understand how to create today's project. It doesn't describe how you'll facilitate this lesson for campers. You'll need to read the "Play-by-Play" section for this information.

Pole

Fig. 1

Lay the dowels on the table and overlap the ends by about 3".

Fig. 2

Press a piece of tape onto the dowels.

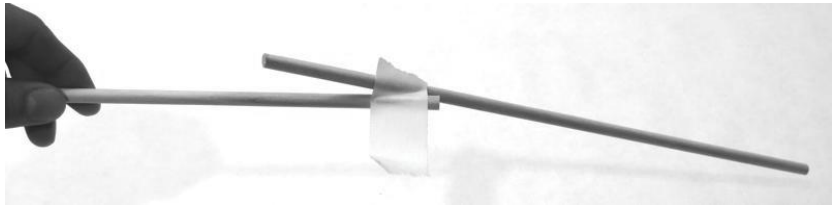


Fig. 3

Pick up the dowels. They should stay loosely connected.

Fig. 4

Wrap the tape tightly around the dowels.

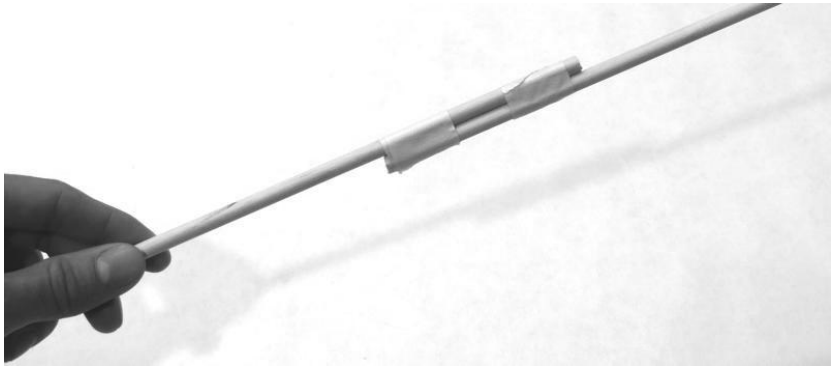


Fig. 5

Repeat this taping technique one more time.

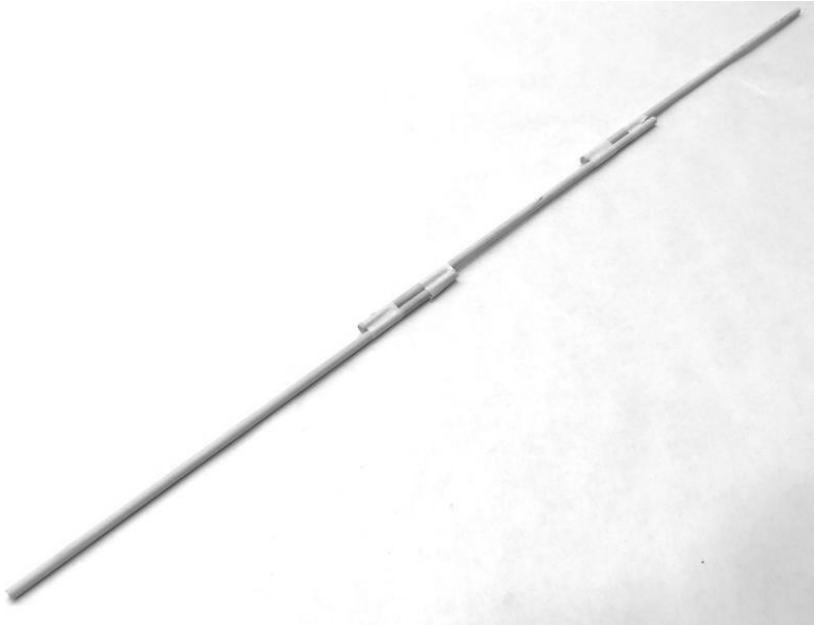


Fig. 6
Overlap and wrap one more dowel to extend the pole.

Spools

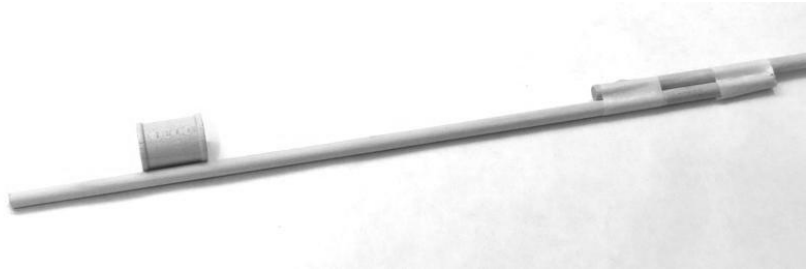


Fig. 7
Place a spool near the end of the pole, leaving some space for a handle.

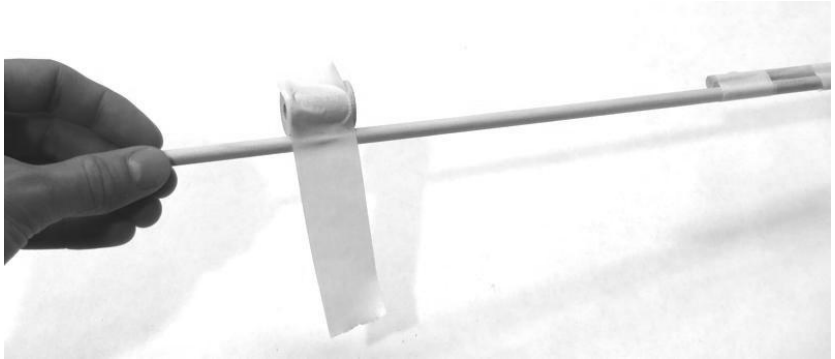


Fig. 8
Press the tape onto the spool and dowel. Pick it up from the table.

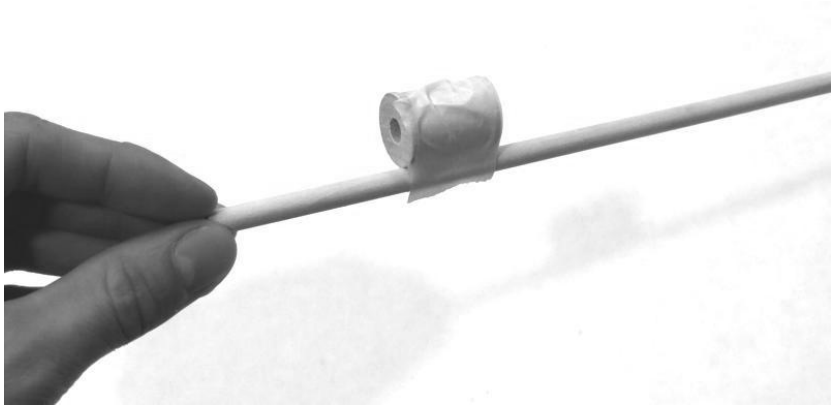


Fig. 9
Tightly wrap the tape around the spool and dowel.

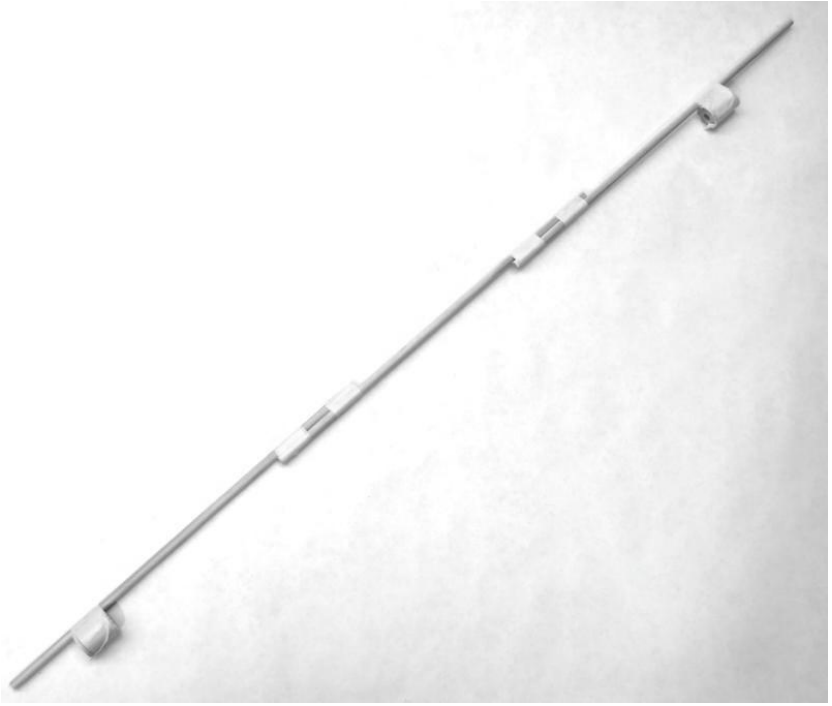


Fig. 10

Repeat this on the other end. It's okay if the spools are not on the same side of the stick.

String and Magnet

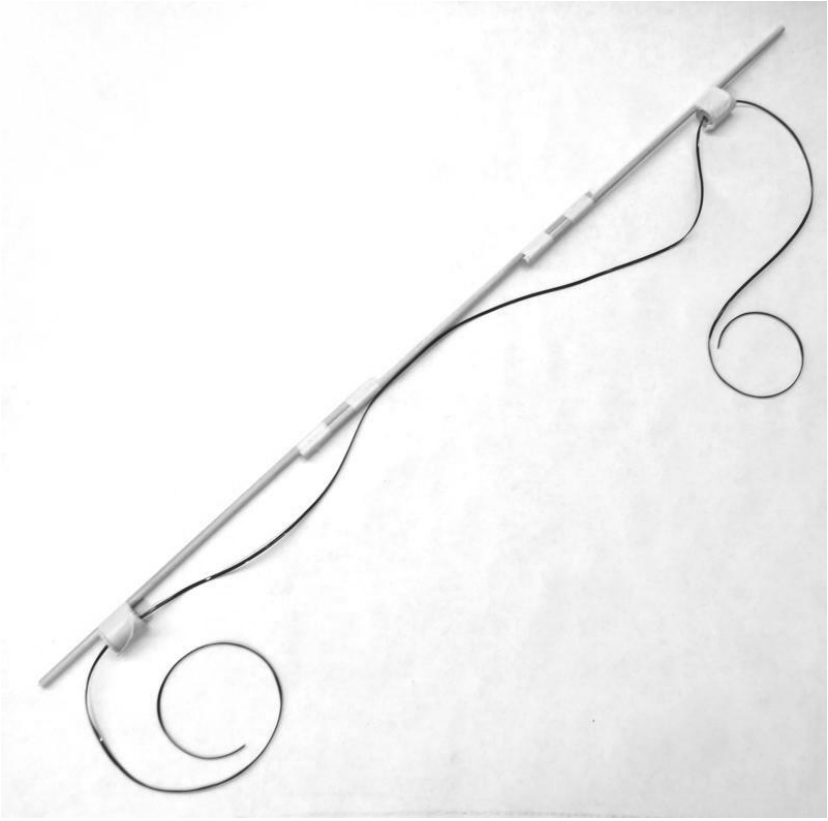


Fig. 11

Thread the lacing (lanyard string) through the spools.

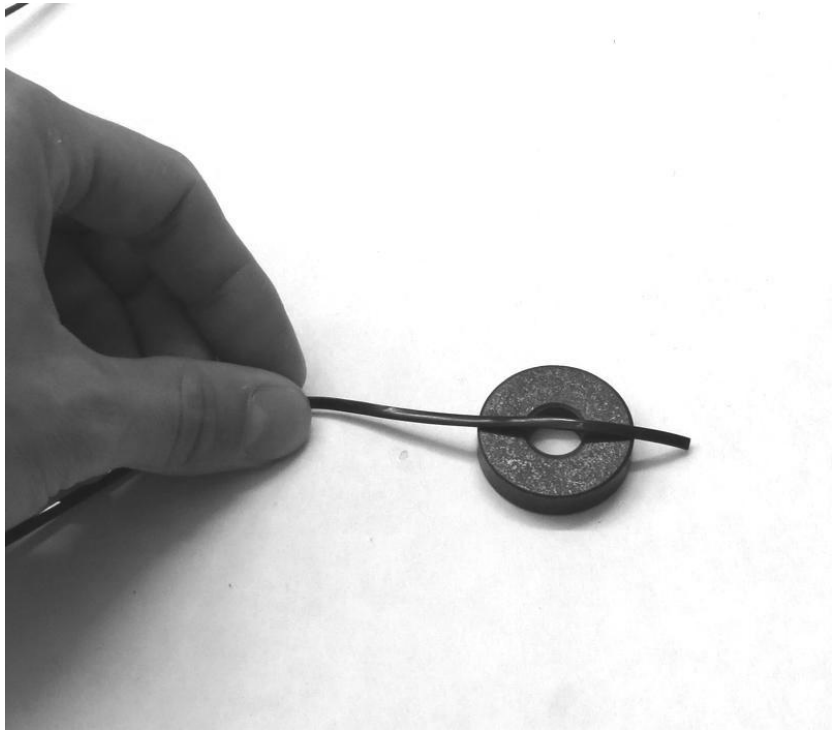


Fig. 12

Lay the end of the lacing across the magnet “hook.”

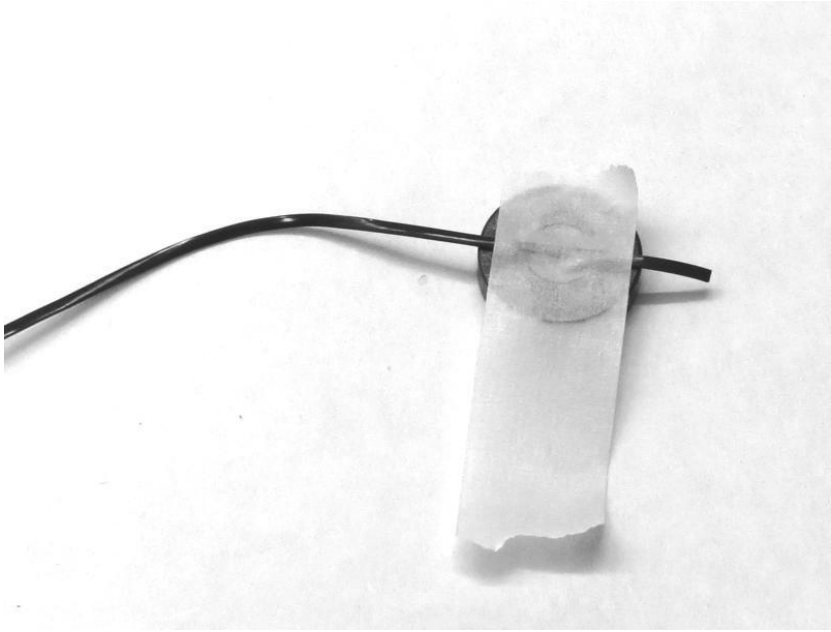


Fig. 13

Press the tape onto the magnet.

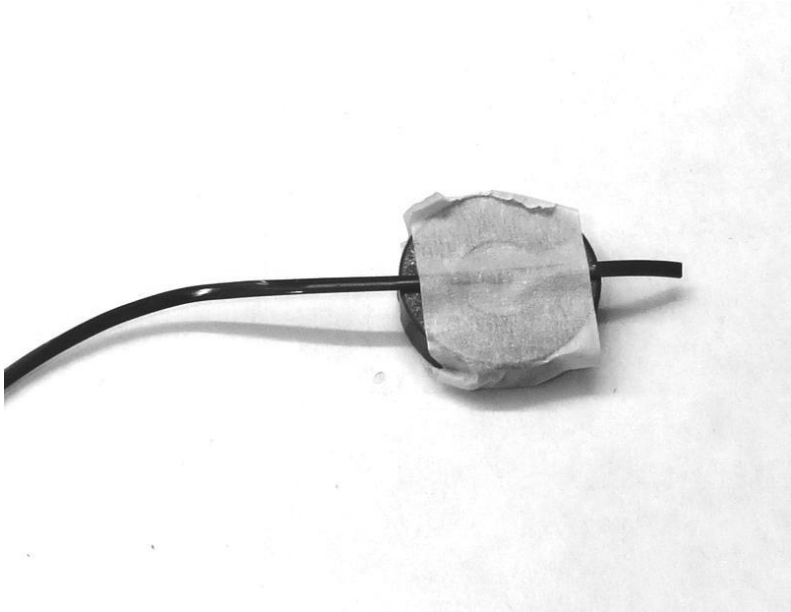


Fig. 14

Wrap the remaining tape around the magnet.

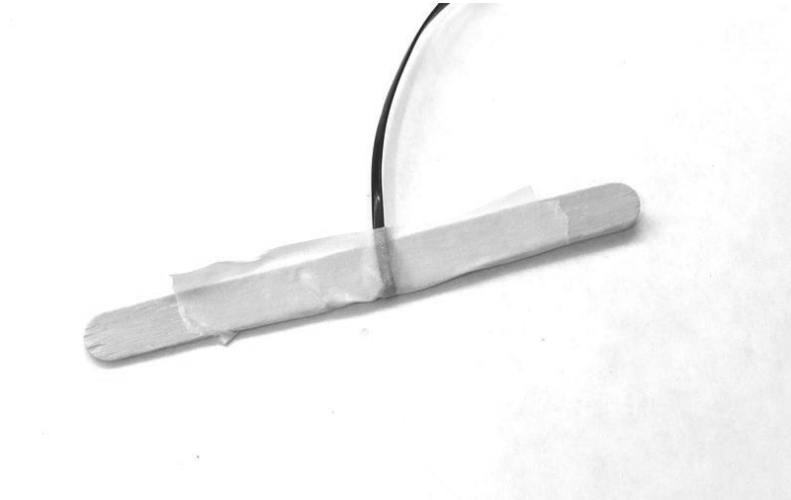


Fig. 15

Repeat this technique with the craft stick “reel.”

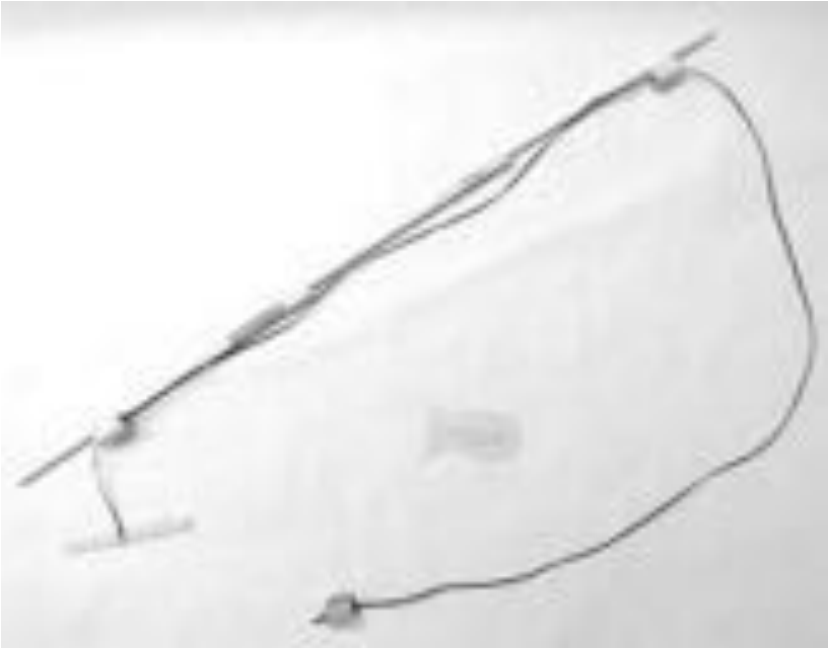


Fig. 16

Finished!

Get Ready!

Lesson Materials

* (starred) items are choice materials; un-starred items are required for each camper

Pre-Assembly

magnetic fish

☐ paperclip, jumbo, *non-consumable* (12 per classroom)
☐ washer, fender, 1/4" id x 2" od, *non-consumable* (24 per classroom)
☐ paper fish, asst., *non-consumable* (36 per classroom)

Intro Materials

☐ finished project sample, *for LI demo* (1 per classroom)

Do-With-Me: Pole and Spools

☐ dowel, wood, 0.25" x 12" (3 per camper)
☐ spool, wood, 1" x 3/4" w/ 1/4" hole (2 per camper)
☐ tape, masking (12" per camper)
☐ copy, color, Girl Fishing (1 per 4 campers)

Camper Work Time: Finish the Fishing Pole

☐ magnet, round, 1" dia., 3/8" hole (1 per camper)
☐ lacing, plastic, white, 100 yd. (60" per camper)
☐ craft stick, regular, 3/8" x 4.5", *for reel* (1 per camper)
☐ *craft stick, regular, 3/8" x 4.5", *for reinforcing dowel connections* (1 per camper)

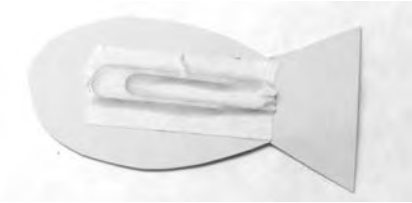
Extension

☐ paperclip, jumbo, *consumable* (1 per camper)
☐ paper fish, asst., *consumable* (1 per camper)
☐ markers, washable, set of 8 (1 per 4 campers)

Preparation

Days earlier

- Tape one paperclip each to 12 paper fish to make the paperclip fish (below).



- Tape one washer each to 12 paper fish to make washer fish.
- Tape two washers each to 6 paper fish to make double washer fish.

Day before

- Create fishing ponds by placing fish in an empty box or bin for fishing. Make a blue tape line about one foot away from the box behind which campers must stand when fishing. This forces campers to hold their poles correctly (near the reel as opposed to at the other end), and ensures that their poles are subjected to the full weight of the fish.
- Set out materials for the Do-With-Me in a container at the building tables.
- Set out the materials for Camper Work Time in a separate container to be passed out after the Do-With-Me.
- Set out the Extension materials at a fish-making station for campers who finish early.

Morning of

- Scatter a few paperclip fish near the front of the room to demo using your pole as campers enter.

Suggestions for Large Classes

Set up designated “fishing ponds” outside the classroom if possible.

Check In With Your TL

Make sure your TLs are clear about their role in helping today’s lesson run smoothly. Specific ways TLs can help today are listed in the dotted overview boxes throughout the lesson.

On the Board

Design Goals

Your fishing pole must:

- Be able to catch a paperclip fish and reel it in
- Have overlapped joints that do not break

Guiding Questions

EVALUATE and BE REFLECTIVE

- Where is your pole nice and strong?
- Where do you notice your fishing pole bending or breaking?
- What do you notice about where/how you've taped?
- How much overlap do you need to make a strong pole?
- What can you add to your pole to make it stronger?

Teaching the Lesson: Overview

Instructional Priorities & Supporting Innovation

These are the key lesson elements you're expected to communicate/support today. Think of this as the blueprint of a successful lesson. When applicable we've included details about why an element is important for innovation.

Do-With-Me: Pole and Spools

★ **Review the TECHNIQUE of overlap and wrap to create a sturdy fishing pole and attach the spools.**

Demo & Discussion: Fishing line, Magnet, and Reel

★ **Focus on how to EVALUATE the fishing pole when it bends or breaks.**

Throughout the Lesson

★ **Support the Innovator's Mindset Challenge: BE REFLECTIVE – Campers watch closely as they use their fishing poles to determine if they are bending or breaking, and if so, how to fix them.**
Why – Nebulas often don't stop to notice what's actually happening as they work. Supporting reflection gives campers an opportunity to recognize how they might want to adjust their process to get a better outcome.

Teaching the Lesson: Play-by-Play

Introduction (5 min)

Welcome campers and make a quick story connection
What's going on with Lucy? (She's been working on inventions for Friday's Maker Faire, but got locked out of Cardboard Island.) We can't let her give up now. Let's keep creating awesome inventions so we can showcase them at the Faire – maybe we'll even come up with an idea to get Lucy back to Cardboard Island as we work!

Build excitement for today's project
- Point out the fish on the floor and tell campers that on their outdoor adventure they've stumbled upon a fishing pond!
- It would be a fun game to catch the fish, but right now they don't have anything to catch the fish with!
- Announce that today they'll need to make something that will let them play with/catch the fish!
- Demonstrate how your magnetic fishing pole works and announce that campers will be making their own today.

Introduce the Innovator's Mindset: BE REFLECTIVE ★
- Point to this on your Innovator's Mindset poster.
- Define the Mindset element in the context of today's lesson. Say: *Today we're going to practice being reflective by paying attention to how our fishing poles are working as we test and thinking about how we can make them stronger. This will allow us to catch big, heavy fish!*

Do-With-Me: Pole and Spools (15 min)

What You'll Need to Cover: Overview
- Review the components of your fishing pole.
- Review the idea of overlapping and wrapping. ★
- Demo building the pole and evaluating the connections. ★
- Demo the overlap and wrap taping technique to attach the spools. ★
- Have campers move to the tables and build a pole with spools.

Guiding Campers

Review the components of your fishing pole
- Show campers the Girl Fishing color copy (below).

- Point out the following parts on the color copy and your fishing pole and explain the purpose of each
  - Long pole
  - Fishing line
  - Hook
  - Reel
- Tell campers the first thing they'll do is make the pole using the overlap and wrap taping technique that they first learned on Monday.

Review the idea of overlapping and wrapping ★
- Have campers say "overlap and wrap" with you and do the corresponding arm movements they learned on Monday.
- Remind campers that attaching pieces in this way makes sure the connections are strong.
- Hold two dowels in overlapping and non-overlapping positions. Quiz campers and have them tell you when the dowels are overlapping and when they aren't.

Demo building the pole and evaluating the connections ★
- Tell campers that you are going to build on the floor. If campers can't see the floor they should stand up but stay in place.
- Lay two dowels on the floor and overlap the ends by about 3".

- Press a piece of tape onto the overlap, and then pick up the dowels and wrap the tape around as shown in the pictorial.
- Support BEING REFLECTIVE ★ – Pick up the pole and wave it around gently to test how strong it is. Notice that with tape along just one end it's still a little wobbly.
- Wrap a second piece of tape at the same connection next to the first piece of tape.
- Test the pole again by gently waving it to show that it's much more secure now.
- Review the Mindset Challenge ★ – Encourage campers to be reflective by stopping to test as they build, like you just did, so they can decide if and where they need to add more tape.
- Add a third dowel using the same technique.

Demo the overlap and wrap taping technique to attach the spools ★

- Place a spool near the end of the pole. Press a piece of tape onto it and the pole, then pick it up and wrap the tape around.
- Repeat this with another spool on the other end of the pole.

Have campers move to the tables and build a pole with spools

- Ask campers to give you a thumbs-up if they understand how to make the first part of the fishing pole.
- Allow campers to stand up and move to the building tables to make the pole and spools.
- Encourage campers to help by holding dowels for each other so the other person can tape.
- As campers build, refrain from pointing out or fixing their building mistakes. In a moment they'll get a chance to evaluate their construction for themselves and redesign if necessary.
- Have the campers leave their poles on the chairs they are using and return to the circle.

Demo & Discussion: Fishing Line, Magnet, and Reel (10 min)

What You'll Need to Cover: Overview

- Demo how to thread the lacing through the spools.
- Demo how to overlap the lacing over the magnet and craft stick, and then tape it in place.
- Demo testing the fishing pole.
- Discuss the fishing challenges and redesigning. ★
- Demo how to make a magnetic paperclip fish.

What You'll Need to Cover: Details

Demo how to thread the lacing through the spools

- Show campers a length of lacing and tell them that this is the fishing line. The lacing might also be known as lanyard string.
- Lay the pole on the ground and thread the lacing through both spools.

Demo how to overlap the lacing over the magnet and craft stick, and then tape it in place

- While keeping the pole on the ground, lay one end of the lacing over the magnet, and then press a piece of tape over it.
- Wrap any excess tape around the magnet.
- Repeat with the craft stick on the other end of the lacing.
- Explain that adding a craft stick will give them something easy to hold on to.

Demo testing the fishing pole

- Explain that the fishing pole is held on one end with one hand and the craft stick reel is in the other hand.
- Show campers the fishing ponds and the blue line they must stand behind while fishing.
- Stand up and carefully lower the magnet over a paperclip fish until you catch one. Point out that you must hold the pole near the bottom/reel in order to reach the pond.
- Then slowly pull on the reel to raise the fish off the floor.
- Direct the campers' attention to your hand that's on the reel. Raise and lower the fish using the reel a few times.

- Explain that this is a safe way to catch the fish instead of pulling the whole fishing pole up into the air.

Discuss the fishing challenges and redesigning ★

- Show campers the bigger fish (washer fish and double washer fish) which they can try to catch if they succeed with the first challenge.
- Point out that these fish are much heavier!
- Review the Mindset Challenge ★ – Tell campers that their fishing poles might bend or break when trying to pull up these fish. That's okay! With some careful observation and reflection they can notice where their poles are bending and figure out what they can do so their poles don't break in the same place again.
- Have campers suggest how you might strengthen your pole if you notice it's bending. Review the following:
  - Overlapping the sticks more than before to make them stronger
  - Adding more tape
  - Wrapping the tape more tightly if the original tape was loose
- Show campers the craft sticks and introduce the idea of adding craft sticks across the dowel connections to strengthen them (below).

Demo how to make a magnetic paperclip fish

- Tell campers that if they finish early they can make a magnetic paperclip fish that they can take home on Friday.
- Show campers the paper fish they can use.
- Remind them they need to add a paperclip so their fishing poles can catch their fish!
- If campers are done early, invite them to explore to see what else their fishing poles can pick up!

Camper Work Time: Finish the Fishing Pole (20 min)

During Work Time Campers Will…

CREATE

1. Thread the lacing through the spools.
2. Overlap the lacing over a magnet and tape it in place.
3. Overlap the lacing over a craft stick and tape it in place.

TEST, EVALUATE & REDESIGN ★

4. Use the fishing pole to catch a paperclip fish.
5. Evaluate whether or not the fishing pole is bending or breaking.
6. If not, try catching a washer fish or a double washer fish.
7. If the pole is bending or breaking, then overlap and wrap craft sticks onto the fishing pole joints to prevent bending or breaking.

Step It Up

Try catching fish in more challenging places, such as inside a box or behind some chairs.

Extension

- Create a paperclip fish.
- Decorate the fish or fishing pole.
- Explore what else the fishing pole magnet can stick to.

How Your TL Can Help

Monitor testing stations to make sure everyone is getting a turn and campers are not lingering at crowded stations too long.

Facilitate the Project Steps

CREATE (Steps 1-3)

- It can be difficult to hold the magnet in one hand and the lacing in the other while trying to tape them together. Remind campers to lay the materials on the table while building.

TEST, EVALUATE & REDESIGN (Steps 4-7) ★

- Have campers spread out across the classroom during testing to prevent fishing lines from getting tangled.
- As campers succeed in fishing for paperclip fish, you can introduce the heavier washer and double washer fish.

- Ask the Guiding Questions that support evaluating.
- Remind campers about using the craft sticks to strengthen connections as necessary.

Extension

- Direct campers to the fish-making station as they are ready.
- Magnets might be a new concept for some campers. You can allow them to explore what kinds of materials magnets stick to (chairs, the whiteboard, door hinges, etc.).

Support BEING REFLECTIVE ★

Suggest strategies that help and encourage campers to be reflective

Some specific strategies for today:

- Verbalizing what's happening as they test (e.g.: "When you pick up a washer fish, the pole starts to bend a lot right here."). Engaging in conversation is a great way for younger campers to practice observing and reflecting. You can support this by talking to campers about their tests as much as possible.
- Having someone else operate the fishing pole so they can get a close look at how the pole is holding up under the weight of the fish.
- Remembering to think about what's working well. (E.g.: "This connection is not bending at all! What did you do differently there?") This is equally as valuable as looking for what's not working and can be especially helpful if campers are feeling disheartened about things not working.

Recognize reflective campers

This encourages the camper and helps others see how they can be reflective as well. Recognition can be just verbal or include some kind of physical award. Be sure to be specific about how you see campers being reflective. Some ways you might see reflection today:

- Using any of the strategies mentioned above
- Noticing when and where the fishing pole is bending
- Taking apart a part of the pole that isn't working and rebuilding it a different way
- Using an additional craft stick to overlap the dowel connections

Ask the Guiding Questions that support being reflective

Clean Up (5 min)

- Write campers' names on their fish and their fishing poles. The craft stick is a good place to write a name.
- If campers made their own magnetic paperclip fish, stick them to the ends of their poles.
- Storing all the fishing poles in a pile will result in a lot of tangled lines. Hold the rod in your hand and then spin it so that any of the loose string is wrapped around the pole itself. Alternatively, use blue tape to tape the poles upright to a plastic-covered wall.

Lesson Wrap Up (10 min)

Recognition and Reflection (BE REFLECTIVE)

Help campers see how they or others embraced the Innovator's Mindset, and why this is important for innovation.

Suggested recognition and reflection activity

- Have campers raise their hands if they noticed that their poles were bending or breaking when they tested and thought of a way to fix them.
- Recognize campers for being reflective!
- Have a few campers share out what ideas they had to fix their poles.
- Reiterate that if campers were rushing and not paying attention they would not have been able to figure out what was wrong and they wouldn't have gotten ideas about how to fix these problems!

Application

Leave campers with a challenge or prompt to help them apply today's learning outside your classroom.

Suggested challenges/prompts

- Encourage campers to be on the lookout for other things they think their magnetic fishing poles might be able to pick up. Things that are shiny and metal are good candidates!

Day 4

Handcart, Part 1 of 2

Carrying a bunch of outdoor gear in your hands can be tiresome. Today, campers begin building working handcarts to help transport their outdoor equipment, lunchboxes, or anything else!

Today campers will make a handle and tape it to a box (right). The finished handcart includes wheels, straps, and baskets (left).

The Big Picture

Lesson Breakdown

Introduction	5 min
Demo & Discussion: Handcart Handle	15 min
Camper Work Time: Build the Handcart Handle Use the overlap and wrap technique to construct and reinforce a cardboard handle, and then attach it to a box. The handcart handle must not break or bend too much when tested. Designable Components: handle height Testing: place a water bottle inside the box and use the handle to tilt the box backward	30 min
Clean Up	5 min
Wrap Up	10 min
Transition	5 min

GIA Focus

Innovator's Process Focus: TEST AND EVALUATE

Innovator's Knowledge Focus: SKILLS AND TECHNIQUES

Innovator's Mindset Focus: BE REFLECTIVE – I take time to think about what is and isn't working in my design.

What's Next: Tomorrow (Day 5) campers will finish the handcart by adding wheels, straps for their other projects, and other useful embellishments.

How to Create Today's Project

Step-by-Step Pictorial

This is intended to help you understand how to create today's project. It doesn't describe how you'll facilitate this lesson for campers. You'll need to read the "Play-by-Play" section for this information.

Camper Work Time

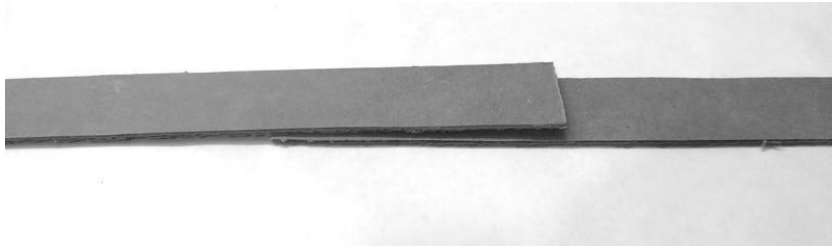


Fig. 1

Begin by making the handle beams. Overlap the 1.5" x 18" cardboard strips by a few inches.

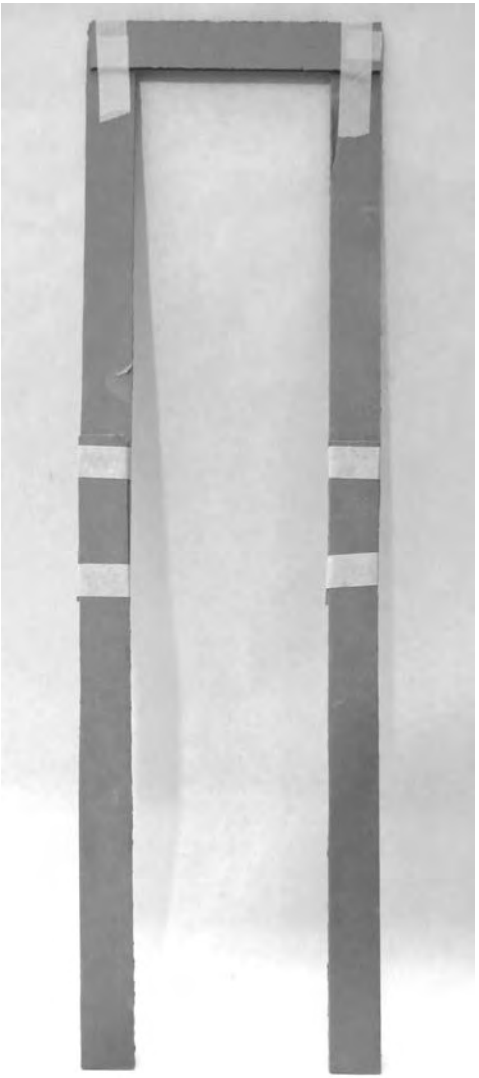


Fig. 2

- The long cardboard beams are taped in two places. The 9" cardboard strip connects the two beams.
- The 9" strip is attached by tape wrapped over the top of the beams.

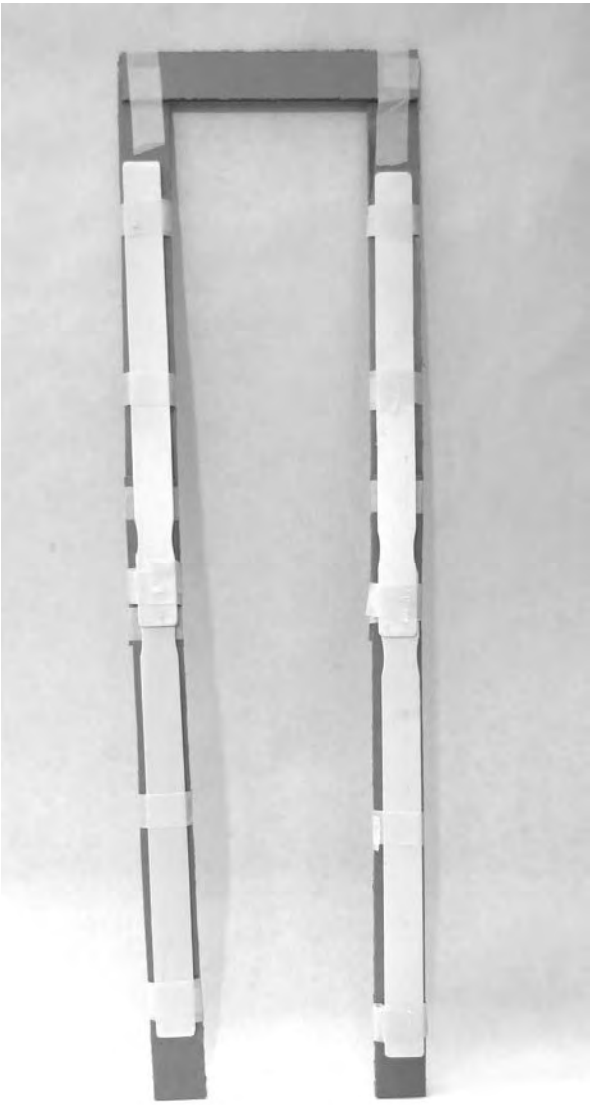


Fig. 3
Four paint stirrers are taped to the beams to prevent them from bending.

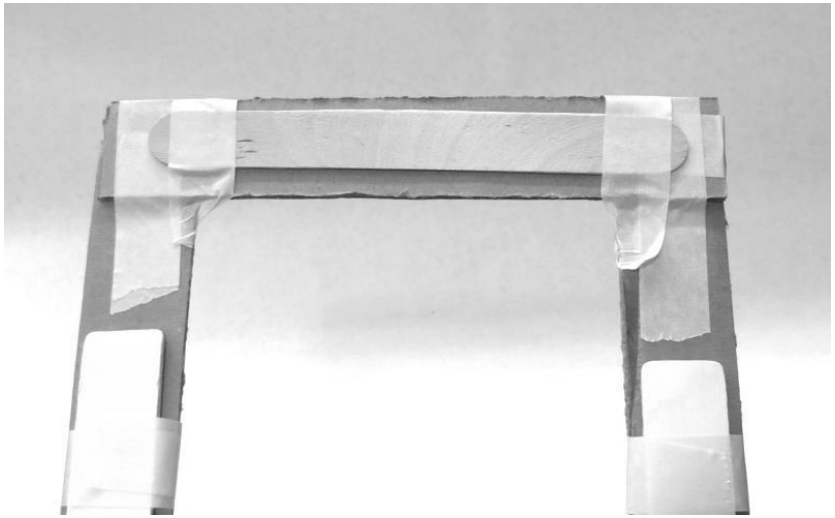


Fig. 4
A jumbo craft stick is taped to the 9" strip to strengthen it.

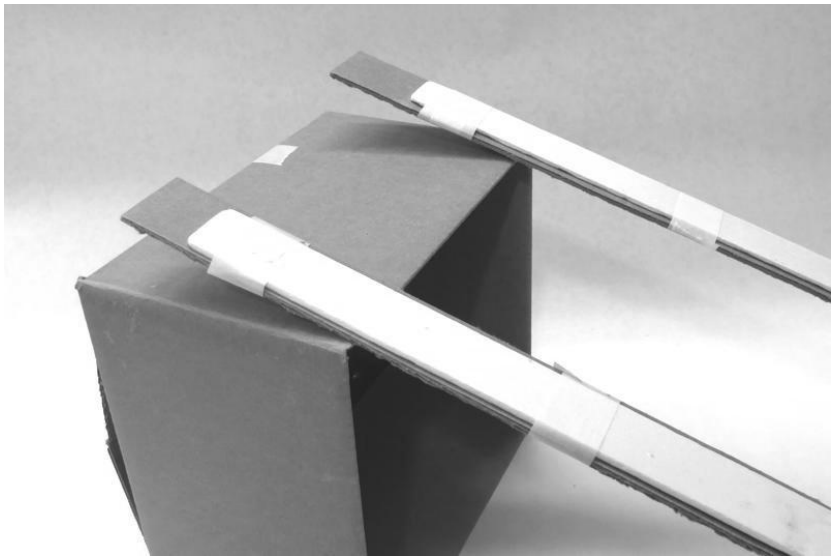


Fig. 5
To attach the handle to the box, place the box on its side and lay the beams on one side.

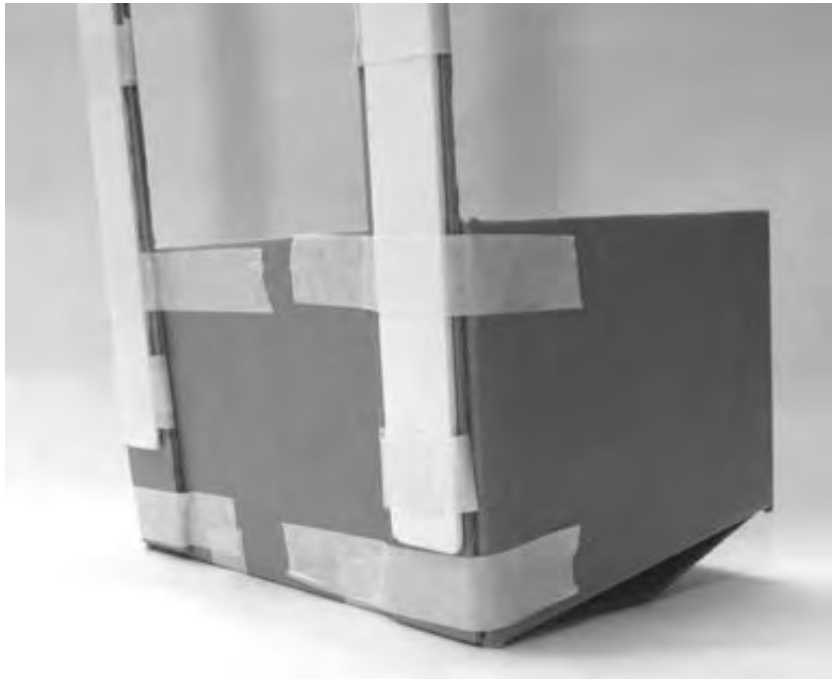


Fig. 6

Wrap tape around the corners of the box in at least two places to secure the beams in place.

Fig. 7

Test the handcart by placing one or more water bottles in the box and tilting it backwards. The test is a success if the box leans back without the handle bending or breaking.

Get Ready!

Lesson Materials

* (starred) items are choice materials; un-starred items are required for each camper

Demo & Discussion: Handcart Handle

☐ materials from Camper Work Time (1 set per rotation)
☐ copy, color, Handcart Example (1 per 4 campers)

Camper Work Time: Build the Handcart Handle

☐ box, corrugated, 8" x 8" x 5", *for handcart* (1 per camper)
☐ cardboard, corrugated, 1.5" x 18", *for handle* (5 per camper)
☐ craft stick, jumbo, 1" x 8", *for handle reinforcements* (2 per camper)
☐ paint stirrer, wood, 12", *for handle reinforcements* (4 per camper)
☐ tape, masking, 1" wide (30" per camper)
☐ water, drinking, 8 oz., *for testing* (1 per 2 campers)

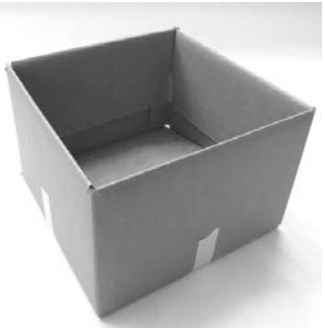
Extension

☐ yarn, jumbo, asst. colors, 60 ft. bag (4 pieces per camper)

Preparation

Days earlier

- ⌛⌛ Open up the boxes, tape one end closed, and fold the flaps in on the other side (1 per camper).



- ⌛⌛ Make a sample handcart.
  - ⌛ Cut 1.5" x 18" cardboard into 9" lengths (1 piece per camper).

Day before

- ⌛ Gather an assortment of items from around the classroom to use during the Introduction.
- ⌛ Gather materials to make a handcart handle during the Demo & Discussion (1 set per rotation).
- ⌛ Set out four 1.5" x 18" cardboard pieces and one 1.5" x 9" cardboard piece in each camper's work area.

Suggestions for Large Classes

None

Check In With Your TL

Make sure your TLs are clear about their role in helping today's lesson run smoothly. Specific ways TLs can help today are listed in the dotted overview boxes throughout the lesson.

On the Board

Design Goals

The handcart handle must not break or bend too much when tested.

Guiding Questions

TEST AND EVALUATE and BE REFLECTIVE

- What do you notice about the tape on your handcart when you test it?
- What can you do to make your handle less wobbly?
- How many water bottles can your handcart hold and still lean back?

Vocabulary

None today

Teaching the Lesson: Overview

Instructional Priorities & Supporting Innovation

These are the key lesson elements you're expected to communicate/support today. Think of this as the blueprint of a successful lesson. When applicable we've included details about why an element is important for innovation.

Demo & Discussion: Handcart Handle

★ **Review the TECHNIQUE of overlapping and wrapping to create a strong handcart handle.**

★ **Model what it looks like to TEST AND EVALUATE the handcart.**

★ **Demonstrate the TECHNIQUE of wrapping and pressing down tape around the corner of the box to secure the handcart handle.**

Throughout The Lesson

★ **Support the Innovator's Mindset Challenge: BE REFLECTIVE – After every test, campers think about the design goal (the handle not breaking or bending too much) and decide what they need to work on next to meet the goal.**
Why – Nebulas may rush to complete the next part of the project without evaluating the first steps. Taking the time to reflect on the project at each phase will show campers how to improve the project before it's complete.

Teaching the Lesson: Play-by-Play

Introduction (5 min)

Build excitement for today's project

- Gather an assortment of items in your arms and greet campers at the door.
- Precariously hold the items as you lead the campers into the classroom. Just as you reach the front of the room, "accidentally" spill all the items from your arms. Oh no!
- State that it's hard to carry a lot of things at once, particularly if you're going to carry them for a long time on an outdoor adventure.
- Ask campers if they think they can make something to solve this problem.
- Snap your fingers – Ah Ha! Show campers your example handcart. Place all the items inside and then pull the handcart effortlessly around the circle of campers.
- List off some other things that the handcart could be useful for carrying (lunch box, toys, games, etc.).
- Announce that campers will get to make their very own handcarts over the next two days!

Introduce the Innovator's Mindset: BE REFLECTIVE ★

- Point to this on your Innovator's Mindset poster.
- Define the Mindset element in the context of today's lesson. Say: *Today you'll be testing your handcart to make sure it can hold some weight! But what do you do if it doesn't work the first time? Be reflective! That means looking closely at what is and isn't working to figure out how to make it better for the next test.*

Demo & Discussion: Handcart Handle (15 min)

What You'll Need to Cover: Overview

- Introduce handcart components.
- Demo making two handle beams using the overlap and wrap technique. ★
- Demo connecting the two cardboard beams.
- Demo reinforcing the beams.
- Demo adding the handle to the box and how to test, evaluate, and redesign the handcart. ★
- Outline the design goals and transition to work time.

What You'll Need to Cover: Details

Introduce handcart components

- Show campers the Handcart Example color copy (below).

- Point out the parts of a handcart on the color copy and your example:
  - Container/box, for holding things
  - Handle, for pushing the cart
  - Frame which connects the box and handle
  - Wheels, which make the cart easy to move around
- Tell campers that they'll be making the handle and frame and attaching it to a box today.
- Tomorrow they'll attach the wheels and add other components.
- Explain that the frame is made of long beams and the handle is made of a short connector.
- Point out the long beams and ask for a camper to name the building technique that's used to make it (overlap and wrap).

Demo making two handle beams using the overlap and wrap technique ★

- Have campers describe how you should overlap and wrap the beams to make strong connections. (They should be experts at this by now since they've been practicing all week!)
- Demo taping both sets of cardboard beams.

Demo connecting the two cardboard beams

- Lay the beams parallel to each other. Use poor taping techniques to connect the two beams with the 9" cardboard (below).

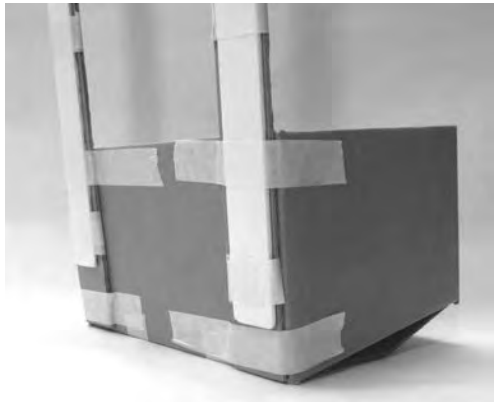
- Test the handle by holding the 9" piece of cardboard and shaking the long beams. Hopefully one will fall off.
- Support BEING REFLECTIVE ★ – Say: *That didn't work well! What do you think I need to do to make sure that my handle doesn't fall apart?*
  - If campers suggest something general like "Tape it better," ask them how exactly to tape it.
  - Implement their suggestions and test it again.
  - Thank campers for helping you be reflective by observing what didn't work and thinking of ways to make it better.

Demo reinforcing the beams

- Wobble the cardboard beams and point out that they are kind of floppy and not strong enough to carry everything without breaking.
- Show campers the paint stirrers and a jumbo craft stick. Ask if anyone has any ideas for using these materials to make the handcart stronger.
- Demonstrate how to lay a paint stirrer across the handle beams and wrap tape around it in at least two places.
- Show that it helps, but that most of the handle is still floppy.
- Use the overlap and wrap technique to secure another paint stirrer to the handle beams as shown in the pictorial.
- Finish reinforcing the beams and tape a jumbo stick to the 9" cardboard strip as shown in the pictorial.

Demo adding the handle to the box and how to test, evaluate, and redesign the handcart ★

- Hastily tape the handle to one side of the box.
- Place a water bottle inside and try leaning the handcart back. The handle will break off.
- Support BEING REFLECTIVE ★ – Ask campers to help you be reflective again by thinking about what went wrong and how to fix it.
  - Take suggestions and implement them.
  - Test again and note any improvements.
  - It's likely that the tape will still peel away from the box at least a little bit.
  - If campers don't suggest it, lead them to the solution of wrapping a long piece of tape around the corner of the box (below).



Outline the design goals and transition to work time

- Tell campers that it's their job to create handcart handles that aren't wobbly, and then attach them to the box.
- When finished, they can test the handcart by placing one or two water bottles inside and leaning the cart backwards.
- If successful, they can try dragging the cart around the class!
- Instruct campers to take four cardboard beams to begin with.

Camper Work Time: Build the Handcart Handle (30 min)

During Work Time Campers Will…

CREATE

1. Tape cardboard beams together to form two longer beams.
2. Tape paint stirrers onto the beams to reinforce them.
3. Connect the beams with a 9" cardboard strip.
4. Attach the whole handle to the box.

TEST, EVALUATE & REDESIGN ★

5. Place a water bottle inside the box and tilt it backwards.
6. Wrap tape around the corner of the box if the handle falls off.

Step It Up

Challenge campers to make a handcart handle that can withstand the force of two or more water bottles.

Extension

Make the handle softer and more decorative by wrapping yarn around the 9" cardboard strip.

How Your TL Can Help

- Help campers evaluate and reflect on their tests.
- Facilitate the Extension activity as campers are ready.

Facilitate the Project Steps

CREATE (Steps 1-4)

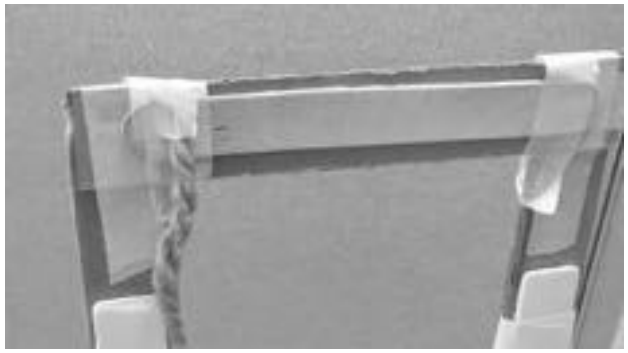
- Taping the 9" cardboard may be challenging for some campers. If a camper is struggling with this step, show him/her how to wrap tape around the top of the beams to secure the 9" piece in place.

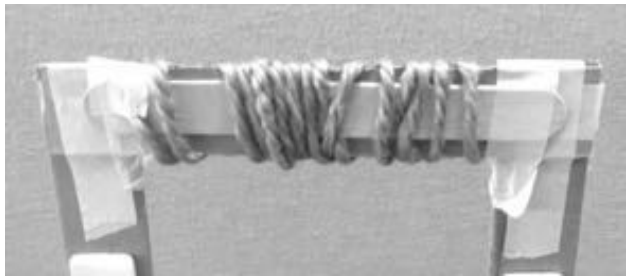
TEST, EVALUATE, AND REDESIGN (Steps 5-6) ★

- While they are testing, encourage campers to pay close attention to taping around the corner to connect the handle to the box.
- If the tape peels away, ask the camper to identify where the tape is coming off and where s/he should put new tape to prevent that from happening.
- Ask the Guiding Questions that support testing and evaluating.

Extension

- Show campers how to start wrapping yarn by taping one end to the handle and then carefully and tightly wrapping the yarn (below). When they are finished, they can tape the other end of the yarn to prevent it from unraveling.





Step It Up

- For ambitious campers, keep loading up bottles until the cart needs to be redesigned.

Support BEING REFLECTIVE ★

Suggest strategies that help and encourage campers to be reflective

Some specific strategies for today:

- Having an adult test the handcart as the camper watches
- Asking other campers to watch as they test and share what they notice
- Testing the handcart without a bottle first, and then with a bottle and comparing the difference in how much the handle bends

Recognize reflective campers

This encourages the camper and helps others see how they can be reflective as well. Recognition can be just verbal or include some kind of physical award. Be sure to be specific about how you see campers being reflective. Some ways you might see reflection today:

- Using any of the strategies mentioned above
- Noticing where the handle tape is peeling away
- Noticing the difference between two tests after redesigning

Ask the Guiding Questions that support being reflective.

Clean Up (5 min)

- Make sure that campers' names are written on the handcarts.
- Unused sticks should be kept in one space so that the next day any breaks that occur can be quickly mended.

Lesson Wrap Up (10 min)

Recognition and Reflection (BE REFLECTIVE)

Help campers see how they or others embraced the Innovator's Mindset, and why this is important for innovation.

Suggested recognition and reflection activity

- Have campers raise their hands if they had to stop and think about a way to make their cart frames or handles stronger.
- Have campers share a few discoveries they made.
- Recognize campers for their careful reflection. Emphasize that they were able to make these discoveries because they were being reflective; they stopped to notice what was going on when they tested and thought carefully about what to do next.

Application

Leave campers with a challenge or prompt to help them apply today's learning outside your classroom.

Suggested challenges/prompts

- Encourage campers to notice other tools and objects that help people carry things. What is good for carrying big things, small things, fragile things? Hint that they might want to start getting ideas for special carrying cases to add to their handcarts tomorrow.

Day 5

Handcart, Part 2 of 2

Campers will finish their handcarts by adding wheels, as well as straps to hold their other projects and baskets to hold small miscellaneous items.

The Big Picture

Lesson Breakdown

Introduction	5 min
Demo & Discussion: Wheels	10 min
Camper Work Time: Build and Test the Wheels Build a set of wheels and attach it to the bottom of the handcart under the handle. The handcart must roll in a straight line for 10 feet. Testing: place the handcart at the start of the line and push it	10 min
Demo & Discussion: Straps and Baskets	10 min
Camper Work Time: Create Straps and Baskets Campers add Velcro straps and a basket to their handcart to hold their other projects and other objects. The handcart must: • Hold the sunhat and fishing pole with Velcro straps • Include at least two other baskets for holding small objects Designable Components: strap placement, basket type, basket placement Testing: place the other projects and small objects in the cart and roll the cart around	15 min
Clean Up	5 min
Wrap Up	10 min
Transition	5 min

GIA Focus

Innovator's Process Focus: TEST AND EVALUATE

Innovator's Mindset Focus: BE DETERMINED – I know innovation and mastery require effort.

How to Create Today's Project

Step-by-Step Pictorial

This is intended to help you understand how to create today's project. It doesn't include everything campers will do today. It also doesn't describe how you'll facilitate this lesson for campers. You'll need to read the "Play-by-Play" section for this information.

Wheels

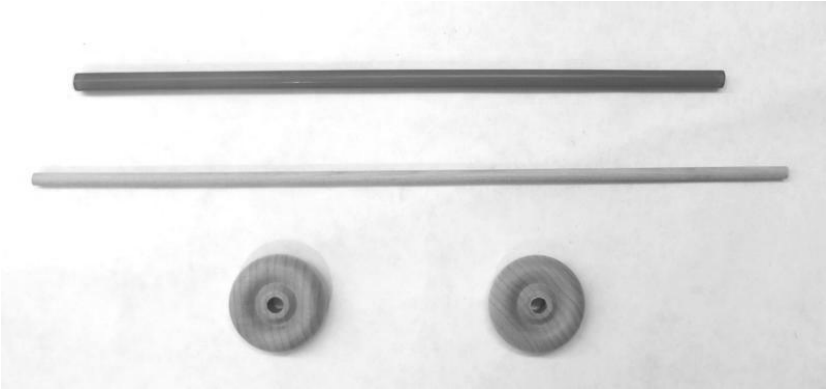


Fig. 1

Campers will be using these materials to make a set of wheels.

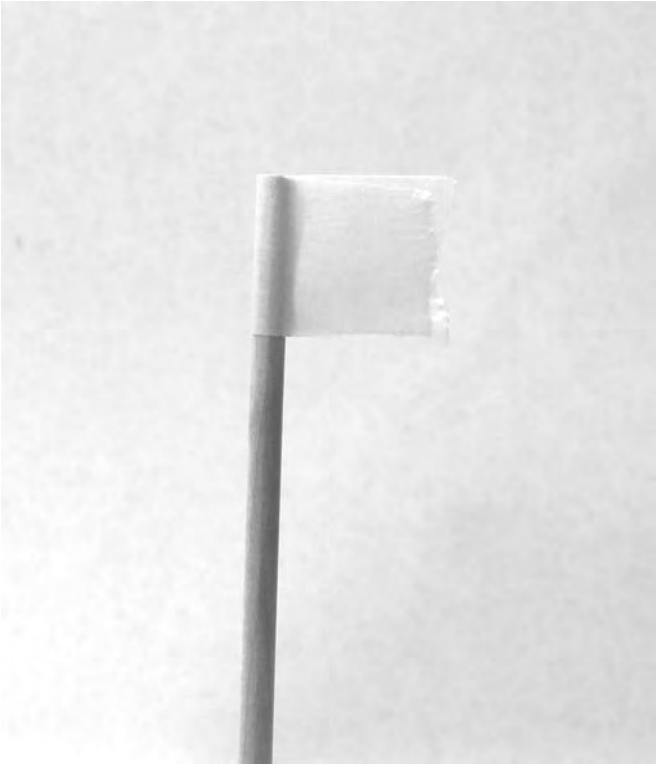


Fig. 2

A "tape flag" is easy to make and very helpful for preventing wheels from falling off.

Fig. 3

The tape flag works!

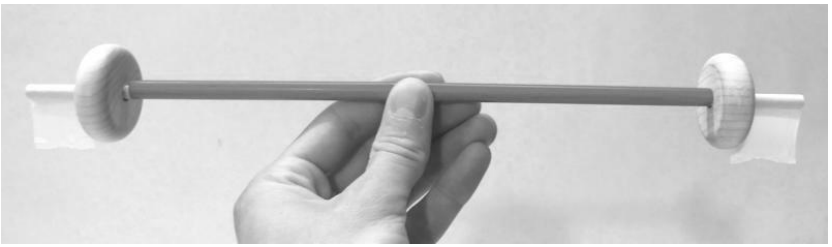


Fig. 4

Make a “wheel sandwich” by putting the wheels on the outside of the straw in the middle, with tape flags on the ends.

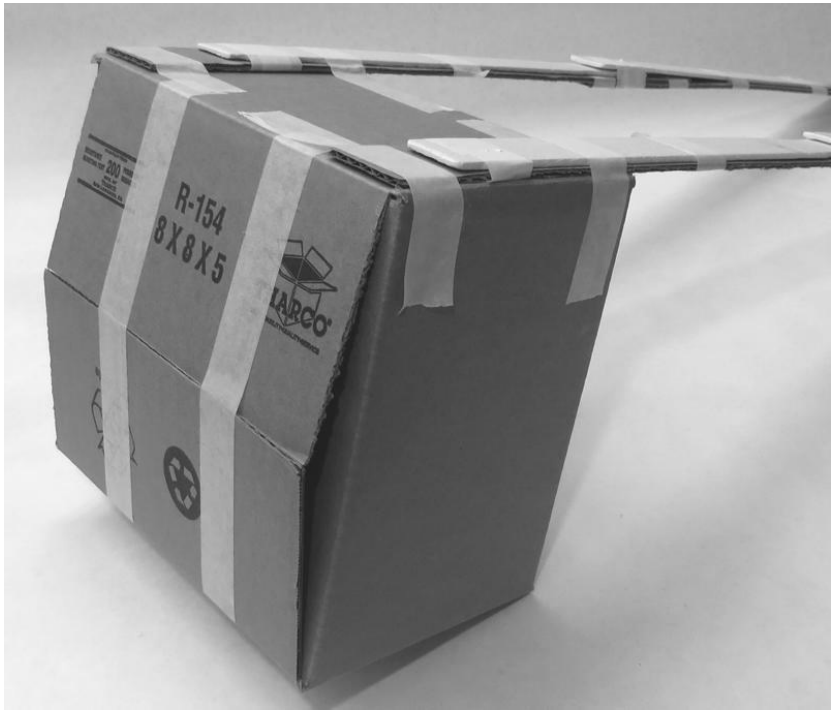


Fig. 5

Lay the box on its side like this to easily access the bottom of the handcart.

Fig. 6

If your tables are tall enough, you can place the box upside down on the edge. This angle makes it much easier to tape the wheels on.

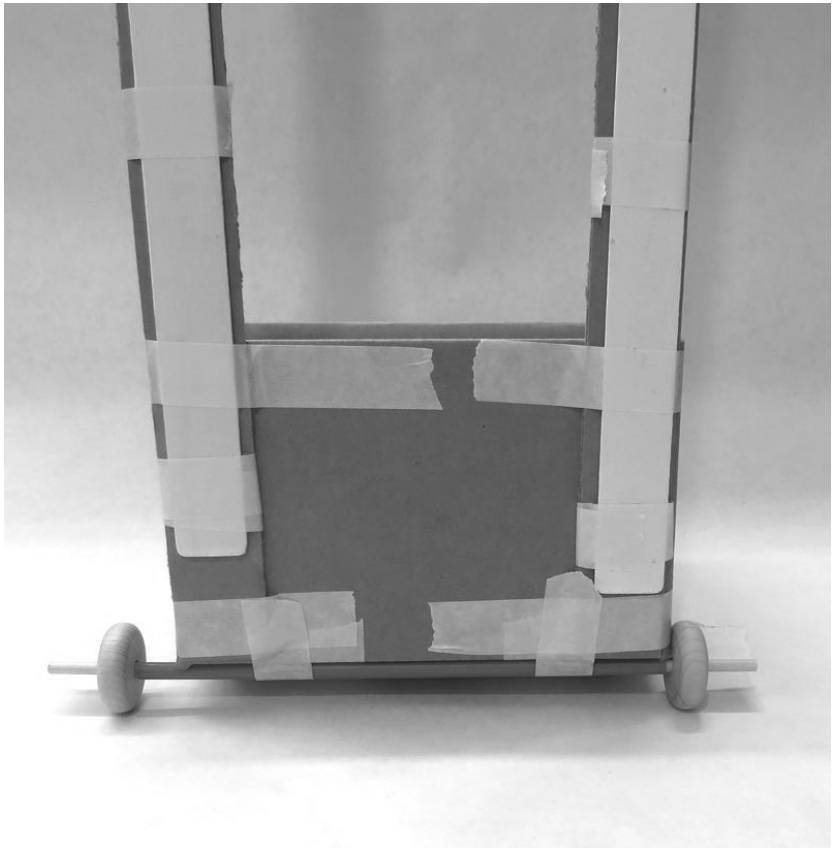


Fig. 7

The wheels are taped in two places directly under the handle.

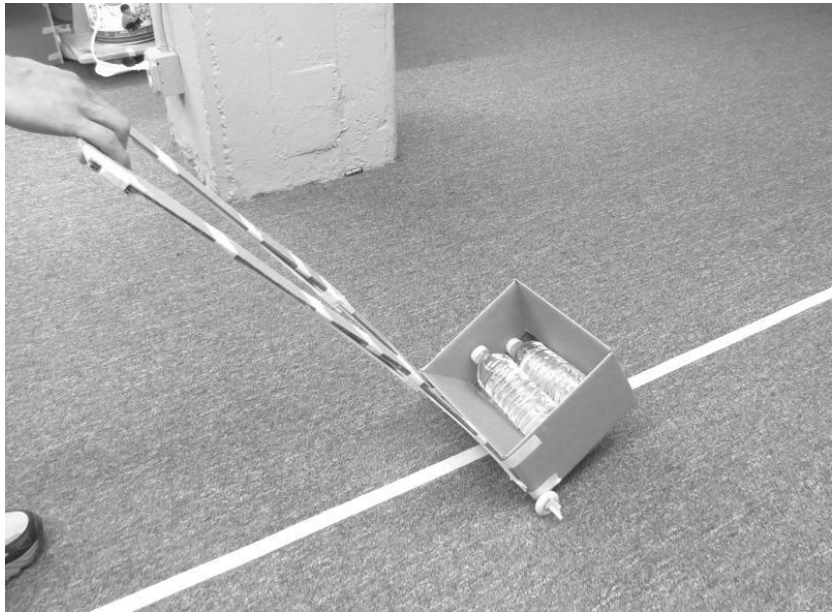


Fig. 8

Test by pushing the handcart along a 10 foot line of tape. If the handcart remains positioned over the line for the whole length of the tape, then it's a success!

Velcro and Containers

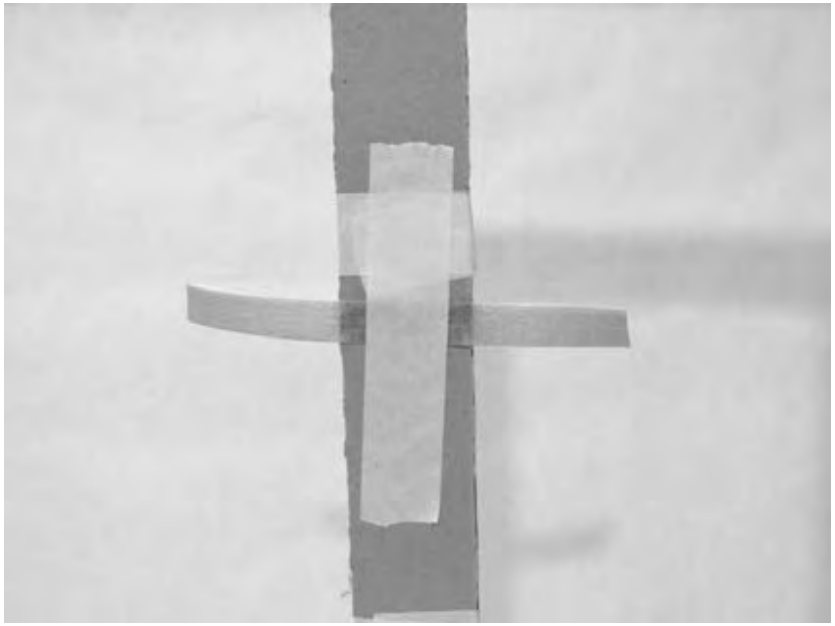


Fig. 9

Velcro straps can be taped to the handcart to hold other projects like the sunhat or fishing pole.

Fig. 10

A strap on the handle holds the fishing pole in place.

Fig. 11

Baskets and other small containers can be added. In this picture, the placement isn't ideal.

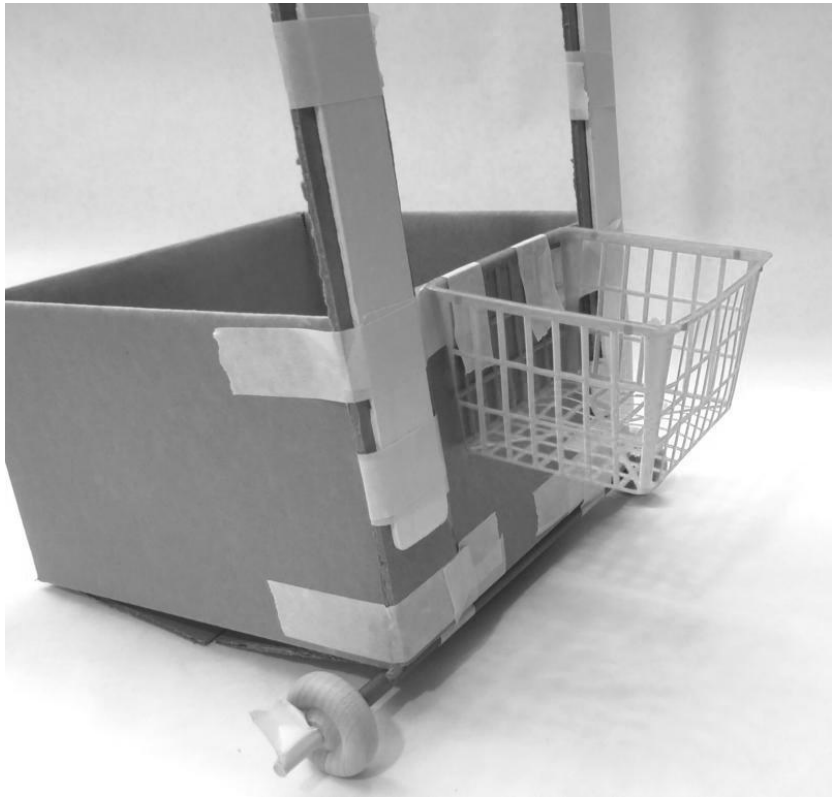


Fig. 12

Redesigned! The basket stays clear of the ground.

Fig. 13

Cups and cones can also be added to the box and/or other parts of the frame.

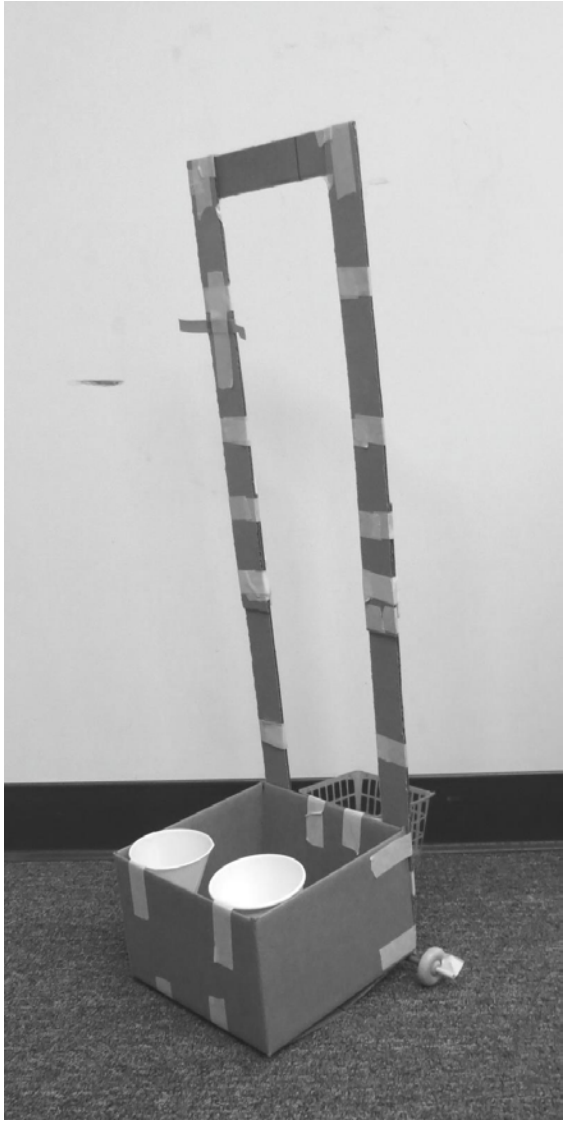


Fig. 14

Finished!

Extensions

Fig. 15

This camper-made example uses lots of yarn to make the handle more comfortable and decorative.

Fig. 16

Cardboard circle lids can be added to containers.

Get Ready!

Lesson Materials

* (starred) items are choice materials; un-starred items are required for each camper

Demo & Discussion: Wheels

☐ same materials as Camper Work Time: Build and Test the Wheels (1 set per LI)

Camper Work Time: Build and Test the Wheels

☐ wheel, wood, 3/8" ctr., 5/8" x 2" (2 per camper)
☐ dowel, wood, 0.25" x 12" (1 per camper)
☐ straw, red, 10" (1 per camper)
☐ tape, masking, 1" wide (30" per camper)

Demo & Discussion: Straps and Baskets

☐ same materials as Camper Work Time: Create Straps and Baskets (1 set per LI)

Camper Work Time: Create Straps and Baskets

☐ Velcro, strap, 0.5" (12" per camper)
☐ basket, strawberry (2 per camper)
☐ cone, paper, cup, 6 oz. (2 per camper)
☐ cup, paper, 12 oz. (2 per camper)
☐ spoon, plastic, *non-consumable, for testing the handcart carrying capacity* (5 per camper)
☐ Easter egg, plastic, asst. colors, *non-consumable, for testing the handcart carrying capacity* (5 per camper)
☐ tape, masking, 1" wide (18" per camper)

Extension

☐ leftover yarn from yesterday
☐ foam, geometric shape, asst. colors, sticky back (8 per camper)
☐ foam, alphabet piece, sticky back (8 per camper)
☐ cardboard, corrugated, circle, w/ 5/16" hole, 4" (2 per camper)

Preparation

Days earlier

- ⌛⌛ Cut Velcro into 6" lengths (2 per camper).

Day before

- ⌛ Use blue tape to create two straight 10 foot lines in the classroom for testing the handcart wheels.
- ⌛ Use blue tape to make a circuit around the classroom. If you want you can add a starting line and arrows so it's clear to campers where to start and which direction to go.
- ⌛ Remove the wheels from your handcart example so you can demo how to attach them during the class.

Suggestions for Large Classes

Put testing stations outside the classroom in a hallway if possible.

Check In With Your TL

Make sure your TLs are clear about their role in helping today's lesson run smoothly. Specific ways TLs can help today are listed in the dotted overview boxes throughout the lesson.

On the Board

Design Goals

Your handcart must:

- Roll in a straight line for 10 feet
- Hold the sunhat and fishing pole with Velcro straps
- Include at least two other baskets for holding small objects

Guiding Questions

TEST AND EVALUATE and BE DETERMINED

- What do you notice about your cart when you roll it?
- How can you make your cart go straighter/hold more/be more stable/look cooler?
- What might you adjust/change/add/remove to make your cart even better?

Vocabulary

None today

Teaching the Lesson: Overview

Instructional Priorities & Supporting Innovation

These are the key lesson elements you're expected to communicate/support today. Think of this as the blueprint of a successful lesson. When applicable we've included details about why an element is important for innovation.

Demo & Discussion: Wheels

★ **Demo the TECHNIQUE of using a straw and tape flags to build a set of wheels.**

★ **Demo how to TEST AND EVALUATE the handcart wheels.**

Demo & Discussion: Straps and Baskets

★ **Demo the taping TECHNIQUES to attach straps that will hold a sunhat and fishing pole.**

★ **Demo how to TEST AND EVALUATE the strap placement and extra baskets and whether or not they're attached in a good place.**

Throughout the Lesson

★ **Support the Innovator's Mindset Challenge: BE DETERMINED – Campers think about and act on what they can do to improve their handcarts.** Why – Nebulas are often in a hurry to be done or move on to the next thing. Encouraging campers to push themselves to put in extra time and effort on each step and on the project as a whole will help them see that with some patience and determination they can build truly impressive creations!

Teaching the Lesson: Play-by-Play

Introduction (5 min)

Welcome campers and make a quick story connection
Let's wrap up the week's inventions and get them ready to show off at today's Maker Faire. I'm sure Lucy is going to be super inspired by all of your innovative projects and get lots of ideas for how to make her new house unique.

Build excitement for today's project

- Announce that today campers will add wheels to make their handcarts super easy to move around!
- Campers will then add straps and containers to help them carry lots of different things.
- Also announce that they will make special straps to hold their fishing poles and sunhats. By the end of the day they'll be able to use their handcarts to take home everything they've made this week!

Introduce the Innovator's Mindset: BE REFLECTIVE ★

- Point to this on your Innovator's Mindset poster.
- Define the Mindset element in the context of today's lesson. Say: *We've been working hard on our handcarts and today we're going to be determined to work hard to make our handcarts as awesome as possible. This means taking time to fix things that aren't working as well as they could and thinking of what we can add to make our carts even better than they already are.*

Demo & Discussion: Wheels (10 min)

What You'll Need to Cover: Overview

- Demo making tape flags to keep the wheels on. ★
- Demo making the wheel sandwich. ★
- Demo how to attach the wheels. ★
- Outline the testing procedure. ★

What You'll Need to Cover: Details

Demo making tape flags to keep the wheels on ★

- Show the materials that are required to make the wheels.
- Try to place a wheel onto the dowel. Allow the wheel to slide all the way down the dowel and fall off. Whoops!
- Demonstrate the technique of making a tape flag. Hold up the flag on a dowel and pretend to wave it around like a real flag.
- Emphasize that the tape shouldn't be touching the wheel. Otherwise the wheel won't be able to turn.
- Slide a wheel on again. The tape flag saves it from falling off!

Demo making the wheel sandwich ★

- Put the straw and second wheel on, and then create a tape flag on the other end.
- Help campers remember the order of materials by stating that it's like a sandwich! Tape on the outsides, wheels next, and a straw in the middle.

Demo how to attach the wheels ★

- Explain and show that the wheels are added below the handle.
- Demonstrate how to put the cart upside down on a table. This will make it much easier to attach the wheels.
- Emphasize that you're handling your cart gently so you don't damage the frame or handle.
- Attach the wheels using two pieces of tape. Deliberately make your wheels crooked.

Outline the testing procedure ★

- Show campers where to test their carts. Walk to the testing area and try out your handcart.

- Instruct campers to push their handcarts during testing, not pull them. Pushing will make it easiest for campers to see if the handcart is going straight or not.
- Your cart won't go very straight when you test it.
- Support BEING DETERMINED ★ – Ask: *Do you think I should leave it like this or put in the effort to fix it and make the cart go as straight as possible?*
  (Stay determined and work to make it better!)
- Show campers the bottom of your handcart and ask: *Are my wheels straight?*
  (No, they aren't.)
- Hold one of the wheels and ask whether it needs to be moved up or down in order to straighten out the wheels (below).

- Demonstrate how to undo the tape, adjust the wheels so that they line up with the edge of the box, and then reapply the tape.
- Test again and evaluate the difference.

Camper Work Time: Build and Test the Wheels (10 min)

During Work Time Campers Will…

CREATE ★

1. Make a tape flag on the end of a dowel.
2. Place a wheel, a straw, and then another wheel onto the dowel.
3. Make another tape flag on the other end of the dowel.
4. Use two pieces of tape to attach the wheels to the bottom of the box under the handle.

TEST, EVALUATE AND REDESIGN ★

5. Roll the handcart along the testing line.
6. Evaluate whether or not the cart moves in a straight line.
7. Adjust the position of the wheels as necessary and test again.

Extension

Allow campers to test their handcarts along the blue tape circuit.

How Your TL Can Help

- Keep an eye on campers as they build their wheels and help ensure that the materials are added in the correct order.
- Keep an eye on campers as they push their carts around the room.

Facilitate the Project Steps

CREATE (Steps 1-4) ★

- Remind campers that the wheels are like a sandwich, with tape on the outsides, wheels next, and a straw in the middle.
- Help campers with tape flags as necessary. Ensure campers are only placing tape at the very end of the dowel.

TEST, EVALUATE AND REDESIGN (Steps 5-7) ★

- Remind campers to push, not pull, their handcarts when testing.
- Ask the Guiding Questions that support evaluating.
- When campers adjust their wheels, remind them to put the handcarts upside down on a table, which is a much easier angle to work at.

Extension

- Have campers who finish early try out their handcarts along the blue tape circuit around the classroom.
- Make sure campers are all walking in one direction.
- Challenge campers to see if they can also carry the water bottle weights from yesterday while pushing their carts around the room.

Support BEING DETERMINED ★

Suggest strategies that help and encourage campers to be determined

Some specific strategies for today:

- Celebrating each improvement to their carts to stay excited about continuing to improve them
- Making small changes for incremental improvements even if their carts are going pretty straight right away
- Getting a buddy to help if they're having a hard time taping or constructing something

Recognize determined campers

This encourages the camper and helps others see how they can be determined as well. Recognition can be just verbal or include some kind of physical award. Be sure to be specific about how you see campers being determined. Some ways you might see determination today:

- Using any of the strategies mentioned above
- Making a lot of changes and tweaks to improve their carts' ability to roll straight

Ask the Guiding Questions that support being determined

Demo & Discussion: Straps and Baskets (10 min)

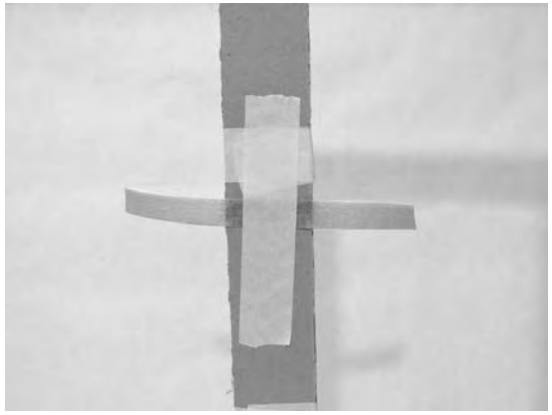
What You'll Need to Cover: Overview

- Demo the technique for taping a strap onto the handcart. ★
- Model how to test and evaluate the strap. ★
- Demo the technique for taping additional baskets to the handcart.
- Model how to test and evaluate the basket placement. ★

What You'll Need to Cover: Details

Demo the technique for taping a strap onto the handcart ★

- Use an attention-getter and have all the campers park their handcarts on a blue line. Campers will likely be busy rolling their handcarts around, so employ a countdown from 10.
- Once campers are seated back at the circle, show them a 6" length of the green Velcro straps and demonstrate how they work.
- Explain that these are going to be used to hold the sunhat and fishing pole.
- Attach the Velcro strap on the frame near the bottom of the handcart.
- Emphasize that you're taping the Velcro onto the frame so that there's some Velcro hanging off both edges of the frame (below).



Model how to test and evaluate the strap ★

- Borrow a camper's sunhat and use the Velcro strap to attach it to the handcart. The sunhat should drag on the ground.
- Support BEING DETERMINED ★

  - Ask: *Even though the hat's dragging on the ground I don't feel like fixing it. This is good enough, right?*
    (No! You should be determined to make it better!)
  - Have the campers persuade you to be determined to redesign so that the strap is in a better place.
- Ask for a volunteer to come to the front and point to a better place for the strap (higher up).
- Repeat this with a camper's fishing pole. In the end, the strap should be somewhere on the handle to support the top of the pole while the bottom of the pole rests inside the box.

Demo the technique for taping additional baskets to the handcart ★

- Show the three basket materials and explain that these can be attached to the handcart to hold and organize more things.
- Show the other materials that can be carried around. Tell campers that these materials can't be taken home, but they can use five of each for now to test out their baskets.
- Demonstrate how to tape one of the basket materials by taking a piece of tape and sticking half of it on the basket. That leaves the other half of the tape to be stuck to the box.
- Emphasize the importance of making sure there's enough tape on both the basket and the box. If all the tape is on the basket it won't stick well to the box.
- For now, tape your basket to your handcart near the wheels (below).

Model how to test and evaluate the basket placement ★

- Tilt the handcart backwards as if you are about to roll it around.
- Ask: *Hmm, my handcart seems to not work as well. If I want to be determined to improve it, what might I do?*
  (Move the basket so it's not in the way of the wheels.)
- Adjust your basket according to the campers' observations.
- Tape on the other two baskets. Tape one on the inside of the box with the others taped on the outside or handle.
- Place some items in each basket and test the handcart again. Adjust the basket positions if items fall out.
- Emphasize that campers can attach their baskets anywhere on their handcarts, but should test that:
  - The baskets don't get in the way of the handcart when it's moving around
  - The objects don't fall out of the baskets when the cart is moving
- Review the Mindset Challenge ★ – Remind campers to keep asking themselves how they can make their carts even better. Point out that even if their carts are working well they could make them even better by adding fancy decorations or other innovations like lids on their containers.

Camper Work Time: Create the Straps and Baskets (15 min)

During Work Time Campers Will…

CREATE, TEST, EVALUATE AND REDESIGN (straps) ★

1. Tape two straps that will hold the sunhat and fishing pole.
2. Evaluate whether or not the strap placement holds the other projects off of the ground.
3. Readjust the strap placement if necessary.

CREATE, TEST, EVALUATE AND REDESIGN (baskets) ★

4. Tape a basket of their choice to the handcart.
5. Test the basket by placing items in it and rolling the cart around.
6. Adjust the basket position if items spill out.
7. Conduct a final test by loading the cart with the fishing pole, sunhat, and at least one bottle of water in the cart and another small bottle in a basket, and then push or pull the cart around the room in a circuit.

Extension

- Decorate the handcart with sticky foam shapes and letters.
- Add cardboard lids to the containers.

Facilitate the Project Steps

CREATE, TEST, EVALUATE AND REDESIGN (straps) (Steps 1-3) ★

- As campers tape the straps to their handcarts, ask your TL to hand out camper projects or have campers gather their own projects before they start working.
- Ask the Guiding Questions that support evaluating.

CREATE, TEST, EVALUATE AND REDESIGN (baskets) (Steps 4-7) ★

- Remind campers to make sure half of the tape is on the basket and half is on the box. Help campers with this as necessary.
- Remind campers of the things their handcarts must carry for the final test.
- After the final test, help campers reflect and evaluate how well their handcarts are able to hold each object.
- Support BEING DETERMINED ★ – Use the strategies listed previously. You can also encourage campers to see what others are doing for inspiration about what else they might add to their carts.

Extension

- If many campers are finishing early, then use an attention-getter and show them the Extension materials.
- Show campers how to peel the sticky backs off of the foam shapes and letters.
- Give campers the idea of using the cardboard wheels as lids. Demo how to tape a lid onto a camper example.

Clean Up (5 min)

- Instruct campers to return the test items to be used in the next rotation/later in the summer.
- Have all the camper projects lined up along a wall in preparation for Friday closing.

Lesson Wrap Up (10 min)

Recognition and Reflection (BE DETERMINED)

Help campers see how they or others embraced the Innovator's Mindset and Process, and why this is important for innovation.

Suggested recognition and reflection activity

- Have campers raise their hands if they did something to make their carts even better or worked especially hard on certain parts of their carts.
- Recognize campers for their determination!
- Have a few campers share what they worked on to make their carts as awesome as possible.
- Reiterate that staying determined to keep improving and working on an idea allows innovators to make some truly awesome creations!

Application

Leave campers with a challenge or prompt to help them apply today's learning outside your classroom.

Suggested challenges/prompts

- Remind campers that this is the Maker week at Galileo. Ask for a camper to explain what a Maker is and/or what Makers do. (Makers create things that are fun, creative, or useful.)
- Invite campers to keep thinking about things that would be useful or fun to have in their everyday lives and encourage campers to see how they might make their own versions of them!

