

Welcome!



Designing STEM programs to reach girls with nanoscale content

- Karen Peterson, National Girls Collaborative Project
- Sarah Carter, Twin Cities Public Television
- Tim Hecox, Oregon Museum of Science & Industry (OMSI)
- Sarah Margoles, Previously with Powerhouse Science Center
- Elizabeth Martineau, Bradbury Science Museum
- Gordon McDonough, Bradbury Science Museum
- Yana Jimenez, Imaginarium of South Texas

National Girls Collaborative Project



NATIONAL GIRLS COLLABORATIVE PROJECT



The National Girls Collaborative Project **brings together organizations** that are committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM).

www.ngcproject.org



Project Goals

- **Maximize** access to shared resources
- **Strengthen** capacity of existing projects
- **Collaborate** to create the tipping point for gender equity in STEM



NATIONAL GIRLS COLLABORATIVE PROJECT



NGCP Impact

31 Collaboratives
Serving **39** States



Facilitating collaboration
between more than

18,000
organizations

Serving more than

9.5 Million Girls
and 4.9 Million Boys

Activities

Virtually:

- Content Rich Project Website
 - <http://www.ngcproject.org/engaging-girls-stem>
- The Connector
- E-Newsletter
- Webinars

Collaboratives:

- Professional Development:
 - Conferences and Forums
 - Focused Content
- Incentives to Collaborate: Mini-Grants
- Newsletters and Local Resources



SciGirls

Sarah Carter
STEM Content & Outreach Manager



Produced by:



Made Possible by:



Additional Support from:



PPG
Industries
Foundation

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Foundation

To change how millions of girls (ages 8-13) think about STEM



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- ★ On TV
 - national PBS Kids series
- ★ Online
 - safe, social networking website
- ★ On the Ground
 - activities and professional development



Began as an outreach program of



A summative evaluation found that girls gained:

- ★ confidence
- ★ a deeper understanding of inquiry
- ★ a broadened awareness and interest in science careers



28 episodes available online now!



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Season One Episodes:

- ★ Turtle Mania
- ★ Puppet Power
- ★ Dolphin Dive
- ★ Digging Archaeology
- ★ Horsing Around
- ★ Blowin' in the Wind
- ★ High-Tech Fashion
- ★ Science Cooks!
- ★ Underwater Eco-Adventure
- ★ Robots to the Rescue!
- ★ Star Power
- ★ Going Green

Season Two Episodes:

- ★ Aquabots
- ★ Mother Nature's Shoes
- ★ Habitat Havoc
- ★ The Awesome App Race
- ★ Multitasking Mania
- ★ Insulation Station
- ★ Workin' It Out
- ★ Bee Haven
- ★ Pedal Power
- ★ Super Sleuths

Season Three Episodes:

- ★ Frog Whisperers
- ★ Flower Power
- ★ SkyGirls
- ★ Butterfly Diaries
- ★ Feathered Friends
- ★ Terrific Pacific



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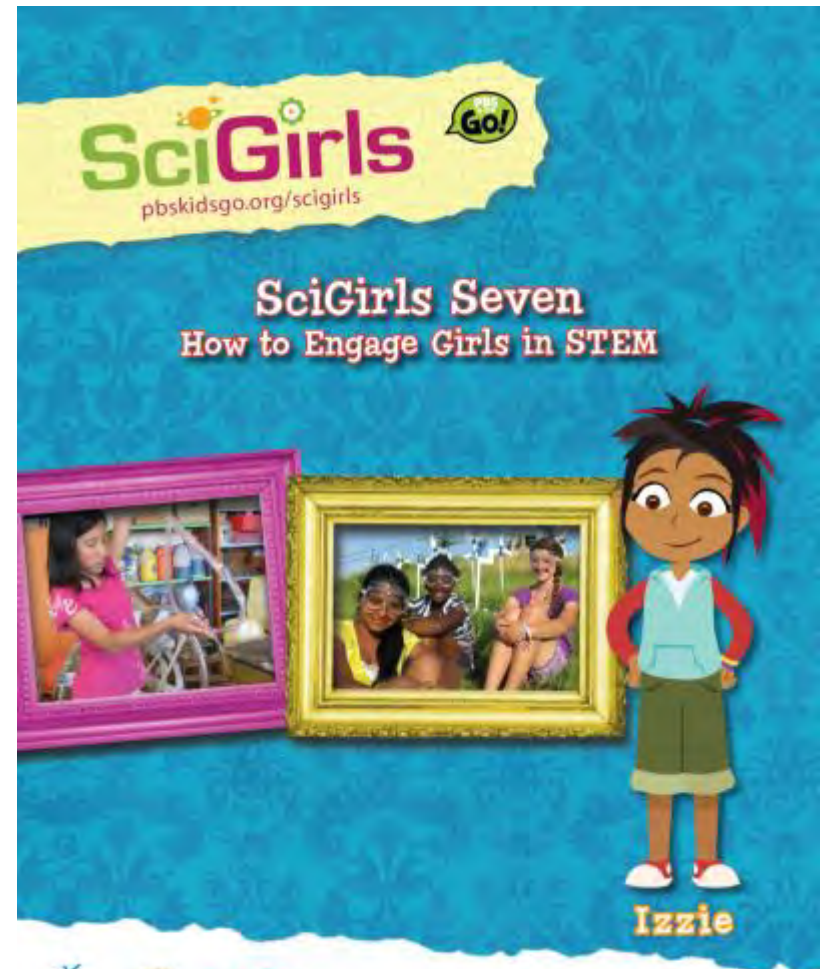
Insert “Sizzle Reel”
video clip here

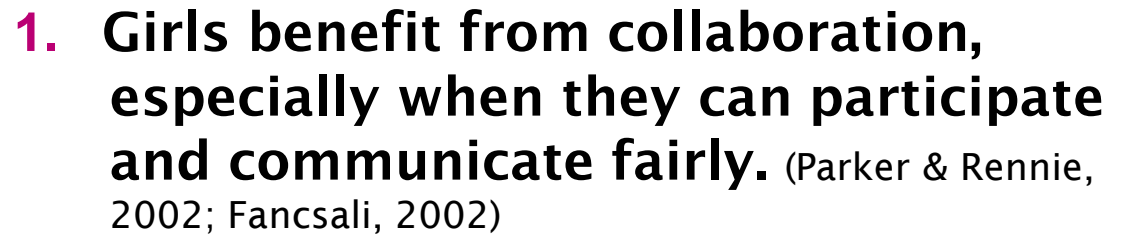


- ★ Features *real* girls doing investigations they're passionate about
- ★ Highlights the *process* of science



- ★ Rationale/Research
- ★ *SciGirls Seven*: Strategies to engage girls in STEM
- ★ Tips for using the *SciGirls Seven*
- ★ Applying the *SciGirls Seven*
- ★ References and Readings







1. **Girls benefit from collaboration, especially when they can participate and communicate fairly.** (Parker & Rennie, 2002; Fancsali, 2002)
2. **Girls are motivated by projects they find personally relevant and meaningful.** (Eisenhart & Finkel, 1998; Thompson & Windschitl, 2005; Liston, Peterson, & Ragan, 2008)



3. Girls enjoy hands-on, open-ended projects and investigations. (Chatman, Nielsen, Strauss, & Tanner, 2008; Burkam, Lee, & Smerdon, 1997; Fanscali, 2002)



3. **Girls enjoy hands-on, open-ended projects and investigations.** (Chatman, Nielsen, Strauss, & Tanner, 2008; Burkam, Lee, & Smerdon, 1997; Fanscali, 2002)
4. **Girls are motivated when they can approach projects in their own way, applying their creativity, unique talents and preferred learning styles.** (Eisenhart & Finkel, 1998; Calabrese Barton, Tan, & Rivet, 2008)



- 5. Girls' confidence and performance improves in response to specific, positive feedback on things they can control – such as effort, strategies and behaviors.** (Halpern, et al., 2007; Zeldin & Pajares, 2000; Blackwell, Trzesniewski, & Sorich Dweck, 2007; Mueller & Dweck, 1998)



- 5. Girls' confidence and performance improves in response to specific, positive feedback on things they can control – such as effort, strategies and behaviors.** (Halpern, et al., 2007; Zeldin & Pajares, 2000; Blackwell, Trzesniewski, & Sorich Dweck, 2007; Mueller & Dweck, 1998)



- 6. Girls gain confidence and trust in their own reasoning when encouraged to think critically.** (Chatman, et al., 2008; Eisenhart & Finkel, 1998)



-





Investigation

Check out the properties of everyday plants.

Guide your kids as they

- 1) Break into groups. Collect several types of “hairy” leaves. (some suggestions are given on the right.)
- 2) Make a table of the properties your group wants to observe. Some examples include: the size and spacing of hairs and the texture of the leaves.
- 3) Place individual drops of water on the leaves. Record your observations.
- 4) Submerge the leaves in water. Record your observations.
- 5) Encourage students to make drawings of their observations in the table. Draw the leaf or do a leaf rubbing. Draw the hairs as they appear under a magnifying glass or the shape of the water droplet (whether it beads up or flattens out).



You'll need:

- leaves from various plants (geranium, nasturtium, lamb's ear, begonia)
- water
- eye dropper
- magnifying glass
- notebook and pencil



Keep Exploring!

Try dropping honey or syrup on the nasturtium leaf. Does it stick?

Look around at the trees in your neighborhood. How do they behave after a rain storm? Why might some leaves shed water and others absorb it? How does this behavior serve the plant? Do the plants get water from the leaves or the roots? Does it depend on the climate the plant lives in?





SciGirls CONNECT website

- ★ Register on scigirlsconnect.org
- ★ Join a group
- ★ Upload photos from your *SciGirls* program or event.
- ★ Fill out a program report sheet after completing your *SciGirls* program or event.



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Looking for more?

For Kids: pbskids.org/scigirls

For Parents: pbs.org/parents/scigirls

For Educators: scigirlsconnect.org

[scigirlstv](#)



[@SciGirls](#)



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Oregon Museum of Science & Industry

- Regional Hub for both the NISE Net and Girls RISEnet
- Joined forces and hosted two NISE Net-Girls RISEnet meetings – Museum of the North and OMSI
- Created the *tips for engaging girls* for NanoDays 2015
- *Designing Our World* (DOW) – 4 year NSF funded project aimed at engaging girls ages 9-14 in engineering
 - Exhibits, Programs, Professional Development, research on girls identity

tips for
**ENGAGING
GIRLS**
at NanoDays

USE INCLUSIVE LANGUAGE

Watch the pronouns you use. When speaking about a scientist, do you say “he” or “his”? Make pronouns gender neutral whenever possible.

FEATURE FEMALE ROLE MODELS

Feature images and stories about women in the information you share while facilitating the activity. Showcase real female nanoscientists. Learning about women role models is inspiring for girls, and it’s also important for boys and parents to see female scientists. Have female facilitators when possible—seeing women leading the activity can help empower girls to participate.

MAKE IT SOCIAL

Encourage sharing and discussion of the activity with friends or family. Set up activities so that more than one person can participate at a time. Consider assigning roles so that every visitor has an active role to play.

ENGAGE THE SENSES

Promote a multisensory experience with a variety of colors, sounds, smells, and textures. Take time to make sure the activity table remains aesthetically pleasing and inviting.

TELL A STORY

Engage participants during the activity by telling a story they can relate to. This could be the story of the person who discovered the technology in the activity or a story of someone who might use this technology. Encourage visitors to tell their own stories.

HIGHLIGHT ALTRUISM

Feature ways the nanotechnology in the activity has been used to help people, or ways that it may one day be used to help others. Encourage visitors to brainstorm ways they think the technology might be useful, or even express concern about ways it could do harm.

MAKE IT PERSONAL

Find common connections between the activity and the everyday lives of girls. Ask girls where they would see or experience a similar phenomenon. Encourage them to tell you about a time they saw something similar, or where they might imagine using a related product in the future.

ENCOURAGE CREATIVITY

Find ways to allow for creative self-expression in the activity. Invite girls to draw, paint, make, or act!

MAKE SURE THERE ARE MANY “RIGHT” ANSWERS

Encourage open-ended investigations by finding ways for girls to explore, discover, and try ideas without any one single “right” answer.

NanoDays 2015

Tips for Engaging Girls

tips for
**ENGAGING
GIRLS**
at NanoDays

Exploring Products—Nano Fabric

MAKE IT PERSONAL

- Invite visitors to **imagine** other places in their lives where nano fabric might be useful (such as a table cloth, on couches, or as carpet).

TELL A STORY

- Tell a **funny story** (real or made up) about a time when nano fabric could have saved you from staining your clothing, carpet, furniture, or similar. Be careful to use inclusive language and not give examples that reinforce stereotypical gender roles (i.e., a wife washing her husband’s clothing).

Powerhouse Science Center

(formerly Durango Discovery Museum,
now closed indefinitely as of May 9, 2015)



Program Statistics



In 2012, we took a close look at our statistics and found that:

- Only 39% of our program participants were girls
- Only 4 of our 19 interns were girls (21%)

So... we applied for some grants:

- Girls RISEnet mini grant
- Women's Foundation of CO
- NISE Net mini grant

“Toolbox”



Created a “Toolbox” to tackle lack of girls in programming:

- Girl-centric marketing techniques
- All-girls programming
- “Maker” programming
- Nanotechnology materials and lessons
- All-girls STEM events
- Professional Development opportunities for local teachers

Girl-centric Marketing



STEM-Power: Growing the Future with You!



Right now, women are changing the world through Science, Technology, Engineering, and Math (STEM) – and it's your creativity and curiosity that's going to make the future of scientific innovation happen!

This *FREE* evening of hands-on experiments and friendly collaboration with local female engineers, scientists, mathematicians, and IT specialists is sure to challenge and inspire young, girl scientists, ages K-5th grade.

**Wednesday, May 21 / 6-8pm
at Durango Discovery Museum**

For more information or to register, contact Sarah at (970) 403-1863 or sarah@durangodiscovery.org.

This material is neither sponsored nor endorsed by Durango School District 9-R.



girl scouts
of colorado



- Wording
- Visuals
- Color choices
- Creativity
- Collaboration
- Service-based
- Role Models
- Girls-only programming

Girl-centric Marketing



**BUILDING ROBOTS. BUILDING TEAMWORK.
BUILDING THE SCIENTISTS AND ENGINEERS
OF THE FUTURE.**



FIRST LEGO League Robotics is a global program for students ages 9-14 to build, test, and program an autonomous robot to conquer theme-based challenges. Four Corners FLL is now one of five official qualifying competitions for the New Mexico State FLL Tournament!



FOUR CORNERS FIRST LEGO LEAGUE

A new season gears up September 8, 2014.

HELP BUILD THE FUTURE. Team and individual registration is Sept. 2 and 4, from 5-6pm. Attending only one registration meeting is necessary. Contact Sarah at Sarah@PowSci.org for more information.



**CREATING ROBOTS. USING TEAMWORK TO
SOLVE WORLD ISSUES. BECOMING THE
SCIENTISTS AND LEADERS OF THE FUTURE.**



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All-Girls Programming

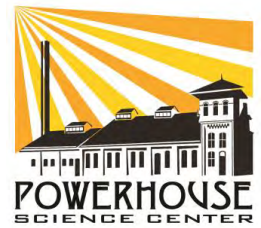


LEGO League Robotics Teams:

- WALL-EV3
- Dill Pickle LEGO Masters
- Roxie's Rockers



All-Girls Programming



Camps:

- Geek Boutique Summer Camp
- Citizen Science Summer Camp

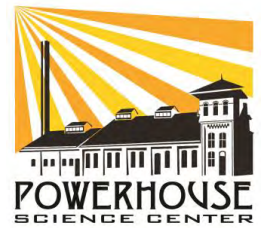
All-Girls STEM Events



“Maker” programming



Nanotechnology Materials



- Nano-day during Geek Boutique Camp
- Nano-research day during Citizen Science Camp
- Nano demos for Interns
- Nano demos and hands-on activities during STEM events

Prof. Developments



Growing girls in STEM.

Engaging girls in STEM throughout the Four Corners.

In collaboration with Fort Lewis College and the Colorado Collaborative for Girls in STEM (CoCo STEM), Powerhouse Science Center is proud to host two professional development workshops, *Role Models Matter* and *SciGirls*, on April 10 and 11.

April 10, at the Powerhouse

- 9–noon: *Role Models Matter*
- 1–4:00 pm: *SciGirls*

April 11, at the Powerhouse

- 9–noon: *Role Models Matter*

To register, please visit:
www.ngcproject.org/collaborative/colorado-collaborative-girls-stem-cocostem/events

*Light snacks and beverages will be provided.



Powerhouse Science Center
1333 Camino del Rio, Durango, CO 81301

Role Models Matter

The Role Models Matter Project, funded by the National Science Foundation, is a collaborative effort among Techbridge, the Society of Women Engineers, the National Girls Collaborative Project, and Girl Scout Councils to bring resources to role models and girl-serving organizations. Role models play a vital role in getting youth excited about careers in STEM, and the Role Models Matter program provides participants tips and practical strategies for communicating effectively with young girls to inspire them in STEM careers.

SciGirls

SciGirls is a PBS STEM outreach initiative designed to engage upper elementary and middle school students in STEM. SciGirls training workshops combine inquiry-based science instruction with a commitment to gender equity. Educators attending SciGirls Trainings will learn the latest research about exciting and engaging girls (and boys) in STEM; experience hands-on STEM activities; and gain access to free materials for hands-on, video-enhanced activities that put a creative twist on teaching STEM.

For more information, please call (970) 403-1863.

2014 Stats and Beyond...



In 2014:

- Increase from 39% to 45% of female program participants
- Increase from 21% to 58% female interns

What does all this mean for a science center that's closed its doors?





A CHILDREN'S MUSEUM AND INFORMAL SCIENCE CENTER

PROMOTING STEAM

SCIENCE, TECHNOLOGY, ENGINEERING, ART & MATHEMATICS

Yana Y. Jimenez
Laredo Children's Museum
dba Imaginarium of South
Texas
Assistant Director

OUR MISSION...

The mission of the Imaginarium of South Texas is to provide a bi-cultural, creative learning experience to local and out-of-town families primarily through hands-on exhibits that nurture individual sense of inquiry and that inspire youth with a focus on Science, Technology, Engineering, Art, and Mathematics (S.T.E.A.M.).

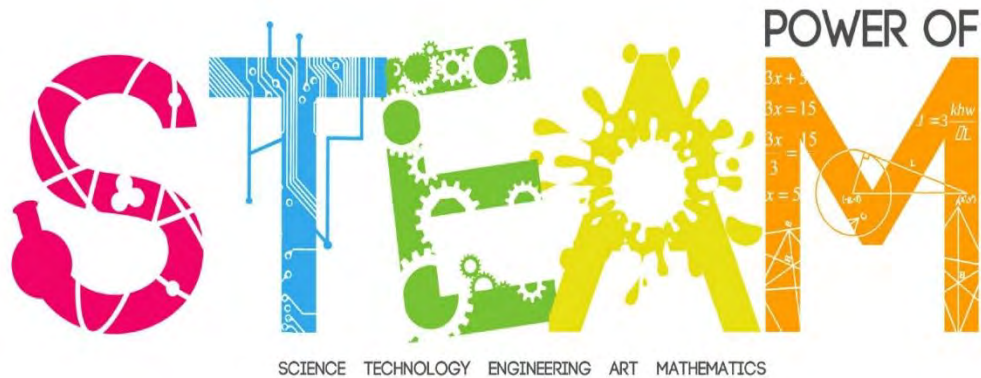


OUR VISION...

The Imaginarium of South Texas envisions expanding and enlarging our facility to continue to provide services that meet its mission of providing the model for creative learning experiences that build confidence in children and adults in their lives.

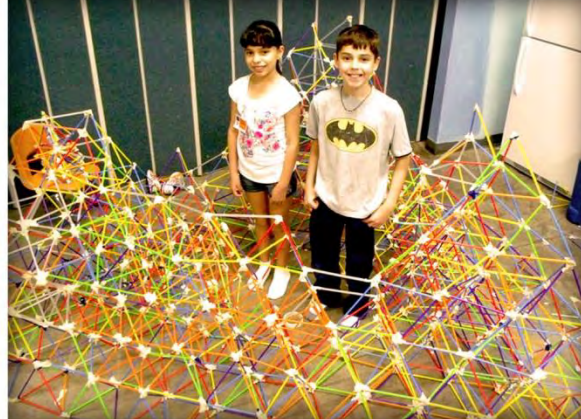
OUR VALUES...

show that science matters. We expand people's horizons. We emphasize the importance of family interactions. We value each child.



SCIENCE TECHNOLOGY ENGINEERING ART MATHEMATICS

ART + SCIENCE = PROGRESS



A Children's Museum & Science Learning

A Place of ~~Center~~ Diversity and Creativity

- ☐ Seasonal Camps
- ☐ Workshops
- ☐ Memberships
- ☐ Volunteer Program
- ☐ Birthday Parties
- ☐ Daily Programs
- ☐ Field Trips
- ☐ Community Outreach
- ☐ Science Festivals



Hands-On Nano Scout Days

- ❑ Serving over 100 Laredo Girl Scout Community from the Greater South Texas Council.
- ❑ Different Age Groups: Daisies, Brownies, and Juniors.



Nano Activities

- ☐ Capillary Action
- ☐ Stain Glass Windows
- ☐ Measure Yourself
- ☐ Thin Films
- ☐ Exploring Forces
- ☐ Heat Transfer
- ☐ Kinetic Sand
- ☐ Graphene
- ☐ Transmission Electron
Microscope
- ☐ Polarizers

OUR GOALS...

- **Increase the ability of Laredo's female students, to become educated in Science, Technology, Engineering, Art, and Mathematics (STEAM) careers through our science based hands-on activities, which will be provided to them at the museum and executed by our trained Imaginarium staff.**
- **Our objective is to expose girls to hands-on activities who other wise would not have the opportunity to experience. The Imaginarium hosted a series of 6 scout days with a total of 100 girls from different scout levels such as Daisies, Brownies, and Juniors. The staff provided a variety of Nano activities that captivated their interest and developed a healthy curiosity of the**



THANK YOU



Variety!

- Elizabeth Martineau, Bradbury Science Museum
- Gordon McDonough, Bradbury Science Museum

Assumptions



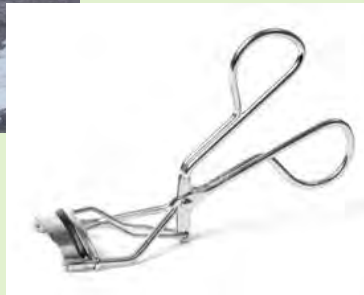
Loud

Messy

Pink



Planning

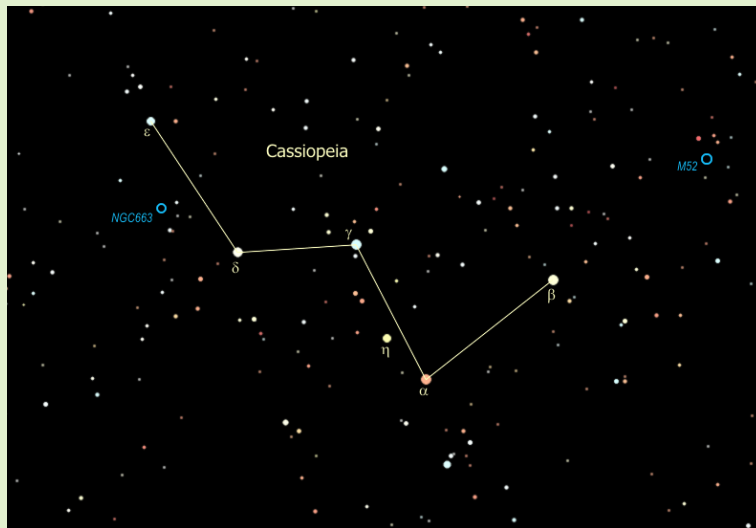
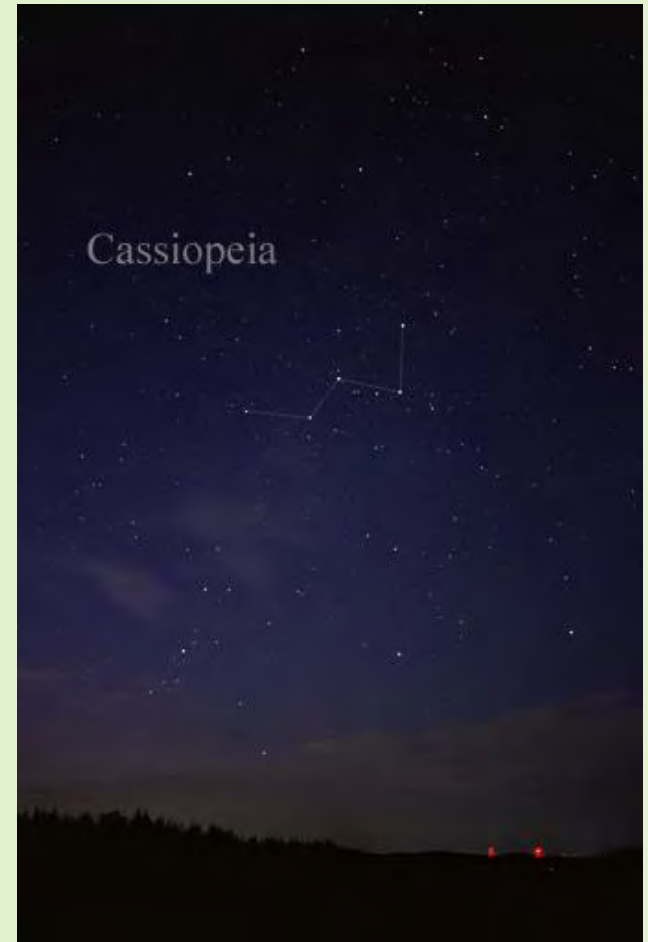
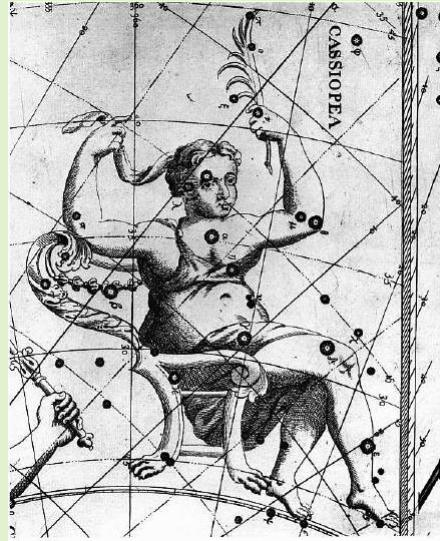
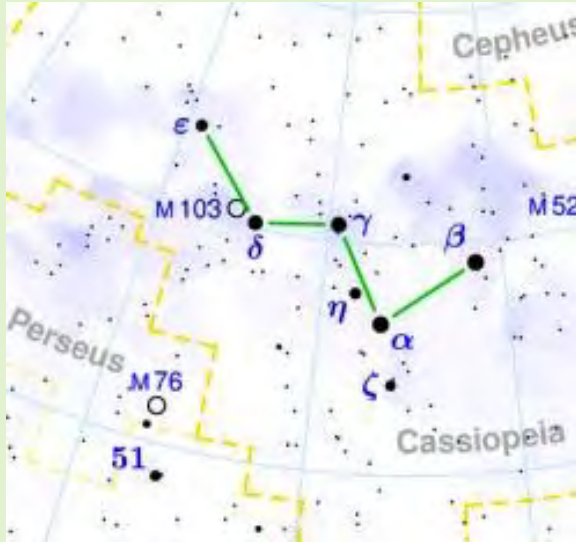


- Style points
- Social
- Creative
- Open-ended
- Stories
- Examples

Text:

- Text

Which picture catches your interest?



Implementation



NanoDays™
The Biggest Event
for the
Smallest Science!

Listening:

- What does it remind you of?
- What do you think?

Watching:

- Is everyone engaged?
- What interests people?

Speaking:

- Use inclusive language.
- Use affective language.
- Praise effort rather than knowledge.

What does success look like?



Mindful teaching
benefits everyone!



Our Favorite Resources

Text:

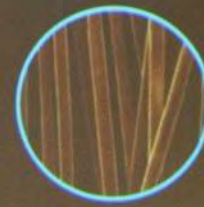
- Nisenet.org
- amightygirl.com



Questions & Discussion



Are there robots
the size of a freckle or hair?



.1mm

Thank you!



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