BLUEBIRD MATH CIRCLE
Alliance of Indigenous Math Circles

Issue 2

Share your problems, solutions, models, stories, and art at:
https://aimathcircles.org/Bluebird

NEWSFLASH

Join LIVE Bluebird Math Circle to work on these activities together with friends and family.

Monday April 12, 5-6 PM MDT online.

Sign up at https://aimathcircles.org/Bluebird

MATH MEME

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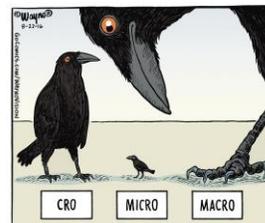
Family Circle: Bridge and Torch Action/Adventure Stories

PROJECT—WRITE AN ACTION/ADVENTURE STORY There is an old math story about people crossing a rickety dark bridge with a single torch. Like any other media, math stories only live to a ripe old age if they grow popular. This one is. You can find many versions under the name *Bridge and Torch Puzzles*. Now is your turn to tell stories in your own way!

STARTER STORY Person A takes 1 minute to cross a bridge, Person B takes 2 min, Person C takes 4 min, and Person D takes 8 min. It is dark, and they must carry a torch to cross. Two people can walk close together if one carries the torch, but the bridge will break if more than two people step on it. All four people must cross with just *one torch*, and take *no more than 15 minutes* to cross. Can they cross, or will they fail?

Storytellers build worlds, develop characters, and plot events. Grab these storytelling tools as your *mathematical modeling tools*.

CHARACTER PROMPT Make up your *characters*. *Who* is in your story? You and your friends, or talking animals, or someone from your favorite book or movie, or…? Why are some faster walkers and some slower walkers?

WORLDBUILDING PROMPT Make your story world come alive. *Why* must your characters hurry to cross, what's their urgency? Will they be late for something, or is someone chasing them, or…? Your world will motivate your characters—and your math.

ALTERNATIVE UNIVERSE PROMPT This is where it's at: change your story's elements! What happens to the crossing time if you have fewer characters, or more? What if you change their speeds? (Hint: make everyone walk at the same speed if you aim to write a less exciting story or an easier puzzle.) Any little thing you change can lead to a storytelling disaster or a brilliant plot twist; a boring exercise or a math thriller. Maybe that's the moral of the story?

Storytelling scenarios by Christalyn, Jaelynn, and their teacher Mr. Craig Young
Arrowhead Math Circle and Thunderbird Academy, Arizona

On a hill, there is a veterinarian's building. Five veterinarian doctors, named Christalyn, Jaelynn, Alex, Xavier, and Pete were helping 5 animals (a dog, a bunny, a chicken, a cat, and a rat). People took their animals in for check-ups, but the animals received the wrong shots and started fighting. The doctors ran out of the building and wanted to cross the bridge. Christalyn and Jaelynn both took 1 min to cross, Alex and Xavier both took 2 min to cross and Pete took 3 min to cross.

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There is one character who crosses the bridge, a shepherd saving three members of their flock who wandered off from the herd. They are trying to get away from a coyote (Ma'ii) and need to cross the bridge to safety. As soon as they all cross the bridge, the shepherd needs to cut the bridge down before the coyote tries to cross.

To make these scenarios into puzzles, pose questions about particular times or the shortest possible time.

Share your stories with other Bluebird Math Circle participants at https://aimathcircles.org/Bluebird

(continued) STORYBOARDING/MODELING PROMPT Writers use action figures or draw stick figures to *storyboard*: play out who takes action, who talks, when, and how. Storyboarding helps you visualize your scenes and avoid errors. You don't want to forget what side of the bridge you left your characters on, or try to pass the torch to someone on the other side! Draw or write names of your characters on small pieces of paper, or use toys. Have a strip of paper to *model* a bridge; use a toy or a sketch to *model* a torch. Now you can play out, or *model*, the dramatic crossing. Keep track of your characters and their torch. The way you play it out, do they make their crossing in 15 minutes, or 20, or?… What's the shortest time possible? How about the longest?

HOW-IT-SHOULD-HAVE-ENDED PROMPT Stories and math do not have to be realistic. That's not their point. Still, do you feel inspired to solve your character's bridge dramas for real, once and for all—with a sturdier bridge, or flashlights for everyone, or another *engineering solution*? That will end the story before it started, and kill the math puzzle. Edgy, but satisfying in a way.

Ask Bluebird

QUESTION—How long is a light year?

BLUEBIRD SAYS—It is quite long, and maybe not in a way you asked. It's a measure of *distance.* Take a mile. Now replace each *inch* in your mile with the distance from the Earth to the Sun. That will make about a light year of length! More precisely, a light year is the distance light travels in a year: around 9.46 trillion kilometres or 5.88 trillion miles. It takes light 8 minutes to travel from the Earth to the Sun. The nearest known star, Proxima Centauri, is a bit more than 4 light years away.

Submit your math-related questions at https://aimathcircles.org/Bluebird and Bluebird will find answers.

FUN FACT OF THE FORTNIGHT

What is the oldest story-puzzle people still retell? It's about four thousand years old and comes from North Africa! Archeologists found it on an ancient Egyptian papyrus. It had a story-puzzle about grain, mice, and cats to practice multiplying by 7. Why 7? That's because back then, as it is for students even now, multiplying by 7 was the hardest of the time tables x2, x3, x4… x10. Here is a more recent version from 18th century.

As I was going to St. Ives,
I met a man with seven wives,
Each wife had seven sacks,
Each sack had seven cats,
Each cat had seven kits:
Kits, cats, sacks, and wives,
How many were there going to St. Ives?

Card Selection Tasks and Fables

1 2 🟥 🟨	*Cards can have numbers on the front (1 or 2) and colors on the back (red or yellow). You see four cards on the table: 1, 2, red, and yellow. A note says, "If a card on the table has 1 on one side, then it should be red on the other side." Is the note a lie? How many cards do you need to turn over to find out?*

Fewer than one in ten grown-ups solve that puzzle right! (See the solution in the Bluebird Leaflet next week, or find the puzzle online.) But the majority do solve it correctly once we retell the puzzle as a story about people and their relationships. Try the card puzzle first, then the story puzzle. Does your answer to the card puzzle change after you solve the story puzzle?

student prof Q A	*Students get envelopes with questions. Professors get envelopes with answer keys. You can't tell who's a student and who's a professor at a glance, but everyone wears college ID cards on campus. You see four people. You recognize a student and a math professor you've met before, who have not opened their envelopes yet. You do not know the other two people, who already opened their envelopes. One is holding the questions, and the other is holding the answer key. You can look into envelopes and check IDs. Whose envelopes and IDs do you check to make sure no students accidentally got answer keys?*

WRITING PROMPT Create your own puzzle-story: a bit like a fable where readers judge characters. Have two types of characters, and two types of things they should or shouldn't have, or do. Model your story after the card selection task. Try the card version on your friends and family. Then give them your story version, where they need to judge the characters. Which is harder for them?

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