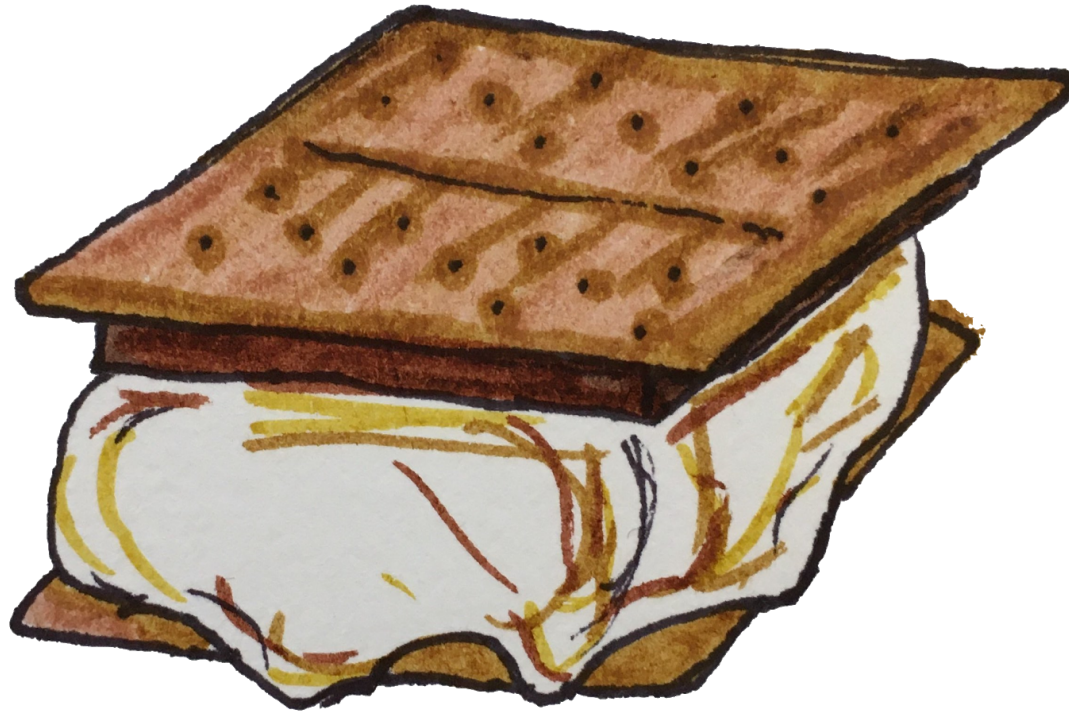


## The Class Goes on a Camping Trip



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Illustrations by Adele Long

*In this story Sophie and Norman are on a camping trip with their classmates. This story is about how the best problem solving happens when people put their ideas together.*

“Sophie, aren’t you afraid to sleep outside tonight? You know there are bears, right?” Norman said to Sophie. Sophie smiled because today their class would board busses and head out for the annual camping trip.

Every year, near the end of school, the second grade classes went camping for two nights at Wild River State Park. Sophie was super excited. She knew Norman was excited too; and a little nervous. Norman was worried about bears. He had never been camping. Sophie and her family went camping every summer. In fact, this would be the first time she went without them. Sophie was pretty sure bears were only interested in food, not people.

Sophie, Norman, and all their classmates had spent the whole week making lists, figuring out menus and packing up materials: sleeping bags, sleeping pads, food, water, and, of course, the fixings for s'mores.

They were packing large, rectangular, heavy canvas tarps in case it rained. But the weather outside was lovely, and it was supposed to be bright and sunny for the next several days.

'Okay class, are you ready to board the bus?' asked Mr. Perez, one of their teachers.



Sophie, Norman, and their classmates cheered back "YES!"

Soon enough, they were on their way. Sophie pressed her face up against the window the entire way to the campground. As they approached a bridge, they saw a sign saying: *Closed for emergency repairs*. The bus had to go a few extra miles to cross the next closest bridge. As the bus was turning around, Sophie was watching all the people who were working on the bridge. Everyone was standing, sort of in a circle, no one was working but you could tell everyone was involved in the conversation.

“Norman, look over there!” Sophie said. “Why do you think everyone is talking when there is so much work to be done?”

**HANDOFF: What do you think the workers could be talking about?**



Ms. Wilson, the other second grade teacher, was in the next seat up and heard Sophie's question. She turned around and said, "Fixing this bridge is a very complicated problem. There are many ways to do it and I read in the newspaper that the engineers

and construction crew were not sure about the best way. I think the people standing there are trying to figure out what to do. I bet they know that good teams share ideas with each other. I bet they know that the best way to solve a problem is to combine people's ideas and make them better. I bet they know that ALL ideas can get better."

**HANDOFF: Do you think people's ideas ever get better? Why do you think so? How do ideas get better? (What are ideas anyway?)**

Sophie had been thinking about what her teacher had said about teams and ideas. She liked the idea that all ideas are improvable. She was just thinking it was funny having an idea about ideas when Norman asked, “Have you seen any bears yet?” Before Sophie could say anything, they arrived at the campground.

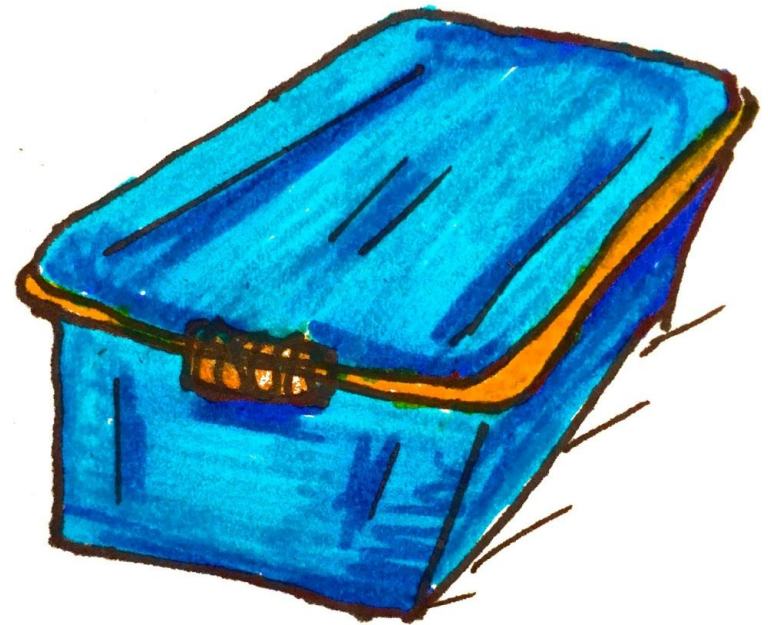
Everyone got off the bus and gathered around their teachers. Ms. Wilson said, “Okay class, find a good place to sleep tonight. Remember there should be lots of stars out, so pick a spot that lets you see the sky. After you find your spot, come back to help unpack supplies.” Everyone ran off to find the best spot.

Sophie walked around the campsite, taking in the whole scene. She chose a spot where she would be able to see the stars, on a patch of soft grass near a log.



She looked to see where Norman was going to camp and saw that he was so close to the bus he was almost underneath it. However, a few minutes after the class had unloaded all the gear and food, the bus drove away. Norman looked at Sophie and asked, “Without the bus, how will I be safe when the bears come?”

Mr. Perez overheard Norman and gathered all the second graders for an announcement. “I’m hearing some concerns about bears,” he said. “The bears are not really interested in us but they are interested in our food. We need to find a way to store it where they can’t get it. But first let’s put all the food together in the center of the campsite.” Mr. Perez opened up some quite large, heavy duty, open-topped, plastic baskets to put the food into.



Norman was thinking about bears and food. He had brought some granola bars – just in case. Norman reached into his sleeping bag and pulled out a granola bar, then another, and another, and a few more. He put them in the growing collection of food that needed to be kept from bears.

Sophie looked at Norman and pointed to his bulging pockets. Norman sighed and pulled out four more granola bars and tossed them into the pile in the center of the campsite.

Before anyone said anything, Jay began to drag one of the mostly full large food baskets over to a shallow hole on the edge of the campsite. Jay yelled to everyone, “Look over here! We can put all the food in this hole and cover it with big rocks.” Norman was relieved. He thought this would be a good way to keep his granola bars safe from the bears.

Before Jay could drag the basket to the hole, Maia said, “Wait! I have another idea!” But Jay kept pulling the food toward the hole.



“Teamwork!” Sophie shouted in her loudest voice. Everyone stopped. “Remember the people working on the bridge? They were a team sharing ideas about solving their problem!”

**HANDOFF: Why did Sophie say what she did about teamwork?**

- **What do you think about Jay’s idea for protecting the food?**
- **What do you think about Jay not listening to Maia’s idea?**
- **What is it like to be on a team? Do all teams work together well?**

BOOM!! Before anyone could respond to what Sophie had said, there was a giant clap of thunder. Surprised by the sound, everyone looked up at the sky and saw that dark clouds had begun to form over the mountain a few miles away. Their perfect day for camping was changing quickly. The teachers, with frowns on their faces, looked at one another and, just like the team working on the bridge, they gathered together to talk.

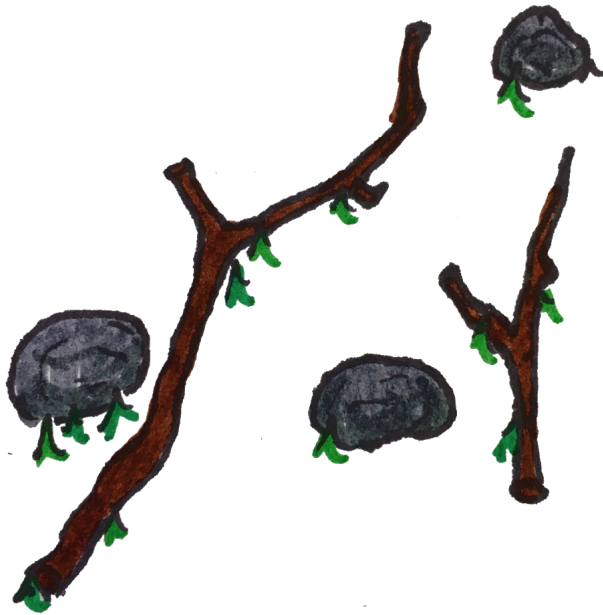
Ms. Wilson walked to the center of the campsite and said, “Second graders, we can worry about the food later. Right now, it’s important we make some sleeping shelters so people can keep their things and themselves dry. We have tarps and plenty of ropes. There is one tarp for every two people. We know you can solve this problem.”

Everyone rushed over to grab a tarp, but it only took a second to be reminded that there were not enough tarps for everyone to have their own. People looked around and teamed up with the person standing closest to them.

Sophie and Norman had not rushed over to the tarps. Instead Sophie was looking around at the campsite, imagining what it would look like once it started raining. Norman darted over to the pile of food, collected some of his granola bars, carefully putting them deep inside a large plastic food bag so they would stay dry. Sophie walked up to Norman and said, “Well Norman, it looks like we’re sharing a tarp. Did you get all of your granola bars into the bag?”

Norman nodded his head and said, “Well, most of them anyway.”

Sophie and Norman walked over to where the tarps and rope were. Norman picked up a tarp and Sophie took some rope. Sophie looked at all her classmates who were hurrying off with tarps and ropes under their arms. In her loudest voice she said, "We should put our shelters where water will not stream or make a puddle when it starts raining." Some of Sophie's classmates stopped, thought about this idea, and realized they should set up their tent somewhere higher up the hill. Other classmates kept looking for the closest spot.



Sophie and Norman grabbed their backpacks and sleeping bags and made their way up the hill with their supplies, tarp, and rope. They picked out a mostly flat spot for their shelter. Sophie put down the tarp and turned to find that Norman was nowhere in sight. Sophie wondered where he had disappeared. She started to pick up the loose sticks and small stones so their camping spot would be more comfortable.

Just then Norman arrived with a big smile on his face and with an armful of long, spindly looking sticks. “I have tent poles.” he announced. “We’re ready to make a great shelter.”

Sophie looked around to see what her classmates were doing. She noticed that many of them had stayed at the bottom of the hill. Sophie thought that, if it rained hard, there would be puddles and streams right where they were setting up their shelters. Three other pairs of students were setting up on higher ground, just like she and Norman. Sophie didn’t see anyone else with sticks but she saw that some of her classmates were working with the rope. “Hmmm...” Sophie thought. “Using rope might be a good idea.”

She turned to tell Norman, just in time to see him crawling out from under the tarp that had collapsed on top of him. Norman pulled out some broken sticks, looked up, and said, “I don’t think that these sticks will work.”

Sophie replied, “Some of our classmates are trying to use the rope. We should go see what they’re doing!” They walked over to Allie and Sean.

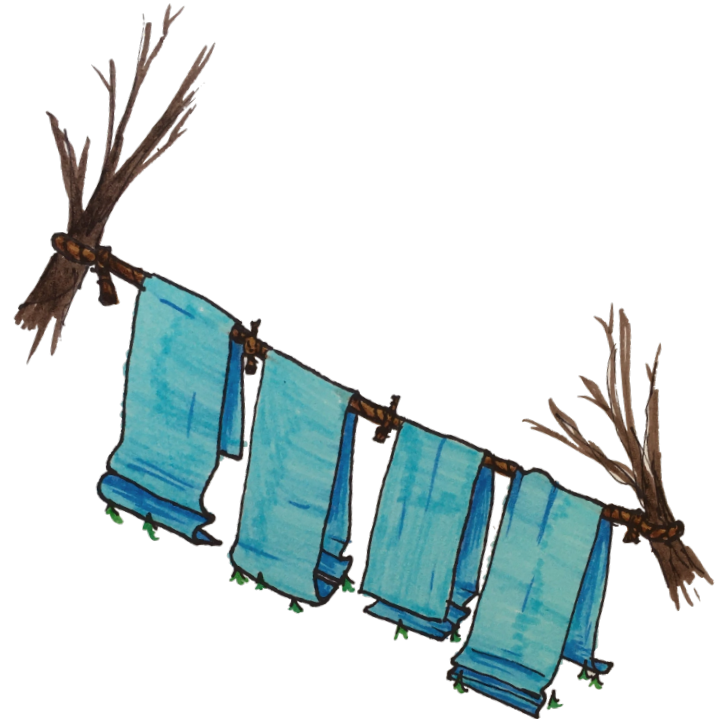
Allie said, “Sophie! Glad you are here. You shared the idea of setting up the shelter on high ground. We have an idea to share with you.” Allie then explained how they were putting the tarp over a stretched-out piece of rope. Sophie could imagine how this would work; so could Norman.

“The problem is we can’t figure out what will hold up the rope,” said Allie. “We’ve been holding it up ourselves but that won’t help when it rains. It would be great, if we could tie the rope between two trees, but the trees are too far apart and the rope won’t reach.”

**HANDOFF: Any ideas?**

Norman was listening and looked at all the pieces of rope on the ground. “Hey!” Norman exclaimed. “We can tie our pieces of rope together.”

Everyone nodded and quickly discussed what kind of knots and which trees to choose. “Nice idea, Norman,” Allie said. Minutes later, with amazing teamwork, all the ropes were tied into one long rope and each end was tied to a tree. There was now room for all the tarps to be put over the rope. The classmates at the top of the hill worked together to hang their tarps over the long piece of rope. Soon the 4 tarps were draped over the rope with some space between each tarp and the one next to it.



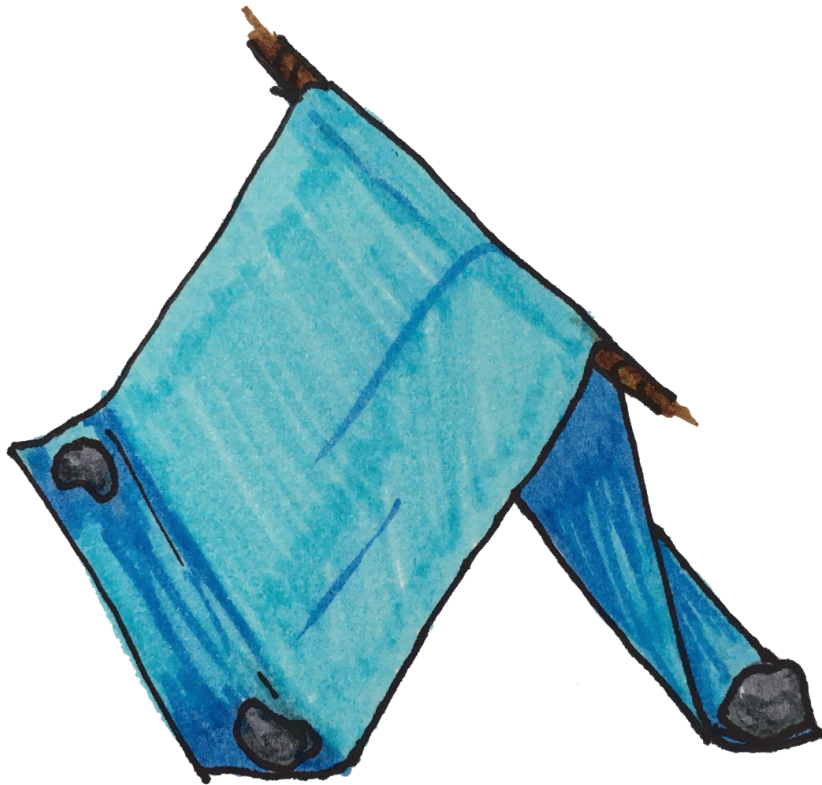
**HANDOFF: Use the rope, rocks, and cloth to turn this into a “hands-on” problem solving experience.**

The sound of thunder was getting louder and more frequent. The wind was getting stronger and stronger and the rain began falling – hard. Everyone scrambled under their tarp and hoped that it would provide shelter from the storm. It didn't take long to realize that nothing was keeping the tarp open. When you were inside, the tarp was resting on shoulders or backs or even people's heads. To make matters worse, the wind was whipping the loose bottom ends of the tarps into the air and rain was blowing in. Everyone was getting very wet.

Sean who was in one of the middle tents yelled over the sound of the wind and rain, "Hey! Everyone! Didn't we pass a pile of rocks a little bit down the hill?"



“Yes, I’m sure we did--there were a lot of rocks back there. What are you thinking?” asked Allie, who was under the tarp at one end of the rope.



“We can use them to hold down the corners of the tarps,” said Sean.

Everyone realized that holding the tarps down would be a big improvement. Four classmates who had rain jackets went off to find the rocks. They soon returned and ducked under the tarp. Together, they had carried back 10, good-sized rocks.

“Is that going to be enough rocks?” asked Norman.

“I don’t think so,” replied Lola. “Each tarp needs 4 rocks, one for each corner.”

“We looked everywhere and these are the only rocks big enough to hold the tarp down. There were some other rocks but they were way too big for us to carry,” Allie explained.

“All right, let’s put our thinking together and imagine the best way to use 10 rocks with our 4 tarps,” said Sophie. Everyone agreed, and they all squeezed under one tarp so they could share their ideas.

**HANDOFF: Perhaps begin with a partner, draw a solution and then combine with another problem solving pair to develop best ideas.**

### **Day 3: How Sophie and Norman and their classmates solved the problem**

“We could use 4 rocks for one tarp and everyone else gets 2,” suggested Sean.

“Well, that’s one way to do it, but I think that there are other ways to use 10 rocks. One tarp could have 4, and two tarps could have 3, and then 2 people would not have their own tarp but could squeeze in under one of the other tarps,” said Marta.

“I don’t know,” said Norman. “Three can fit under one tarp when we’re sitting up like this, but if we need to sleep or stretch out there won’t be enough room.”

Everyone was thinking about where to put the 10 rocks. “***Wait, I have an idea!***” ***exclaimed Sean. “Why don’t we move these tarps together? Then we don’t need so many rocks.”***

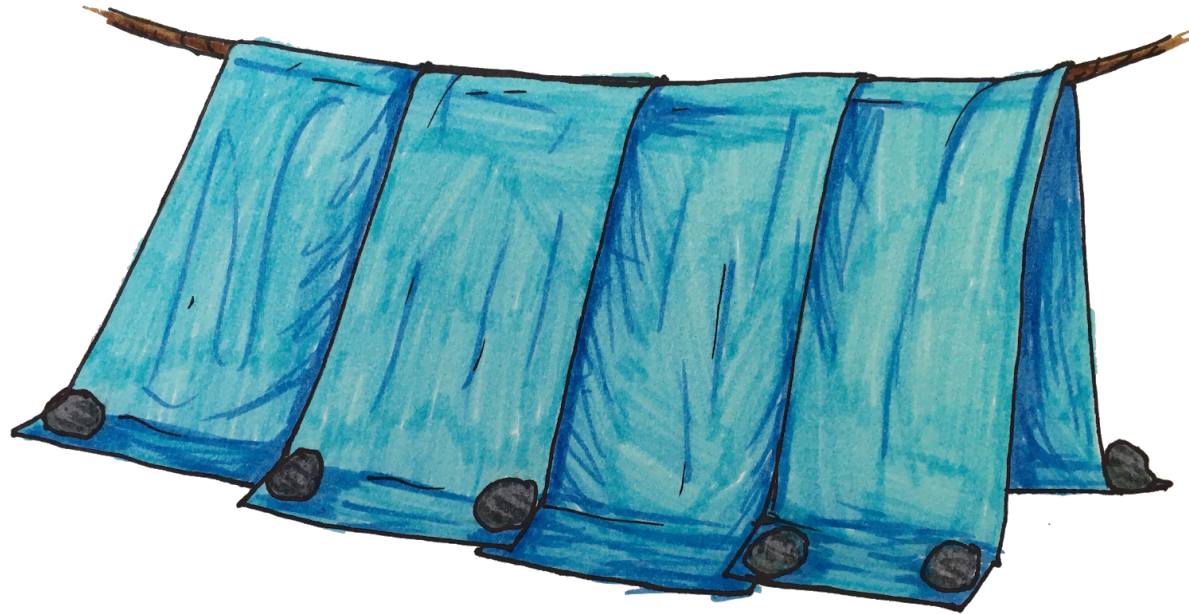
“How do you figure that?” asked Norman.

“Yes! I see it in my mind,” exclaimed Sophie. Other classmates were also imagining how Sean’s idea might work.

Norman smiled and said, “Yes, instead of 4 separate tarp-tents we can have one long tent!”

Sean was already starting to slide the tarps along the rope so there would not be any spaces between each tarp. Allie, Sophie, Marta, and Norman were putting rocks in place.

Soon the combined tarp-tent was finished. Everyone was together, dry, and smiling.



**HANDOFF: How does this solution compare to yours? How did collaboration and good talk help?**

It was still very windy and raining hard when Norman grabbed his rain jacket and scooted out from under the tarp. He ran down the hill over to one of the plastic containers with food. Everyone looked at each other.

“What is Norman doing?” asked Allie.

Sophie, laughing, thought she knew. A moment later, Norman arrived carrying a handful of granola bars. “Hurrah for Norman!” everyone cheered as they all unwrapped a granola bar. It was just what everyone needed and being able to share his granola bars with everyone made Norman happy.



The rain and wind stopped almost as suddenly as it had begun. The sun came out from behind the clouds. There was still plenty of daylight left. The whole class gathered together in the center of the soggy campsite. Not everyone looked as dry and happy as the people who had chosen a campsite on the hill and worked together to make a tarp-tent. The tarps and sleeping bags of the classmates that had stayed on the low part of the campsite had gotten soaked. They were using their ropes to hang things up so they could dry in the sun. Everyone was glad to be together again.

“Now that the rain has stopped, I’m going to explore the campsite! Anyone want to come with me?” Norman asked.

“Norman, I’m so glad you’re not afraid of bears anymore. You’ve come a long way on this trip!” said Ms. Wilson.

Norman stopped in his tracks. 'Bears...' he thought. 'Food...' he thought. Then turning to face the whole group, he said, "Whoa! What about the food? We need to keep it away from bears."

"I was starting to bury it before the rain started, let's go finish that now!" Jay said.

"I'm not sure I understand how putting the food in a hole is going to work," Allie said. Everyone looked at each other and realized at the same moment that this would not keep the bears away from the food. If they could move the rocks, so could bears. And the hole was half-full of water from the rain.

"We need a better idea," said Jay.



“Yes, we need a better idea but how do we come up with one?” asked Norman.

Sophie was picturing the people working on the bridge and how they all talked together. Sophie also knew that figuring out how to use the 10 rocks for their tarp-tent was a great example of teams building better ideas. “We get one by talking and working together!” exclaimed Sophie.

The classmates gathered in a circle. They looked around them, hoping that would help them come up with ideas. How could they keep the food and the bears apart?

Just then Mr. Perez appeared and said, “I’m so glad to see that you’re working on keeping the food safe from the bears.”

**HANDOFF: Your students can develop their own ideas for keeping food safe from bears (or you can continue with the story).**

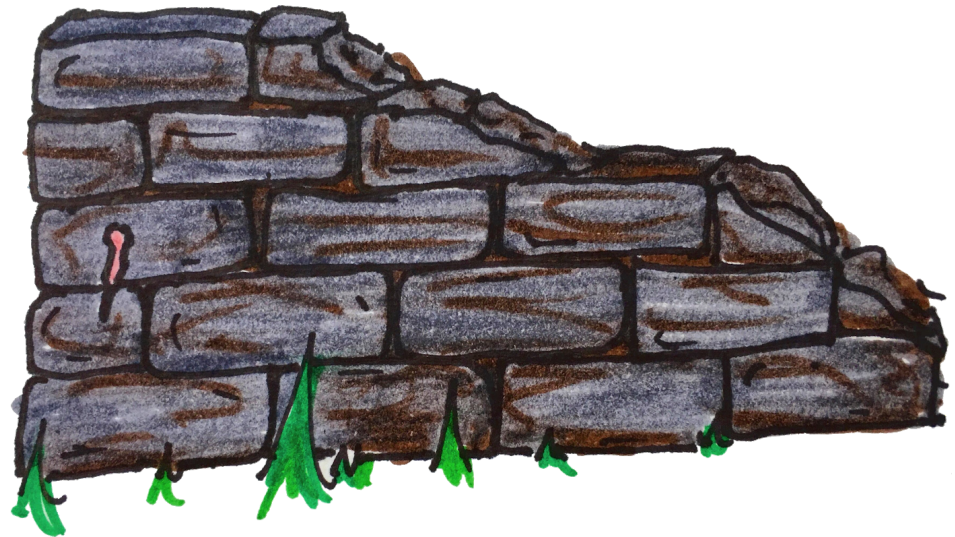
The food was now safe from the bears. The campsite and wet things had dried out quite a bit. Everyone was thinking about what to do next. They looked over and saw Mr. Perez approaching with the fixings for s'mores. "We have had quite an adventure today. This is a time to celebrate with s'mores. Before we do we need more wood for the campfire. It's about to go out!" he said. Everyone except Norman hurried off in different directions to look for firewood.

"Wait!" Norman called out. "Shouldn't we circle up and talk about it first?" But everyone was already too far away to hear what he said.

Norman thought that maybe finding wood for the campfire was not really a problem to solve but rather something to just get done. “Okay, well, I should stay here just to keep an eye on the s’mores,” Norman said quietly to himself.

As Norman sat quietly he watched a worm that was slowly making its way up a brick wall that had been part of an old shed and now was all that was left. The worm was going soooo slowly. Norman thought it would take the worm days to get to the top of the wall.

**HANDOFF: Let’s help Norman by figuring out how long it will take the worm to reach the top of the wall.**



## **Worm Journey**

A worm has to climb over a wall. The wall is 5 bricks high. Each morning the worm starts up and slithers up 2 bricks. But then, when the worm stops for the night, it slides back 1 brick. How many days (or how long) will it take for the worm to reach the top of the wall?

**FOR TEACHERS:** This is a challenging problem because students have to represent a dynamic situation. One way to support them is to provide a worksheet that has a picture of the five brick wall.

Students might first work individually but then join up with a partner to form a “team.” Just like Sophie and Norman, they have to explain their solutions, put their ideas together and come up with one drawing / solution with both student’s name on it. If the class needs help, try beginning a representation via whole class discussion – the wall and then what one day’s worm-travel might look like.

If they can figure this out, it’s likely the class will “fall for the trick” here. The worm goes up 2 then back 1 for a total progress of 1. The worm has to do this 5 times to get to the top, so five days is the answer. If they work HARD coming up with this solution, great. If you want to challenge them:

(The “real answer” is 4 days. When the worm starts out from 3 feet high on day four, the 2 feet it climbs gets it to the top! Tricky!! If most students (2<sup>nd</sup>

graders?) can come up with the 5 days answer, it would be a challenge to tell them – No, 5 days is NOT how long it takes the worm.)

The big takeaway here is the conversation about teamwork and how putting ideas together helps.

## **DAY 4**

### **IDEO video**

- The IDEO video would be great for the class to watch together. It is 8+ minutes long and tells the story of designers who are building a better shopping cart.
- IDEO shopping cart video:  
<https://www.youtube.com/watch?v=M66ZU2PClcm>

**A DESIGN CHALLENGE (this would go on for several days)**

Here's a suggestion for a design challenge: Students have to design a better lunchbox. This could be anything. Great, if related to your curriculum. Lots of other possibilities (including hands-on "making" of things like sail cars.

The steps follow NGSS depiction of the (engineering) design cycle.

Step 1. **Define.** What is the Problem?

- Find out what people need. Do this together on a chart.
- What are the things you like about your lunchbox?
- How could your lunchbox be better?
- Etc.

Step 2. **Develop.** Come up with an initial design.

- Individuals should design their lunchbox.
- They should know that, like IDEO, they are going to put their ideas together.

Step 3. **Optimize.** Improve your design.

- Cannot manufacture a prototype and test it out.
- Instead

- Improving involves joining a partner and, as a design team, combine and improve their ideas; producing a shared drawing

Display (a big chart?) initial designs –in one column and □ improved design in the other. Students can explain their improvements. The “best” designs are the ones that improve the most.

- Students should now merge with their ‘ultimate’ design team. Another pair. (Everyone should know that the process is going to work this way.)
  - One design comes out of the work of four students.

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