

Eduardo and Maria Make a Telegraph

CHAPTER 1

Eduardo felt really awful! His head hurt, his tummy hurt, even his hair hurt! Worst of all, it was Saturday so he wasn't even missing school!

"What's the matter with Eduardo?" asked his sister Maria.

"I think he has the flu," said their mother. "You should stay away from him or you might catch it, too!"

"OK," said Maria.

Maria was bored. She had watched all her favorite shows on TV and now there was nothing on but stupid football games.

"Why don't you read a book?" asked her mother.

"I've read all my books a million times!" said Maria. "I want to play. I want to play with Eduardo."

"OK," said her mother. "You can play with him, but you can't go in his room or you might catch the flu."

"That's dumb!" thought Maria. "How can I play with Eduardo if we can't be in the same room?" And then Maria got an idea.

How could Maria and Eduardo communicate with the door closed? You can draw a picture of your idea or describe it in words.

CHAPTER 2

Maria went to find her mother. She found her in the kitchen.

"Mom," she said, "I need two tin cans and some string."

"OK," said her mother. "There's a ball of string in the cupboard and you can take two empty cans out of the recycling bin in the basement."

Maria went to the cupboard and got out a big ball of string and a pair of scissors. She went downstairs to the recycling bin and took out two empty cans with no tops. Then she went back to her mother.

"Mom," said Maria. "Can you make some holes in these cans for me?"

Maria's mother got a hammer and a nail. She hammered the nail into the bottom of each can. When she was done there was a hole in each can. The holes were just big enough for the string to pass through.

"Thanks, Mom!" said Maria.

Maria pushed the end of the string through the hole in the bottom of one of the cans. She made a knot in the end of the string so that it wouldn't slip back through the hole.

Maria went to Eduardo's room. The door was closed. Maria knocked on it.

"Come in," said Eduardo.

Maria opened the door. Eduardo was in his bed. He looked sick. His eyes were puffy and his nose was runny. There was a Kleenex box on the bed stand beside his bed and a bunch of Kleenexes on the floor near the wastebasket. There were a few Kleenexes in the wastebasket, too.

"I brought you something!" said Maria. She tried to sound bright and cheerful.

"What is it?" asked Eduardo.

"This!" said Maria, showing him the tin can with the string attached to it.

"Oh goody!" said Eduardo, "Just what I wanted: a tin can with a string attached to it!"

"No, silly!" said his sister. "It's a telephone!"

Maria was careful not to go into Eduardo's room. She threw the can to Eduardo and then walked away, holding the other tin can in one hand. In the other hand she had the ball of string. She let the string run out of the ball until it lay on the floor all the way down the hall in front of Eduardo's room. When she got to the end of the hall she cut the string and poked the end through the hole in the bottom of the tin can. She tied a knot in the string so it wouldn't come out. She pulled on her can until the string between the two cans was pulled tight.

"Put the can to your ear!" she yelled to Eduardo. Eduardo put the can to his ear. Maria spoke into her can in a quiet voice.

"Can you hear me?" she asked.

"Yes!" Eduardo shouted back. "I hear you loud and clear! This thing really is a telephone!"

"You don't have to shout," said Maria, still speaking in a quiet voice. "If you talk into the can I'll hear you even if you whisper."

Eduardo took the can away from his ear and spoke into it in a quiet voice. Maria put her can to her ear. She could hear Eduardo's voice through the can even though he wasn't shouting.

The telephone worked both ways!

Just then their mother came out of the kitchen and saw what they were doing. She walked over to Maria shaking her head. She looked angry.

"This will never do," she said. "No, this won't do at all!"

"It's all right," said Maria. "You said I couldn't go into Eduardo's room and I didn't. I threw the can to him and walked down the hall."



"We can't have his door open like that," said her mother. "The germs will get out and infect you. Then you'll be just as sick as Eduardo! His door has to stay closed." And she walked over to Eduardo's room and shut the door.

CHAPTER 3

Eduardo's door was closed, but he still had his can and it was still attached to Maria's can by the string. The string ran under his door.

"Maybe this telephone will work through a closed door," thought Maria. She pulled on the string until it was tight between the two cans. Then she put her can up to her mouth and spoke into it. "Can you hear me?" she asked.

"I can hear you," yelled Eduardo from behind his closed door. "But your voice is very faint and it's not coming through the can. The telephone isn't working."

Maria walked slowly down the hall to Eduardo's room. She stopped in front of the closed door and spoke loudly. "I guess this string telephone doesn't work through closed doors," she said. "Now what are we going to do?"

"I don't know," said Eduardo.

"It isn't fair!" said Maria. "Why did you have to get sick?"

"I didn't want to get sick," said Eduardo. "It isn't my fault!"

Their mother was watching them. "I have an idea," she said. "Why don't you two make a telegraph instead of a telephone?"

"What's a telegraph?" asked Maria. "Is it like those graphs we make at school? The ones with the squiggly lines? I hate those."

"This is different," said her mother. "It's like a telephone, but it will work through closed doors. In fact, it will work anywhere in the house! You'll need some batteries and bulbs and some wire. And, of course, you'll have to learn Morse Code."

"What's she saying?" yelled Eduardo. "I can't hear very well in here."

"She says we should make a telegraph," yelled Maria. "With batteries and bulbs. And we have to learn Morse Code."

"Morse Cold?" said Eduardo. "Is that what I've got?"

"No, no," said his mother. "Morse CODE, not cold! Morse Code can help you and Maria send messages without talking. All you'll have to do is turn a light bulb on and off by connecting it to a battery."

"I know how to do that," said Eduardo from behind his closed door. "We did it in school."

"Do we have to?" asked Maria. "I'd much rather just talk to Eduardo than have to mess with this stupid Morse Code."

"Your telephone won't work through a closed door," her mother reminded her. "So if you want to send messages to your brother you'll have to find another way. It won't be so bad – once you both know Morse Code, it will be like a secret language. You'll be able to send messages that no one else will understand."

"OK," said Maria. "I guess it's worth it. Anyway, there's nothing else to do around here."

"It will be fun," said her mother. "You'll see. You can take the batteries out of your flashlight. I'll get you some holiday bulbs."

"OK," said Maria. She looked a little happier. "But this better work."

She ran to her room and found her flashlight. She took the batteries out of the flashlight. When she got back to Eduardo's room her mother was there. She was holding a holiday bulb and two large spools of electrical wire.

CHAPTER 4

The little bulb had two short wires coming out of it. They were green with copper colored ends. The spools of wire were also green. Maria touched one of the bulb wires to one end of the battery. Then she touched the other wire to the other end of the battery. The bulb lit up.

"I got the bulb to light up!" she told Eduardo through the closed door.

"Great," said Eduardo, "but how are we going to turn that into a telegraph?"

"You'll need a lot of wire," said their mother. "Then you can have the battery far away from the bulb. So when you touch the two wires to the ends of the battery in your room Maria will see the bulb light up no matter how far away she is. Once you have that working, I'll show you how to use Morse Code to send messages."

"I get it," said Maria. "But how do I connect the long wires to the bulb?"

"Simple," said her mother. "You just twist the ends of the wires around each other. It doesn't matter how you do it as long as the ends are touching each other. Here, try it."

Maria twisted one of the wires coming out of the bulb around the wire from one of the spools. Then she twisted the other bulb wire around the wire from the other spool. "There," she said, "I've done it!"

"Now you need to wrap the copper ends of the wires with electrical tape," said her mother. "Luckily, I brought some for you. I knew you would need it." She reached into her pocket and brought out a roll of electrical tape. She handed the tape to Maria. Maria used it to wrap the copper wires.

"Thanks, Mom," she said. "You think of everything!"

"I try to," said her mother. "Right now I have to think of making dinner, so you're on your own!"

"Wait!" said Maria. "Before you go, you've got to give Eduardo the bulb! I'm not allowed to go in there!"

"You're right," said her mother. "I almost forgot." She opened the door to Eduardo's room and walked over to his bed. "How are you feeling?" she asked.

"OK," said Eduardo. "I'll feel better once we get this telegraph thing to work."

"It will work," said his mother. "You'll see. Just hold on to these spools of wire and I'll unroll them so Maria can connect the other ends to the battery.

Eduardo took the bulb from his mother and held it carefully where it connected to the two spools of wire. His mother walked out of his room very carefully, letting the little spools of wire turn so that the wires got longer and longer. When she got to Maria she handed the spools of wire to her. "Here," she said to Maria. "Keep unrolling these wires until they reach all the way down the hall. Then attach them to the battery and Eduardo will see the bulb light up, just the way it did when the wires were short. And you'll have a telegraph!"

Then she went to the kitchen, leaving Maria with a battery, a roll of sticky tape, a pair of scissors, and two spools of wire.

Maria walked slowly down the hall, unrolling the wires behind her. When she got to the end she cut the wires with the scissors and touched the ends of the wires to the two ends of the battery.

"I'm touching the wires to the ends of the battery!" she yelled to Eduardo. "Is the bulb lit?"

"No, it's not!" yelled Eduardo. "Are you sure you're doing it right?"

"Of course I am!" yelled Maria, "It's not very hard. I'm holding them as tightly as I can! This stupid telegraph just doesn't work! I hate this telegraph! I give up!"

"Don't give up!" said Eduardo. "It's lonely in here! I need a telegraph to talk to someone! We've got to make it work!"

"Mom," called Maria. "Help!"

Maria's mother came out of the kitchen. She had an apron on and her hands were white with flour. "What's the problem?" she asked.

"This telegraph doesn't work," said Maria. "The bulb lit up when we connected it to the battery with the short wires, but it doesn't light when we use the long wires."



"Let me take a look," said her mother. "Show me what you're doing to make the bulb light." Maria touched the ends of the long wires to the battery carefully, making sure that they were really touching it.

"I do this, but Eduardo says the bulb doesn't light up," she said. "What's wrong?"

"I see what the problem is," said her mother. "You have it almost right. There's just one little thing you've forgotten to do. Fix that and your telegraph will work perfectly."

"What is it?" asked Maria.

CHAPTER 5

Maria's mother explained the problem.

"You haven't stripped the wires," she said. "You're touching the green part of the wire to the battery, not the copper inside. The green stuff is made of plastic. Plastic is an insulator. It can't carry an electric circuit. You need to touch the copper wire directly to the battery. Copper is a conductor. Electricity can travel through copper and light Eduardo's bulb."

"Oh, I remember now!" said Maria. "We stripped the wires for my science fair project too, but I never understood why."

She ran down the hall to Eduardo's room.

"Eduardo!" she yelled. "Did you hear what Mom said?"

"No," said Eduardo. "I can't hear much through this door. What did she say? Did you fix our telegraph?"

"Not yet," said Maria, "but Mom told me what we were doing wrong. I forgot to strip the wires. We used an insulator instead of a conductor, so we didn't get any electricity."

"Oh," said Eduardo. "I understand. Can you fix it?"

"Sure," said Maria. "I can strip the wires with my scissors. I did it for my science project!"

What is the difference between an insulator and a conductor?

She ran back to where she had left the battery. She picked up the scissors and very carefully cut a ring around the green insulation, about half an inch from the end. Then she pulled on the insulation until it came off both wires. The copper was shiny. She touched one copper wire to the knobby end of the battery and the other to the flat end.



"You did it!" yelled Eduardo from his room. "The bulb is lit!"

Maria disconnected one of the wires.

"Now it went off," yelled Eduardo. "What did you do?"

"I disconnected one of the wires," yelled Maria. "I can make it go on and off. Watch!"

She connected the wire and then immediately disconnected it.

"The bulb just flashed!" yelled Eduardo.

"I know," yelled Maria. "The telegraph is working. Now we have to figure out how to send messages with it. Mom, we need help again! You have to teach us how to use Morse Code."

CHAPTER 6

Maria and her mother were standing just outside the door to Eduardo's room. Her mother was talking loudly so that Eduardo could hear her.

"Morse Code works by turning the bulb on and off," she said.

"We can do that part," said Maria. "All I have to do is connect a wire to turn it on and disconnect it to turn it off. Like this." She held the battery in her left hand and touched the flat end of the battery with one of the long wires that went down the hall to Eduardo's room. With her right hand she touched the knob on the battery with the end of the other long wire. "Now the bulb is on," she said. Then she pulled the wire away from the battery and said, "and now it's off."

"That worked, " said Eduardo from inside his closed room. "I saw the bulb go on and off. But I need a battery too. And Maria has to have a bulb. Otherwise I can't send her messages."

"That's OK," said his mother. "We have another bulb and battery and there's plenty of wire. We can make you a telegraph, too."

"Cool!" said Eduardo. "But I don't understand how this code thing works."

"Morse Code works with dots and dashes," said his mother. "A dot is when you turn the bulb on for just a short time. A dash is when you turn it on for a longer time. Maria, try to make a dot."

Maria touched the wire to the battery and then immediately pulled it away.

"That was a dot!" said Eduardo.

"Now make a dash," said her mother.

She touched the battery with the wire and held it there for a longer time.

Eduardo said, "That was a dash!"

"That's right!" said his mother. "Now you have to combine dots and dashes to make letters."

"How does that work?" asked Maria.

"Each letter is a certain number of dots and dashes," said her mother. "For example, E is a dot, T is a dash, A is a dot followed by a dash, I is two dots, and so on. You pause between each letter and you pause longer at the ends of words."

"How are we ever going to remember all that?" asked Maria.

"You're not," said her mother. "I've written it all out for you on this piece of paper. There are two copies: one for you and one for Eduardo. After a while you'll both know the code by heart, but at first you'll use your tables to remember it. Here's what the Morse code looks like. Remember, the dots stand for short pulses of light and the dashes stand for long ones." She handed a piece of paper to Maria. This is what it looked like:

Morse Code Alphabet					
The International Morse Code characters					
A	· _	N	_ ·	0	— — — — —
B	_ · · ·	O	— — —	1	· — — — —
C	_ · _ ·	P	· — — ·	2	· · — — —
D	_ · ·	Q	— · _ —	3	· · · — —
E	·	R	· _ ·	4	· · · · —
F	· · _ ·	S	· · ·	5	· · · · ·
G	_ — ·	T	—	6	— · · · ·
H	· · · ·	U	· · —	7	— — · · ·
I	· ·	V	· · · —	8	— — — · ·
J	· — — — —	W	· — —	9	— — — — ·
K	_ · —	X	_ · · —	Period	· — — — —
L	· — · ·	Y	— · — —	Comma	— — · · — —
M	_ — —	Z	_ — · ·	Question	· · — — · ·

"I get it!" said Maria. "Eduardo, I'm sending you a message!"

"Wait a minute!" said her mother. "I've got to give him his copy of the code." She went into Eduardo's room, gave him the other piece of paper with the Morse Code on it, and came out again."



THE END

Draw a diagram of the telegraph circuit that Maria and Eduardo used.