THE BARTON SERIES

BARTON'S

CHOICES
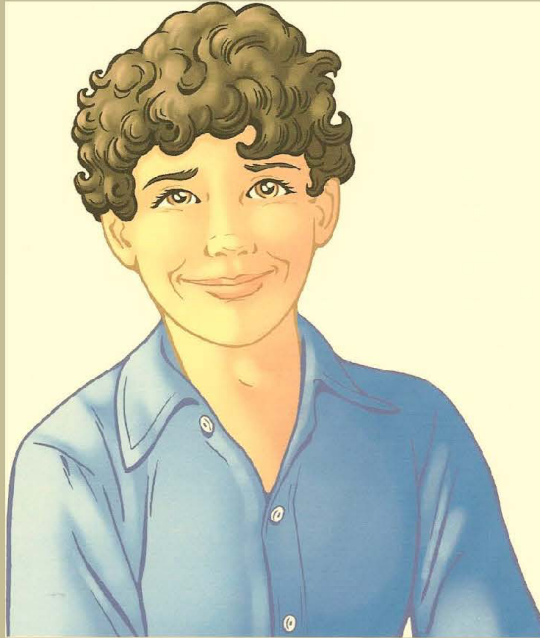
BY

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(Ages 8 and over)

BARTON'S CHOICES

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The Proportion

The fierce August sun shone mercilessly upon the already-parched ground. Fleecy white clouds speckled a sky of deepest azure blue and shady old trees, who still kept most of their leaves, cast velvety shadows upon the once green grass. Scattered around were patches of brown grass and shrubs, transformed from green to brown as they thirsted. Though the occasional wind would offer some minimal comfort, both plant and animal waited agonisingly for the promised rains to descend.
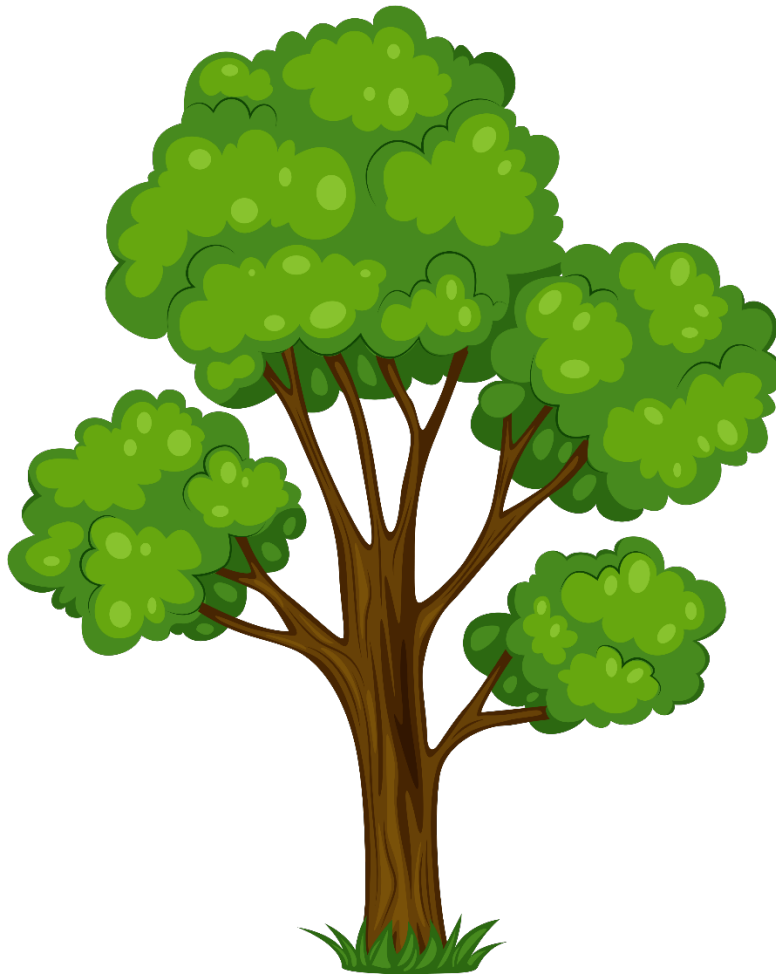
Barton cycled carefully along the roadway, still enjoying the day. He kept a bottle of water in a small basket that was affixed in front of the handlebars of

his cycle. With the bottle within easy reach, Barton would occasionally quench his thirst, even without dismounting.

Barton could see some passers-by fanning themselves. Some could be seen mopping their foreheads and wiping their faces. A few would even interrupt their journey by pausing for a brief rest under a shady tree.

As Barton rode on, he saw something rather interesting in the distance. He pulled alongside to view what appeared to be a small business.

Two little boys sat on a bench behind a small table. A sign was written with crayons on a sheet of white cardboard. It read:

COLD REFRESHING LEMONADE

50 CENTS PER CUP

On the table lay a single jug of freshly-made lemonade. Some cups were neatly stacked at the side. Cubes of ice floated about in the mixture, which was given a little stir before one of the boys would pour a cupful for some delighted patron. Some of the customers even had a second cup and the small proprietors seemed to be enjoying some handsome takes from the lively and profitable business.

Barton leaned his bike against a tree at the side of the road and sought from his pockets the fee that permitted a cupful. As he held his cup to his lips and drank, a few other customers joined him. Then, seeming quite satisfied after appeasing their thirst, they went off on their respective ways. Barton, though, waited and observed. He was curious, one of his great weaknesses.

Barton marvelled at the efficiency of the two boys as they shared the job's responsibility. One of them poured the drinks into the cups. Then, carefully and politely he would hand it to the customer. The other boy collected the fee and

returned the necessary change if need be. Barton looked around as he heard a rustling sound a short distance from the lemonade stand.

Close to the back of where the boys stood and under a small tree which offered adequate shade was a girl, a bit shorter and younger than the boys. She hardly looked up either at the on-going business proceedings or at Barton, as he slowly drank from his cup of refreshing drink.

"This is definitely great lemonade," said Barton to the boys.

The two boys nodded in agreement.

"It is very tasty. It seems to have the correct amount of lemon juice, the correct amount of sugar and perhaps a dash of some special ingredient that is your business secret," added Barton.

The two boys smiled at the compliment. They had been complimented about their tasty lemonade quite often that morning, but hearing it again was always welcome.

"My sister has perfected the mixture," said one of the boys, pointing to the little girl.

"She makes one jug at a time. It is enough to fill exactly six cups," he said.

The little girl seemed quite occupied, as she squeezed lemons, then, poured the juice into a jug of water. Then she carefully measured a quantity of sugar and a few other ingredients to create the final mixture. The boys would fetch a filled jug when their own was empty, returning the empty jug to her for refilling. The procedure was being repeated often as the bountiful sales continued. Barton smiled at the little workers and then a question arose in his mind.

"You seem to have a thriving little business here," said Barton to the boys. "But why doesn't your sister mix a larger amount than one jug at a time? In so doing, she would save a lot of time and effort."

The two boys looked at each other and then one of the girl's brothers whispered to Barton.

"My sister knows the correct amount of each item to be used for the mixing of one jug of lemonade," he said. "She does not know the amount that can be used for mixing a larger amount, say, as for a full pail. We have a large pail available, but 'sis' is not able to calculate the number of lemons to squeeze for a pail full of lemonade and the amount of sugar needed, as well as the amount of the other special secret ingredients."

"We can't figure it out either," added the other boy. "So we are working with only one jug at a time. It is not too bad, though."

The two boys looked at Barton as if they were expecting a solution to this problem.

"Couldn't you calculate the correct proportion for her?" asked Barton.

Both boys looked bewildered.

"What is the meaning of proportion?" they asked almost together.

Barton smiled and patted them on the shoulder.

"I could help her if you wish," suggested Barton, as the boys tended to two new customers.

"Would you, please?" they asked Barton. "It would save all three of us a lot of time and 'sis' would get a rest as well."

The little girl was listening to the conversation among Barton and the two boys. She welcomed him as he walked across to her. Though she looked a bit tired, she was quite pleasant. She explained to Barton about the recipe used for their special blend of lemonade. She spoke about the amount of each item that was used in the making of one jug of the product.

"Well," said Barton, "do you know your tables and can you multiply?"

"I do and I can," was the quick reply from the girl. "But what does that have to do with the mixing of lemonade in a large pail?"

The two boys looked on, anxious to hear Barton's reply and a possible solution from him.

"First of all," said Barton, "bring the clean, large pail that you have available and we shall mix up a large full pail of lemonade all at one time. It shall have the correct amount of each ingredient and shall taste the same."

"I don't want to waste the ingredients with substandard lemonade," the girl warned Barton.

"You won't," assured Barton.

"Are you sure it shall taste the same?" the little girl asked fearfully.

"We shall use the simple mathematics of proportion to ensure that it does," replied Barton.

The little girl brought the large red pail and placed it in front of Barton.

"Now," said Barton, "listen carefully and observe well, so that you may clearly understand all the steps."

The girl stood close to Barton and the boys listened from where they stood, as they still attended to one or two visiting clients. Luckily they had enough lemonade in a full jug for the servings.

"Let us, first of all, fill the large pail with water by using the jug. Meanwhile, you are noting carefully the number of filled jugs that are required to do so."

The girl did so and soon announced that the pail required eight filled jugs of water.

"What are the amounts of each ingredient that you use in each jug of lemonade?" asked Barton.

"I use (i) the juice obtained from 3 lemons

 (ii) 5 spoons of sugar

(iii) ½ spoonful of salt

The girl paused and pointed to two bottles placed nearby.

"I shall call the first bottle A and the second bottle B," she said.

Barton nodded as the little girl continued.

"I add 1 spoonful of the contents of bottle A and finally I add 2 spoonfuls of the contents of bottle B."

"Now," said Barton, "the pail contains 8 times the amount of water as in one jug."

The girl nodded and the two boys listened.

"We shall now need to add 8 times the amount of each ingredient that you used for one jug to complete the mixture in the pail. This is said to be the correct proportion. The volume of lemonade is now eight times the amount as that of one full jug and so the new amount of ingredients that will be required must now be eight times the amount that was needed for one full jug."

The three children all seemed to follow the reasoning of the older boy and the little girl set to work.

The little girl spoke to herself as she prepared for the mixing of the larger batch of lemonade.

"I shall require the juice from 3 x 8 = 24 lemons, 5 x 8 = 40 spoonsful of sugar, ½ x 8 = 4 spoonsful of salt, 1 x 8 = 8 spoonsful of the item from bottle A and 2 x 8 = 16 spoonsful of the item from bottle B."

"That is excellent mathematics," said Barton.

He looked on at the little girl as she carefully squeezed the lemons and measured the correct amount of each of the required additional ingredients. She had already placed eight full jugs of water in the pail. Then, the little girl slowly added each of the separate ingredients and stirred the mixture. She looked both anxious and slightly worried.

As the little girl became finished, she wiped her brow upon her apron and without saying a word to anyone, poured herself a small cupful. The two boys

looked on eagerly as she slowly sipped from her cup. Much to their excitement, a broad smile came across her face. The girl looked up at the boys and then at Barton.

"It tastes the same," she said. "This is fantastic," the little girl added.

"Did you see your 8 times tables at work?" asked Barton to the three business workers of the small company.

"We most certainly did," they replied. "Proportion simply requires the operation of multiplication."

"If we wanted to make a total volume of 10 filled jugs, then we ought to multiply the amount of the ingredients required for one filled jug by 10," said one of the boys.

Barton agreed with their reasoning as he mounted his bicycle.

"Barton," shouted the little girl, as he was just about to pedal off.

"If I wanted to make only a half-filled jug, won't I have to take one-half of the quantities of each ingredient required for one full jug?" she asked.

"And what shall that be?" asked Barton.

"I shall need the juice from 1 ½ lemons, 2 ½ spoonsful of sugar, a ¼ spoonful of salt, a ½ spoonful of the item from the bottle A, and finally 1 spoonful of the item from the bottle B. This will be enough to give me 3 cups of lemonade."

Barton laughed with the small group as he slowly cycled off homewards.

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