

THE BARTON SERIES

# ESPECIALLY BARTON



BY

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(Ages 8 and over)

# ESPECIALLY BARTON

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## A Call To The Bar

Miss had given the class a long talk about the importance of statistics in the business world. She gave them a simple, yet informative reason for the importance of statistics in the fields of business, medicine, and sports. She spoke about statistics in the predictions of important and useful events and outcomes all over the world.

The class was utterly dumbstruck. Their young minds were acquainted with simple mean and mode calculations. They had learned to tabulate data and tally the results. More so, they had recently become knowledgeable about the displaying of data on a pie chart. However, they never knew or realised how dependent the productive world was on the branch of mathematics called statistics.

This lesson from Miss added a new dimension to their appreciation of mathematics and its impact on the great, blue planet. They had always been told that mathematics ranked high on the list one of man's greatest cultural achievements.

Today Miss was going to show her class about displaying the results of an experiment or test or survey that was conducted on a bar graph or a bar chart.

Miss decided to take the results obtained from a simple test that she had with the class.

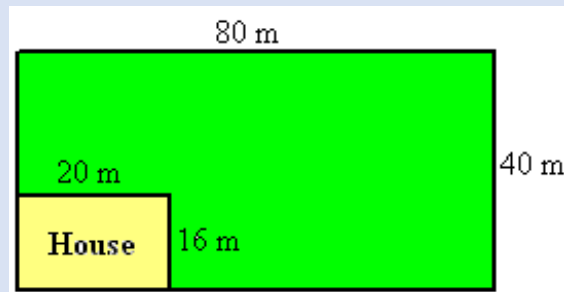
Miss would give a mathematics test consisting of only five questions and then she would note the number of correct answers at the end of the test. She would then display the results on a new type of diagram called a bar chart.

The class quickly got prepared for Miss' questioning. Regardless of their results, they all enjoyed these small tests. Miss always inspired the lesser achievers to attain greater heights and the greater achievers on the importance and skills necessary for the maintaining of excellence. She always

coaxed and encouraged her students to do their best at all times and she was always happy when they did so.

Miss placed five questions, one at a time, on the board. She allowed the candidates an average of five minutes to do each one. The questions were:

### QUESTION 1



**A house measures 20 m by 16 m and occupies a portion of a parcel of land which measures 80 m by 40 m. What fraction of the land is unoccupied?**

### QUESTION 2



**A set of three bottles, of different sizes, have a capacity of 2 litres,  $1\frac{1}{2}$  litres and 1 litre each. How many sets of these bottles can be filled with water from a filled tank that holds 36 litres?**

### QUESTION 3

**The mean of three numbers is 15. Two more numbers are added to these numbers and the new mean is 10. What is the sum of these two numbers?**

#### QUESTION 4

A circular track has a radius of 287 m. What is the distance covered, if a runner runs around it twice?

#### QUESTION 5

A car covers a distance of 1 km in 2 minutes. What is the average speed in metres per second?

Miss then proceeded to obtain the solution to each question and the class saw the results.

Question	Answer
1	9/10
2	8
3	5
4	3608 metres
5	$8\frac{1}{3}$ metres per second

Each student computed their total number of correct answers and a tally of the students' scores was drawn up on the board. The incomplete table is shown below.

“Complete the table,” Miss requested, as a further exercise to her students, though it would carry no additional marks.

Number of Correct Answers	Number of Students	Total
0		1
1		3
2		?
3	+++	?
4	?	15
5	?	?
<b>TOTAL</b>		<b>36</b>

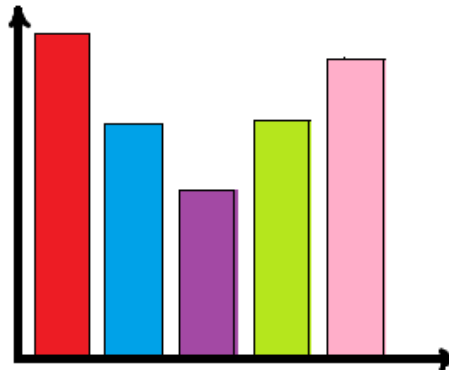
The table was quickly and correctly completed by all the students. They found no difficulty in the simple exercise of tallying the results. They loved to tally a set of results.

Number of Correct Answers	Number of Students	Total
0		1
1		3
2		2
3	+++	7
4	+++ + + + + +	15
5	+++ -	8
<b>TOTAL</b>		<b>36</b>

The class, along with Miss, checked over the table of values. This was to ensure that the tabulated data was statistically sound and no errors were made.

Always make assurance doubly sure, was one of Miss' teaching policy and regular practice.

Miss then decided to show the class how such results can be demonstrated on a bar chart. The class was most attentive as she began her explanation along with the instructions.



First, we draw a horizontal line and a vertical line to meet at a single point. They must be drawn to meet at right angles, she advised.

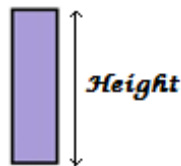


“These lines are now referred to as the horizontal axis and the vertical axis of the bar graph,” she explained, as the students wrote in their notebooks.

The class followed her instructions and did this on a clean grid page.

Miss continued to explain that each item of the result is to be represented by a rectangular bar and hence the reason why its name is a bar chart or bar graph.

“The height of the bar represents the number of times that the event occurred. For example, if the number of times that the score of 0 occurred was 1, then the height of the rectangular bar must be 1 unit,” said Miss.



Miss paused briefly to ensure that the lesson was being well understood and then she continued.

“Notice that the number of times that 1 occurred was 3,” said Miss. “Hence, the height of the rectangular bar that would represent this portion of the data must be 3 units long or high.”

Then, Miss asked the class if they could remember the name given to the ‘number of occurrences of an event,’ such as 0 questions correct, occurring 1 time, 1 question correct, occurring 3 times, and so on.

The class members were quick to shout out the correct answer of ‘frequency.’ Miss looked quite pleased and confirmed their correctness with soundless applause. She continued to explain that the tallest bar would correspond to the item with the highest frequency.

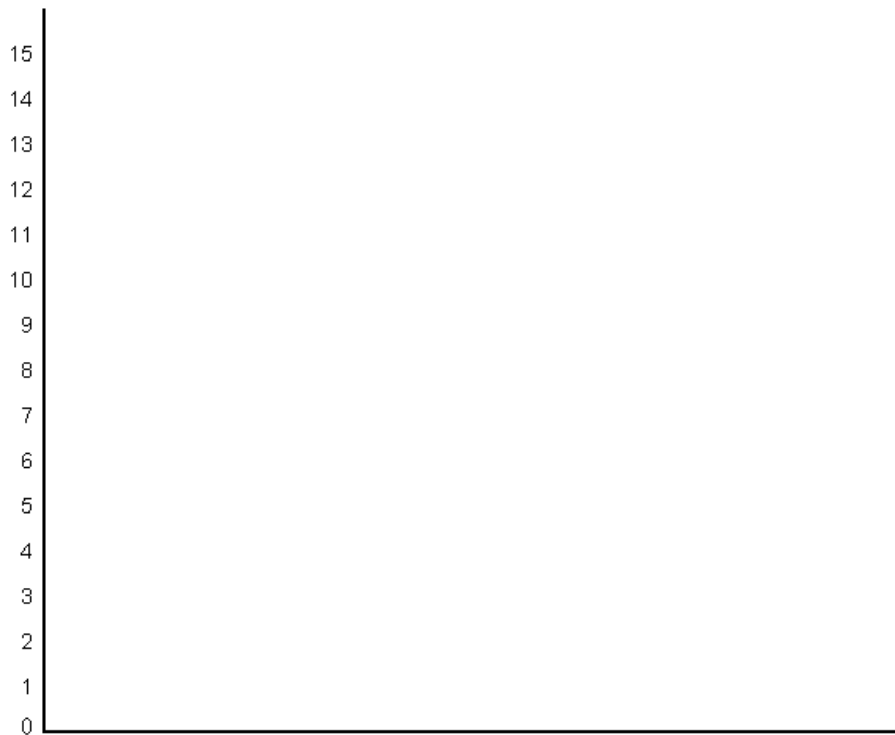
The greatest frequency, seen on the table, was 15 and so the rectangle with the greatest height would be 15. Miss suggested that the vertical axis should be measured off in units with their ruler. However, the calibrated grid paper minimises the effort and allows the checking to be done rather quickly.



“If you have just plain paper, you may use the ruler and a convenient scale to mark off values, counting from the lowest point,” she advised.

The class followed easily these instructions, as Miss demonstrated the procedure on the board. The class thought that a good scale was 1 cm being equivalent to 1 unit. Miss advised that they could use any scale they wished, but to ensure that the diagram does not fall outside the page.

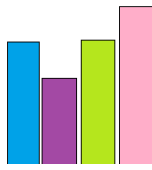
“The item to seek is the one with the highest frequency and to ensure that this value is catered for on the vertical axis,” she advised.



“In the example which we are working on, the highest value was 15 as 15 students got 4 correct answers. The vertical axis need not be graduated beyond 15,” she said, as she looked at the efforts of her wards.

The class clearly understood the reason for this.

Miss then explained, with a gasp of surprise among the class members, that the width of all the rectangular bars of a bar chart is to be entirely their choice.

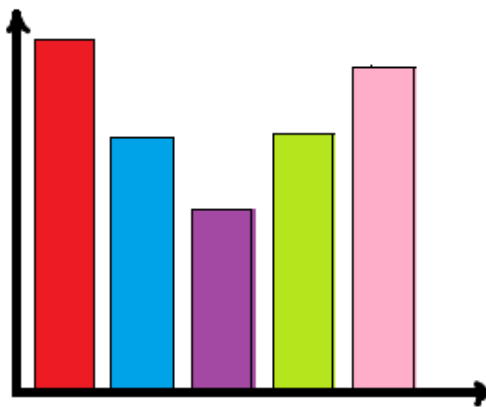


“However, each of the bars must have the same width,” she quickly added.

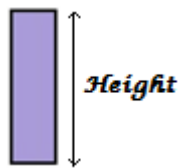
“We must also choose a width so that all the bars can fit on the horizontal axis and the bars must be spaced. Also, the first bar must be drawn away from the vertical axis.”

The students wrote quickly, not wanting to miss any of the valuable information on bar charts or bar graphs.

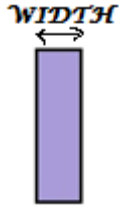
“Again,” Miss informed her class, “the distance that the first bar is drawn, from the vertical axis, should also be the distance between the successive bars.”



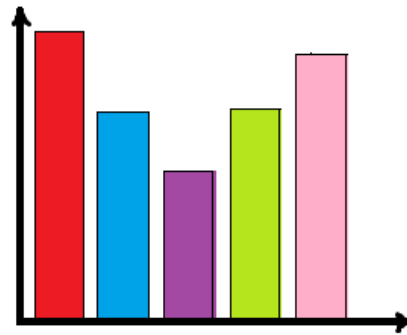
Miss wrote down some rules for the drawing of bar graphs:



- The height of the bar represents the frequency of the event, which is the number of times the event occurred. In this example, this is the number of students getting that particular score.**



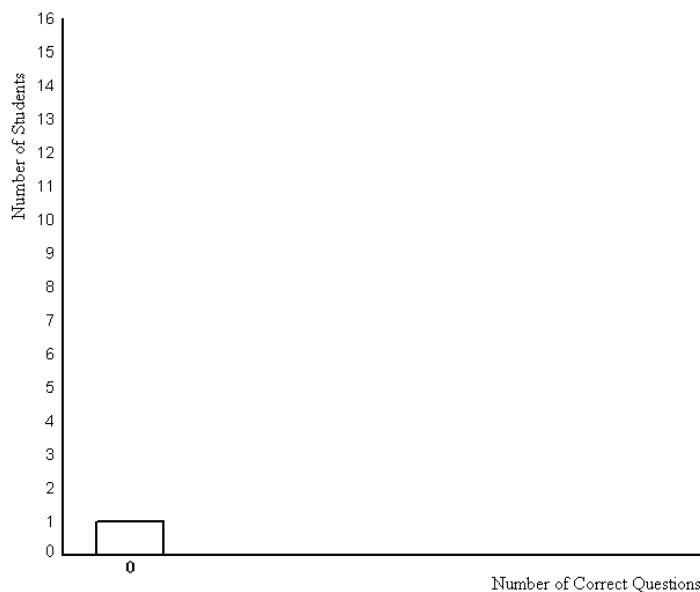
2. The width of the bar is to be our choice and these must remain the same for all bars. Care must be made when making this choice, to ensure that the completed bars all fit along the horizontal axis.



3. All bars must be equally spaced with this same space separating the first bar from the vertical axis.

The class members each chose a convenient space from the vertical axis and each chose their width for the rectangular bar.

They all drew their first bar, following along with Miss, who demonstrated the procedure on the board.



Miss advised the class to label or name the axes. This meant that they should write the name of the item that is being represented on each axis.

The class members loved to work on mathematics topics involving the drawing or creating of diagrams. The present exercise was one in which such skills were activated.

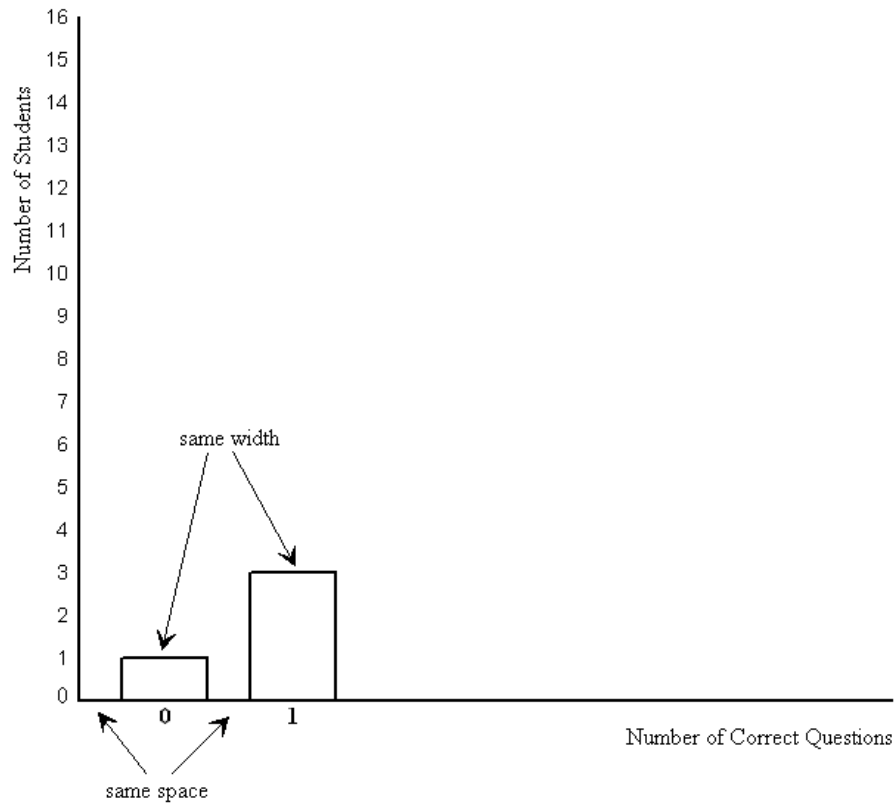
Also, just below the horizontal axis and the middle of the bar, Miss advised that they ought to write the item which the bar represents.

“For example,” she said, “under the first bar they ought to write 0, to indicate that 0 questions were answered correctly. The class was anxious to draw and label the second bar. They carefully checked the space between the vertical axis and the start of the first bar and ensured that it was the same as the space between the end of the first and the start of the second bar. They ensured that the width of the second bar was the same as the first bar.

“This is fun,” whispered Barton to Shanna.

But, the little girl was so engrossed in her drawing, that Barton’s words fell on deaf ears and there was no response.

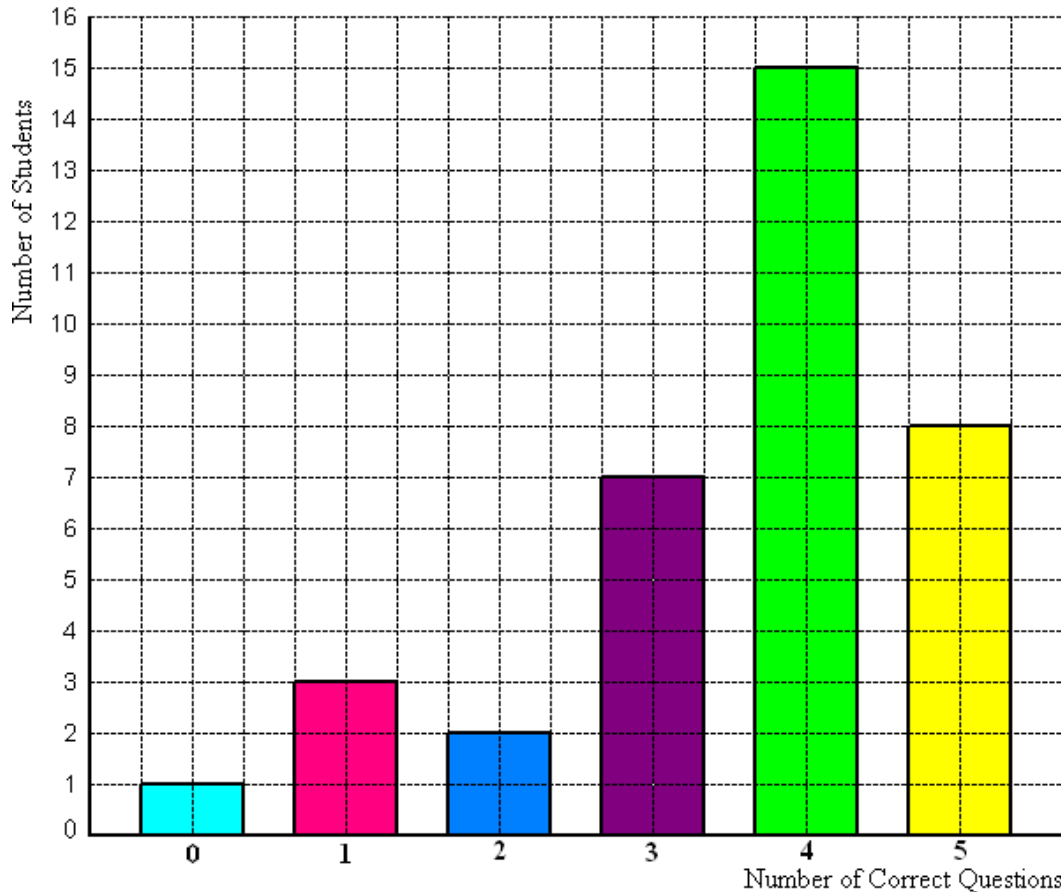
The class, meanwhile, realised that this would be easier to check if the bar chart was being drawn on squared paper or a grid.



The procedure was carried out for the completion of all the rest of the bars, to illustrate the entire data. It was altogether a beautiful diagram when completed. Miss was pleased with the fine efforts of her students.

She walked along the aisles, checking the diagrams that were being drawn, and praising their constructions.

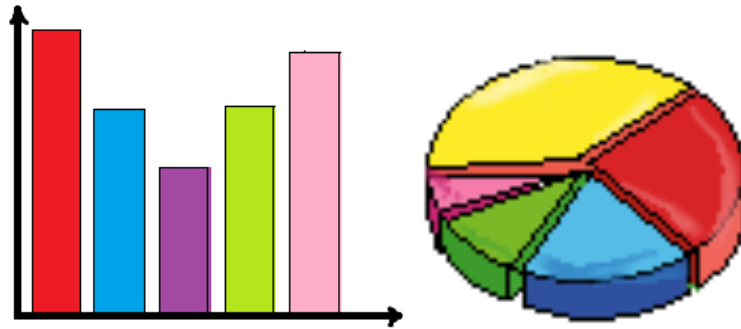
Their complete bar graphs looked like this:



Miss told the class that they were now able to read off information on a bar chart and also able to draw their bar charts as well. The class thought that the drawing of a bar chart was fun, especially when Miss told them that they can proceed to colour the various bars in different colours if they so wished.

Barton thought that he might draw a bar chart of how Mr Albernatty had divided his garden for the planting of various crops.

But, as Barton left for home, his active and creative mind began to wander. What, thought Barton, is the advantage, if any, of expressing data on a bar chart as opposed to a pie chart?



He thought about another interesting case. What is to be drawn when the frequency or number of occurrences of an event is 0? Then, he thought, the height of the bar would be 0. I wonder, he pondered, how this would look? Maybe it would remain a horizontal line along the horizontal axis.