THE BARTON SERIES

BARTON DOES HIS BIT

BY

DR FAYAD W. ALI

(Ages 8 and over)

DEDICATION

The author wishes to dedicate this book to

Zorina Ramrattan

ACKNOWLEDGEMENTS

The author wishes to express his deepest gratitude to all who helped him in any way or form towards the completion of this book.

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Dr. Shereen A. Khan served as an advisor in creating the Barton Series. May I embrace this opportunity to especially thank Dr. Khan for the valuable suggestions, contributions and recommendations which she offered to me during the writing of these books.

Pictures for LITTLE BARTON were sourced by Anisa Baksh.

The Barton Series was edited by Sally Sooknanan.

BARTON DOES HIS BIT

The set of **BARTON** stories is an attempt to reach all children, through the creation of a character, who best epitomises the enacted school curriculum. Barton is a curious, well-mannered individual and represents an ideal child who is moulded by all the intended learning experiences of school. The entire curriculum is supposed to transform individuals into a character, just like the boy Barton.

BARTON DOES HIS BIT targets the child at the middle and upper level of the primary school. At this level, the child would have mastered some of the mathematics content expected at the primary level and the problems emphasise the process goals of mathematics, rather than a wide range of content. This set of stories focuses on building model personality characteristics and close relationships with family, friends, and the society.

The stories use an approach to learning that not only integrates all areas of the curriculum but merges two essential areas, mathematics and language arts. The emphasis on building literacy skills is deliberate since comprehension is a key area needed for developing an understanding of mathematics.

Too often, mathematics has been presented as a set of rules and procedures, to be applied in situations that have no bearing on reality. In these stories, the problems are practical and useful and can serve to whet the child's appetite into learning the subject outside the constraints of rules and formulae. The stories appeal to the child's intuitive and imaginative tendencies and encourage the use of strategic and critical thinking, in a context that is meaningful and relevant. These reasoning processes are developed through reading for a purpose - to solve a problem.

It is hoped that through these stories, students will learn not just to be creative and critical problem solvers, but to acquire good habits and become caring and productive citizens. The stories are laden with sound moral, social and ethical values and teachers

3

may take the opportunity to encourage discussion on the consequences of certain actions, or what other alternatives are possible. They may also use the stories as stimulus material that can be further reinforced in other areas of the curriculum.

For the more mature student, small group work is recommended whereby discussion is limited to a few students and this can be followed by the sharing of ideas from each group, in whole-class settings.

Fayad W. Ali & Shereen A. Khan

GUIDE FOR TEACHERS

The **Barton Series** was written with the intention of enriching the primary school curriculum. Teachers can use the book in the following ways:

1. To motivate students to read.

Children will learn mathematics through stories in which they have to extract information and extend their imagination, and so learn to read with a purpose. Visuals are also provided to appeal to several of the child's senses as well as to provide entertainment.

2. To develop skills in vocabulary, word study, phonics, and spelling.

Students will encounter new and challenging words as they read the stories and teachers can use this opportunity to teach phonetic sounds and build vocabulary in relation to mathematics as well as other areas of the curriculum.

3. To teach comprehension skills in mathematics and language arts.

Teachers can create questions about each story, to test students' comprehension skills. These questions can be based on the mathematics content in the story or developing the students' literacy skills. The following are suggested activities for developing comprehension skills.

5

Mathematical Comprehension	Language Comprehension
Recall of mathematical facts.	Recall of events in the story.
Extract specific details in the story that are critical to the solution of the problem.	Extract specific details in the story that relate to the characters, settings or events.
Explain the strategies used to solve the problems.	Explain the events in a given sequence.
Making predictions on the solutions and comparing these with peers and verifying solutions.	Making and comparing predictions and making inferences as to what will happen in the next story.
Checking for reasonableness of answers.	Discussing the consequences of certain actions.
Writing explanations or statements to represent mathematical ideas presented.	Writing explanations of events using different genres.
Drawing schematic diagrams to represent information when solving problems.	Drawing characters to show their dispositions in the story.

4. To present mathematics using authentic situations

The stories provide opportunities to enrich student understanding of the content through experiences that they encounter in real life. Children will have the opportunity to experience mathematics as a tool to solve problems. Teachers should examine the stories and select one that is appropriate for their intended topic. Next, ensure that pupils have the necessary previous knowledge by constructing practice exercises to review the content needed. Teachers should allow sufficient time for problem-solving through group work and student explanations.

5. To allow for the integration of subjects with mathematics in the primary school curriculum.

6

There are numerous opportunities for incorporating the various curriculum areas in the teaching of matematics. For example, teachers can allow students to draw or dramatise situations to demonstrate their own interpretations of the plot, thus incorporating the Visual and Performing Arts. Some stories have a subject-specific focus incorporating curriculum areas such as Character Education, Morals, Values, and Family Education. These can be used as introductory lessons in a unit. Other stories may center around a particular theme and provide opportunities for incorporating different models of integration in the curriculum.

6. Provide stimulus material for teaching values through situations that are realistic, age- appropriate and easy to enact.

The stories can be used to generate class discussions and so provide opportunities for value clarification without the teacher having to impose personal values. Some of the stories are strong on a particular set of core values, and the teacher may select a story to match a particular theme or topic that is relevant to student needs.

Fayad W. Ali & Shereen A. Khan

7

TABLE OF CONTENTS

STORY   PAGE

"Well," continued Miss   one morning in class, "it is the great merging, the important blending, the complementing relationship between literacy and numeracy, that is one of the most important keys to unlocking the mastering of mathematics."

As usual, Miss' pupils were spellbound with her talk. They loved it when Miss spoke like this.

"In mathematics," said Miss, "the correct method for problem-solving remains unaltered throughout the ages. We must first read, then comprehend the data and finally, based on the question, plan and outline the course of our solution, carefully choosing the sequence of the mathematical operations."

Miss continued amidst the silence of her 'young wards.'

"Then, with our skill of language and computation, we present our solution in the same sequence as our solution had been thought.

"Let us take a simple example," continued Miss. "Let us read a question, deduce all the necessary information, plan our course of the solution and then let us present our work in a manner that is masterly."

The class looked on as Miss wrote out a mathematics question.

Question:

A vehicle can cover a distance of 12 kilometres on one litre of fuel which costs \$6.70. What is the expected distance that can be covered with a tank of fuel which costs \$56.95?

Let us first examine the question and formulate our plan," began Miss as she listed the sequence of her reasoning.

(i) The vehicle covers 12 km on 1 litre of fuel.

9

(ii) Hence, to obtain the distance that can be expected, we need to know how many litres of fuel are available.

(iii) We know the price per litre or the unit price and also the total cost of the fuel in the tank.

From this information, we can now obtain the number of litres of fuel in the tank.

Therefore, we start with the plan that was thought off in (iii), which is to obtain the result of step (ii) and then we use the result from (ii) to give us the required result of step (i).

Let us now place the solution in the same order as this plan that we have formulated.

Solution:

The cost of fuel in the tank is $56.95

Cost of fuel per litre is $6.70

Therefore the number of litres of fuel in the tank

10

$$= \frac{\$56.95}{\$6.70} \text{ litres}$$

= 8.5 litres

The distance that can be covered on 1 litre of fuel is 12 km.

Therefore the distance, that can be covered with 8.5 litres

= 12 x 8.5 km

=102 km

Answer: <u>102 km</u>

The class was most impressed with the clarity of thought that was laid out for the solution, but more so with the sequencing of the solution plan and the actual presentation of the solution.

"A mathematics question, though, must be written and should never leave one to wonder or to assume anything that is pertinent to the calculations involved in the question," emphasised Miss.

"Mathematics is an exact science and it must be exemplified in the manner of questioning as well as in the answering and so at all times," Miss added.

"In fact," said Miss, "I have an idea; I shall place six questions on the board. You will all solve them, presenting your answer in a similar manner, showing the proper sequence of thought and computation. Then you may identify, if any, flaws that you recognise in the wording of the question itself."
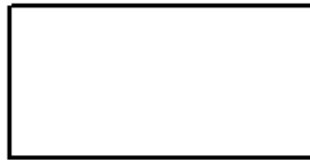
Barton, as usual, was ready to do his bit. Armed with pencil and paper he waited for the questions to be placed on the whiteboard.

Miss wrote:

11

Question 1

What is the size of the angle between the two hands of a clock which shows the time of 3 o'clock?

Question 2

State the number of axes of symmetry in the figure shown above.

Question 3

At a sale, a discount of 15% is given on the original price of all items. What does a customer pay for an item priced at $600?

Question 4

Mr Toby rises at 6 a.m. and takes one- half of an hour to dress and have breakfast. If the time taken to drive to work is ¾ of an hour, at what time does Mr Toby arrive at work?

Question 5

Majorie borrowed $12000 from an institution and agreed to repay the loan at 8 % per annum simple interest over two years. Calculate the monthly installments.

Question 6

In a test of 10 questions, Anaah is awarded 3 marks for a correct answer and has 1 mark deducted for an incorrect answer. How many correct answers did Anaah get if her final score was 18 marks?

Barton decided to write the solution to each question and then list his comments after each one of them.

12

Question 1

What is the size of the angle between the two hands of a clock which shows the time at 3 o'clock?

Solution:

The hands of the clock will be pointed, one at 12, and the other at 3. The angle between the two hands, counted clockwise is 90^0, since it is ¼ of a complete turn of 360^0.
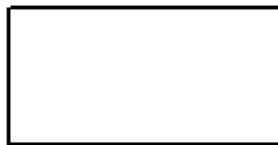
Answer: 90^0

Comments:

The angle, if counted counter-clockwise, is 270^0. The question, therefore, could have two solutions.
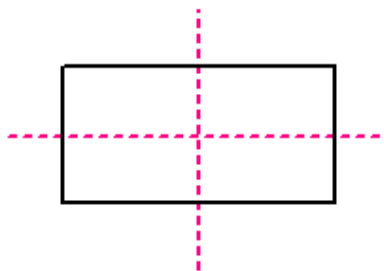
The question should be specific and state which of these two angles was required. Was it to be the smaller or acute angle of 90^0 or the larger or reflex angle of 270^0?

Question 2

State the number of axes of symmetry in the figure shown above.

Solution:

The above diagram shows the two axes of symmetry of the given figure.

Answer: 2

13

Comments:

The question did not indicate that the figure is a rectangle. It could have been an ordinary quadrilateral with unequal sides, for example, and which would have had no axes of symmetry. We assumed that the figure is a rectangle based on 'how it looks' which is not good mathematical practice.

The question should have instead said:

State the number of axes of symmetry in the rectangle shown above.

Question 3

At a sale, a discount of 15% is given on the original price of all items. What does a customer pay for an item priced at $600?

Solution:

The marked price of the item = $600

Percentage discount = 15%

$$\text{Discount} = \frac{15}{100} \times \$600$$

$$= \$90$$

Therefore the customer pays $600 - $90 = $510

Answer: $510

Comment:
The marked price of the item may already include the discount. The items could have been already discounted by 15% from their original price and then the sales price marked.

The question would be mathematically correct, leaving no room for doubt, by replacing the word 'original' by the word 'marked,' so as to read:

14

At a sale, a discount of 15% is given on the marked price of all items. What does a customer pay for an item marked at $600?

In its original form, the answer of $600 could arguably have been the correct answer.

Question 4

Mr Toby rises at 6 am and takes ½ hour to dress and have his breakfast.

If the time taken to drive to work is three-quarters of an hour, what time does Mr Toby arrive at work?

Solution:

Time of rising   6:00

Time taken for dressing and breakfast   : 30 +

Time taken to drive to work   : 45

Time of arrival at work   7:15

Answer: <u>7:15 a.m</u>

Comments:

The question did not indicate that Mr Toby left for work immediately after dressing and having breakfast. This had to be assumed. If there was a period between his dressing and completion of breakfast and his departure for work, the arrival time of 7:15 would not be correct. It would have been later.

Question 5

Marjorie borrowed $12000 from an institution and agrees to repay at 8 % simple interest over two years. Calculate the monthly installments.

Solution:

Principal borrowed = $12 000

Simple interest to be paid at 8 % per annum over 2 years

15

$$= \frac{\$12\,000 \times 8 \times 2}{100}$$

= $ 1 920

Total to be repaid = Principal borrowed + Interest acquired

$$=\$ 12\,000 + \$ 1\,920$$

$$= \$ 13\,920$$

Monthly installment = $\dfrac{\$13\,920}{24}$

$$= \$580$$

Answer: $580

Comments:

The question ought to have said that the monthly installments were equal. Installments of any kind may not necessarily be equal.

Question 6
In a test consisting of 10 questions, a candidate is awarded 3 marks for a correct answer and has a 1 mark deducted for an incorrect answer. How many correct answers did Anaah get if her score was 18 marks?

Solution:

Trying different sets of possible outcomes would lead to:

7 correct answers will be awarded 7 x 3 = 21 marks

3 incorrect answers will result in a deduction of 3x1 = 3 marks

Total marks then received = 21 – 3

$$= 18$$

Answer: 7

16

Page 16 of 17

Comment:

The solution is based on the assumption that all the questions were answered.

The question should have indicated whether or not there is a penalty for an unanswered question. In the latter case, the person could have answered, for example, 6 correct questions and omitted 4 questions, to still obtain the same score.

Young Barton A. Sandiford submitted his work to Miss and walked slowly back to his desk.

He imagined himself as a great architect who was called in by the authorities to pinpoint any possible flaws in the building plans of a giant skyscraper. He would carefully observe the plans and discover all the existing problems that went undetected by the junior designers and architects.

Then he, Barton A. Sandiford, senior architect, would set about correcting the flaws before any construction could commence. The building would then have no imperfections and many thanks would be bestowed unto him.