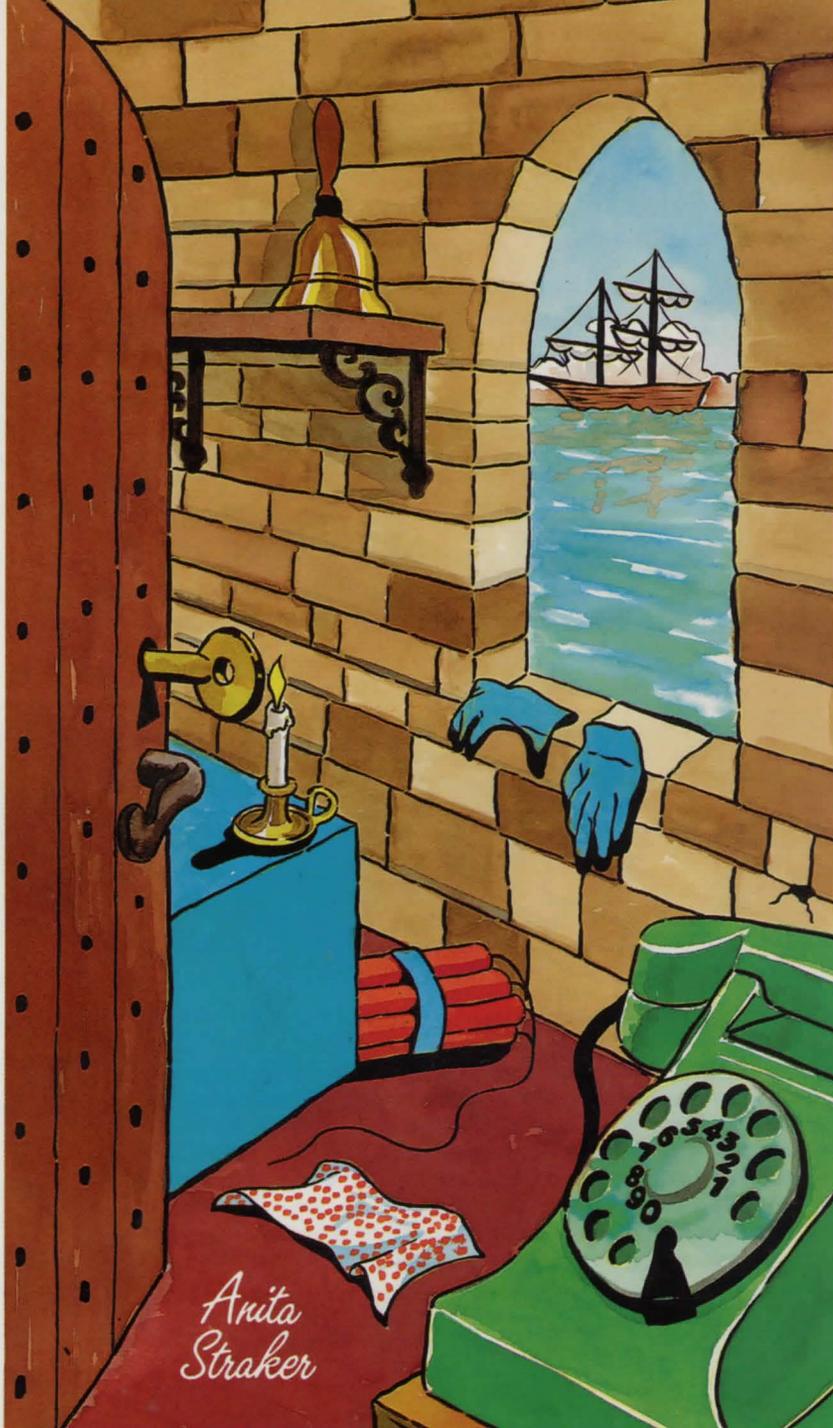


Martello Tower

Intriguing maths problems in a mysterious adventure.



Anita
Straker

THE AUTHOR

Anita Straker has always taken a great interest in the uses of computers in primary schools. She was Director of the National Primary Project for the Microelectronics Education Programme, and the author of much of the software distributed by the Project. She was formerly a primary teacher, and now works as a local authority adviser. She has visited large numbers of primary schools who are using computers, both in this country and in countries as far away as China and Australia. She has four sons, all of whom make a great deal of fuss when she wants to use her home computer to develop new programs!

INTRODUCTION

Martello Tower is an adventure game in which the children have to find their way through a Martello Tower and escape to the sea in as few moves as possible. The children move around the rooms of the tower and up and down the floors using six commands. Escape is possible with sixty commands.

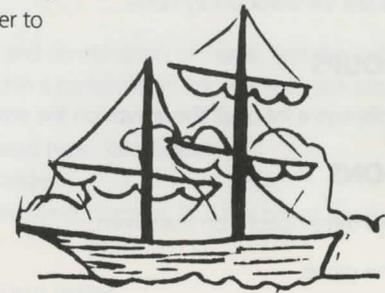
Part of the problem posed by an adventure game is to develop the plan or map of the place in which the adventure is based as the game is played. Some children find map drawing difficult and so a photocopy master for the plan for Martello Tower is provided as Worksheet 1.

As the game is played, objects are found which are needed at various places to help the children to escape. A magic word has to be found which the children need to use before they can escape. Some of the rooms can be entered only when a number puzzle is solved.

There is an introductory story to tell the children:

It is a warm, sunny day. You are walking along a cliff top above the sea. In the distance, a small ship is bobbing on the waves. Ahead of you on the cliffs you can see an old tower. You decide to explore it but you find yourself in very mysterious surroundings from which it is difficult to escape.

You have to find a magic word on the way through the tower and say it in the right place in order to get to the sea and sail away from danger.



PLAYING THE GAME

Hold down SHIFT and tap BREAK to load the program. The first screen after the title page offers the option to see information about the program.

After the title screen a choice page will be shown as follows:

- A start a new adventure
- B load an old position
- C see the notes
- D check the groups
- E teacher options

Press the ESCAPE key to return to this page at any time.

START A NEW ADVENTURE

When you start a new adventure the computer asks for a group number. Each group of children working together on the program must be allocated a different number between 1 and 20. This number is used by the group each time it uses the program.

If you enter a group number that is already being used the computer displays: 'Group number has already been saved. Call your teacher'. However, if the group number entered does not exist, the adventure begins.

N.B. To save your adventure type SAVE at any point during the adventure.

LOAD AN OLD POSITION

When you want to go back to a partly finished adventure select option B and enter your group number. If the group number does not exist, you will be returned to the choice page. Otherwise the adventure continues from the point at which you last saved your position.

SEE THE NOTES

Select this option to see the introductory notes.

CHECK THE GROUPS

Selecting option D displays a list of all the groups on the screen.

TEACHER OPTIONS

Selecting this displays three options on the screen:

- A delete one group
- B delete all groups
- C return to Choice Page

Option A gives a listing of all the groups and prompts for the group number to be deleted.

Option B gives a listing of all the groups to be deleted. WARNING! This option deletes all the groups saved on the disc.

Option C returns you to the choice page.

MOVING AROUND

The following commands (press RETURN after each one) are used to move through the tower:

N or North	to go north	W or West	to go west
S or South	to go south	U or Up	to go up
E or East	to go east	D or Down	to go down

The children will need to use a plan to keep track of where they are. They can either make one as they move around or use the one supplied as Worksheet 1.

If children draw their own map, some help might be needed in planning how the map might be set out as there are several floors to the tower.

THE COMPUTER'S VOCABULARY

The objects which are found as the search takes place are needed to get through the tower and escape. The children can 'take', 'examine', and 'drop' the objects. Sometimes other actions can be performed with the objects and part of the adventure is to discover which other verbs can be used and in which places.

The program recognises a limited vocabulary and combination of words, and the instructions to take, examine or drop an object must be expressed in a certain form. For example, the program displays the sentence: You can see: ladder

If the children want to take the ladder, they must type: Take ladder

Typing anything different, such as: Take the ladder

will result in the screen message: 'I don't understand'. Pressing RETURN brings the chance to type in the instruction correctly.

To drop the ladder the children should type: Drop ladder

Only four objects can be carried at any one time. If the children try to take a fifth, the screen message: You're carrying too much is displayed. They have to drop one of the objects they are carrying before taking another.

Objects can be examined, and sometimes this will provide more information about them, for example, typing: Examine scratches

will produce the response: The scratches could be a message

At this point the children have to work out that they need to type: Read scratches

to have the message revealed. 'Read' is one of the extra verbs to be discovered as the game is played.

To speed up the entry of the instructions, only the first three letters of any word need to be typed, for example: Rea scr will do instead of Read scratches.

There are three other useful commands. If the children want to find out their current score, they should type: Score

If they are stuck somewhere and want to stop playing, they should type: Quit

If they want to save their current position in order to start there the next time they play, they should type: Save

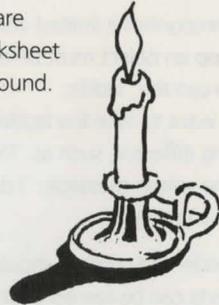
The children should aim to save their position regularly. If they meet a disaster, or if they are unexpectedly sent back to the beginning of the program, they can quit and then load an old game. This will take them back to the point at which they last saved their position.

THE PROBLEMS

In some places, a problem must be solved successfully before a room or area can be entered. All the problems are randomised, so that each group of children who encounter them will need to find a different solution. Strategies can be shared and discussed, but 'answers' to problems will be different for each group. It is a good idea for children to save their position each time they have successfully solved a problem.

THE WORKSHEETS

Worksheets 1 and 2 are provided for the children to use when they are solving the problems. Worksheet 1 is the plan of the tower and Worksheet 2 is a table to be completed with the details of the objects that are found.



USING MARTELLO IN THE CLASSROOM

The children should be allowed to solve the problems for themselves. Average ten year old children can complete the program, but experience at overcoming the obstacles builds up only after many attempts. Hints, tips and above all, sympathy and interest, need to be available when required, especially when a group of children are first getting started. However, individual levels of reading ability, of logical deduction and planning, and of motivation, vary so much in young children that levels of achievement are hard to predict.

USING THE RIGHT WORDS

When they are first using the program, children might be puzzled about the words to use. Keeping a list on a piece of paper of those which are successful can be helpful, plus some positive advice:

'Perhaps try going NORTH?' or

'Would it help to EXAMINE the GATE?'

Direct help in the form of 'Why not PUSH GATE?' should not continue for too long.

Some help might also be needed to encourage the precision necessary when typing in the instructions. Reminding children quite frequently at the start to use just one or two words to instruct the computer should help to establish the idea.

WORKING IN GROUPS

In a class of thirty children, groups of four or five may be the best size. Some teachers prefer mixed ability groups, with one child good at reading, one very curious, one artistic, one a logical thinker. Other teachers may prefer to have groups which are a good social mix.

If required, the program can be used by a whole class at the same time. While one group is working at the keyboard, another can be drawing or painting one of the scenes, another group writing an account of life in clifftop buildings, another creating a model of the tower, another researching the history of Martello Tower.

ENCOURAGING IMAGINATION

The program deliberately uses no pictures of scenes so that children are encouraged to read and talk, to write and paint, and generally let their imaginations run riot. All the text is in double height characters so that a medium sized group of children can sit round the micro with note-books, yet comfortably read the screen.

ADDITIONAL IDEAS FOR THE CHILDREN

- Start and maintain a log-book describing your adventures in the tower.
- Keep a record of your group's score and make a bar-chart showing how it changes each time you play.
- Develop a map/plan showing how each of the areas in the adventure links to others.
- Paint some pictures of the rooms in the tower, or of the people who work there.
- Can you use your turtle to draw a plan of one of the floors of the tower?
- Make a working model of a gate house.

- Listen to some sea shanties. Make up some sea music of your own and play it on your recorder. Use your music in some drama sessions based on scenes from the adventure.
- Discuss and write stories to explain some of the unsolved mysteries of the program: Why is there a keeper of the tower? Who installed the phone? Who is the captain of the ship? Who is the old woman? Where did the 1918 florin come from? What did Ferdinand do before he became a plumber?
- Talk about the following:
Are there any old buildings near your school?
Have you ever visited a castle? What was it like?
Who do you think the tower belongs to?
What has it been used for?
Why is gunpowder stored in it?
- Design and make a suitable disguise which you could wear on this adventure, or make a uniform for the gatekeeper, a handkerchief for the old woman, some oven gloves . . .
- Use thin card, boxes and paper to build a tower to your own design.
- What are walls built from? How many different kinds of brick patterns can you find in the buildings close to your school? Can you design some other good shapes for bricks, or some other brick patterns?
- What creatures are you likely to find living in the stonework of an old tower? Find out all you can about them.
- Inside the tower it is dark. Test your sense of touch to see if you can recognise the following when blindfolded:
pencil, battery, prune, rubber, 10p coin, 20p coin, washer, screw, key, bottle top, toothbrush, small piece of fur, sandpaper, walnut, conker, shell, pebble, teaspoon, drinking straw, cocktail stick.
- Collect some poems about the sea and ships. Write some of your own to add to the collection.
- Try some more mathematical puzzles. 'Figures for Fun' by J. A. H. Hunter, published by Phoenix, is a good source.
- Read the adventure story Moonfleet.
- MARTELLO TOWER has many rooms, So does your school. Could you devise a treasure hunt in which your friends have to find and collect something from each room in order to solve a mystery?

SOME HINTS

For teachers who are busy, and who want to look at the program quickly, the following hints might be helpful.

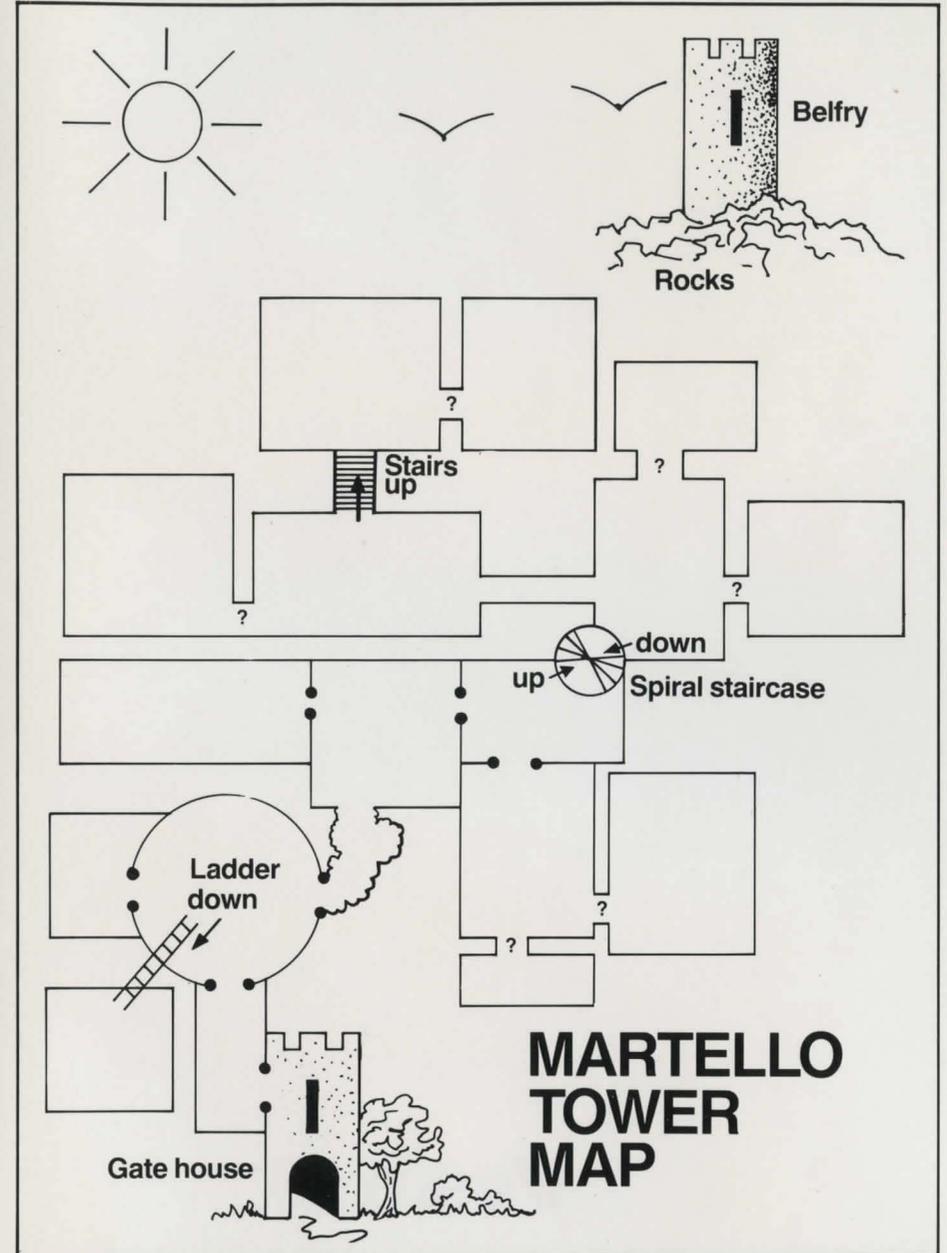
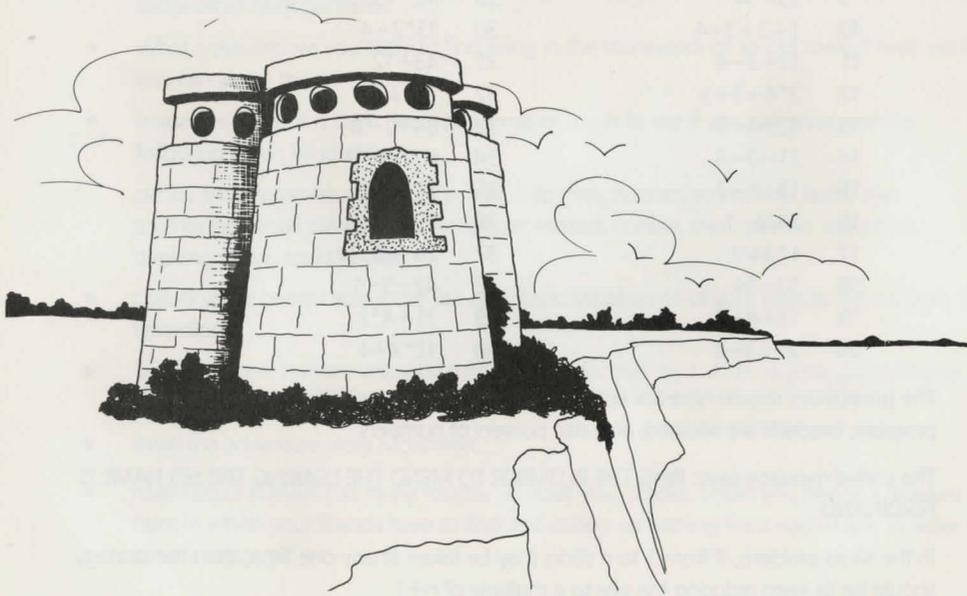
- 1 The sequence of triangular numbers is:
1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210, 231, 253, 276, 300, 325, 351, 378, 406, 435, 465, 496, 528, 561, 595, 630, 666, 703, 741, 780, 820,
and so on.
- 2 The first forty numbers can be formed from the digits 1, 2, 3 and 4 as follows:

1	$2*3-4-1$	21	$13+2*4$
2	$1+2+3-4$	22	$34-12$
3	$2*3+1-4$	23	$4*3*2-1$
4	$1+2+4-3$	24	$4*3*2*1$
5	$12-3-4$	25	$4*3*2+1$
6	$1+3+4-2$	26	$24+3-1$
7	$24/3-1$	27	$32-4-1$
8	$2+3+4-1$	28	$23+4+1$
9	$23-14$	29	$42-13$
10	$1+2+3+4$	30	$13*2+4$
11	$12+3-4$	31	$43-12$
12	$2*4+3+1$	32	$12*3-4$
13	$12+4-3$	33	$34+1-2$
14	$21-3-4$	34	$(13+4)*2$
15	$13+4-2$	35	$32+4-1$
16	$34/2-1$	36	$32+4*1$
17	$1*34/2$	37	$24+13$
18	$32-14$	38	$42-3-1$
19	$13+4+2$	39	$31+4*2$
20	$21+3-4$	40	$12*3+4$

The possibilities shown here are not unique. Nor do the possibilities stop at 40. In the program, brackets are allowed, and also powers of numbers.

- 3 The coded message says: RING THE PLUMBER TO MEND THE LEAKING TAP. HIS NAME IS FERDINAND.
- 4 In the sticks problem, if from 1 to n sticks may be taken at any one time, then the strategy should be to keep reducing the pile to a multiple of $n+1$.

- 5 The number of diagonals in a polygon with n sides is $n(n-3)/2$.
- 6 Examining the hole, entering the dark passage without a lighted candle, ringing the bell, or lighting the dynamite without earplugs, all lead to disaster. Don't try them if you are in a hurry. You also need to make sure that you have a handkerchief for the old woman.



This map shows where all the rooms are in Martello Tower.



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