

# T Shapes on a Number Grid

The activities are related to the work in Ma2, using and applying numbers and algebra.

Pupils should be taught to explore, identify and use pattern and symmetry in algebraic contexts, investigating whether particular cases can be generalised further and understanding the importance of a counter-example.



## Organisation of the materials

The SMART Notebook™ file is saved as “T Shapes.notebook”. It consists of eight pages of which the first is the title page. There are five pages to support the activity and its extension.

Page 7 is a blank page.

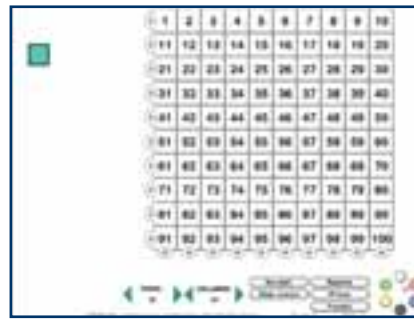
Page 8 contains teacher notes which are amplified here.

## Notes

## The first activity

Page 1 provides a starter activity to encourage pupils to define different positions on the number grid in terms of a number.

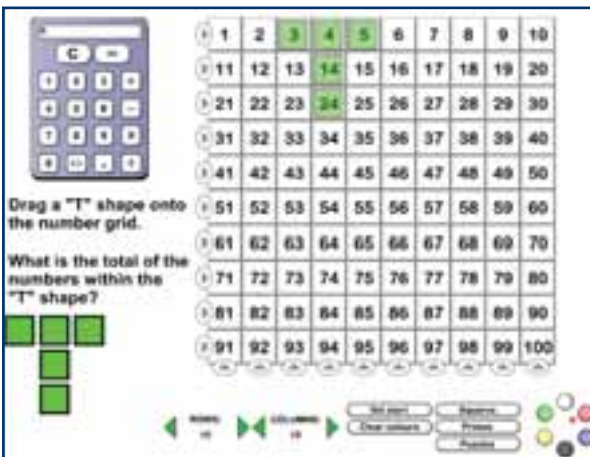
The pile of squares are provided for pupils to come up to the board and drag onto the grid to highlight two numbers on the board. You might like to ask: "How could we describe the higher number in terms of the lower number?"



Page 2

## The main task

Page 3 of the notebook contains a "10 grid" and a pile of T shapes. The object of the task is to provide a context for pupils to generate some algebraic expressions and create an equation that connects a number inside the T shape, (n) with the sum of the numbers inside the T shape. Invite pupils to come up to the board and drag one of the T shapes onto the grid. Ask pupils to calculate the sum of the numbers inside the T shape. The on screen calculator could be used to check answers.



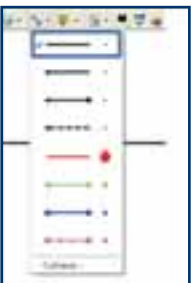
Page 3

Discuss with pupils how they might define the T shape they are looking at and begin to collect some information that will allow them to predict what the total might be for a particular T shape.

Page 4 provides the beginnings of a table on which some results could be collated. Encourage the pupils to suggest the headings for the columns and which columns might be useful.

Use the 'Line tool' to create additional columns.

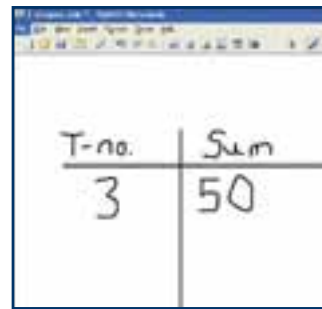
### Line Tool



There are two ways of completing the information in the table.

1. Use the SMART Board™ interactive whiteboard pens and write in the traditional way! Because you are working in a SMART Notebook, this handwriting will NOT disappear when you move to other pages and can be saved into the SMART Notebook.

### Handwriting



You can convert this handwriting to text by using the 'Select' tool to highlight some text and then selecting the downward arrow that appears in the top right hand corner of the selection box.

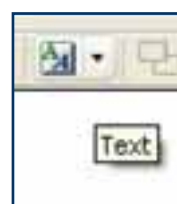
### Converting Text



Choose from the 'Recognize' options that are given.

2. Select the 'Text' tool from the menu bar and type the required text using the SMART keyboard.

### Text Tool



Page 5 shows an enlarged T shape for annotation to support pupils to generate algebraic expressions for each cell in the T shape. Use the blank space on the page to invite pupils to the board to develop an equation that connects the sum of the numbers in the shape to the T number.

## SMART specific

The SMART Notebook Gallery has an Education area within which there is a Mathematics area. This contains some useful Notebook resources, including Flash resources such as the calculator and the multigrid that is used in this activity. "Multigrid.notebook" is also provided as an attachment within "T Shapes.notebook".

Additional Flash resources can be downloaded from the 'EdCompass' website.

([www.education.smarttech.com/ste/en-GB](http://www.education.smarttech.com/ste/en-GB)). Follow the links to Notebook collections and mathematics. If you are in an open Notebook page, Select 'Import' and 'Import Online Content' and, providing you have an Internet connection, the relevant web page will open automatically.

You can modify the "T Shapes.notebook" file in any way you like. If you do so, then save it with a different name in case you want to access the original again at some point.

### How to: Create and use your own shape templates in SMART Notebook

Each of the T shapes was made from five identical (cloned) squares which were then arranged to make the T shape and grouped to stop them falling apart.

Choose the square from prepared shapes on the dropdown menu. When you move over the board a cross-hair will appear and when you tap it, it will leave a small square. You will stay in 'shape' mode until you tap the 'select' tool. Then you can drag the square around.



When you tap on your square you will see some buttons to enable you to resize and orient the shape. The white circle at the bottom right allows you to drag it to increase the size.

This can change either or both of the dimensions of the box surrounding your shape. If you want to keep the figure as a square use the SHIFT key while dragging. If you select 'Properties', then you can change the thickness, style and colour of the outline as well as selecting the colour to use to fill in the shape. You will need to select a degree of transparency so that when you drag it over the grid, you can still see the number underneath.

Once you are happy with the appearance of your square, tap the drop down arrow and 'clone' it to give the number of squares you require. Drag these onto the grid to create the shape you want. With a square selected, the arrow keys on the keyboard allow you to perfect the position pixel by pixel.

**Teacher notes:**

- To drag the T shapes onto the number grid you will need to use the Select tool. If you tap on the number grid itself, the individual cells will be shaded. Tap again on the same cell to remove the shading.
- The Flash resource *multigrid* can be used to create a range of number grids. It also has some built in features, such as revealing prime and square numbers and some number puzzles.
- Of course you can write and draw over the grids, shapes and text.
- Remember that, as you are working in SMART Notebook, any annotations will be retained as you move from page to page.
- The number grid occupies more of the page than it appears. You might accidentally select the grid and a blue bar will appear at the top. To deselect the grid, simply tap on a blank part of the Notebook page.

Page 8

## Notes

## The extension task

The extension to the T shape task is usually to encourage pupils to consider how they might change the original problem in some way to create a new problem to explore.

For example, changing the number of cells in the shape or exploring different types of number grids.

Page 6 provides a page on which different number grids can be explored.

To increase (or decrease) the number of columns in the grid, tap the green arrows to the right or left, either side of 'Columns'.

▶	1	2	3	4	5	6	7	8
▶	9	10	11	12	13	14	15	16
▶	17	18	19	20	21	22	23	24
▶	25	26	27	28	29	30	31	32
▶	33	34	35	36	37	38	39	40
▶	41	42	43	44	45	46	47	48
▶	49	50	51	52	53	54	55	56
▶	57	58	59	60	61	62	63	64
▶	65	66	67	68	69	70	71	72
▶	73	74	75	76	77	78	79	80

ROWS: 10    COLUMNS: 8

Set start    Squares  
Clear colours    Primes  
Puzzles

Page 6

## Notes

## Resources

Additional Flash resources can be downloaded from the 'EdCompass' website at:

[www.education.smarttech.com/ste/en-GB](http://www.education.smarttech.com/ste/en-GB)

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