# Areas on a Geoboard

## The activities are related to work in Ma3 Shape, space and measures.

**Pupils should be taught to find areas of rectangles, recalling the formula, understanding the connection to counting squares and how it extends this approach. Recall and use the formulae for the area of a parallelogram and a triangle; find the surface area of simple shapes using the area formulae for triangles and rectangles; calculate perimeters and areas of shapes made from triangles and rectangles.**

**Organisation of the materials**

The SMART Notebook™ file is saved as, "Areas on a geoboard.notebook". It consists of seven pages of which the first is the title page. There are four pages to support the activity and its extension. Page 6 is a blank page.

Page 7 contains teacher notes which are amplified here.

The Year 7 and 8 columns on pages 234-7 of the Framework suggest some practical activities involving geometric problems on dotty grids.

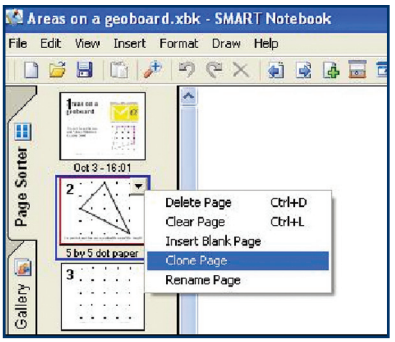
## Notes

## The first activity

Page 2 provides a starter activity to encourage pupils to review how they might find areas of triangles on a 5 by 5 dot grid which represents a Geoboard[1].

You might like to invite pupils to the board to annotate the screen with their strategy. It might be useful to insert a copy of this page to allow several strategies to be shared.

You can do this by selecting 'Clone Page' from the drop down menu in the 'Page Sorter'.




[1] *A traditional geoboard is a wooden board with a 5 by 5 array of nails, onto which elastic bands are stretched to produce different 2-D shapes.*

## The main task

Page 3 provides a blank 5 by 5 geoboard. Invite pupils to create a triangle shape on the screen and discuss strategies for finding some areas. If you intend to develop the formula area of a triangle (= 1/2 x base x height), you will need to consider how the triangle is positioned.

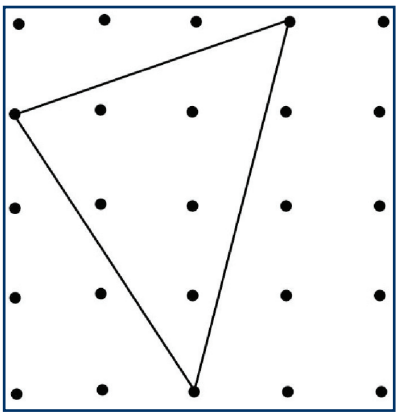
For example, the first triangle would provide a better example than the second.

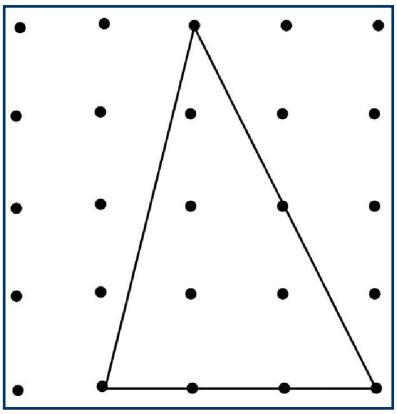
However, if the object is to develop pupils' strategies for finding areas of shapes using geometrical reasoning, the second triangle provides more of a challenge.

Page 4 of the Notebook provides a template of four blank 5 by 5 geoboards to support class discussion. You could invite pupils to share their shapes and strategies.

(This page could be printed and photocopied to provide a resource sheet for the pupil activity).

**Triangle on geoboard**



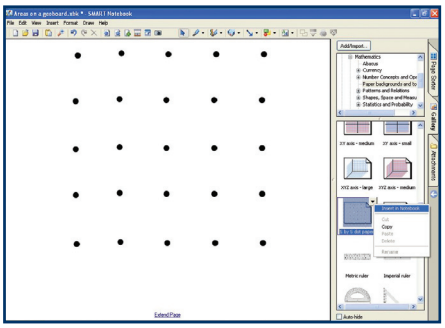


## Notes

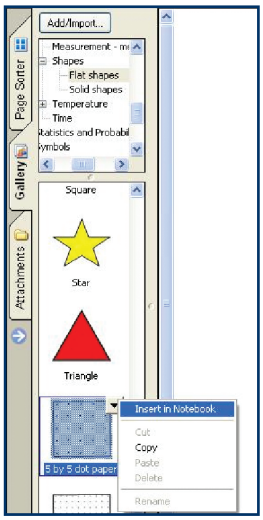
# SMART specific

The SMART Notebook Gallery has an Education area, within which there is a Mathematics area. This contains some useful Notebook resources, including templates which can be used as a background for mathematical activities. The 5 by 5 dot paper is an example of one of these and is within the category 'Paper backgrounds and tools'. Scroll down until you come to 5 by 5 dot paper. There are two ways of selecting the template, by dragging the icon onto the Notebook page or by choosing 'Insert in Notebook' from the drop down menu that appears when you tap the downward arrow in the top right hand corner of the icon.

## Geoboard Template



## Copy and Paste Pictures




Templates cannot be manipulated in size or have their appearance changed in any way. They act in a similar way to a pre-printed template projected by an overhead projector. The turned down corner on the icon indicates a template.

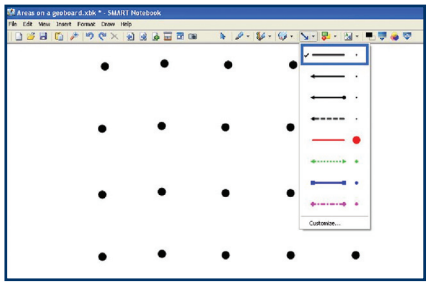
There are other 5 by 5 dot papers which can be imported as pictures. These can be resized and copied.

There is no 'snap to grid' facility within SMART Notebook.

There are three ways of drawing triangles on the 5 by 5 geoboard:

1. Using the 'Line' tool, draw the three sides of the triangle as separate objects.

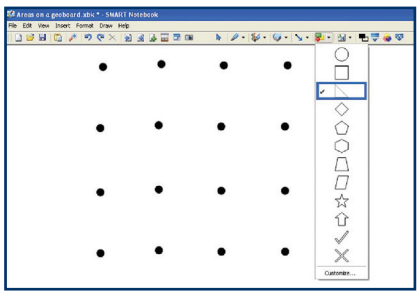
## Line Tool



The sides of triangles produced in this way can be grouped to produce a shape that does not fall apart. However, the interior of the shape cannot be shaded.

2. A closed triangle that can be shaded can be produced by selecting the triangle tool from the 'Shape' menu.

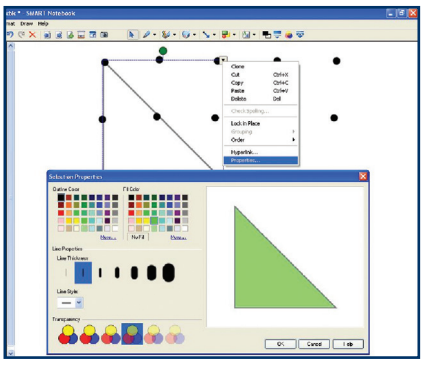
## Triangle on Tool



However, this tool only draws right angled triangles. To shade the interior of the shape, select the shape and tap the arrow that appears in the top right hand corner.

Select Properties and a fill colour.

## Shading the Shape



3. There is a library of 2-D shapes within the 'Gallery' resources. There are pre-drawn triangles within shape, space and measures, in the 'Flat shapes' and 'Areas' categories. All of these shapes can be shaded, rotated and enlarged. However they cannot be stretched and so they have limited use in this particular activity.

## Notes

**Teacher notes:**

- The 5 by 5 geoboard template cannot be resized and has no 'snap to grid' facility. It works in the same way as if you had projected it on an overhead projector!
- There are three ways of drawing triangles on the grid - refer to the full Teachers Notes for details.
- Of course you can write and draw over the 5 by 5 geoboard and text.
- Don't use a plastic or wooden board ruler or protractor on a SMART Board as the screen will `feel' these and not recognise a pen!
- Instead, use the Straight Line tool to connect a couple of points.

You can modify the "Areas on a geoboard.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.

## The extension task

An extension to this task might be to explore compound shapes and support pupils to see how the shape might be divided (or extended) to find its area.

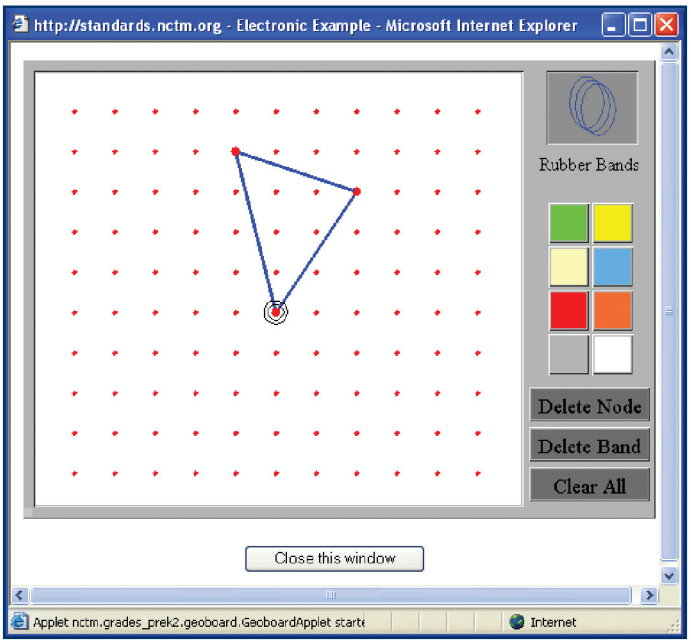
Page 6 provides a page on which different number grids can be explored.

## Ideas for follow up work

An alternative ICT tool to support this activity is available at:

**standards.nctm.org/document/eexamples/chap4/4.2/#applet**

A hyperlink to this resource is provided on the attachments page.




### ICT Tool

The additional features of this resource are 'snap to grid' and the ability to create and shade a closed shape with vertices that can be moved to new positions.

## Notes

## Resources

National Council for Teachers of Mathematics Interactive Geoboard Online at:
**standards.nctm.org/document/eexamples/chap4/4.2/#applet**

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Authors:
Alison Clark-Jeavons
Adrian Oldknow