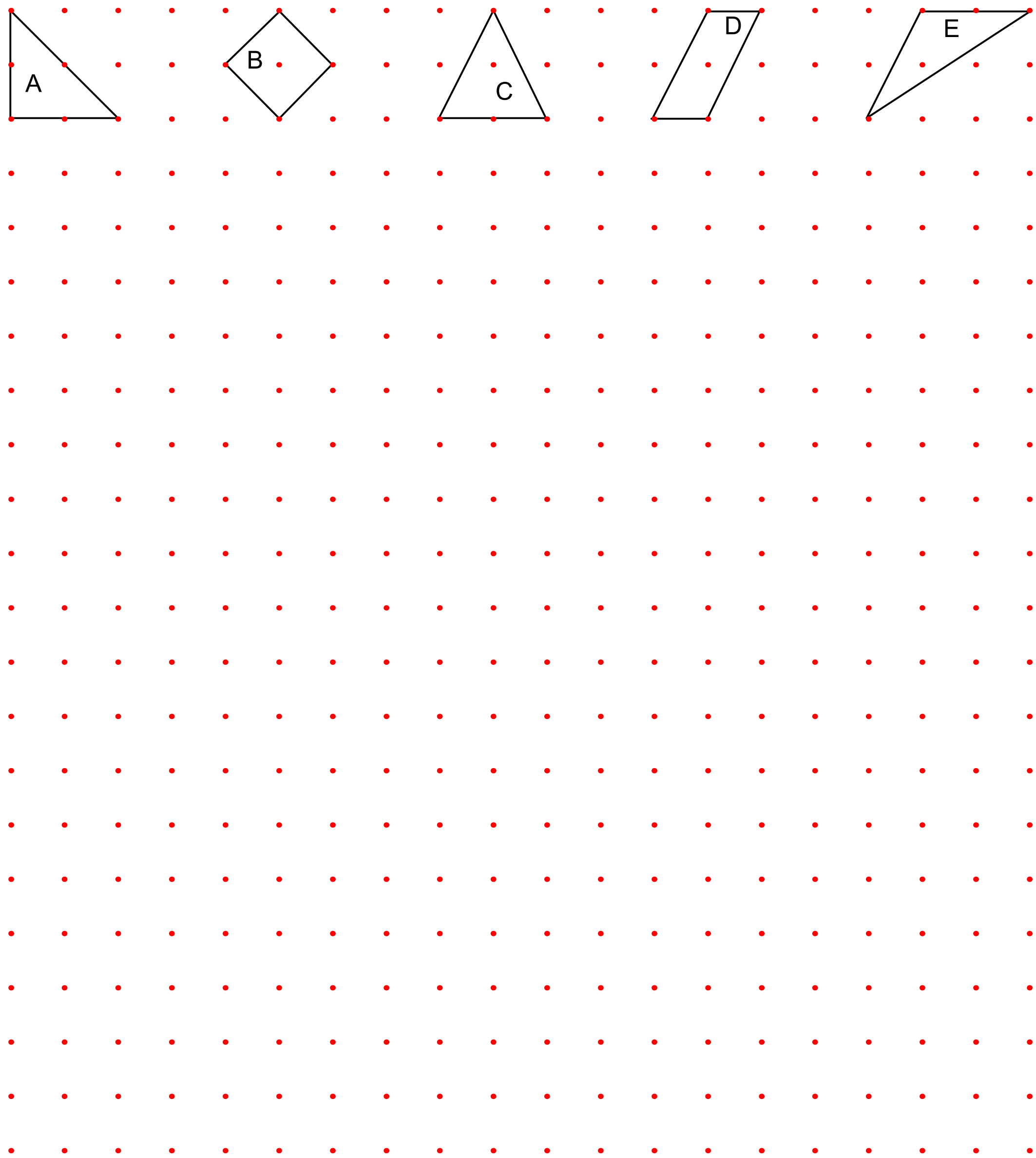
GO TO MODULE 4A

Activity 13

AREA 2



1. Compare the areas of the above figures.

2. Draw the following figures on the dotty paper:

   - Three different shaped triangles with the same area as the parallelogram.
   - Three different shaped parallelograms with the same area as the square.

Teacher Notes: Activity 13

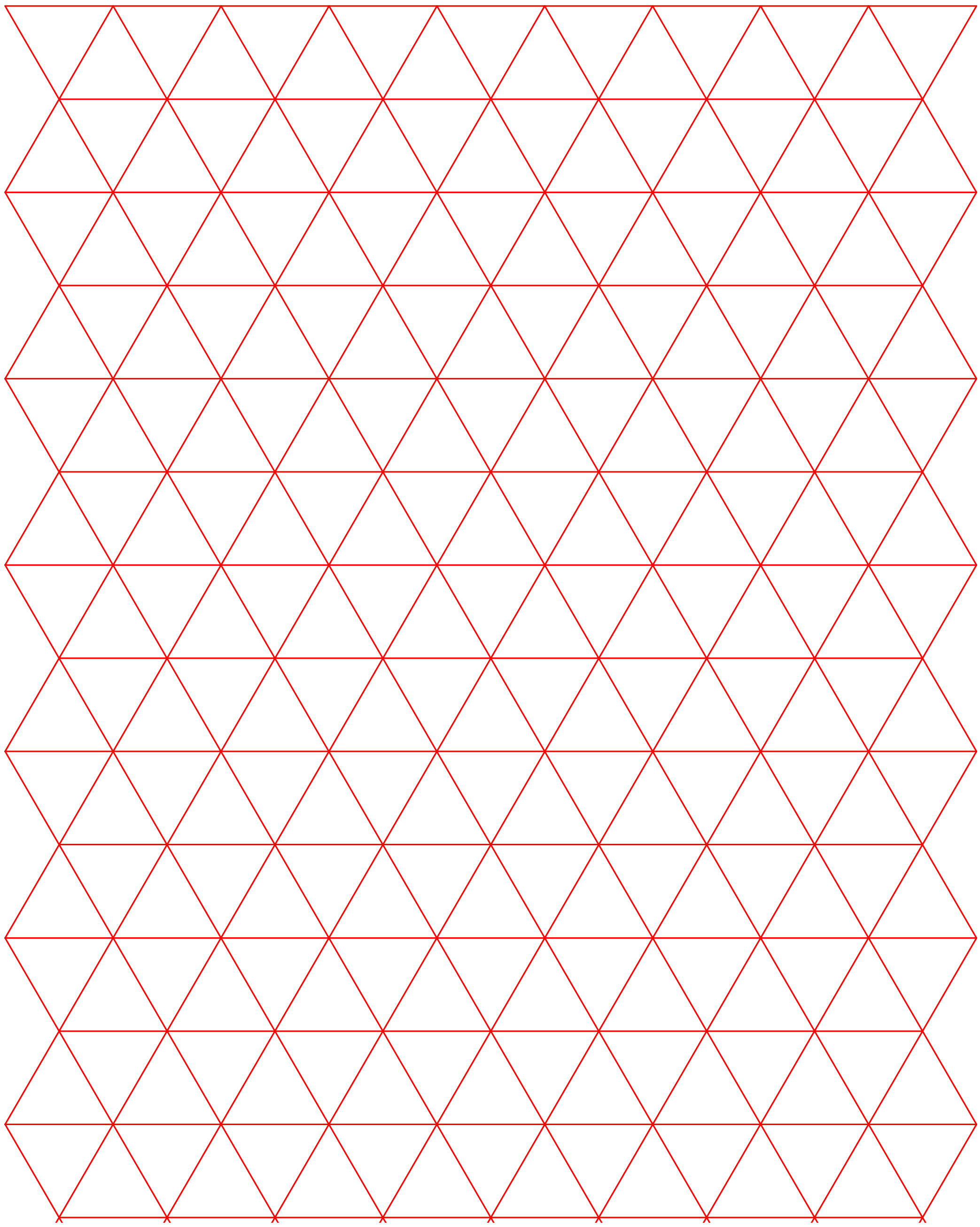
In this activity the focus shifts to classes of figures that have the same area. The learners can now be encourages to reflect on what common properties, for example, triangles with the same area have.

Activity 14

AREA OF SIMILAR FIGURES

Use the triangular grid below to compare the area of the following figures:

1. similar triangles
2. similar parallelograms



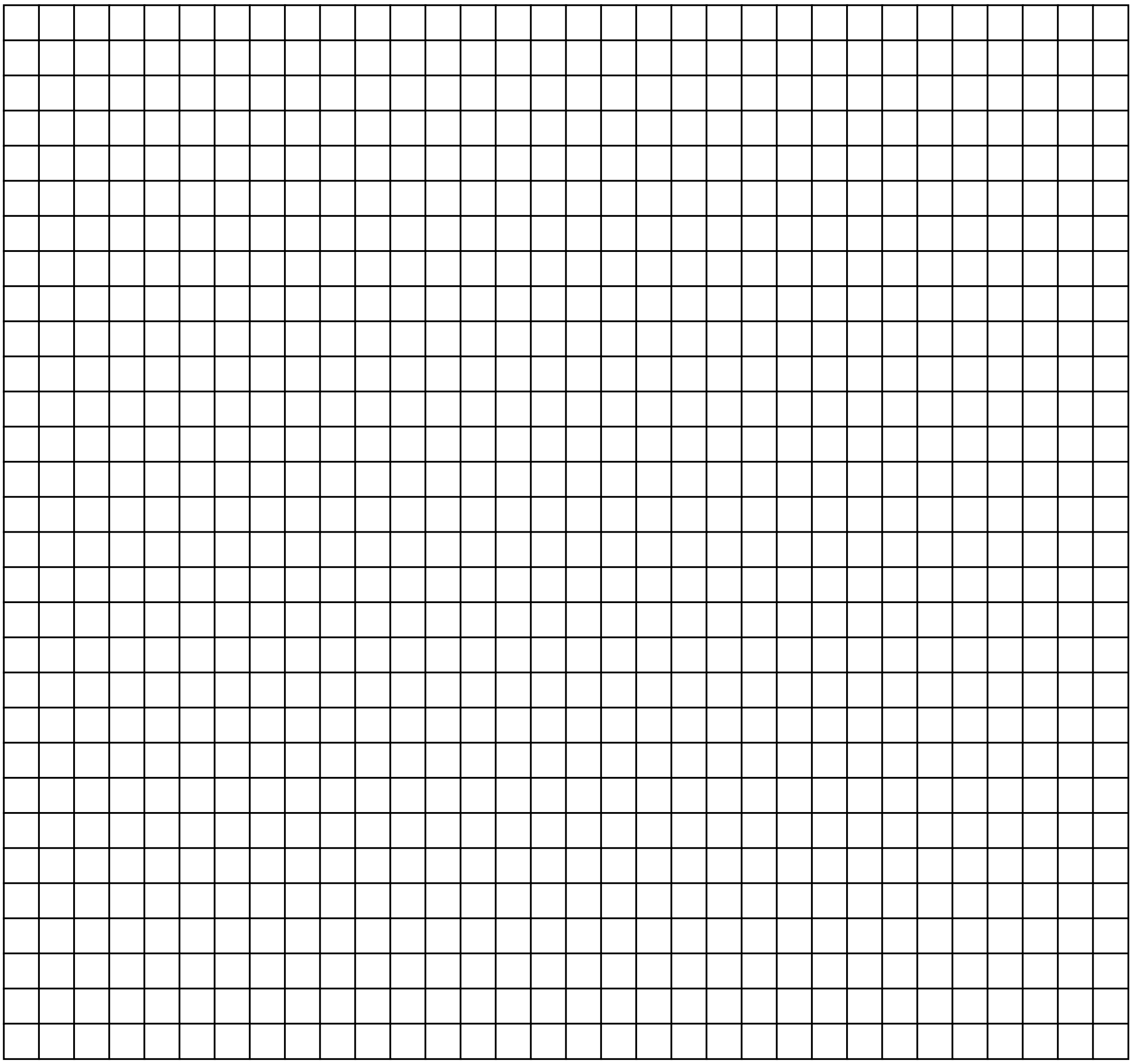
Activity 15

RECTANGLE AREAS

On the square grid below draw six different shaped rectangles.

Write down the area of the rectangles in terms of the number of squares that cover the rectangles.

Is there a shorter way of determining the areas of your rectangles than having to count the number of squares that cover the rectangle?



Teacher Notes: Activity 15

In this activity the learners need to look for a relationship between the length, breadth and the area of the rectangles.

The area of the rectangle can now be described as the length of the rectangle multiplied by the breadth of the rectangle.

It needs to be made explicit in the whole-class discussion that the length and the breadth are always expressed in the same units.

Activity 16

PARALLELOGRAM AREAS

On the square grid below draw six different shaped parallelograms with the **same area.**

Show what cuts you need to make on each of your parallelograms to transform them into a rectangle.

What measurements on your parallelogram correspond to the length and width of the rectangle?

Based on what you know about the area of a rectangle can you come up with a formula for the area of a parallelogram?

Teacher Notes: Activity 16

The aim of this activity is to develop the formula for the area of a parallelogram through transformations. The learners need to reflect on the properties of the rectangle, for example, a 90° angle must be created. This is necessary in deciding where to make the appropriate cut on the parallelogram to transform it into a rectangle.

The concept of the height of the parallelogram has to be discussed.

The height of a parallelogram is the perpendicular distance between any pair of parallel sides chosen as the bases.

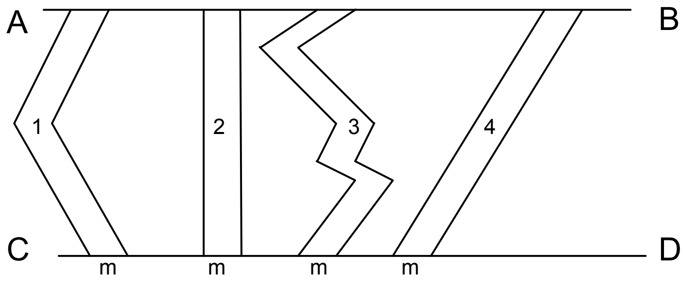
Once a definition of the height has been formulated ask them to draw different parallelograms and to mark off their heights and corresponding bases.

Ask the learners to make a copy of the parallelogram they have drawn and to find a different way of dissecting it to make a rectangle.

Activity 17

AREA

There are four strips in the figure below, marked 1, 2, 3 and 4. Each strip has the same width m. The strips connect two parallel lines AB and CD. Compare the areas of the four strips.



Teacher Notes: Activity 17

The aim of this activity is to give the learners experiences in which they apply their knowledge about the area of parallelograms. Since all the strips are parallelograms or composed of different parallelograms (strip 1 and 3), all with the same width and placed between the same two parallel lines, their areas will be equal.

Activity 18

TRIANGLE AREAS

On the square grid below draw six different shapes triangles with the **same area.**

Show what cuts you need to make on each of your triangles to transform them into a rectangle.

Based on what you know about the area of a rectangle can you come up with a formula for the area of a triangle?

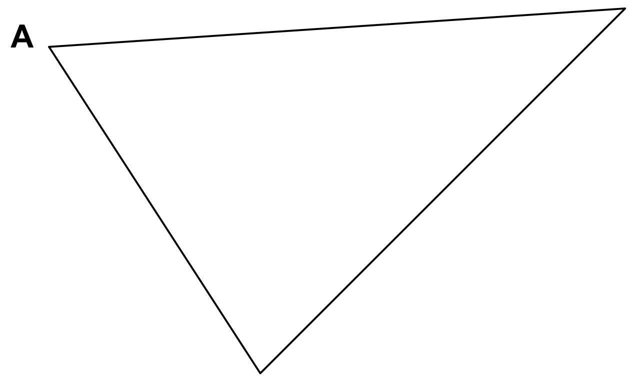
Teacher Notes: Activity 18

Refer to the notes of activity 16. The height of a triangle has to be dealt with now.

Activity 19

MOVING A VERTEX

Kirsten draws the triangle below.



Kirsten decides to change the area of her triangle. She chooses vertex A and moves it to a new position. She keeps the other two vertices in the same position.

How must Kirsten move vertex A to be sure that the area of her new triangle is

(a) smaller
(b) bigger?

Explain why the move works.

Kirsten claims that she can also find a direction to move vertex A so that the area of the triangle remains fixed.
Explain whether this is possible.

Teacher Notes: Activity 19

The aim of this activity is to give the learners a “dynamic” experience in how the area of a triangle changes as one of its vertices changes position. Computer package, Sketchpad, can also be used to explore this. Ensure that the learners are able to make sense of this in terms of the area formula of the triangle, namely, that the height of the triangle is changing and therefore the area will change.
For those learners who are not immediately able to relate the movement of the vertex to the area formula of the triangle, the drawing of the triangles and cutting and rearranging into rectangles must be done.

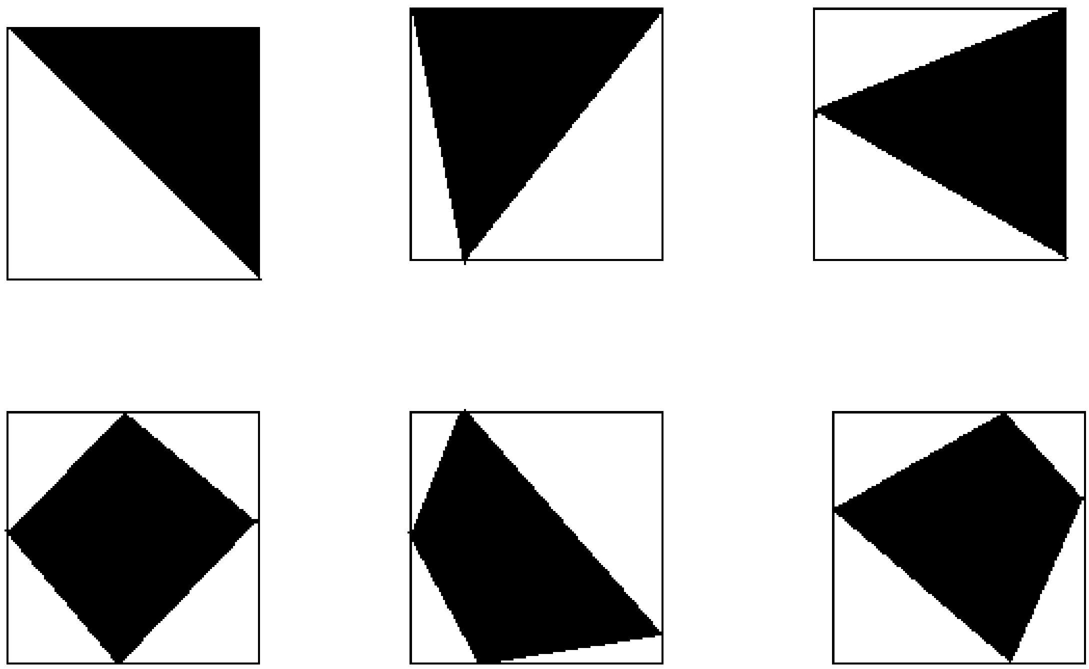
Further work on square grids can also be done- drawing different triangles keeping one side either fixed or equal.

Activity 20

TILES 2

Which of the square tiles below have more black than white?

How do you know?



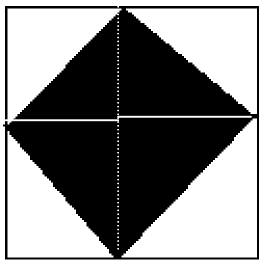
Teacher Notes: Activity 20

The aim of this activity is for the learners to consolidate the following:

If a triangle has the same base and height, their areas are equal (black triangles in tiles 1,2.3)

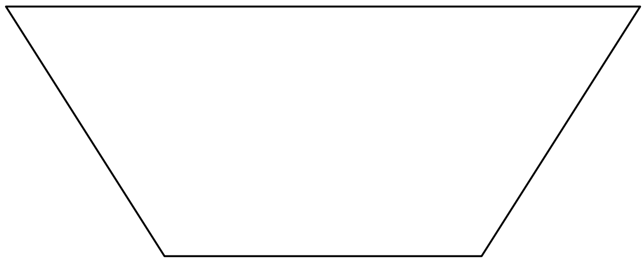
In tiles 4,5 and 6, the black shape can be dissected into two triangles whose bases are equal to that of the black triangles in tiles 1,2 and 3. The sum of the heights is equal to the height of is equal to the height of the black triangles in tiles 1,2 and 3 as shown in the diagram below:

In all the tiles the area of the white and black regions are therefore equal.



Activity 21

CUTTING TRAPEZOIDS



Draw a trapezoid.

Cut the trapezoid so that the pieces can be rearranged to form a rectangle.

Now rearrange your pieces to form the original trapezoid and look carefully at what measurements on the trapezoid correspond to the rectangle's length and width.

Based on what you know about the area of a rectangle can you come up with a formula for the area of a trapezoid?

Teacher Notes: Activity 21

Ask the learners to cut the trapezoid to form a triangle. How does the measurements of the triangle relate to the measurements of the trapezoid?

Based on what you now know about the area of a triangle can you come up with a formula for the area of a trapezoid?

Additional activities

Work out the area and perimeter of the following figures:

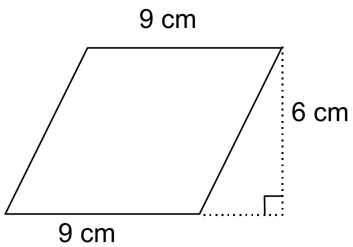


Fig. 1

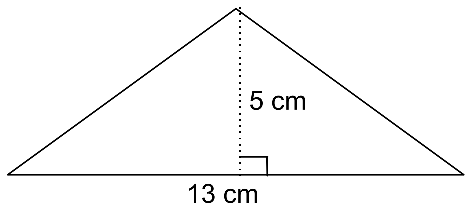


Fig. 2

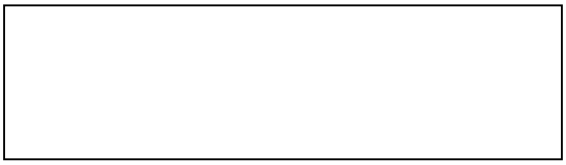
Teacher Notes: Additional activities

These problems can be taken from any standard textbook to give the learners opportunities to use the different formulae for calculations.

<u>Enrichment</u>

NEW RECTANGLES

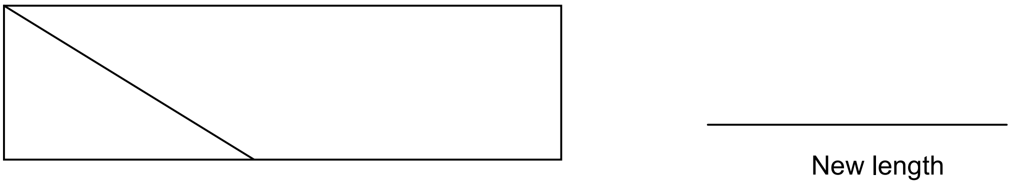
Dumisani wants to make a different rectangle with the **same area** as the rectangle below.



Dumisani decides that his new rectangle must have a shorter length.

Dumisani has a method for transforming the given rectangle into the new rectangle that starts like this:

1. From the upper left corner of the rectangle he marks off the new length that will touch the original length as shown:



2. How do you think Dumisani's method continues in order to make the new rectangle?