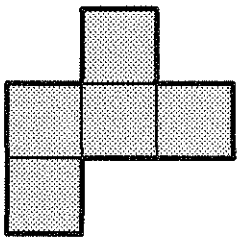
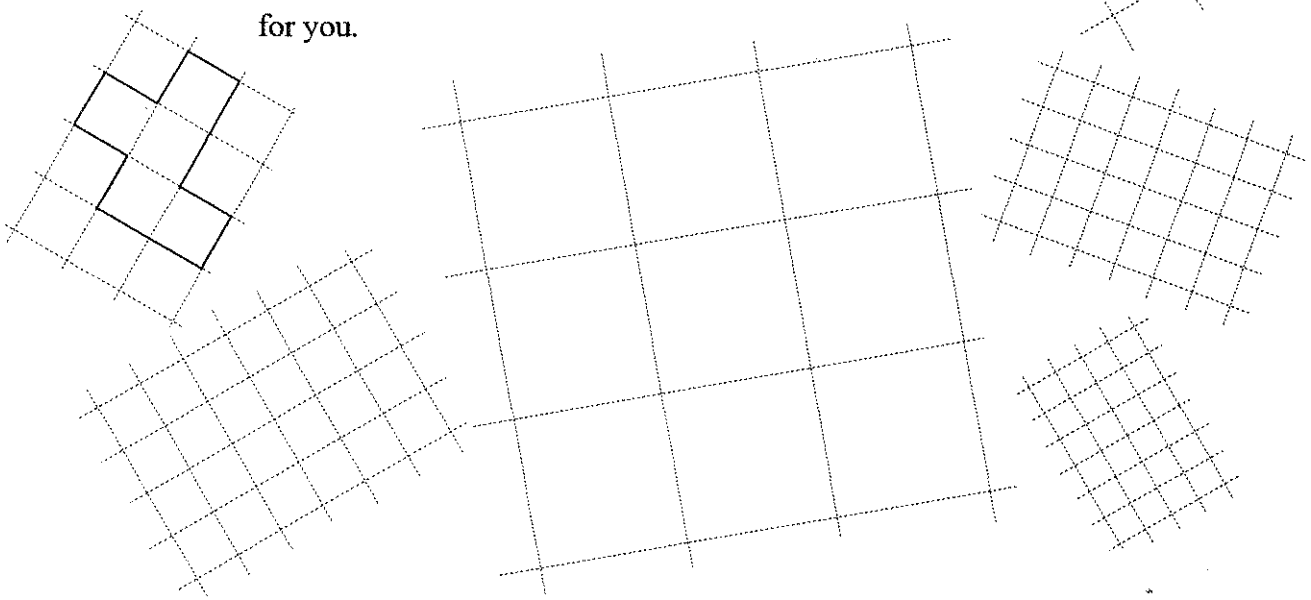
Sheet A1 A Shape Built of Squares



Here is a shape made up of five squares.
Copy it on the other grids on this page.

This one has been done for you.



All the diagrams you have drawn have the **same shape**, but not the same **size**.
This is because the size of the basic square in each grid is different.

Although the basic square varies from grid to grid, we can say that its area is

x sq cm,

where x stands for a number whose *value* depends on the size of the grid.

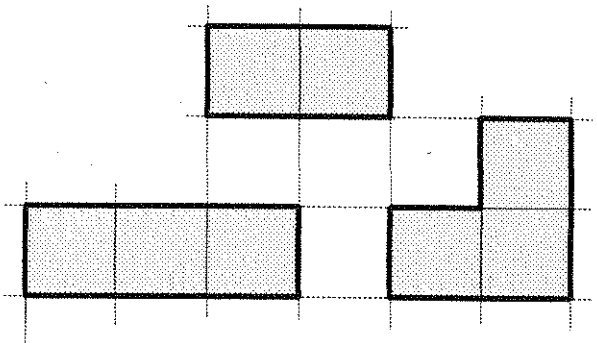
Look at the first grid. Here each square measures 1cm each way, so $x = 1$.
Which grid has $x = 4$?

By approaching the grids in this way, whether or not we know the value of x, it is always true that **the area of the shape = $5 \times x$ sq cm.**

REMEMBER: In **algebra**, instead of putting $5 \times x$, we always write it as $5x$.

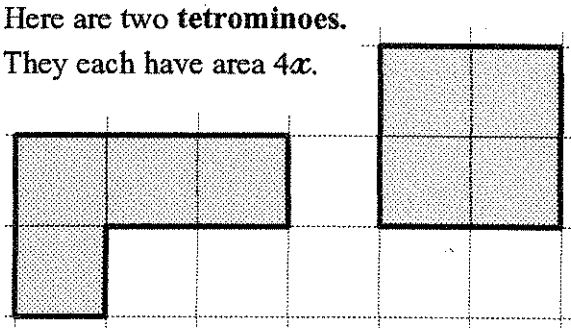
Sheet A2 Pentominoes

There is only one way of joining <u>two</u> squares together so that their sides and corners touch.
We call this the **domino**, which has area $2x$.



Two different **trominoes** can be made by joining <u>three</u> squares together.
Their areas are both $3x$.

Here are two **tetrominoes.**
They each have area $4x$.



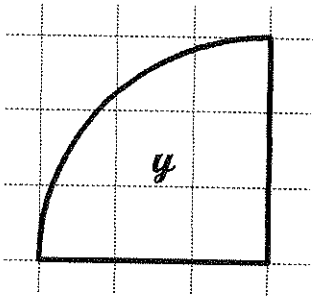
Altogether there are five different ones.
Find the other three. Draw them below.

When are two shapes different? If you have one shape cut out, and find it <u>cannot</u> be made to fit the outline of another shape, even if it is turned round or flipped over, then the <u>two shapes are ***different***</u>.

With five squares you get **pentominoes.** Find as many of them as you can. Draw them below.

How many <u>different</u> ones can you discover?

Sheet A3 Introducing Quadrants

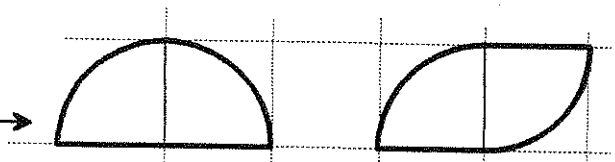


This is a quarter circle, or **quadrant**.

Its radius is 3 cm, and its area we will call y sq cm.
(The actual number that y stands for is just over 7.)

With **quadrants** we can make various different shapes if we join them together by their straight edges.

By using **two** of them, there are just two different shapes that we can make. →
Each has area $2y$.



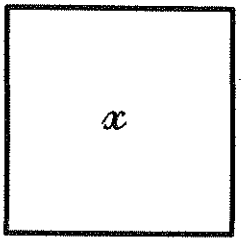
If **three** quadrants are joined together, then three different shapes can be made, each with area $3y$.

Draw them here.

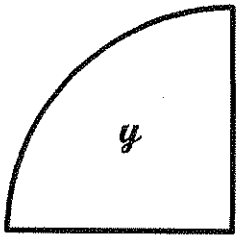
Now see how many different shapes you can make with **four** quadrants. Each will have area $4y$. Draw them below.

Sheet A4 Squares and Quadrants

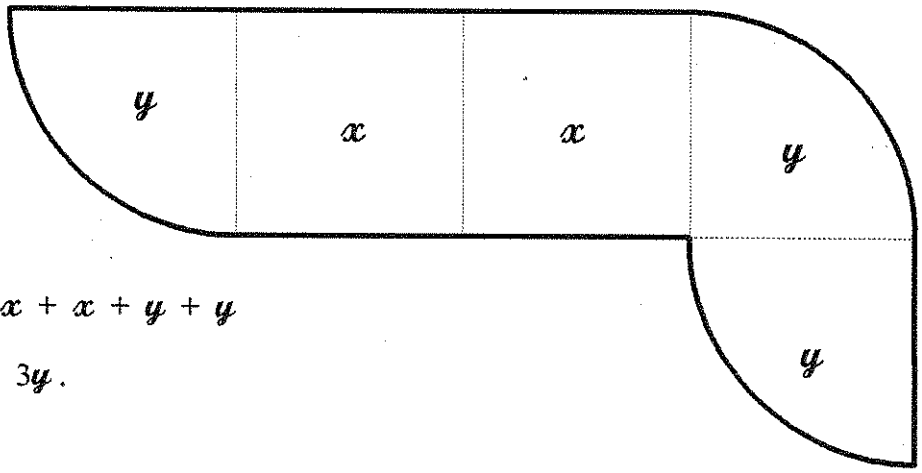
The shape below is made of squares with area x



and quadrants with area y.



Its total area is easily found by counting.



Area of shape $= y + x + x + y + y$

$= 2x + 3y$.

Sketch shapes on this grid that have areas

(a) $x + y$

(b) $3x + y$

(c) $x + 3y$

(d) $4x + 3y$

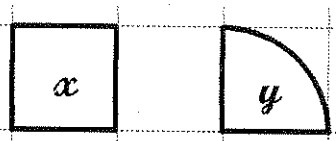
With shape (e) make the outline (or **perimeter**) as short as you can.

If possible make it fit into a '3 x 3 square'.

(e) $5x + 4y$

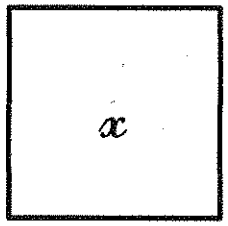
Sheet A5 Two Squares and Three Quadrants

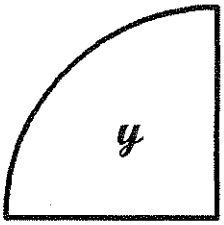
Design a shape that has area $2x + 3y$. Draw it on the grid below.
How many different ones can you design? Are others possible?



Make sure that your shapes are all **different**. It is very easy to draw two that are the same!
Have you included a shape twice? (The second one might be upside-down!)

Sheet A6 Subtracting Areas





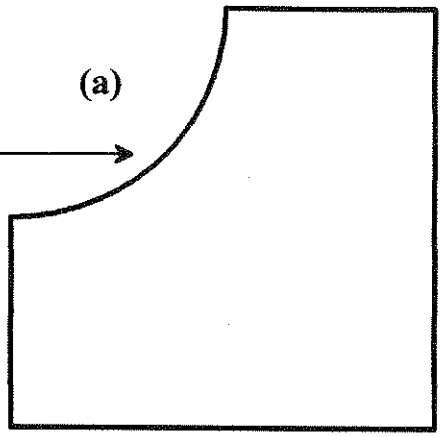
Sometimes finding the area of a shape in terms of x and y involves **subtraction**.

For example, the area of this shape is

$$4x - y.$$

If your teacher asked you to explain this, what would you say?

(a)



Can you work out the areas of the following shapes in the same way?
Write them all in terms of x and y. Express them as simply as possible.

Area =

(b)

(c)

Area =

=

(d)

Area =

=

(e)

Area =

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Each square is the same size as the shape named ***x***.
The sheet can help you work out the area of each shape.
You might trace the shapes and then remove them to work out the area.