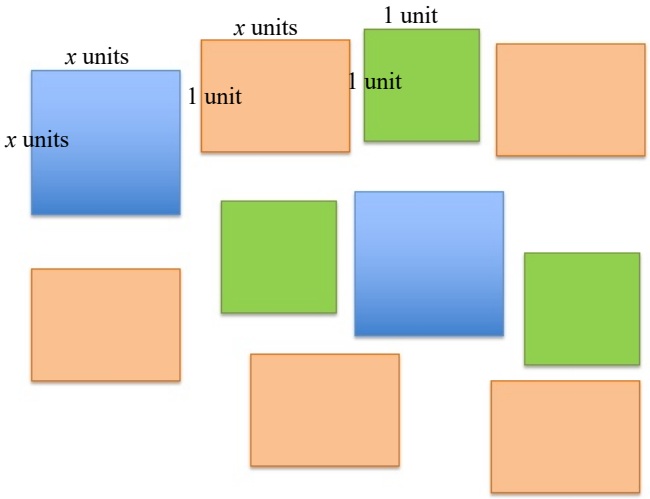
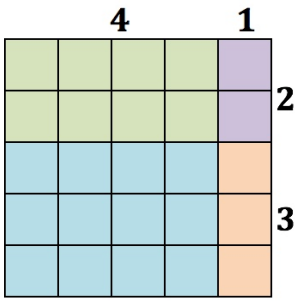
ALGEBRAREA Product of two brackets and area

1. Describe the three different types of pieces shown in the diagram.
2. Cut out the pieces on page 3. Using **all ten pieces**, make one BIG shape, draw it in your notebook and find its area in square units in terms of x.
3. Find as many different BIG shapes as you can, including a rectangle, that are made with the 10 pieces joined edge to edge. Draw them and find their areas in square units in terms of x.



4. What do you notice about the areas of the BIG composite shapes?
5. What mathematical relationships can you find from the area of the rectangle made with the 10 pieces?

HELP



Using this diagram, and counting squares, explain how you would work out (4 + 1) multiplied by (2 + 3) in different ways.

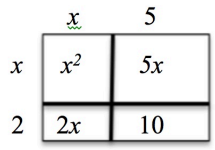
Apply your newly developed method to find different ways to write down the area of the big rectangle made from the 10 pieces shown above.

If you are having difficulties, then think about the importance of subdividing the geometrical shapes into simpler units and then finding their areas.

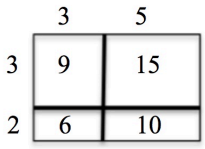
See https://aiminghigh.aimssec.ac.za/grades-7-to-9-partitioning/

NEXT

Compare the algebraic expression $(x + 2)(x + 5)$ to $(3 + 2)(3 + 5)$.



$(x + 2)(x + 5)$
$= x^2 + 5x + 2x + 10$
$= x^2 + 7x + 10$



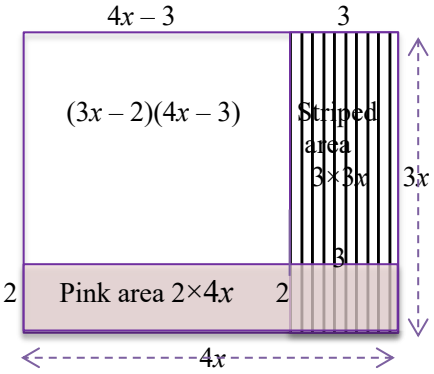
$(3 + 2)(3 + 5)$
$= 9 + 15 + 6 + 10$
$= 40$

Explain how these diagrams illustrate the products of the binomial expressions.

We talk about polynomials that have many terms, but when there are 2 terms we call them *binomial* and when there are 3 terms we call them *trinomial.*

Make up some examples for yourself and work out more problems involving expansion of brackets where all the terms are positive, such as $(3x + 2)(2x + 3)$, using a diagram if you find it helpful.

When you are confident about the method without needing to draw a diagram, then multiply binomials with negative terms such as $(2x - 3)(2x + 4)$. The illustration representing $(3x - 2)(4x - 3)$ is given as an example. Remember the rules that multiplying two positive numbers or two negative numbers gives a positive number and multiplying a positive and a negative gives a negative number.

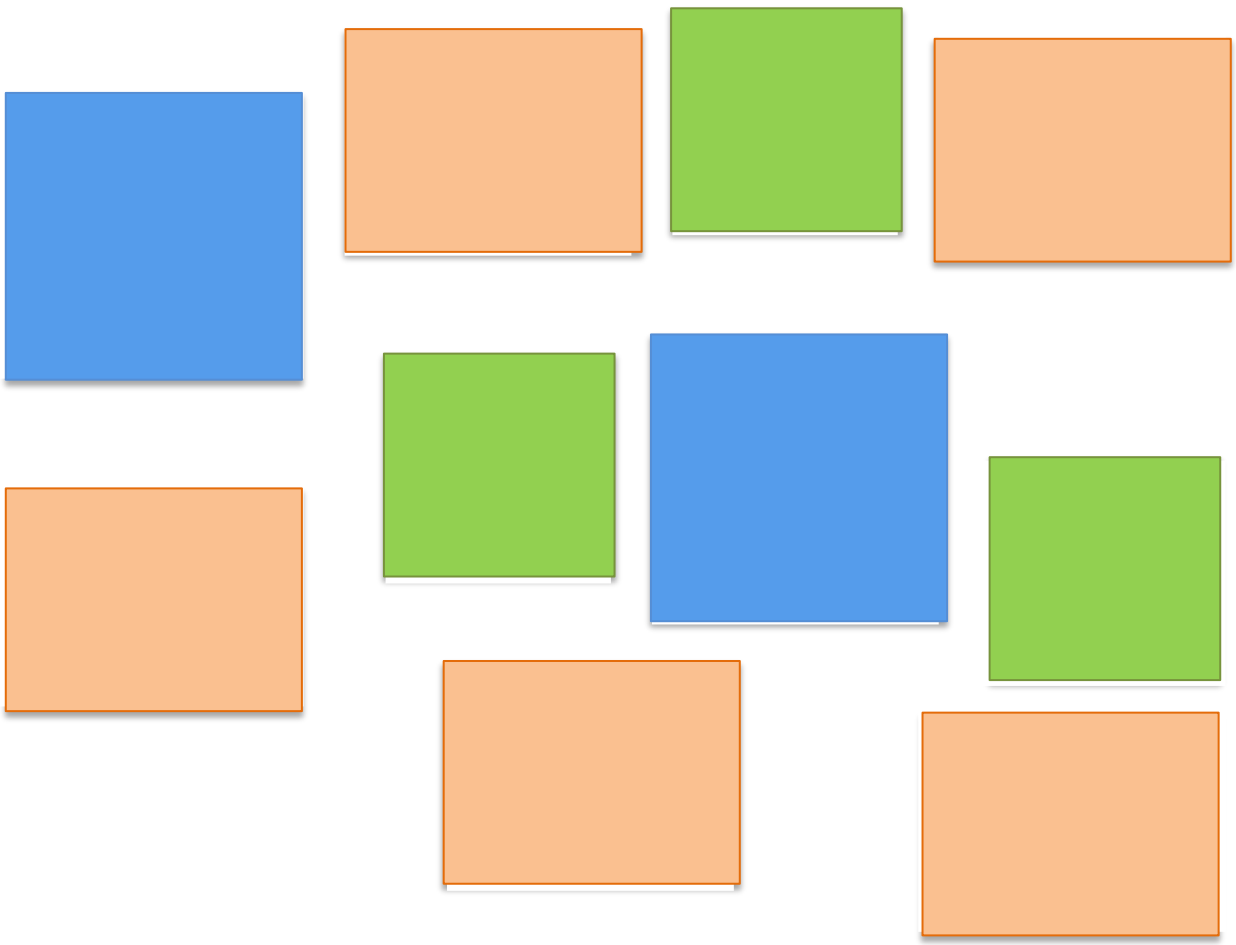


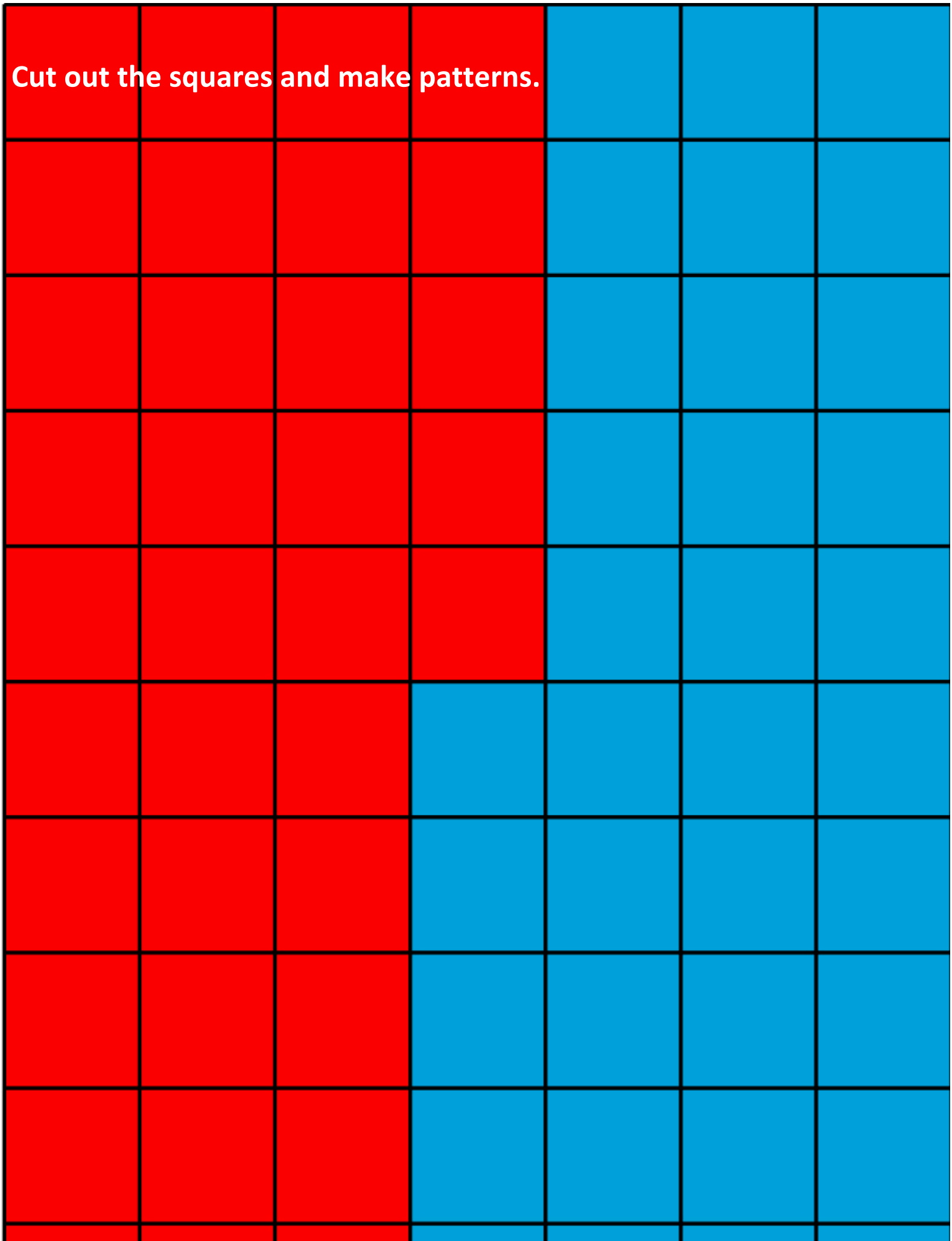
The unshaded area is $(3x – 2)(4x – 3)$, given by the area of the large rectangle minus the pink area, minus the striped area plus the overlapping area that has been deducted twice.

So $(3x – 2)(4x – 3) = 3x \times 4x$
$-2 \times 4x$
$-3 \times 3x$
$+2 \times 3$

COMMON TASK FOR A MIXED-AGE GROUP

Cut out the 10 shapes below.
Solve the puzzle by fitting the smaller pieces into the big rectangle?
Older learners could help younger learners to solve the puzzle.

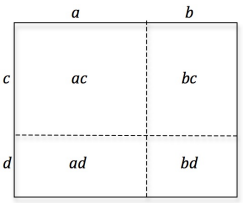



Cut out the squares and make patterns.

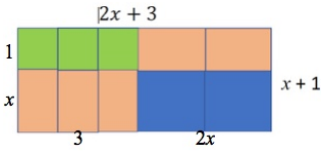
Appendix

List of learning tasks in the Inclusion Guide for School and Home Learning:

1. **Puzzle Activity for All:** Fit the 10 pieces into the rectangular frame (page 3)
2. **Early Years:** Make tiling patterns and rectangles with square tiles (page 4)
3. **Lower Primary:** Do the puzzle and compare it with other patterns made from the 10 pieces by matching edges. Notice that the area stays the same when the pieces move to make different shapes.
4. **Years 7 and 8.** Finding areas of rectangles and composite shapes made from rectangles, some with lengths given in numbers other in terms of x. For example rectangles split into 4 smaller rectangles to show (4 + 1)(2 + 3) and (x + 2)(x + 5)



5. Multiplication of 2 digit numbers using area
   $23 \times 45 = (20\times40) + (20\times5) + (3\times40) + (3\times5) = 800 + 100 + 120 + 15 = 1035$
6. Match expressions with their values e.g. (7 + 2)(5 + 3) = 72
7. Put the Algebrarea jigsaw pieces together to make a rectangle.
8. Area of the rectangle produced from the Algebrarea jigsaw
   $(2x+3)(x+1) = 2x^2 + 5x + 3$



9. **Years 9 and 10:** Multiplication of binomial and trinomial algebraic expressions using area diagrams.
10. Apply the area method for multiplication with negative terms.
11. Apply to areas of land in square metres.
12. Apply to area of a billboard in square centimetres.
13. **Years 11 and 12:** Read information, interpret information in mathematical terms, form a quadratic equation, solve the equation, and interpret and apply it to solve the original problem. For example, from the information given form and solve the equation: (3x + 2)(x + 3) = 66 (see page 15 of Inclusion and Home Learning Gide,).