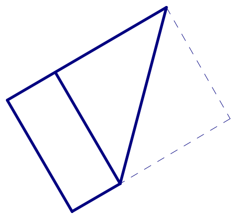
Algebra Activity Masters and Handouts

Activity 1

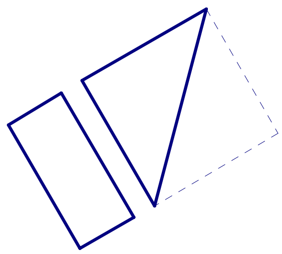
See why $a^2 - b^2 = (a + b)(a - b)$

Use any rectangular shaped piece of paper

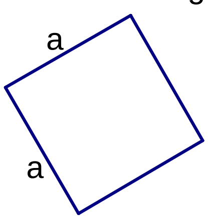
Fold it so a square can be cut from it



Cut the excess "tail" off



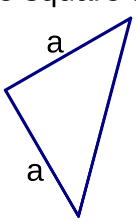
Express the side length of the square in terms of a variable.



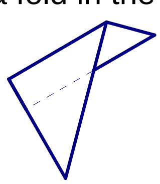
What is the area of the square?

a^2

Fold the square along the previously established diagonal

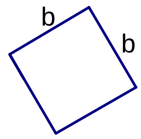


Make a fold in the triangle so it is parallel to one of the legs of the triangle.



Cut along this new fold line and, for the time being, lay the resultant trapezoid to the side. Open the triangle and express the side length of the small square in terms of a variable.

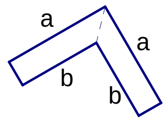
Activity 1 (continued)



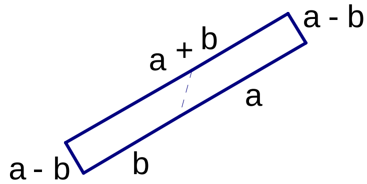
What is the area of the square?

b^2

Open the folded trapezoid to show an L-shaped concave hexagon.



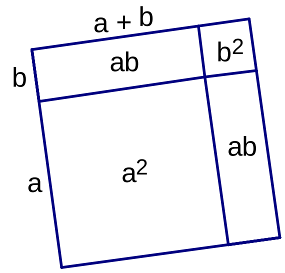
Cut the “L” along the established diagonal. Flip and rotate one of the two trapezoids, placing the two together at the common diagonal to form a rectangle.



The area of this rectangle, in terms of its dimensions, is (a + b)(a – b), which is the same as $a^2 - b^2$ since the area of the little square was subtracted from the area of the initial square.

Activity 2

Show $(a + b)^2 = (a + b)(a + b)$. (Have participants draw and explain their work)



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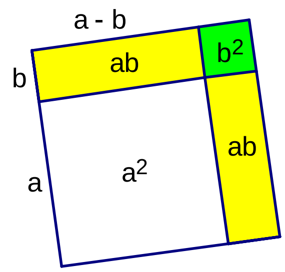
Show $(a - b)^2 = (a - b)(a + b)$. (Have participants draw and explain their work)



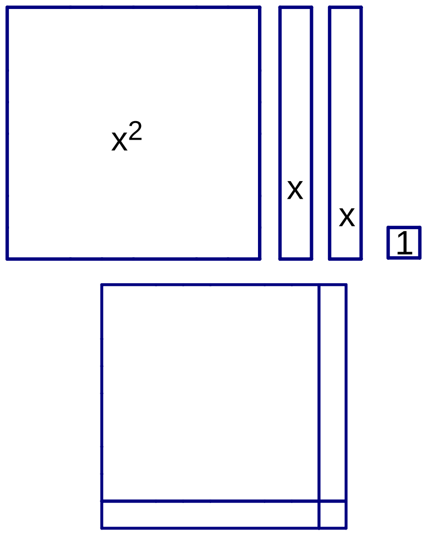
Activity 3

(34)(21) expressed in partial product form, paralleled with (x + 3)(2x + 4). (Have participants do similar examples and explain their work)

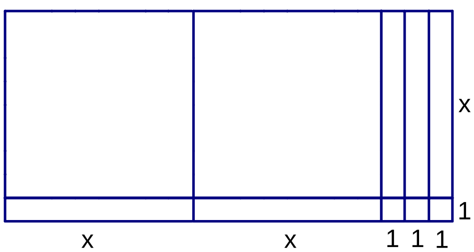
34		$x + 3$	
× 21		$2x + 4$	
4	from 1 × 4	12	from 4 × 3
30	from 1 × 30	$4x$	from 4 × x
80	from 20 × 4	$6x$	from 2x × 3
600	from 20 × 30	x^2	from x × x
714		$x^2 + 4x + 6x + 12$ or $x^2 + 10x + 12$	

Activity 4

Can you build a rectangle using an x^2, two xs, and a unit? (Have participants build the rectangle.)



Can you make a rectangle from two x^2s, five xs, and three 1s? (Have participants build the rectangle. Do additional examples as needed.)



What are the dimensions of the rectangle?

$2x + 3$ long and $x + 1$ high

Activity 5

Have participants do $\dfrac{1234567890}{(1234567891)^2 - (1234567890)(1234567892)}$ (Calculators are acceptable)

Then consider the situation algebraically.

$$\frac{x}{(x + 1)^2 - (x)(x + 2)}$$

Simplifying the denominator gives

$x^2 + 2x + 1 – x^2 – 2x$, which is 1

Activity 6

Sneaky drill

Pick any counting number.	x
Add the next highest counting number.	x + x + 1
Add 9 to the sum.	x + x + 1 + 9 or 2x + 10
Divide this new sum by 2.	$\frac{2x + 10}{2} = x + 5$
Subtract 5.	x + 5 - 5
What did you get?	x
How does this work? Explain algebraically.	

Activity 7

For 30 days your pay is doubled each day, starting with 1¢. How much will you make on day 30? What will your total income be after 30 days? Have participants work the problem. After it is solved, discuss how many used technology or algebra.

Day	Pay For Day	TOTAL Pay
1	1	1
2	2	3
3	4	7
4	8	15
5	16	31
n	2^{n-1}	$2^{n} - 1$

30th day = $5,638,709.12

Total for all 30 days = $10,737,418.23

Without patterning and algebraic, solution difficult (but not impossible)

Activity 8

Show this proof to participants and ask how this can be. If anyone has seen this, ask them to please reserve responding until others have had an opportunity to investigate and discuss the "proof."

Prove 2 = 1

$$A = B$$

$$A^2 = AB$$

$$A^2 - B^2 = AB - B^2$$

$$(A + B)(A - B) = (A - B)B$$

$$\frac{(A + B)(A - B)}{(A - B)} = \frac{(A - B)B}{(A - B)}$$

$$A + B = B$$

$$B + B = B$$

$$2B = B$$

$$2 = 1$$

Dividing by (A – B) is undefined since (A – B) = 0.

Activity 9

These “blocks should be cut out and used to build rectangles to show factoring of trinomials. It is unacceptable to trade 8 little squares for one long rectangle, or at long, thin rectangles for one big square. The 8 to 1 ratio is made only for construction purposes and is not a defined relation. (enlarge as needed)