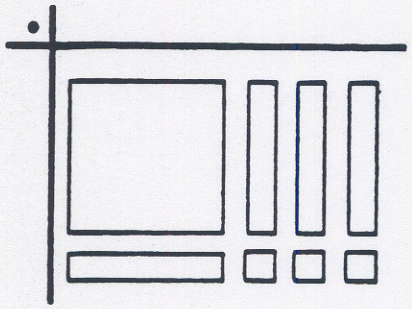
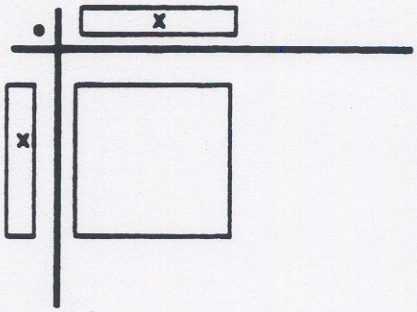
FACTORING TRINOMIALS

Factoring a trinomial is the reverse of multiplication.
Remember that (factor)(factor) = product, therefore product = (factor)(factor).
If a trinomial does not have at least one pair of factors then it is a prime trinomial.

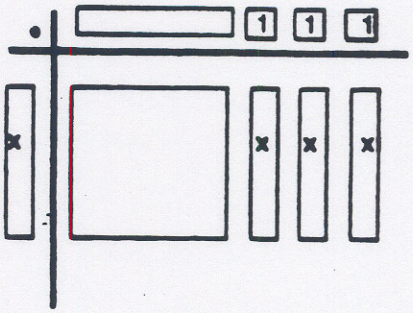
Given the diagram below, find the factors of the trinomial $x^2 + 4x + 3$.



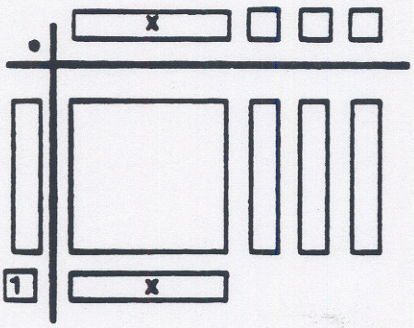
The x^2 comes from $x \cdot x$.



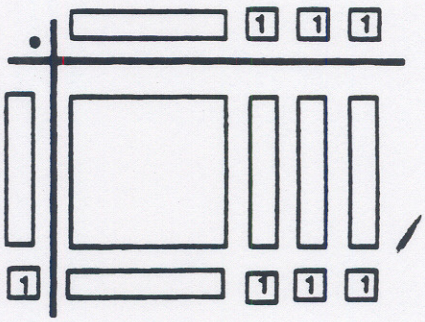
The $3x$ comes from $3 \cdot x$



The $1x$ comes from $1 \cdot x$.



The 3 comes from $1 \cdot 3$



Therefore the factors of $x^2 + 4x + 3$ are $(x + 1)(x + 3)$

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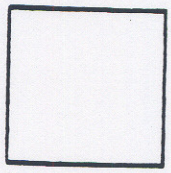
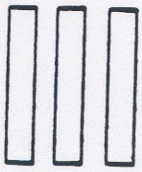
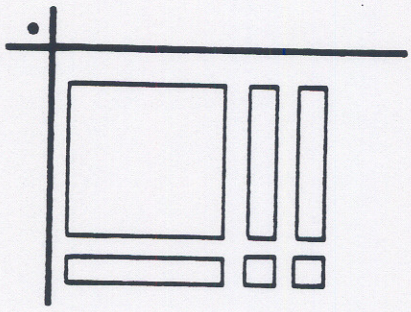
Find the factors of $x^2 + 3x + 2$.

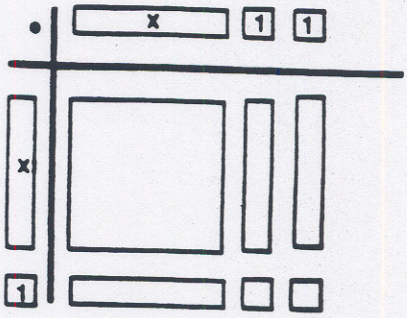
Select the tiles to represent each term.

For x^2  for $3x$  for 2 

Arrange the tiles in a rectangular array.



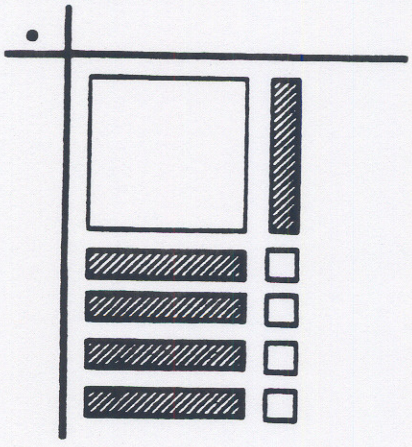
Place the correct tiles on the outside.



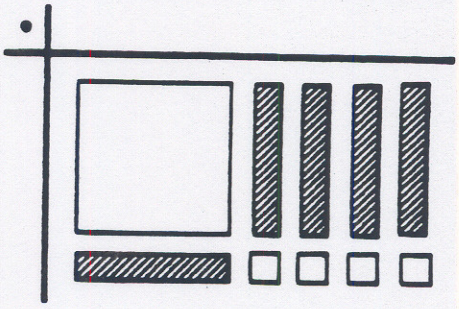
Read the factors: $(x + 1)(x + 2)$.

Factor $x^2 - 5x + 4$

Remember: Select the corresponding pieces and arrange them in a rectangle.



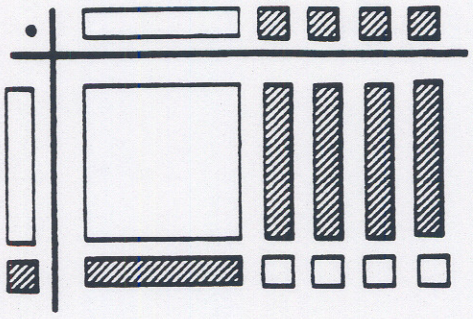
or



Either of these models will work, since multiplication is a commutative operation and the order of the factors will not change the product.

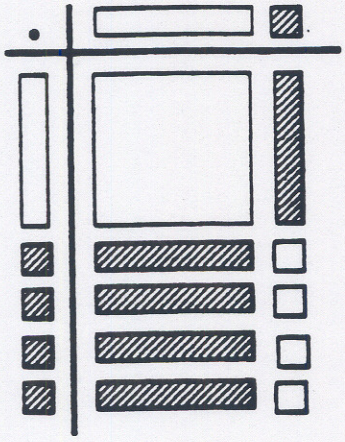
Next, find the factors by selecting the correct tiles for the outside of the grid.

We know to place the x-tiles to multiply to be x^2. To get the $-x$ in the product the units must be negative.



The configuration gives us the proper product since $(-1)(-1) = +1$

The factors are $(x - 1)(x - 4)$.

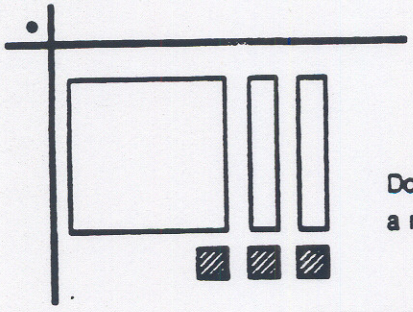


Using this model simply alters the order of the factors. Generally the factor on the vertical is read first and then the factor on the horizontal.

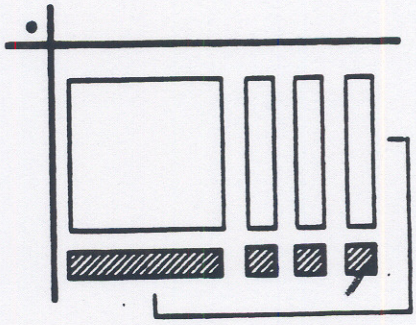
The factors are $(x - 4)(x - 1)$.

Sometime it is necessary to use zero pairs to factor a trinomial.

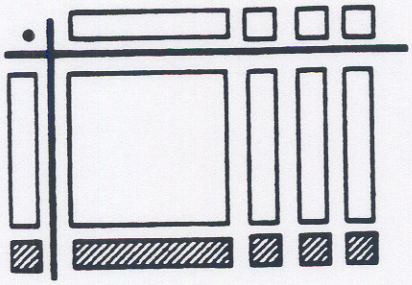
Use a model to factor $x^2 + 2x - 3$.



Does not form a rectangle.



Add in a zero pair.



The factors are $(x - 1)(x + 3)$.

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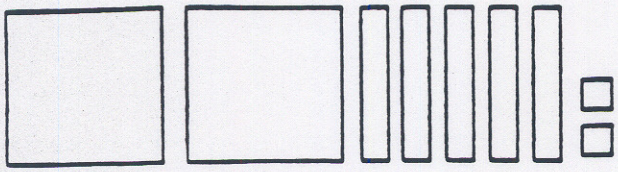
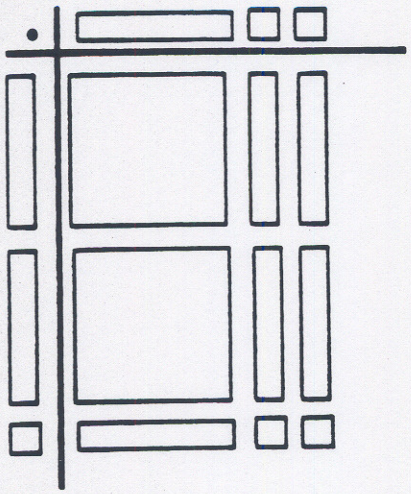
Factor each of these by building a model and finding the factors:

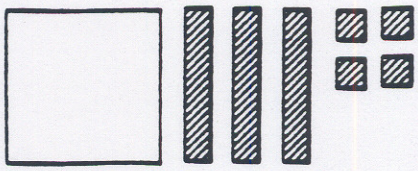
$2x^2 + 5x + 2$

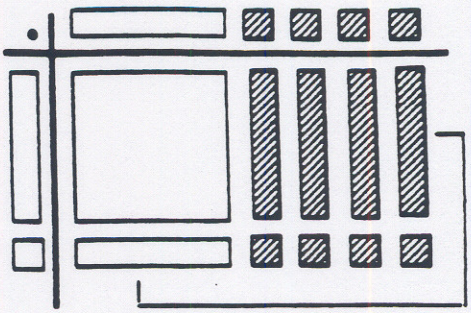




The factors are $(2x + 1)(x + 2)$.

$x^2 - 3x - 4$



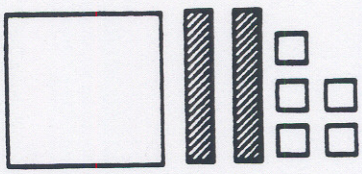


Add a zero pair.

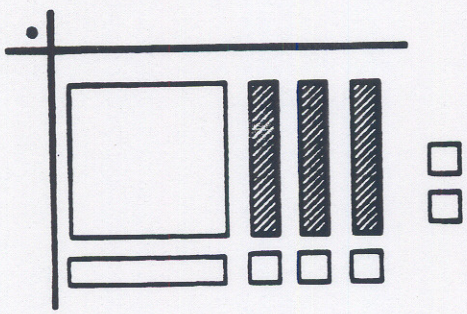
The factors are $(x + 1)(x - 4)$.

If no rectangle can be formed using the corresponding tiles for a trinomial, the trinomial is a prime polynomial.

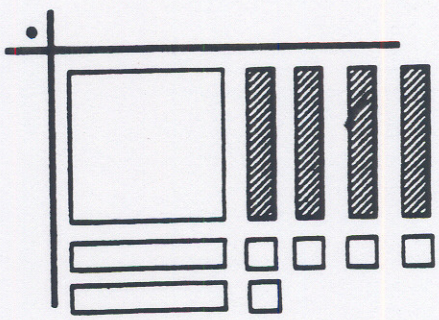
For example: Factor $x^2 - 2x + 5$.



Adding in one zero pair is not enough (two units are left out).



Adding in two zero pairs is too much (three spaces are left).



Since no rectangle can be formed, the trinomial is prime.

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Name _____

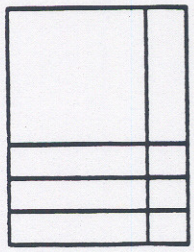
□ = +

▨ = −

Factoring

Write the factored form of these products:

1



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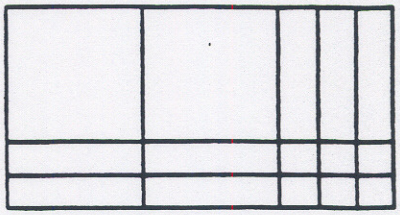
2



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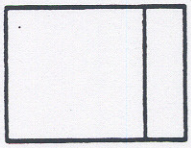

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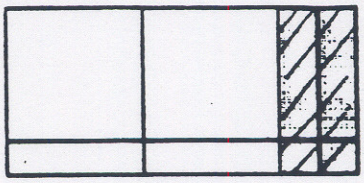

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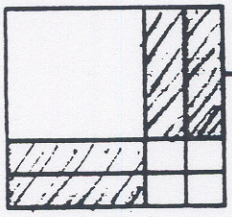

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6

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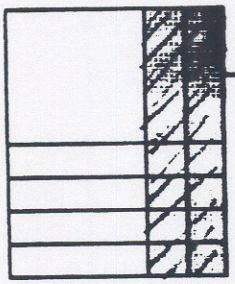

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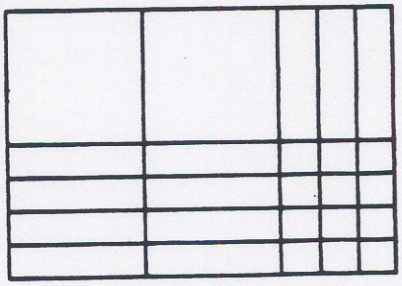

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Name_____

Factoring

Factor each polynomial.

1. $6x + 3y = 3(\underline{?} + y)$

2. $12a^2b + 6a = 6a(\underline{?} + 1)$

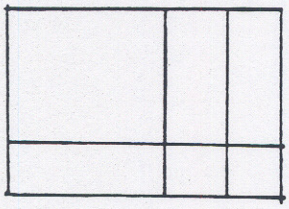
3. $24x^2 + 12y^2$

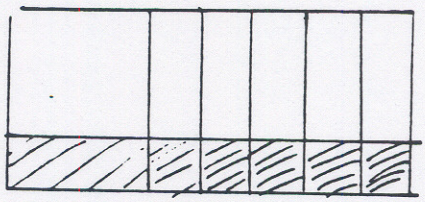
4. $15wx - 35wx^2$

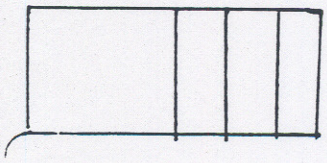
5. $11x + 44x^2y$

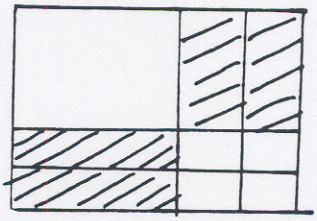
6. $14mn^3 + 2m^4n^5$

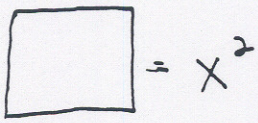
What are the dimensions of the polynomial shown in each?

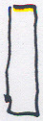
7. 

8. 

9. 

10. 

 $= x^2$

 $= x$

$= 1$ $= -1$