Station 1: Fill in the Blanks

Problem solving

2 Copy and complete each identity, using integer values.

a $\square x^2 - 100 \equiv (3x - \square)(3x + \square)$

b $25y^2 - \square \equiv (\square y - 4)(\square y + 4)$

c $16a^2 - \square b^2 \equiv (\square a - \square b)(\square a + 7b)$

d $\square u^2 - \square \equiv (3u + 2)(3u + \square)$

e $\square t^2 - \square \equiv (3t + 5)(\square t - 20)$

f $\square x^2 - \square \equiv (3x + 4)(6x - \square)$

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5 Copy and complete, using integer values:

a $x^2 - \square x + 12 \equiv (x - 3)(x - \square)$

b $x^2 \square\square x + 16 \equiv (x - 8)(x \square\square)$

c $x^2 - 5x \square\square \equiv (x + \square)(x - 7)$

d $x^2 \square 9x + 20 \equiv (x + 5)(x \square\square)$

e $x^2 \square 10x \square 16 \equiv (x + \square)(x + \square)$

f $x^2 - 5x \square 24 \equiv (x \square\square)(x \square\square)$

Copy and complete each identity, using integer values.

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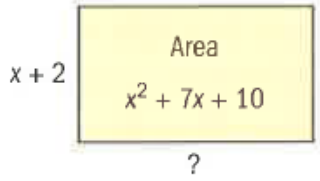
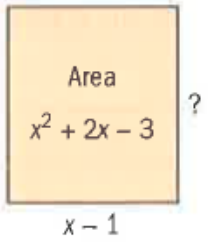
Station 2: Rectangular Areas

Find an expression for the unknown side in these rectangles:

a

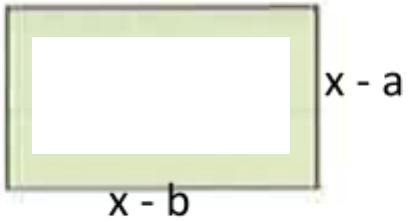


b



Problem 2: Use algebra (don't just guess and check).

A rectangle has area $x^2 \square x + 24$



Its perimeter is $4x - 28$. Find, in terms of x, the lengths of each of its sides.

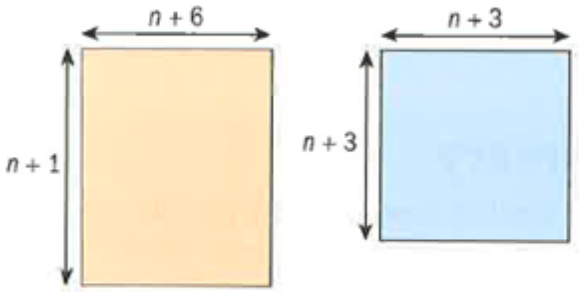
Use the X-Factor method to help find as many possibilities as you can for each quadratic below.

These expressions can be factorized. Determine the different values that could fill the empty boxes.

a $3x^2 + \square x + 2$ **b** $\square x^2 + 9x + 2$ **c** $6x^2 + 10x + \square$

Station 3: Quadratic "Area" Problems

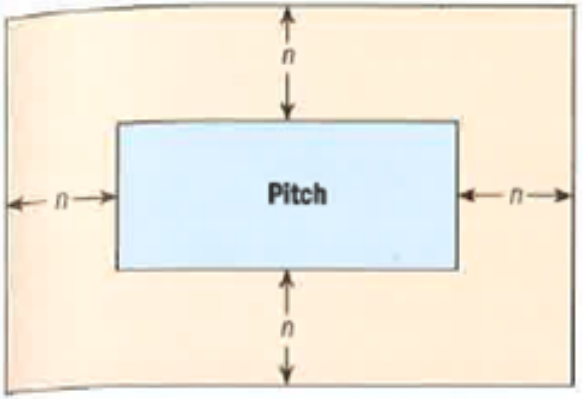
You have two rectangular grids of 1 cm³ cubes, one measuring $n + 1$ by $n + 6$ cm, and the other measuring $n + 3$ by $n + 3$ cm, where n is a positive integer.



a **Find** and simplify an expression for the total number of 1 cm³ cubes in the two rectangular grids combined.

b **Show** that if you take apart the rectangles and recombine the 1 cm³ cubes you will always be able to form a rectangle with no cubes left over (where the rectangle will not simply be a straight line of cubes).

A rectangular sports pitch has a border of n meters on each side. The total area occupied by the pitch and its border is $4n^2 + 28n + 45$.



Find the dimensions of the pitch.

Station 4: Quadratic "Number" Word Problems

Ornella thinks of a whole number, adds four to it, squares the result, and subtracts 9.

a By letting the original number be n, **write down** an expression for this process.

b Hence **show** the number that Ornella obtains can always be written as the product of two integers with a difference of 6.

Dagmar thinks of an even number, squares it, and subtracts 1. By expressing his original number in the form $2n$, or otherwise, **show** that the result of this process can be written as the product of two consecutive odd integers.

STATION 5: Bonus Practice - Review of Factoring Methods

A) Perfect Square Trinomials

a $x^2 + 14x + 49$ **b** $x^2 + 22x + 121$ **c** $x^2 - 12x + 36$

B) Difference of Squares

2 Factorize fully:

a $x^2 - 49$ **b** $x^2 - 169$

c $64 - x^2$ **d** $25x^2 - 4$

e $144x^2 - 81$ **f** $256x^2 - 169$

g $4x^2 - y^2$ **h** $16x^2 - 9y^2$

i $25x^2 - 289y^2$ **j** $x^4 - 16$

k $16x^4 - 1$ **l** $9x^4 - 729y^4$

C) Quadratic Trinomials (a = 1)
Factor out GCF first, then X-Factor

3 Factorize completely:

a $2x^2 + 8x + 6$ **b** $2x^2 + 14x + 20$

c $2x^2 - 12x + 10$ **d** $3x^2 - 9x + 6$

e $2x^2 + 8x - 24$ **f** $3x^2 + 21x - 24$

g $4x^2 - 8x - 32$ **h** $2x^2 - 2x - 40$

D) Quadratic Trinomials (a ≠ 1)
 X-Factor, then Grouping

4 Factorize:

a $2x^2 + 5x + 2$ **b** $2x^2 + 13x + 20$

c $2x^2 - 11x + 12$ **d** $3x^2 - 8x - 3$

e $5x^2 - 12x + 4$ **f** $7x^2 + 38x - 24$

g $6x^2 + 31x + 5$ **h** $6x^2 - 17x + 5$

i $8x^2 + 18x + 9$ **j** $3x^2 + 5x - 12$

Need More Practice?

Always begin by factoring out a GCF (if possible).
Then check: Is it a difference of squares? Is it a perfect square trinomial?
If not, then use X-Factor (with or without Grouping).

a $3a^2 + 6a + 3$ **b** $4b^2 + 2b$ **c** $5c^2 - 10c - 75$

d $6d^2 - 3d$ **e** $4e^2 + 20e - 144$ **f** $3f^2 - 24f + 45$

Fully factorize each expression.

a $x^2 - 25$ **b** $x^2 - 121$ **c** $4x^2 - 9$

d $x^2 - y^2$ **e** $9x^2 - 1$ **f** $x^4 - 1$

g $16x^2 - 169$ **h** $81x^2 - 9$ **i** $25u^2 - 16v^2$

j $16 - 49x^2$ **k** $16 - x^4$ **l** $1 - 81y^4$

6 Factorize:

a $a^2 - 5a - 36$ **b** $16b^2 - 9$

c $c^2 + 11c + 24$ **d** $4d^2 - 17d - 15$

e $4e^2 - 3e$ **f** $f^2 + 2f - 48$

g $3g^2 - 23g + 14$ **h** $16h^2 - 1$

Factorize each quadratic.

a $5x^2 - 9x + 4$ **b** $6x^2 + 7x + 2$ **c** $4x^2 + 8x + 3$

d $6x^2 - 11x + 4$ **e** $8x^2 - 14x - 15$ **f** $12x^2 - 17x + 6$

g $6x^2 + 5x + 1$ **h** $6x^2 + x - 2$ **i** $6x^2 - 5x - 1$