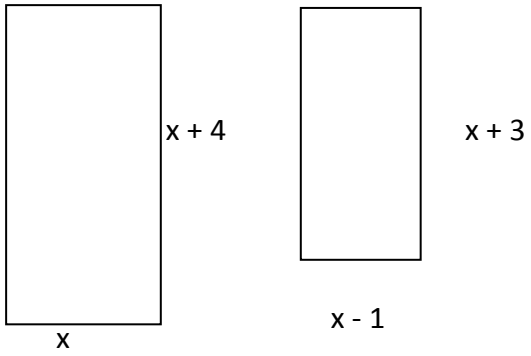
Solving Quadratic Equations and Factoring Expressions

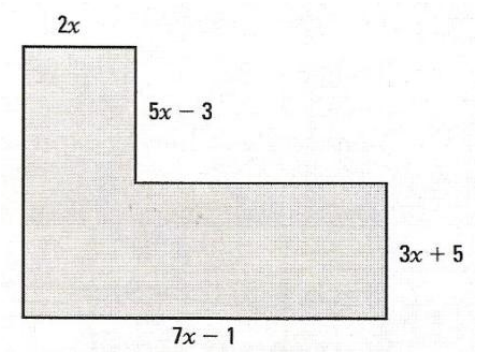
1. The area of the rectangle on the left is 17 cm^2 more than the area of the rectangle on the right. **What is the perimeter of the smaller rectangle**?



2. The area of a rectangular filed is expressed as $A = 6x^2 + 7x - 20$. 7 meters are removed from each side of the field. **What are the new binomial dimensions of the rectangle?** Is there a way that you can <u>verify</u> that your answer is correct

3. Today Jerry is 4 years older than his sister Gloria. In 7 years, the product of their ages will be 621. **How old will Jerry be in ~~2015~~?** 2035 ?

4. The area of the shape below is equal to 171 cm^2. **Determine the perimeter of the figure.**



5. A square-shaped piece of metal has an area of $4x^2 + 28x + 49$ cm^2. 2 cm are added to one side and 5 cm are taken away from the other side**. What trinomial could represent the area of this new piece of metal?** Can this new area be expressed as a product of factors? If so, do it.

6. The dimensions of a rectangular piece of paper are (5x + 1) cm by (13x - 8) cm. A small square that measures 6 cm by 6 cm is cut out of the paper. The remaining area of paper is 162 cm^2. **What are the actual dimensions of the original rectangle (in cm)?**

1. $x(x+4) = (x-1)(x+3) + 17$

$x^2 + 4x = x^2 + 2x - 3 + 17$

$x^2 + 4x = x^2 + 2x + 14$

$4x = 2x + 14$

$2x = 14$

$x = 7$

Perimeter, smaller rectangle $= 2(x-1) + 2(x+3)$

$= 2(6) + 2(10)$

$= 12 + 20$

$= 32\text{ cm}$

2. $A = 6x^2 + 7x - 20$ $\quad m \times n = -120$, $m + n = 7$, $15, -8$

$A = 6x^2 + 15x - 8x - 20$

$A = 3x(2x+5) - 4(2x+5)$

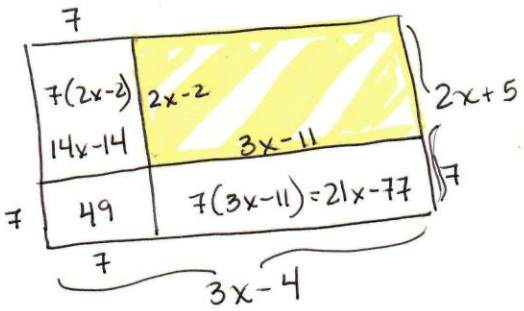
$A = (2x+5)(3x-4)$

New dimensions: $2x + 5 - 7 = 2x - 2$

$3x - 4 - 7 = 3x - 11$

Verification: $(2x-2)(3x-11) = 6x^2 - 22x - 6x + 22$

$= 6x^2 - 28x + 22$



$(6x^2 + 7x - 20) - (21x - 77) - (14x - 14) - 49$

$= 6x^2 + 7x - 20 - 21x + 77 - 14x + 14 - 49$

$= 6x^2 - 28x + 22$ ✓

3.

	Now	Then
Jerry	$x+4$	$x+11$
Gloria	x	$x+7$

$(x+11)(x+7) = 621$

$x^2 + 18x + 77 = 621$

$x^2 + 18x = 544$

$18 \div 2 = 9$

$9^2 = 81$

$x^2 + 18x + 81 = 544 + 81$

$(x+9)^2 = 625$

$x+9 = \pm 25$

$x+9 = 25$ or $x+9 = -25$

$x = 16$ $\quad x = -34$

reject b/c you can't have a negative age

using Z.P.P. $x^2 + 18x - 544 = 0$

$(x+34)(x-16) = 0$

$x = -34 \quad x = 16$

2014 : Jerry : 20
Gloria : 16

2015 : Jerry : 21
Gloria : 17

2035 : J : 41
G : 37

4. (1) + (2) = 171

$2x(5x-3) + (7x-1)(3x+5) = 171$

$10x^2 - 6x + 21x^2 + 35x - 3x - 5 = 171$

$31x^2 + 26x - 5 = 171$

QF may be easier to use.

$31x^2 + 26x - 176 = 0$

$mxn = -5456$

$m+n = 26$

$88, -62$

$31x^2 - 62x + 88x - 176 = 0$

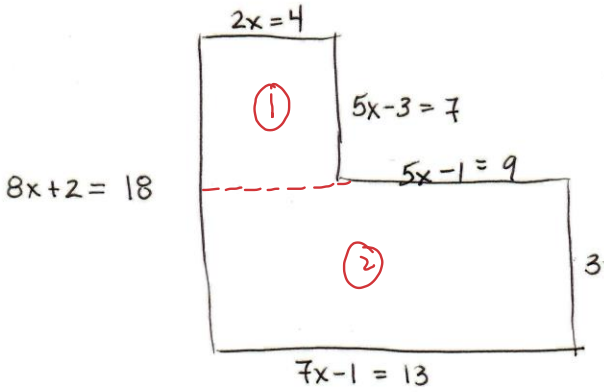
$31x(x-2) + 88(x-2) = 0$

$(x-2)(31x+88) = 0$

$x-2 = 0$ or $31x + 88 = 0$

$x = 2$ $\quad 31x = -88$

$x = -88/31$



Perimeter = 4 + 7 + 9 + 11 + 13 + 18

= 62

5. $4x^2 + 28x + 49$

$= (2x+7)^2$

Side 1: $2x+7+2 = 2x+9$

Side 2: $2x+7-5 = 2x+2$

Area $= (2x+2)(2x+9) = 4x^2 + 22x + 18$

As a product of factors: $2(x+1)(2x+9)$

6. Rectangle: Area $= (5x+1)(13x-8)$

$= 65x^2 - 27x - 8$

Square: Area $= 6 \times 6 = 36\,cm^2$

Area remaining: $162 = 65x^2 - 27x - 8 - 36$

$162 = 65x^2 - 27x - 44$

$0 = 65x^2 - 27x - 206$

$m \times n = -13390$

$m + n = -27$

$+103, -130$

$0 = 65x^2 - 130x + 103x - 206$

$0 = 65x(x-2) + 103(x-2)$

$0 = (x-2)(65x+103)$

$x - 2 = 0$ or $65x + 103 = 0$

$x = 2$ $\quad 65x = -103$

$x = -\frac{103}{65}$

∴ Original dimensions: $5x+1 = 11\,cm$

$13x - 8 = 18\,cm$