Algebra 2

Ch. 5 Handout 5.4

Factoring Quadratic Expressions

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Binomial a polynomial with 2 terms
Ex. 2x + 3

Trinomial a polynomial with 3 terms
Ex. x^2+6x+9

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Rules to Factoring: (must be completely factored - written as a product of terms)

1) Factor out all common factors

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Binomial

2) If an expression has two terms (binomial), check to see if the problem type is:

a) Difference of Squares:

1) Has to be subtraction
2) Both terms have to be perfect squares

$$x^2-y^2=(x+y)(x-y)$$

$$(1st)^2-(2nd)^2=(1st+2nd)(1st-2nd)$$

b) Sum of Cubes:

$$x^3+y^3=(x+y)(x^2-xy+y^2)$$

$$(1st)^3+(2nd)^3=(1st+2nd)((1st)^2-(1st)(2nd)+(2nd)^2)$$

c) Difference of Cubes:

$$x^3-y^3=(x-y)(x^2+xy+y^2)$$

$$(1st)^3-(2nd)^3=(1st-2nd)((1st)^2+(1st)(2nd)+(2nd)^2)$$

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Trinomial

3. If an expression has three terms, check to see if the problem type is a **perfect square trinomial** :

a) $x^2+2xy+y^2=(x+y)(x+y)=(x+y)^2$

$(1st)^2+2(1st)(2nd)+(2nd)^2=(1st+2nd)(1st+2nd)=(1st+2nd)^2$

b) $x^2-2xy+y^2=(x-y)(x-y)=(x-y)^2$

$(1st)^2-2(1st)(2nd)-(2nd)^2=(1st-2nd)(1st-2nd)=(1st-2nd)^2$

If the trinomial is not a trinomial square attempt to factor the trinomial as a general trinomial "Trial & Error"

If last term is positive, (+)(+) or (-)(-)

If last term is negative, (+)(-) or (+)(-)

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4. if an expression has **four or more terms** try to factor it by grouping

5. continue to factor until each individual factor is prime

6. check the results by multiplying

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1. Factor each expression. Check your answers.

a) $\frac{15x^2}{5} + \frac{25x}{5} + \frac{100}{5}$

$5(3x^2 + 5x + 20)$

b) $\frac{8m^2}{4m} + \frac{4m}{4m}$

$4m(2m + 1)$

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c) $x^2 + 14x + 33$ 1·33, 3·11

$(x + 3)(x + 11)$

$11x + 3x = 14x$

$(x+3)(x+11)$

d) $x^2 + 3x - 28$ 1·28, 2·14, 4·7

$(x + 7)(x - 4)$

$+7x - 4x = 3x$

$(x+7)(x-4)$

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e) $6x^2 + 11x - 35$ 1·6, 2·3, 1·35, 5·7

$(2x + 7)(3x - 5)$

$-10x + 21x = 11x$

$(2x+7)(3x-5)$

f) $x^2 - 6x + 8$

$(x - 4)(x - 2)$

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g) $16x^2 - 54x + 45$ 1·16, 2·8, 4·4, 1·45, 3·15, 5·9

$(8x - 15)(2x - 3)$

$-24x + -30x = -54x$

$(8x-15)(2x-3)$

h) $15x^2 - x - 8$ 1·15, 3·5, 1·8, 2·4

~~$(3x + \quad)(5x - \quad)$~~

$15x^2 - x - 8$

prime

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i) $\frac{8x^2}{4} + \frac{44x}{4} + \frac{12}{4}$

$4(2x^2 + 11x + 3)$

j) $\frac{6x^2}{3} + \frac{21x}{3} - \frac{27}{3}$

$3(2x^2 + 7x - 9)$ 1·9, 3·3

$3(2x + 9)(x - 1)$

$-2x + 9x = 7x$

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k) $4x^2+12x+9$ (1·4, 2·2; 1·9, 3·3)

$(2x+3)(2x+3)$

$6x+6x=12x$

l) $64x^2-16x+1$ (1·64, 2·32; 4·16, 8·8)

$(8x-1)(8x-1)$

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A perfect square trinomial is

The difference of two square is

Pull

Pull

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Factoring Perfect Square Trinomials

$a^2+2ab+b^2=(a+b)(a+b)=(a+b)^2$

Example: $x^2+6x+9=(x)^2+2(x)(3)+(3)^2=(x+3)(x+3)=(x+3)^2$

$a^2+2ab+b^2=(a+b)(a+b)=(a+b)^2$

Example: $x^2-6x+9=(x)^2-2(x)(3)+(3)^2=(x-3)(x-3)=(x-3)^2$

Factoring Difference of Two Squares

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

Example: $9x^2-16=(3x-4)(3x+4)$

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Factoring a Perfect Square Trinomial

2. Factor $100x^2+180x+81$

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Factoring a Perfect Square Trinomial

3. Factor $9x^2-42x+49$

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Factoring a Perfect Square Trinomial

3. Factor $25x^2+90x+81$

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Factoring Difference of Two Squares

4. $x^2 - 64$ 5. $4a^2 - 49$

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6. $9c^2 - 16$

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Factor: $12x^3 - 75x$

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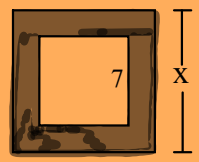
A square photo is enclosed in a square frame, as shown in the diagram. Express the area of the frame (the shaded area) in completely factored form.



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Factor each expression completely.

8. $12x^2 + 6x + 18$ 9. $m^2 + 11m + 18$

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Factor each expression completely.

10. $x^2 - 14x - 15$ 11. $x^2 - 13x + 42$

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Factor each expression completely.

12. $64x^2+144x+81$ 13. $3x^2+5x-50$

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Factor each expression completely.

14. $5k^2-125$ 15. $15n^2-8n+1$

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Assignment:

Day 1 pgs 263-265 1,4,7,10,13,16,19,22, 25,28,31,34, 48-50,67

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