Sec 9-7: Factoring Special Cases:

Factoring the Difference of Perfect Squares:

$\sqrt{a^2} - \sqrt{b^2} = \boxed{(a-b)(a+b)}$

Perfect Squares:

1	
4	49
9	64
16	81
25	100
36	

Factor each.

1. $\sqrt{144Q^2} - \sqrt{25}$

$(12Q+5)(12Q-5)$

2. $81c^4 - 100d^2$

$(9c^2+10d)(9c^2-10d)$

GCF

3. $98k^2 - 128$

$2(49k^2-64)$

$=2(7k-8)(7k+8)$

OR

$=2(7k\pm 8)$

4. $\frac{1}{9}g^2 - \frac{4}{49}$

$\left(\frac{1}{3}g \pm \frac{2}{7}\right)$

Factor. GCF

5. $27w^3 - 75w$

$3w(9w^2-25)$

$3w(3w+5)(3w-5)$

GCF = 9

6. $36g^{10} - 9h^8$

$9(4g^{10}-h^8)$

$=9(2g^5 \pm h^4)$

Factor. $12x^2 - 20x$

Always look for GCF first. Sometimes that is all you can do!

GCF

$4x(3x - 5)$

Expand: $(b + 7)^2$ $b^2 + 14b + 49$

this middle term is just twice the constant.

Factor: $e^2 + 8e + 16$ $\sqrt{16} = 4$

$\times 2$

8

$(e + 4)^2$

If the last number, c, is a perfect square and the middle term is twice the square root of this number, then it always factors into the same factor twice or $(\text{factor})^2$ where the constant inside the factor is the square root of c.

When factoring $ax^2 + bx + c$

If a=1 and c is a perfect square look at b

if b is two times the square root of c...

Factor: $d^2 - 12d + 36$

$(d - 6)^2$

If you don't recognize this pattern you can always factor using the "X" and the "Box"

Factor

$R^2 - 24R + 144$

$(R - 12)^2$

$W^2 + 25W + 100$

100

20 5

25

$(w + 20)(w + 5)$

Expand: $(3m - 8)^2$

$9m^2 - 48m + 64$

The middle coefficient
is found by multiplying a and c
then doubling it.
(3)(-8) = -24 x 2 = -48

Factor: $4k^2 - 20k + 25$

$\sqrt{4}$ $\sqrt{25}$

$2 \cdot 5 = 10$

$(2k - 5)^2$

Since the middle term , 20, is twice
this number it factors into

When factoring $ax^2 + bx + c$

If a and c is are both perfect squares look at b

if b is two times the product of the
square roots of a and c...

Factor: $\sqrt{9H^2} + 24H + \sqrt{16}$

$\sqrt{9} = 3$

$\sqrt{16} = 4$

$3 \cdot 4 = 12$

$\boxed{(3H + 4)^2}$

Since you can double this
product: (2)(12) to get the
middle term of 24 it factors
into a perfect square trinomial.

Factor

$\sqrt{100h^2} - 140h + \sqrt{49}$

$10 \cdot 7 = 70$

$(10h - 7)^2$

As long as the middle term, 140,
is twice the product of the square
roots of a and c then
this is a perfect square trinomial.

If you don't notice this you can
always factor this like any other
trinomial using the "X" and the "Box"

Factor: $\sqrt{9x^2} + 13x + \sqrt{4}$

$3 \cdot 2 = 6$

Since the middle term, 13x, isn't
twice this number you must factor
the way you always would using
the "X" and the "Box".

36, 9, 4, +13

	x	$+1$
$9x$	$9x^2$	$9x$
$+4$	$4x$	$+4$

$\rightarrow \boxed{(x+1)(9x+4)}$

Factor

$\sqrt{64j^2} + 48j + \sqrt{9}$

$8 \cdot 3 = 24 \times 2 = 48$

$(8j + 3)^2$

As long as the middle term, 48, is twice the product of the square roots of a and c then this is a perfect square trinomial.

If you don't notice this you can always factor this like any other trinomial using the "X" and the "Box"

You can now finish Hwk #22
Sec 9-7

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Problems 3, 6, 14, 19, 22, 32, 38, 48, 62