FACTORING

Hawkes Practice:

(1) Factor the following binomial if possible.

$8y^3 + 125x^6$

Signs that this can be factored as sum of cubes:
① y^3 and x^6 are perfect cub
② 8 and 125 are perfect cu
③ it's the sum of two perfect cubes

$\sqrt[3]{8y^3} = \sqrt[3]{8}\sqrt[3]{y^3} = 2y$

$\sqrt[3]{125x^6} = \sqrt[3]{125}\sqrt[3]{x^6} = 5x^2$

$8y^3 + 125x^6$

$= (2y + 5x^2)((2y)^2 - (2y)(5x^2) + (5x^2)^2)$

$= (2y + 5x^2)(4y^2 - 10yx^2 + 25x^4)$

To confirm this:

$(2y + 5x^2)(4y^2 - 10yx^2 + 25x^4)$

$= (2y)(4y^2) - (2y)(10yx^2) + (2y)(25x^4)$

$+ (5x^2)(4y^2) - (5x^2)(10yx^2) + (5x^2)(25x^4)$

$= 8y^3 - 20y^2x^2 + 50yx^4 + 20x^2y^2 - 50yx^4 + 125x^6$

$= 8y^3 + 125x^6$. check ✓

Factorable Trinomials

$x^2 + bx + c$.

To factor this trinomial, start by looking for 2 numbers that multiply to get c, and locate the pair that add to b

Ex ① $x^2 + 7x + 12$

$= (x+3)(x+4)$.

12

1, 12 −1, −12
2, 6 −2, −6
(3, 4) −3, −4

Ex ② $x^2 + 9x + 14$

$= (x+2)(x+7)$

14

1, 14 −1, −14
(2, 7) −2, −7

Ex ③ $x^2 - 12x + 20$

$= (x-2)(x-10)$

20

1, 20 −1, −20
2, 10 (−2, −10)
4, 5 −4, −5

Ex ④ $x^2 - 2x - 35$

$= (x+5)(x-7)$

−35

1, −35 1, −35
(5, −7) −5, 7.

Ex ⑤ $x^2 + 4x - 12$

$= (x-2)(x+6)$

−12

1, −12 −1, 12
2, −6 (−2, 6)
3, −4 −3, 4

Ex ⑥ $x^2 + 2x + 1$

$= (x+1)(x+1)$

$= (x+1)^2$

} perfect square

Ex ⑦ $x^2 - 8x + 16$

$= (x-4)^2$

Ex ⑧ $x^2 + 3x + 5$ is prime. no factoring possible

Factorable Trinomials

$ax^2 + bx + c$.

To factor this trinomial, follow these steps:

(1) multiply $a \cdot c$

(2) find a pair of numbers that multiply to get ac, and add to give b.

(3) replace b with the sum of the pair of numbers that you found in step two

(4) you have four terms now, so factor by grouping.

Ex ① $6x^2+19x+15$.

$6 \cdot 15 = 90$

1, 90	-1, -90
2, 45	-2, -45
3, 30	-3, -30
5, 18	-5, -18
6, 15	-6, -15
9, 10	-9, -10

$= 6x^2 + 9x + 10x + 15$

$= (6x^2 + 9x) + (10x + 15)$

$= 3x(2x+3) + 5(2x+3)$

$= (2x+3)(3x+5)$

Ex ② $20x^2 - 17x + 3$

$20 \cdot 3 = 60$.

$-12, -5$

$= 20x^2 - 12x - 5x + 3$

$= (20x^2 - 5x) - (12x - 3)$

$= 5x(4x-1) - 3(4x-1)$

$= (4x-1)(5x-3)$

Hawkes Practice

(1) Factor the following polynomial.

$$6x^4y + 9x^3 - 12x^3y$$

$$= 3x^3(2xy + 3 - 4y)$$

(2) Consider the following polynomial

$$4y^{11} - y^{12} + 1 + 6y^8$$

① Express the polynomial in descending order

$$-y^{12} + 4y^{11} + 6y^8 + 1$$

② degree?

12

③ leading coefficient

-1