1-4 HW Answer Key

1 & 2. See next page.

3. $2x(x - 2)$
4. $4mn(m - 2n + 3mn)$
5. $(x + 1)(x - 1)$
6. $(5x - 6y)(5x + 6y)$
7. $(x - 3)(x + 4)(x - 4)$
8. $5x^3(x^3 + 3)$
9. $(11x + 5y)(11x - 5y)$
10. $(16x^2 + 1)(4x + 1)(4x - 1)$
11. $(x + 4)(x + 3)(x - 3)$
12. $6rs(5s - 4r + 1)$
13. $y^a(y^a + 1)(y^a - 1)$
14. $9(3x + y)(3x - y)$
15. $-11x^3 + x^2 + 8x + 4$
16. $-3x^3y^4 - 6x^4y^2 + 12x^2y^3 - 9x^2y^2$
17. $10a^2 - 33ab + 27b^2$
18. $-7x^3 + 26x^2 - 10x - 15$

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1. Algebraically prove why $a^2-b^2 = (a+b)(a-b)$ by simplifying the right side.

$a^2-b^2 = a^2+ab-ab-b^2$

$a^2-b^2 = a^2-b^2$ ✓

2. Using a=5 and b=2, show that $a^2-b^2 = (a+b)(a-b)$ is true.

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

$25-4=(7)(3)$

$21=21$ ✓

Factor completely:

3. $2x^2 - 4x$ GCF

$=2x(x-2)$

4. $4m^2n - 8mn^2 + 12m^2n^2$ GCF

$=4mn(m-2n+3mn)$

5. $x^2 - 1$ DOTS

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

6. $25x^2 - 36y^2$ DOTS

$=(5x-6y)(5x+6y)$

7. $x^3 - 3x^2 - 16x + 48$ Grouping

$=x^2(x-3)-16(x-3)$

$=(x-3)(x^2-16)$

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

8. $5x^6 + 15x^3$ GCF

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

9. $121x^2 - 25y^2$ DOTS

$=(11x+5y)(11x-5y)$

10. $256x^4 - 1$ Dbl DOTS

$=(16x^2+1)(16x^2-1)$

$=(16x^2+1)(4x+1)(4x-1)$

11. $x^3 + 4x^2 - 9x - 36$ Group DOTS

$=x^2(x+4)-9(x+4)$

$=(x+4)(x^2-9)$

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

12. $30rs^2 - 24r^2s + 6rs$ GCF

$=6rs(5s-4r+1)$

13. $y^{3a} - y^a$ GCF/DOTS

$=y^a(y^{2a}-1)$

$=y^a(y^a+1)(y^a-1)$

14. $81x^2 - 9y^2$ GCF/DOTS

$=9(9x^2-y^2)$

$=9(3x+y)(3x-y)$

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Simplify by rewriting after ~~Rewrite~~ each polynomial in standard form ~~by~~ applying the operations in the appropriate order.

15. $(2x^2 + 3x + 4) - (11x^3 + x^2 - 5x)$

$=2x^2+3x+4-11x^3-x^2+5x$

$=-11x^3+x^2+8x+4$

16. $-3xy^2(2x^3 + x^2y^2 - 4xy + 3x)$

$=-6x^4y^2-3x^3y^4+12x^2y^3-9x^2y^2$

$=-3x^3y^4-6x^4y^2+12x^2y^3-9x^2y^2$

17. $(2a - 3b)(5a - 9b)$

$=10a^2-18ab-15ab+27b^2$

$=10a^2-33ab+27b^2$

18. $(5 + 5x - 7x^2)(x - 3)$

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

$=5x+5x^2-7x^3-15-15x+21x^2$

$=-7x^3+26x^2-10x-15$

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1-5: Factoring Long and Short Product/Sum

Factoring Trinomials using Product/Sum (with leading coefficient ≠ 1):

Example: Factor the following trinomials using Product/Sum long form.

$xy=30$ $y=\frac{30}{x}$

1. $2x^2 + 13x + 6$

① P: 12 S: 13

Factor pair 12, 1

② Replace the middle term with the factor pair.

③ Group

$2x^2+12x+1x+6$

$2x(x+6)+1(x+6)$

$(x+6)(2x+1)$

2. $6x^2 - 13x + 5$

P: 30 S: −13

−10, −3

$6x^2-10x-3x+5$

$2x(3x-5)-1(3x-5)$

$(3x-5)(2x-1)$

3. $4x^2 + 4x - 3$

P = −12 S = 4

FP = 6, −2

$4x^2+6x-2x-3$

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

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

4. $4x^2 - 4x - 3$

P: −12 S: −4

FP: (−6, 2)

$4x^2-6x+2x-3$

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

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

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5. $3x^2 + 7x + 2$

P: 6 S: 7

6, 1

$3x^2+6x+1x+2$

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

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

6. $3x^2 - 7x + 2$

P: 6 S: −7

(−6, −1)

$3x^2-6x-x+2$

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

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

7. $5x^2 + 2x - 3$

8. $5x^2 - 2x - 3$

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Factoring Trinomials (with leading coefficient = 1):

Example: Factor the following trinomials using Product/Sum short cut.

$y=\frac{40}{x}$

1. $x^2 + 6x + 8$

P: 8 S: 6

4, 2

$=(x+4)(x+2)$

2. $x^2 - 13x + 40$

P: 40 S: −13

−8, −5

$=(x-8)(x-5)$

3. $x^2 - 3x - 40$

P −40 S −3

−8, 5

$y=\frac{-40}{x}$

$(x-8)(x+5)$

4. $x^2 + 3x - 10$

P −10 S 3

−2, 5

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

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5. $x^2 + 7x + 6$

6. $x^2 + 5x + 6$

7. $x^2 + 5x - 6$

8. $x^2 - 6x + 5$

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Factor Completely: $2y^3 + 6y^2 + 4y$

① GCF of $2y$

$\frac{2y^3}{2y} + \frac{6y^2}{2y} + \frac{4y}{2y} = 2y(y^2 + 3y + 2)$

$= 2y(y+2)(y+1)$

P: $\underline{2}$

S: $\underline{3}$

$\underline{2}, \underline{1}$

What is different about this one? Try factoring it.

$x^2 + 2xy - 24y^2$

2 variables

$(x+6y)(x-4y)$

P $\underline{-24}$

S $\underline{2}$

$\underline{6}, \underline{-4}$

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Describe what is different about factoring the following trinomials, and then factor them.

$x^2 + 6x + 8$ and $2x^2 + 13x + 6$

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