WORKSHEET #12 - REVIEW OF ALL TYPES OF FACTORING
*****DO AT LEAST 10 QUESTIONS IN EACH SECTION**

Factoring Practice

I. Greatest Common Factor (GCF)

Find the GCF of the numbers.

$$\begin{gathered}18,\ 30\\ 18 = 2\cdot 3\cdot 3\\ 30 = 2\cdot 3\cdot 5\\ 2\cdot 3 = 6\\ 6 = GCF\end{gathered}$$

1. 12, 18
2. 10, 35
3. 8, 30
4. 16, 24
5. 28, 49
6. 27, 63
7. 30, 45
8. 48, 72

II. Greatest Common Monomial Factor

Factor, write prime if prime.

$$12a^3b + 15ab^3 = 3ab(4a^2 + 5b^2)$$

1. $6x + 3$
2. $24x^2 - 8x$
3. $6x - 12$
4. $2x^2 + 8x$
5. $4x + 10$
6. $10x^2 + 35x$
7. $10x^2y - 15xy^2$
8. $12x^2 - 9x + 15$
9. $3n^3 - 12n^2 - 30n$
10. $9m^2 - 4n + 12$
11. $2x^3 - 3x^2 + 5x$
12. $13m + 26m^2 - 39m^3$
13. $17x^2 + 34x + 51$
14. $18m^2n^4 - 12m^2n^3 + 24m^2n^2$

III. Factoring the Difference of Two Squares

$$a^2 - 36 = (a + 6)(a - 6)$$
$$3x^2 - 48 = 3(x^2 - 16) = 3(x + 4)(x - 4)$$

Factor, write prime if prime.

1. $x^2 - 1$
2. $x^2 - 9$
3. $x^2 + 4$
4. $x^2 - 25$
5. $9y^2 - 16$
6. $4x^2 - 25$
7. $9x^2 - 1$
8. $a^2 - x^2$
9. $25 - m^2$
10. $x^2 - 16y^2$
11. $25m^2 - n^2$
12. $-x^2 + 16$
13. $36m^2 - 121$
14. $2x^2 - 8$
15. $25 + 4x^2$
16. $4a^2 - 81b^2$
17. $12x^2 - 75$
18. $a^2b - b^3$
19. $-98 + 2x^2$
20. $5x^2 - 45y^2$
21. $9x^4 - 4$
22. $16x^4 - y^2$

IV. Factoring Perfect Square Trinomials

$$x^2 - 14x + 49 = (x - 7)^2$$

Factor, write prime if prime.

1. $x^2 + 8x + 16$
2. $x^2 - 16x + 64$
3. $y^2 + 12y + 36$
4. $a^2 - 10a + 25$
5. $16y^2 + 8y + 1$
11. $25a^2 + 60a + 36$
12. $16 + 40x + 25x^2$
13. $16x^2 + 24x + 9$
14. $49x^2 - 14x + 1$
15. $9y^2 - 30y + 25$
6. $9x^2 - 6x + 1$
7. $25x^2 + 10x + 1$
8. $n^2 - 14n + 49$
9. $81x^2 - 90x + 25$
10. $4y^2 - 20y + 25$
16. $n^2 + 2n + 4$
17. $b^2 + 2b + 1$
18. $36x^2 + 84x + 49$
19. $81 - 18x + x^2$
20. $4 - 12y + 9y^2$

VI. Factoring Trinomials: $x^2 + bx + c$

$$x^2 + 7x + 10 = (x)^2 + (2+5)x + (2)(5) = (x+2)(x+5)$$

Factor, write prime if prime.

1. $x^2 + 6x + 8$
2. $c^2 + 5c + 6$
3. $y^2 - 9y + 14$
4. $x^2 - 10x + 16$
5. $a^2 + 12a + 27$
6. $x^2 - 14x + 24$
7. $x^2 - 15x + 36$
8. $y^2 + 21y + 54$
9. $m^2 + 13m - 36$
10. $x^2 - 8x + 15$
11. $y^2 - 4y - 32$
12. $x^2 - x - 6$
13. $y^2 + 3y - 18$
14. $b^2 + 7b - 18$
15. $a^2 + a - 56$
16. $c^2 - 4c - 12$
17. $x^2 - 9x - 36$
18. $y^2 + 4y - 21$
19. $x^2 - 22x - 75$
20. $x^2 - 3x - 40$
21. $45 + 14y + y^2$
22. $x^2 - 13x + 36$

VII. ...More Factoring Trinomials: $x^2 + bx + c$

$$k^2 - k - 20 = (k)^2 + (4 + -5)k + (4)(-5) = (k+4)(k-5)$$

Factor, write prime if prime.

1. $x^2 + 7x + 12$
2. $m^2 + 10m + 21$
3. $y^2 - 7y - 8$
4. $x^2 - 6x + 5$
5. $x^2 + 4x - 32$
6. $x^2 - 2x - 15$
7. $x^2 - 6x + 8$
8. $y^2 + 9y + 18$
9. $3 - 4t + t^2$
10. $v^2 + 12v + 20$
11. $51 - 20k + k^2$
12. $a^2 - 14ab + 24b^2$
13. $y^2 + 6y - 72$
14. $x^2 - 11xy - 60y^2$
15. $15r^2 + 2rs - s^2$
16. $3x^2 + 21xy - 54y^2$ (Hint: Check for GCF)
17. $x^2 - 5xy - 6y^2$
18. $x^2 + 8xy + 12y^2$
19. $y^2 - 7xy + 10x^2$
20. $a^2 - 11ab - 60b^2$

VIII. Factoring Trinomials: $ax^2 + bx + c$

$$2x^2 - 5x - 3 = (2x + 1)(x - 3)$$

Factor, write prime if prime.

1. $2x^2 - 5x - 3$
2. $3x^2 + 10x - 8$
3. $2y^2 + 15y + 7$
4. $7a^2 - 11a + 4$
5. $5n^2 + 17n + 6$
6. $4y^2 + 8y + 3$
7. $3x^2 + 4x - 7$
8. $2x^2 + 13x + 15$
9. $9y^2 + 6y - 8$
10. $6x^2 - 7x - 20$
11. $2n^2 - 3n - 14$
12. $5n^2 + 2n + 7$
13. $10x^2 + 13x - 30$
14. $12y^2 + 7y + 1$
15. $2n^2 + 9n - 5$
16. $2x^2 + 7x + 6$
17. $5a^2 - 42a - 27$
18. $15x^2 - 28x - 32$
19. $8a^2 - 10a + 3$
20. $2y^2 - 3y - 20$

X. Factoring: Putting It All Together

$$5x^2 + 20x - 60 = 5(x^2 + 4x - 12) = 5(x + 6)(x - 2)$$

Factor Completely, write prime if prime.

1. $2x^2 - 8$
2. $2x^2 + 8x + 6$
3. $3n^2 + 9n - 30$
4. $6x^2 - 26x - 20$
5. $2x^2 + 12x - 80$
6. $5t^2 + 15t + 10$
7. $8n^2 - 18$
8. $14x^2 + 7x - 21$
9. $4x^2 + 16x + 16$
10. $18x + 12x^2 + 2x^3$
11. $2x - 2xy^2$
12. $3t^3 - 27t$
13. $24a^2 - 30a + 9$
14. $10x^2 + 15x - 10$
15. $3x^2 - 42x + 147$
16. $4x^4 - 4x^2$

XI. Factoring: By Grouping

1) $x^2 + 3x + 2x + 6$
2) $x^2 + 3x - 5x - 15$
3) $2x^3 - x^2 - 10x + 5$
4) $x^3 + 4x + x^2 + 4$
5) $15x^3 + 5x^2 + 3x + 1$
6) $x^2 + 5x + 4x + 20$
7) $x^2 + 2x + 5x + 10$
8) $x^3 + 10x^2 + 5x + 50$
9) $2x^3 + x^2 + 8x + 4$
10) $20n^3 + 12n^2 + 25n + 15$

ANSWERS:

I. Greatest Common Factor

1. 6
2. 5
3. 2
4. 8
5. 7
6. 9
7. 15
8. 24

II. Greatest Common Monomial Factor

1. $3(2x+1)$
2. $8x(3x-1)$
3. $6(x-2)$
4. $2x(x+4)$
5. $2(2x+5)$
6. $5x(2x+7)$
7. $5xy(2x-3y)$
8. $3(4x^2-3x+5)$
9. $3n(n^2-4n-10)$
10. prime
11. $x(2x^2-3x+5)$
12. $13m(1+2m-3m^2)$
13. $17(x^2+2x+3)$
14. $6m^2n^2(3n^2-2n+4)$

III. Factoring the Difference of Two Squares

1. $(x+1)(x-1)$
2. $(x+3)(x-3)$
3. prime
4. $(x+5)(x-5)$
5. $(3y+4)(3y-4)$
6. $(2x+5)(2x-5)$
7. $(3x+1)(3x-1)$
8. $(a+x)(a-x)$
9. $(5+m)(5-m)$
10. $(x+4y)(x-4y)$
11. $(5m+n)(5m-n)$
12. $(4+x)(4-x)$
13. $(6m+11)(6m-11)$
14. $2(x+2)(x-2)$
15. prime
16. $(2a+9b)(2a-9b)$
17. $3(2x+5)(2x-5)$
18. $b(a+b)(a-b)$
19. $-2(7+x)(7-x)$ *or* $2(x+7)(x-7)$
20. $5(x+3y)(x-3y)$
21. $(3x^2+2)(3x^2-2)$
22. $(4x^2+y)(4x^2-y)$

IV. Factoring Perfect Square Trinomials

1. $(x+4)^2$
2. $(x-8)^2$
3. $(y+6)^2$
4. $(a-5)^2$
5. $(4y+1)^2$
6. $(3x-1)^2$
7. $(5x+1)^2$
8. $(n-7)^2$
9. $(9x-5)^2$
10. $(2y-5)^2$
11. $(5a+6)^2$
12. $(4+5x)^2$
13. $(4x+3)^2$
14. $(7x-1)^2$
15. $(3y-5)^2$
16. prime
17. $(b+1)^2$
18. $(6x+7)^2$
19. $(x-9)^2$
20. $(3y-2)^2$

VI. Factoring Trinomials: $x^2 + bx + c$

1. $(x+4)(x+2)$
2. $(c+2)(c+3)$
3. $(y-7)(y-2)$
4. $(x-8)(x-2)$
5. $(a+9)(a+3)$
6. $(x-12)(x-2)$
7. $(x-12)(x-3)$
8. $(y+18)(y+3)$
9. prime
10. $(x-5)(x-3)$
11. $(y-8)(y+4)$
12. $(x-3)(x+2)$
13. $(y+6)(y-3)$
14. $(b+9)(b-2)$
15. $(a+8)(a-7)$
16. $(c-6)(c+2)$
17. $(x-12)(x+3)$
18. $(y+7)(y-3)$
19. $(x-25)(x+3)$
20. $(x-8)(x+5)$
21. $(y+9)(y+5)$
22. $(x-9)(x-4)$

VII. …More Factoring Trinomials: $x^2 + bx + c$

1. $(x+4)(x+3)$
2. $(m+3)(m+7)$
3. $(y-8)(y+1)$
4. $(x-1)(x-5)$
5. $(x+8)(x-4)$
6. $(x-5)(x+3)$
7. $(x-2)(x-4)$
8. $(y+3)(y+6)$
9. $(t-1)(t-3)$
10. $(v+2)(v+10)$
11. $(3-k)(17-k)$ *or* $(k-3)(k-17)$
12. $(a-2b)(a-12b)$
13. $(y-6)(y+12)$
14. $(x-15y)(x+4y)$
15. $(5r-s)(3r+s)$
16. $3(x-2y)(x+9y)$
17. $(x-6y)(x+y)$
18. $(x+6y)(x+2y)$
19. $(y-5x)(y-2x)$
20. $(a-15b)(a+4b)$

VIII. Factoring Trinomials: $ax^2 + bx + c$

1. $(2x+1)(x-3)$
2. $(3x-2)(x+4)$
3. $(2y+1)(y+7)$
4. $(7a-4)(a-1)$
5. $(5n+2)(n+3)$
6. $(2y+3)(2y+1)$
7. $(3x+7)(x-1)$
8. $(2x+3)(x+5)$
9. $(3y-2)(3y+4)$
10. $(3x+4)(2x-5)$
11. $(2n-7)(n+2)$
12. prime
13. $(2x+5)(5x-6)$
14. $(3y+1)(4y+1)$
15. $(2n-1)(n+5)$
16. $(2x+3)(x+2)$
17. $(5a+3)(a-9)$
18. $(3x-8)(5x+4)$
19. $(2a-1)(4a-3)$
20. $(2y+5)(y-4)$

X. Factoring: Putting It All Together

1. $2(x+2)(x-2)$
2. $2(x+3)(x+1)$
3. $3(n+5)(n-2)$
4. $2(3x+2)(x-5)$
5. $2(x+10)(x-4)$
6. $5(t+1)(t+2)$
7. $2(2n+3)(2n-3)$
8. $7(2x+3)(x-1)$
9. $4(x+2)^2$
10. $2x(3+x)^2$ *or* $2x(x+3)^2$
11. $2x(1+y)(1-y)$
12. $3t(t+3)(t-3)$
13. $3(2a-1)(4a-3)$
14. $5(2x-1)(x+2)$
15. $3(x-7)^2$
16. $4x^2(x+1)(x-1)$

XI. Factoring: By Grouping

1. $(x+3)(x+2)$
2. $(x+3)(x-5)$
3. $(2x-1)(x^2-5)$
4. $(x+1)(x^2+4)$
5. $(3x+1)(5x^2+1)$
6. $(x+5)(x+4)$
7. $(x+2)(x+5)$
8. $(x+10)(x^2+5)$
9. $(2x+1)(x^2+4)$
10. $(5n+3)(4n^2+5)$