

## Math 95--Factoring Worksheet #3--page 1

Name \_\_\_\_\_

Date \_\_\_\_\_

Remember that conjugate pairs multiply to a binomial (called the difference of squares). We're going to use that fact to factor. The difference of squares always factors into conjugate pairs.

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|---|---|
| <p>a. <math>(x+6)(x-6)</math> conjugate pairs<br/> <math>x^2 - 6x + 6x - 36</math><br/> <math>x^2 - 36</math> difference of squares</p> | <p>b. <math>x^2 - 36</math> difference of squares<br/> <math>x^2 + 6x - 6x - 36</math><br/> <math>x(x+6) - 6(x+6)</math><br/> <math>(x+6)(x-6)</math> conjugate pairs</p> |
|---|---|

As we can see, the difference of squares can be factored using grouping. However, the result is always going to be conjugate pairs. We can use that to speed us up and write the answer directly without showing the grouping steps.

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|---|--|
| <p>c. <math>z^2 - 49</math><br/> <math>(z+7)(z-7)</math></p>    | <p>d. <math>m^2 - 196</math><br/> <math>(m+14)(m-14)</math><br/><br/> you can use the square root button to find<br/> <math>\sqrt{196} = 14</math></p> |
| <p>e. <math>4y^2 - 25</math><br/> <math>(2y+5)(2y-5)</math></p> | <p>f. However, the sum of squares is prime:<br/> <math>x^2 + 16</math> won't factor; prime.</p>  |

You can also divide out a GCF before you begin. You might also need to factor more at the end.

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|---|---|
| <p>g. <math>45y^2 - 20</math><br/> <math>5(9y^2 - 4)</math><br/> <math>5(3y+2)(3y-2)</math></p> | <p>h. <math>2y^4 - 32</math><br/> <math>2(y^4 - 16)</math><br/> <math>2(y^2 + 4)(y^2 - 4)</math><br/> <math>2(y^2 + 4)(y+2)(y-2)</math></p> |
|---|---|

This worksheet will be a mixture of this type of factoring with all the other types we've done so far.

Factor.

- |                  |                   |                   |
|------------------|-------------------|-------------------|
| 1. $x^2 - 1$     | 2. $a^2 - 4$      | 3. $m^2 - 9$      |
| 4. $z^2 - 16$    | 5. $y^2 - 25$     | 6. $k^2 - 36$     |
| 7. $b^2 - 49$    | 8. $c^2 - 64$     | 9. $w^2 - 81$     |
| 10. $x^2 - 100$  | 11. $4y^2 - 9$    | 12. $16z^2 - 25$  |
| 13. $81a^2 - 49$ | 14. $36m^2 - 121$ | 15. $25z^2 - 4$   |
| 16. $2x^2 - 8$   | 17. $3k^2 - 75$   | 18. $5w^2 - 45$   |
| 19. $4a^2 - 16$  | 20. $4b^2 - 36$   | 21. $25c^2 - 100$ |

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22.  $x^2 - y^2$                       23.  $x^2 - 25y^2$                       24.  $a^2 - 36m^2$
25.  $49y^2 - 25z^2$                       26.  $81a^2 - 4b^2$                       27.  $18x^2 - 8y^2$
28.  $x^2 + 4$                       29.  $a^2 + 25$                       30.  $z^2 + 49$
31.  $x^4 - 4$                       32.  $a^4 - 9$                       33.  $m^4 - 25$
34.  $x^4 - 16$                       35.  $y^4 - 81$                       36.  $2w^4 - 2$
37.  $x^2y^2 - 4$                       38.  $a^2b^2 - 25$                       39.  $36a^2b^2 - 49x^2y^2$
40.  $25 - x^2$                       41.  $100 - m^2$                       42.  $36 - y^2$
43.  $a^2(a^2 + 6a + 8) - 25(a^2 + 6a + 8)$                       44.  $z^2(z^2 - 49) - 100(z^2 - 49)$
45.  $5m^2(m^2 - 36) - 12m(m^2 - 36) + 4(m^2 - 36)$                       46.  $y^2 - 5y - 24$
47.  $2z^3 + 14z^2 + 20z$                       48.  $-m^2 - 6m + 27$
49.  $x^2(x^2 - 100) - 16(x^2 - 100)$                       50.  $-50x^2 - 40xy - 8y^2$
51.  $x^4 - 36$                       52.  $x^4 + 81$
53.  $x^2 + 10x + 25$                       54.  $y^2 + 12y + 36$
55.  $m^2 - 14m + 49$                       56.  $z^2 - 16z + 64$
57.  $4x^2 + 12x + 9$                       58.  $9a^2 - 24a + 16$

**Answer Key.** I'll show answers only unless I feel I should show more details.

1.  $(x+1)(x-1)$                       2.  $(a+2)(a-2)$                       3.  $(m+3)(m-3)$
4.  $(z+4)(z-4)$                       5.  $(y+5)(y-5)$                       6.  $(k+6)(k-6)$
7.  $(b+7)(b-7)$                       8.  $(c+8)(c-8)$                       9.  $(w+9)(w-9)$
10.  $(x+10)(x-10)$                       11.  $(2y+3)(2y-3)$                       12.  $(4z+5)(4z-5)$
13.  $(9a+7)(9a-7)$                       14.  $(6m+11)(6m-11)$                       15.  $(5z+2)(5z-2)$
16.  $2(x+2)(x-2)$                       17.  $3(k+5)(k-5)$                       18.  $5(w+3)(w-3)$

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|-----|--|-----|--|-----|---|
| 19. | $4(a+2)(a-2)$  | 20. | $4(b+3)(b-3)$  | 21. | $25(c+2)(c-2)$  |
| 22. | $(x+y)(x-y)$   | 23. | $(x+5y)(x-5y)$   | 24. | $(a+6m)(a-6m)$  |
| 25. | $(7y+5z)(7y-5z)$   | 26. | $(9a+2b)(9a-2b)$   | 27. | $2(3x+2y)(3x-2y)$                                       |
| 28. | can't factor   | 29. | can't factor   | 30. | can't factor  |
| 31. | $(x^2+2)(x^2-2)$   | 32. | $(a^2+3)(a^2-3)$   | 33. | $(m^2+5)(m^2-5)$  |
| 34. | $(x^2+4)(x^2-4)$<br>$(x^2+4)(x+2)(x-2)$  | 35. | $(y^2+9)(y^2-9)$<br>$(y^2+9)(y+3)(y-3)$  | 36. | $2(w^4-1)$<br>$2(w^2+1)(w^2-1)$<br>$2(w^2+1)(w+1)(w-1)$ |
| 37. | $(xy+2)(xy-2)$   | 38. | $(ab+5)(ab-5)$   | 39. | $(6ab+7xy)(6ab-7xy)$                                    |
| 40. | $(5+x)(5-x)$<br>or<br>$-1(x+5)(x-5)$   | 41. | $(10+m)(10-m)$<br>or<br>$-1(m+10)(m-10)$   | 42. | $(6+y)(6-y)$<br>or<br>$-1(y+6)(y-6)$                    |
| 43. | $(a+4)(a+2)(a+5)(a-5)$   | 44. | $z^2(z^2-49) - 100(z^2-49)$<br>$(z^2-49)(z^2-100)$<br>$(z+7)(z-7)(z+10)(z-10)$           |     |   |
| 45. | $(m+6)(m-6)(5m-2)(m-2)$  | 46. | $(y+3)(y-8)$   |     |   |
| 47. | $2z(z+5)(z+2)$   | 48. | $-1(m+9)(m-3)$ or $-(m+9)(m-3)$  |     |   |
| 49. | $(x+10)(x-10)(x+4)(x-4)$   | 50. | $-2(5x+2y)(5x+2y)$   |     |   |
| 51. | $(x^2+6)(x^2-6)$   | 52. | prime  |     |   |
| 53. | $(x+5)(x+5)$ or $(x+5)^2$  | 54. | $(y+6)(y+6)$ or $(y+6)^2$  |     |   |
| 55. | $(m-7)(m-7)$ or $(m-7)^2$  | 56. | $(z-8)(z-8)$ or $(z-8)^2$  |     |   |
| 57. | $4x^2+12x+9$<br>$4x^2+6x+6x+9$<br>$2x(2x+3)+3(2x+3)$<br>$(2x+3)(2x+3)$ or $(2x+3)^2$ | 58. | $9a^2-24a+16$<br>$9a^2-12a-12a+16$<br>$3a(3a-4)-4(3a-4)$<br>$(3a-4)(3a-4)$ or $(3a-4)^2$ |     |   |