

Factoring Worksheet Key

1. $8x^3 + 12x^2 + 2x + 3$
 $(8x^3 + 12x^2) + (2x + 3)$
 $4x^2(2x + 3) + 1(2x + 3)$
 $(2x + 3)(4x^2 + 1)$

factor by grouping

2. $3x(x+4)^5 + 27x^2(x+4)^2$
 $3x B^5 + 27x B^2$
 $3x B^2 [B^{5-2} + 9]$
 $3x B^2 (B^3 + 9)$
 $3x (x+4)^2 ((x+4)^2 + 9)$

let $B = (x+4)$

3. $(x+1)^3 - 27y^3$
 $B^3 - 27y^3$
 $(B-3y)(B^2 + B \cdot 3y + (3y)^2)$
 $(B-3y)(B^2 + 3By + 9y^2)$
 $((x+1)-3y)((x+1)^2 + 3(x+1)y + 9y^2)$
 $(x+1-3y)((x+1)^2 + 3(x+1)y + 9y^2)$

let $B = (x+1)$
use: difference of cubes

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

4. $(x+4)^2 - 2(x+4) - 8$
 $B^2 - 2B - 8$
 $(B-4)(B+2)$
 $((x+4)-4)((x+4)+2)$
 $(x+4-4)(x+4+2)$

Let $B = (x+4)$

5. $81 - (x+y)^2$
 $81 - B^2$
 $(9-B)(9+B)$
 $(9-(x+y))(9+(x+y))$
 $(9-x-y)(9+x+y)$

Let $B = (x+y)$

Factoring Worksheet Key Page 2

6. $(x+1)^{1/2} - (x+1)^{3/2}$ let $B = (x+1)$
 $B^{1/2} - B^{3/2}$
 $B^{1/2} (B^{1/2-1/2} - B^{3/2-1/2})$
 $B^{1/2} (B^0 - B)$
 $(x+1)^{1/2} (1 - (x+1))$
 $(x+1)^{1/2} (1 - x - 1)$
 $(x+1)^{1/2} (-x)$

7. $x^{-5} y^4 - x^3 y^{-3}$
 $x^{-5} y^{-3} (y^{4-(-3)} - x^{3-(-5)})$
 $x^{-5} y^{-3} (y^7 - x^8)$

8. $x^5 (y-2)^4 - x^3 (y-2)^{-3}$ let $B = (y-2)$
 $x^5 B^4 - x^3 B^{-3}$
 $x^3 B^{-3} (x^2 B^{4-(-3)} - 1)$
 $x^3 B^{-3} (x^2 B^7 - 1)$
 $x^3 (y-2)^{-3} (x^2 (y-2)^7 - 1)$

9. $(x+2)^{-1/2} (y-2)^{3/4} - (x+2)^{1/2} (y-2)^{-1/4}$ let
 $A = (x+2)$
 $B = (y-2)$
 $A^{-1/2} B^{3/4} - A^{1/2} B^{-1/4}$
 $A^{-1/2} B^{-1/4} (B^{3/4-(-1/4)} - A^{1/2-(-1/2)})$
 $A^{-1/2} B^{-1/4} (B - A)$
 $(x+2)^{-1/2} (y-2)^{-1/4} ((y-2) - (x+2))$
 $(x+2)^{-1/2} (y-2)^{-1/4} (y-2-x-2)$
 $(x+2)^{-1/2} (y-2)^{-1/4} (y-x-4)$

Factoring Worksheet Key - page 3

10)

let
 $A = (x^2 - 1)$
 $B = (y - 2)$

$$6x(x^2 - 1)^{-1/2}(y - 2)^{3/4} - 12x^{-2}(x^2 - 1)^{1/2}(y - 2)^{-1/4}$$

$$6x A^{-1/2} B^{3/4} - 12x^{-2} A^{1/2} B^{-1/4}$$

$$6x^{-2} A^{-1/2} B^{-1/4} (x^{1-2} B^{3/4-1/4} - 2 A^{1/2-1/2})$$

$$6x^{-2} A^{-1/2} B^{-1/4} (x^{-1} B - 2A)$$

$$6x^{-2} (x^2 - 1)^{-1/2} (y - 2)^{-1/4} (x^3 (y - 2) - 2(x^2 - 1))$$