Unit 2

Name _____ Date _____ Period Key

Unit 2 Test Review

Factor the following polynomials. Multiply to check your answers.

1. $x^2 - 81$ DIF. OF SQ.

$a=x \quad b=9$

$(x+9)(x-9)$

2. $x^3 + 125$ SUM OF CUBES

$a=x \quad b=5$

$(x+5)(x^2-5x+25)$

3. $x^2 + 16x + 60$ Short cut

x	+
60	16
10	6

$(x+10)(x+6)$

4. $10x^2 - 11x - 6$ Grouping

x	+
-60	-11
-15	4

$10x^2+4x-15x-6$

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

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

5. $x^2 - 14x + 49$ Short cut

x	+
49	-14
-7	-7

$(x-7)(x-7)$

or

$(x-7)^2$

6. $64x^3 - 27y^3$ DIF OF CUBES

$a=4x \quad b=3y$

$(4x-3y)(16x^2+12xy+9y^2)$

7. $25x^2 - 15x$ GCF

$5x(5x-3)$

8. $108y^3 - 32$ GCF

$4(27y^3-8)$ DIF OF CUBES

$a=3y \quad b=2$

$4(3y-2)(9y^2+6y+4)$

9. $64x^2 - 25y^2$ DIF OF SQ.

$a=8x \quad b=5y$

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

10. $5x^2 - 52x + 20$ Grouping

x	+
100	-52
-50	-2

$5x^2-50x-2x+20$

$5x(x-10)-2(x-10)$

$(5x-2)(x-10)$

11. $9y - 18$ GCF

$9(y-2)$

12. $20x^2 + 22x - 12$ GCF

$2(10x^2+11x-6)$ Grouping

$10x^2+15x-4x-6$

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

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

x	+
-60	11
15	+4

Write the **common denominator** in factored form.

13. $\frac{4}{x-1} - \frac{10}{x+2}$

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

14. $\frac{5x}{2x+6} + \frac{3}{x+3}$

$2(x+3)$

$2(x+3)$

15. $\frac{2}{4x^2+12x} + \frac{5x}{x^2+x-6}$ ← shortcut

$4x(x+3)$ $(x+3)(x-2)$

x	+
-6	1
3	-2

$4x(x+3)(x-2)$

Simplify the following expressions. **Do the operation that is asked.** Do NOT multiply answers, leave them in factored form.

16. $\frac{3x^2+13x-10}{3x-2}$ ← Grouping

x	+
-30	13
10	3
15	-2

$3x^2+15x-2x-10$

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

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

$\frac{(3x-2)(x+5)}{(3x-2)}$

$x+5$

17. $\frac{8x}{x-2} - \frac{16}{x-2} = \frac{8x-16}{x-2} = \frac{8(x-2)}{(x-2)}$

$= 8$

18. $\frac{x^2+5x}{x^2-49} + \frac{5x+21}{x^2-49} = \frac{x^2+10x+21}{x^2-49}$ shortcut DF SQ

$= \frac{(x+7)(x+3)}{(x+7)(x-7)}$

$= \frac{x+3}{x-7}$

19. $\frac{5}{x-2} - \frac{4}{x-3}$ LCD: $(x-2)(x-3)$

$\frac{5(x-3)}{(x-3)} - \frac{4(x-2)}{(x-2)}$

$\frac{5x-15}{(x-3)(x-2)} + \frac{-4x+8}{(x-3)(x-2)} = \frac{x-7}{(x-3)(x-2)}$

20. $\frac{x^2+3x-10}{4x^2-9x+2} \cdot \frac{16x-4}{x^2+5x}$ $(x-2)(x+5)$ $4(4x-1)$ grouping $(4x-1)(x-2)$ $x(x+5)$ $= \boxed{\frac{4}{x}}$

21. $\frac{x+2}{x^2+6x+8}$ SH. CUT $\begin{array}{c|cc} x & 8 & 6 \\ \hline 4 & 2 \end{array}$ $(x+2)(x+4)$ $\boxed{\frac{1}{x+4}}$

$4x^2-9x+2$ $\begin{array}{c|cc} x & 8 & -9 \\ \hline -8 & 1 \end{array}$ $4x^2-8x-x+2$ $4x(x-2)-1(x-2)$ $(4x-1)(x-2)$

22. $\frac{x^2+8x-20}{x^2+6x-40} \div \frac{x^2-x}{x^2+x-1}$ short cut $\begin{array}{c|cc} x & 10 & -4 \\ \hline 10 & 1 \end{array}$ $\frac{(x+10)(x-2)}{(x+10)(x-4)} \cdot \frac{(x-1)}{x(x-1)} = \boxed{\frac{x-2}{x(x-4)}}$

23. $\frac{12x}{4x+8} \cdot \frac{x^2+5x+6}{x^2+3x}$ SH. CUT GCF $4(x+2)$ GCF $x(x+3)$ $(x+2)(x+3)$ $\boxed{3}$

24. $\frac{x^2+6x+9}{x+3} \div \frac{2x+6}{x^2-9}$ SH. CUT GCF DIF OF SQ. $\frac{(x+3)(x+3)}{(x+3)} \cdot \frac{(x+3)(x-3)}{2(x+3)}$ $\boxed{\frac{(x+3)(x-3)}{2}}$

25. $\frac{10}{4x-12} + \frac{4}{2x-6}$ $\cdot 2$ LCD $= 4(x-3)$ $4(x-3)$ $2(x-3)\cdot 2$ $\frac{10}{4(x-3)} + \frac{8}{4(x-3)} = \frac{18}{4(x-3)} = \frac{9}{2} = \boxed{\frac{9}{2(x-3)}}$

26. $\frac{(x+1)(x-4)}{x^2+5x+4} + \frac{2(x+1)}{x^2-16}$ LCD: $(x+4)(x-4)(x+1)$ $(x+4)(x+1)$ $(x-4)(x+4)$ $\frac{x^2-4x+x-4}{(x+4)(x+1)(x-4)} + \frac{2x+2}{(x+4)(x-4)(x+1)} = \frac{x^2-x-2}{(x+4)(x-4)(x+1)}$ $(x-2)(x+1)$ $\boxed{\frac{x-2}{(x+4)(x-4)}}$

27. $\frac{12x-18}{x^2-5x-24} \div \frac{4x^2-9}{2x^2-13x-24}$ $\frac{6(2x-3)}{(x-8)(x+3)} \cdot \frac{(2x+3)(2x-3)}{(2x+3)(x-8)}$ DIF OF SQ. FLIP $a=2x$ $b=3$ $\begin{array}{c|cc} x & 48 & -13 \\ \hline 8 & 6 \\ -16 & 3 \end{array}$ $2x^2-13x-24$ $2x^2-16x+3x-24$ $2x(x-8)+3(x-8)$ $(2x+3)(x-8)$ $\boxed{\frac{6}{x+3}}$

28. $\frac{x^3-64}{x^3+64} \div \frac{x^2-16}{x^2-4x+16}$ DIF OF CUBES $a=x$ $b=4$ SUM OF CUBES $a=x$ $b=4$ DIF OF SQ. $a=x$ $b=4$ SHORT CUT $\begin{array}{c|cc} x & -4 & +4 \\ \hline -4 & 1 \end{array}$ $\frac{(x-4)(x^2+4x+16)}{(x+4)(x^2-4x+16)} \cdot \frac{x^2-4x+16}{(x+4)(x-4)} = \boxed{\frac{x^2+4x+16}{(x+4)^2}}$