

Name \_\_\_\_\_

Advanced Algebra  
Factoring Test Review

Factor Each Expression Completely:

$$1) (12n^3 + 8n^2) \div (21n + 14)$$
$$4n^2(3n+2) \div (3n+2)$$
$$\boxed{(4n^2+7)(3n+2)}$$

$$2) p^4 + p^2 - 90$$

$$(p^2+10)(p^2-9)$$
$$\boxed{(p^2+10)(p+3)(p-3)}$$

$$\begin{array}{r} -90 \\ 10 \quad -9 \\ \hline 1 \end{array}$$

$$3) 2x^2 - 34x + 140$$

$$2(x^2 - 17x + 70)$$
$$\boxed{2(x-10)(x-7)}$$

$$\begin{array}{r} 70 \\ -10 \quad -7 \\ \hline -17 \end{array}$$

$$4) 6k^2 + 11k - 7$$

$$(6k^2 + 14k) - 7(3k - 7)$$
$$2k(3k+7) - 1(3k+7)$$
$$\boxed{(2k-17)(3k+7)}$$

$$\begin{array}{r} -42 \\ 14 \quad -3 \\ \hline 11 \end{array}$$

$$5) 20x^2 - 5$$

$$5(4x^2 - 1)$$
$$\boxed{5(2x+1)(2x-1)}$$

$$6) 4a^3 + 43a^2 + 30a$$

$$a(4a^2 + 43a + 30)$$
$$(4a^2 + 40a) + (3a + 30)$$
$$4a(a+10) + 3(a+10)$$
$$\boxed{a(4a+3)(a+10)}$$

$$\begin{array}{r} 120 \\ 40 \quad 3 \\ \hline 43 \end{array}$$

$$7) (56x^3 - 24x^2) \div (21x + 9)$$

$$8x^2(7x-3) \div 3(7x-3)$$
$$\boxed{(8x^2-3)(7x-3)}$$

$$8) 75x^8 - 3y^6$$

$$3(25x^8 - y^6)$$
$$\boxed{3(5x^4+y^3)(5x^4-y^3)}$$

$$9) 5m^4 - 5m^3 - 280m^2$$

$$5m^2(m^2 - m - 56)$$
$$\boxed{5m^2(m-8)(m+7)}$$

$$\begin{array}{r} -56 \\ -8 \quad 7 \\ \hline -1 \end{array}$$

$$10) (3x^3 + 8x^2) \div (3x - 8)$$

$$x^2(3x+8) \div (3x+8)$$
$$(x^2-1)(3x+8)$$
$$\boxed{(x+1)(x-1)(3x+8)}$$

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11)  $40x^2 - 52x + 12$

$$\begin{array}{r} 30 \\ -10 \times -13 \\ -3 \end{array}$$

$$\begin{aligned} &4(10x^2 - 13x + 3) \\ &(10x^2 - 10x)(-3x + 3) \\ &10x(x-1) - 3(x-1) \\ &\boxed{4(10x-3)(x-1)} \end{aligned}$$

12)  $5d^3 + 4d^2 - d$

$$\begin{array}{r} -5 \\ 5 \times -1 \\ 4 \end{array}$$

$$\begin{aligned} &d(5d^2 + 4d - 1) \\ &(5d^2 + 5d)(-d - 1) \\ &5d(d+1) - 1(d+1) \\ &\boxed{d(5d-1)(d+1)} \end{aligned}$$

13)  $14x^2 + 30x + 16$

$$\begin{array}{r} 56 \\ 7 \times 8 \\ 16 \end{array}$$

$$\begin{aligned} &2(7x^2 + 15x + 8) \\ &(7x^2 + 7x)(8x + 8) \\ &7x(x+1) \quad 8(x+1) \\ &\boxed{2(7x+8)(x+1)} \end{aligned}$$

14)  $75x^4 - 25x^3 - 30x^2 + 10x$

$$\begin{aligned} &\boxed{5x} (15x^3 - 5x^2 - 6x + 2) \\ &5x^2(3x-1) - 2(3x-1) \\ &\boxed{5x(5x^2-2)(3x-1)} \end{aligned}$$

Divide:

15)  $(m^3 - 2m^2 - 10m + 20) \div (m - 2)$

16)  $(12x^3 - 8x^2 - 19x - 8) \div (x + 1)$

$$\begin{array}{r} 2 \overline{) 1 \ -2 \ -10 \ 20} \\ \underline{\downarrow 2 \quad 0 \ -20} \\ 1 \quad 0 \ -10 \ \underline{20} \end{array}$$

$\boxed{m^2 - 10}$

$$\begin{array}{r} -1 \overline{) 12 \ -8 \ -19 \ -8} \\ \underline{\downarrow -12 \quad 20 \ -1} \\ 12 \ -20 \quad 1 \ \underline{-9} \end{array}$$

$\boxed{12x^2 - 20x + 1 + \frac{-9}{x+1}}$

17)  $(3x^4 - 2x - 5) \div (x + 4)$

$$\begin{array}{r} -4 \overline{) 3 \quad 0 \quad 0 \quad -2 \quad -5} \\ \underline{\downarrow -12 \quad 48 \quad -192 \quad 776} \\ 3 \quad -12 \quad 48 \quad -194 \quad \underline{771} \end{array}$$

$\boxed{3x^3 - 12x^2 + 48x - 194 + \frac{771}{x+4}}$