

Divide the following polynomials by the *monomial* given (split them up).

$$1) \frac{12x^5 - 15x^4 - 18x^3}{3x^2}$$

$$= \frac{12x^5}{3x^2} - \frac{15x^4}{3x^2} - \frac{18x^3}{3x^2}$$

$$= 4x^3 - 5x^2 - 6x$$

$$2) \frac{4a^7b^6 - 6a^6b^8 + 12a^2b^{10}}{2a^2b^6}$$

$$= \frac{4a^7b^6}{2a^2b^6} - \frac{6a^6b^8}{2a^2b^6} + \frac{12a^2b^{10}}{2a^2b^6}$$

$$= 2a^5 - 3a^4b^2 + 6b^4$$

$$3) \frac{12x^3 + 6x^2 - 5x + 4}{-6x}$$

$$= \frac{12x^3}{-6x} - \frac{6x^2}{-6x} - \frac{5x}{-6x} + \frac{4}{-6x}$$

$$= -2x^2 - x + \frac{5}{6} - \frac{2}{3x}$$

Divide using *long division*.

$$4) \begin{array}{r} 2a^2 + 5a + 2 - \frac{5}{3a-2} \\ 3a-2 \overline{) 6a^3 + 11a^2 - 4a - 9} \\ \underline{-6a^3 + 4a^2} \\ 15a^2 - 4a \\ \underline{-15a^2 + 10a} \\ 6a - 9 \\ \underline{-6a + 4} \\ -5 \end{array}$$

$$5) (x^3 - 13x - 12) \div (x - 4)$$

$$\begin{array}{r} x^2 + 4x + 3 \\ x-4 \overline{) x^3 + 0x^2 - 13x - 12} \\ \underline{-x^3 + 4x^2} \\ 4x^2 - 13x \\ \underline{-4x^2 + 16x} \\ 3x - 12 \\ \underline{-3x + 12} \\ 0 \end{array}$$

Divide using synthetic division (remember to switch the sign of the number that goes in the box).

$$6) (x^3 + 4x^2 - 7x - 14) \div (x - 2)$$

$$7) (x^4 - 2x^2 - 6x + 15) \div (x + 5)$$

$$8) \frac{3x^2 - 15x + 9}{x - 4}$$

$$\boxed{2} \begin{array}{r} 1 \quad 4 \quad -7 \quad -14 \\ \underline{2 \quad 12 \quad 10} \\ 1 \quad 6 \quad 5 \quad -4 \end{array}$$

$$\boxed{-5} \begin{array}{r} 1 \quad 0 \quad -2 \quad -6 \quad 15 \\ \underline{-5 \quad 25 \quad -115 \quad 605} \\ 1 \quad -5 \quad 23 \quad -121 \quad 620 \end{array}$$

$$\boxed{4} \begin{array}{r} 3 \quad -15 \quad 9 \\ \underline{12 \quad -12} \\ 3 \quad -3 \quad -3 \end{array}$$

$$= x^2 + 6x + 5 - \frac{4}{x-2}$$

$$= x^3 - 5x^2 + 23x - 121 + \frac{620}{x+5}$$

$$= 3x - 3 - \frac{3}{x-4}$$

Divide the following polynomials using whatever method you feel is appropriate.

9) $\frac{c^2+10c+24}{c+8}$

$\boxed{-8}$
$$\begin{array}{r} 1 \quad 10 \quad 24 \\ -8 \quad -16 \\ \hline 1 \quad 2 \quad 8 \end{array}$$

 $= c + 2 + \frac{8}{c+8}$

10) $(4a^3 - 8a^2 + a)(4a)^{-1}$

$$= \frac{4a^3}{4a} - \frac{8a^2}{4a} + \frac{a}{4a}$$

 $= a^2 - 2a + \frac{1}{4}$

11) $\frac{3x^3 - 5x^2 - 17x - 12}{x-4}$

$\boxed{4}$
$$\begin{array}{r} 3 \quad -5 \quad -17 \quad -12 \\ 12 \quad 28 \quad 44 \\ \hline 3 \quad 7 \quad 11 \quad 32 \end{array}$$

 $= 3x^2 + 7x + 11 + \frac{32}{x-4}$

12) $(6n^3 + 5n^2 + 2n + 9) \div (2n + 3)$

$$\begin{array}{r} 3n^2 - 2n + 4 - \frac{3}{2n+3} \\ 2n+3 \overline{) 6n^3 + 5n^2 + 2n + 9} \\ \underline{6n^3 - 9n^2} \\ -4n^2 + 2n \\ \underline{4n^2 + 6n} \\ 8n + 9 \\ \underline{-8n - 12} \\ -3 \end{array}$$

13) $\frac{x^4 - 6x^3 + 3x - 9}{x+3}$

$\boxed{-3}$
$$\begin{array}{r} 1 \quad -6 \quad 0 \quad 3 \quad -9 \\ -3 \quad 27 \quad -81 \quad 234 \\ \hline 1 \quad -9 \quad 27 \quad -78 \quad 225 \end{array}$$

 $= x^3 - 9x^2 + 27x - 78 + \frac{225}{x+3}$

14) $\frac{8xy + 2x^2}{2x^2}$

$$= \frac{8xy}{2x^2} + \frac{2x^2}{2x^2}$$

 $= \frac{4y}{x} + 1$

The remaining problems should be review from sections 3-1 & 3-2. Simplify each. Hint: #19,20 are not FOIL problems.

15) $\frac{60a^9}{(15a^6)(4a^3)}$

16) $\frac{-8n^{15}}{(-2n^5)^3}$

17) $\frac{4}{\frac{28g^4}{7g^5}}$

18) $\frac{3}{(3r)^{-1}}$

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

20) $\frac{-m-1}{(5m - 3n + 1) - (6m - 3n + 2)}$

21) $\frac{2x^2 - 10x - 28}{(2x + 4)(x - 7)}$

22) $\frac{5}{\text{The degree for: } 6 + 2y^5 - y^3 + 9y^2}$