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Math 30 – Exam 3 Instructor: Y. Petersen

Name Key

1. a) Write the polynomial $-6x + 5x^3 - 2x^2 + 7 - x^5$ in descending order.

$-x^5 + 5x^3 - 2x^2 - 6x + 7$

b) What is the degree of the polynomial?

5 or 5th

c) What is the coefficient of the leading term?

-1

2. Simplify: $2^{-3} + (-39)^0$

$\frac{1}{2^3} + 1 = \frac{1}{8} + 1 = 1\frac{1}{8}$ or $\frac{9}{8}$

3. Simplify: $(x^3 - 18x^2 + 11) + (x^3 + 13x - 15)$

$$\begin{array}{r} x^3 - 18x^2 \quad\quad + 11 \\ +x^3 \quad\quad +13x - 15 \\ \hline 2x^3 - 18x^2 + 13x - 4 \end{array}$$

4. Simplify: $(-7a + 4b - 1) - (3a - 8b - 13)$

$$\begin{array}{r} -7a + 4b - 1 \\ -3a + 8b + 13 \\ \hline -10a + 12b + 12 \end{array}$$

5. Simplify: $(-3xy^2)(4x^2y^7)$

$-3 \cdot 4 \cdot x \cdot x^2 \cdot y^2 \cdot y^7$

$= -12x^3 \cdot y^9$

6. Simplify: $\left(\frac{-2ab^7}{c^2}\right)^3 = \frac{(-2)^3 \cdot a^3 \cdot (b^7)^3}{(c^2)^3}$

$= \frac{-8a^3b^{21}}{c^6}$

7. Simplify completely: $\frac{3^{-2}x^3y^{-2}}{2x^5y^4} = \frac{x^3}{3^2 \cdot y^2 \cdot 2x^5y^4}$

$= \frac{x^3}{9 \cdot 2 \cdot x^5y^2y^4} = \frac{1}{18x^2y^6}$

8. a) Convert to scientific notation: 0.000407

4.07×10^{-4}

b) Convert to standard form: 8.37×10^5

$8.37000 = 837,000$

9. A raindrop weights about 0.000005 pounds. A car is hit by about 30,000,000 drops in a storm.

a) Write these 2 numbers in scientific notation.

$.000005 = 5 \times 10^{-6}$ $30,000,000 = 3 \times 10^7$

b) Multiply the numbers to find the weight of water that hits the car.

$5 \times 10^{-6} \times 3 \times 10^7 = 15 \times 10^1 = 150$ lb

10. Simplify: $2x^3(-3x^2 - x + 5)$

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

$= -6x^5 - 2x^4 + 10x^3$

11. Simplify: $(7x^2 - 2x + 1)(x^2 - 5x - 2)$

Vertical:

$7x^2 - 2x + 1$

$x^2 - 5x - 2$

$-14x^2 + 4x - 2$

$-35x^3 + 10x^2 - 5x$

$7x^4 - 2x^3 + x^2$

$7x^4 - 37x^3 - 3x^2 - x - 2$

12. Simplify: $(y + \frac{1}{4})(y - \frac{1}{4})$

$(A+B)(A-B) = A^2 - B^2$

$= y^2 - (\frac{1}{4})^2 = y^2 - \frac{1}{16}$

$A = y$

$B = \frac{1}{4}$

13. Simplify: $(3a + 4b)^2$

$(A+B)^2 = A^2 + 2AB + B^2$

$= (3a)^2 + 2(3a)(4b) + (4b)^2$

$= 9a^2 + 24ab + 16b^2$

$A = 3a$

$B = 4b$

14. Write the area as a simplified polynomial:

$(6x^2 - 13x - 28)$

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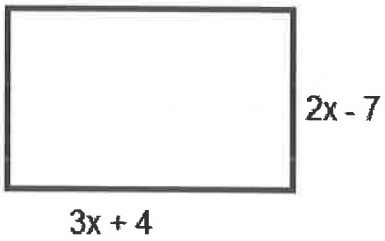
Area = L · W



$A = (3x+4)(2x-7)$

$= 6x^2 - 21x + 8x - 28$

$= 6x^2 - 13x - 28$

15. Divide: $\dfrac{12a^2b + 8ab - 6a^4}{-2a}$

$= \dfrac{12a^2b}{-2a} + \dfrac{8ab}{-2a} - \dfrac{6a^4}{-2a}$

$= -6ab - 4b + 3a^3$

16. Divide: $\dfrac{2x^2+7x-15}{x+5}$

$$\begin{array}{r} 2x-3 \\ x+5 \overline{)\,2x^2+7x-15} \\ -(2x^2+10x) \\ \hline -3x-15 \\ -3x-15 \\ \hline 0 \end{array}$$

$\frac{2x^2}{x} = 2x$

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

Answer: $2x-3$

17. Divide: $\dfrac{x^3+3x^2-11x+5}{x-2}$

$$\begin{array}{r} x^2+5x-1 \\ x-2 \overline{)\,x^3+3x^2-11x+5} \\ -(x^3-2x^2) \\ \hline 5x^2-11x+5 \\ -(5x^2-10x) \\ \hline -x+5 \\ -(-x+2) \\ \hline 3 \end{array}$$

$\frac{x^3}{x} = x^2$

$\frac{5x^2}{x} = 5x$

$\frac{-x}{x} = -1$

Answer: $x^2+5x-1+\frac{3}{x-2}$

Bonus Problem (4 pts): Write in factored form: $4x^3 - 12x^2 + 28x$

$4x(x^2-3x+7)$