

Name

KEY

Instructions: Show all work. If you are using your calculator to solve, you may sketch a graph or indicate keys pressed to show work. Exact values: do not use decimals in your answers unless the problem begins with decimals, or is a word problem. All answers should be fully reduced for full credit. Draw diagrams to help organize the data (this is worth partial credit). If you do your work on scrap paper, you should indicate that directly on the test paper along with your final answer. It is preferable, if you can, to do work directly on the test.

1. For each of the problems below do the following:
 - a. Perform the indicated operations (be careful not to confuse addition with multiplication and vice versa) and simplify the result. (6 points)
 - b. State the type polynomial it is: monomial, binomial, trinomial, or polynomial (1 point)
 - c. State the degree of each polynomial (1 point)

i. $(y^3 - 2y + 1) - (-2y^3 + 3y + 5)$

$$y^3 - 2y + 1 + 2y^3 - 3y - 5$$

$$3y^3 - 5y - 4$$

trinomial
degree 3

ii. $-2(-3a^3b^2)^2 \left(\frac{3}{2}ab^4\right)^3$

$$-2(9a^6b^4) \left(\frac{27}{8}a^3b^{12}\right)$$

$$-\frac{243}{4}a^9b^{16}$$

monomial
degree 25

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iii.

$$4w(2w^2 + w - 7)$$

$$8w^3 + 4w^2 - 28w$$

trinomial
degree 3

iv.

$$(n - 9)(n + 5)$$

$$n^2 + 5n - 9n - 45$$

$$n^2 - 4n - 45$$

trinomial
degree 2

v.

$$(3r + 5s)(2r + 3s)$$

$$6r^2 + 9rs + 10rs + 15s^2$$

$$6r^2 + 19rs + 15s^2$$

trinomial
degree 2

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vi. $(3x^2 - 1)(3x^2 + 1)$

$$9x^4 - 1$$

binomial
degree 4

vii. $(b + 1)(b - 1)(b + 3)$ [Hint: Do two of them, and then multiply the result by the third.]

$$(b^2 - 1)(b + 3)$$

$$b^3 + 3b^2 - b - 3$$

polynomial
degree 3

2. Simplify the expressions. Your final answers should have only positive exponents. (6 points each)

a. $\frac{5}{(2m)^{-3}}$

$$= 5(2m)^3 = 5 \cdot 8m^3 = 40m^3$$

b. $\left(\frac{2}{3}y^{-2}z\right)\left(\frac{2}{3}y^{-2}z^5\right)$

$$\frac{2}{3}y^{-4}z^6 = \frac{2z^6}{3y^4}$$

c. $7x^0 - 7^0$

$$7(1) - (1) = 7 - 1 = 6$$

d. $\frac{(-2a^{-3}b^2)^{-4}}{5a^2b^2c^0}$

$$\frac{(-2)^{-4}a^{12}b^{-8}}{5a^2b^2(1)} = \frac{a^{12}}{5(-2)^4a^2b^2b^8} = \frac{a^{10}}{80b^{10}}$$

↑
16

3. Divide. You **may** need to use long division. If there is a remainder, write your answer in $\text{Quotient} + \frac{\text{Remainder}}{\text{Divisor}}$ form. (6 points each)

a. $\frac{16m^3 + 8m^2 - 4}{8m^2}$

$$\frac{16m^3}{8m^2} + \frac{8m^2}{8m^2} - \frac{4}{8m^2}$$

$$2m + 1 - \frac{1}{2m^2}$$

b. $\frac{x^3 - x^2 + 8}{x + 1}$

$$\begin{array}{r}
 x^2 - 2x + 2 \\
 \hline
 x+1 \overline{) x^3 - x^2 + 0x + 8} \\
 \underline{-x^3 + x^2} \\
 -2x^2 + 0x \\
 \underline{+2x^2 + 2x} \\
 2x + 8 \\
 \underline{-2x - 2} \\
 6
 \end{array}$$

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

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

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

$$x^2 - 2x + 2 + \frac{6}{x+1}$$

c. $\frac{x^2 + 4x - 32}{x - 4}$

$$\begin{array}{r}
 x + 8 \\
 \hline
 x-4 \overline{) x^2 + 4x - 32} \\
 \underline{-x^2 - 4x} \\
 8x - 32 \\
 \underline{8x - 32} \\
 0
 \end{array}$$

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

$$\frac{8x}{x} = 8$$

$$x + 8$$

d. $\frac{4x^3 - 3x^2 + x + 1}{2x - 5}$

$$\begin{array}{r}
 2x^2 + \frac{7}{2}x + \frac{37}{4} \\
 \hline
 2x - 5 \overline{) 4x^3 - 3x^2 + x + 1} \\
 \underline{-4x^3 + 10x^2} \\
 7x^2 + x \\
 \underline{-7x^2 + \frac{35}{2}x} \\
 \frac{37}{2}x + 1 \\
 \underline{-\frac{37}{2}x + \frac{185}{4}} \\
 \hline
 \frac{189}{4}
 \end{array}$$

$$\frac{4x^3}{2x} = 2x^2$$

$$\frac{7x^2}{2x} = \frac{7}{2}x$$

$$\frac{\frac{37}{2}x}{2x} = \frac{37}{4}$$

$$2x^2 + \frac{7}{2}x + \frac{37}{4} + \frac{189/4}{2x-5}$$

4. Simplify and write in scientific notation. You may use your calculator to check your answers, but you must show work to earn full credit. (6 points each)

a. $(4 \times 10^7)(2.5 \times 10^{-4})$

$$10 \times 10^3 = 10^4$$

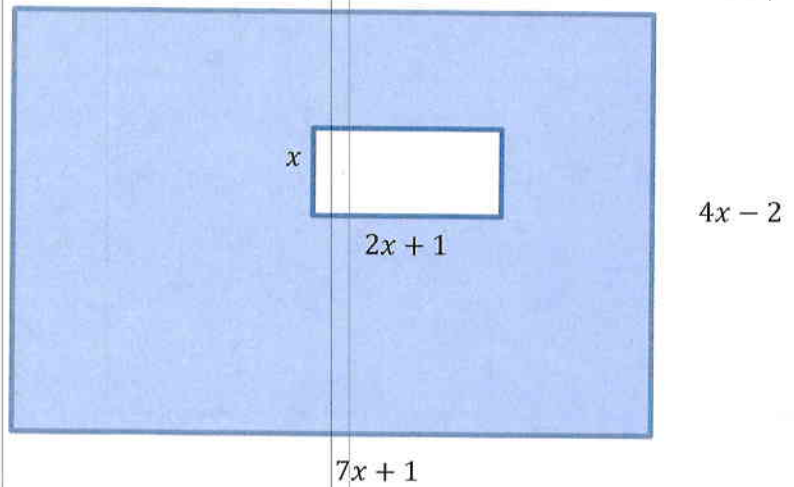
b. $\frac{4.8 \times 10^{-3}}{1.2 \times 10^{-5}} = 4 \times \frac{10^5}{10^3} = 4 \times 10^2$

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5. Write 0.0000000065 in scientific notation. (4 points)

$$6.5 \times 10^{-9}$$

6. Write an algebraic expression for the area of the given shape. Simplify as much as possible. (10 points)



$$A = (7x + 1)(4x - 2) - x(2x + 1)$$

$$28x^2 - 14x + 4x - 2 - (2x^2 + x)$$

$$28x^2 - 10x - 2 - 2x^2 - x$$

$$26x^2 - 11x - 2$$