

**Instructions:** Show all work. Reduce as much as possible and use exact answers unless specifically asked to round.

1. Simplify each expression. Write the final result with positive exponents only. (3 points each)

a.  $(-2)^4$

$$16$$

b.  $(2a^5)^3$

$$8a^{15}$$

c.  $\frac{x^8y^6}{xy^5}$

$$x^7y$$

d.  $\left(\frac{2ab}{6yz}\right)^4$

$$\frac{16a^4b^4}{1296y^4z^4} = \frac{a^4b^4}{81y^4z^4}$$

e.  $\frac{5^{-1}z^7}{5^{-2}z^9}$

$$\frac{5^2z^7}{5z^9} = \frac{25}{z^2}$$

f.  $4^{-1} + 4^{-2}$

$$\frac{1}{4} + \frac{1}{16} = \frac{4}{16} + \frac{1}{16} = \frac{5}{16}$$

g.  $(x^9y)(x^{10}y^5)$

$$x^{19}y^6$$

h.  $\left(\frac{q}{t}\right)^{11}$

$$\frac{q^{11}}{t^{11}}$$

i.  $(-3s^5t)(-7st^{10})$

$$21s^6t^{11}$$

j.  $\frac{(2x^5y^2)^6}{-32x^{12}y^{10}}$

$$\frac{64x^{30}y^{12}}{-32x^{12}y^{10}} = -2x^{18}y^2$$

k.  $\frac{p}{p^{-3}q^{-5}}$

$$p \cdot p^3 q^5 = p^4 q^5$$

l.  $\frac{(-3x^2y^2)^{-2}}{(xyz)^{-2}}$

$$\frac{3^{-2}x^{-4}y^{-4}}{x^{-2}y^{-2}z^{-2}} = \frac{x^2y^2z^2}{9x^4y^4} = \frac{z^2}{9x^2y^2}$$

2. For each polynomial, i) state whether it is a monomial, binomial, trinomial or none of these; ii) the degree of the polynomial. (2 points each)

a.  $-6y + 4$

degree 1  
binomial

b.  $8x^2y^2$

degree 4  
monomial

c.  $9m^3 - 5m^2 + 4m - 8$

degree 3  
none of these

d.  $5a^2 - 2a + 1$

degree 2  
trinomial

3. Perform the indicated operation. Simplify. (4 points each)

a.  $3x(2x + 5)$

$$6x^2 + 15x$$

b.  $5y + 7y - 6y$

$$6y$$

c.  $(7x^2 + 2x - 9) + (-3x^2 + 5)$

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

d.  $4 - (-y - 4)$

$$4 + y + 4$$

$$y + 8$$

e.  $(y - 10)(y + 11)$

$$y^2 - 10y + 11y - 110$$

$$y^2 + y - 110$$

f.  $(x + 6)^2$        $(x + 6)(x + 6)$

$$x^2 + 12x + 36$$

g.  $(x - 2)(x^2 - 3x + 7)$

$$x^3 - 3x^2 + 7x - 2x^2 + 6x - 14$$

$$x^3 - 5x^2 + 13x - 14$$

h.  $(q + 1)(q - 1)$

$$q^2 - 1$$

4. Complete the table. (2 points each)

	Standard Notation	Scientific Notation
a.	0.00000017	$1.7 \times 10^{-7}$
b.	1,160,000	$1.16 \times 10^6$
c.	0.033	$3.3 \times 10^{-2}$
d.	24,000,000,000	$2.4 \times 10^{10}$
e.	-394.5	$(2.63 \times 10^{12})(-1.5 \times 10^{-10})$
f.	500,000	$\frac{25 \times 10^{-4}}{5 \times 10^{-9}}$

5. Divide. Use long division when the denominator has more than one term. Write any remainder as  $\frac{\text{Remainder}}{\text{Divisor}}$ . (5 points each)

a.  $\frac{6a^2 - 4a + 12}{-2a^2}$

$$-3 + \frac{2}{a} - \frac{6}{a^2}$$

c.  $\frac{y^3 + 3y^2 + 4}{y - 2}$

$$\begin{array}{r}
 y^2 + 5y + 10 + \frac{24}{y-2} \\
 y-2 \overline{) y^3 + 3y^2 + 0y + 4} \\
 \underline{-(y^3 - 2y^2)} \phantom{+ 0} \\
 5y^2 + 0y \phantom{+ 4} \\
 \underline{-(5y^2 - 10y)} \phantom{+ 4} \\
 10y + 4 \\
 \underline{-(10y - 20)} \\
 24
 \end{array}$$

b.  $\frac{2x^2 - 7x + 3}{x - 4}$

$$\begin{array}{r}
 2x + 1 + \frac{7}{x-4} \\
 x-4 \overline{) 2x^2 - 7x + 3} \\
 \underline{-(2x^2 - 8x)} \phantom{+ 3} \\
 x + 3 \\
 \underline{-(x - 4)} \\
 7
 \end{array}$$

d.  $\frac{18w^2 + 18w - 8}{3w + 4}$

$$\begin{array}{r}
 6w - 2 \\
 3w+4 \overline{) 18w^2 + 18w - 8} \\
 \underline{-(18w^2 + 24w)} \phantom{- 8} \\
 -6w - 8 \\
 \underline{-(-6w - 8)} \\
 0
 \end{array}$$