Chapter 3 – Polynomials - Exam Review
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Section 1: Exponents

1. Write each expression as a power

a) $5\times5\times5$

$= 5^3$

b) $(-3)\times(-3)\times(-3)\times(-3)$

$= (-3)^4$

c) $\left(\frac{1}{2}\right)\times\left(\frac{1}{2}\right)$

$= \left(\frac{1}{2}\right)^2$

2. Write each power in expanded form

a) 7^4

$= 7\times7\times7\times7$

b) $(-10)^5$

$= (-10)(-10)(-10)(-10)(-10)$

c) $\left(\frac{5}{3}\right)^3$

$= \left(\frac{5}{3}\right)\left(\frac{5}{3}\right)\left(\frac{5}{3}\right)$

Evaluate the following powers

a) 5^3

$= 125$

b) 2^5

$= 32$

c) -3^3

$= -27$

d) $(-3)^3$

$= -27$

e) $(-2)^4$

$= 16$

f) -2^4

$= -16$

g) $(-1)^{17}$

$= -1$

h) $(-1)^{20}$

$= 1$

i) $\left(\frac{3}{5}\right)^2$

$= \frac{9}{25}$

4. Evaluate. Remember to use the correct order of operations

a) $3^4 + 4^2$

$= 81 + 16$

$= 97$

b) $7^2 - 7$

$= 49 - 7$

$= 42$

c) $9^2 \div 3^2$

$= 81 \div 9$

$= 9$

d) $5 \times \left(\frac{2}{5}\right)^3$

$= \frac{1}{5} \times \frac{8}{125_{25}}$

$= \frac{8}{25}$

e) $(3^2 + 4^2)$

$= 9 + 16$

$= 25$

f) $(3 + 4)^2$

$= 7^2$

$= 49$

5. Write as a single power (with a positive exponent), then evaluate

a) $8^2 \times 8^3$

$= 8^5$

$= 32768$

b) $4^3 \times 4^5 \div 4^2$

$= 4^8 \div 4^2$

$= 4^6$

$= 4096$

c) $6^7 \div 6^5 \div 6$

$= 6^2 \div 6^1$

$= 6$

d) $9^7 \times 9^5 \div 9^{12}$

$= 9^{12} \div 9^{12}$

$= 1$

e) 7^{-2}

$= \frac{1}{7^2}$

$= \frac{1}{49}$

f) $5^4 \times 5^{-7}$

$= 5^{-3}$

$= \frac{1}{5^3}$

$= \frac{1}{125}$

g) $(2^2)^4$

$= 2^8$

$= 256$

h) $\left[\left(-\frac{2}{3}\right)^2\right]^3$

$= \left(\frac{-2}{3}\right)^6$

$= \frac{64}{729}$

i) $(5^2)^{-2}$

$= 5^{-4}$

$= \frac{1}{5^4}$

$= \frac{1}{625}$

j) $(3^3)^4 \div 3^9$

$= 3^{12} \div 3^9$

$= 3^3$

$= 27$

k) $\dfrac{(5^3)^4 \times 5^2}{5^{10}}$

$= \dfrac{5^{14}}{5^{10}}$

$= 5^4$

$= 625$

l) $2^7 \times 2^5 \div (2^2)^4$

$= 2^{12} \div 2^8$

$= 2^4$

$= 16$

m) $[(-6)^3]^3 \div [(-6)^2]^4$

$= (-6)^9 \div (-6)^8$

$= (-6)^1$

$= -6$

n) $(-3)^5 \times (-3)^4 \div (-3)^6$

$= (-3)^9 \div (-3)^6$

$= (-3)^3$

$= -27$

o) $\dfrac{8^7 \times 8^3}{(8^2)^4}$

$= \dfrac{8^{10}}{8^8}$

$= 8^2$

$= 64$

6. Simplify the following using exponent laws and evaluate where possible

a) $(x^7)(x^7)$

$= x^{14}$

b) $(a^3)(a^4)(a^5)$

$= a^{12}$

c) x^{-3}

$= \dfrac{1}{x^3}$

d) $\dfrac{y^6}{y^3}$

$= y^3$

e) $\dfrac{2x^{10}}{8x^2}$

$= \dfrac{x^8}{4}$

f) $\dfrac{y^3}{y^6}$

$= \dfrac{1}{y^3}$

f) $\dfrac{6a^5}{3a^9}$

$= \dfrac{2}{a^4}$

g) $(x^4)^5$

$= x^{20}$

h) $(x^4)^{-5}$

$= x^{-20}$

$= \dfrac{1}{x^{20}}$

i) $(5x^6)^2$

$= 25x^{12}$

j) $(4x^2y^5)^3$

$64x^6y^{15}$

k) $(a^5)^3 \div (a^4)^2$

$= a^{15} \div a^8$

$= a^7$

l) $5m^5n \times 4m^2n^4$

$= 20m^7n^5$

m) $p^7q^4 \div p^3q^4$

$= p^4$

n) $\frac{24x^3y^{10}}{36xy^4}$

$= \frac{2x^2y^6}{3}$

o) $\frac{36x^3y^9}{27x^6y^4}$

$= \frac{4y^5}{3x^3}$

p) $\frac{8b^3d \times 4bd^2}{2(2bd)^2}$

$= \frac{32b^4d^3}{2(4b^2d^2)}$

$= \frac{32b^4d^3}{8b^2d^2}$

$= 4b^2d$

q) $x^5 \div x^7$

$= x^{-2}$

$= \frac{1}{x^2}$

r) $\frac{2x^3 \cdot 3x^3}{18x^5}$

$= \frac{6x^6}{18x^5}$

$= \frac{x}{3}$

s) $\frac{4x^7}{12x^{11}}$

$\frac{1}{3x^4}$

t) $(x^{25})^0$

$= x^0$

$= 1$

u) $\frac{(2x^2)^3 \cdot 2x^2}{(8x^2)^{\blacksquare}}$

$= \frac{8x^6 \cdot 2x^2}{8x^2}$

$= \frac{16x^8}{8x^2}$

$= 2x^6$

v) $\left(\frac{3}{7}\right)^2$

$= \frac{9}{49}$

w) $(-4x^2y^5)^3$

$= -64x^6y^{15}$

x) $-8a^5 \times (2a^3)^2$

$= -8a^5 \times 4a^6$

$= -32a^{11}$

y) $\frac{3f^4g^3 \times 8fg^4}{(6f^2g^3)^2}$

$= \frac{24f^5g^7}{36f^4g^6}$

$= \frac{2fg}{3}$

z) $\frac{(-3m^2n)(6m^3n^2)}{(2m^4n^2)(3mn)}$

$= \frac{-18m^5n^3}{6m^5n^3}$

$= -3$

Section 2: Polynomials

7. Classify each of the following polynomials and state the degree of the polynomial

	Type of Polynomial (monomial, binomial, trinomial, etc.)	Degree of Polynomial
a) $3a^2 + 2a^3 + b$	trinomial	3
b) $3x^2y$	monomial	3
c) $-b^4d + bd^3 + b^6$	trinomial	6
d) $7xy^5z - 15x^6$	binomial	7
e) $2 - 3x^4 - 5x^2 + 4x$	4-term polynomial	4

8. State the degree of each of the following terms

a) $-8b^4$ 4

b) $-x^4y^3$ 7

c) $\frac{3}{4}mn^2$ 3

d) $6r^6s$ 7

9. Classify each of the following terms as like or unlike

a) $4a^2$ and $4a$ unlike

b) $6x^3$ and $-x^3$ like

c) $12p^4$ and $-p^4$ like

d) $4a^2b^3$ and $6a^3b^2$ unlike

10. Simplify the following expressions by collecting like terms

a) $-2x + 7y - 5x - 9y$

$= -7x - 2y$

b) $3x^2 + y^2 + 5y^2 - 7x + x^2$

$= 4x^2 + 6y^2 - 7x$

c) $6q + u + 4u + q + u + 4u - u$

$= 7q + 9u$

d) $10 - nm^2 - 7 - nm^2 + 4n^2m^2$

$= 4n^2m^2 - 2nm^2 + 3$

e) $-3v + 2v + 6 - 3v - 9 - v$

$= -5v - 3$

f) $7 + 3x^2y + 4y - y + 8x^2y + 80$

$= 11x^2y + 3y + 87$

11. Add/Subtract the following polynomials

a) $(3x - 1) + (4 - 2x)$

$= 3x - 1 + 4 - 2x$

$= x + 3$

b) $(-6k - 4) + (2k + 4)$

$= -6k - 4 + 2k + 4$

$= -4k$

c) $(68x^2 + 66x + 1) + (3x^2 + 86)$

$= 68x^2 + 66x + 1 + 3x^2 + 86$

$= 71x^2 + 66x + 87$

d) $(2 + y) - (3 - 2y)$

$= 2 + y - 3 + 2y$

$= 3y - 1$

e) $(2a + 1) - (4a + 2)$

$= 2a + 1 - 4a - 2$

$= -2a - 1$

f) $(g + 12) + (g - 7) - (2 - 3g)$

$= g + 12 + g - 7 - 2 + 3g$

$= 5g + 3$

g) $(2m^2 - m - 12) - (5m^2 + 4m - 6)$

$= 2m^2 - m - 12 - 5m^2 - 4m + 6$

$= -3m^2 - 5m - 6$

h) $(b - 6) - (2 - 5b) + (b + 4)$

$= b - 6 - 2 + 5b + b + 4$

$= 7b - 4$

12. Expand and simplify the following expressions using the distributive property

a) $5(x + 3)$

$= 5x + 15$

b) $4(b + 2)$

$= 4b + 8$

c) $w(2w + 1)$

$= 2w^2 + w$

d) $q(q + 4)$

$= q^2 + 4q$

e) $3c(6 - 4c)$

$= 18c - 12c^2$

f) $-p(2p - 1)$

$= -2p^2 + p$

g) $-5(a^2 - 4a - 2)$

$= -5a^2 + 20a + 10$

h) $2d(d^2 - 3d - 1)$

$= 2d^3 - 6d^2 - 2d$

i) $3(x + 3) + 2(x + 1) - 5x$

$= 3x + 9 + 2x + 2 - 5x$

$= 11$

j) $-4(m+2)+3(m-7)$

$= -4m-8+3m-21$

$= -m-29$

k) $-(d-3)-5(d+2)$

$= -d+3-5d-10$

$= -6d-7$

l) $5[b+2(b+1)]$

$= 5(b+2b+2)$

$= 5b+10b+10$

$= 15b+10$

m) $-2[3(a+3)-4]$

$= -2(3a+9-4)$

$= -2(3a+5)$

$= -6a-10$

n) $4[-2(4-t)+3t]$

$= 4(-8+2t+3t)$

$= 4(-8+5t)$

$= -32+20t$

$= 20t-32$

o) $4x(xy+2y)-3y(3x^2+x)$

$= 4x^2y+8xy-9x^2y-3xy$

$= -5x^2y+5xy$

Section 3: Applications

13. Katherine and Christine work at the same restaurant. Each week, Katherine works 5 more hours than Christine. Katherine earns $7.00 per hour and Christine earns $8.00 per hour.

a) Write a simplified expression to represent the total number of hours Katherine and Christine work in one week.

$h+(h+5)$ h = hours Christine worked

$= 2h+5$

b) Write a simplified expression to represent the total amount they earn in one week.

$8h+7(h+5)$

$= 8h+7h+35$

$= 15h+35$

c) Suppose Christine worked 9 hours last week. What was the total amount the girls earned last week?

Earnings $= 15h+35$

$= 15(9)+35$

$= 170$

$170

14. A triangle has a height that is twice the length of the base.

a) Write a simplified expression to represent the area of the triangle (Remember: $Area = \frac{1}{2}bh$)

$h = 2b$

$A = \frac{1}{2}b(2b)$

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

$= b^2$

b) What is the area of the triangle if the base is 10 meters?

$A = b^2$

$= (10)^2$

$= 100$

$100\ m^2$