

Chapter 3 Review - Polynomials

MPM1D

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SOLUTIONS

Section 1: Vocabulary

Match each term to the correct definition.

a. distributive property

b. polynomial

c. term

d. algebraic expression

e. degree of a term

f. degree of a polynomial

g. variable

h. like terms

G 1. a quantity whose value can change or vary

C 2. an expression formed by the product of numbers and/or variables

B 3. an algebraic expression formed by adding or subtracting terms

F 4. the degree of the highest-degree term

H 5. terms that have identical variables

A 6. $a(x + y) = ax + ay$

E 7. the sum of the exponents on the variables in a term

Section 2: Exponents

8. Evaluate the Following Exponents

$$\begin{aligned} \text{a) } 5^3 \\ = 125 \end{aligned}$$

$$\begin{aligned} \text{b) } 2^8 \\ = 256 \end{aligned}$$

$$\begin{aligned} \text{c) } -3^4 \\ = -81 \end{aligned}$$

$$\begin{aligned} \text{d) } (-2)^4 \\ = 16 \end{aligned}$$

$$\begin{aligned} \text{e) } (-1)^{10} \\ = 1 \end{aligned}$$

$$\begin{aligned} \text{f) } \left(\frac{2}{3}\right)^3 \\ = \frac{2^3}{3^3} \\ = \frac{8}{27} \end{aligned}$$

9. Write as a single Power then Evaluate

$$\begin{aligned} \text{a) } 8^5 \times 8^4 \div 8^7 \\ = 8^9 \div 8^7 \\ = 8^2 \\ = 64 \end{aligned}$$

$$\begin{aligned} \text{b) } 6^7 \div 6^5 \div 6 \\ = 6^2 \div 6^1 \\ = 6 \end{aligned}$$

$$\begin{aligned} \text{c) } (3^3)^4 \div 3^9 \\ = 3^{12} \div 3^9 \\ = 3^3 \\ = 27 \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{(5^3)^4 \times 5^2}{5^{10}} \\ = \frac{5^{12} \times 5^2}{5^{10}} \\ = \frac{5^{14}}{5^{10}} \\ = 5^4 \\ = 625 \end{aligned}$$

$$\begin{aligned} \text{e) } 2^7 \times 2^5 \div (2^2)^4 \\ = 2^{12} \div 2^8 \\ = 2^4 \\ = 16 \end{aligned}$$

$$\begin{aligned} \text{f) } [(-6)^3]^3 \div [(-6)^2]^4 \\ = (-6)^9 \div (-6)^8 \\ = (-6)^1 \\ = -6 \end{aligned}$$

10. Simplify the following using exponent laws.

a) $(b^6)(b^3)$

$$= b^9$$

b) $\frac{g^2 \cdot g^8}{g^7}$

$$= \frac{g^{10}}{g^7}$$

$$= g^3$$

c) $\frac{(a^5)^3}{(a^4)^2}$

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

$$= a^7$$

d) $3m^5n^1 \times 4m^2n^4$

$$= 12m^7n^5$$

e) $\frac{p^7q^4}{p^3q^4}$

$$= p^4q^0$$

$$= p^4(1)$$

$$= p^4$$

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

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

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

$$= 4b^2d$$

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

$$= x^{-2}$$

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

h) $\frac{2x^3 \cdot 3x^3}{9x^5}$

$$= \frac{6x^6}{9x^5}$$

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

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

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

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

j) $\frac{(2x^3)^3 \cdot 2x^2}{(8x^2)^5}$

$$= \frac{8x^9 \cdot 2x^2}{32768x^{10}}$$

$$= \frac{16x^{11}}{32768x^{10}}$$

$$= \frac{x}{2048}$$

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

$$= \frac{3^2}{7^2}$$

$$= \frac{9}{49}$$

l) -6^4

$$= -1296$$

Section 3: Communication

11. Complete the following charts:

a)

Term	Coefficient	Variable
$7m$	7	m
$-3x^5$	-3	x^5
$\frac{3}{7}m^2n$	$\frac{3}{7}$	m^2n
gh	1	gh

b)

Term	Degree of Term
$-8b^4$	4
$-x^4y^3$	7
$\frac{3}{4}mn^2$	3
$6r^6s$	7

c)

Expression	Classify the Polynomial by Name
$a^2 - 2a + 1$	Trinomial
$2 - 3x^4 - 5x^2 + 4x$	4-term Polynomial
$6m^2n^5$	Monomial
$h^3 + 6$	Binomial
$12x$	Monomial

d)

Polynomial	Degree of Polynomial
$5a^4 + b^3$	4
$7ab^6 + 8a^3b^3$	7
$2x^2 + 3x - 1$	2
$8m^4n - m^2n^4 + 2m$	6

Section 4: Like Terms

12. Simplify the following by collecting like terms:

a) $2b + 7g - 5b - 8g$

$$= 2b - 5b + 7g - 8g$$

$$= -3b - 1g$$

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

$$= 1y^2 + 5y^2 + 3x - 7x$$

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

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

$$= 6q + 1q + 1u + 4u + 1u + 4u - 1u$$

$$= 7q + 9u$$

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

$$= -1m^2 - 1m^2 + 4m^2 + 10 - 7$$

$$= 2m^2 + 3$$

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

$$= -3v - 3v + 2v - 1v + 6 - 9$$

$$= -5v - 3$$

f) $7 + h + h - 5 + 6h + 2 + 3h$

$$= 1h + 1h + 6h + 3h + 7 - 5 + 2$$

$$= 11h + 4$$

Section 5: Add and Subtract Polynomials

13. Simplify the following expressions

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

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

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

$$= 8k$$

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

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

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

$$= -2a - 1$$

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

$$= 1b - 6 - 2 + 5b + 1b + 4$$

$$= 1b + 5b + 1b - 6 - 2 + 4$$

$$= 7b - 4$$

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

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

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

$$= 5g + 3$$

e) $(x^2 + 2x + 1) + (2x^2 + 4)$

$$= x^2 + 2x + 1 + 2x^2 + 4$$

$$= x^2 + 2x^2 + 2x + 1 + 4$$

$$= 3x^2 + 2x + 5$$

f) $(2m^2 + m + 12) - (3m^2 + 4m - 6)$

$$= 2m^2 + m + 12 - 3m^2 - 4m + 6$$

$$= 2m^2 - 3m^2 + m - 4m + 12 + 6$$

$$= -1m^2 - 3m + 18$$

Section 6: Distributive Property

14. Expand and simplify the following:

a) $5(x + 3)$

$$= 5x + 15$$

b) $w(2w + 1)$

$$= 2w^2 + w$$

c) $q(q + 4)$

$$= q^2 + 4q$$

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

$$= 18c - 12c^2$$

$$= -12c^2 + 18c$$

e) $\frac{1}{4}(8a - 4) + \frac{2}{5}(5a + 10)$

$$= \frac{1}{4}(8a) - \frac{1}{4}(4) + \frac{2}{5}(5a) + \frac{2}{5}(10)$$

$$= \frac{8a}{4} - \frac{4}{4} + \frac{10a}{5} + \frac{20}{5}$$

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

$$= 4a + 3$$

f) $-5b(a^2 - 4a - 2)$

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

g) $3(x + 3) + 2(x + 1)$

$$= 3x + 9 + 2x + 2$$

$$= 3x + 2x + 9 + 2$$

$$= 5x + 11$$

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

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

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

$$= -m - 29$$

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

$$= 5d - 15 - d - 2$$

$$= 5d - 1d - 15 - 2$$

$$= 4d - 17$$

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

$$= 5[b + 2b + 2]$$

$$= 5[3b + 2]$$

$$= 15b + 10$$

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

$$= -2[3a + 9 - 4]$$

$$= -2[3a + 5]$$

$$= -6a - 10$$

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

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

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

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

Section 7: Applications

15. A rectangular window frame has dimensions expressed by $3x$ and $(2x - 5)$. Find a simplified expression for its perimeter and determine the actual perimeter if $x = 3$ meters.

$$P = 2(3x) + 2(2x - 5)$$

$$P = 6x + 4x - 10$$

$$P = 10x - 10$$

$$P = 10(3) - 10$$

$$P = 30 - 10$$

$$P = 20 \text{ units}$$

16. Write, expand and simplify an expression for the area of the face of the:

a) Front or back

$$A = 2a(3a)$$

$$A = 6a^2$$

b) Left or right side

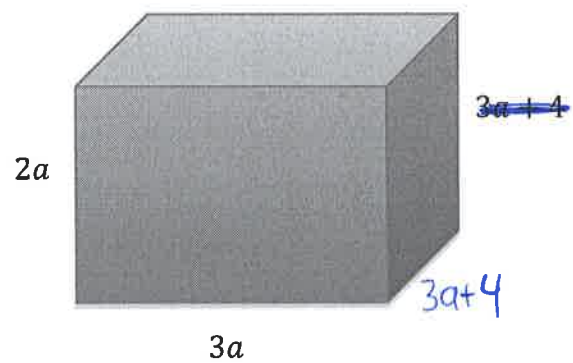
$$A = 2a(3a + 4)$$

$$A = 6a^2 + 8a$$

c) Top or bottom

$$A = 3a(3a + 4)$$

$$A = 9a^2 + 12a$$



17. Write a simplified expression for the volume of the rectangular prism from the previous question.

$$V = 2a(3a)(3a + 4)$$

$$V = (6a^2)(3a + 4)$$

$$V = 18a^3 + 24a^2$$