

To Add and Subtract Polynomials:

- combine like terms (same variable and same exponent)
- add/subtract coefficients
- keep the base and do not change the exponents
- write all answers in standard form

*Standard form is when terms are written in order from greatest exponent to least exponent.

1. What is the sum of $(8x^4 + 9x^3 - 7)$ and $(12x^3 - 6x^2 + 8)$?
2. Subtract $(14x^3 + 8x^2 - 9)$ from $(10x^3 - 4x^2 + 8x + 2)$.
3. What is the perimeter of a square if one side is represented by $7x + 3$?

To Multiply Monomials and Polynomials:

- distribute by multiplying the coefficients
- add the exponents of the like bases

4. What is the product of $-3x^2$ and $(7x^2 - 8x + 1)$?
5. Distribute: $4x^2yz^4(-2xy^2z + 9x^3y - 3xyz)$
6. What is the product of $(x - 8)$ and $(x + 2)$?
7. Write the following as a trinomial: $(2x - 3)^2$

To Divide Monomials and Polynomials:

- if it applies, rewrite each term of the polynomial divided by the monomial
- divide the coefficients
- subtract the exponents of the like bases

8. Divide: $\frac{14m^5n^6p^{10}}{7m^3p^2}$
9. Simplify the following: $\frac{10x^2y^9 + 25x^3y^8 - 5x^2y}{5x^2y}$
10. If the area of a rectangle is represented by $18d^9f^7g^{12}$, and the width is represented by $3d^4f^3g^6$, then what is the length represented by?

To Use the Power Rule:

- raise the coefficient to the power outside the parentheses
- raise each base with an exponent to that same power and multiply the exponents

11. Rewrite each of the following:
 - a) $(k^8)^3$
 - b) $(-4h^6)^2$
 - c) $(-3m^4n^7p)^5$

To Make a Negative Exponent Positive:

- Write its reciprocal (flip) and make the exponent positive

12. Rewrite the following using positive exponents:
 - a) s^{-5}
 - b) $(2m^4)^{-3}$
 - c) $-3x^{-8}$

To Simplify a Non-Zero Value with a Zero Exponent:

- any non-zero value raise to the zero exponent has a value of 1
- Negative exponents go in the denominator and make the exponent positive
- Positive exponents go in the numerator
- Coefficients always go in the numerator

13. Simplify each of the following:
 - a) $6x^0$
 - b) $\left(\frac{4}{9}y^3\right)^0 + \left(\frac{5}{6}\right)$
 - c) $\frac{14x^5y^8}{2x^5y^9}$

14. The expression $(-2a^2b^3)(4ab^5)(6a^3b^3)$ is equivalent to

15. Which expression is equivalent to $-3k(\alpha - 4) - 2k(\alpha + 3)$?

Fill in the "?" for each of the following to make the statements true.

16. $(4k^3)^2 = 16k^6$

17. $(12g^4h^8)(-3g^2h^{12}) = -36g^{10}h^{20}$

18. $(y-3)(y+?) = y^2 + 3y - 18$

19. $\frac{4d^4e^5 - 2d^8e^7}{2d^2e^2} = 2d^3e^3 - d^7e^5$

20. $(9x^2 + 8x + 2) + (3x^2 - 7x - 1) = 12x^2 + 1x^2 + 1$

21. What is the value of $4(xy)^0$

- (1) 1 (2) xy (3) 4 (4) 0

22. The perimeter of a square is $40x + 12$. What is the length of one of its sides?

23. The length of a rectangle is $(2f + 5)$ ft. & the width is represented by $(f - 3)$ ft. Find:
a) the perimeter of the rectangle b) the area, in square feet, of the rectangle

24. The expression $\frac{-32x^8}{4x^2}$, $x \neq 0$, is equivalent to

- (1) $8x^4$
(2) $-8x^4$
(3) $8x^6$
(4) $-8x^6$

25. What is the simplified form of $3a^4b^{-2}c^3$?

- (1) $\frac{81a^4c^3}{b^2}$ (3) $\frac{3a^4}{b^2c^3}$
(2) $\frac{81a^4}{b^2c^3}$ (4) $\frac{3a^4c^3}{b^2}$

26. What is the product of $2r^2 - 5$ and $3r$?

- (1) $6r^3 - 15r$
(2) $6r^2 - 15r$
(3) $6r^3 - 5$
(4) $6r^2 - 15$

27. Which of the following is equal to $\frac{x^2y + y^2}{-y}$?

- (1) $-x^2 - y$
(2) $-x^2 + y^2$
(3) $x^2 + y$
(4) $x^2 + y^2$

28. Which expression is equivalent to $x^{-1} \cdot y^2$

- (1) xy^2 (3) $\frac{x}{y^2}$
(2) $\frac{y^2}{x}$ (4) xy^{-2}

29. $(-2x^2)^3 =$

- (1) $-2x^5$
(2) $-8x^5$
(3) $-8x^6$
(4) $-6x^6$

<p>30. For a photo at a family reunion, $8gh$ people arranged in 4h rows, with an equal number of people in each row. Which expression represents the number of people in one row of the photograph?</p> <p>(1) $2g$ (2) $4g$ (3) $12gh^2$ (4) $32ggh^2$</p>
<p>31. Which expression represents $\frac{(2x^3)(8x^5)}{4x^6}$?</p> <p>(1) x^2 (2) $4x^2$ (3) $4x^9$ (4) $4x^{21}$</p>
<p>32. A pizza shop owner is monitoring the amount of cheese he uses each week. The polynomials below model the pounds of cheese ordered in the past, where p represents pounds.</p> <p>Mozzarella: $3p^3 - 6p^2 + 14p + 125$ Cheddar: $12.5p^2 + 18p + 75$</p> <p>Write a polynomial that models the total number of pounds of cheese ordered.</p>
<p>33. The length of a rectangle is $(4x + 5)$ and the width of a rectangle is $(x + 1)$.</p> <p>a) Find the perimeter of the rectangle. b) Find the area of the rectangle</p>

<p>34. Kelly simplified $(x + 2)^2$ and got $x^2 + 4$. EXPLAIN Kelly's mistake and give the correct answer.</p>	
<p>35. $(5x^2 - 7x - 4) + (2x^2 + 9x + 7) + (-8x^2 - 2x - 9)$</p>	<p>36. Subtract: $(4x + y - 3) - (6x - 3y + 1)$</p>
<p>37. Simplify: $6a(a^2 + 4a - 2) - 3a$</p>	<p>38. Simplify: $-20 - (7m - 6)$</p>
<p>39. Subtract $(5y^2 - 8y + 3)$ from $(7y^2 - 3y - 4)$</p>	<p>40. Multiply: a) $(2x - 3)(x + 4)$ b) $(x - 6)^2$</p>
<p>41. Multiply the following by its conjugate and express answer in standard form. a) $(5 - m)$</p>	<p>42. Divide: a) $\frac{a + abc}{a}$ b) $\frac{9x^2y - 12xy^2}{xy}$</p>

<p>43. Express in standard form: $5x - x^2 + 3 + x^7$</p> <p>Degree of above polynomial :</p>	<p>44. What is the value of $5^0 + 6^{-2}$?</p>
<p>45. Simplify:</p> <p>a) $(-3x^5)^2$</p> <p>b) $(2x^2y^3)^4$</p> <p>c) 5^{-3}</p> <p>d) $6(3^{-3})$</p> <p>e) $(-2x)^0$</p> <p>f) $-2x^0$</p>	<p>46. If the expression $(2y^6)^4$ is equivalent to $16y^8$, what is the value of a?</p>
<p>47. Simplify:</p> <p>a) $(2x^2 - 4x + 1) - 2(x^2 - 3x + 2)$</p> <p>b) $(6d^8)(-8d^9)(6d)$</p>	<p>48. Simplify the expressions below:</p> <p>a) $\frac{(4x^3)^2}{2x}$</p> <p>b) $5c^{-3}d^{-6}e^2 \cdot -2c^4d^2e^{-2}$</p> <p>c) $\frac{a^2b^3c^5}{a^5b^2c^5}$</p> <p>d) $\frac{-30x^2y^{-5}z^4}{15x^5y^4z^2}$</p>
<p>49. For a square whose side is $(x - 5)$ feet, find the:</p> <p>a) perimeter</p> <p>b) area</p>	<p>50. The side of a hexagon (6 sides) is represented by $4x - 3$. How would you represent the perimeter of the hexagon in terms of x?</p>

<p>51. The lengths of the sides of a triangle are $x - y$, $x + y$, and $3x + y$. Find the perimeter of the triangle in terms of x and y.</p>	<p>52. The area of a rectangle is $10x^2 - 20x$. Find the width given the length is $5x$.</p>
<p>53. The perimeter of a rectangle is represented by $24x - 8$. If the length is represented by $3x + 5$, how would you represent the width in terms of x?</p>	<p>54. Suppose you have been given this polynomial: $5b + 4b^2 - 3b^4 + 3$</p> <p>a. How can you write this polynomial in standard form?</p> <p>b. What is the degree of the polynomial?</p>
<p>55. Describe and correct the error made in simplifying the product</p>	<p>$(2x + 7)(2x - 7)$ $= 4x^2 - 28x + 49$</p>

Polynomial Extra Review #1

To Add and Subtract Polynomials:

- combine like terms (same variable and same exponent)
 - add/subtract coefficients
 - keep the base and do not change the exponents
 - write all answers in standard form
- *Standard form is when terms are written in order from greatest exponent to least exponent.

1. What is the sum of $(8x^4 + 9x^2 - 7)$ and $(12x^3 - 6x^2 + 8)$?

$$\begin{array}{r} 8x^4 + 9x^2 - 7 \\ + 12x^3 - 6x^2 + 8 \\ \hline 8x^4 + 12x^3 + 3x^2 + 1 \end{array}$$

2. Subtract $(14x^3 + 8x^2 - 9)$ from $(10x^3 - 4x^2 + 8x + 2)$.

$$\begin{array}{r} 10x^3 - 4x^2 + 8x + 2 \\ - (14x^3 + 8x^2 - 9) \\ \hline -4x^3 - 12x^2 + 8x + 11 \end{array}$$

3. What is the perimeter of a square if one side is represented by $7x + 3$?

$$4(7x + 3) = 28x + 12$$

To Multiply Monomials and Polynomials:

- distribute by multiplying the coefficients

4. What is the product of $-3x^2$ and $(7x^2 - 8x + 1)$?

$$-3x^2(7x^2 - 8x + 1) = -21x^4 + 24x^3 - 3x^2$$

5. Distribute: $4x^2y^2(-2xy^2 + 9x^3y - 3yz)$

$$-8x^3y^4 + 36x^5y^3 - 12x^3y^2z$$

6. What is the product of $(x-8)$ and $(x+2)$?

$$(x-8)(x+2) = x^2 + 2x - 8x - 16 = x^2 - 6x - 16$$

7. Write the following as a trinomial: $(2x-3)^2$

$$(2x-3)(2x-3) = 4x^2 - 12x + 9$$

To Divide Monomials and Polynomials:

- if it applies, rewrite each term of the polynomial divided by the monomial
- divide the coefficients
- subtract the exponents of the like bases

8. Divide: $\frac{14m^5n^6p^{10}}{7m^3p^2} = 2m^2n^6p^8$

9. Simplify the following: $\frac{10x^2y^9 + 25x^3y^8 - 5x^4y}{5x^2y} = 2x^2y^8 + 5x^3y^7 - 5x^2y^6$

10. If the area of a rectangle is represented by $18d^2fg^2$, and the width is represented by $3d^2fg^2$, then what is the length represented by?

$$L = \frac{18d^2fg^2}{3d^2fg^2} = 6d^0f^0g^0 = 6$$

- To Use the Power Rule:
- raise the coefficient to the power outside the parentheses
 - raise each base with an exponent to that same power and multiply the exponents

11. Rewrite each of the following:

a) $(k^2)^3 = k^6$

b) $(-4h^6)^2 = 16h^{12}$

c) $(-3m^2n^2)^5 = -243m^{10}n^{10}$

- To Make a Negative Exponent Positive:
- Write its reciprocal (flip) and make the exponent positive

12. Rewrite the following using positive exponents:

a) $s^{-5} = \frac{1}{s^5}$

b) $(2m)^{-3} = \frac{1}{(2m)^3} = \frac{1}{8m^3}$

c) $-3x^{-8} = -\frac{3}{x^8}$

- To Simplify a Non-Zero Value with a Zero Exponent:
- any non-zero value raise to the zero exponent has a value of 1
 - Negative exponents go in the denominator and make the exponent positive
 - Positive exponents go in the numerator
 - Coefficients always go in the numerator

13. Simplify each of the following:

a) $6x^0 = 6$

b) $\left(\frac{4}{9}y^3\right)^0 + \left(\frac{5}{6}\right) = 1 + \frac{5}{6} = \frac{11}{6}$

c) $\frac{14z^3y^8}{2z^3y^8} = 7$

14. The expression $(-2a^3b^3)(4ab^3)(6a^3b^3)$ is equivalent to

$-48a^9b^{10}$

15. Which expression is equivalent to $-3x(x-4) - 2x(x+3)$?

$-5x^2 + 12x - 6x$

Fill in the " ? " for each of the following to make the statements true.

16. $(4k^3)^2 = 16k^6$

$[2]$

17. $(12g^4h^8)(-3g^2h^{12}) = -36g^{10}h^{20}$

$[6]$

18. $(y-3)(y+?) = y^2 + 3y - 18$

$[6]$

19. $\frac{4d^4e^5 - 2d^8e^7}{2d^2e^2} = 2d^2e^3 - d^6e^5$

$[1]$ $[2]$

20. $(9x^2 + 8x + 2) + (3x^2 - 7x - 1) = 12x^2 + 1x + 1$

$[2]$ $[1]$

21. What is the value of $4(xy)^0$?

- (1) 1 (2) xy (3) 4 (4) 0

22. The perimeter of a square is $40x + 12$. What is the length of one of its sides?

$\frac{40x + 12}{4} = 10x + 3$

23. The length of a rectangle is $(2f+5)$ ft. & the width is represented by $(f-3)$ ft. Find:
 a) the perimeter of the rectangle
 b) the area, in square feet, of the rectangle

Perimeter: $2(2f+5)(f-3) = 2f^2 - 6f + 5f - 15 = 2f^2 - f - 15$
 Area: $(2f+5)(f-3) = 2f^2 - f - 15$

24. The expression $\frac{-32x^8}{4x^2}$, $x \neq 0$, is equivalent to

$-8x^6$

- (1) $8x^4$
 (2) $-8x^4$
 (3) $8x^6$
 (4) $-8x^6$

25. What is the simplified form of $3a^4b^2c^3$?

(1) $\frac{81a^4c^3}{b^2}$

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

(2) $\frac{81a^4}{b^2c^3}$

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

26. What is the product of $2r^2 - 5$ and $3r$?

(1) $6r^3 - 15r$

$3r(2r^2 - 5)$

(2) $6r^2 - 15r$

(3) $6r^3 - 5$

(4) $6r^2 - 15$

27. Which of the following is equal to $\frac{x^2y + y^2}{-y}$?

(1) $\frac{y-x^2-y}{y}$

(2) $-x^2 + y^2$

(3) $x^2 + y$

(4) $x^2 + y^2$

$-\frac{x^2}{-y} + \frac{y^2}{-y}$

28. Which expression is equivalent to $x^{-1} \cdot y^2$?

(1) xy^2

(3) $\frac{x}{y^2}$

(2) $\frac{y^2}{x}$

(4) xy^{-2}

29. $(-2x^2)^3 =$

(1) $-2x^5$

(2) $-8x^5$

(3) $-8x^6$

(4) $-6x^6$

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

$-8x^6$

30. For a photo at a family reunion, 84 people arranged in 4 rows, with an equal number of people in each row. Which expression represents the number of people in one row of the photograph?

- (1) $2g$
- (2) $4g$
- (3) $12gh^2$
- (4) $32gh^2$

$$\frac{84h}{4h} = 21g$$

31. Which expression represents $\frac{(2x^3)(8x^5)}{4x^6} = \frac{16x^8}{4x^6}$

- (1) x^2
- (2) $4x^2$
- (3) $4x^9$
- (4) $4x^{21}$

$$4x^2$$

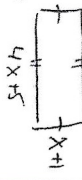
32. A pizza shop owner is monitoring the amount of cheese he uses each week. The polynomials below model the pounds of cheese ordered in the past, where p represents pounds.

Mozzarella: $3p^3 - 6p^2 + 14p + 125$
 Cheddar: $12.5p^2 + 18p + 75$

Write a polynomial that models the total number of pounds of cheese ordered.

$$3p^3 + 6.5p^2 + 32p + 200$$

33. The length of a rectangle is $(4x + 5)$ and the width of a rectangle is $(x + 1)$.



a) Find the perimeter of the rectangle.

$$4x+5 + 4x+5 + x+1 + x+1 = 10x+12$$

b) Find the area of the rectangle

$$(4x+5)(x+1) = 4x^2 + 4x + 5x + 5 = 4x^2 + 9x + 5$$

34. Kelly simplified $(x + 2)^2$ and got $x^2 + 4$. EXPLAIN Kelly's mistake and give the correct answer.

Kelly just squared x and 2 instead of using the distributive property. She should have done: $(x + 2)^2 = x^2 + 2x + 2x + 4 = x^2 + 4x + 4$

35. $(5x^2 - 7x - 4) + (2x^2 + 9x + 7) + (-8x^2 - 2x - 9)$

$$(2x^2 + 9x + 7) + (-8x^2 - 2x - 9) - x^2 - 6 = -x^2 - 6$$

36. Subtract:

$$(4x + y - 3) - (6x - 3y + 1) = -2x + 4y - 4$$

37. Simplify:

$$6a(a^2 + 4a - 2) - 3a = 6a^3 + 24a^2 - 12a - 3a = 6a^3 + 24a^2 - 15a$$

38. Simplify:

$$-20 - (7m - 6) = -20 - 7m + 6 = -7m - 14$$

39. Subtract $(5y^2 - 8y + 3)$ from $(7y^2 - 3y - 4)$

$$(7y^2 - 3y - 4) - (5y^2 - 8y + 3) = 2y^2 + 5y - 7$$

40. Multiply:

$$(2x - 3)(x + 4) = 2x^2 + 8x - 3x - 12 = 2x^2 + 5x - 12$$

41. Multiply the following by its conjugate and express answer in standard form.

a) $(5 - m)(5 + m) = 25 + 5m - 5m - m^2 = 25 - m^2$

42. Divide:

a) $\frac{a+abc}{a} = \frac{a}{a} + \frac{abc}{a} = 1 + bc$

b) $\frac{9x^2y - 12xy^2}{xy} = \frac{9x^3y}{xy} - \frac{12xy^2}{xy} = 9x^2 - 12y$

<p>43. Express in standard form: $5x - x^2 + 3 + x^7$</p> <p>Degree of above polynomial: $\boxed{7}$</p> <p>* Leading Coefficient: $\boxed{1}$</p>	<p>44. What is the value of $5^0 + 6^{-2}$?</p> <p>$1 + \frac{1}{36}$</p>
<p>45. Simplify:</p> <p>a) $(-3x^5)^2$ $(-3)^2(x^5)^2$ $9x^{10}$</p> <p>b) $(2x^2y^3)^4$ $(2)^4(x^2)^4(y^3)^4$ $16x^8y^{12}$</p> <p>c) 5^{-3} $\frac{1}{5^3} = \frac{1}{125}$</p> <p>d) $6(3^3)$ $6 \cdot 3^3 = 6 \cdot \frac{27}{1} = \frac{6 \cdot 27}{1} = \frac{162}{1}$</p> <p>e) $(-2x)^0$ $\boxed{1}$</p> <p>f) $-2x^0$ $-2 \cdot x^0$ $-2 \cdot 1$ $\boxed{-2}$</p>	<p>46. If the expression $(2y^a)^4$ is equivalent to $16y^8$, what is the value of a?</p> <p>$\boxed{a=2}$</p> <p>$(4x^3)(4x^3) = \frac{16x^6}{2x} = \boxed{8x^5}$</p>
<p>47. Simplify:</p> <p>a) $(2x^2 - 4x + 1) - 2(x^2 - 3x + 2)$ $2x^2 - 4x + 1 - 2x^2 + 6x - 4$ $2x^2 - 2x^2 - 4x + 6x + 1 - 4 = \boxed{2x - 3}$</p> <p>b) $(6d^8)(-8d^9)(6d)$ $\boxed{-288d^{18}}$</p>	<p>48. Simplify the expressions below:</p> <p>a) $\frac{(4x^3)^2}{2x} = \frac{(4)^2(x^3)^2}{2x} = \frac{16x^6}{2x} = \boxed{8x^5}$</p> <p>b) $5c^{-3}d^{-6}e^2 \cdot -2c^4d^2e^{-2}$ $-10c^{-3+4}d^{-6+2}e^{2-2}$ $-10c^1d^{-4}e^0 = -10 \cdot \frac{c^1}{d^4} \cdot 1 = \boxed{-\frac{10c}{d^4}}$</p> <p>c) $\frac{a^2b^3c^4}{a^5b^2d^6} = a^{-3}b = \frac{1}{a^3} \cdot b = \boxed{\frac{b}{a^3}}$</p> <p>d) $\frac{-30x^2y^{-5}z^4}{15x^5y^4z^2} = -2x^{-3}y^{-9}z^2$ $-\frac{2}{1} \cdot \frac{1}{x^3} \cdot \frac{1}{y^9} \cdot \frac{z^2}{1} = \boxed{-\frac{2z^2}{x^3y^9}}$</p>
<p>49. For a square whose side is $(x-5)$ feet, find the:</p> <p>a) perimeter $4(x-5)$ $\boxed{4x-20}$</p> <p>b) area $A = s^2$ $A = (x-5)^2$ $(x-5)(x-5)$ $x^2 - 5x - 5x + 25$ $x^2 - 10x + 25$</p>	<p>50. The side of a hexagon (6 sides) is represented by $4x-3$. How would you represent the perimeter of the hexagon in terms of x?</p> <p>$6(4x-3)$ $\boxed{24x-18}$</p>

<p>51. The lengths of the sides of a triangle are $x - y$, $x + y$, and $3x + y$. Find the perimeter of the triangle in terms of x and y.</p> <p>$x - y + x + y + 3x + y$ $\boxed{5x + y}$</p>	<p>52. The area of a rectangle is $10x^2 - 20x$. Find the width given the length is $5x$.</p> <p>$A = L \cdot W$ $\frac{10x^2 - 20x}{5x} = \frac{5x \cdot W}{5x}$ $2x - 4 = W$ $\boxed{2x - 4}$</p>
<p>53. The perimeter of a rectangle is represented by $24x - 8$. If the length is represented by $3x + 5$, how would you represent the width in terms of x?</p> <p>$P = 2L + 2W$ $24x - 8 = 2(3x + 5) + 2W$ $24x - 8 = 6x + 10 + 2W$ $-6x - 10 - 6x - 10 = -6x - 10 - 6x - 10$ $\frac{18x - 18}{2} = \frac{2W}{2}$ $\boxed{W = 9x - 9}$</p> <p>Check: $3x + 5$ $3x + 5$ $9x - 9$ $\frac{18x - 18}{2}$</p>	<p>54. Suppose you have been given this polynomial:</p> <p>a. How can you write this polynomial in standard form? $\boxed{-3b^4 + 4b^2 + 5b + 3}$</p> <p>b. What is the degree of the polynomial? $\boxed{4}$</p>
<p>55. Describe and correct the error made in simplifying the product</p> <p>$(2x + 7)(2x - 7)$ $4x^2 - 14x + 14x - 49$ $\boxed{4x^2 - 49}$</p> <p>Error: They combined $-14x + 14x$ to get $-28x$</p>	<p>$(2x + 7)(2x - 7)$ $= 4x^2 - 28x - 49$</p>