

Algebra 1 Final Exam Review

Properties of Exponents

Evaluate the expression.

1. $4^2 \cdot 4^4 = 4^6 = 4,096$

2. $(5^{-2})^3 \cdot 5^{-6} = \frac{1}{5^6} = \frac{1}{15,625}$ 3. $\frac{5^2}{5^5} = \frac{1}{5^3} = \frac{1}{125}$

4. $\left(\frac{3}{7}\right)^3 = \frac{3^3}{7^3} = \frac{27}{343}$

5. $\frac{2^2}{2^{-9}} = 2^{11} = 2,048$

6. $(-9)(-9)^3 = (-9)^4 = 6,561$

Simplify the expression. Express your answer using positive exponents only.

7. $a^6 \cdot a^3 = a^9$

8. $(x^5)^2 = x^{10}$

9. $(4a^2b^3)^5 = 1,024a^{10}b^{15}$

10. $\frac{x^8}{x^6} = x^2$

11. $\frac{x^5}{x^8} = \frac{1}{x^3}$

12. $\frac{x^6}{x^6} = x^0 = 1$

13. $\left(\frac{4a^3}{2b^4}\right)^2 = \frac{16a^6}{4b^8} = \frac{4a^6}{b^8}$

14. $(2^3x^2)^5 \cdot 2^{15}x^{10} = 32,768x^{10}$

15. $(x^4y^7)^{-3} = \frac{1}{x^{12}y^{21}}$

16. $\frac{x^{11}y^{10}}{x^{-3}y^{-1}} = x^{14}y^{11}$

17. $-3x^{-4}y^0 = \frac{-3}{x^4}$

18. $\frac{5x^3y^9}{20x^2y^{-2}} = \frac{xy^{11}}{4}$

19. $\frac{x^5}{x^{-2}} = x^7$

20. $\frac{x^5y^2}{x^4y^0} = xy^2$

21. $(x^3)^0 = 1$

22. $(10x^5y^3)^{-3} = \frac{1}{1,000x^{15}y^9}$

23. $\frac{x^{-1}y}{xy^{-2}} = \frac{y^3}{x^2}$

24. $(4x^2y^5)^{-2} = \frac{1}{16x^4y^{10}}$

Evaluating Expressions

Evaluate each of the following expressions.

25. $4(x + y) - 2$, when $x = 4$ and $y = 5$

$$4(4+5) - 2$$

$$4(9) - 2$$

$$36 - 2 = \boxed{34}$$

26. $3x^2 + 2y$, when $x = 3$ and $y = -3$

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

$$3(9) - 6$$

$$27 - 6 = \boxed{21}$$

27. $-5a + 2b - 6c$, when $a = -6$, $b = 4$, and $c = -2$

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

$$30 + 8 + 12$$

$$38 + 12 = \boxed{50}$$

28. $\sqrt{5x} + 2y$, when $x = 5$ and $y = -2$

$$\sqrt{5(5)} + 2(-2)$$

$$\sqrt{25} - 4$$

$$5 - 4 = \boxed{1}$$

29. $1 - y|2x - y|$, when $x = 3$ and $y = 10$

$$1 - 10|2(3) - 10|$$

$$1 - 10|6 - 10|$$

$$1 - 10|-4|$$

$$1 - 10(4)$$

$$1 - 40 = \boxed{-39}$$

Multiplying Polynomials

Simplify each by writing the product as a sum.

30. $(x - 2)(x - 9)$

x	x^2	$-9x$
-2	$-2x$	18
	x	-9

$$x^2 - 11x + 18$$

31. $(2x + 4)(x + 1)$

2x	$2x^2$	$2x$
4	$4x$	4
	x	1

$$2x^2 + 6x + 4$$

32. $(3x + 7)(3x - 7)$

3x	$9x^2$	$-21x$
-7	$21x$	-49
	$3x$	-7

$$9x^2 - 49$$

33. $(7x - 4)(3x + 6)$

7x	$21x^2$	$42x$
-4	$-12x$	-24
	$3x$	6

$$21x^2 + 30x - 24$$

34. $(2x + y)(x + 3y)$

2x	$2x^2$	$6xy$
y	xy	$3y^2$
	x	$3y$

$$2x^2 + 7xy + 3y^2$$

35. $(7x + 3y)(x + 2y)$

7x	$7x^2$	$14xy$
3y	$3xy$	$6y^2$
	x	$2y$

$$7x^2 + 17xy + 6y^2$$

36. $(2x - 1)^2$

2x	$4x^2$	$-4x$
-1	$-2x$	1
	$2x$	-1

$$4x^2 - 4x + 1$$

37. $(3x + 9)^2$

3x	$9x^2$	$27x$
9	$27x$	81
	$3x$	9

$$9x^2 + 54x + 81$$

38. $(4x - y)^2$

4x	$16x^2$	$-4xy$
-y	$-4xy$	y^2
	$4x$	-y

$$16x^2 - 8xy + y^2$$

39. Explain what is similar and what is different about the two expressions: $3x^2$ and $(3x)^2$.

$$3x^2 = 3 \cdot x \cdot x \text{ simplified stays } \boxed{3x^2}$$

$$(3x)^2 = (3x) \cdot (3x) = 3 \cdot x \cdot 3 \cdot x \text{ simplified } \boxed{9x^2}$$

40. Simplify then explain what is similar and what is different about the two expressions: $(3x)^2$ and $(3+x)^2$.

$$(3x)^2 = (3x) \cdot (3x) = 3 \cdot x \cdot 3 \cdot x = \boxed{9x^2}$$

$$(3+x)^2 = (3+x)(3+x) = \boxed{x^2 + 6x + 9}$$

41. Simplify then explain what is similar and what is different about the two expressions: $3x^{-2}$ and $(3x)^{-2}$

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

$$(3x)^{-2} = \frac{1}{(3x)^2} = \boxed{\frac{1}{9x^2}}$$

42. In the expression $\frac{a-b}{a \cdot b}$, if the value of a is positive and the value of b is negative, is the value of the expression positive or negative? Explain.

$$\frac{+ - (-)}{+ (-)} = \frac{+}{-} = \boxed{\text{negative answer always}}$$

43. Write the algebraic expression for each of the phrases below.

a. Three subtracted from the product of -2 and 7 is less than 5.

$$\frac{(-2)(7) - 3 < 5}{-14 - 3 < 5 \quad -17 < 5}$$

$$\underline{x + 4 = -1}$$

b. The quotient of a number and 4 is -1.

$$\underline{(3x + 4) - 5x = 12}$$

c. A number multiplied by 5, subtracted from the sum of three times the number and 4 is 12.

d. The difference of seven and number, divided by the product of 10 and a number is less than or equal to 8.

$$\frac{7 - x}{10(x)} = \leq 8$$