Exponent Rules Review Worksheet

NOTE: Anything to the zero power equals 1!

Product Rule: When multiplying monomials that have the same base, add the exponents.

$$x^m \cdot x^n = x^{m+n}$$

Example 1: $x \cdot x^3 \cdot x^4 = x^{1+3+4} = x^8$ Example 2: $(2x^2y)(-3x^3y^4) = 2\cdot(-3)\cdot x^2 \cdot x^3 \cdot y \cdot y^4 = -6x^5y^5$

Power Rule: When raising monomials to powers, multiply the exponents.

$$(x^m)^n = x^{m\cdot n}$$

Example 3: $(x^2y^3)^4 = x^{2\bullet 4}\, y^{3\bullet 4} = x^8y^{12}$ Example 4: $(2x^3yz^2)^3 = 2^3\, x^{3\bullet 3}\, y^3\, z^{2\bullet 3} = 8x^9y^3z^6$

Quotient Rule: When dividing monomials that have the same base, subtract the exponents.

$$\frac{x^m}{x^n} = x^{m-n}$$

Example 5: $\frac{x^3}{x^{-2}} = x^{3-(-2)} = x^5$ Example 6: $\frac{5^6}{5^2} = 5^{6-2} = 5^4$ Example 7: $\frac{36m^3n^5}{-9mn^4} = \frac{36}{-9}\cdot\frac{m^3}{m}\cdot\frac{n^5}{n^4} = -4m^2n$

Simplify each of the following. Copy the problem. Work on your own paper.

1) $a \cdot a^2 \cdot a^3$ a^6

2) $(2a^2b)(4ab^2)$ $8a^3b^3$

3) $(6x^2)(-3x^5)$ $-18x^7$

4) $b^3 \cdot b^4 \cdot b^7 \cdot b$ b^{15}

5) $(3x^3)(3x^4)(-3x^2)$ $-27x^9$

6) $(2x^2y^3)^2$ $4x^4y^6$

7) $(5x^2y^4)^3$ $125x^6y^{12}$

8) $(6x^4y^6)^3$ $216x^{12}y^{18}$

9) $(4x^3y^3)^3$ $64x^9y^9$

10) $(7xy)^2$ $49x^2y^2$

11) $\frac{x^3}{x}$ x^2

12) $\frac{18c^3}{-3c^2}$ $-6c$

13) $\frac{9a^3b^5}{-3ab^2}$ $-3a^2b^3$

14) $\frac{-48c^2d^4}{-8cd}$ $6cd^3$

15) $\frac{22y^6z^8}{2yz^{-7}}$ $11y^5z^{15}$

16) $x^2 \cdot x^7$ x^9

17) $(x^2)^7$ x^{14}

18) $(-2x^4)^5$ $-32x^{20}$

19) $2x^3 + 7x^3$ $2x^3+7x^3$

20) 7^0 1

21) $8x^0$ 8

22) -3^4 -81

23) $(-3)^4$ 81

24) $6x^0y^8 - (2y^2)^4$ $6y^8-16y^8$

25) $(x+2y)(x-2y)$ GRADE TEN x^2-4y^2

26) $\frac{2x^3}{-8x^4}$ Grade10 answer $\boxed{\frac{1}{-4x}}$ or $\frac{x^{-1}}{-4}$

27) $\frac{xy^7}{x^3y^4}$ $x^{-2}y^3$ or $\boxed{\frac{y^3}{x^2}}$ Grade10 answer

either will be accepted

28) $6x^5 \cdot 3x^5 \cdot x^0$ $18x^{10}$

29) $(3st^{12})^3$ $27s^3t^{36}$

30) $\left(\frac{3m^2n^7}{m}\right)^5$ $243m^5n^{35}$

Practice Worksheet for Law of Exponents

Use the laws of exponents you discovered in your investigation to simplify each of the following expressions with positive exponents.

now that we know the laws, go all the way, how far can you go.

1. $3^3 \bullet 3^4$

$3^7 = 2187$

2. $x^8 \bullet x^5$

x^{13}

3. $3x^3 \bullet 4x^2$

$12x^5$

4. $x^2y^4 \bullet x^5y^{12}$

x^7y^{16}

5. $(5^2)^3$

$5^6 = 15\,625$

6. $(x^4)^5$

x^{20}

7. $(2x)^3$

$8x^3$

8. $(x^4y^5)^3$

$x^{12}y^{15}$

9. $(3x^4y^3z^5)^3$

$27x^{12}y^9z^{15}$

10. $(2x^3)^4(-3x^2y^3)^2$

$16x^{12} \cdot 9x^4y^6$

$\hookrightarrow 144x^{16}y^6$

Grade 10 Question

11. 3^{-4}

$\frac{1}{3^4} = \frac{1}{81}$

12. $\frac{8^5}{8^2}$

$8^3 = 512$

13. 27^0

1

14. $\frac{12x^5}{4x^2}$

$3x^3$

15. $\frac{2x^6y^5}{16x^4y}$

$\frac{1}{8} \cdot x^2y^4$ OR $\frac{x^2y^4}{8}$

16. $\frac{3^5}{3^7}$

3^{-2} OR $\boxed{\frac{1}{3^2}}$ Grade 10 answer

17. $\frac{4x^5y^2}{20x^3y^4}$

$\frac{x^2y^{-2}}{5}$ OR $\boxed{\frac{x^2}{5y^2}}$ Grade 10 answer

18. $\frac{12xy^2}{3x^4y^2}$

$4x^{-3}$ OR $\boxed{\frac{4}{x^3}}$ Grade 10 answer

19. $\left(\frac{2x^4}{3x}\right)^3$

$\frac{8x^4}{27}$

20. $\frac{18x^{-5}y^4}{12x^{-3}y^{-3}}$

$\frac{3x^{-8}y^7}{2}$ OR $\boxed{\frac{3y^7}{2x^8}}$ Grade 10 answer