

Warm-Up



Complete the square: $r^2 + 8r + \frac{16}{2}$

$$(4)^2 = 16$$

- What is the vertex of the quadratic function $f(x) = 6x^2 + 12x - 18$?
- a. $(0, -18)$
 - b. $(-3, 0)$
 - c. $(-1, -24)$
 - d. $(1, 0)$

Agenda:

- 1) Investigation on Exponent Rules.
- 2) Practice problems.
- 3) Group Practice.



Exponent Rules Pattern Investigation

Expectations:

- Work in pairs.
- Music volume > Talking volume
- Cooperate.
- Each section: 5-7 minutes.
- General discussion in the end of each section.



4^3
 $4 \cdot 4 \cdot 4$

base is what we are multiplying
 exponent is how many times we multiply the base by itself

$3^4 \cdot 3^2 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^6$

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

$(2^3)^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

$(2^2)^3 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

$(2^2)^4 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^8$

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

$2^5 \div 2^2 = \frac{2^5}{2^2} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2} = 2^3$

$4^6 \div 4^2 = \frac{4^6}{4^2} = \frac{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4}{4 \cdot 4} = 4^4$

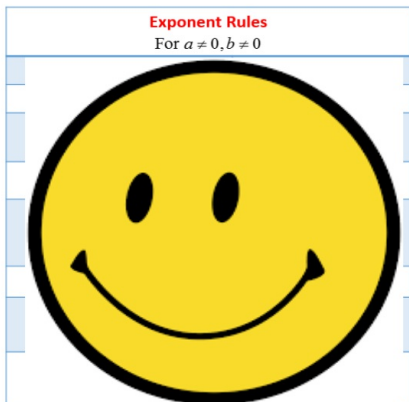
$\frac{x^n}{x^m} = x^{n-m}$
 Subtract exponents



Multiplying numbers with exponents
(Product Rule)

Exponents with raised to an exponent
(Power to power)

Dividing numbers with exponents
(Quotient Rule)



Example 1 – Simplify: $\frac{(3x^4y^{-2})^{-3}}{(2x^3y^2)^{-2}}$

Example 2 – Simplify: $\frac{(3x^{-5}y^2)^0}{(4x^{-3}y^2)^{-2}}$

Example 3 –Simplify: $\left(\frac{3x^3y^{-2}}{4x^5y^{-3}}\right)^{-3}$

Conclusion

1. We do not want negative exponents.
2. Apply the exponent rules to simplify expressions: Product, Quotient, Power to Power, Zero, and Negative rule.
3. Each terms must be examined and simplified individually.

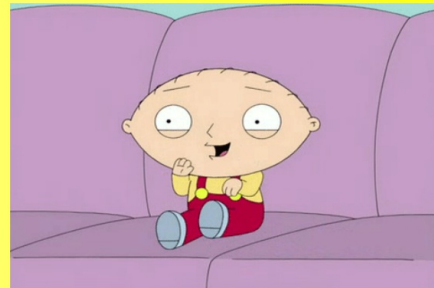
Matching Activity!

- Get in pairs.
- Each groups will receive a sheet.
- You and your partner will simplify the expressions.
- Work / Solution / Final product in the ONE journal.
- You have 45 minutes
- Raise your hand once you're finished.

-Solution is at the front. Check as you go!

Expectations:

- Work in pairs.
- Talking volume < Music volume
- 45 minutes.



Exit Ticket

1. $-(9x)^0$

2. $(y^4)^3$

3. $1/(-2)^{-4}$



Example 5 –Simplify:
$$\frac{(6x^3y^{-2})^{-2}(3x^4y^{-5})^2}{(2x^4y^2)^{-3}}$$

EXPONENTS PRACTICE

Simplify:

1. $3 \cdot 4^3$

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

3. $x^5 \cdot x^3$

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

5. $\frac{6^5}{6^3}$

6. $\frac{x^4}{x^7}$

7. 8^0

8. $-(9x)^0$

9. $(y^4)^3$

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

11. $\frac{6x^7}{2x^4}$

12. $\frac{8x^5}{4x^2}$

13. $(2cd^4)^2(cd)^5$

14. $(2fg^4)^4(fg)^6$

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

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

17. $\left(\frac{4x^5y}{16xy^4}\right)^3$

18. $\left(\frac{5x^3y}{20xy^5}\right)^4$

19. y^{-7}

20. 7^{-2}

21. $\frac{1}{x^{-3}}$

22. $\frac{1}{2^{-4}}$

23. $x^5 \cdot x^{-1}$

24. x^{-6}

25. $x^9 \cdot x^{-7}$

26. $(j^{-13})(j^4)(j^6)$

27. $\frac{x^{-1}}{x^{-4}}$

28. $\frac{52x^6}{13x^{-7}}$

29. $f^{-3}(f^2)(f^{-3})$

30. $\frac{x^{-4}}{x^{-9}}$

31. $\frac{24x^4}{12x^{-8}}$

32. $\frac{3x^3y^{-3}}{12x^6y^3}$

33. $(2x^3y^{-3})^{-2}$

34. $\frac{2x^4y^{-4}}{8x^7y^3}$

35. $(4x^4y^{-4})^3$

36. $5x^2y(2x^4y^{-3})$

37. $\left(\frac{-7a^2b^3c^0}{3a^3b^4c^1}\right)^{-4}$

38. $\left(\frac{-2a^3b^2c^0}{3a^2b^3c^1}\right)^{-2}$