Warm Up

Simplify:

$$\frac{15x^{6}y^{-9}}{5xy^{-11}} = \frac{3x^{6}y^{11}}{xy^{9}} = 3x^{5}y^{2}$$

What Did P **Homework Questions?**

Have You Ever Heard of the Planet Saturn?

Simplify each expression. Write the letter of the answer in the box containing the exercise number.

1. 5^3
2. 5^{-3}
3. 3^{-5}
4. $(-5)^{-3}$
5. $(-12)^{-2}$ $= \frac{1}{(-12)^2} = \frac{1}{144}$
6. -12^{-2} $= -1 \cdot 12^{-2} = -1 \cdot \frac{1}{12^2} = \frac{-1}{144}$
7. $(-12)^0$
8. $(-4)^{-3}$

Answers 1-8:

T $\frac{1}{144}$ M $\frac{1}{125}$ P -1 R $-\frac{1}{64}$ I 125 L 144 U $\frac{1}{144}$ N $\frac{1}{243}$ O $-\frac{1}{125}$ F -125 E $\frac{1}{64}$ S $-\frac{1}{144}$

9. -4^{-3}
10. 10^{-5}
11. $(-10)^{-5}$
12. 10^0
13. 75^{-1}
14. -75^{-1}
15. $(-2)^{-4}$
16. -2^{-4}

Answers 9-16:

O 16 I $\frac{1}{75}$ T $-\frac{1}{75}$ E $-\frac{1}{64}$ A $-\frac{1}{16}$ N $\frac{1}{1000}$ T 1 R -75 S -64 H $\frac{1}{16}$ B $\frac{1}{100,000}$ U $-\frac{1}{100,000}$

17. $7ab^0$
18. $7ab^{-4}$
19. $\frac{7}{ab^{-4}}$
20. $\frac{7^{-2}a}{b^{-1}}$
21. $2x^3y^{-8}$
22. $\frac{2x^{-3}}{y^{-8}}$
23. $\frac{2^{-1}x^{-3}}{u^8}$

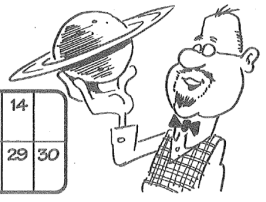
Answers 17-23:

I $\frac{2y^8}{x^3}$ A $\frac{7a}{b^4}$ R $2x^3y^8$ O $7ab^4$ F $\frac{7b^4}{a}$ L $\frac{1}{2x^3y^8}$ S $7a$ A $\frac{ab}{49}$ M $\frac{2x^3}{y^8}$ N $\frac{b}{49a}$

24. $\frac{3n^2}{t^{-5}}$
25. $3^4n^{-2}t^5$
26. $\frac{3^{-4}t^{-5}}{n^{-2}}$
27. $\frac{8^2c^{-1}d^{-6}}{5}$
28. $\frac{(-8)^2c^0}{5^{-1}d^{-6}}$
29. $\frac{(-8)^{-2}d^{-6}}{5c^{-1}}$
30. $\frac{-8^{-2}}{5^{-1}cd^0}$

Answers 24-30:

T $\frac{64c}{5d^6}$ G $-\frac{5}{64c}$ I $3n^2t^5$ I $320d^6$ R $\frac{n^2}{81t^5}$ A $\frac{81t^5}{n^2}$ E $320cd^6$ S $81n^2t^5$ R $\frac{64}{5cd^6}$ N $\frac{c}{320d^6}$



1	2		3	4	5		6	7	8	9		10	11	12		13	14	
15	16	17		18		19	20	21	22	23	24	25	26		27	28	29	30

$\frac{(-8)^{-2}d^{-6}}{5c^{-1}}$

Strategy: make all neg. exponents positive

$\frac{(-8)^{-2}d^{-6}}{5c^{-1}} = \frac{c}{(-8)^2 d^6 \cdot 5}$

exponent only on '-8'

$= \frac{c}{64d^6 \cdot 5} = \frac{c}{320d^6}$

$\frac{(-8)^2c^0}{5^{-1}d^{-6}}$

Strategy: make all neg. exponents positive

$\frac{(-8)^2c^0}{5^{-1}d^{-6}} = \frac{64 \cdot 1 \cdot 5 \cdot d^6}{}$

$= 320d^6$

Additional Practice

All work should be done in your notebook. Final answer should contain only positive exponents.

Remember: Whenever a term is raised to a negative exponent, that means you are dividing by that term to the positive exponent. When you are dividing by a term, it gets moved to the other side of the division bar.

22. $\dfrac{m^{-2}n^{-5}}{(m^4n^3)^{-1}}$

23. $\dfrac{(j^{-1}k^3)^{-4}}{j^3k^3}$

24. $\dfrac{(2a^{-2}b)^{-3}}{5a^2b^4}$

Power to Power

$(x^4)^2 = x^{4\cdot 2} = x^8$

Use power to power rule

$\dfrac{(j^{-1}k^3)^{-4}}{j^3k^3}$

$\dfrac{j^4k^{-12}}{j^3k^3}$

$\dfrac{j^4}{j^3\cdot k^3\cdot k^{12}}$

$= \dfrac{j}{k^{15}}$

25. $\left(\dfrac{q^{-1}r^3}{qr^{-2}}\right)^{-5}$

26. $\left(\dfrac{7c^{-3}d^3}{c^5de^{-4}}\right)^{-1}$

27. $\left(\dfrac{2x^3y^2z}{3x^4yz^{-2}}\right)^{-2}$

#24 $\dfrac{(2a^{-2}b)^{-3}}{5a^2b^4}$

$= \dfrac{2^{-3}a^6b^{-3}}{5a^2b^4}$

$= \dfrac{a^6}{2^3a^2\cdot b^4\cdot b^3\cdot 5}$

$= \dfrac{a^4}{40b^7}$

Create Your Own Problem

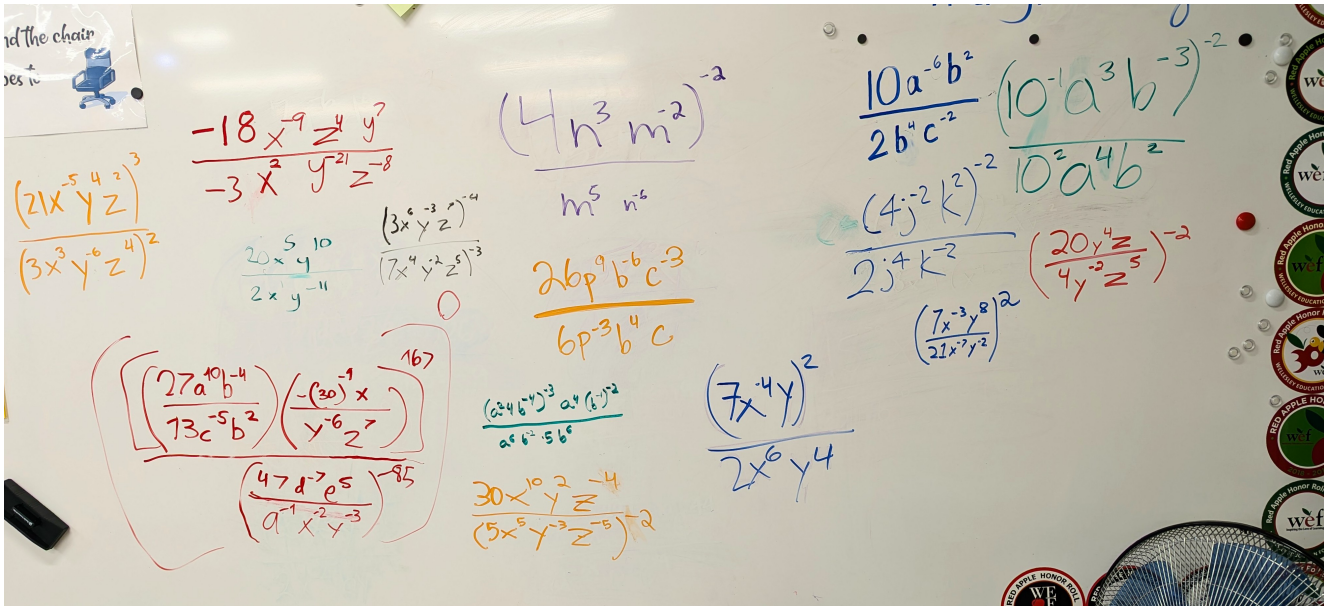
1. Create your own simplifying exponential expressions problem, and simplify it.

2. Write your problem and solution on a file card and hand it in.

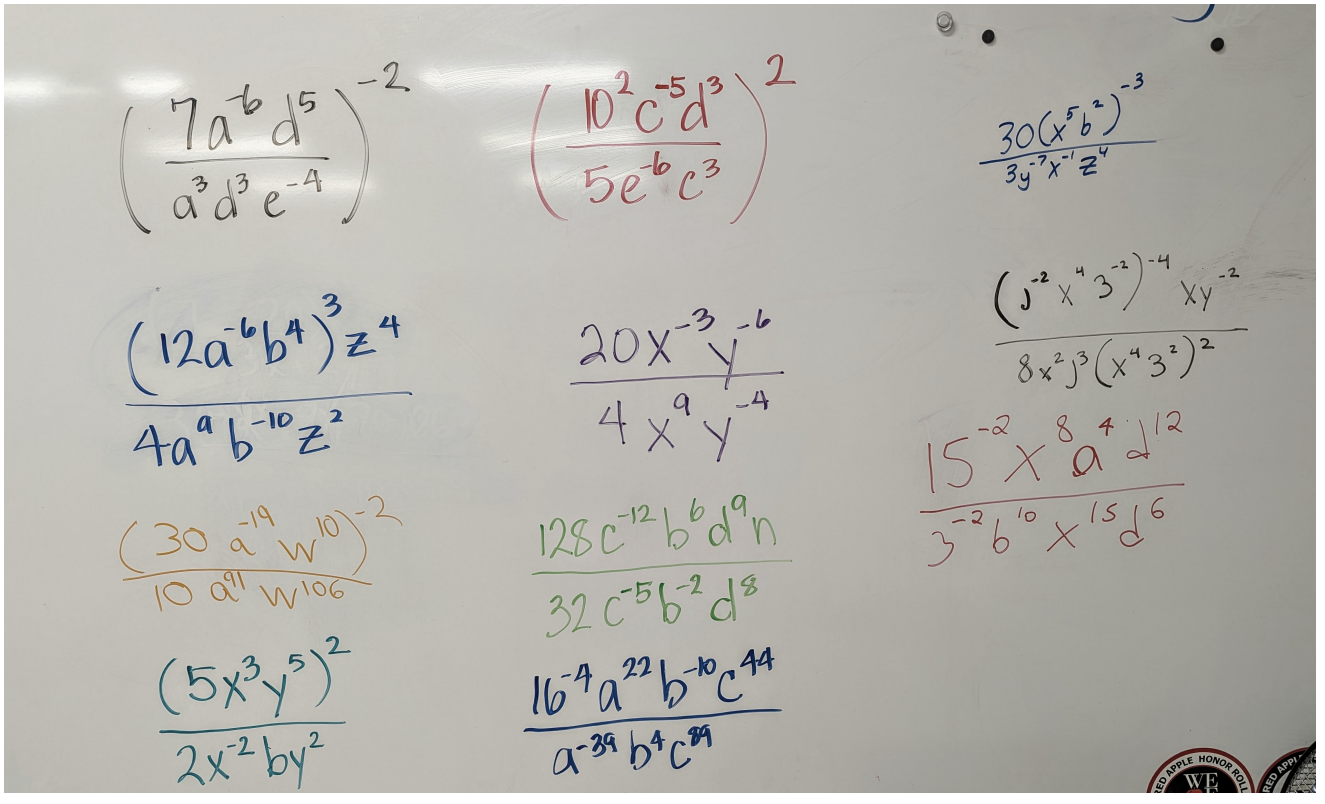
3. Write your problem (with your name) on the board so friends can simplify it.

4. Simplify other problems that your classmates have created.

5. Be prepared to hand in your work.


nd the chair
$\frac{-18x^{-9}z^{4}y^{7}}{-3x^{2}y^{21}z^{-8}}$
$\left(\frac{21x^{-5}y^{4}z^{2}}{3x^{3}y^{-6}z^{4}}\right)^{3}$
$\frac{20x^{5}y^{10}}{2xy^{-11}}$
$\frac{\left(3x^{6}y^{-3}z^{7}\right)^{-4}}{\left(7x^{4}y^{-2}z^{5}\right)^{-3}}$
$\left(\frac{4n^{3}m^{-2}}{m^{5}n^{-5}}\right)^{-2}$
$\frac{26p^{9}b^{-6}c^{-3}}{6p^{-3}b^{4}c}$
$\frac{10a^{-6}b^{2}}{2b^{4}c^{-2}}$
$\left(\frac{10^{-1}a^{3}b^{-3}}{10^{2}a^{4}b^{2}}\right)^{-2}$
$\frac{(4j^{-2}k^{2})^{-2}}{2j^{4}k^{-2}}$
$\left(\frac{20y^{4}z}{4y^{-2}z^{5}}\right)^{-2}$
$\left(\frac{7x^{-3}y^{8}}{21x^{-2}y^{-2}}\right)^{2}$
$\left[\left(\frac{27a^{10}b^{-4}}{13c^{-5}b^{2}}\right)\left(\frac{-(30)^{-1}x}{y^{-6}z^{7}}\right)\right]^{167}$
$\left(\frac{47d^{-7}e^{5}}{a^{-1}x^{-2}y^{-3}}\right)^{-85}$
$\frac{(a^{2}4b^{-4})^{-3}a^{4}(b^{-})^{-2}}{a^{6}b^{-2}\cdot 5b^{6}}$
$\frac{30x^{10}y^{2}z^{-4}}{(5x^{5}y^{-3}z^{-5})^{-2}}$
$\frac{(7x^{-4}y)^{2}}{2x^{6}y^{4}}$

B block Problems



A block Homework

1. $\frac{(5x^3y^5)^2}{2x^{-2}by^2}$

2. $\frac{30(x^5b^2)^{-3}}{3y^{-7}x^{-1}z^4}$

3. $\frac{15^{-2}x^8a^4d^{12}}{3^{-2}b^{10}x^{15}d^6}$

4. $\left(\frac{7a^{-6}d^5}{d^3a^3e^{-4}}\right)^{-2}$

5. $\frac{(12a^{-6}b^4)^3z^4}{4a^9b^{-10}z^2}$

B block Homework

1. $\dfrac{30x^{10}y^{2}z^{-4}}{(5x^{5}y^{-3}z^{-5})^{-2}}$

2. $\dfrac{(3x^{6}y^{-3}z^{7})^{-4}}{(7x^{4}y^{-2}z^{5})^{-3}}$

3. $\dfrac{-18x^{-9}y^{7}z^{4}}{-3x^{2}y^{-21}z^{-8}}$

4. $\dfrac{(4a^{2}b^{-4})^{-3}\cdot a^{4}\cdot (b^{-1})^{-2}}{a^{6}b^{-2}\cdot 5b^{6}}$

5. $\left[\dfrac{\left[\left(\dfrac{27a^{10}b^{-4}}{13c^{-5}b^{2}}\right)\left(\dfrac{-(30)^{-9}x}{y^{-6}z^{7}}\right)\right]^{167}}{\left(\dfrac{47d^{-7}e^{5}}{a^{-1}x^{-2}y^{-3}}\right)^{-85}}\right]^{0}$