Warm Up

Simplify:

$$7.23 \times 10^{12} + 6.8 \times 10^{10}$$

Exponents don't match

$$7.23 \times 10^{12} + 6.8 \times 10^{10}$$

$$7.23 \times 10^{12} + 0.068 \times 10^{12}$$ Exponents match

$$(7.23 + 0.068) \times 10^{12}$$

$$7.298 \times 10^{12}$$

Homework Questions?

A block Homework

1. $\dfrac{(5x^3y^5)^2}{2x^{-2}by^2} = \dfrac{25x^6y^{10}}{2x^{-2}by^2} = \boxed{\dfrac{25x^8y^8}{2b}}$

2. $\dfrac{30(x^5b^2)^{-3}}{3y^{-7}x^{-1}z^4} = \dfrac{30x^{-15}b^{-6}}{3y^{-7}x^{-1}z^4}$

$= \dfrac{10xy^7}{x^{15}b^6z^4} = \boxed{\dfrac{10y^7}{b^6x^{14}z^4}}$

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

$= \left(\dfrac{3}{15}\right)^2\cdot\dfrac{a^4d^6}{b^{10}x^7}$

$= \left(\dfrac{1}{5}\right)^2\cdot\dfrac{a^4d^6}{b^{10}x^7} = \boxed{\dfrac{a^4d^6}{25b^{10}x^7}}$

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

$= \left(\frac{7d^2e^4}{a^9}\right)^{-2}$

$= \left(\frac{a^9}{7d^2e^4}\right)^2 = \boxed{\frac{a^{18}}{49d^4e^8}}$

5. $\frac{(12a^{-6}b^4)^3 z^4}{4a^9b^{-10}z^2} = \frac{12^3 a^{-18} b^{12} z^4}{4a^9 b^{-10} z^2}$

$= \frac{1728\, b^{10} \cdot b^{12} \cdot z^4}{4a^9 \cdot a^{18} \cdot z^2}$

$= \boxed{\frac{432\, b^{22} z^2}{a^{27}}}$

Homework Questions?

B block Homework

1. $\dfrac{30x^{10}y^{2}z^{-4}}{(5x^{5}y^{-3}z^{-5})^{-2}} = \dfrac{30x^{10}y^{2}z^{-4}}{5^{-2}x^{-10}y^{6}z^{10}}$

$= \dfrac{30 \cdot 5^{2} \cdot x^{10} \cdot x^{10} y^{2}}{y^{6} z^{10} \cdot z^{4}}$

$= \boxed{\dfrac{750x^{20}}{y^{4}z^{14}}}$

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

$= \dfrac{7^{3}x^{12}y^{-6}z^{15}}{3^{4}x^{24}y^{-12}z^{28}}$

$= \boxed{\dfrac{343y^{6}}{81x^{12}z^{13}}}$

3. $\dfrac{-18x^{-9}y^{7}z^{4}}{-3x^{2}y^{-21}z^{-8}} = \dfrac{6y^{7}\cdot y^{21}\cdot z^{4}\cdot z^{8}}{x^{2}\cdot x^{9}}$

$= \boxed{\dfrac{6y^{28}z^{12}}{x^{11}}}$

4. $\dfrac{(4a^{2}b^{-4})^{-3}\cdot a^{4}\cdot (b^{-1})^{-2}}{a^{6}b^{-2}\cdot 5b^{6}} = \dfrac{4^{-3}a^{-6}b^{12}\cdot a^{4}b^{2}}{5a^{6}b^{4}}$

$= \dfrac{a^{4}b^{14}}{4^{3}\cdot 5a^{6}\cdot a^{6}\cdot b^{4}}$

$= \boxed{\dfrac{b^{10}}{320a^{8}}}$

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

Anything to the zero power equals 1.

Addition and Subtraction with Scientific Notation

Let's work with an exponent of 2

$4.2 \times 10^{2} + 1 \times 10^{1} =$

$4.2 \times 10^{2} + 0.1 \times 10^{2} = 4.3 \times 10^{2}$

Let's go to 10^{3}

6.3×10^{3} and 5.9×10^{-1}

$6.3 \times 10^{3} + 0.00059 \times 10^{3} = 6.30059 \times 10^{3}$

Exponents the same

$6 \times 10^{7} + 7 \times 10^{7} = 13 \times 10^{7}$

1.3×10^{8}

$2.5 \times 10^{7} + 1.3 \times 10^{7} = 3.8 \times 10^{7}$

$2 \times 10^{6} + 5 \times 10^{5} = 2.5 \times 10^{6}$

Scientific Notation Review

Proper Form: $a \times 10^{b}$

What if? 24×10^{4}

2.4×10^{5}

Multiplication and Division with Scientific Notation

$1.2 \times 10^7 \cdot 3 \times 10^3$

$$\frac{6 \times 10^7}{3 \times 10^3}$$

What would happen if we replaced 10 with a variable?

$1.2a^7 \cdot 3a^3$

$3.6a^{10}$

"a" is our common base

$$\frac{6a^7}{3a^3}$$

$2a^4$

$1.2 \times 10^7 \cdot 3 \times 10^3$

3.6×10^{10}

"10" is our common base

$$\frac{6 \times 10^7}{3 \times 10^3}$$

2×10^4

It is the exact same process that we are used to using with monomials!

Practice

$(2\times10^{5})(3\times10^{2}) = 6\times10^{7}$

6 $\quad$ 10^{7}

$(5\times10^{-2})(2.3\times10^{12}) = 11.5\times10^{10}$

11.5 $\quad$ $10^{12-2}=10^{10}$ $\quad$ 1.15×10^{11}

$(2.5\times10^{-3})(6\times10^{-15}) = 15\times10^{-18}$

15 $\quad$ 10^{-18} $\quad$ 1.5×10^{-17}

$$\frac{4.8\times10^{-4}}{1.2\times10^{-7}} = 4\times10^{3}$$

$$\frac{10^{-4}}{10^{-7}} = \frac{10^{7}}{10^{4}} = 10^{3}$$

$$\frac{10^{4}}{10^{-7}} = 10^{-4--7} = 10^{3}$$

$$\frac{1.2\times10^{5}}{6\times10^{3}} = 0.2\times10^{2} = 2\times10^{1}$$

Classwork

Name _____ Block _____ Date _____

Multiplying and Dividing with Scientific Notation

No calculators needed.

1. $(2\times10^{7})\cdot(1.1\times10^{4})$

2. $(1.2\times10^{3})\cdot(3\times10^{5})$

3. $(4\times10^{3})\cdot(2\times10^{9})$

4. $(3\times10^{-4})\cdot(3\times10^{8})$

5. $(5\times10^{8})\cdot(3\times10^{8})$

6. $(8\times10^{2})\cdot(7\times10^{7})$

7. $(6\times10^{-4})\cdot(4\times10^{-3})$

8. $(5\times10^{-10})\cdot(8\times10^{4})$

9. $(7\times10^{5})\cdot(2\times10^{4})\cdot(2\times10^{3})$

10. $(5\times10^{7})\cdot(2\times10^{-4})\cdot(4\times10^{6})$

11. $\frac{8\times10^{10}}{2\times10^{7}}$

12. $\frac{9\times10^{9}}{3\times10^{-4}}$

13. $\frac{1.2\times10^{6}}{6\times10^{3}}$

14. $\frac{16\times10^{4}}{2\times10^{6}}$

15. $\frac{2.4\times10^{5}}{1.2\times10^{7}}$

16. $\frac{1.0\times10^{17}}{2\times10^{11}}$

17. $\frac{7\times10^{6}}{2\times10^{-2}}$

18. $\frac{(5\times10^{6})(2\times10^{3})(3\times10^{3})}{(5\times10^{4})} =$

19. $\frac{(4\times10^{6})(2\times10^{3})}{(8\times10^{-4})(2\times10^{4})} =$

20. $\frac{(4\times10^{6})(5\times10^{-3})}{(8\times10^{-4})(5\times10^{3})} =$

Homework

Finish classwork