Math 310 - Dr. Miller - HW #15E: Exponents and the Same Base Rules

1. Simplify to an expression that has only one exponent, which is positive. (The number 1 is also allowed as an answer, numerator, denominator, etc.) Exponents of 1 or 0 should be interpreted correctly, not shown.

   (a) $x^5 \cdot (x^4)^{-2} \div x^3$

   (b) $x^5 \cdot (x^4) \div (x^3)^{-2}$

   (c) $\dfrac{y^{-6} \cdot y^8}{(y^4)^7}$

   (d) $\dfrac{y^{-4} \cdot y^6}{(y^5)^{-5}}$

   (e) $k^3 \cdot k^7 \div (k^{-1})^2$

   (f) $(k^5)^2 \div (k^7 \cdot k^3)$

   (g) $(k^5)^2 \div k^7 \cdot k^3$

2. Find the value of the exponent N in each case; the answer may be negative or zero if needed.

   Unlike Problem #1, here you will need to CREATE a "same base" by using such facts as $4 = 2^2$ or $8 = 2^3$ (so switching to a base of 2), $\frac{1}{3} = 3^{-1}$ or $81 = 3^4$ (so switching to a base of 3, $25 = 5^2$, etc. Guess-and-check can help you sort out the correct swap: for instance, if you aren't sure how to make 625 into a power of 5, use your calculator to find 5×5, and $\times 5$ further, and so on until you get 625 as an answer, keeping track of how many factors of 5 it took.

   (a) $4 \cdot 2^{-3} \div 32 = 2^N$

   (b) $8 \div \frac{1}{2} \times 16^3 = 2^N$

   (c) $64^{-1} \cdot 2^3 \cdot 4^5 = 2^N$

   (d) $27 \div (3^4 \cdot 9^{-1}) = 3^N$

   (e) $27 \div 3^4 \cdot 9^{-1} = 3^N$

   (f) $81^{-2} \cdot \frac{1}{9} \cdot 3^6 = 3^N$

   (g) $5^4 \div 625 \cdot 25^{-1} = 5^N$

1. (a) $\dfrac{1}{x^6}$

   (b) x^{15}

   (c) $\dfrac{1}{y^{26}}$

   (d) y or y^1

   (e) k^{12}

   (f) 1

   (g) k^6

2. (a) $N = -6$ since $4 \cdot 2^{-3} \div 32 = 2^2 \cdot 2^{-3} \div 2^5$

   (b) $N = 16$ since $8 \div \frac{1}{2} \times 16^3 = 2^3 \div 2^{-1} \times (2^4)^3$

   (c) $N = 7$ since $64^{-1} \cdot 2^3 \cdot 4^5 = (2^6)^{-1} \cdot 2^3 \cdot (2^2)^5$

   (d) $N = 1$ since $27 \div (3^4 \cdot 9^{-1}) = 3^3 \div (3^4 \cdot (3^2)^{-1})$

   (e) $N = -3$ since $27 \div 3^4 \cdot 9^{-1} = 3^3 \div 3^4 \cdot (3^2)^{-1}$

   (f) $N = -4$ since $81^{-2} \cdot \frac{1}{9} \cdot 3^6 = (3^4)^{-2} \cdot 3^{-2} \cdot 3^6$

   (g) $N = -2$ since $5^4 \div 625 \cdot 25^{-1} = 5^4 \div 5^4 \cdot (5^2)^{-1}$