MAT 099 §5.2 #s 7, 13, 19, 27, 47, 55, 59, 67, 69, 73, 83, 87

#s 1-15 Write each answer using positive exponents only.

(7) $(3x^2y^3)^2 = 3^2(x^2)^2(y^3)^2 = \boxed{9x^4y^6}$

(13) $\left(\frac{x^7y^{-3}}{z^{-4}}\right)^{-5} = \frac{(x^7)^{-5}(y^{-3})^{-5}}{(z^{-4})^{-5}} = \frac{x^{-35}y^{15}}{z^{20}}$

$= \boxed{\frac{y^{15}}{x^{35}z^{20}}}$

#s 16-27 Simplify. Write each answer using positive exponents only.

(19) $\left(\frac{5x^7y^4}{10x^3y^{-2}}\right)^{-3} = \left(\left(\frac{5}{10}\right)x^{7-3}y^{4-(-2)}\right)^{-3}$

$= \left(\frac{1}{2}x^4y^6\right)^{-3} = \left(\frac{1}{2}\right)^{-3}(x^4)^{-3}(y^6)^{-3} = \left(\frac{1^{-3}}{2^{-3}}\right)x^{-12}y^{-18}$

$= \left(\frac{2^3}{1^3}\right)\left(\frac{1}{x^{12}}\right)\left(\frac{1}{y^{18}}\right) = \left(\frac{8}{1}\right)\left(\frac{1}{x^{12}y^{18}}\right) = \boxed{\frac{8}{x^{12}y^{18}}}$

(27) $\left(\frac{x^{-1}y^{-2}}{5^{-3}}\right)^{-5} = \frac{(x^{-1})^{-5}(y^{-2})^{-5}}{(5^{-3})^{-5}} = \boxed{\frac{x^5y^{10}}{5^{15}}}$

MAT 099 8.5, 2 #s 47, 55, 59, 67, 69, 73, 83, 87

(47) $\dfrac{3^{-2}a^{-5}b^{6}}{4^{-2}a^{-7}b^{-3}} = \left(\dfrac{4^2}{3^2}\right) a^{-5-(-7)}\, b^{6-(-3)} = \boxed{\dfrac{16}{9}a^2b^9}$

OR $\boxed{\dfrac{16a^2b^9}{9}}$ ← same

(55) $\left(\dfrac{2x^2}{y^4}\right)^3\left(\dfrac{2x^5}{y}\right)^{-2} = \left(\dfrac{2^3(x^2)^3}{(y^4)^3}\right)\left(\dfrac{2^{-2}(x^5)^{-2}}{y^{-2}}\right)$

$= (2^3)(2^{-2})\left(\dfrac{x^6}{y^{12}}\right)\left(\dfrac{x^{-10}}{y^{-2}}\right) = 2^{3-2}\,x^{6-10}\,y^{-12-(-2)}$

$= 2x^{-4}y^{-10} = \boxed{\dfrac{2}{x^4y^{10}}}$

#s 57-68 Simplify. Assume that variables in the exponents represent integers and that all other variables are not 0.

(57) $\left(x^{3a+6}\right)^3 = x^{(3a+6)(3)} = x^{9a+18}$

(59) $\dfrac{x^{4a}\left(x^{4a}\right)^3}{x^{4a-2}} = \dfrac{x^{4a}x^{12a}}{x^{4a-2}} = x^{4a+12a-(4a-2)}$

$= x^{16a-4a+2} = \boxed{x^{12a+2}}$

MAT 099 §5.2 #s 67, 69, 73, 83, 87

(67) $\dfrac{25x^{2a+1}y^{a-1}}{5x^{3a+1}y^{2a-3}} = \left(\dfrac{25}{5}\right)x^{2a+1-(3a+1)}y^{a-1-(2a-3)}$

$= 5x^{2a+1-3a-1}y^{a-1-2a+3} = \boxed{5x^{-a}y^{-a+2}}$

#s67-86 Perform the indicated operation. Write each answer in scientific notation.

(69) $(5\times10^{11})(2.9\times10^{-3}) = (5)(2.9)(10^{11-3})$

$= 14.5\times10^{8} = \boxed{1.45\times10^{9}}$

(73) $\dfrac{3.6\times10^{-4}}{9\times10^{2}} = \dfrac{3.6}{9}\times10^{-4-2} = .4\times10^{-6}$

$= \boxed{4\times10^{-7}}$

(83) $\dfrac{66{,}000\times.001}{.002\times.003} = \dfrac{6.6\times10^{4}\times10^{-3}}{(2\times10^{-3})(3\times10^{-3})}$

$= \left(\dfrac{6.6}{6}\right)\times10^{4-3-(-3)-(-3)} = \boxed{1.1\times10^{7}}$

(87) A computer adds 2 numbers in 10^{-8} sec. How long would it take to do this 200,000 times?

$200000 = 2\times10^{5}$. $(2\times10^{5})(10^{-8}) = \boxed{2\times10^{-3}\text{ sec}}$