Math 10

4.6 Applying the Exponent Laws (Part 1)

$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$(a^m)^n = a^{mn}$
$(ab)^n = a^n b^n$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$a^0 = 1 \quad (a \neq 0)$
~~$a^{1/n} = \sqrt[n]{a}$~~	~~$a^{m/n} = \left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$~~	$a a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$

Ex.1) Simplify by writing as a single power. Do not leave negative exponents in your answers.

a) $0.6^4 \cdot 0.6^{-7}$

$= 0.6^{-3}$

$= \left(\frac{6}{10}\right)^{-3}$

$= \left(\frac{10}{6}\right)^{3}$

$= \left(\frac{5}{3}\right)^{3}$

b) $\left[\left(-\frac{4}{5}\right)^2\right]^{-3} \div \left[\left(-\frac{4}{5}\right)^4\right]^{-5}$

$= \left(-\frac{4}{5}\right)^{-6} \div \left(-\frac{4}{5}\right)^{-20}$

$= \left(-\frac{4}{5}\right)^{-6-(-20)}$

$= \left(-\frac{4}{5}\right)^{14}$

c) $\frac{\left(1.5^{-3}\right)^{-5}}{1.5^5}$

$= \frac{1.5^{15}}{1.5^5}$

$= 1.5^{10}$

d) $\frac{9^{5/3} \cdot 9^{-1/3}}{9^{1/3}}$

$= \frac{9^{5/3+(-1/3)}}{9^{1/3}}$

$= \frac{9^{4/3}}{9^{1/3}}$

$= 9^{4/3-1/3}$

$= 9^{3/3}$

$= 9^1$

$= 9$

Ex. 2) Simplify each expression, then evaluate:

a) $\left(\frac{3}{2}\right)^{\frac{3}{2}}\left(\frac{3}{2}\right)^{\frac{1}{2}}$

$= \left(\frac{3}{2}\right)^{3/2+1/2}$

$= \left(\frac{3}{2}\right)^{4/2}$

$= \left(\frac{3}{2}\right)^{2}$

$= \frac{3}{2} \times \frac{3}{2}$

$= \frac{9}{4}$

b) $\frac{(-5)^{\frac{2}{3}}}{(-5)^{-\frac{4}{3}}}$

$= (-5)^{2/3-(-4/3)}$

$= (-5)^{6/3}$

$= (-5)^{2}$

$= 25$

c) $\left[\left(\frac{-12}{5}\right)^{\frac{1}{3}}\right]^{6}$

$= \left(\frac{-12}{5}\right)^{\frac{1}{3}\cdot 6}$

$= \left(\frac{-12}{5}\right)^{2}$

$= \frac{144}{25}$

d) $\frac{0.2^{\frac{3}{4}}}{0.2^{\frac{7}{4}}}$

$= 0.2^{3/4-7/4}$

$= 0.2^{-4/4}$

$= 0.2^{-1}$

$= \left(\frac{2}{10}\right)^{-1}$

$= \left(\frac{10}{2}\right)^{1}$

$= 5^{1}$

$= 5$

Assignment: p.241 #3-7, 9, 10

Math 10

4.6 Applying the Exponent Laws (Part 2)

$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$(a^m)^n = a^{mn}$	$(ab)^n = a^n b^n$
$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$a^0 = 1 \quad (a \neq 0)$	$a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$	

Ex.1) Simplify. Do not leave negative exponents in your answers.

a) $m^4n^{-2} \cdot m^2n^3$

$= m^4 \cdot m^2 \cdot n^{-2} \cdot n^3$

$= m^6 n^1$

b) $\frac{6x^4y^{-3}}{14xy^2} = \frac{3}{7}x^3y^{-5} = \frac{3x^3}{7y^5}$

c) $\left(a^4b^2\right)^{3/2}$

$= a^{4 \cdot 3/2} \cdot b^{2 \cdot 3/2}$

$= a^6 b^3$

d) $\left(x^3y^{-3/2}\right)\left(x^{-1}y^{1/2}\right)$

$= x^3 \cdot x^{-1} \cdot y^{-3/2} \cdot y^{1/2}$

$= x^2 \cdot y^{-2/2}$

$= x^2 y^{-1} = \frac{x^2}{y}$

e) $\frac{12x^{-5}y^{5/2}}{3xy^{-1/2}}$

$= 4x^{-6}y^{6/2}$

$= \frac{4y^3}{x^6}$

f) $\left(\frac{50x^2y^4}{2x^4y^7}\right)^{-1}$

$= \frac{2x^4y^7}{50x^2y^4}$

$= \frac{1}{25}x^2y^3$

Ex. 2) Evaluate the expression for a = 2 and b = –3 : $\left(\frac{a^{-8}b^2}{a^{-10}b^5}\right)^{-1}$

$= \frac{a^{-10}b^5}{a^{-8}b^2}$

$= a^{-2}b^3$

$= \frac{b^3}{a^2}$ $\quad a=2, b=-3$

$\frac{(-3)^3}{2^2} = \frac{-27}{4}$

Assignment: p.242 #8, 11, 14, 15, 16a, 17, 19a