Pre-Algebra Solutions
Homework 8

1)
a) $a^4b^2a/a^5 = a^{4+1-5}b^2 = a^0b^2 = b^2$
b) $(-6y^3) = (-6)^2y^{3\cdot 2} = 36y^6$
c) $\frac{(3x^2)^3}{(9x^3y)^2} = \frac{3^3x^6}{3^2x^6y^2} = \frac{3}{y^2}$
d) $(4xy)^3(z^2)^{-3} = (4xy/z^2)^3$
e) $6^3/(2^39) = (2\cdot 3)^3/(2^33^2) = (2^33^3)/(2^33^2) = 3$
f) $12^34^{-3}/81 = (4\cdot 3)^3/(4^33^4) = 1/3$

2)
a) $0.0001 = 10^{-4}$
b) $(5\times 10^{-12})(2.5\times 10^9) = 12.5\times 10^{-12+9} = 1.25\times 10^{-2}$
c) $457234516 = 4.57\times 10^8$
d) $(7\times 10^4)(5\times 10^{-7}) = 35\times 10^{4-7} = 3.5\times 10^{1+4-7} = 3.5\times 10^{-2}$

3)
The amount w of water the entire world population drinks every day is just the product of the number of people in the world (6.7 billion) and the amount of water drunk by each person every day (1 liter), so that $w = 6.7\times 10^9$ liters/day. Since we have 365 days in one year, the amount of water drunk every year is $365\times w = 2.4455\times 10^{12}$ liters/year.

4)
The mass of the Galaxy is 100 billion $\times 2\times 10^{33}$ gm $= 10^2\times 10^9\times 2\times 10^{33}$ gm $= 2\times 10^{2+9+33}$ gm $= 2\times 10^{44}$ gm.

5)
One trillion dollars is \$ 10^{12}. The average cost to build or restore a house is \$ 100,000 = \$ 10^5. So the number of houses that can be purchased is $10^{12-5} = 10^7$ or 10 million houses. The current US population is about 300 million people. If there are 6 people per family on the average, that's 300 million/6 = 50 million families. So the housing stimulus could house 1/5 of those families, or 20%.

6)

$\sqrt{100} = \pm 10$

$\sqrt{169} = \pm 13$

$\sqrt{0.01} = \pm 0.1$

$\sqrt{81} = \pm 9$

$\sqrt{0.25} = \pm 0.5$