Mole worksheet 1

Make sure to include all units in your calculations and final answers. If you don't, the unit-police will come and take points away.

1) How many H_2O molecules are in one mole of water?

2) How many atoms are in 0.0225 mol of helium?

3) How many atoms are in one mole of water?

4) The weapons inspectors in Iraq can detect sarin, a chemical warfare agent, If they find at least a femtomole (10^{-12} mol) of sarin. How many sarin molecules do the inspectors need to find?

5) Baby George had a little "accident" in the pool and "released" 0.0800 mol of urea (CH_4N_2O) into the water. Does this exceed the federal health standard of 10^{-6} moles of urea per liter of water? Assume an Olympic size pool of 50m length by 16m wide and 2 m deep.

6) 1 Euro = $ US 1.08 1 liter = 1.09 quart 1 gallon = 4 quart
In Europe gas costs about 0.90 Euro / liter
How expensive is gas in Europe In $ / gallon?

7) The speed of light is $3x10^8$ m/s
a) How fast does light travel in miles / second
b) How many nanometer does light travel in one minute?
c) How long does it take light to get from the sun to earth. The earth is 93 million miles from earth.
d) The Voyager 1 spacecraft, launched on Sept 5th 1977 is still sending signals back to earth. Currently it takes those signals 12h 10min to get to earth. How far is Voyager 1 from earth? (remember that ALL electromagnetic radiation, whether visible light, x-rays or radio waves, travels the same speed)

8) 1 kWh (kilo watt hour) costs 8 cent. If your 100W porch light is lit every night for 10 hours it will use exactly 100W x 10h = 1000 Wh or 1 kWh of electricity each night. How much does the porch light cost you each year electricity?
How much money would you save if you were to replace your 100W bulb with an equally bright, 25 W energy savings bulb.

9) The "Smart", a little commuter car popular in Germany, fits on the back of most pickup trucks. It consumes 3.5 liter of gasoline per 100km. How many miles can you drive per gallon?
Why do you think this car is so popular? (hint: see question 6)