Quiz Chs. 8-9

Physics 100 Prof. Menningen 4/11/18 Name: _____**KEY**_____

1. (2 pts) The emissions of particulates due to the burning of coal can be reduced by the use of _____.
   a. electrostatic precipitators b. wet scrubbers
   c. fluidized limestone d. catalytic converters

2. (2 pts) Smog in major cities is primarily a consequence of
   a. dust generated by industrial manufacturing processes.
   b. evaporation of acidified puddles and reservoirs of water.
   c. inadequate emission controls on coal-fired power plants.
   d. emission of NO_x and hydrocarbons by vehicles.

3. (2 pts) What is the primary source of carbon monoxide pollution?
   a. industrial processes **b. transportation**
   c. landfill emissions d. coal-fired power plants

4. (2 pts) Besides polluting the air we breathe, what other effect does smog have on the environment?
   a. It leads to deforestation which reduces the amount of CO_2 in the atmosphere.
   b. It reflects more light into space, decreasing the atmospheric warming rate.
   c. It suppresses plant growth, increasing the rate at which CO_2 is absorbed into the biomass.
   d. It artificially fertilizes lakes, producing algae blooms.

How much CO_2 is emitted by an average US household each year? Let's make an estimate.

5. (3pts) The family drives cars that have a 20 mpg fuel efficiency for a combined total of 25,000 miles annually. How much CO_2 (in kg) do their automobiles produce if 9.0 kg of CO_2 is emitted per gallon of gasoline? {Do **not** enter any commas or scientific notation for clicker submission}

$$25{,}000\ \text{mi} \times \frac{1\ \text{gal}}{20\ \text{mi}} = 1{,}250\ \text{gal} \times \frac{9.0\ \text{kg}}{\text{gal}} = \boxed{11{,}250\ \text{kg}}$$

6. (3 pts) The household draws most of its electricity from a coal-fired power plant, which emits 0.836 kg of CO_2 per kWh of electricity it generates. If the major electrical needs are the following, how much CO_2 (in kg) is produced due to electricity consumption each year?

Item	Hrs/day	Power (kW)
Furnace / AC	6.0	1.5
Kitchen appliances	3.0	7.5
Lighting	8.0	0.60

$$E = (1.5\text{kW})(6\text{h}) + (7.5\text{kW})(3\text{h}) + (0.6\text{kW})(8\text{h})$$

$$= 36.3\ \text{kWh/day} \times 365\ \text{day} = 13{,}250\ \text{kWh}$$

$$13{,}250\ \text{kWh} \times 0.836\ \text{kg/kWh} = \boxed{11{,}077\ \text{kg}}$$

7. (3 pts) The family heats its home with natural gas, burning 750 therms over the course of a year. If each therm releases 5.45 kg of CO_2, what is the <u>total</u> amount of CO_2 (in kg) released by the family (from cars, electricity, and natural gas) in one year?

$$750\ \text{therm} \times \frac{5.45\ \text{lb}}{\text{therm}} = \underline{\underline{4088\ \text{kg}}} \Rightarrow 11{,}250 + 11{,}077 + 4088\ \text{kg} = \boxed{26{,}415\ \text{kg}}$$

$$= 26{,}415\ \text{kg} \times 2.2\ \text{lb/kg} = 58{,}113\ \text{lb} = 29.1\ \text{tons}$$

8. (3 pts) By how much would CO_2 emissions (in kg) be *reduced* if the family replaced their cars with hybrids that got 50 mpg, but still drove 25,000 miles annually?

$$25{,}000\ \text{mi} \times \frac{1\ \text{gal}}{50\ \text{mi}} = 500\ \text{gal}$$

$$1{,}250 - 500\ \text{gal} = 750\ \text{gal} \times 9.0\ \text{kg/gal} = \boxed{6750\ \text{kg}} = 7.4\ \text{tons saved!}$$

9. (+3 pts) Would you like your bonus points from the class quiz? A. yes B. no

10. (+2 pts) Did you submit your quiz via clicker? A. yes B. no