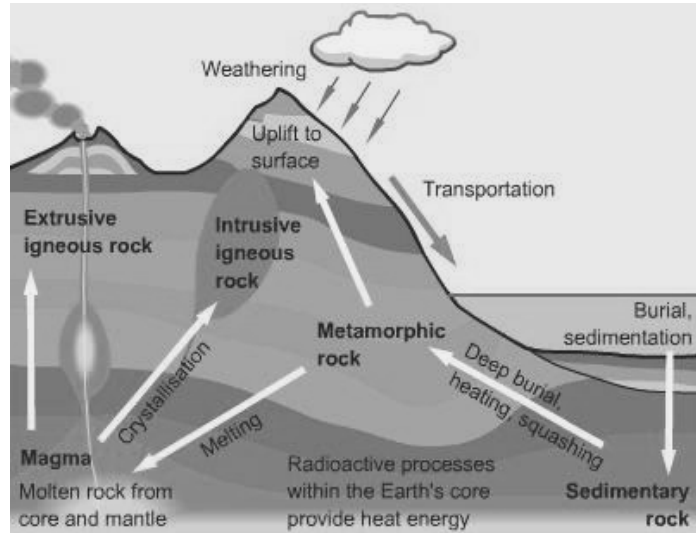**ST Pretest 2.3** Scroll below for answers or for STE

1. A) According to the diagram, why aren't all igneous rocks the same?

    B) Give an example how sedimentary rock can be turned in to metamorphic rock?

    C) What intrusive igneous rock is used for to make staircase steps and counter tops?

    D) How does weathering play a role in creating sedimentary rock?

2. Rock or mineral?
    a) Mica... Chemically, micas can be given the general formula $X_2Y_{4-6}Z_8O_{20}(OH,F)_4$
    b) Pumice

3. Erosion of nitrate-rich rocks introduces nitrates into the soil.
    a) Are these nitrates absorbed by plants?
    b) What compounds are made with nitrates and other substances?

4. Classify as matter or energy:

    a) Red light
    b) X-rays
    c) Neutrons
    d) Gamma rays

5. a) When steam condenses into water, what kind of energy is being released?
    b) Give an example of energy that radiates through space.
    c) Where does the energy come from in the following equation?

    $$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O + energy$$
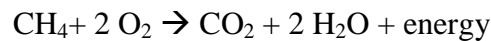
6. Trace the energy that powers a TV in Quebec to the evaporation of water.

7. What releases more energy: 3 human beings whose body temperature is at 37.0 °C? Or a single 10 000 kg minke whale whose body temperature is 35.5 °C? Explain.

8. If a 100 W light bulb releases 4320 kJ in 12 hours, of which 600 kJ is heat, how efficient is it?

1. a)Some(intrusive) never surfaced, even though they still derive from magma. Examples of such rocks include granite.

b) Limestone can be converted into marble.

c) Granite. (pictured is Cary Granite, a Flinstone character spoofing the classic actor Cary Grant)

d) Sediments consist partly of eroded rock that are washed off hillsides by rain. Ice also erodes and contributes sediments.

2. a) mineral; mostly one compound

b)   pumice is a rock(extrusive igneous rock)

3. a)   yes

b) amino acids(building blocks of protein); DNA, RNA, ATP

4. a)   energy

    b)   energy

    c)   matter

    d)   energy

5. a)   thermal

    b)   light

    c)   bond energy(chemical)

 6.

- Light and sound come from electricity and digital signals
- The electricity comes from a generator
- The generator obtained its energy from moving turbines
- Flowing water spun the turbines
- Water flowed due to gravity
- The sun's energy was used to work against gravity as it caused the water to evaporate and fall on higher ground.

7. **The whale does. Although it is at a slightly lower temperature, it is much heavier than the three people, and heat depends on both temperature and *mass*.**

8. **% efficiency =$\frac{(useful\ energy)}{(total\ consumed)} * 100\% = \frac{4320-600}{4320} * 100\ \% = 86\ \%$**

STE Pretest 2.3

1. What is the hydrogen ion concentration at the following pH's?

a) 0.5
b) 6.0
c) 9.0

2. Why is there still $[H^+]$ at pH = 9 which has 100 times more hydroxide ion than neutral water?

3. How much more acidic is a pH = 3.2 solution compared to one at a pH of 3.3?

4. Calculate the pH of the following solutions?

   a) A tomato juice with $[H^+]$ = 0.001 mole/L
   b) A snow sample with $[H^+]$ = 0.00001 g/L

5. Aside from legislation, what helped solve the acid rain problem in most places in North America?

6. Solubility depends on pH. We saw that idea at work when we did the carbon cycle lab. If pH was low carbonates dissolved. List two acid rain-related problems where something that should not be dissolving does because of low pH.

7. a) What environmental problem makes this disease worse?

   b) What polyatomic ion derived from sulphur can get into lungs and also aggravate other lung diseases like bronchitis and pneumonia?

Alveoli with emphysema

Microscopic view of normal alveoli
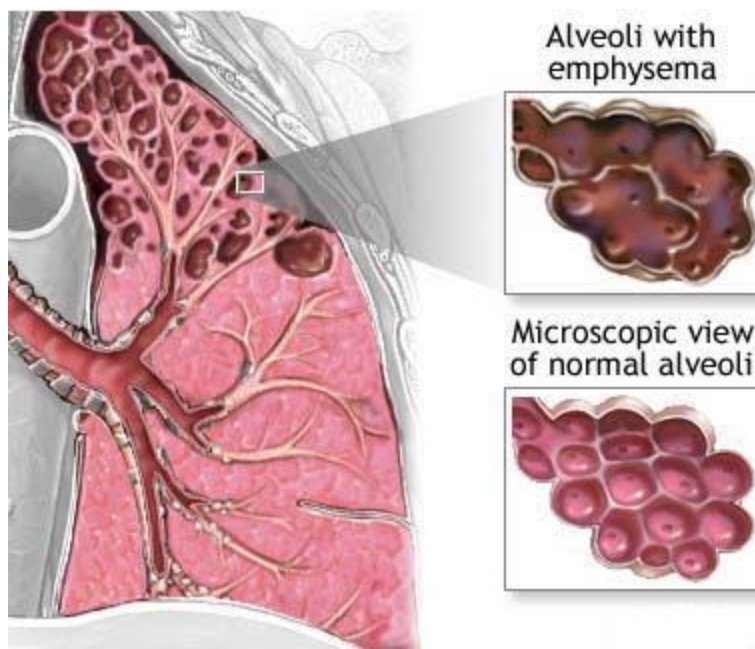
8. What gas is formed the reaction of air molecules within an internal combustion engine(cars, trucks, planes)?

9. What environmental problem can make it more likely that a normal mole will turn into melanoma?

10. What part of CF_2Cl_2(a Freon, actually attacks O_3?

11. Give two reasons why the ozone hole still exists even though the compounds responsible for it were first banned in 1989?

12. What problem is associated with both the nitrogen cycle and the phosphorus cycle?

13. What "energy-rich" molecule contains three phosphate groups?

Normal Mole	Melanoma	Sign	Characteristic
		Asymmetry	when half of the mole does not match the other half
		Border	when the border (edges) of the mole are ragged or irregular
		Color	when the color of the mole varies throughout
		Diameter	if the mole's diameter is larger than a pencil's eraser

Photographs Used By Permission: National Cancer Institute

14. a)What will the pH of a solution become if 2.0 grams of NaCl completely destroy H_2SO_4 and we are left with 4.0 litres of HCl and sodium sulphate solution?

   2 $NaCl_{(s)} + H_2SO_{4(aq)} \rightarrow$ 2 HCl + $Na_2SO_{4(aq)}$
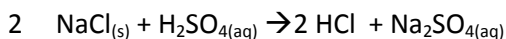
   b) Also calculate the concentration of sodium sulfate in moles/L.

ANSWERS STE

1.

   a) $[H^+] = 10^{-pH} = 10^{-0.5} = 0.32$ M
   b) $10^{-6.0} = 1 \times 10^{-6}$ M
   c) $= 1 \times 10^{-9}$ M

2.   It comes from the dissociation of water.

3. $10^{-3.3}$ M/ $10^{-3.3}$ M = 1.26 times more acidic

4.   pH = -log[H^+]

a)   pH = -log[0.001] = 3

b)   5

5.   CaO filters that remove sulphur dioxide and sulphur trioxide from the emissions and convert to the material that's in drywall.

6.   Acid attacks the arsenic in treated wood and it dissolves limestone in statues and building materials.

7.   a)   acidic precipitation

b) SO_4^{2-}
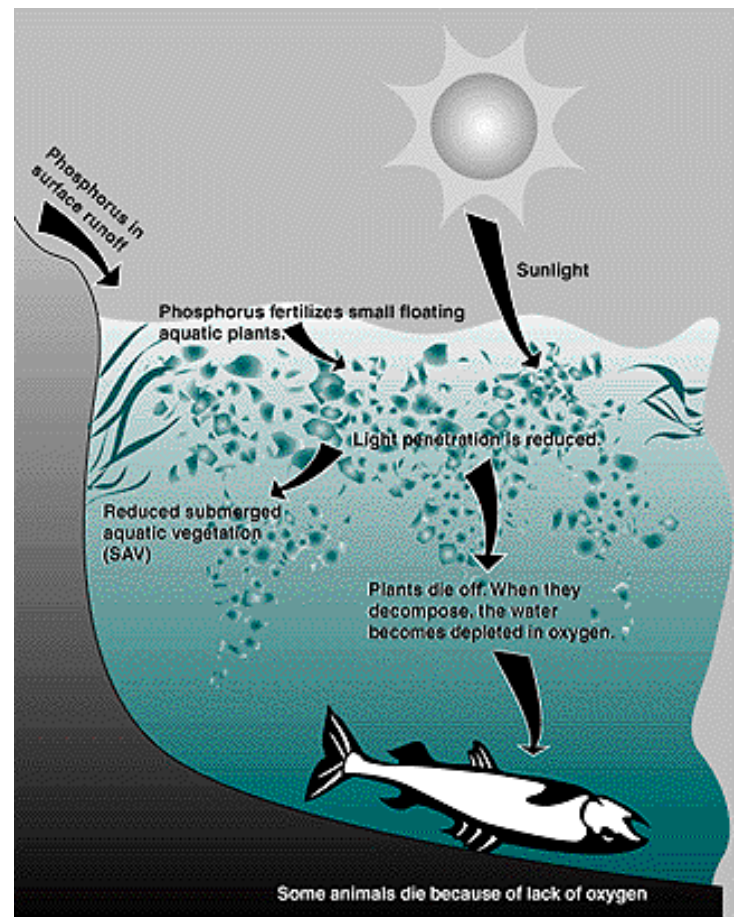
8. NO_2

9.   ozone depletion

10.   Cl

11.   (1) It takes time for the Cl to get used up by other chemicals in the environment

(2) Not all countries stopped producing freons in 1989

12.   Runoff and eventually eutrophication.

Above is what eutrophication looks like, as if the whales all decided to throw out their peppermint ice cream!

13. ATP

14. a) $2.0 \text{ g } NaCl \left(\frac{mole}{58 \text{ } g}\right) = 0.0344 \text{ } mole \text{ } NaCl$

$$0.0344 \text{ } mole \text{ } NaCl \left(\frac{2 \text{ } HCl}{2 NaCl}\right) = 0.0344 \text{ } mole \text{ } HCl$$

For pH we need concentration of HCl = [H$^+$]

C=n/V = $\frac{0.0344 mole}{4.0 \text{ } L}$ = 0.00862 M

pH = -log(0.00862 M) = 2.06

b) $0.0344 \text{ } mole \text{ } NaCl \left(\frac{Na2SO4}{2 NaCl}\right) = 0.0172 \text{ } mole \text{ } Na_2SO_4$

$\frac{0.0172 \text{ } mole Na_2SO_4}{4 \text{ } L}$=0.00341 M Na_2SO_4