Name: _____   Date: _____

[2 pt]   1. How are acids and bases defined according to Arrhenius?

[2 pt]   2. How are acids and bases defined according to Bronsted Lowry?

[4 pt]   3. What is the main difference between the Arrhenius and Bronsted-Lowry definitions of acids and bases. Which definition is "better"? Explain.

[8 pt]   4. Write the reaction of the following molecules with water. Circle the requested molecule.

   (a) H_3PO_4, circle the conjugate base.

   (b) SO_4^{-2}, circle the conjugate acid.

   (c) ClO_4^-, circle the conjugate acid.
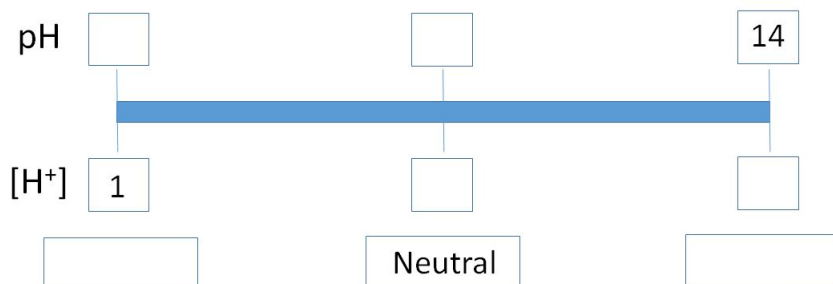
   (d) HSO_4^-, cicle the conjugate base.

[2 pt]   5. What is the difference between a strong acid, a weak acid, and a very weak acid?

[2 pt]   6. What are the 6 strong acids and 6 strong bases (you should memorize)?

[2 pt]   7. What is pH? Why do we use it?

[3 pt]   8. Fill in the missing values on the pH scale below.

pH [   ]   [   ]   **14**

$[H^+]$ [1]   [   ]   [   ]

[   ]   Neutral   [   ]

[10 pt]   9. Are the following solutions (A)cidic, (B)asic, or (N)eutral.

(a) pOH = 2.2   9(a) _____

(b) $[OH^-] = 2.0 \times 10^{-8}$ M   9(b) _____

(c) pH = 3   9(c) _____

(d) $[H^+] = 5.0 \times 10^{-9}$ M   9(d) _____

(e) pH = 10   9(e) _____

(f) pOH = 12   9(f) _____

(g) $[OH^-] = 1.0 \times 10^{-7}$ M   9(g) _____

(h) pH = 7   9(h) _____

(i) $[OH^-] = 9.5 \times 10^{-2}$ M   9(i) _____

(j) $[H^+] = 5.0 \times 10^{-4}$ M   9(j) _____

[20 pt] 10. Complete the following calculations:

(a) What is the $[H^+]$ for a solution with pH = 8.83?   10(a) _____

(b) What is the pOH for a solution with $[OH^-] = 2.8 \times 10^{-10}$ M?   10(b) _____

(c) What is the $[OH^-]$ for a solution with pOH = 3.53?   10(c) _____

(d) What is the pH of a solution with $[H^+] = 1.9 \times 10^{-9}$ M?   10(d) _____

(e) What is the pOH of a solution with $[H^+] = 1.7 \times 10^{-8}$ M?   10(e) _____

(f) What is the $[H^+]$ for a solution with pH = 1.38?   10(f) _____

(g) What is the $[H^+]$ for a solution with $[OH^-] = 9.5 \times 10^{-12}$ M?   10(g) _____

(h) What is the pOH of a solution with $[OH^-] = 3.2 \times 10^{-5}$ M?   10(h) _____

(i) What is the $[H^+]$ for a solution with pOH = 3.53?   10(i) _____

(j) What is the pH of a solution with $[H^+] = 2.4 \times 10^{-4}$ M?   10(j) _____