

Name (Print): \_\_\_\_\_ Signature: \_\_\_\_\_  
 (Honor Code Pledge)

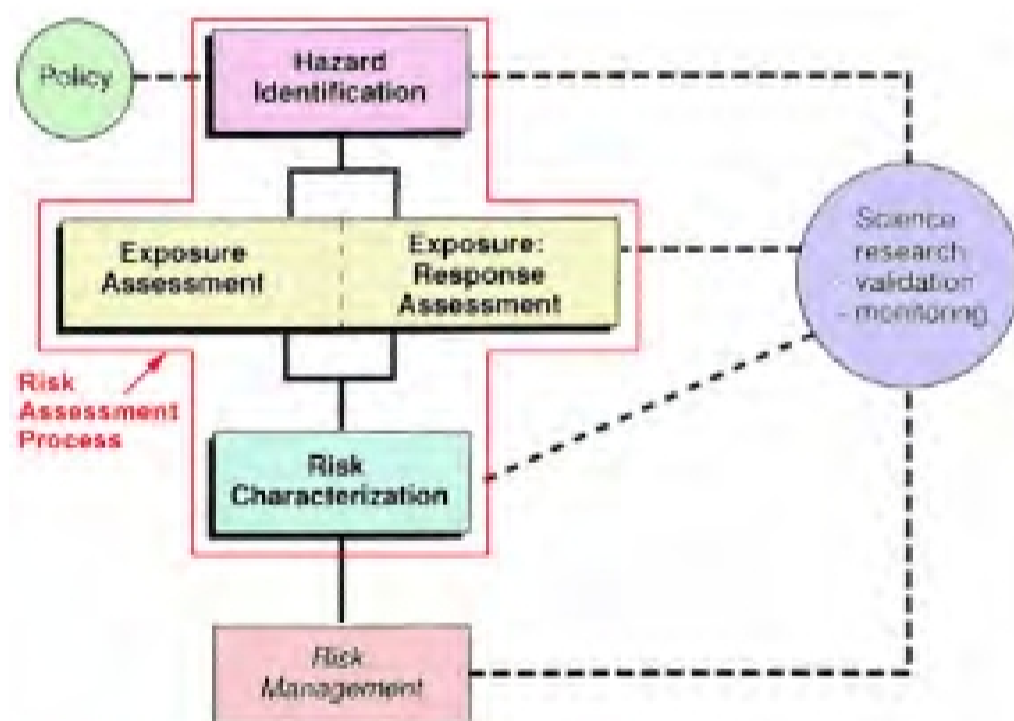
ENVR 890 – First Exam – March 17, 2009. **Follow directions.**

**Total Points: 112**

1. From the list below match the name of the microbe with the microbe class it belongs to and the illness or disease it causes (10 points)

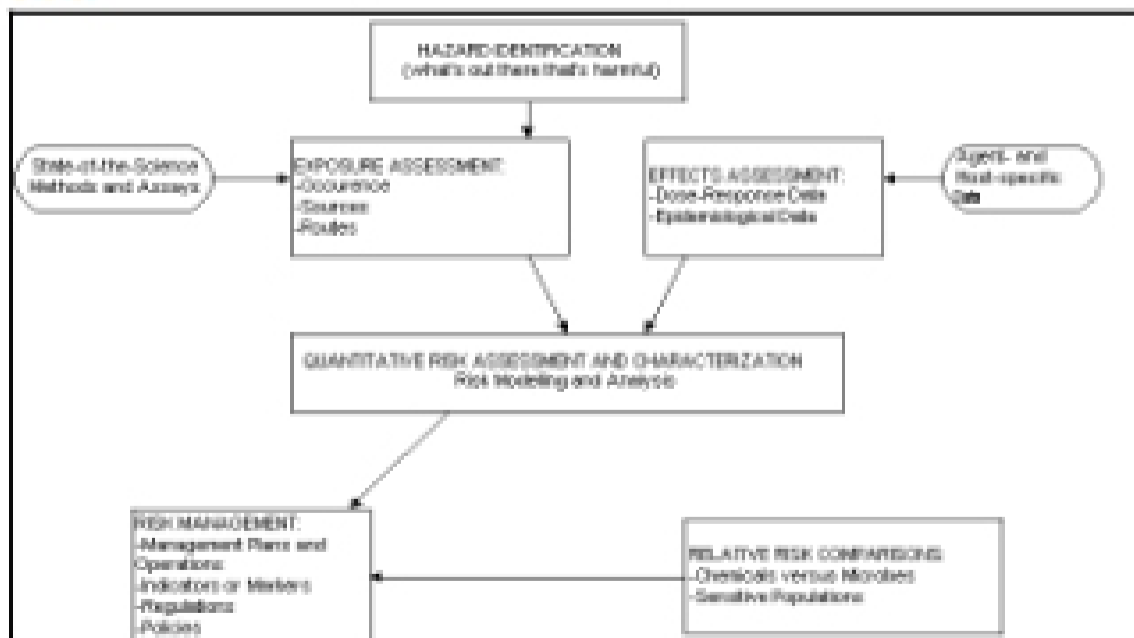
Microbe name	Microbe Type	Disease/Illness	Microbe Match
a. <i>Entamoeba histolytica</i>	Bacterium	dysentery	f. <i>Shigella dysenteriae</i>
b. Hepatitis A virus	Parasite	dysentery	a. <i>Entamoeba histolytica</i>
c. <i>Salmonella typhi</i>	Virus	child diarrhea	k. Rotavirus
d. <i>Dracunculus medinensis</i>	Bacterium	cholera	h. <i>Vibrio cholerae</i>
e. Poliovirus	Parasite	ascariasis	i. <i>Ascaris lumbricoides</i>
f. <i>Legionella pneumophila</i>	Virus	paralysis	e. Poliovirus
h. <i>Vibrio cholerae</i>	Bacterium	typhoid fever	c. <i>Salmonella typhi</i>
i. <i>Ascaris lumbricoides</i>	Parasite	guinea worm disease	d. <i>Dracunculus medinensis</i>
j. <i>Shigella dysenteriae</i>	Bacterium	respiratory disease	f. <i>Legionella pneumophila</i>
j. Rotavirus	Virus	infectious hepatitis	b. Hepatitis A virus

2. Draw a diagram or list in order the main components of the Quantitative Microbial Risk Assessment Framework used by the World Health Organization and the US EPA. Be sure to spell out acronyms and define key terms. (10 points)



Or the Equivalent of Either One of These in Words  
 2 points each for:  
 Hazard Identification  
 Exposure Assessment  
 Exposure Response or Effects Assessment  
 Risk Characterization  
 Risk Management

OR



3. Of the terms listed below, which treatment processes listed below are used mainly for water treatment, for waste treatment or for both.

For each term indicate if the process is primarily Physical (p), Chemical (C), (physical-chemical (P-C), Biological (B) or all three (physical, chemical and biological; P-C-B) (10 points)

Process Name	Use (Water, Waste or Both)	P, C, P-C, B or P-C-B
Plain Sedimentation	Both	Physical _____
Rapid Granular Media Filter	Water but will accept Both	Physical or Pphysical-Chemical
Activated Sludge	Waste	Biological
Composting	Waste	Biological _____
Coagulation-flocculation	Water; but will accept both	P-C
Slow sand Filter	Water	P-C-B; partial credit for B
Stabilization Pond	Waste	PCB; partial credit for B
Disinfection, chlorine	Both	C _____
Anaerobic Digestion	Waste	B _____
Septic Tank/Soil Absorption	Wastew	P-C-B; partial credit for P or C or B

4. Define and give a brief meaning or description for the terms below: (2 points each; 12 total)

a. Zoonoses

Infectious diseases with animal-to-human transmission, with animals as reservoir hosts

OR: An infectious disease in animals that can be transmitted to people. The natural reservoir for the infectious agent is a animal.

OR something close to the above

b. Disability adjusted life year

The sum of years of potential life lost due to premature mortality (years of life lost or YLL) and the years of productive life lost due to disability (Years Lived with Disability or YLD)

OR: a measure of overall disease burden that is the sum of Years of Life Lost (YLL) and Years Lived with Disability (YLD). Disability Adjusted Life Year = YLL + YLD

c. Latrine

A receptacle (as a pit in the earth) for use as a toilet

A toilet or something used as a toilet, such as a trench in the earth

A privy or water-closet (partial credit)

d. Case-Control (epidemiological) study

an investigation employing an epidemiologic approach in which previously existing incidents of a medical condition are used in lieu of gathering new information from a randomized population. Control is obtained by comparing known cases of the medical condition with a group of persons who have not developed the medical condition.

OR: Studies examining the association between exposure and a health outcome by comparing individuals already ill with the disease of interest (i.e. cases) and a control group who are a sample of the same population from which the cases were identified.

OR: Determiniung the relationship between disease and risk factrors by comparing the incidence of disease in exposed individuals to matched controls

e. Intervention (epidemiological) Study

A study comparing the rates of disease in two or more groups (cohorts) of randomly chosen individuals after intervening to change the level of exposure.

OR: Epidemiologic study design that is experimental in nature and used to test a hypothesis about a cause-and-effect relationship. OR:

An epidemiologic investigations designed to test a hypothesized cause and effect relation by modifying the supposed causal factor(s) in the study population.

OR: A study in which participants are randomly assigned to a treatment (exposed) group (cohort) and a control (unexposed) group (cohort) in order to compare them for an outcome measure

f. Eco-San

Ecological sanitation. The concept and approach of recycling to nature the nutrients and water from human and animal wastes.

OR: Eco-san is ecological sanitation, which is a cycle or a sustainable, closed-loop system that treats human excreta as a resource. Human excreta are processed on site and then, if necessary, further processed off site until they are completely free of disease organisms. The nutrients contained in the excreta are then recycled by using them in agriculture or horticulture and the water is recycled for beneficial use. ((or something like this))

5. Choose (circle) the correct response for each of the statements below:

(5 points total; 1 point each)

A. The number of people currently without or lacking access to improved water is about:

- i. Half a (0.5) million
- ii. One (1) billion
- iii. Two and a half (2.5) million
- iv. Five (5) million

B. The approximate number of people lacking access to proper sanitation is about:

- i. Half (0.5) a million
- ii. One (10 million
- iii. Two and a half (2.5) billion
- iv. Four (4) million

C. According to the US Environmental Protection Agency the acceptable level of risk of a waterborne disease such as giardiasis is

- i. One per 10,000 ( $10^{-4}$ ) per person per day
- ii. One per 10,000 ( $10^{-4}$ ) per year
- iii. One per million ( $10^{-6}$ ) people per day
- iv. One per million ( $10^{-6}$ ) people per year

D. According to the World Health Organization the tolerable level of disease risk from a water or excreta pathway is: