**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Company\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Team Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Contest Position No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Team Member No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Directions: Circle the letter preceding the correct answer to each of the following questions. Circle only one answer per question.**

1. Which of these gases is the hardest to disperse by ventilation?

A. Sulfur Dioxide (p. 2-21)

B. Methane

C. Carbon Monoxide

D. Nitrogen

1. Hydrogen gas can be liberated when water or steam comes into contact with hot carbon materials during firefighting.

A. True (p 2-19) B. False

1. Gas detectors must measure concentrations of methane from 0.0 percent to 100 percent of volume, and carbon dioxide from 0.0 parts per million to at least 9,999 parts per million.
2. True B. False (p 2-3)

1. Which gas has a bitter, acid taste, and a strong sulfurous odor?

A. Methane

B. Nitrogen Dioxide

C. Carbon Dioxide

D. Sulfur Dioxide (p. 2-21)

1. Which of the following gases is considered both nonexplosive and nontoxic?
2. Carbon monoxide
3. Carbon dioxide
4. Nitrogen (p.2-14)
5. Hydrogen
6. Which of the following gases will neither burn nor explode?
7. Carbon monoxide
8. Carbon dioxide (p.2-15)
9. Methane
10. Propane
11. Normal air contains about 0.30 percent carbon dioxide.

A. True B. False (p 2-15)

1. Why does carbon monoxide interfere with your blood’s oxygen carrying capacity?
2. Because the cells normally carry carbon dioxide to your body’s tissues
3. Because carbon monoxide has the capacity to burn
4. Because it causes violent panting and can lead to death
5. Because the gas combines with hemoglobin 200-300 times more readily than oxygen (p. 2-16)

1. Which of the following is not a likely source of carbon monoxide production:

1. Mine fire
2. Gas Explosion
3. Flood (p 2-16)
4. Internal Combustion Engines
5. The specific gravity of nitrogen dioxide is 0.9672
6. True B. False (p 2-17)

1. When the exposure has been severe, the victim may die, literally drowned by water that has entered the lungs from the body in an attempt to counteract corrosive effect of the acids formed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. Oxides of Carbon Monoxide
2. Oxides of Nitrogen Dioxide (p. 2-18)
3. Oxides of Carbon Dioxide
4. Methane
5. Hydrogen is a highly \_\_\_\_\_\_\_\_\_\_\_ gas.
6. Non-volatile
7. Toxic
8. Reactive
9. Explosive (p.2-18)
10. Hydrogen sulfide is \_\_\_\_\_\_\_\_\_\_\_\_ in water.

A. Soluble (p. 2-20) B. Insoluble

1. Which gas can cause severe lung damage, and may cause respiratory paralysis and the complete inability to breathe?
2. Carbon monoxide
3. Carbon dioxide
4. Sulfur Dioxide (p 2-21)
5. Nitrogen

1. Which of the following gases has a slight garlic odor?
2. Nitrogen Dioxide
3. Sulfur Dioxide

C. Helium

D. Acetylene (p.2-24)

1. Mines are required to keep exposure to radiation below 4WLM per year. What does WLM stand for?
2. Working Life Measurement
3. Working Life Minutes
4. Working Level Measurement
5. Working Level Months (p. 2-25)
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a mixture of carbon monoxide, carbon dioxide, methane, oxygen, nitrogen, and hydrogen.
7. Stinkdamp
8. Blackdamp
9. Afterdamp (p. 2-27)
10. Firedamp

1. When pressure decreases, gas contracts.

A. True B. False (p 2-35)

1. The effects of a toxic gas depend on its concentration, duration of exposure, and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Age of the victim
3. Weight of the victim
4. Toxicity of the gas (p. 2-43)
5. Rescue response time
6. The reported health hazard for oxygen deficiency at 9% is\_\_\_\_\_\_\_\_\_\_\_\_.

1. Unconsciousness (p.2-51)
2. Death
3. Tightness in the forehead
4. Panting
5. The explosive range for hydrogen sulfide is

A. 0.005 to 0.010%

B. 0.10 to 0.20%

C. 4.3% to 45.5% (p. 2-61)

D. 12.5% to 74.2%

1. Porous stoppings such as concrete block stoppings are usually plastered on the low-pressure side to reduce air leakage.

A. True B. False (p 3-8)

1. Sometimes permanent bulkheads have a man door (or drop door) in them to allow miners to pass through. Man doors are not meant to be ventilation controls, and if propped open this will not affect airflow.

A. True B. False (p 3-9)

1. Smoke tubes are used mainly to measure medium- and high velocity air flow in the mine.

A. True B. False (p.3-16)

1. When measuring velocity the anemometer should be raised and lowered as you walk to the opposite side so that the average velocity of the air is measured.

A. True (p.3-17) B. False

1. Velocity is always measured in cubic feet per minute (for mine application).

A. True B. False (p.3-19)

1. The purpose of an air lock is to merge two different atmospheres while still permitting miners to enter and exit, this allows mixing of the atmospheres.

A. True B. False (p. 3-23)

1. The air we breathe is actually a mixture of gases. Clean, dry air at sea level is made up of 78 percent nitrogen and 21 percent oxygen. The remaining one percent is made up of argon, carbon dioxide, and small traces of other gases. Which of the following is NOT one of the trace gases:

A. Methane

B. Ozone

C. Acetylene (p.2-12)

D. Hydrogen

1. Per 30 CFR Section 49.6(a) self-contained breathing apparatus must be capable of a minimum number of hours capacity. Which number of hours is correct?

A. 4 (p.4-13)

B. 5

C. 6

D. 7

1. In mine rescue, when should barefaced exploration stop?
   1. at any point where disruptions in ventilation are found
   2. when gas tests indicate the presence of any carbon monoxide
   3. other noxious gases, elevated readings of explosive gases, or an oxygen deficiency.
   4. All of the above (p. 4-6)