

# 2017 Northern Mine Rescue Contest

## Written Exam

## Field Competition



June 5, 2017

Clymer, New York

**Please do not write on this test. Use the answer sheet provided.**

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**Directions: Fill in the corresponding bubble on your Scantron sheet to indicate the letter preceding the correct answer to each of the following questions. Select only one answer per question.**

1. High temperatures (or heat) cause gases to expand, so they \_\_\_\_\_.
  - A. diffuse more quickly
  - B. explode more readily
  - C. disperse more easily
  - D. both A. and C.
  
2. One of the consequences of making the wrong alteration to a ventilation system is \_\_\_\_\_.
  - A. redirecting and feeding air to a fire
  - B. pushing deadly gases or smoke into areas where survivors are located
  - C. forcing explosive gases back over fire areas or hot spots and causing an explosion
  - D. All of the above
  
3. To extinguish a fire, it is necessary to remove one element, or one leg of the triangle. Therefore, which of the following is not true?
  - A. Fighting a fire with water removes the heat.
  - B. Loading out hot materials from the fire area removes the heat.
  - C. Smothering the fire with noncombustible materials removes the oxygen.
  - D. Dry chemical extinguishers stop the chemical reaction between the fuel and the oxygen.
  
4. If you encounter an obstacle fire with flaming equipment at its center, the fire should be fought by two people using hand-held extinguishers. The two firefighters should approach the fire together from the exhaust air side, holding the extinguisher nozzle downward at a 45-degree angle.
  - A. True
  - B. False
  
5. The gas's rate of diffusion is affected by the ventilating air currents in the mine. The rate of diffusion is greatly increased by \_\_\_\_\_ of air currents or by \_\_\_\_\_ in the air.
  - A. higher velocities / smoke
  - B. lower velocities / stagnancy
  - C. higher velocities / turbulence
  - D. lower velocities / smoke
  
6. When using a smoke tube, the more accurate method of determining the air velocity is to take readings at quarter points within the airway.
  - A. True
  - B. False

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7. An exhaust fan pulls or sucks old air out of the exhaust airway. This pulling causes a pressure differential which, in turn, pulls fresh air into the mine's intake.
- A. True
  - B. False
8. Hydrogen sulfide is flammable and explosive in concentrations from 4.3 to 45.5 percent in normal air. It is most explosive at \_\_\_\_ percent.
- A. 12.4
  - B. 14.2
  - C. 21.4
  - D. 24.1
9. Specific gravity is the weight of a gas compared to an equal volume of normal air under the same temperature and pressure. This is also referred to as "\_\_\_\_\_."
- A. molecular weight
  - B. volumetric weight
  - C. relative weight
  - D. composite weight
10. Survivors can be categorized into three priority groups according to their condition or injuries. Severe bleeding or unconsciousness are examples of a \_\_\_\_\_.
- A. first priority condition
  - B. second priority condition
  - C. third priority condition
  - D. None of the above
11. Survivors should never be allowed to walk out on their own even if they appear to be in good shape. If a survivor is able to walk, he or she should be positioned between two rescue team members and guided out to fresh air.
- A. True
  - B. False
12. When a survivor is found in an open passageway of the mine, the team should \_\_\_\_.
- A. immediately report the miner's location, identity (if possible), and condition to the command center
  - B. mark the miner's location, time, and date on the team's map
  - C. provide first aid treatment and/or respiratory protection if needed
  - D. All of the above
13. Nitrogen is not an explosive gas but it will burn.
- A. True
  - B. False

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14. In natural ventilation, air flows because of the natural difference in pressure inside and outside the mine. This natural pressure can only be supplied thermal energy.
- A. True
  - B. False
15. Which single factor about smoke adds an extra element of difficulty to any rescue or recovery operation?
- A. Smoke usually contains carbon monoxide and other toxic or asphyxiating gases produced by fires.
  - B. If there is a sufficient amount of hydrocarbons in the smoke, the hydrocarbons can make the smoke explosive
  - C. The presence of smoke limits your visibility.
  - D. None of the above
16. Hydrogen sulfide is one of the most poisonous gases known. Hydrogen sulfide concentrations from \_\_\_\_ to \_\_\_\_ can cause rapid unconsciousness, cessation of respiration, and death.
- A. 200 ppm to 700 ppm
  - B. 700 ppm to 1,000 ppm
  - C. 1,000 ppm to 2,000 ppm
  - D. None of the above
17. Which of the following is not true for oxides of nitrogen?
- A. Oxides of nitrogen are slightly toxic.
  - B. When mixed with the moisture in your lungs, oxides of nitrogen form acids that corrode your respiratory passages and cause them to contract.
  - C. Oxides of nitrogen can only be produced by burning and by the detonation and burning of explosives.
  - D. All of the above
18. Carbon monoxide is so toxic because it combines easily with your red blood cells (hemoglobin)—the cells that normally carry oxygen to your body's tissues. It doesn't take much CO to interfere with your blood's oxygen-carrying capacity because the gas combines with hemoglobin \_\_\_\_\_ times more readily than oxygen.
- A. 100 -200
  - B. 200 - 300
  - C. 300 - 400
  - D. None of the above
19. The captain marks areas explored by dating and initialing crosscuts, impassable falls, barricades, bulkheads, air doors, and other points where conditions prohibit further advance. These places are also noted on the team map. Marking areas as the team explores provides a visual record of what the Team did and found as they advanced.
- A. True
  - B. False

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20. The National Fire Protection Association classifies fires involving flammable or combustible liquids such as gasoline, diesel fuel, kerosene, and grease as \_\_\_\_\_ fires.
- A. Class A
  - B. Class B
  - C. Class C
  - D. Class D
21. Re-ventilation after an explosion in a single-level, room-and-pillar mine is usually accomplished by progressive ventilation.
- A. True
  - B. False
22. With progressive ventilation, the affected area is recovered and re-ventilated as a whole rather than in successive blocks.
- A. True
  - B. False
23. Since oxygen is only slightly heavier than air, hold your portable detector at \_\_\_\_\_ level when you test for oxygen deficiency.
- A. chest
  - B. knee
  - C. eye
  - D. waist
24. Federal regulations (30 CFR 49.9) require mines to have and post a Mine Rescue Notification Plan. The plan must list all of the \_\_\_\_\_ that will be needed to assist in the rescue and recovery operation.
- A. various supervisors
  - B. government officials
  - C. mine rescue team members
  - D. None of the Above.
25. A standby team is scheduled to be on the surface in ready reserve when rescue teams are working underground.
- A. True
  - B. False
26. Barefaced exploration should stop at any point \_\_\_\_\_.
- A. where disruptions in ventilation are found
  - B. when elevated readings of explosive gases are detected
  - C. when the team encounters smoke
  - D. All of the above

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27. The fresh air base \_\_\_\_\_.
- A. is the base of operations from which rescue and recovery work advances into irrespirable atmospheres.
  - B. functions as a base of communications for the operation linking the team, the command center, and all support personnel.
  - C. should be located as far as possible from the affected area of the mine and situated where it's assured a supply of good air.
  - D. Only A and B
28. The fresh air base coordinator \_\_\_\_\_.
- A. maintains communications with the working rescue team and the command center.
  - B. makes all decisions concerning the mine rescue teams and methods of exploration or firefighting.
  - C. follows the team's progress on the mine map and marks findings on the map as the team reports them.
  - D. Only A and C
29. Before a mine rescue team proceeds to the fresh air base, it is the team trainer's responsibility to make sure the team, its equipment, and its apparatus are ready to go.
- A. True
  - B. False
30. Which of the following is not true for sulfur dioxide (SO<sub>2</sub>)?
- A. It will not burn or explode.
  - B. Because of its low specific gravity, it is hard to disperse by ventilation.
  - C. It is one of the most water soluble gases found in mines.
  - D. It is a very toxic and irritating gas that is dangerous even in small concentrations.

## **ANSWER KEY**

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**All questions taken from MSHA Publication 3027**

<b><u>Question</u></b>	<b><u>Answer</u></b>	<b><u>Source</u></b>
1	D.	Module 2, pg. 2-6
2.	D.	Module 3, pg. 3-15
3.	B.	Module 5, pg. 5-4
4.	B.	Module 5, pg. 5-7
5.	C.	Module 2, pg. 2-5
6.	A.	Module 3, pg. 3-18
7.	A.	Module 3, pg. 3-4
8.	B.	Module 2, pg. 2-19
9.	C.	Module 2, pg. 2-6
10.	A.	Module 6, pg. 6-5
11.	A.	Module 6, pg. 6-7
12.	D.	Module 6, pages 6-4 and 6-7
13.	B.	Module 2, pg. 2-14
14.	A.	Module 3, pg. 3-5
15.	C.	Module 2, pg. 2-26
16.	B.	Module 2, pg. 2-20
17.	D.	Module 2, pages 2-17 and 2-18
18.	B.	Module 2, pg. 2-16
19.	A.	Module 4, pg. 4-27
20.	B.	Module 5, pg. 5-5
21.	A.	Module 7, pg. 7-7
22.	B.	Module 7, pg. 7-9
23.	D.	Module 2, pg. 2-14
24.	C.	Module 1, pg. 1-3
25.	A.	Module 1, pg. 1-14
26.	D.	Module 4, pg. 4-6
27.	D.	Module 4, pages 4-6 and 4-7
28.	D.	Module 1, 1-3 and Module 4, pg. 4-8
29.	B.	Module 4, pg. 4-17
30.	B.	Module 2, pg. 2-21