

# ***2012 National Metal and Nonmetal Mine Rescue Contest***

## **Mine Rescue Field Competition Written Test**

### **Directions:**

- 1. Find the correct answer to each of the questions.**
- 2. Select only one answer per question.**
- 3. Then, fill in the corresponding circle on the answer sheet for each numbered question.**

**Good Luck!**



***July 31, 2012***

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## Mine Rescue Field Competition – Written Test

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

1. Federal regulations require mines to have and post a Mine Rescue and Recovery Plan for notifying all the mine rescue team members that will be needed to assist in the rescue and recovery operation (30 CFR Section 49.9).
  - A. True
  - B. False
2. During a rescue and/or recovery operation, the team is under the direct supervision of the \_\_\_\_\_.
  - A. fresh air base coordinator
  - B. command Center
  - C. safety director
  - D. team captain
3. If shafts are used as the two main airways, the intake airway is called the downcast shaft and the return airway is referred to as the upcast shaft.
  - A. True
  - B. False
4. In natural ventilation, air flows because of the natural difference in pressure \_\_\_\_\_.
  - A. between the underground intake and return entries
  - B. created by the ventilation controls in the mine
  - C. inside and outside the mine
  - D. None of the above
5. Clean, dry normal air at sea level \_\_\_\_\_.
  - A. supplies us with the oxygen we need to live
  - B. contains 78 percent nitrogen and 21 percent oxygen
  - C. has a specific gravity of 1.0
  - D. All of the above
6. Overcasts and undercasts are used to permit the two air currents to cross without the intake air short-circuiting into the exhaust.
  - A. True
  - B. False

7. Normal air contains about \_\_\_\_\_ percent of carbon dioxide (CO<sub>2</sub>).
- A. 0.30
  - B. 0.003
  - C. 0.03
  - D. 3.00
8. Although each situation is different, experience indicates that no attempt should be made to unseal a fire area until –
- A. the oxygen content of air behind the seal is low enough to make an explosion impossible
  - B. the seals can be removed while the main fan is operating
  - C. there are enough teams available to rebuild the seals if necessary
  - D. carbon monoxide has disappeared or nearly disappeared from the air in front of the seals
  - E. All of the above
9. Progressive ventilation is the re-ventilation of the entire sealed area at once.
- A. True
  - B. False
10. Before entering a mine to search for missing miners, there are several questions to which the team should have answers. These include:
- A. How many miners are missing?
  - B. When did the miners' shift start?
  - C. Where do the miners normally take their breaks?
  - D. What areas were they supposed to work in?
  - E. Both A. and D.
11. Survivors can be categorized into three priority groups according to their condition or injuries. Multiple lacerations, moderate shock, and back injuries with or without spinal injuries, are examples of \_\_\_\_\_.
- A. First Priority conditions
  - B. Second Priority conditions
  - C. Third Priority conditions
  - D. A mix of all three Priority conditions
12. Survivors should be allowed to walk out on their own if they appear to be in good shape.
- A. True
  - B. False

13. For a fire or explosion to occur, three elements must be present at the same time: fuel, sufficient oxygen, and heat (ignition).
- A. True
  - B. False
14. A jump in the pressure recording chart for the main fan is a definite indication that an explosion has occurred underground.
- A. True
  - B. False
15. Hydrogen Sulfide ( $H_2S$ ) \_\_\_\_\_.
- A. is one of the least poisonous gases known
  - B. is explosive in concentrations of 4.3 to 42.5 percent in normal air
  - C. has a specific gravity of 1.9106
  - D. None of the above
16. Oxides of Nitrogen ( $NO$ ,  $NO_2$ , and  $N_2O_4$ ) \_\_\_\_\_.
- A. are highly toxic
  - B. can burn, but will not explode
  - C. tend to collect in low areas in the mine
  - D. appear reddish-brown in higher concentrations
  - E. All of the above, except B.
17. The presence of sulfur hexafluoride ( $SF_6$ ) could indicate that an explosion has taken place in an area with low oxygen content, such as a sealed area.
- A. True
  - B. False
18. Acetylene ( $C_2H_2$ ) \_\_\_\_\_.
- A. is colorless and tasteless, but has a slight garlic odor
  - B. is formed when methane is burned or heated in air having high oxygen content
  - C. has an explosive range between 2.5 to 70 percent in normal air
  - D. is combustible and will support combustion
19. During a rescue operation, the rescue of survivors is the \_\_\_\_\_ priority of the mine rescue team.
- A. first
  - B. second
  - C. third
  - D. None of the above

20. In accordance with 30 CFR Section 49.6(a)(3), each mine rescue station shall be equipped with at least two extra, fully-charged oxygen bottles for every self-contained breathing apparatus.
- A. True
  - B. False
21. Before everyone is moved up to the new fresh air base, the area between the old and new fresh air base should be explored by the team.
- A. True
  - B. False
22. A partially opened man door cannot be used as a regulator.
- A. True
  - B. False
23. Which instrument can be used to measure air velocities greater than 2,000 feet per minute (fpm)?
- A. a high-velocity anemometer
  - B. a medium-velocity anemometer
  - C. a Pitot tube with an attached differential pressure gauge
  - D. Both A. and C.
24. There are two methods of measuring velocity with a smoke tube. The more accurate method is to take a smoke reading only at the center of the airway.
- A. True
  - B. False
25. During recovery work, the role of a mine rescue team varies as the operation progresses and conditions change. Until ventilation is re-established, apparatus crews will be needed to:
- A. assess ground conditions
  - B. clear debris and stabilize ground conditions
  - C. rebuild bulkheads
  - D. All of the above
26. Indirect firefighting methods work by \_\_\_\_\_.
- A. removing potential ignition sources from the fire area
  - B. exhausting the fuel source in the fire area
  - C. eliminating oxygen from the fire
  - D. None of the above

27. These gases are explosive, flammable, and highly toxic.
- A. CO, H<sub>2</sub>S, and CH<sub>4</sub>
  - B. H<sub>2</sub>, H<sub>2</sub>S, and CO
  - C. CH<sub>4</sub>, H<sub>2</sub>S, and CO<sub>2</sub>
  - D. CO and H<sub>2</sub>S
28. This gas is a product of complete combustion.
- A. CO<sub>2</sub>
  - B. CO
  - C. Both A. and B.
  - D. Neither A. nor B.
29. These gases are heavier than normal air under the same temperature and pressure conditions.
- A. CO, H<sub>2</sub>, H<sub>2</sub>S, and CH<sub>4</sub>
  - B. H<sub>2</sub>, CO, and CH<sub>4</sub>
  - C. CO<sub>2</sub>, H<sub>2</sub>S, NO<sub>2</sub>, and SO<sub>2</sub>
  - D. CO, H<sub>2</sub>S, NO<sub>2</sub>, and SO<sub>2</sub>
30. Any flammable gas can explode under certain conditions. That is, there must be enough of the gas in the air, enough oxygen, and a source of ignition.
- A. True
  - B. False