2009 UMR/MISSOURI REGIONAL MINE RESCUE CONTEST
ROLLA, MISSOURI
412 MULTI- GAS INSTRUMENT TEST
ANSWER SHEET (25 QUESTIONS)
MSHA 3027 (Formerly IG 6) Revised 2008

FROM TRAINING MODULE IG6 REVISED 2008: MINE GASES

True and False Questions (1-10)

1. An increase in temperature causes a gas to contract
   a. True
   b. False (Page 2-5)

2. The specific gravity of sulfur dioxide is 2.2683.
   a. True
   b. **False** (Page 2-6 s.g. is 2.2638)

3. The explosive range for hydrogen is 4.0 to 72.4 percent.
   a. True
   b. **False** (Page 2-7)

4. The Threshold Limit Value (TLV) for carbon dioxide ($CO_{2)}$ is 0.5 percent.
   a. **True** (Page 2-9)
   b. False

5. Oxygen is not an explosive gas and it doesn't support combustion.
   a. True
   b. **False** (Page 2-13)

6. The specific gravity of carbon dioxide ($CO_{2)}$ is 1.5219.
   a. True
   b. **False** (Page 2-15)

7. The specific gravity of carbon monoxide (CO) 0.9627.
   a. True
   b. **False** (Page 2-16)

8. Carbon monoxide (CO) is explosive and non flammable.
   a. True
   b. **False** (Page 2-16)

9. The specific gravity of nitrogen dioxide (NO_2) is 1.5894.
   a. **True** (Page 2-17)
   b. False

10. Hydrogen sulfide (H_2S) is flammable and explosive in concentrations from 3.4 to 46.5 percent in normal air.
   a. True
   b. **False** (Page 2-19)

FROM TRAINING MODULE MSHA 3027 REVISED 2008: MINE VENTILATION Multiple Choice Questions (11-18)

11. A medium-velocity or "regular" anemometer is used for measuring velocities from _____.
   a. 100 to 2000 feet per minute
   b. 200 to 2200 feet per minute
   c. **120 to 2000 feet per minute** (Page 3-16)
   d. 100 to 2200 feet per minute

12. A high-velocity anemometer is used for measuring velocities from _____.
   a. 1,500 to 8,000 feet per minute
   b. 2,000 to 12,000 feet per minute
   c. 1,500 to 10,000 feet per minute
   d. **2,000 to 10,000 feet per minute** (Page 3-16)

13. The anemometer actually measures linear feet of travel and requires timing- usually one minute- to determine _____ in feet per minute.
   a. quantity
   b. quality
   c. area
   d. **velocity** (Page 3-16)

14. Two instruments commonly used to measure air movement are the anemometer and the _____.
    a. pilot tube
    b. magic wand
    c. pyrometer
    d. **smoke tube** (Page 3-16)

15. To obtain the quantity of the air current in cubic feet per minute, the area is then multiplied by the _____.
    a. width
    b. length
    c. volume
    d. **velocity** (Page 3-16)

16. If your team finds a fallen check curtain while exploring a mine you should_____.
    a. immediately re-hang it and make it air-tight
    b. build an air lock in front of it
    c. **leave it as it is for the time being and report the condition to the command center** (Page 3-10 first paragraph).
    d. neatly fold it and lay it against a rib out of the way

17. The following smoke tube reading of 10 foot measured distance and an average of 15 seconds with an area of 200 ft^2 the quantity of airflow is _____.

    a. 8,400 ft/min
    b. 8,800 ft/min
    c. 8,000 ft/min
    d. **none of the above** (Page 3-20, 8,000 ft^3/min)

18. A commonly used method of measuring the velocity in an airway is to traverse the airway to get the _____ velocity in the airway.
    a. lowest
    b. highest
    c. median
    d. **average** (Page 3-17, 3rd paragraph)

From Multi Gas Monitor TMX 412 Instruction Manual (19-25)

19. When the instrument TMX 412 is in the normal viewing mode, an _____ segment battery status indicator continuously displays the battery condition.
    a. 6
    b. 7
    c. 8 (Page 8, last paragraph)
    d. 10

20. To manually activate the backlight when needed, press and release the (E) key. The backlight will illuminate the display for approximately _____.
    a. 5 seconds
    b. 15 seconds (Page 9, under 4.3, last sentence)
    c. 30 seconds
    d. 45 seconds

21. When a monitored gas concentration reaches the low level alarm setpoint, the instrument emits a short beep approximately every _____ seconds.
    a. 12
    b. **1.2 (Page 11, 4.5.1 low alarm)**
    c. 2.4
    d. None of the above

22. The dimensions on the TMX-412 are _____.
    a. 4.5" L, 2.5"W, 2.5" H
    b. 4.5" L, 2.5"W, 2.0" H
    c. 4.5" L, 2.5"W, 1.75" H
    d. none of the above (Page 27)

23. When you replace the lithium battery cells, replace with three _____ 3.0 volt lithium battery cells.
    a. Duracell DA 123A
    b. Panasonic CA 123A
    c. Sanyo CR 123A (Page 21, 1st paragraph)
    d. None of the above

24. When a new Oxygen sensor is installed, allow _____ for it to stabilize before attempting calibration.

a. 5 minutes
b. 15 minutes **(Answer on page 22, NOTE)**
c. 30 minutes
d. 45 minutes

25. The temperature range for continuous operation of the TMX 412 is _____.

a. -40 degrees F to 100 degrees F
b. -20 degrees F to 100 degrees F
c. **-4 degrees F to 122 degrees F** **(Answer on page 27)**
d. None of the above