INDUSTRIAL HYGIENE TECHNIQUES/EXPOSURE MONITOR COURSE MATH REVIEW

The following math problems are intended to exercise and refresh math skills. You should be able to complete math problems of this type before attending this class. These basic math skills will not be taught in class due to time limitations. You should come prepared to build upon the examples given on this sheet. If assistance is needed to complete these questions, contact your supervisor or local industrial hygienist for assistance. If you have undue trouble completing these problems, you should talk to your supervisor about not coming to the course since you will probably fail. A calculator with a square root function is required.

1. Calculate the following:

a. $\frac{(5)(6)+(3)(8)+(2)(12)}{6}$

b. $\frac{(7)(11)+(9)(2)+(8)(4)}{(5)(5)}$

c. $\frac{(8)^2+10+(5)^2}{11}$

d. $\frac{(6)^2+(2)^2+(5)^2}{(3)^2}$

Convert the following:

a. 30 inches to feet
b. 69 inches to yards
c. 5 yards to inches
d. 6.5 feet to inches
e. 5.75 hours to minutes
f. 390 minutes to hours
g. 2.3 hours to seconds
h. 400 seconds to minutes
i. 22 cc to ml

How much time in minutes has elapsed?

a. 0705 to 1143
b. 0827 to 1204
c. 0816 to 1426
d. 0944 to 1530

4. Calculate the following:

a. $(3)^2 \, x \, (3)^3$
b. $4^2 \, x \, 4^3$
c. $\frac{2^4}{2^3}$
d. $(3^2)^3$
e. $(2 \, x \, 3)^2$
f. $\left(\frac{4}{2}\right)^3$
g. $\sqrt{47.5}$
h. $\sqrt{19.4}$
i. $\sqrt{1.75}$

5. Complete the following:

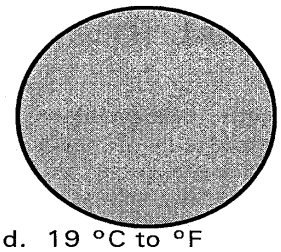
a. Find the average OF 650 FT, 700 FT, AND 625 FT.

b $(.72 \, ft^2)(600 \, ft)$

c. Convert 126 in^2 to ft^2

(Enclosure 2)

6. The diameter (d) of this circle is 16 inches



   a. What is the radius of the circle in inches?

   b. What is the area of this circle in square inches?

   c. What is the area of the circle in ft^2?

7. Convert the following temperatures:

   a. 98 °F to °C b. 35 °F to °C c. 32 °C to °F d. 19 °C to °F

8. Convert the following:

   a. 14 L to m^3 b. 29 L to m^3 c. 5 L to m^3

   d. 200 μg to mg e. 141 μg to mg f. 28 μg to mg

The following is a problem typical of the type you will encounter in this course. We do not expect you to be able to work this problem <u>at this time</u>, but you <u>will</u> be able to solve such problems at the conclusion of this course.

You have been tasked with sampling a metal grinding operation. Using a 1000 ml bubble meter to calibrate your air sampling pump, the bubble traveled the volume of the tube in 28 seconds. In the shop you placed the pump on the worker and started it at 0735 and shut it off at 1128 when he went to lunch. After lunch you used a new filter and restarted the pump at 1233. The worker was called away from the shop and you stopped the pump at 1407. He had no further exposure for the remainder of the day. Again using the 1000 ml bubble tube to post calibrate the pump, the bubble time was 29.4 seconds. The two filters were sent to the laboratory which reported the following results: filter 1 = 15 μg iron oxide; filter 2 = 13.7 μg iron oxide. While in the grinding shop you also evaluated the local exhaust ventilation system. The hood of the system was not readily accessible but you were able to use a pitot tube in the 12 inch diameter duct and determined the velocity pressure (VP) to be 1.75 inches of water.

Using the above information, find the following:

The flowrate of the sampling pump in liters per minute.
The sampling time for each filter in minutes.
The percentage of error between the pump flow rates.
The volume of air drawn through each filter in liters.
The volume of air drawn through each filter in cubic meters.
The airborne concentration of iron oxide on each filter in mg/m^3.
The worker's 8-hr TWA concentration in mg/m^3.
Was he overexposed to iron oxide that day?
The area of the ventilation duct in ft^2.
The velocity of the air in the duct in feet per minute.
The volumetric flowrate of the exhaust system in cubic feet per minute.