

Matter and the Metric System: Test 3.1

Instructions: All responses for the multiple choice and matching are to be made on the Scantron answer sheet by blackening the letter corresponding to the answer you have chosen. In all cases the **best** answer should be chosen. If you select an answer that looks like "(1,3)", then you must blacken **both** 1 and 3 on the Scantron answer sheet.

Multiple Choice

- ___ 1. In an experiment conducted by Black Bart to determine the density of a new compound created by Sally Sue. A value of 7.00 G/mL was calculated from the data collected. What is Black Bart's relative error if the density of Sally's new substance was actually 6.00 G/mL? (1) 20.0 %; (2) -20.0%; (3) -16.7 %; (4) 16.7 %; (5) 1.00 %
- ___ 2. How many decigrams would be equal to 2.45 dekagrams? (1) 24.5; (2) 245; (3) 2450; (4) 24500; (5) 245000.
- ___ 3. The equatorial radius of the earth is reported as 6378.388 kM. What would this value be if reported to 2 significant digits? (1) 6380; (2) 6370; (3) 637; (4) 638; (5) 6300; (1,2) 6400.
- ___ 4. Which of the following numbers is in standard scientific notation? (1) 6.66×10^1 ; (2) 6.66×10^1 ; (3) 0.666×10^{20} ; (4) both 2 and 3; (5) both 1 and 2.
- ___ 5. The gravitational attraction a body "feels" is known as the body's (1) mass; (2) weight; (3) volume; (4) inertia.
- ___ 6. The production of electric energy when sunlight falls on a solar cell represents (1) the transformation of energy; (2) the conservation of matter and energy; (3) the release of nuclear energy; (4) the creation of energy.
- ___ 7. Science can best be described as (1) a unit of time in 3 dimension space; (2) finding the best answer to the question Why?; (3) a study of matter; (4) a study of energy; (5) a study of the forms of energy
- ___ 8. The measurement of the ratio of mass to volume of a body is the body's (1) density; (2) volume; (3) weight; (4) mass.
- ___ 9. In one reference book the the heat of fusion of water is reported as 79.71 cal/G. How many of these digits are significant? (1) 1; (2) 2; (3) 3; (4) 4.
- ___ 10. In another reference book the heat of fusion of water is reported as 80 cal/G. How many significant digits does this value contain? (1) 1; (2) 2; (3) 3; (4) 4; (5) 5; (1,2) 6; (1,3) 7
- ___ 11. The original definition of the liter was (1) the volume of one cubic meter; (2) equal to 1.059 quarts; (3) one 10,000,000 th the volume of the earth; (4) one cubic decimeter; (5) the volume of three barley corns.
- ___ 12. Two setups exist on the demonstration table. Which one is measuring weight? (1) A; (2) B.
- ___ 13. Of the two setups referenced in question 12, which one will give the same reading if moved to the moon? (1) A; (2) B.

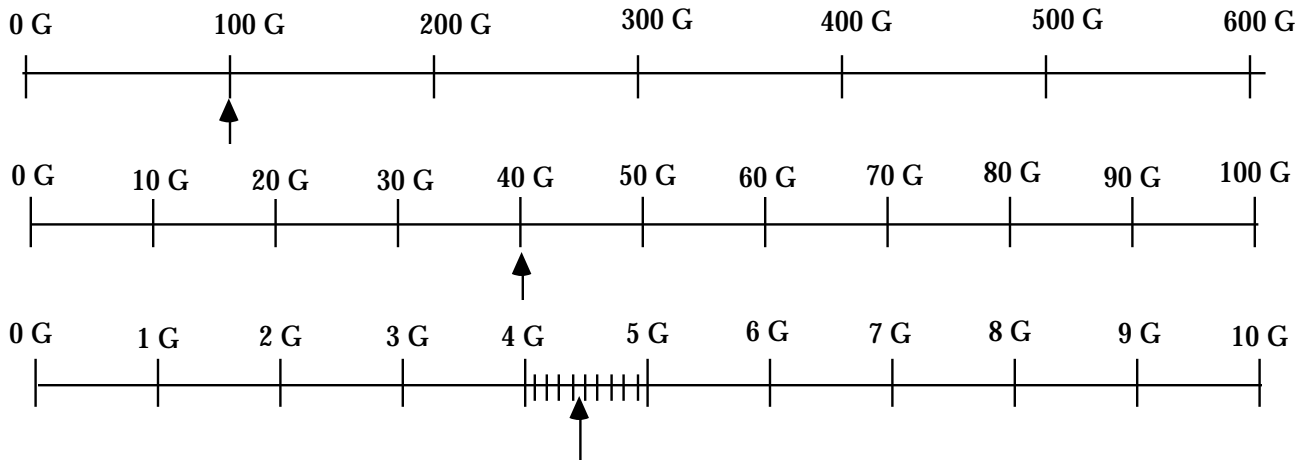
- ___ 14. Professor Erbie Terbium conducted an experiment which did not result in a change in the physical properties of a substance? Which of the following probably occurred during the course of the experiment? (1) physical change; (2) chemical change; (3) nuclear change.
- ___ 15. One hundred grams of water was warmed from 22 °C to 30 °C. How much heat was used to accomplish this? (1) 800 J; (2) 34.5 J; (3) 45 J; (4) 3400 J; (5) 8000 J.
- ___ 16. Tungsten filaments are used in light bulbs. A 2.02 G piece of Tungsten was found to have a volume of 0.1047 cc. What would be the density of Tungsten (W)? (1) 0.0518 cc/G; (2) 0.0518; (3) 19.6; (4) 19.3 G/cc .
- ___ 17. The wavelength of “light” generated by a microwave oven is 12.2 cM. This distance expressed in meters would be about (1) 3; (2) 4; (3) 5; (4) 6; (5) 7; (1,2) none of the above.
- ___ 18. One parsec is equal to 1.92×10^{13} miles. Which of the following best describes this distance in meters: (1) 3.136×10^{13} ; (2) 3.136×10^{16} ; (3) 3.136×10^{14} ; (4) 3.136×10^{10} .
- ___ 19. Gold has a density of 19.4 G/mL. What volume would 1 Avoirdupois pound of gold (454 G) occupy? (1) 300 mL; (2) 18.01 mL ; (3) 19.2 mL; (4) 23 mL.
- ___ 20. The height of Mount Arvon in Michigan is listed as being about 2000 ft (2×10^3) above sea level. To the proper number of significant digits what would be its height above sea level in meters? [Note the conversion factors used were: 12.0 in = 1.00 ft (an exact relationship); 2.54 cM = 1.00 in (an exact relationship by act of U.S. Congress in 1959); and 1.00 M = 100.0 cM (an exact relationship by definition)] (1) 609.60 M; (2) 609.6 M; (3) 610 M; (4) 600 M
- ___ 21. A more accurate listing for the height of Mount Arvon in the above question is 1976 ft. Which of the following could now be correctly listed as the height of Mount Arvon in meters, to the proper number of significant digits, if the same conversion factors were used? (1) 602.285 M; (2) 602.29M; (3) 602.3 M; (4) 602M; (5) 600 M.
- ___ 22. Almost all food containers today list the amount of substance in the container in both the Metric and English system of measurements. Given below are the listings from five containers. In which case did the manufacturer report the conversion properly. (You may assume that there were no math errors made.) (1) Heinz Ketchup: 40 oz = 1134 G; (2) Brooks Chili Beans: 31 oz = 879 G; (3) Ken’s Buttermilk Ranch Dressing: 8 fl oz = 237 mL; (4) Krusteaz Almond Poppysseed Muffin Mix: 80 oz = 2.26 kG; (5) Henri’s Creamy Garlic Dressing: 16 fl oz = 0.47 L.
- ___ 23. As stated above the U.S. Congress defined the inch in 1959 to be exactly equal to 2.54 cM. Prior to this the inch was listed as being equal to 2.540005 cM. Did congress lengthen or shorten the inch? (1) lengthen; (2) shorten.
- ___ 24. By how many cM did the mile change by Congress in 1959? (1) 2 cM; (3) 200 cM; (4) 0.3168 cM; (5) 0.254 cM; (1,2) the length of the mile did not change.
- ___ 25. The disadvantage(s) of the English system of measurement is (are) (1) it is poorly standardized; (2) it is difficult to use; (3) it is based on the decimal system not fractions; (4) both 1 and 3; (5) both 1 and 2.
- ___ 26. Which of the following lines is closest to 1 cM?
- (1) _____ (3) _____
- (2) _____ (4) -

___ 27. An experiment was conducted to determine the specific heat of a metal. The formula used in class when we conducted this experiment was $H = m \cdot T \cdot SpH$. The following data was collected:

mass of the empty test tube -----	20.00 G
mass of test tube + metal -----	120.00 G
initial temperature of the metal -----	120.0 °C
mass of the empty styrofoam cup -----	1.00 G
mass of the styrofoam cup + water -----	151.00 G
initial temperature of the cup + water -----	20.0 °C
final temperature of the cup, water and metal -----	30.0 °C
specific heat of water -----	$4.184 \frac{J}{G \cdot ^\circ C}$

The specific heat of the metal in $\frac{J}{G \cdot ^\circ C}$ would be (1) 0.70; (2) 1.43; (3) 2.51; (4) 0.0398; (5) 4.184.

___ 28. The mass of a piece of copper was determined on a triple beam balance similar to the ones you used in the lab. What would be the mass of the copper, to the proper number of significant digits, given the following state of the riders on the three beams when the reading was taken? (The arrows point to the final state of the riders.)



(1) 144 G; (2) 144.1 G; (3) 145 G; (4) 144.4 G; (5) 144.45 G; (1,2) 144.458 G

___ 29. Gonzo collected 60 eggs from his chickens over a 6 hour period. Determine the number of eggs per second. (1) 360; (2) 60; (3) 6; (4) 0.0028; (5) 0.0167; (1,2) 0.167.

___ 30. The cheetah has been clocked at 112 km/hr over a 100 M distance. What would this speed be in ft/sec. (1) 102; (2) 1225; (3) 9.79×10^{-3} ; (4) 8.16×10^{-4} ; (5) 31.1; (1,2) 3.2×10^{-2}

___ 31. When 20.04 is multiplied times 6.5, how many significant digits are allowed in the answer? (1) 1; (2) 2; (3) 3; (4) 4; (5) 5

Short Answer

1. In his last race Snoopy won by a nose. If his nose was 14.20 cm long, what was his margin of victory in the English system? (Note: two points extra credit will be given for an answer to the proper number of significant digits.)

One Step Beyond (1 pt Extra Credit)

Kitchen work area.

Twilight Zone (3 pts Extra Credit)

Given the following information:

12 freshman use 200 sheets of paper

12 inches in one foot

144 sheets of paper to one Gross

60 seconds per minute

1.728×10^7 square sheets of paper (sheets of paper)² burn per minute

Determine the number of $\left(\frac{\text{Gross} - \text{Freshman} - \text{Feet}}{\text{inch} - \text{sec ond}}\right)$.