

Name \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) The current definition of the standard meter of length is based on 1) \_\_\_\_\_  
A) the length of a particular object kept in France.  
B) the distance between the earth and the sun.  
C) the distance traveled by light in a vacuum.  
D) the distance between the earth's equator and north pole.
- 2) The current definition of the standard second of time is based on 2) \_\_\_\_\_  
A) the duration of one year.  
B) the frequency of radiation emitted by cesium atoms.  
C) the oscillation of a particular pendulum kept in France.  
D) the earth's rotation rate.
- 3) The current definition of the standard kilogram of mass is based on 3) \_\_\_\_\_  
A) the mass of a cesium-133 atom.  
B) the mass of the sun.  
C) the mass a particular object kept in France.  
D) the mass of the earth.
- 4) If a woman weighs 125 lb, her mass expressed in kilograms is  $x$  kg, where  $x$  is 4) \_\_\_\_\_  
A) less than 125. B) greater than 125.
- 5) If a tree is 15 m tall, its height expressed in feet is  $x$  ft, where  $x$  is 5) \_\_\_\_\_  
A) less than 15. B) greater than 15.
- 6) If a flower is 6.5 cm wide, its width expressed in millimeters is  $x$  mm, where  $x$  is 6) \_\_\_\_\_  
A) less than 6.5. B) greater than 6.5.
- 7) If an operatic aria lasts for 5.75 min, its length expressed in seconds is  $x$  s, where  $x$  is 7) \_\_\_\_\_  
A) greater than 5.75. B) less than 5.75.
- 8) Scientists use the metric system chiefly because it is more accurate than the English system. 8) \_\_\_\_\_  
A) True B) False
- 9) When adding two numbers, the number of significant figures in the sum is equal to the number of significant figures in the least accurate of the numbers being added. 9) \_\_\_\_\_  
A) True B) False
- 10) When determining the number of significant figures in a number, zeroes to the left of the decimal point are never counted. 10) \_\_\_\_\_  
A) True B) False
- 11) Convert  $1.2 \times 10^{-3}$  to decimal notation. 11) \_\_\_\_\_  
A) 1.200 B) 0.1200 C) 0.0120 D) 0.0012 E) 0.00012

- 12) Write out the number  $7.35 \times 10^{-5}$  in full with a decimal point and correct number of zeros. 12) \_\_\_\_\_  
 A) 0.00000735  
 B) 0.0000735  
 C) 0.000735  
 D) 0.00735  
 E) 0.0735
- 13) 0.0001776 can also be expressed as 13) \_\_\_\_\_  
 A)  $1.776 \times 10^{-3}$ .  
 B)  $1.776 \times 10^{-4}$ .  
 C)  $17.72 \times 10^4$ .  
 D)  $1772 \times 10^5$ .  
 E)  $177.2 \times 10^7$ .
- 14)  $0.00325 \times 10^{-8}$  cm can also be expressed in mm as 14) \_\_\_\_\_  
 A)  $3.25 \times 10^{-12}$  mm.  
 B)  $3.25 \times 10^{-11}$  mm.  
 C)  $3.25 \times 10^{-10}$  mm.  
 D)  $3.25 \times 10^{-9}$  mm.  
 E)  $3.25 \times 10^{-8}$  mm.
- 15) If, in a parallel universe,  $\pi$  has the value 3.14149, express  $\pi$  in that universe to four significant figures. 15) \_\_\_\_\_  
 A) 3.141                      B) 3.142                      C) 3.1415                      D) 3.1414
- 16) The number 0.003010 has 16) \_\_\_\_\_  
 A) 7 significant figures.                      B) 6 significant figures.  
 C) 4 significant figures.                      D) 2 significant figures.
- 17) What is  $\frac{0.674}{0.74}$  to the proper number of significant figures? 17) \_\_\_\_\_  
 A) 0.9                      B) 0.911                      C) 0.9108                      D) 0.91
- 18) What is the value of  $\pi(8.104)^2$ , written with the correct number of significant figures? 18) \_\_\_\_\_  
 A) 206.324                      B) 206.323                      C) 206.3                      D) 206                      E) 200
- 19) What is the sum of 1123 and 10.3 written with the correct number of significant figures? 19) \_\_\_\_\_  
 A)  $1.1 \times 10^3$                       B) 1133                      C) 1133.3000                      D)  $1.13 \times 10^3$                       E) 1133.3
- 20) What is the sum of  $1.53 + 2.786 + 3.3$  written with the correct number of significant figures? 20) \_\_\_\_\_  
 A) 8                      B) 7.6                      C) 7.62                      D) 7.616                      E) 7.6160
- 21) What is the difference between 103.5 and 102.24 written with the correct number of significant figures? 21) \_\_\_\_\_  
 A) 1                      B) 1.3                      C) 1.26                      D) 1.260                      E) 1.2600
- 22) What is the product of 11.24 and 1.95 written with the correct number of significant figures? 22) \_\_\_\_\_  
 A) 22                      B) 21.9                      C) 21.92                      D) 21.918                      E) 21.9180

- 23) What is the result of  $1.58 \div 3.793$  written with the correct number of significant figures? 23) \_\_\_\_\_
- A)  $4.1656 \times 10^{-1}$   
 B)  $4.2 \times 10^{-1}$   
 C)  $4 \times 10^{-1}$   
 D)  $4.166 \times 10^{-1}$   
 E)  $4.17 \times 10^{-1}$
- 24) What is  $34 + (3) \times (1.2465)$  written with the correct number of significant figures? 24) \_\_\_\_\_
- A)  $4 \times 10^1$                       B) 38                      C) 37.7                      D) 37.7395                      E) 37.74
- 25) What is  $56 + (32.00)/(1.2465 + 3.45)$  written with the correct number of significant figures? 25) \_\_\_\_\_
- A) 62.81  
 B) 62.812  
 C) 62.8123846  
 D) 62.8  
 E) 63
- 26) Add 3685 g and 66.8 kg and express your answer in milligrams (mg). 26) \_\_\_\_\_
- A)  $7.05 \times 10^4$  mg                      B)  $7.05 \times 10^6$  mg                      C)  $7.05 \times 10^7$  mg                      D)  $7.05 \times 10^5$  mg
- 27) Express  $(4.3 \times 10^6)^{-1/2}$  in scientific notation. 27) \_\_\_\_\_
- A)  $2.1 \times 10^3$                       B)  $4.8 \times 10^{-4}$                       C)  $2.1 \times 10^4$                       D)  $2.1 \times 10^{-5}$
- 28) What is  $0.205^{2/3}$ , expressed to the proper number of significant figures? 28) \_\_\_\_\_
- A) 0.3                      B) 0.3477                      C) 0.35                      D) 0.348
- 29) The length and width of a rectangle are 1.125 m and 0.606 m, respectively. Multiplying, your calculator gives the product as 0.68175. Rounding properly to the correct number of significant figures, the area should be written as 29) \_\_\_\_\_
- A) 0.7 m<sup>2</sup>.  
 B) 0.68 m<sup>2</sup>.  
 C) 0.682 m<sup>2</sup>.  
 D) 0.6818 m<sup>2</sup>.  
 E) 0.68175 m<sup>2</sup>.
- 30) The following exact conversion equivalents are given: 1 m = 100 cm , 1 in = 2.54 cm, and 1 ft = 12 in. 30) \_\_\_\_\_
- If a computer screen has an area of 1.27 ft<sup>2</sup>, this area is closest to
- A) 0.118 m<sup>2</sup>.  
 B) 4.65 m<sup>2</sup>.  
 C) 0.0465 m<sup>2</sup>.  
 D) 0.00284 m<sup>2</sup>.  
 E) 0.284 m<sup>2</sup>.

- 31) In addition to  $1 \text{ m} = 39.37 \text{ in.}$ , the following exact conversion equivalents are given: 31) \_\_\_\_\_  
 $1 \text{ mile} = 5280 \text{ ft}$ ,  $1 \text{ ft} = 12 \text{ in}$ ,  $1 \text{ hour} = 60 \text{ min}$ , and  $1 \text{ min} = 60 \text{ s}$ . If a particle has a velocity of 8.4 miles per hour, its velocity, in m/s, is closest to  
 A) 4.1 m/s.      B) 3.4 m/s.      C) 4.5 m/s.      D) 3.0 m/s.      E) 3.8 m/s.
- 32) A weight lifter can bench press 171 kg. How many milligrams (mg) is this? 32) \_\_\_\_\_  
 A)  $1.71 \times 10^8 \text{ mg}$       B)  $1.71 \times 10^9 \text{ mg}$       C)  $1.71 \times 10^7 \text{ mg}$       D)  $1.71 \times 10^6 \text{ mg}$
- 33) How many nanoseconds does it take for a computer to perform one calculation if it performs 33) \_\_\_\_\_  
 $6.7 \times 10^7$  calculations per second?  
 A) 11 ns      B) 67 ns      C) 15 ns      D) 65 ns
- 34) The shortest wavelength of visible light is approximately 400 nm. Express this wavelength in 34) \_\_\_\_\_  
 centimeters.  
 A)  $4 \times 10^{-9} \text{ cm}$   
 B)  $4 \times 10^{-11} \text{ cm}$   
 C)  $400 \times 10^{-11} \text{ cm}$   
 D)  $4 \times 10^{-5} \text{ cm}$   
 E)  $4 \times 10^{-7} \text{ cm}$
- 35) The wavelength of a certain laser is 0.35 micrometers, where 1 micrometer =  $1 \times 10^{-6} \text{ m}$ . Express 35) \_\_\_\_\_  
 this wavelength in nanometers.  
 A)  $3.5 \times 10^2 \text{ nm}$       B)  $3.5 \times 10^4 \text{ nm}$       C)  $3.5 \times 10^3 \text{ nm}$       D)  $3.5 \times 10^1 \text{ nm}$
- 36) A certain CD-ROM disk can store approximately  $6.0 \times 10^2$  megabytes of information, where  $10^6$  36) \_\_\_\_\_  
 bytes = 1 megabyte. If an average word requires 9.0 bytes of storage, how many words can be  
 stored on one disk?  
 A)  $5.4 \times 10^9$  words      B)  $6.7 \times 10^7$  words      C)  $2.1 \times 10^7$  words      D)  $2.0 \times 10^9$  words
- 37) A plot of land contains 5.8 acres. How many square meters does it contain? [1 acre = 43,560 ft<sup>2</sup>] 37) \_\_\_\_\_  
 A)  $7.0 \times 10^4 \text{ m}^2$       B)  $5.0 \times 10^4 \text{ m}^2$       C)  $7.1 \times 10^3 \text{ m}^2$       D)  $2.3 \times 10^4 \text{ m}^2$
- 38) A person on a diet loses 1.6 kg in a week. How many micrograms/second ( $\mu\text{g/s}$ ) are lost? 38) \_\_\_\_\_  
 A)  $1.6 \times 10^5 \mu\text{g/s}$       B)  $44 \mu\text{g/s}$       C)  $2.6 \times 10^3 \mu\text{g/s}$       D)  $6.4 \times 10^4 \mu\text{g/s}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 39) Albert uses as his unit of length (for walking to visit his neighbors or plowing his fields) 39) \_\_\_\_\_  
 the albert (A), the distance Albert can throw a small rock. One albert is 92 meters. How  
 many square alberts is equal to one acre? (1 acre = 43,560 ft<sup>2</sup> = 4050 m<sup>2</sup>)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 40) Convert a speed of 4.50 km/h to units of ft/min. (1.00 m = 3.28 ft) 40) \_\_\_\_\_  
A) 246 ft/min  
B) 886 ft/min  
C) 165 ft/min  
D) 82.3 ft/min  
E) 0.246 ft/min
- 41) The exhaust fan on a typical kitchen stove pulls 600 CFM (cubic feet per minute) through the filter. Given that 1.00 in. = 2.54 cm, how many cubic meters per second does this fan pull? 41) \_\_\_\_\_  
A) 0.283 m<sup>3</sup>/sec      B) 32.8 m<sup>3</sup>/sec      C) 0.328 m<sup>3</sup>/sec      D) 3.05 m<sup>3</sup>/sec
- 42) The mass of a typical adult woman is closest to 42) \_\_\_\_\_  
A) 75 kg.      B) 35 kg.      C) 150 kg.      D) 20 kg.
- 43) The height of the ceiling in a typical home, apartment, or dorm room is closest to 43) \_\_\_\_\_  
A) 100 cm.      B) 200 cm.      C) 400 cm.      D) 500 cm.
- 44) Approximately how many times does an average human heart beat in a year? 44) \_\_\_\_\_  
A)  $4 \times 10^5$       B)  $4 \times 10^8$       C)  $4 \times 10^9$       D)  $4 \times 10^6$       E)  $4 \times 10^7$
- 45) Approximately how many times does an average human heart beat in a lifetime? 45) \_\_\_\_\_  
A)  $3 \times 10^{10}$       B)  $3 \times 10^9$       C)  $3 \times 10^8$       D)  $3 \times 10^{11}$       E)  $3 \times 10^7$
- 46) Approximately how many pennies would you have to stack to reach an average 8-foot ceiling? 46) \_\_\_\_\_  
A)  $2 \times 10^2$       B)  $2 \times 10^6$       C)  $2 \times 10^4$       D)  $2 \times 10^5$       E)  $2 \times 10^3$
- 47) Estimate the number of times the earth will rotate on its axis during a human's lifetime. 47) \_\_\_\_\_  
A)  $3 \times 10^5$       B)  $3 \times 10^4$       C)  $3 \times 10^6$       D)  $3 \times 10^8$       E)  $3 \times 10^7$
- 48) Estimate the number of pennies that would fit in a box one foot long by one foot wide by one foot tall. 48) \_\_\_\_\_  
A)  $5 \times 10^4$       B)  $5 \times 10^2$       C)  $5 \times 10^3$       D)  $5 \times 10^6$       E)  $5 \times 10^5$
- 49) A marathon is 26 mi and 385 yd long. Estimate how many strides would be required to run a marathon. Assume a reasonable value for the average number of feet/stride. 49) \_\_\_\_\_  
A)  $4.5 \times 10^5$  strides      B)  $4.5 \times 10^6$  strides      C)  $4.5 \times 10^3$  strides      D)  $4.5 \times 10^4$  strides
- 50) The period of a pendulum is the time it takes the pendulum to swing back and forth once. If the only dimensional quantities that the period depends on are the acceleration of gravity,  $g$ , and the length of the pendulum,  $\ell$  what combination of  $g$  and  $\ell$  must the period be proportional to? (Acceleration has SI units of  $\text{m} \cdot \text{s}^{-2}$ .) 50) \_\_\_\_\_  
A)  $g\ell$       B)  $\sqrt{g\ell}$       C)  $g\ell^2$       D)  $\sqrt{\ell g}$       E)  $g/\ell$

51) The speed of a wave pulse on a string depends on the tension,  $F$ , in the string and the mass per unit length,  $\mu$ , of the string. Tension has SI units of  $\text{kg} \cdot \text{m} \cdot \text{s}^{-2}$  and the mass per unit length has SI units of  $\text{kg} \cdot \text{m}^{-1}$ . What combination of  $F$  and  $\mu$  must the speed of the wave be proportional to? 51) \_\_\_\_\_

A)  $\sqrt{F/\mu}$       B)  $F/\mu$       C)  $\sqrt{\mu/F}$       D)  $\mu/F$       E)  $\sqrt{\mu F}$

52) The position  $x$ , in meters, of an object is given by the equation  $x = A + Bt + Ct^2$ , where  $t$  represents time in seconds. What are the SI units of  $A$ ,  $B$ , and  $C$ ? 52) \_\_\_\_\_

A) m, s,  $s^2$   
B) m, m, m  
C) m, m/s,  $m/s^2$   
D) m, s, s  
E) m/s,  $m/s^2$ ,  $m/s^3$

## Answer Key

Testname: UNTITLED1

- 1) C
- 2) B
- 3) C
- 4) A
- 5) B
- 6) B
- 7) A
- 8) B
- 9) B
- 10) B
- 11) D
- 12) B
- 13) B
- 14) C
- 15) A
- 16) C
- 17) D
- 18) C
- 19) B
- 20) B
- 21) B
- 22) B
- 23) E
- 24) B
- 25) E
- 26) C
- 27) B
- 28) D
- 29) C
- 30) A
- 31) E
- 32) A
- 33) C
- 34) D
- 35) A
- 36) B
- 37) D
- 38) C
- 39)  $1.29 A^2$
- 40) A
- 41) A
- 42) A
- 43) B
- 44) E
- 45) B
- 46) E
- 47) B
- 48) A
- 49) D
- 50) D

Answer Key

Testname: UNTITLED1

51) B

52) B