

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 distance between the earth and the sun.
B) the distance traveled by light in a vacuum.
C) the length of a particular object kept in France.
D) the distance between the earth's equator and north pole.

Answer: B

- 2) The current definition of the standard second of time is based on 2) _____
A) the frequency of radiation emitted by cesium atoms.
B) the oscillation of a particular pendulum kept in France.
C) the duration of one year.
D) the earth's rotation rate.

Answer: A

- 3) The current definition of the standard kilogram of mass is based on 3) _____
A) the mass of the earth.
B) the mass of the sun.
C) the mass of a cesium-133 atom.
D) the mass a particular object kept in France.

Answer: D

- 4) If a woman weighs 125 lb, her mass expressed in kilograms is x kg, where x is 4) _____
A) greater than 125. B) less than 125.

Answer: B

- 5) If a tree is 15 m tall, its height expressed in feet is x ft, where x is 5) _____
A) greater than 15. B) less than 15.

Answer: A

- 6) If a flower is 6.5 cm wide, its width expressed in millimeters is x mm, where x is 6) _____
A) greater than 6.5. B) less than 6.5.

Answer: A

- 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.

Answer: A

- 8) Scientists use the metric system chiefly because it is more accurate than the English system. 8) _____
A) True B) False

Answer: B

- 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

Answer: B

- 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
 Answer: B
- 11) Convert 1.2×10^{-3} to decimal notation. 11) _____
 A) 1.200 B) 0.1200 C) 0.0120 D) 0.0012 E) 0.00012
 Answer: D
- 12) Write out the number 7.35×10^{-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
 Answer: B
- 13) 0.0001776 can also be expressed as 13) _____
 A) 1.776×10^{-3} .
 B) 1.776×10^{-4} .
 C) 17.72×10^4 .
 D) 1772×10^5 .
 E) 177.2×10^7 .
 Answer: B
- 14) 0.00325×10^{-8} cm can also be expressed in mm as 14) _____
 A) 3.25×10^{-12} mm.
 B) 3.25×10^{-11} mm.
 C) 3.25×10^{-10} mm.
 D) 3.25×10^{-9} mm.
 E) 3.25×10^{-8} mm.
 Answer: C
- 15) If, in a parallel universe, π has the value 3.14149, express π in that universe to four significant figures. 15) _____
 A) 3.141 B) 3.142 C) 3.1415 D) 3.1414
 Answer: A
- 16) The number 0.003010 has 16) _____
 A) 7 significant figures. B) 6 significant figures.
 C) 4 significant figures. D) 2 significant figures.
 Answer: C
- 17) What is $\frac{0.674}{0.74}$ to the proper number of significant figures? 17) _____
 A) 0.9108 B) 0.91 C) 0.9 D) 0.911
 Answer: B

- 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
 Answer: C
- 19) What is the sum of 1123 and 10.3 written with the correct number of significant figures? 19) _____
 A) 1.1×10^3 B) 1.13×10^3 C) 1133 D) 1133.3000 E) 1133.3
 Answer: C
- 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
 Answer: B
- 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
 Answer: B
- 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
 Answer: B
- 23) What is the result of $1.58 \div 3.793$ written with the correct number of significant figures? 23) _____
 A) 4.2×10^{-1}
 B) 4.1656×10^{-1}
 C) 4×10^{-1}
 D) 4.166×10^{-1}
 E) 4.17×10^{-1}
 Answer: E
- 24) What is $34 + (3) \times (1.2465)$ written with the correct number of significant figures? 24) _____
 A) 38 B) 37.74 C) 37.7395 D) 37.7 E) 4×10^1
 Answer: A
- 25) What is $56 + (32.00)/(1.2465 + 3.45)$ written with the correct number of significant figures? 25) _____
 A) 62.81
 B) 62.8123846
 C) 62.812
 D) 62.8
 E) 63
 Answer: E
- 26) Add 3685 g and 66.8 kg and express your answer in milligrams (mg). 26) _____
 A) 7.05×10^4 mg B) 7.05×10^7 mg C) 7.05×10^6 mg D) 7.05×10^5 mg
 Answer: B
- 27) Express $(4.3 \times 10^6)^{-1/2}$ in scientific notation. 27) _____
 A) 2.1×10^3 B) 4.8×10^{-4} C) 2.1×10^4 D) 2.1×10^{-5}
 Answer: B

- 28) What is $0.205^{2/3}$, expressed to the proper number of significant figures? 28) _____
 A) 0.3 B) 0.35 C) 0.3477 D) 0.348
 Answer: D
- 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 m².
 B) 0.68 m².
 C) 0.682 m².
 D) 0.6818 m².
 E) 0.68175 m².
 Answer: C
- 30) The following exact conversion equivalents are given: 1 m = 100 cm, 1 in = 2.54 cm, and 1 ft = 12 in. If a computer screen has an area of 1.27 ft², this area is closest to 30) _____
 A) 0.0465 m².
 B) 0.00284 m².
 C) 0.118 m².
 D) 0.284 m².
 E) 4.65 m².
 Answer: C
- 31) In addition to 1 m = 39.37 in., the following exact conversion equivalents are given: 1 mile = 5280 ft, 1 ft = 12 in, 1 hour = 60 min, and 1 min = 60 s. If a particle has a velocity of 8.4 miles per hour, its velocity, in m/s, is closest to 31) _____
 A) 3.0 m/s. B) 3.8 m/s. C) 4.5 m/s. D) 4.1 m/s. E) 3.4 m/s.
 Answer: B
- 32) A weight lifter can bench press 171 kg. How many milligrams (mg) is this? 32) _____
 A) 1.71×10^8 mg B) 1.71×10^9 mg C) 1.71×10^7 mg D) 1.71×10^6 mg
 Answer: A
- 33) How many nanoseconds does it take for a computer to perform one calculation if it performs 6.7×10^7 calculations per second? 33) _____
 A) 15 ns B) 67 ns C) 65 ns D) 11 ns
 Answer: A
- 34) The shortest wavelength of visible light is approximately 400 nm. Express this wavelength in centimeters. 34) _____
 A) 4×10^{-5} cm
 B) 4×10^{-11} cm
 C) 4×10^{-7} cm
 D) 400×10^{-11} cm
 E) 4×10^{-9} cm
 Answer: A

- 35) The wavelength of a certain laser is 0.35 micrometers, where 1 micrometer = 1×10^{-6} m. Express this wavelength in nanometers. 35) _____
A) 3.5×10^3 nm B) 3.5×10^4 nm C) 3.5×10^1 nm D) 3.5×10^2 nm
Answer: D

- 36) A certain CD-ROM disk can store approximately 6.0×10^2 megabytes of information, where 10^6 bytes = 1 megabyte. If an average word requires 9.0 bytes of storage, how many words can be stored on one disk? 36) _____
A) 6.7×10^7 words B) 2.0×10^9 words
C) 2.1×10^7 words D) 5.4×10^9 words
Answer: A

- 37) A plot of land contains 5.8 acres. How many square meters does it contain? [1 acre = 43,560 ft²] 37) _____
A) 5.0×10^4 m² B) 2.3×10^4 m² C) 7.1×10^3 m² D) 7.0×10^4 m²
Answer: B

- 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) 2.6×10^3 $\mu\text{g/s}$ B) 6.4×10^4 $\mu\text{g/s}$ C) 1.6×10^5 $\mu\text{g/s}$ D) 44 $\mu\text{g/s}$
Answer: A

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) 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 ft² = 4050 m²) 39) _____
Answer: 1.29 A²

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) 82.3 ft/min
D) 0.246 ft/min
E) 165 ft/min
Answer: A

- 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 m³/sec B) 3.05 m³/sec C) 0.328 m³/sec D) 32.8 m³/sec
Answer: A

- 42) The mass of a typical adult woman is closest to 42) _____
A) 35 kg. B) 150 kg. C) 75 kg. D) 20 kg.
Answer: C

- 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.
Answer: B

- 44) Approximately how many times does an average human heart beat in a year? 44) _____
 A) 4×10^7 B) 4×10^9 C) 4×10^8 D) 4×10^5 E) 4×10^6
 Answer: A
- 45) Approximately how many times does an average human heart beat in a lifetime? 45) _____
 A) 3×10^{10} B) 3×10^{11} C) 3×10^8 D) 3×10^9 E) 3×10^7
 Answer: D
- 46) Approximately how many pennies would you have to stack to reach an average 8-foot ceiling? 46) _____
 A) 2×10^5 B) 2×10^3 C) 2×10^2 D) 2×10^4 E) 2×10^6
 Answer: B
- 47) Estimate the number of times the earth will rotate on its axis during a human's lifetime. 47) _____
 A) 3×10^8 B) 3×10^4 C) 3×10^7 D) 3×10^5 E) 3×10^6
 Answer: B
- 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) 5×10^6 B) 5×10^2 C) 5×10^4 D) 5×10^3 E) 5×10^5
 Answer: C
- 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) 4.5×10^3 strides B) 4.5×10^4 strides
 C) 4.5×10^5 strides D) 4.5×10^6 strides
 Answer: B
- 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, ℓ , what combination of g and ℓ must the period be proportional to? (Acceleration has SI units of $\text{m} \cdot \text{s}^{-2}$.) 50) _____
 A) g/ℓ B) $g\ell^2$ C) $\sqrt{\ell/g}$ D) $\sqrt{g\ell}$ E) $g\ell$
 Answer: C
- 51) The speed of a wave pulse on a string depends on the tension, F , in the string and the mass per unit length, μ , 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 μ must the speed of the wave be proportional to? 51) _____
 A) F/μ B) $\sqrt{\mu F}$ C) μ/F D) $\sqrt{\mu/F}$ E) $\sqrt{F/\mu}$
 Answer: A
- 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 , m/s^2 , m/s^3
 B) m , s , s
 C) m , m , m
 D) m , m/s , m/s^2
 E) m , s , s^2
 Answer: C