1-1A. Consider two quantities, A and B, which have different dimensions. We can form their sum: (A+B), their difference, (A-B), their product, AB, and their ratio, A/B. Which of these four arithmetic operations could be physically meaningful?
(a) Only the sum. (b) Only the difference. (c) Only the product. (d) Only the ratio. (e) The ratio or the product.

1-2A. Which one of the following corresponds to the prefixes: milli-, micro-, mega-, IN THE ORDER LISTED?
(a) 10^3, 10^-6, 10^9 (b) 10^-3, 10^-6, 10^9 (c) 10^-3, 10^6, 10^-6 (d) 10^3, 10^-6, 10^6 (e) None of these.

1-3A. Which one answer properly uses the rules of significant figures for the following sum? 21.4 + 15 + 17.17 + 4.003.
(a) 57.573 (b) 57.57 (c) 57.6 (d) 58 (e) None of these is correct.

1-4A. What is the product 3.2 x 3.563 to the correct number of significant figures?
(a) 11 (b) 11.4 (c) 11.40 (d) 11.402 (e) 11.4016.

1-5A. The length of the first joint of your index figure is closest to:
(a) 2 mm (b) 2 cm (c) 2 m (d) 2 km (e) 0.2 m

1-6A. A sphere has a surface area of 100 m^2. A second sphere has a radius twice that of the first. What is the surface area of the second sphere? (Hint: you don’t need to find the radius of the first or second sphere).
(a) 50 m^2 (b) 200 m^2 (c) 157 m^2 (d) 400 m^2 (e) 800 m^2 (e) None of these is correct.

1-7A. Which of the following is closest to your age in seconds?
(a) 6 x 10^8 sec (b) 6 x 10^7 sec (c) 6 x 10^6 sec (d) 6 x 10^5 sec (e) None of these is correct.

1-8A. A speed of 60 miles/hour is equivalent to about what speed in ft/sec?
(a) 176 ft/sec (b) 88 ft/sec (c) 44 ft/sec (d) 880 ft/sec (e) 8.8 ft/sec

1-9A. For the triangle at the right, what is the length of the unknown side and the cos θ, in that order?
(a) \(3\sqrt{3}, \frac{1}{2}\) (b) \(3\sqrt{3}, 2\) (c) \(3\sqrt{3}, 1/2\) (d) \(3\sqrt{3}, 2\) (e) None of these is correct.

1-10A. For the triangle at the right, what are tan θ and cos φ, in that order?
(a) 4/5, 4/3 (b) 4/3, 4/5 (c) 3/4, 4/5 (d) 3/4, 5/4 (e) 4/3, 3/5

1-11A. A corner of a room is chosen as the origin of a rectangular coordinate system. If a fly is on an adjacent wall at coordinates (3 m, 4 m), how far is the fly from the corner at the origin?
(a) 5 m (b) 12 m (c) \(\sqrt{5}\) m (d) \(\sqrt{7}\) m (e) 25 m

1-12A. Two points in a rectangular coordinate system have coordinates (5, 3) and (-3,4) with units in meters. The distance between the two points is:
(a) \(\sqrt{5}\) m (b) \(\sqrt{6}\) m (c) 8 m (d) \(\sqrt{309}\) m (e) \(\sqrt{65}\) m

1-13A. A gallon of paint of volume 3.78 x 10^-3 m^3 covers 25.0 m^2 of a wall. What is the thickness of the paint coat?
(a) 94.5 m^3 (b) 94.5 m (c) 0.151 m (d) 0.000151 m (e) 0.00661 m

1-14A. Newton’s law of gravitation is written as \(F = G\frac{M_1 M_2}{r^2}\), where \(F\) is the force of gravity, \(M_1\) and \(M_2\) are masses and \(r\) is a length. If the units of force are \((kg\cdot m)/s^2\), what must be the units of \(G\) in kg, m, s units?
(a) Unitless (b) m/(kg\cdot s^2) (c) m^3/(kg\cdot s^2) (d) (m^2\cdot kg)/s^2 (e) None of these is correct.
1-1B. Acceleration has units of distance (x) divided by time squared (t^2). Speed (v) has units of distance divided by time.
Distance (x) has units of distance. Which one of the following relationships has the dimensions of acceleration?
(a) v/t^2  (b) v/x  (c) v^2t  (d) v^2/x  (e) v/x

1-2B. Which one of the following corresponds to the prefixes: kilo-, centi-, micro-, IN THE ORDER LISTED?
(a) 10^3, 10^-2, 10^-6  (b) 10^-3, 10^2, 10^6  (c) 10^-3, 10^2, 10^-6  (d) 10^3, 10^-2, 10^-6  (e) None of these.

1-3B. Which one answer properly uses the rules of significant figures for this sum? 21.4276 + 15.3 + 17.17 + 4.003.
(a) 57.9006  (b) 57.901  (c) 57.90  (d) 57.9  (e) 58

1-4B. What is the ratio (5.351)/(0.0300) to the correct number of significant figures?
(a) 180  (b) 178  (c) 178.3  (d) 178.36  (e) 178.367.

1-5B. The height of the Biomedical-Physical Sciences building is closest to:
(a) 0.2 m  (b) 2 m  (c) 2 cm  (d) 2 km  (e) 20 m

1-6B. A sphere has a volume of 100 m^3. A second sphere has a radius twice that of the first. What is the volume of the second sphere? (Hint: you don’t need to find the radius of the first or second sphere).
(a) 200 m^3  (b) 800 m^3  (c) 12.5 m^3  (d) 400 m^3  (d) 1600 m^3  (e) None of these is correct.

1-7B. Which of the following is closest to a year in seconds?
(a) 3 x 10^6 sec  (b) 3 x 10^7 sec  (c) 3 x 10^8 sec  (d) 3 x 10^9 sec  (e) 3 x 10^5 sec

1-8B. A speed of 60 km/hour is equivalent to about what speed in m/sec?
(a) 68 m/sec  (b) 34 m/sec  (c) 17 m/sec  (d) 216 m/sec  (e) 8.5 m/sec

1-9B. For the triangle at the right, what is the length of the unknown side and the cos φ, in that order?
(a) 27, 3\sqrt{3}/2  (b) 3\sqrt{3}, 3\sqrt{3}/2  (c) 27, 2\sqrt{3}  (d) 3\sqrt{5}, 2\sqrt{3}  (e) None of these is correct.

1-10B. Given the triangle at the right, what are tan φ and sin θ, in that order?
(a) 3/4, 3/5  (b) 4/3, 4/5  (c) 3/4, 4/5  (d) 3/4, 5/4  (e) 4/3, 3/5.

1-11B. A corner of a room is chosen as the origin of a rectangular coordinate system. If a fly is on an adjacent wall at coordinates (8 m, 6 m), how far is the fly from the corner at the origin?
(a) 14 m  (b) 196 m  (c) 2 m  (d) \sqrt{14} m  (e) 10 m

1-12B. Two points in a rectangular coordinate system have coordinates (5, -3) and (3, -4) with units in meters. The distance between the two points is:
(a) \sqrt{6} m  (b) \sqrt{5} m  (c) 15 m  (d) \sqrt{53} m  (e) \sqrt{65} m

1-13B. A droplet of oil on water will spread out until it is only about molecule of oil thick. If an oil droplet of volume 1 x 10^9 m^3 spreads out to cover an area 5000 cm^2, about what is the diameter of an oil molecule?
(a) 5 x 10^{13} m  (b) 2 x 10^{13} m  (c) 5 x 10^{-6} m  (d) 2 x 10^{-9} m  (e) None of these is correct.

1-14B. Energy has units of (kg•m^2)/s^2. Which one of the following relations involving acceleration, a, velocity, v, mass, M, and time, t has the units of energy?
(a) Mv^2  (b) Mav  (c) Ma/vt  (d) (vt^2)/M  (e) None of these has units of energy.
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