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.

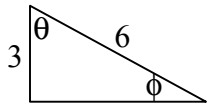
1-5A. The length of the first joint of your index figure is closest to:
(a) 2 mm (b) 2 cm (c) 2 m (d) 2 km (e) 0.2 m

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 (d) 800 m^2 (e) None of these is correct.

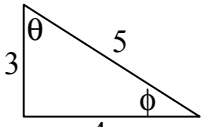
1-7A. Which of the following is closest to your age in seconds?
(a) 6 x 10^8 sec (b) 6 x 10^7 sec (c) 6 x 10^6 sec (d) 6 x 10^9 sec (e) 6 x 10^5 sec

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) $\sqrt{3}$, 1/2 (b) $\sqrt{3}$, 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^{-1} (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 $F = G(Mm/r^2)$, where F is the force of gravity, M and m are masses and r is a length. If the units of force are $(kg\text{-}m)/s^2$, what must be the units of G in kg,m,s units?
(a) Unitless (b) $m/(kg\text{-}s^2)$ (c) $m^3/(kg\text{-}s^2)$ (d) $(m^3\text{-}kg)/s^2$ (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^2 (c) v^2/t (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.

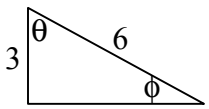
1-5B. The height of the Physics-Astronomy building is closest to:
(a) 0.1 m (b) 1 m (c) 1 cm (d) 1 km (e) 10 m

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.

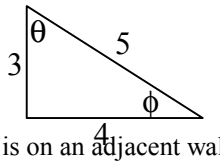
1-7B. Which of the following is closest to a year in seconds?
(a) 3 x 10^6 sec (b) 3 x 10^7 sec (c) 3 x 10^8sec (d) 3 x 10^9 sec (e) 3 x 10^5 sec

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, $\sqrt{3}$ /2 (b) 3 $\sqrt{3}$, $\sqrt{3}$ /2 (c) 27, 2 $\sqrt{3}$ (d) 3 $\sqrt{3}$, 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 $(kg\text{-}m^2)/s^2$. 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.

1-1A) e 2A) e 3A) d 4A) a 5A) b 6A) d 7A) a 8A) b 9A) c 10A) b 11A) a 12A) e 13A) d 14A) c

1-1B) d 2B) a 3B) d 4B) b 5B) e 6B) b 7B) b 8B) c 9B) b 10B) c 11B) e 12B) b 13B) d 14B) a