

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 3.2×3.563 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?

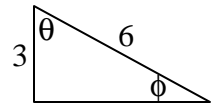
(a) $6 \times 10^8 \text{ sec}$ (b) $6 \times 10^7 \text{ sec}$ (c) $6 \times 10^6 \text{ sec}$ (d) $6 \times 10^9 \text{ sec}$ (e) $6 \times 10^5 \text{ sec}$

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

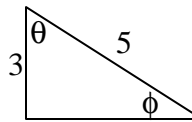
1-9A. For the triangle at the right, what is the length of the unknown side and the $\cos \theta$, in that order?

(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 $\tan \theta$ and $\cos \phi$, 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 $3.78 \times 10^{-3} \text{ m}^3$ 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 $F = G(M_1 M_2 / r^2)$, 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 $(\text{kg} \cdot \text{m})/\text{s}^2$, what must be the units of G in kg,m,s units?

(a) Unitless (b) $\text{m}/(\text{kg} \cdot \text{s}^2)$ (c) $\text{m}^3/(\text{kg} \cdot \text{s}^2)$ (d) $(\text{m}^3 \cdot \text{kg})/\text{s}^2$ (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 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 (e) 1600 m^3 (e) None of these is correct.

1-7B. Which of the following is closest to a year in seconds?

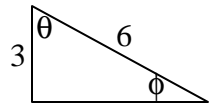
- (a) $3 \times 10^6 \text{ sec}$ (b) $3 \times 10^7 \text{ sec}$ (c) $3 \times 10^8 \text{ sec}$ (d) $3 \times 10^9 \text{ sec}$ (e) $3 \times 10^5 \text{ sec}$

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

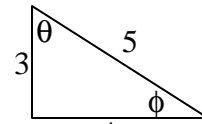
1-9B. For the triangle at the right, what is the length of the unknown side and the $\cos \phi$, in that order?

- (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 $\tan \phi$ and $\sin \theta$, 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

$1 \times 10^{-9} \text{ m}^3$ spreads out to cover an area 5000 cm^2 , about what is the diameter of an oil molecule?

- (a) $5 \times 10^{13} \text{ m}$ (b) $2 \times 10^{13} \text{ m}$ (c) $5 \times 10^{-6} \text{ m}$ (d) $2 \times 10^{-9} \text{ m}$ (e) None of these is correct.

1-14B. Energy has units of $(\text{kg} \cdot \text{m}^2)/\text{s}^2$. 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