

PHYSICS 101 HOME WORK PROBLEMS

problems Chapter 1

Chapter 2 Problems

1. (I) What, approximately, is the percent uncertainty for the measurement 8.7 m?
5. (I) Express the following using the prefixes of Table 1-4: (a) 10^6 volts, (b) 10^{-6} meters, (c) 4×10^7 days, (d) 2×10^3 bucks, and (e) 2×10^{-9} pieces.
9. (I) A typical atom has a diameter of about 1.0×10^{-10} m. What is this in inches?
10. (I) (a) How many seconds are there in 1 year? (b) How many nanoseconds are there in 1 year? (c) How many years in 1 second?
14. (I) The speed, v , of a body is given by the equation $v = At^3 - Bt$, where t refers to time. What are the dimensions of A and B ?
21. (II) Estimate the number of times a human heart beats in a lifetime.
26. (II) Estimate the number of marbles in the jar shown in Fig. 1-1.

1. (I) If you are driving 100 km/h and look to the side for 2.0 s, how far do you travel during this inattentive period?
2. (I) 55 mph is how many (a) km/h, (b) m/s, and (c) ft/s?
5. (I) The position of a rabbit along a straight tunnel as a function of time is plotted in Fig. 2-21. What is its instantaneous velocity (a) at $t = 10.0$ s and (b) at $t = 30.0$ s? What is its average velocity (c) between $t = 0$ and $t = 5.0$ s, (d) between $t = 25.0$ s and $t = 30.0$ s, and (e) between $t = 40.0$ s and $t = 50.0$ s?
10. (II) An airplane travels 2200 km at a speed of 1000 km/h. It then encounters a headwind that slows it to 850 km/h for the next 1250 km. What is the average speed of the plane for this trip?
11. (II) A race car driver must average 200 km/h for six laps to qualify for a race. Because of engine trouble, the car averages only 170 km/h over the first two laps. What average speed must be maintained for the last four laps?
12. (II) Calculate the carrying capacity (number of cars passing a given point per hour) on a freeway with three lanes (in one direction) using the following assumptions: the average speed is 100 km/h, the average length of a car is 6.0 m, and the average distance between cars should be 80 m.
17. (II) An automobile traveling 90 km/h overtakes a 1.10-km-long train traveling in the same direction on a track parallel to the road. If the train's speed is 80 km/h, how long does it take the car to pass it, and how far will the car have traveled in this time? What are the results if the car and train are traveling in opposite directions?
18. (II) A ball traveling with constant speed hits the pins placed at the end of a bowling lane 16.5 m long. The bowler heard the sound of the ball hitting the pins 2.5 s after the ball was released from his hands. What was the speed of the ball? The speed of sound is 330 m/s.
19. (I) Figure 2-22 shows the velocity of a train as a function of time. (a) At what time was its velocity greatest? (b) During what periods, if any, was the velocity constant? (c) During what periods, if any, was the acceleration constant? (d) When was the magnitude of the acceleration greatest?
21. (I) At highway speeds, a parucular automobile is capable of an acceleration of about 1.7 m/s^2 . At this rate, how long does it take to accelerate from 85 km/h to 100 km/h?
24. (II) The position of a body is given by x (meters) = $At + 5Bt^3$, where t is in seconds. (a) What are the dimensions of A and B ? (b) What is the acceleration as a function of time? (c) What is the velocity and acceleration at $t = 5.0$ s? (d) What is the velocity as a function of time if $x = At + Bt^{-3}$?

TABLE 1-4
Metric (SI) Prefixes[†]

Prefix	Abbreviation	Value
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
hecto	h	10^2
deka	da	10^1
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro [‡]	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}

[†] See also inside the front cover.

[‡] μ is the Greek letter "mu."

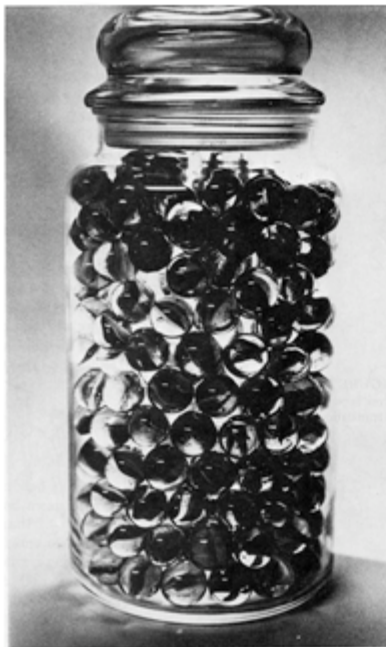


FIGURE 1-1 Problem 26.