1. Earth is approximately a sphere of radius 6.37\*10^6 m. What are
2. its circumference in kilometers
3. its surface area in sq
4. we have to find volume of earth in cubic kilometers.
5. A gry is an old English measure for length, defined as 1/10 of a line, where line is another old English measure for length, defined as 1/12 inch. A common measure for length in the publishing business is a point, defined as ½ inch. What is an area of 0.50 gry2 in points squared (points2)?
6. The micrometer is often called the micron.
7. How many microns make up 1.0 km?
8. What fraction of a centimeter equals 1.0 micrometer?
9. How many microns are in 1.0 yard?
10. Spacing in this book was generally done in units of points and picas: 12 points = 1 pica and 6 picas = 1 inch. If a figure was misplaced in the page proofs by 0.8 cm, what was the misplacement in:
11. picas? and
12. points?
13. Horses are to race over a certain English meadow for a distance of 4 furlongs. What is the race distance in:
14. rods and
15. chains?
16. There used to be a system of volume measures once common in Spain; a volume of 1 fanega is equivalent to 55.501 dm3 (cubic decimeters). What numbers should be entered in:
17. the cahiz column?
18. the fanega column?
19. The cuartilla column?
20. The almude column?

Express 7 almudes in:

1. Medios?
2. Cahizes?
3. Cubic centimeters (cm3)
4. Hydraulic engineers in the United States often use, as a unit of volume of water, the acre-foot, defined as the volume of water that will over 1 acte of land to a depth of 1 ft. A severe thunderstorm dumped 2.0 inches of rain I 30 minutes on a town of area 26 km2. What volume of rain, in acre-feet, fell on the town?
5. Harvard Bridge, which connects MIT with its fraternities across the Charles River, has a length of 364.4 Smoots plus one ear. The unit of one Smoot is based on the length of Oliver Reed Smoot, Jr., class of 1962, who was carried or dragged length by length across the bridge so that other pledge members of the Lambda Chi Alpha fraternity pledges since the initial measurement, usually during times of traffic congestion so that the police cannot interfere. (Presumably, the police were originally upset because the Smoot is not an SI base unit, but these days they seem to have accepted the unit.) What is the length of 50 Smoots in:
6. Willies and
7. Zeldas?
8. Antarctica is roughly semicircular, with a radius of 2000 km. The average thickness of its ice cover is 300 m. How many cubic centimeters of ice does Antarctica contain?
9. Until 1883, every city and town in the United States kept its own local time. Today, travelers reset their watches only when the time change equals 1 hour. How far, on the average, must you travel in degrees of longitude between the time-zone boundaries at which your watch must be reset by 1 hour?
10. For about 10 years after the French Revolution, the French government attempted to base measures of time on multiples of ten: One week consisted of 10 days, one day consisted of 10 hours, one hour consisted of 100 minutes, and one minute consisted of 100 seconds. What are the ratios of:
11. The French decimal week to the standard week and
12. The French decimal second to the standard second?
13. The fastest growing plant on record is a Hesperoyucca whipplei that grew 3.7 meters in 14 days. What was its growth rate in micrometers per second?
14. Three digital clocks A, B, and C run at different rates and do not have simultaneous readings of zero. Figure 1-6 shows simultaneious readings on pairs of the clocks for four occasions. (At the earliest occasion, for example, B reads 25.0 and C reads 92.0s.) If two events are 600 s apart on clock A, how far apart are they on (a) clock B and (b)clock C? (c) When clock A reads 400 s, what does clock B read? (d) When clock C reads 15.0 s, what does clock B read? (Assume negative readings for prezero times.)
15. A lecture period (50 min) is close to 1 microcentury. (a) How long is a microcentury in minutes? (b) Using

Percentage difference = ((actual-approximation)/actual)\*100, find the percentage difference from the approximation.

1. A fortnight is a charming English measure of time equal to 2.0 weeks (the word is a contraction of “fourteen nights”). That is a nice amount of time in pleasant company but perhaps a painful string of microseconds in unpleasant company. How many microseconds are in a fortnight?

1. Time standards are now based on atomic clocks. A promising second standard is based on pulsars, which are rotating neutron stars(highly compact stars consisting only of neutrons). Some rotate at a rate that is highly stable, sending out a radio beacon that sweeps briefly across Earth once with each rotation, like a light house beacon. Pulsar PSR 1937+21 is an example; it rotates once every 1.557 806 448 872 75 ± 3 ms, where trailing ± 3 indicates the uncertaintly in the last decimal place (it does not mean ± 3 ms).
2. How many rotations does PSR 1937+21 make in 7.00 days?
3. How much time does the pulsar take to rotate exactly one million times and
4. What is the associated uncertainty?
5. Five clocks are being tested in a laboratory. Exactly at noon, as determined by the WWV time signal, on successive days of a week the clocks read as in the following table. Rank the five clocks according to their relative value as good time keepers, best to worst. Justify your choice

Text, letter

Description automatically generated

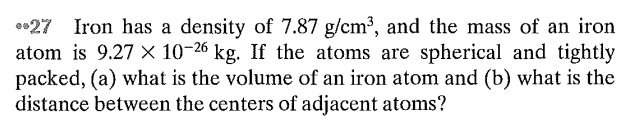
1. Because Earth’s rotation is gradually slowing, the length of each day increases: The day at the end of 1.0 century is 1.0 ms longer than the day at the start of the century. In 20 centuries, what is the total of the daily increases in time?
2. Suppose that, while lying on a beach near the equator watching the sun set over a calm ocean, you start a stopwatch just as the top of the sun disappears. You then stand, elevating your eyes by a height H = 1.70m, and stop the watch when the top of the Sun again disappears. If the elapsed time is t = 11.1 s, what is the radius r of Earth?
3. The record for the largest glass bottle was set in 1992 by a team in Millville, New Jersey—they blew a bottle with a volume of 193 U.S. fluid gallons. (a) How much short of 1.0 million cubic centimeters is that? (b) If the bottle were filled with water at the leisurely rate of 1.8g/min, how long would the filling take? Water has a density of 1000 kg/m3.
4. Earth has a mass of 5.98 x 1024 kg. The average mass of the atoms that make up Earth is 40 atomic units. How many atoms are there in Earth?
5. Gold, which has a density of 19.32 g/cm3, is the most ductile metal and can be pressed into a thin leaf or drawn out into a long fiber. (a) If a sample of gold, with a mass of 27.63 g, is pressed into a leaf of 1.000 micrometers thickness, what is the area of the leaf? (b) If, instead, the gold is drawn out into a cylindrical fiber of radius 2.5 micrometers, what is the length of the fiber.
6. (a) Assuming that water has a density of exactly 1 g/cm3, find the mass of one cubic meter of water in kilograms. (b) Suppose that it takes 10 hours to drain a container of 5700 m3 of water. What is the “mass flow rate,” in kilograms per second, of water from the container?

24. Grains of fine California beach sand are approximately spheres with an average radius of 50 micrometers and are made of silicon dioxide, which has a density of 2600 kg/m3. What mass of sand grains would have a total surface area (the total area of all the individual spheres) equal to the surface area of a cube 1.00 m on an edge?

25. During heavy rain, a section of a mountainside measuring 2.5 km horizontally, 0.8 km up along the slope, and 2 m deep slips into a valley in a mud slide. Assume that the mud ends up uniformly distributed over a surface area of the valley measuring 0.4 km x 0.4 km and that mud has a density of 1900 kg/m3. What is the mass of the mud sitting above a 4.0 m2 of area of the valley floor?

26. One cubic centimeter of a typical cumulus cloud contains 50 to 500 water drops, which have a typical radius of 10 micrometers. For that range, give the lower value and the higher value, respectively, for the following: (a) How many cubic meters of water are in a cylindrical cumulus cloud of height 3 km and radius 1 km? (b) How many 1-liter pop bottles would that water fill? (c) Water has a density of 1000 kg/m3. How much mass does the water in the cloud have?

27. Iron has a density of 7.87 g/cm3, and the mass of an iron atom is 9.27 x 10-26 kg. If the atoms are spherical and tightly packed, (a) what is the volume of an iron atom and (b) what is the distance between the centers of adjacent atoms?



Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Diagram

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

A picture containing table

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

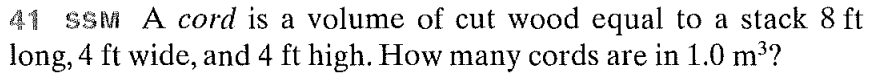
Text

Description automatically generatedText, letter

Description automatically generated

Text

Description automatically generated

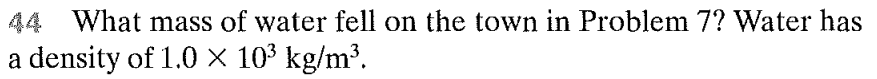


Text

Description automatically generated

Text

Description automatically generated



Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

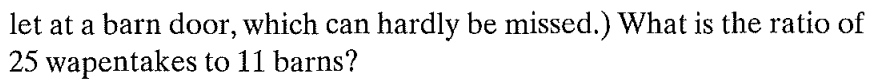
Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated