

1201 Math Problem Set

Show all your work. State all your assumptions. Box all your answers.

1. Convert 7 cc (cubic centimeter) to cubic inches.
2. A flat disk has a diameter of 4 meters. What is the disk's area in square feet?
3. A world-class mile runner can run 1 mi in a time of 4 min. What is the runner's average speed in units of miles per hour and meters per second?
4. Calculate the temperature at which the Celsius (oC) and Fahrenheit (oF) are the same.
5. An underground pipe carries drinking water into a home at a volume flow rate of 5 gal/min. Determine the flow rate in units of m³/s and ft³/hr.
6. The standard acceleration due to gravity at the earth's surface is $g = 9.81 \text{ m/s}^2$. Convert this acceleration to units of ft/hr² and mi/s².
7. A 90 kg astronaut biologist searches for microbial life on Mars where the gravitational acceleration is $g = 3.71 \text{ m/s}^2$. What is the weight of the astronaut in N and lbf?
8. A spherical tank with a radius of 0.25 m is filled with water ($\rho = 1000 \text{ kg/m}^3$). Calculate the mass and the weight of the water in SI units.
9. A large indoor arena is cylindrical in shape. The height and diameter of the cylinder are 120 m and 180 m, respectively. Calculate the mass and weight of air contained in the sports arena in SI units if the density of the air is $\rho = 1.20 \text{ kg/m}^3$.
10. The length of a new bridge in England is 2.63 km from abutment to abutment. As the lighting engineer, you know that a light pole must be installed every 250 feet. Finished light poles have an installed price of \$450. What will be the cost for light poles?

11. The water speed record has been held by Australian Ken Warby since November 1977 at 464.5 km/h. What is the speed in mph? What is the speed in feet per second?

12. Your little sister convinces you to take her to the county fair. At the ball toss game she spots a large stuffed bear she just has to have. The game costs \$1 for three balls. You have to knock over four jars with the three balls to earn a small kupie doll. Three kupie dolls equal one panda bear. Two panda bears equal one large boa. Four large boas equal one unicorn. Five unicorns equal two large kupie dolls. Two large kupie dolls equal one large stuffed bear. What is the minimum cost to you for the large stuffed bear by playing the ball toss game?

13. In simple terms it costs you \$12,000 per year to attend UNC Charlotte. Upon graduation with a 3.0 or better GPA you will have a job with a starting salary of \$48,000. Assuming your living expenses are twice what they are now and your only other expense is to pay off college loans, how many months will it take for you to be debt free?

14. A person who is 6 feet and 1 inch tall and weighs 185 lbs is driving a car at a speed of 65 mph over a distance of 25 miles. The outside air temperature is 80°F and has a density of 0.0735 lb/ft³. Convert all of the values given in this example from US Customary Units to SI units.

15. Eurostar's nose is computer-optimized for running in the Channel Tunnel where pressure waves can affect passenger comfort. The train travels through the tunnel at a reduced speed of 1.6×10^2 km/hr. Determine the length of time it takes to complete the 23-mile underwater portion of the trip from London to Paris. Neglect the length of the train.