

Mastering Physics Prerequisites

Unit Conversion

Problems 11-15

11. A cylindrical pipeline is 450 meters long with an internal diameter of 300 mm. What is its volume in units of

- a) cubic meters
- b) cubic feet
- c) gallons
- d) barrels

12. A building in Cleveland must maintain an indoor temperature between 72°F and 78°F per ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standards. Convert this range temperature to Celsius for an international consultant's report.

13. An excavator digs a trench 220 feet long, 3 feet wide, and 5 feet deep. The soil that is removed is called the "spoil."

- a) Express the volume of the spoil in units of cubic yards.
- b) Express the volume of the spoil in units of cubic meters.
- c) Express the volume of the spoil in units of register tons.
- d) When trenches or holes are dug, the volume of the removed material increases because it is no longer compressed. This expansion must be accounted for when hauling away loose material. If the soil in this application has a swell factor of 25%, what is its loose volume in units of cubic yards?

14. Copper has a density of 8.96 g/cm³. Express the density of copper in units of

- a) kg/m³
- b) pounds/ft³

15. The ideal gas law is $PV = nRT$, where P is the pressure, V is the volume, n is the number of moles, R is the gas constant and T is the absolute temperature. The gas constant, R , is usually expressed in *SI* (Système International) units, which is $R = 8.314 \text{ J}/(\text{mol}\cdot\text{K})$. How many moles of gas will occupy 2.5 L at 25°C and 1.0 atm?