

► **TASK** Identify standard and metric designation.

**MAST**  
OB2

**CDX Tasksheet Number: C467**

Time off \_\_\_\_\_

Time on \_\_\_\_\_

Total time \_\_\_\_\_

1. Complete the following conversions from metric to standard and vice versa using the conversion charts below.

### Volume

Volume is the amount of space occupied by a three-dimensional object. The metric system uses liters (l) or cubic centimeters (cc or cm<sup>3</sup>). The Imperial system uses gallons (gal) and quarts (qt) for “wet” volume and cubic feet (ft<sup>3</sup>) for “dry” volume. You’ll need to determine volume any time you fill a vehicle’s reservoir with liquid. This includes petrol/gasoline, coolant, oil, transmission fluid, or lubricant.

Volume Conversions	
Imperial-Imperial	4 US qt = 1 US gal 1 ft <sup>3</sup> = 7.48 US gal 1 ft <sup>3</sup> = 6.22 UK gal
Metric-Metric	1 L = 1000 cc 1 cc = 0.001 L
Imperial-Metric	1 in. <sup>3</sup> = 16.387 cc 1 US gal = 3.78 L 1 UK gal = 4.54 L 1 US qt = 0.95 L
Metric-Imperial	1 L = 61.0237 in. <sup>3</sup> 1 L = 0.035 ft <sup>3</sup> 1 L = 0.26 US gal 1 L = 0.21 UK gal 1 L = 1.05 qt

**2. Knowledge Check: Convert the following:**

- a. 3.0 L = \_\_\_\_\_ in.<sup>3</sup>
- b. 350 in.<sup>3</sup> = \_\_\_\_\_ L
- c. 3.0 gal = \_\_\_\_\_ L
- d. 9 L = \_\_\_\_\_ gal

### Mass

Mass is a unit or system of units by which a degree of heaviness is measured. The metric system uses grams (g), kilograms (kg), and tonnes (t). The Imperial system uses ounces (oz), pounds (lb), and tons (T). In the workshop, you will use these measurements to determine the lifting capacity of equipment like hydraulic and engine hoists and floor jacks.

Mass Conversions	
Imperial-Imperial	16 oz = 1 lb 2000 lb = 1 T
Metric-Metric	1000 g = 1 kg 1000 kg = 1 t
Imperial-Metric	1 oz = 28.3 g 1 lb = 453 g 2.2 lb = 1 kg 1 T = 0.907 t
Metric-Imperial	1 t = 1.10 T

### 3. Knowledge Check: Convert the following:

- a. 8 oz = \_\_\_\_\_ g
- b. 475 g = \_\_\_\_\_ oz
- c. 6.6 lb = \_\_\_\_\_ kg
- d. 4500 kg = \_\_\_\_\_ lb

## Torque

Torque is the twisting force applied to a shaft. The metric system uses the Newton meter (Nm). The Imperial system uses the inch-pound (in-lb) and the foot-pound (ft-lb). Vehicle manufacturers specify torque settings for key fasteners on the engine and wheels. You will need to follow the specifications or you could strip threads or break bolts. Torque is also an important concept when discussing engine performance. A foot-pound (ft-lb) is the twisting force applied to a shaft by a lever 1 foot long with a 1-pound mass on the end. A Newton meter (Nm) is the twisting force applied to a shaft by a level 1 meter long with a force of 1 Newton applied to the end of the lever. (1N is equivalent to the force applied by a mass of 100.)

Torque Conversions	
Imperial-Imperial	12 in-lb = 1 ft-lb 1 in-lb = 0.08 ft-lb
Imperial-Metric	1 ft-lb = 1.34 N·m
Metric-Imperial	1 N·m = 0.74 ft-lb 1 N·m = 8.8 in-lb

### 4. Knowledge Check: Convert the following:

- a. 48 in-lb = \_\_\_\_\_ ft-lb
- b. 15 ft-lb = \_\_\_\_\_ in-lb
- c. 65 ft-lb = \_\_\_\_\_ N·m
- d. 142 N·m = \_\_\_\_\_ ft-lb

## Pressure

Pressure is a measurement of force per unit area. The metric system uses kilopascals (kPa) and bar. The Imperial system uses pounds per square inch (psi) and atmospheres. *Vacuum* is a term given to a pressure that is less than atmospheric pressure. The Imperial system measures vacuum in inches of mercury (" Hg) or inches of water. The metric system measures vacuum in millimeters of mercury (mm Hg). You'll need to understand pressure conversions when filling tires and replacing air conditioning refrigerants or using a vacuum gauge.

Pressure Conversions	
Imperial-Imperial	14.7 psi = 1 atmosphere 1" Hg = 14" H <sub>2</sub> O 0" Hg = 1 atmosphere
Metric-Metric	100 kPa = 1 bar
Imperial-Metric	1 psi = 6.89 kPa 1 atmosphere = 101.3 kPa 1" Hg = 25.4 mm Hg 1 atmosphere = 1.013 bar

### 5. Knowledge Check: Convert the following:

- a. 14.7 psi = \_\_\_\_\_ kPa
- b. 650 kPa = \_\_\_\_\_ psi
- c. 22 psi = \_\_\_\_\_ bar
- d. 5.5 bar = \_\_\_\_\_ psi

6. Have your supervisor/instructor verify satisfactory completion of this procedure, any observations found, and any necessary action(s) recommended.

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**Performance Rating**

**CDX Tasksheet Number: C467**

**0**

**1**

**2**

**3**

**4**

Supervisor/instructor signature \_\_\_\_\_ Date \_\_\_\_\_