

HW#1 Background Review for Internal Combustion Engines

This homework is to assess your basic capabilities and knowledge. Some of the questions have an acceptable range of answers (eg. Height of a typical Malaysian male [m]: Answer may be anywhere from 1.4 to 1.8). If you give a number that is CLEARLY out of the reasonable range (eg. Height of 1.4E-3m) or wrong units (eg. 1400mm) you will lose points.

Note: Give answers in the requested units in [square] brackets.

Also please BOX your answers. This makes it easier to grade.

1) How many spark plugs are there in most container lorries (ie. the big diesel trucks that haul the large cargo containers from port to factory) engines?

2) What is the maximum reasonable acceleration rate for a race car while speeding up? [m/s²]

3) What is the volume occupied by 12 gm of dry air at standard ambient conditions (1 atm pressure, 25°C)? [liters]

4) How many Oxygen **atoms** are in 1mm³ of air at the above (question 3) conditions?

5) How much fuel does a Proton Saga 1.3l Manual Transmission typically use? [km/l]

6) A 1.6L 4 cylinder automotive engine has a compression ratio of 10. The air fuel mixture fills one cylinder with 90 kPa at 330K at BDC. If the engine misfires (ie. the mixture does not ignite) what is the pressure, temperature, and volume at TDC? [bar, °C, cc]