

FORMULA SHEET FOR MECHANICAL TECHNOLOGY (AUTOMOTIVE)

$$\text{Force} = m \times a \quad \text{where } m = \text{mass}$$

$$a = \text{acceleration}$$

$$\text{Work} = \text{force} \times \text{distance} (F \times d)$$

$$\text{Power} = \frac{\text{force} \times \text{distance}}{\text{time}}$$

$$\text{Torque} = \text{force} \times \text{radius}$$

$$\text{Indicated power} = P \times L \times A \times N \times n$$

where $P = \text{mean effective pressure}$
 $L = \text{length of stroke}$
 $A = \text{area of piston crown}$
 $N = \text{number of power strokes per second}$
 $n = \text{number of cylinders}$

$$\text{Brake power} = 2 \pi N \times T$$

where $N = \text{revolutions per second}$
 $T = \text{torque}$

$$\text{Brake power (Prony brake)} = F \times 2 \times R \times N$$

where $F = \text{force}$
 $R = \text{length of brake arm}$
 $N = \text{revolutions per second}$

$$\text{Mechanical efficiency} = \frac{\text{brake power}}{\text{indicated power}} \times 100$$

$$\text{Compression ratio} = \frac{\text{swept volume} + \text{clearance volume}}{\text{clearance volume}}$$

$$\text{where swept volume} = \frac{\pi \times D^2}{4} \times L$$

where $L = \text{length of stroke}$
 $D = \text{diameter of bore}$

$$\text{Clearance volume} = \frac{\pi \times D^2}{4} \times l$$

where $D = \text{diameter of bore}$
 $l = \text{clearance}$

$$\text{Gear ratio} = \frac{\text{product of the number of teeth of the driven gears}}{\text{product of the number of teeth of the driver gears}}$$