

Mathematics for Automotive Engineering

$$\text{Cylinder volume} = (\pi/4) \times \text{bore}^2 \times \text{stroke}$$

$$\text{Displacement} = (\pi/4) \times \text{bore}^2 \times \text{stroke} \times \text{number of cylinders}$$

$$\text{Displacement of overbore} = (\pi/4) \times (\text{bore} + \text{overbore})^2 \times \text{stroke} \times \text{number of cylinders}$$

$$\text{Stroke} = \text{displacement} / (\pi/4 \times \text{bore}^2 \times \text{number of cylinders})$$

$$\text{Compression ratio} = (\text{cylinder} + \text{chamber volume}) / \text{chamber volume}$$

$$\text{Piston speed in inches per minute} = 2 \text{ stroke in inches} \times \text{rpm}$$

$$\text{Horsepower} = (\text{rpm} \times \text{torque}) / 5252$$

$$\text{Bhp loss} = (\text{elevation in feet} / 1000) \times 0.03 \times (\text{bhp at sea level})$$

$$\text{Horsepower} = (\text{mean effective pressure} \times \text{displacement} \times \text{rpm}) / 792,000$$

$$\text{Torque} = (\text{mean effective pressure} \times \text{displacement}) / 150.8$$

$$\text{Theoretical cubic feet per minute} = (\text{rpm} \times \text{displacement}) / 3456$$

$$\text{Racing carb cfm} = 1.1 \times (\text{rpm} \times \text{displacement}) / 3456$$

$$\text{Center of gravity behind front wheels} = (\text{rear wheel weight} / \text{overall weight}) \times \text{wheelbase}$$

$$\text{Drive wheel torque} = \text{flywheel torque} \times \text{first gear} \times \text{final drive} \times 0.85$$

$$\text{Wheel thrust} = \text{drive wheel torque} / \text{rolling radius}$$

$$g = \text{wheel thrust} / \text{weight}$$

$$\text{rpm after shift} = (\text{ratio shift into} / \text{ratio shift from}) \times \text{rpm before shift}$$

$$\text{mph} = (\text{rpm} \times \text{tire diameter}) / (\text{gear ratio} \times 336)$$

$$\text{tire diameter} = 2 \times (\text{section width} \times \text{aspect ratio}) / 2540 + \text{rim diameter}$$

Actual mph = (new tire diameter/old tire diameter) x indicated mph

Blood alcohol concentration = (ounces x %alcohol x 0.075)/weight —
(hours x 0.015)