WORKSHEET LESSON #4

Gravity:
Gravity's downhill pull affects a vehicle's ability to accelerate, decelerate and maintain speed on hills. The driver will need to take gravity's pull into account when making inputs using the accelerator and brake pedal. Downshifting can help to overcome the influence of gravity on extended downhill driving without overtaxing the brakes.

Inertia:
An object in motion will continue to move in the same direction at the same speed until acted upon by an outside force.

Momentum:
"Inertia in motion" – product of mass and velocity.

Kinetic Energy:
The amount of energy needed to propel a vehicle. $KE = \frac{1}{2} mv^2$. The exponential relationship of speed in the equation directly relates to the exponential increase of forces in a crash and total stopping distance [based on increased braking distance] as speed is increased.

Friction: A force between two surfaces that resists movement.

Traction: The friction between the tire and the road.

Total Stopping Distance:
Made up of three components:
- Perception Distance – The distance the car travels before you realize the need to brake.
- Reaction Distance – The distance the car travels before your foot engages the brake pedal.
- Breaking Distance – The distance it takes your particular car to stop once the brakes have been applied. Breaking distance increases exponentially with increased speed (as Kinetic Energy increases).

Crashworthiness:
How well a vehicle's design extends the time of impact by using crumple zones, etc.; spreads out the force of impact over a larger area by using air-bags, etc.; and keeps the occupant compartment intact.