Natural Laws and Car Control

5.1 Gravity and Energy of Motion

5.2 Friction and Traction

5.3 Stopping Distance

5.4 Controlling Force of Impact

Chapter 5

Gravity

- The force that pulls all things to earth
- You can feel the pull of gravity as you drive up and down hills
- Affects speed and braking distance.

Center of Gravity



- Point at which an object's weight is evenly distributed.
- Lower Center of Gravity makes a car perform better.

Kinetic Energy

- Energy of Motion
- The faster a car moves the more energy of motion is has.
- Weight affects the energy

Friction

- The force that keeps each tire from sliding on the road.
- Example - Rub hands together

TRACTION

- The friction created between the tire and the road.
- A tires gripping ability will increase as the amount of tread touching the road increases.

Tread

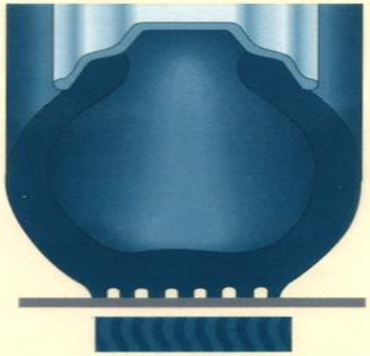
- The grooved surface of the tire that grips the road.
- Water flows through the grooves
- 1/16 inch tread
- Police used a penny to test tread depth

Inflation and Traction

- Check owner's manual for best pressure
- When pressure is right, you get your best control, better gas mileage, and tire wear.
- Under-inflation
- Over-inflation
- Split Traction

Proper Inflation for Better Grip on Road

Good handling. Good, long term wear is possible



Proper Inflation

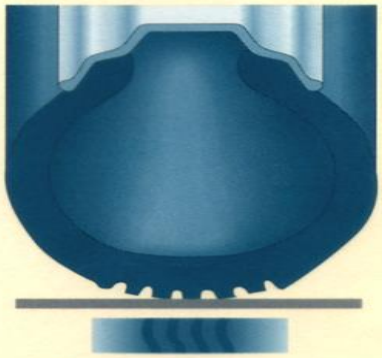
Full face of the tire tread is touching the road surface

Poor handling due to side wall flexing. Vehicle will sway. Poor tire wear. Tire will wear on edges and tire will run hot

Underinflation

Only the outer edges of the tread are touching the road surface

Poor handling and will take longer to stop due to decrease in traction. Poor tire wear. Tire will wear in the center of the tread



Overinflation

Only the center of the tread is touching the road surface

Reduced Traction

Two things to maintain ideal levels of traction

1. Vehicle must be in good condition
   - Tires, shock absorbers, steering system
2. Road must be smooth
   - Snow, Ice, Rain, Gravel

REDUCED TRACTION

Vehicle Control in Curves

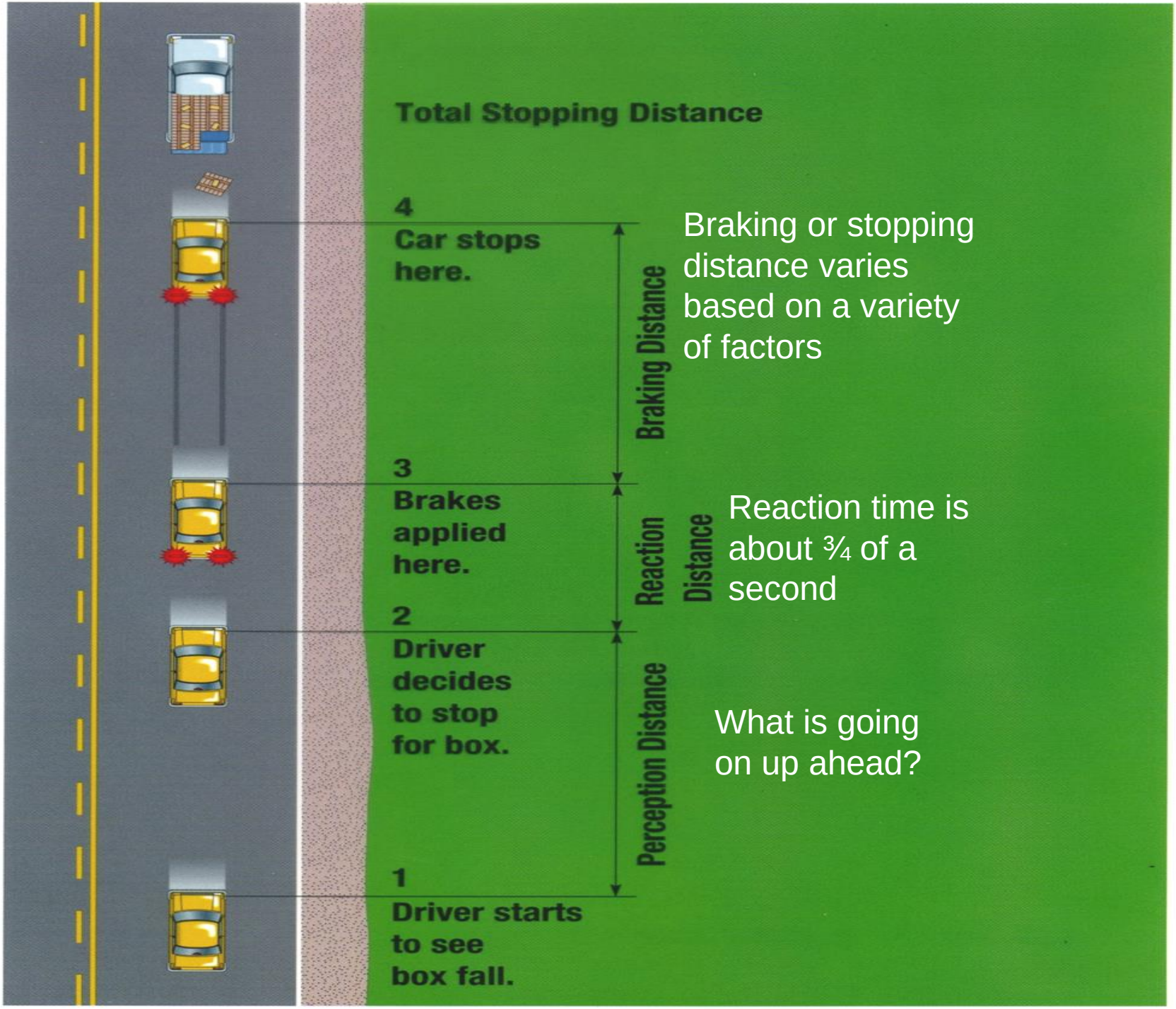
Affected by:

- Vehicle speed
- Sharpness of the curve
- Vehicle load
- Bank of the curve

Total Stopping Distance

Includes:

1. Perception Time and Distance
2. Reaction Time and Distance
3. Braking Distance
4. Entire Time you see you need to stop

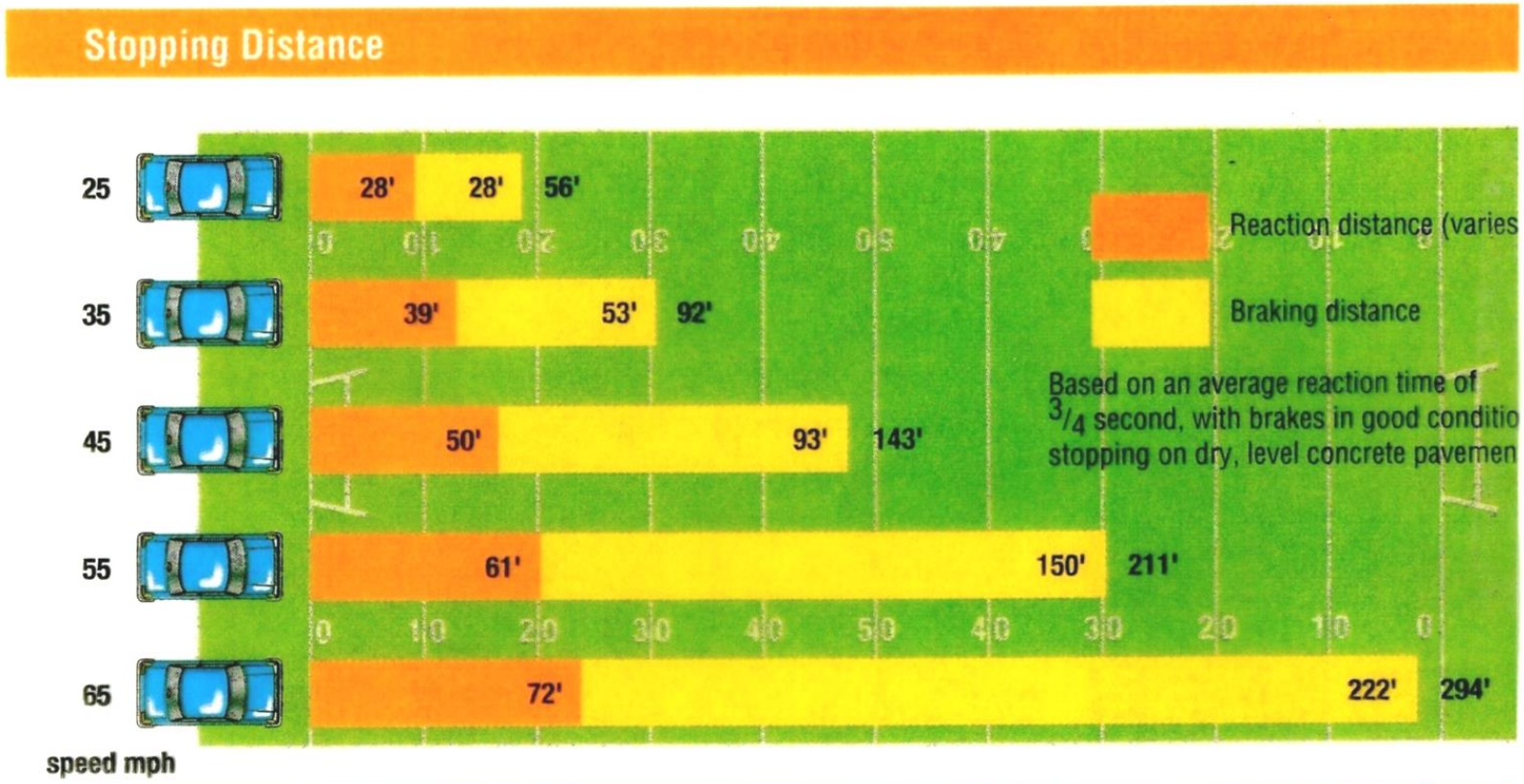


Braking or stopping distance varies based on a variety of factors

Reaction time is about ¾ of a second

What is going on up ahead?

Total Stopping Distance



Distances traveled at various speeds once driver perceives hazard and begins to stop

WHEN VEHICLE SPEED DOUBLES, STOPPING DISTANCE INCREASES ABOUT FOUR TIMES

STOPPING DISTANCE AT 25 MPH IS APPROXIMATELY 56 FEET

STOPPING DISTANCE AT 55 MPH IS APPROXIMATELY 211 FEET

NEWTON'S LAW OF MOTION STATES:

BODIES IN MOTION TEND TO STAY IN MOTION, BODIES AT REST TEND TO STAY AT REST.

Factors that affect braking distance

1. Speed
2. Vehicle Condition
3. Roadway Surface
4. Driving Ability
5. Anti-Lock Braking System (ABS)
6. Hills
7. Loads

The force with which a moving object hits another object.

Force of Impact

3 Factors –

1. Speed
2. Weight
3. Distance between impact and stopping

Restraint Devices

Three collisions occur when a vehicle hits a solid object

1. Vehicle hits object and stops
2. Occupants either hit the inside or their restraint devices
3. Occupants may suffer internal collisions as their organs impact inside their bodies

Active

Passive