Chapter 6
The Speed Factor:
Negotiating Curves and Braking

6-1 PHYSICAL LAWS AFFECTING DRIVING

A. Complete each of the following sentences by writing the correct word or phrase in the space provided.

1. _______ is measured in miles or kilometers per hour.
2. Gravity is an invisible _______ that massive objects like the Earth exert on other objects.
3. As you travel uphill, it takes more _______ from your engine to maintain speed.
4. Without _______ , your car’s wheels cannot “grip” the road.
5. Torque is the ability of a force to cause an object to _______ .
6. According to the law of inertia, an object in motion will continue in motion in a _______ until acted upon by a force.
7. If you apply the brakes forcefully, you will be “thrown _______ .”
8. For an object to move, it must acquire _______ energy.
9. Crashing into a row of bushes will result in _______ damage than hitting a concrete wall.
10. Car bumpers and bodies are designed with _______ to absorb as much of an impact as possible.

B. When driving, when is gravity most noticeable?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

C. What will happen if your tires lose traction while driving?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
D. Indicate the relative degree of traction for each of the following road surfaces by placing the number 1, 2, 3, etc. (1 meaning best traction) in the space provided.

____ Polished concrete
____ Gravel
____ Concrete
____ Sand
____ Blacktop
____ Hard dirt

E. What does it mean to “burn rubber”?


F. What are the two main ways you can get a vehicle to stop?


G. How does force of impact factor in the design of today’s roadways and vehicles?


H. CHECK IT OUT.

Go to a local tire store or use the Internet to research the various types of tread designs available on modern tires. In the space provided, describe each design and how it affects traction.
Contact your local highway department to find out what traffic safety engineers are doing to minimize damage and loss of life caused by collisions. In the space provided, write down what you discover.

Use the Internet to find out what automakers are doing to make cars safer in the event of a crash. In the space provided, write down what you discover.

6-2 NEGOTIATING CURVES

A. For each of the following sentences, circle T if it is true and F if it is false.

1. T F The faster you go around a curve, the stronger the centrifugal force you experience.
2. T F If your car’s inertia exceeds the traction force of your tires on a curve, your vehicle might come to a stop.
3. T F Vehicles with a low center of gravity are more likely to roll over on sharp turns.
4. T F Adding weight increases your car’s center of gravity, making it harder to stop or change direction.
5. T F Jeeps have a relatively high center of gravity.
6. T F A banked road that dips in the direction of a curve increases the risk of rollover.
7. T F Roads are crowned to promote water runoff after rains and to reduce the risk of hydroplaning.
8. T F Of all the factors that affect negotiating a curve, speed is the only one over which you have a large degree of control.
9. T F Understeering is turning too sharply into a curve.
10. T F If it is raining or snowing, you should gently accelerate into a curve.
B. What is the relationship between speed and centrifugal force?

C. In the space provided, identify each of the following types of roads.

D. In the space provided, describe how you would apply the SAFE method to negotiating a curve.

E. Select the word or phrase that best completes each of the following sentences and write the letter in the space provided.

1. Vehicles with a high center of gravity:
   a. are more fuel efficient.  
   b. are more likely to swing wide on a turn.  
   c. allow for greater visibility.  
   d. cause less damage to roadways.

2. Increasing loading on your vehicle will:
   a. increase acceleration.  
   b. decrease acceleration.  
   c. reduce force of impact.  
   d. increase center of gravity.

3. In most cases, roads are banked:
   a. in the direction of curves.  
   b. to promote water runoff.  
   c. to reduce hydroplaning.  
   d. to increase centrifugal force.

4. When negotiating a curve, you can control:
   a. the bank of the turn.  
   b. the vehicle’s center of gravity.  
   c. the vehicle’s speed.  
   d. Both b and c.

5. Oversteering can cause you to:
   a. skid.  
   b. drift into another lane.  
   c. lose centrifugal force.  
   d. drift into opposing traffic.
F. Why is it dangerous to drive next to tractor-trailer trucks on turns?

G. CHECK IT OUT.

While riding as a passenger, take a survey of road slopes in a nearby rural area. Travel on both highways and local roads. Which types of roads tend to be sloped? How are the roads sloped on curves? In the space provided, write down what you discover.

While riding as a passenger, take a survey of curves in a nearby rural area. Do all the curves have warning signs? speed reduction signs? Are they posted well in advance of the curves? In the space provided, write down what you discover.

6-3 BRAKING

A. Select the word or phrase that best completes each of the following sentences and write the letter in the space provided.

_____ 1. A braking system exerts up to _______ of hydraulic pressure on each of the four brakes.
   a. 350 pounds (160 kg)  
   b. 500 pounds (230 kg)  
   c. 750 pounds (340 kg)  
   d. 1,000 pounds (450 kg)

_____ 2. The kinetic energy of a car’s motion is transformed into _______ as the friction of the brakes resists the motion of the wheels.
   a. rubber  
   b. heat  
   c. torque  
   d. centrifugal force
3. When applying the brakes, you should:
   a. use the ball of your foot.
   b. lift your foot off the floor.
   c. keep your heel on the floor.
   d. use your left foot.

4. ABS brakes:
   a. have a sensor mounted on each wheel.
   b. give you more control than without ABS brakes.
   c. will not lock.
   d. All of the above.

5. What type of emergency braking technique involves a full and firm application of the brake pedal up to the point where the brakes lock?
   a. Pumping the brakes
   b. Threshold braking
   c. Locking the brakes
   d. Antilock braking

6. What type of emergency braking technique will stop your car in the shortest possible distance?
   a. Pumping the brakes
   b. Threshold braking
   c. Locking the brakes
   d. Antilock braking

7. What type of emergency braking technique involves applying the brakes completely until they lock and then releasing them in rapid succession?
   a. Pumping the brakes
   b. Threshold braking
   c. Locking the brakes
   d. Antilock braking

8. If you are traveling 50 miles per hour (80 km/h), your stopping distance is:
   a. 110 feet (34 m).
   b. 158 feet (48 m).
   c. 268 feet (82 m).
   d. 464 feet (141 m).

9. Brake effectiveness depends on:
   a. visibility.
   b. speed.
   c. vehicle weight.
   d. All of the above.

10. What is the most important factor in your ability to brake?
    a. Weather conditions
    b. The type of tires you have
    c. Your speed
    d. The condition of your brakes

B. How do brakes slow down a car?

C. Where should you practice proper braking procedures?
D. What are the two main reasons ABS brakes are more effective than standard brakes?

E. Which emergency braking technique is least likely to cause a skid?

F. What is the proper way to pump the brakes?

G. Why should you never pump the brakes on a vehicle with ABS?

H. What factors can affect reaction distance while braking?

I. Complete each of the following sentences by writing the correct word or phrase in the space provided.

   1. If you brake rapidly, the friction between your tires and the road surface increases to the point where traction is lost, resulting in a ________ .

   2. Antilock braking systems automatically ________ the brakes at a rate of eighteen times per second.

   3. Antilock braking systems work independently on each ________ .

   4. A ________ sensation in the brake pedal is normal for ABS brakes.

   5. Pumping the brakes imitates the action of ________ brakes.
6. To disengage the power train, you put the vehicle transmission in ____.

7. If you lock your brakes, you will lose all or most of your ability to ____.

8. ____ distance is the distance traveled by your vehicle during the time it takes you to identify the need to stop.


10. The faster you travel, the longer it takes to ____.

J. CHECK IT OUT.

There are two basic types of standard brakes: disc and drum brakes. Go to the library or use the Internet to find out the basic differences between these two types of brakes. Do some vehicles use both types of brakes? On which wheels (front or rear) are they used? In the space provided, write down what you discover.

Go to the library or use the Internet to find out what types of braking systems are used on buses, tractor-trailers, and airplanes. How are they different from automobile braking systems? In the space provided, write down what you discover.
6-4  SPEED LIMITS

A. What are some of the factors considered in setting speed limits?

B. What are the maximum speed limits in your jurisdiction?

C. Can you be cited for speeding even if you are going below the posted limit? If so, how?

D. What is the minimum speed law?

E. CHECK IT OUT.

Find out what steps you have to take to petition the local authorities to erect a speed limit sign or to change an existing posted limit. In the space provided, summarize the procedures you have to follow.
Contact the various law-enforcement agencies in your jurisdiction to find out what devices they use to enforce the speed laws. How long have they been in use? How effective are they in reducing collision rates? Are there new technologies they are testing or will be implementing soon? In the space provided, write down what you discover.

Use the Internet to find out what the maximum speed limits are in a neighboring jurisdiction. In the space provided, summarize how they are different from those in your jurisdiction.
CROSSWORD PUZZLE: THE SPEED FACTOR:
NEGOTIATING CURVES AND BRAKING

Across
2. Ability of force to cause object to rotate
4. Zones that “give” upon impact
5. How fast something is moving
9. Rate of change of object’s speed
11. Turning too sharply
13. Road that reduces hydroplaning
14. What you should never do to ABS brakes
15. Adding weight to a vehicle
16. Braking system with sensors on each wheel

Down
1. Pavement with most traction
3. Friction between tires and road
6. Road that dips in one direction
7. Invisible force
8. Not turning enough
10. “Pulling” force
12. “An object at rest tends to remain at rest”
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
<th>Where</th>
<th>What Happened</th>
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<tbody>
<tr>
<td>Lost traction</td>
<td></td>
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<tr>
<td>Experienced effect of “loading”</td>
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<tr>
<td>Road banked in “wrong” direction</td>
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<tr>
<td>Entered curve too fast</td>
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<tr>
<td>Oversteered on turn</td>
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<tr>
<td>Understeered on turn</td>
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<tr>
<td>Accelerated into curve on wet/icy road</td>
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<td>Used improper braking technique</td>
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<td>Felt “pulsing” sensation in brakes</td>
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<td>Applied threshold braking</td>
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<tr>
<td>Pumped the brakes</td>
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<tr>
<td>Locked the brakes</td>
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<td>Applied basic speed law</td>
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