Module 4.2
Curves and Hills
Curves and Hills Objectives

- Know what a curve is.
- Know how to recognize an approaching curve.
- Be able to recognize different types of curves.
- Understand that hills are curves of a different sort.
- Identify factors that contribute to risk in curves.
- Understand how altitude affects vehicles and drivers.
Video: Well Managed Momentum, Balance and Traction
Types of Curves

• Constant Radius
• Decreasing Radius
• Increasing Radius
Constant radius curves
1. When should you reduce speed?
2. Describe your speed as you travel through the curve.
3. When can you increase your speed?
4. How do you know?
Decreasing radius curves

1. When should you slow down?
2. How do you know the safest speed for this curve?
3. Where do you need the slowest speed? Why?
4. When can you increase your speed?
5. How do you know?
Increasing radius curves

1. Where should you begin to slow down?
2. Where is your slowest speed for this curve?
3. How do you know what the best speed is for this curve?
For each curve:
1. Where should you slow down?
2. Where should you be at your slowest speed?
3. How do you know what the best speed is for each curve?
What Type of Curve?
SPEED IN A CURVE
Why does speed kill in curves?

Inertia & momentum

Radius of the curve

Slope of the roadway

Roadway surface conditions
Curves: Speed, Camber, & Vehicle Load

Let us experiment with speed limitations.

Speed and Traction Scale

50 mph
45 mph
40 mph
35 mph
30 mph
25 mph
20 mph
15 mph
Curves: Speed, Camber, & Vehicle Load

Small Group Experiment: Use 2½ mph increments to determine...
1. the maximum speeds at which your car maintains traction, with and without a load.
2. the minimum speeds at which your car loses traction, with and without a load.
3. the speed differences between maintaining and losing control, with and without a load.
Why does speed kill in curves?

- Tire condition
- Vehicle type, weight, height, load
- Driver expectations

Let’s take a look at each risk factor.
WHAT CONTRIBUTES TO RISK IN A CURVE?
Vehicle Contributes to Risk

- Width
- Length
- Height
- Velocity
- Weight
- Type of Tires
- Condition of Tread
- Center of Gravity
- Tire Inflation
- Load Distribution
- And More!
1. Which direction does your body want to go when running through this curve?

2. Does the runner stay on track or does the runner go down the slope?

3. What can the runner do to stay in the curve?
Roadway Design
Positive Slope
Roadway Design
Negative Slope

1. Which direction does your body want to go when running through this curve?

2. Does the runner stay on track or does the runner go down the slope?

3. What can the runner do to stay in the curve?
Roadway Design
Negative Slope
Roadway Design and Vehicle Load
Roadway Surface Contributes Risks

Each surface demands a different level of traction and contributes to a unique and dangerous layer of risk!

Activity: Working groups of 2 or 3, identify and write down as many different road surface conditions as you can think of.

Share your list with the class.
Describe the following:

- Surface condition
- Roadway design
- Curve radius (sharpness)
- Speed control
- Lane position
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ZONE CONTROL FOR CURVES
FIND
Clues for Curves
What clues do you see that a curve is ahead?
SOLVE
Solve – Speed Control

• Speed (Motion) Control
  – What is my best speed for this curve?
  – How do I know what my best speed is for this curve?
  – How do I manage my speed for this curve?
Solve – Steering Control

• Steering Control
  – What is my best lane position to enter this curve?
  – What is my best lane position for driving through the curve?
  – How do I manage my speed for this curve?
CONTROL—DRIVELINE
Right Curve Drive Line
No Oncoming Traffic
Open Right Front
LP2-LP3-LP1
Right Curve Drive Line
With Oncoming Traffic
Open Right Front
LP1-LP3-LP1
Right Curve Drive Line
Closed Left Front
Closed Right Front
LP1-LP1-LP1
Left Curve Drive Line
With Open Left and Right Front
LP3-LP1-LP1
Left Curve Drive Line
With an Open or Closed Left Front
Closed Right Front
LP1-LP1-LP1
Vision Control and Driveline

Target on Approach
HILLS
Hills and Mountains

• A hill can rise and descend gently, or can be part of a mountain range
• Gravity is every driver’s passenger when traveling up and down hills
Adjusting Your Speed for Uphill
Slow Moving Vehicles
Speed Control—Where?
Speed Control—What?

• Off Accelerator
• Trail brake on and off
• Controlled Braking
• Downshift to a lower gear both automatic and standard transmission
Runaway Truck Escape Ramps

Montana Teen Driver Education and Training
ALTITUDE
Less oxygen = lower performance
Montana Driver Education and Training
Standards and Benchmarks

1. **Laws and Highway System**
   1.1. know the laws outlined in the Montana Driver's manual;
   1.2. understand the laws outlined in the Montana Driver's Manual; and
   1.3. consistently demonstrate knowledge and understanding by responsible adherence to highway transportation system traffic laws and control devices.

2. **Responsibility**
   2.1. recognize the importance of making safe and responsible decisions for owning and operating a motor vehicle;
   2.2. demonstrate the ability to make appropriate decisions while operating a motor vehicle;
   2.3. consistently display respect for other users of the highway transportation system; and
   2.4. develop positive habits and attitudes for responsible driving.

3. **Visual Skills**
   3.1. know proper visual skills for operating a motor vehicle;
   3.2. communicate and explain proper visual skills for operating a motor vehicle;
   3.3. demonstrate the use of proper visual skills for operating a motor vehicle; and
   3.4. develop habits and attitudes with regard to proper visual skills.

4. **Vehicle Control**
   4.1. demonstrate smooth, safe and efficient operation of a motor vehicle; and
   4.2. develop positive habits and attitudes relative to safe, efficient and smooth vehicle operation.

(continued on next slide)
Montana Driver Education and Training Standards and Benchmarks

5. **Communication**
   5.1. consistently communicate driving intentions (i.e., use of lights, vehicle position, and personal signals);
   5.2. adjust driver behavior based on observation of the highway transportation system and other roadway users;
   5.3. adjust communication (i.e., use of lights, vehicle position, and personal signals) based on observation of the highway transportation system and other users; and
   5.4. develop positive habits and attitudes for effective communication.

6. **Risk Management**
   6.1. understand driver risk-management principles;
   6.2. demonstrate driver risk-management strategies; and
   6.3. develop positive habits and attitudes for effective driver risk-management.

7. **Lifelong Learning**
   7.1. identify and use a range of learning strategies required to acquire or retain knowledge, positive driving habits, and driving skills for lifelong learning;
   7.2. establish learning goals that are based on an understanding of one’s own current and future learning needs; and
   7.3. demonstrate knowledge and ability to make informed decisions required for positive driving habits, effective performance, and adaptation to change.

8. **Driving Experience**
   8.1. acquire at least the minimum number of BTW hours over at least the minimum number of days, as required by law, with a Montana-approved driver education teacher; and
   8.2. acquire additional behind-the-wheel driving experience with a parent or guardian’s assistance in a variety of driving situations (i.e., night, adverse weather, gravel road, etc.).