

Texas Driver Education Classroom and In-car Instruction Model Curriculum

Module Six

Information Processing:

Complex Risk Environments

- **CHARACTERISTICS OF EXPRESSWAYS**
- **ENTERING, CHANGING LANES, AND EXITING**
- **HIGH SPEED CONSIDERATIONS**

FACT SHEETS

Fact Sheet
Module 6

F-6.1 Expressway Basics

Complex Risk Environment. A complex risk environment is limited to speeds under 70 mph, having controlled or limited access interchanges or intersections in urban, suburban, and rural settings. Traffic flow should be heavy and many times unpredictable, which does not allow excessive time for the novice driver to identify risks through changes to line of sight or path of travel. Instructor should be prepared to control the level of risk regarding the traffic flow around the vehicle by changing speed or position. Two way, one way, access lanes, and multi-lane roadways are recommended for use in complex risk environments.

Expressways. High-speed (up to 70 mph) roadways that typically carry a high volume of traffic. They are usually divided by a barrier of some type (guardrail, cement barrier, grassy median). There are multiple lanes going in the same direction (two, three, four or more lanes). They are controlled-access because there are only certain locations where a driver can enter and exit the expressway. These are called interchanges. Expressways have a low frequency of collisions but may have a high severity rate when a collision occurs because of the higher speeds.

Advantages of Driving on Limited Access Roadways. These roadways carry a larger volume of traffic. Collision and fatality rates are lower than on other types of roadways. Cross traffic is not present because of interchanges. Opposing traffic is divided by some barrier. Pedestrians, bicyclists, and slow-moving vehicles are not permitted on expressways. They are designed to help drivers anticipate conditions ahead.

Cloverleaf Interchange. Allows for interchange of two expressways with minimal disruption of speed or movement. The cloverleaf usually has characteristic weave lanes as traffic leaves one roadway and exits from another roadway. Curved roadways have banked and flat exits which lead to braking and steering problems as drivers adjust from high speed to speed of curve. The curves often are noted by reflector poles which are knocked down due to loss of traction on the entry and exit of the curved roadways.

Diamond Interchange. Allows for interchange of a major roadway with a secondary dual or multiple lane roadway. The diamond interchange may have traffic control devices on the intersecting secondary roadway which allow for left and right turns onto the secondary roadway. The signals may be used to allow left turns from the secondary roadway to the entry ramps of the major multiple roadway. Lane markings may indicate lane position on the approach to the intersection. A diamond interchange will allow the driver to re-enter the entrance ramp by moving across the intersection of the secondary roadway.

Trumpet Interchange. Allows for interchange of secondary two-way streets to a multiple lane roadway with minimal traffic mix. It would take the place of a t-intersection often used when a roadway ends at the intersection of another roadway. These intersections are often found when interstate feeder roads stop at the interstate roadway or loop. For example, Interstate 220 may stop at Interstate 620 or Interstate 20, since Interstate 220 would direct drivers from a major city to the Interstate Loop (620) or the Interstate (20). The major function of a trumpet intersection is to replace the t-intersection at the junction of two roadways.

Frontage Road Interchanges. Allows for interchange of vehicles using parallel secondary two-way or one-way roadways and a major multiple lane roadway. Frontage road turnarounds allow drivers to exit a multiple lane roadway and use the opposing frontage road to enter the multi-lane roadway in the opposite direction. Allows for dense city traffic flows to mix efficiently with higher speed traffic flows of the multiple lane roadway. Yield rules on the frontage road may vary, as well as roadway markers, based on the direction of traffic flow.

Multilevel Traffic Mix Interchanges. Allows for interchange of vehicles joining major limited-access multiple lane roadways. Multilevel interchanges may be combinations of cloverleaf, diamond, and trumpet style interchanges. Searching sign information is critical to maneuvering through multilevel limited-access multiple lane roadways.

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F-6.2 Expressway Entry/Exit

Multiple Lane roadway Characteristics. Traveling on multiple-lane roadways is often faster than traveling on local roadways due to the lack of intersections that require stopping. Driving at higher speeds is demanding and requires full concentration to allow time for searching and evaluating problems in order to respond in time to problems. Limited access and controlled access roadways allow vehicles to enter and exit with limited interruptions in traffic flow while using merge and exit ramp areas. There are normally two or more lanes of traffic traveling in the same direction. Speed and the effects of speed limit the driver's ability to use the peripheral vision field effectively.

Speed. High-speed (up to 70 mph) roadways that typically carry a high volume of traffic are often found on expressways. Expressways have a low frequency of collisions but may have a high severity rate when a collision occurs because of the higher speeds. The higher speeds require drivers to manage space and time more effectively especially when entering, changing lanes, passing, and exiting.

Entrance/Exit Ramps. Cross traffic is not present because of interchanges. The exit ramps and entry ramps may be miles apart but traffic mix increases at the locations for entry and exit. Interchanges are made up of the through lanes, entry, and exit ramps, acceleration lanes, and deceleration lanes. Entry ramps may be controlled by metering devices. However, each may have individual characteristics that the driver must search carefully for information. Pedestrians, bicyclists, and slow-moving vehicles are not permitted on expressways due to the speed mix problem.

Passing and Being Passed. Passing other vehicles and being passed is a major activity on high speed roadways. The intermix with traffic flow, interchanges, and traffic volume creates passing situations that raise the risk and provide sudden changes that add to the complex nature of multi-lane driving especially in urban driving areas. Depending on the roadway, lane position, and speed, the driver may find passing activities on both sides of the vehicle. The BGE setting of the mirrors allows the driver to recognize movement from the rear to the sides more effectively.

Other users. Trucks, tractor-trailers, buses, recreational vehicles, and other large or slow moving vehicles add additional challenges to driving on multiple-lane roadways. They are especially a concern when driving on hills where speeds are not consistent with other vehicles. Larger vehicles may provide a wind blast that can move smaller vehicles when passing. Keep in mind that smaller vehicles may not recognize the time needed to pass larger vehicles on the roadway.

Managing Space. A driver should use the following guidelines to manage space more effectively on the multiple lane roadway:

- Adjust the vehicle's position and speed to road and weather conditions in order to provide time for braking, accelerating, and steering.
- Develop a minimal four second following interval when merging onto the roadway, changing lanes, and exiting the expressway area.
- Minimal steering inputs are needed to change lanes when passing, entering, or exiting. Excessive steering can lead to a loss of control at higher speeds.
- Move over one lane at a time rather than moving across multiple lanes. Visibility and time are key elements to performing a safe lane change.
- Make room for vehicles entering the roadway from an entrance ramp by changing lanes when clear.
- When another driver tailgates, it is safer to change lanes while keeping an adequate distance to the front of the vehicle.
- Maintain plenty of space when returning to the lane after a pass.
- Reduce speed when roadway narrows at tunnels, construction zones, and for larger vehicles.
- Be alert for crossing winds when driving over bridges or through open mountain passes.

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F-6.3 Multiple Lane Roadway Problem Areas

Exiting Problems. Potential exiting conflicts include “weave” lane conflicts, traffic stopped on the exit ramp, short deceleration lane, and very slow ramp speed.

Roadway Problems. A driver on an expressway should not drive over or across median, yellow painted line, or raised dividing section; make a left turn or a U-turn; use left lane except for passing; change lanes without signaling and checking for an open gap; drive onto freeway except through an on-ramp; park or stop on the freeway, except at areas provided; park on shoulder unless you have an emergency; or back up on or along the roadway.

Multiple Lane Roadway Dangers. Higher speeds create greater braking distances—it takes longer to stop; the field of vision is narrowed; highway hypnosis is prominent; velocitation effect on expressway and when leaving the multiple lane roadway; entering and exiting sometimes on the left; vehicles on shoulder re-entering; windy sections of the roadway; vehicles changing lanes into same lane; inappropriate use of lane changing device; slow moving vehicles ahead; driving in a pack of vehicles; and tire hydroplaning during wet weather conditions.

Highway Hypnosis. This is a dull or drowsy condition that can occur because of the concentration needed while driving long distances. Plan breaks and rest stops to combat highway hypnosis. Pull to a safe area for rest and sleep when tired.

When driving over a long period of time. Particularly on a rural expressway with little traffic, be aware of a condition known to drivers as “highway hypnosis.” When traveling at high speeds for long periods of time, the driver may become hypnotized by constant staring ahead on the roadway, which may result in driving in a dulled, drowsy, trancelike condition.

Ramp Metering Devices. Include a system of lights and sensors that allows only one car at a time to enter a limited access highway.

Short Trips on Multiple Lane Roadways. Know the name, route and number of the entrance and exit to be used and check vehicle for maintenance problems to plan a time to travel to avoid congestion. Remember to take a local map if needed.

Long Trips on Multiple Lane Roadways. Maintenance check of vehicle becomes critical; vehicle loading considerations; plan stops for food, rest, and fuel; know the route numbers needed; check with local agencies for construction delays; carry money or credit cards; take a map of planned route; and plan to avoid congestion in cities.

Reducing Risk. Search for proper entrance; search for potential conflicts; prepare to adjust speed; avoid stopping on the ramp; prepare to drive onto the shoulder; merge smoothly; and create space around your vehicle.

Increase Following Interval: Especially when following large trucks or buses; following motorcycles; driving in bad weather; when being tailgated; when driving a heavy load or pulling a trailer; and entering/exiting the expressway.

Special Conditions: Expressways through cities; disabled vehicles; construction areas; and toll booths.

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WORKSHEETS

W-6.1, Expressway Interchanges

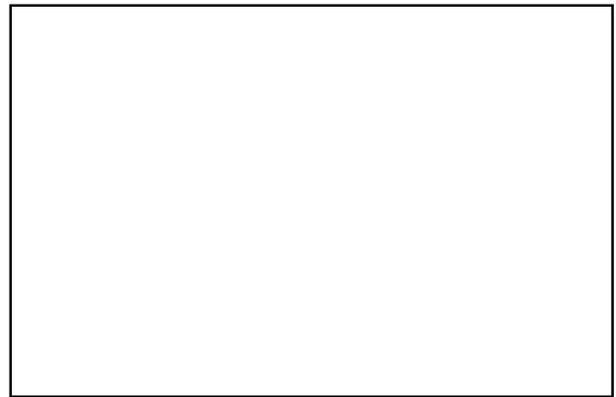
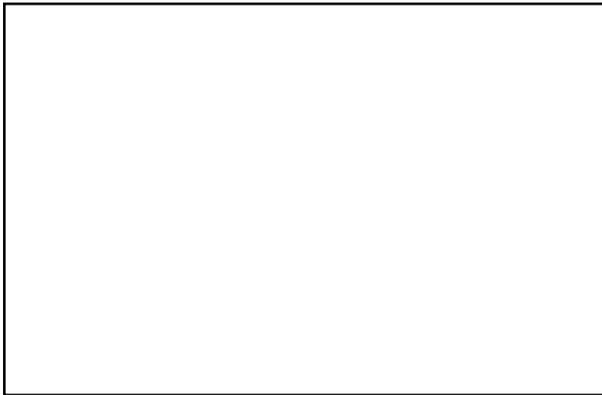
Name _____

List the basic characteristics of a multiple-lane roadway or expressway.

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____

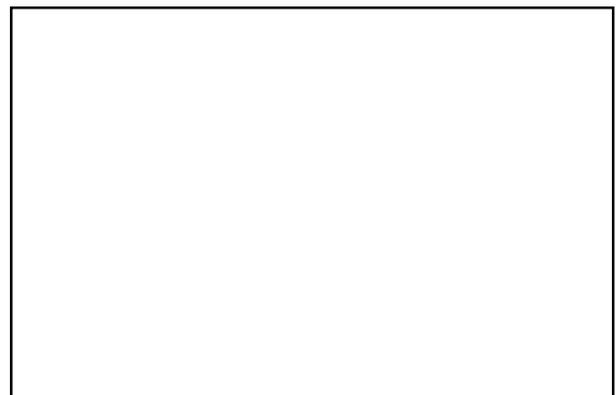
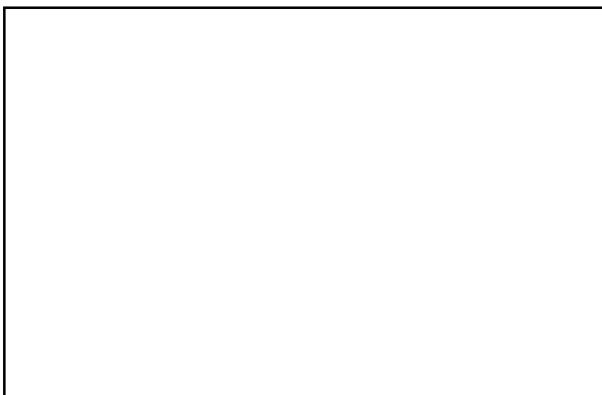
List and draw four typical expressway interchanges found in Texas:

1. _____



2. _____

3. _____



4. _____

W-6.1, Expressway Interchanges

List four common expressway signs.

1. _____

3. _____

2. _____

4. _____

List two special traffic signals used on expressways.

1. _____

2. _____

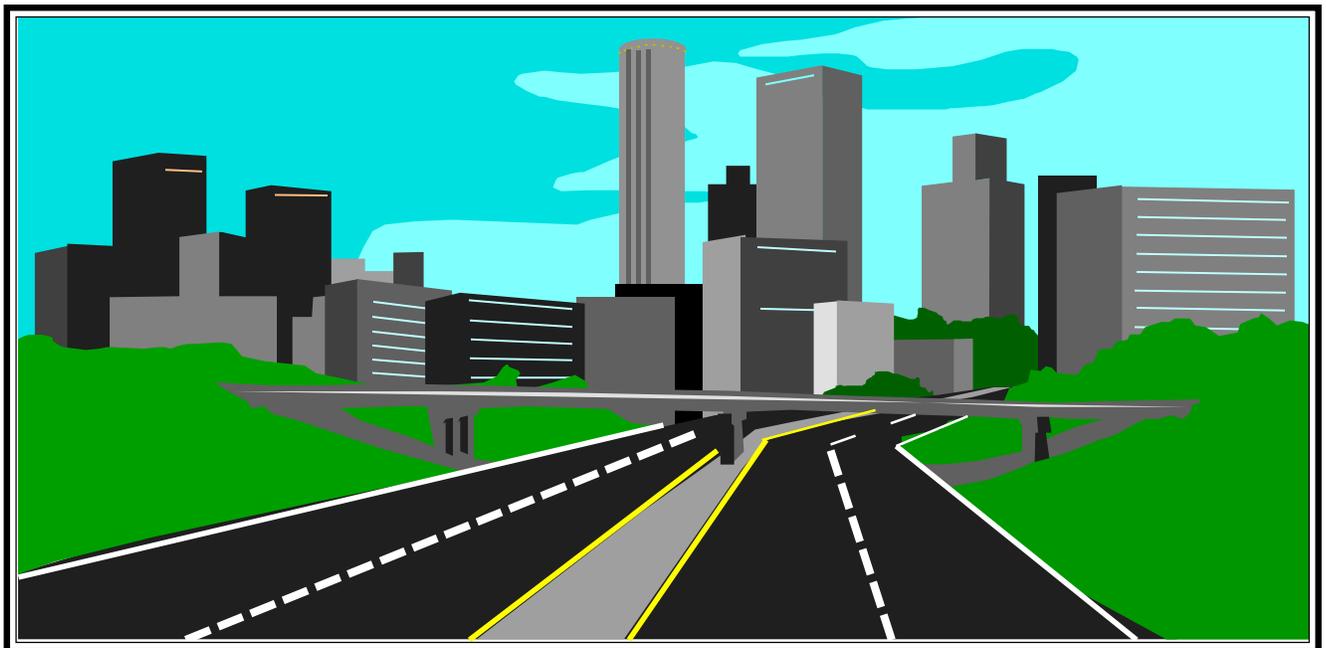
List four common line systems used on expressways.

1. _____

2. _____

3. _____

4. _____

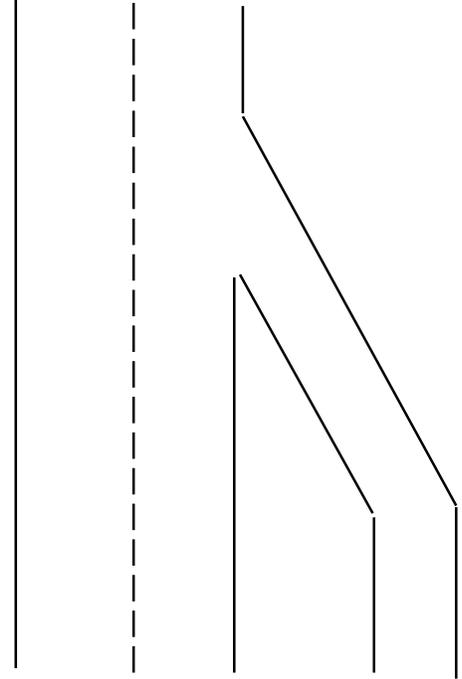


W-6.2, Expressway Characteristics

Name _____

List and draw the steps to merge onto the expressway.

- A.
- B.
- C.
- D.
- E.
- F.



List when reduced risk lane changes are used.

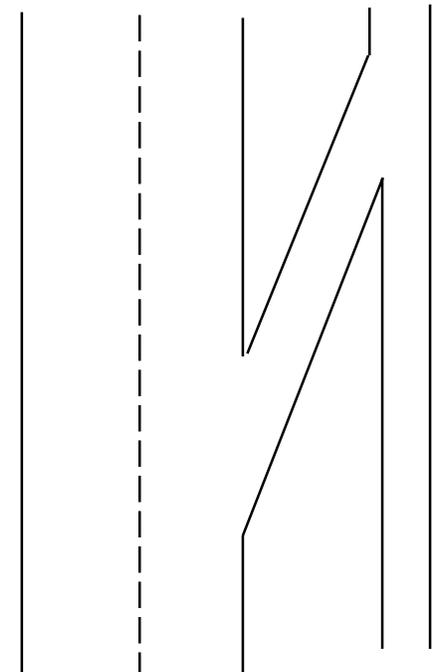
- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

List four concerns when being passed.

- 1. _____
- 2. _____
- 3. _____
- 4. _____

List and draw the steps to merge onto the expressway.

- A.
- B.
- C.
- D.



Describe special problems in a weave lane when exiting.

W-6.3, Problem Areas on Multiple Lane Roadways

Name _____



List eight choices that drivers **should not** make on an expressway.

- A. _____ B. _____
- C. _____ D. _____
- E. _____ F. _____
- G. _____ H. _____

List eleven dangers faced by new drivers on an expressway.

- 1. _____ 2. _____ 3. _____
- 4. _____ 5. _____ 6. _____
- 7. _____ 8. _____ 9. _____
- 10. _____ 11. _____

Explain the purpose of a ramp metering device. _____

When is it crucial to increase the following interval on an expressway?

- 1. _____ 4. _____
- 2. _____ 5. _____
- 3. _____ 6. _____



List four special roadway areas found in expressway travel.

- 1. _____
- 2. _____
- 3. _____
- 4. _____

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EVALUATION AND ASSESSMENT

Module Assessment MA-6.1 Complex Risk Environments

Please do not write on the test. Select the best answer and place the appropriate letter (A, B, C, D) on the answer sheet provided.

1. Which is NOT a characteristic of an expressway?
 - A. High speed traffic.
 - B. Divided by some barrier between opposing lanes of travel.
 - C. Has a high rate of collisions.
 - D. Drivers can enter and exit only at certain places.

2. Types of interchanges at expressways are called:
 - A. Flute, harp, and violin.
 - B. Diamond, trumpet, and cloverleaf.
 - C. Ruby, star, and heart.
 - D. Bear, owl, and eagle.

3. Before traveling long or short distances on expressways, be sure to:
 - A. Check fluid levels in your car.
 - B. Know your entrance and exit before you leave.
 - C. Neither A nor B are correct.
 - D. Both A and B are correct.

4. "Highway hypnosis" is a driver condition that is affected by:
 - A. Short trips on expressways.
 - B. The driver staring at the roadway for long periods of time.
 - C. Frequent rest stops.
 - D. A magician.

5. When choosing the ramp to enter the expressway, which of the following is an important clue?
 - A. Use any ramp available to get on.
 - B. Check for "DO NOT ENTER" and "WRONG WAY" signs at the ramp.
 - C. Make sure the ramp is marked "UP."
 - D. Only make right turns to get onto the entrance ramp.

6. The entrance to an expressway has three parts. What are they?
 - A. The entrance ramp, the acceleration lane, and the merge area.
 - B. The entrance ramp, the deceleration lane, and the merge area.
 - C. The exit ramp, the deceleration lane, and the change area.
 - D. The weave, the speed sign, and the curve.

7. When entering the expressway, some important clues to search for include_____.
- A. traffic ahead.
 - B. a gap in traffic on the expressway.
 - C. the ramp speed sign.
 - D. all the above are important.
8. When in the acceleration lane, getting ready to get on the expressway, which of these is important to do?
- A. Stop suddenly if there is no gap to move into on the expressway.
 - B. Stare straight ahead for traffic in the lane.
 - C. Do not yield to traffic on the expressway.
 - D. Adjust your speed to flow of traffic on the expressway.
9. Which of these should you NOT do when merging onto an expressway?
- A. Select a gap large enough to fit your vehicle.
 - B. Change lanes smoothly.
 - C. Change two lanes at once and speed up.
 - D. Adjust your speed to create a safe following interval.
10. Which of the following can be a potential problem when entering an expressway?
- A. Bicyclists, pedestrians, and mopeds.
 - B. No traffic at the merge area.
 - C. No gap to move into on the expressway.
 - D. A long straight stretch of roadway ahead.
11. Some expressway entrances come in from the left instead of the usual right. Why do these present special problems?
- A. The left lane is usually reserved for higher speed traffic.
 - B. No one can see to the left.
 - C. Lane changes to the right are impossible.
 - D. Parked vehicles on the left shoulder.
12. Driving on the expressway requires the driver to_____.
- A. search farther down the roadway for clues (20-30 seconds ahead).
 - B. take pills to stay awake.
 - C. drive slowly and carefully.
 - D. stop often for traffic signals.
13. You are driving and looking to get onto Interstate 95. What color will the sign be identifying I-95?
- A. Yellow and black.
 - B. White and black.
 - C. Red, white and blue.
 - D. Green and white.

Evaluation and Assessment

14. Some expressways have minimum speed signs. This means that you_____.
- A. should not drive slower than the minimum speed posted.
 - B. can drive as slowly as you want.
 - C. can drive as fast as you want.
 - D. speed limits have no effect on your driving.
15. You are driving on an expressway that has 3 lanes going in your direction. You will be driving a long distance ahead. Which lane should you drive in to avoid the most conflicts?
- A. Right lane.
 - B. Center lane.
 - C. Left lane.
 - D. Any lane.
16. Keeping a safe space cushion around your vehicle on the expressway is important. When is it difficult to do this on expressways?
- A. When tractor-trailers are on the expressway.
 - B. When it is rush hour, bumper to bumper traffic.
 - C. When pulling a trailer.
 - D. When driving at night.
17. Passing another vehicle is dangerous anytime. What makes it more dangerous on an expressway?
- A. Speeds are higher and danger can come up quickly.
 - B. There is usually more sight distance ahead.
 - C. Traffic travels at the same speed all the time.
 - D. Traffic signs regulate where you can pass on the expressway.
18. If you want to get off the expressway but miss your exit, _____.
- A. pull over to the shoulder and back to the exit.
 - B. pull across the median and head back to the exit.
 - C. go to the next exit, cross over and return to your exit.
 - D. flag down a police officer for an escort back to your exit.
19. When leaving an expressway _____.
- a. Search early for your correct exit.
 - b. Signal early for your exit to warn following drivers of your intent to leave.
 - c. Do most of your slowing in the deceleration lane.
 - d. A, B, and C are correct.

20. A “weave” lane on a freeway is very dangerous because_____.
- A. it is a lane for drunk or drowsy drivers.
 - B. the lane curves sharply.
 - C. it is both an entrance and exit lane.
 - D. high occupancy vehicles use this lane.
21. Which is NOT a possible problem at an expressway exit?
- A. Pedestrians and bicyclists.
 - B. Traffic backed up on the ramp.
 - C. A short deceleration lane.
 - D. A very slow ramp speed.
22. If there is a disabled vehicle along side the expressway, you should _____.
- A. reduce speed and put more space between you and it.
 - B. increase speed to get by it quickly.
 - C. stop and offer the driver a ride.
 - D. keep the same lane position.
23. If your vehicle becomes disabled on the expressway, which should you NOT do?
- A. Pull off as far as possible onto the shoulder or median.
 - B. Turn on the emergency flashers.
 - C. Call for help if you have a cell phone.
 - D. Ask for a ride to a service station from anyone who stops to help you.
24. Construction areas on expressways require a driver to _____
- A. pay more tolls.
 - B. slow your speed and adjust your lane position.
 - C. play loud music to drown out the construction noise.
 - D. maintain a high rate of speed to get through quickly.
25. Some expressways make the driver pay a toll to drive on them. Which of the following is NOT a threat around toll booths?
- A. Traffic slows rapidly on approaching the toll booth.
 - B. Traffic congestion can be a problem.
 - C. When leaving the toll booth, traffic may merge together from several lanes.
 - D. A, B, and C are all threats at toll booth areas.

MA-6.1 Complex Risk Environments Answer Sheet

Name: _____

Date: _____

Score: _____

1. _____

14. _____

2. _____

15. _____

3. _____

16. _____

4. _____

17. _____

5. _____

18. _____

6. _____

19. _____

7. _____

20. _____

8. _____

21. _____

9. _____

22. _____

10. _____

23. _____

11. _____

24. _____

12. _____

25. _____

13. _____

MA-6.1 Complex Risk Environments Answer Sheet

Name: _____ **ANSWER KEY** _____

Date: _____

Score: _____

- | | | | |
|-----|---|-----|---|
| 1. | C | 14. | A |
| 2. | B | 15. | B |
| 3. | D | 16. | B |
| 4. | B | 17. | A |
| 5. | B | 18. | C |
| 6. | A | 19. | D |
| 7. | D | 20. | C |
| 8. | D | 21. | A |
| 9. | C | 22. | A |
| 10. | C | 23. | D |
| 11. | A | 24. | B |
| 12. | A | 25. | D |
| 13. | C | | |

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TRANSPARENCIES