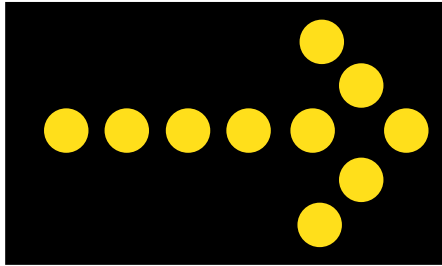
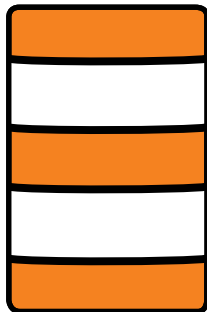




The Virginia Department of Transportation  
and the  
Virginia Road and Transportation Builders Association  
present



# Work Zone Safety Teacher's Guide



## Highlights:

- ➔ driver inattention
- ➔ aggressive driving
- ➔ managing risk
- ➔ recognition, reaction, responsibility



In cooperation with the Virginia Department of Education

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\* Reproducible worksheet

Updated 10/2004

## Introduction

The Virginia Department of Transportation (VDOT) and the Virginia Road and Transportation Builders Association (VRTBA), in cooperation with the Virginia Department of Education, have joined forces to provide the Commonwealth's driver's educators with work zone safety instructional resource materials.

The lesson goals are to:

- acquaint students with dangers inherent to the driving experience
- increase student awareness of highway work zone safety
- offer students opportunities to discuss responsible driving behaviors

Transportation construction industry professionals are also available to visit your classroom to share their experiences with your students. Please contact Jan Morehead at the Virginia Road and Transportation Builders Association to schedule a work zone safety speaker.

***To obtain more information on work zone safety contact:***

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Virginia Department of Transportation  
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[VRTBA.org](http://VRTBA.org)

## **Work Zone Safety: “A Sudden Change of Plans”**

*Lesson Objective: “A Sudden Change of Plans” video gives students an opportunity to view the consequences of inattention when driving in a highway work zone. While the video initially alludes to the death of a highway worker, its presentation will demonstrate to new drivers the precautions to take to prevent work zone crashes.*

*Ask students:* Have any of you worked in a position that requires you to work in very close proximity to multi-ton equipment? Have any of you ever worked in traffic with only a few plastic cones, a vest and a hard hat protecting you? The answer is probably *no* to both of these questions. Highway workers do this every day under these adverse conditions in all kinds of weather. “A Sudden Change of Plans” will allow new drivers to see how to safely co-exist with highway workers and their equipment.

Transportation construction is a complex and sometimes lengthy process. While temporarily inconvenient for drivers, a road-building project increases safety and improves mobility for all highway transportation users.

**Activity A:** Have students view the video “A Sudden Change of Plans.” Allow students to then share highway work zone experiences -- positive and negative. Have them analyze what happened to make the experience positive or negative. And, if the experience was a negative one, ask them to brainstorm what could have done differently to reduce risk and create a positive experience. This activity can also be done as a written assignment either in the classroom or at home as a parent-involvement activity.

*NOTE: After the video’s production and distribution, it was noticed that the driver again used a cell phone and took her hands off the steering wheel in the “positive” segment. These behaviors are NOT encouraged and will be changed when the video is revised.*

## **Activity B: Work Zone Safety “A Sudden Change of Plans”**

*Lesson Objective: Use the video’s work zone safety concepts, the questions below and the Work Zone Safety Crash Facts to create discussion and review new drivers’ awareness of work zones and work zone safety. The exercise will require new drivers to assimilate information from the video and demonstrate an understanding of work zone safety. Reproducible worksheets in Appendix.*

(1) What are the Three R’s of work zone safety?

*The three R’s are: **Recognition, Reaction and Responsibility.***

***Recognition** refers to identifying a work zone -- watching for early warning signs (orange signs, cones, etc.), signs indicating lane closures ahead or merging traffic and posted speed limits. In addition, drivers should watch for equipment and construction workers in the work zone.*

***Reaction** refers to responding to the work zone environment. A driver should always be aware of his/her surroundings and stay alert. Expect the unexpected. Anticipate the possibility of changes in traffic pattern and the presence of heavy equipment.*

***Responsibility** refers to taking personal liability for yourself and your actions. It is your duty to drive responsibly at all times and to take extra precautions when in a work zone area. Don’t take unnecessary chances – speeding, tailgating, changing lanes – that will put you and others in jeopardy.*

(2) What is a work zone and what are the characteristics of a work zone?

*A work zone is a designated area on a street or highway in which construction and/or maintenance work is taking place. A work zone is easily recognizable by the use of the color orange. Orange and black warning signs with black letters and/or symbols alert motorists to the presence of the work zone and provide drivers with specific information and directions.*

(3) What are some of the distractions you might encounter in work zones?

*Work zones are unique places of activity. The bright colors of the signs and equipment can be distracting for some drivers. For other motorists, the presence of the heavy equipment, the noise and the activity can be a distraction. We have an intrinsic curiosity and a tendency to focus on changes in our environment.*

(4) How should you react in a work zone to manage the risks?

*There are a number of steps you should take when traveling through a work zone.*

- Be alert -- to the conditions and activities around you, your vehicle’s speed, the location of your vehicle and that of other vehicles around you.*
- Be prepared to react quickly.*

*(Continued on next page)*

- *Do not tailgate – allow ample space between your vehicle and the one in front of you.*
- *Be patient – the time spent in a work zone (even if stopped by flagging operations) is relatively short. The inconvenience may translate into a few moments of delay but you reach your destination safely.*
- *Pay attention to the signs and follow directions. Don't wait until the last minute to merge into another lane or reduce your speed.*

(5) If you have an accident in a work zone and someone is hurt or killed, what penalty or penalties may apply?

*In Virginia and numerous other states, if your actions cause injuries in an accident (including those in work zones), you are responsible for the person's injuries and may also face traffic charges. If you caused a crash and a death results from it, you could be charged with vehicular manslaughter.*

(6) What is the penalty for speeding in a work zone?

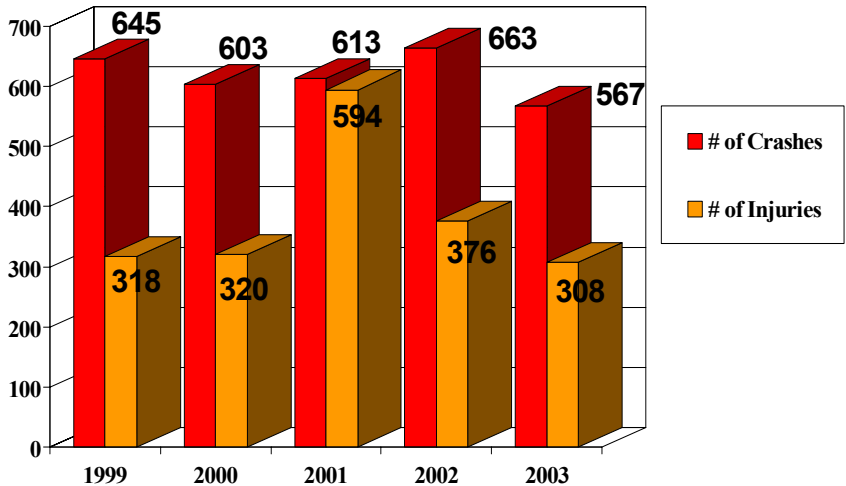
*In the Commonwealth of Virginia, the fine for speeding in a work zone is up to \$500, effective July 1, 2003.*

(7) After analyzing the statistics provided, what trends do you think are occurring in work zone safety? Why?

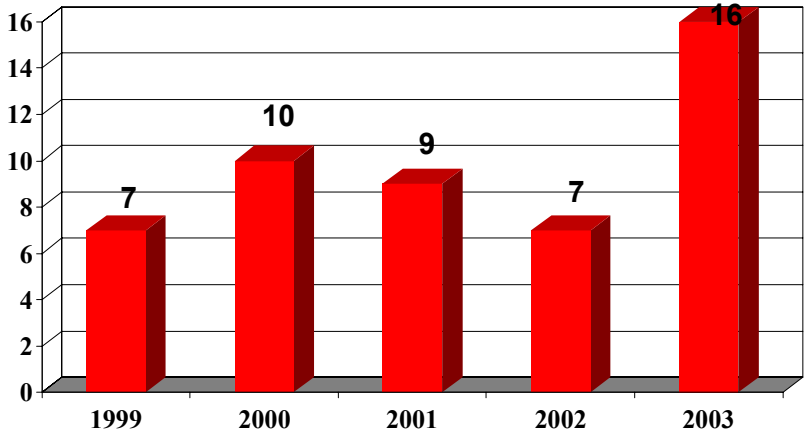
*Several possible general conclusions can be made:*

1. *The number of work zone crashes is increasing*
2. *The number of injuries in work zone crashes is relatively stable*
3. *The number of fatalities in work zone crashes is relatively stable after a major decline*
4. *Work zone crashes occur in high population areas*
5. *In general, about 50% of all work zone crashes result in injuries*

# Work Zone **Crashes/Injuries** on State Roadways from 1999-2003



# Work Zone **Fatalities** on State Roadways from 1999-2003



## Virginia Work Zone Crash Statistics

### 2003 Statewide Summary

Crashes	567
Injuries	308
Fatalities	16

VDOT DISTRICT	# OF CRASHES	# OF INJURIES	# OF FATALITIES
Bristol	37	27	0
Culpeper	26	10	1
Fredericksburg	26	12	1
Hampton Roads	22	20	1
Lynchburg	20	6	2
Northern Virginia	224	110	5
Richmond	102	64	6
Salem	86	48	0
Staunton	24	11	0
<b>TOTAL</b>	<b>567</b>	<b>308</b>	<b>16</b>

-VDOT Districts include these counties and cities:

**Bristol:** Bland, Buchanan, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe.

**Culpeper:** Albemarle, Culpeper, Fauquier, Fluvanna, Greene, Louisa, Madison, Orange, Rappahannock.

**Fredericksburg:** Caroline, Essex, Gloucester, King George, King and Queen, King William, Lancaster, Mathews, Middlesex, Northumberland, Richmond, Spotsylvania, Stafford, Westmoreland.

**Hampton Roads:** Accomack, Greensville, Isle of Wight, James City, Northampton, Southampton, Surry, Sussex, York; cities of Chesapeake, Emporia, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg.

**Lynchburg:** Amherst, Appomattox, Buckingham, Campbell, Charlotte, Cumberland, Halifax, Nelson, Pittsylvania, Prince Edward.

**Northern Virginia:** Arlington, Fairfax, Loudoun, Prince William.

**Richmond:** Amelia, Brunswick, Charles City, Chesterfield, Dinwiddie, Goochland, Hanover, Henrico, Lunenburg, Mecklenburg, New Kent, Nottoway, Powhatan, Prince George.

**Salem:** Bedford, Botetourt, Carroll, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pulaski, Roanoke.

**Staunton:** Alleghany, Augusta, Bath, Clarke, Frederick, Highland, Page, Rockbridge, Rockingham, Shenandoah, Warren.



## Work Zone Safety Statistics and Fact Sheet

### Top Five Offenses Charged in 2003 Work Zone Crashes:\*

1. Following Too Close
2. Reckless Driving - General
3. Failure to Maintain Control
4. Failure to Yield Right-of-Way
5. Improper Lane Change

### Type of Roadway Where 2003 Work Zone Crashes Occurred:\*

1. Primary (41.3%)
  2. Interstate (36.7%)
  3. Secondary (22.0%) *(In Virginia, these are non-interstate roads numbered 600 and higher)*
- On average from 1999-2003, 14.2% of the fatalities resulting from crashes in work zones were non-motorists (pedestrians and bicyclists). #
  - Approximately 48,000 people per year are injured as a result of motor vehicle crashes in work zones. #
  - Between 1999 and 2003, almost half of all work zone crashes occurred during the day and about 70% of fatal, large-truck work zone crashes occurred during the day. #
  - During the same timeframe, almost 64% of work zone crashes occurred on weekdays. #

### ***Nationwide Work Zone Fatalities for a 10-Year Period: ^***

<b>1994</b>	<b>828</b>
<b>1995</b>	<b>789</b>
<b>1996</b>	<b>717</b>
<b>1997</b>	<b>693</b>
<b>1998</b>	<b>772</b>
<b>1999</b>	<b>872</b>
<b>2000</b>	<b>1026</b>
<b>2001</b>	<b>989</b>
<b>2002</b>	<b>1186</b>
<b>2003</b>	<b>1023</b>

\* Highway Traffic Records Inventory System (VDOT)

# <http://www.atssa.com/public/downloads/CMZONE03.PDF>

^ National Center for Statistics and Analysis, <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/nrsa/>

**Activity C:** Students will complete sentences and locate words in puzzle as either homework or class work. The activity will help familiarize students with words and concepts key to highway and work zone safety.  
*Reproducible worksheet in Appendix.*

### Activity C: Answer Key

1. Alcohol impairs a driver's ability to drive.
2. An individual's anger behind the wheel may escalate to the point of road rage. (Two words, appear together in puzzle)
3. The Virginia Department of Transportation builds and maintains roads throughout the Commonwealth.
4. The color orange on warning signs alerts motorists to highway construction/maintenance zones ahead.
5. A \$500 fine may be levied on drivers exceeding the posted speed in a highway work zone.
6. A driver's license is a privilege, not a right.
7. State troopers in helicopters monitor speed limits on major highways. The slang term for one of these is "a bear in the air."
8. When you are behind the wheel, you are responsible for your safety and that of others around you.
9. Road crews wear safety equipment, including hard hats and vests as protection and to alert motorists to their presence.
10. More vehicles on the highways may result in increased congestion.
11. The work zone is the highway worker's office.
12. Traffic signals, cones and barriers are safety control devices.
13. Don't change lanes or pass in highway work zones.
14. There are two types of highway work zones, stationary and mobile.
15. Stop signs are red in color and octagonal in shape.
16. Traffic signals are red, amber and green in color.
17. The goal of every student in Drivers' Education is to earn a license.
18. With the popularity of cell phones increasing, driver inattention has become a greater problem.
19. The Virginia Road and Transportation Builders Association (VRTBA) is comprised of contractors, suppliers and engineers involved in Virginia's transportation construction industry.
20. Safety is no accident!
21. Highway workers – Give 'em a Brake!
22. In the Commonwealth of Virginia, the Department of Motor Vehicles issues driver's licenses.
23. Unless otherwise posted, maintain your vehicle's speed when traveling through highway work zones.
24. Be prepared for the unexpected when traveling on our highways.
25. Statistically, a motorist is more likely to be injured in a work zone accident than a highway worker is.

### Activity C: Answer Key

E			S	A	F	E	T	Y								V		A	
N						N	O	I	T	S	E	G	N	O	C		R		L
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F					Q	G	E									R	B		O
		R			U	C	E									E	A		H
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## Awareness of Your Surroundings: Making Sense of It All

*Lesson Objective: To make students aware of one of the leading causes of accidents in regular travel and in work zones -- driver inattention. Students need to be alert to and aware of activities around them when driving.*

Ask students: Can you think of any instance in which exercise may *not* benefit your health?

*Possible answers:*

- *When you are not in shape/condition*
- *When you overdo*
- *When you work out in extreme conditions – too hot, too cold*
- *When you don't wear the proper safety equipment*
- *When you don't take the proper precautions*
- *When your choice of exercise puts you in close contact with an automobile*

As a jogger, bicyclist, or walking enthusiast, you need to be aware of everything going on around you. As a driver, you need the same sense of awareness. Awareness of your surroundings, to activities taking place around you, is key to automobile safety.

### **Activity D:**

Close your eyes. For the next 30 seconds there is to be no talking – just listen. At the end of the 30 seconds you will quickly write down everything you heard during that timeframe.

*(At the end of your selected timeframe, allow students an equal amount of time to jot down their answers.)*

Now, with your eyes open, let's try again. Do not talk. Observe and write down as many things as possible of which you are aware. *(Allow a selected timeframe to elapse.)*

Did your list increase? Why? *(Allow students to offer reasons.)* By using all of your senses, you were able to increase your awareness of things around you. Statistically, driver inattention is one of the leading causes of accidents. As a driver you must use every resource available to stay alert!

**Alternate activity/homework:** Make a list illustrating how each of your senses may provide information helpful in the driving task.

## **Road Rage: Physical and Emotional Reactions to the Driving Experience**

*Lesson objective: New drivers will begin to associate road congestion and delays to the potential for road rage.*

From all accounts--interviews with family members, friends – Shirley Henson and Gena Foster were responsible, middle-class women. They were both mothers who played an active role in their children’s lives while maintaining employment outside their homes. In November 1999, Henson and Foster became tragic statistics.

The *Washington Post* characterized the women’s **only** meeting as follows:

*The two drivers had been battling for about four miles, jousting for position in the congested rush-hour traffic streaming homeward from Birmingham along southbound Interstate 65. After one vehicle cut off the other one, they played a cat-and-mouse game, tailgating, lane-changing, slamming on brakes until they got off at the same exit.*

What happened next changed the lives of Henson, her family, Foster’s family and members of their community; it ended Gena Foster’s life.

After pulling off at the exit, Foster pulled in front of Henson and “bolted from her car.” According to witnesses, “She was mad. Her eyes were wide,” and she was yelling and gesturing as she approached the partly open driver’s side window. Henson shot Foster in the face, dropped the gun on the seat of the car and picked up her cellular phone to call 911. *NOTE: In December 2000, Henson was sentenced to 13 years in prison for manslaughter, with a minimum of 4 ½ years before parole.*

**Activity E:** In order to facilitate understanding of road rage/aggressive driving, have students share “road rage” experiences either through brainstorming, group/individual activity or homework.

The following activities will help to determine what might be happening physically and emotionally to drivers behind the wheel. New drivers will analyze the effects of emotions on the driving experience by developing responses for the following questions through brainstorming, group/individual activity or homework.

## Reactions to the Driving Experience

**Activity F:** Either by brainstorming, group/individual activity or homework, students will answer the following and discuss as an effort to analyze the effects that emotions have on the driving experience. *(Possible responses follow) Reproducible worksheet in Appendix.*

- (1) What are some of the physical and emotional reactions you might have to driving, especially in congestion or when you are delayed?

*Feeling more stress*

*Swearing, yelling and/or gesturing*

*Speeding*

*Honking the horn*

*Running lights and stop signs*

*Reving engine*

*Hitting the steering wheel*

*Dilated pupils and/or blood vessels*

*Sweaty palms*

*Tailgating, cutting others off*

*Fantasizing about violence*

*Feeling compassion for other drivers*

*Rapid heartbeat*

*Weaving in and out of traffic*

- (2) How might these reactions affect your ability to drive safely? How might these reactions affect motorists around you?

*These reactions might hinder your ability to drive safely. You might become aggressive and/or take unnecessary and unsafe risks. Motorists around you might react adversely to your actions. Your behavior, etc. might be the fuel for their "fire."*

- (3) What causes these reactions?

*Tailgaters*

*Lines of traffic*

*People pulling in front of me in line*

*People speeding up and slowing down*

*Slow drivers*

*Others running lights and signs*

*People driving over the lines or in and out of traffic*

*People who pull in front of me without enough space*

- (4) What are some of the possible consequences of allowing your emotional or physical reactions to affect your driving style?

*Accident resulting in property damage*

*Fines, jail time*

*Injury/death to self and/or others*

- (5) What can you do to control (or lessen) these reactions?

*Deep breathing exercises*

*Avoid eye contact*

*Count to "10"*

*Drive to somewhere safe, then stop and calm down*

- (6) What is the cause/effect relationship between work zones and "road rage"?

*Studies continue to be conducted to understand any possible relationship; however, no direct correlation has been discovered. Indirectly, studies have shown that emotional reactions occur as a result of unexpected delays. Delays are an aspect of highway construction and maintenance.*

**Activity G:** Use the following exercise to reinforce reading/writing/problem-solving skills while continuing to develop an understanding of the effects of emotions on the driving experience. Have new drivers determine:

1. what this driver might have been feeling emotionally
2. what physical reactions she might have been experiencing
3. specifically, what words identify these feelings and/or reactions
4. what happened to possibly create a negative driving experience
5. what could have been done to prevent (or lessen) the negative effects  
(*Reproducible handout in Appendix*)

**Activity G:  
Situational problem: Aggressive Driving?**

Read the following situational problem and determine:

- what this driver might have been feeling emotionally,
- what physical reactions she might have been experiencing,
- what specific words identify these feelings and/or reactions.
- what happened to possibly create a negative driving experience, and
- what could have been done to prevent (or lessen) the negative effects.

Jackie Alexander plans to meet her friends at the mall after school on Friday. She's going to run a few errands before joining her family for a vacation weekend. As the last bell of the day sounds, she grabs her purse and leaves.

Greeting friends in the hallway, Jackie pushes open the building door and heads toward her car.

"See you in the Food Court," yells her best friend, Tara, "in about 30 minutes."

Jackie nods in acknowledgement, unlocks her car door and slides into the front seat. The fluttering of a paper under her windshield wiper draws her attention. The note from her mother reads:

*Jackie, I have to run into the office for a while before we leave. You need to pick up Nathan at school at 3:00 and take him to put Sparky in the vet's for the weekend. I will be home no later than 5:00 so we can hit the road!*

Glancing at her watch, Jackie sees that it is already 1:15. She mutters to herself, starts the car and pulls out onto the highway.

"You need to pick up Nathan," she echoes in a singsong voice. After turning on the radio, she reaches into the back seat for her purse and cell phone. The purse drops to the back floorboard.

*(Continued on next page)*

“Great,” she barks and leans further over.

“Honk! Honk! Honk!” The sound of a horn draws her attention back to the road.

“Get in your own lane, lady,” bellows another driver from the passing lane.

Jackie turns around and drives quickly away from the angry words. As traffic slows in front of her, Jackie again reaches for the purse and phone. The purse has slid under the seat out of reach. The honking of a horn behind her causes her to pull her foot off the brake. Startled, she slams her foot down on the gas pedal and barely misses the highway flagger trying to slow her down.

Hearing a siren, she glances in her rearview mirror at the flashing lights of the police vehicle. She pulls quickly to the side to allow him to pass. The policeman pulls in behind her.

“Great! Just great! Now I’m going to be really late,” she grumbles.

Forty minutes later – with ticket in hand – she pulls into the mall parking lot.

“You’re late,” exclaims Tara. “I’d almost given up on you.”

Wildly gesturing, Jackie tells Tara about the “stupid policeman” who gave her a ticket “because the state is working on some dumb road!”

“And now,” she continues, “my folks are going to kill me. I’ll probably have to pay the stupid thing from my allowance and I’ll never have any money for clothes and stuff.”

“Forget it. Let’s shop,” offers her friend.

“I have to call my mom first and tell her that I can’t pick up my little brother,” Jackie responds while dialing her phone. “Mom, hey! I’m at the mall and I can’t pick ...”

“At the mall?” her mother asks. “Didn’t you get my message? You need to pick your brother up in less than an hour. What’s wrong with you, Jackie?”

“I made plans to shop with Tara today. You were supposed to pick up the brat.”

“We will talk about this when I get home. I don’t have time for this. Get in the car and go get your brother,” her mother said. “If you’re at the mall you can go by and pick up Sparky first and then get your brother. Once you’ve taken care of that you can park that car until your father and I have had a chance to discuss your attitude.”

Click! After quickly speaking to Tara, Jackie heads to her car to go do what she has been told.

***What happens next to Jackie? You decide.***



## Speed and Distance How Fast is Fast Enough?

*Lesson Objective: To teach students the relationship between speed and distance.*

Motorists often complain it is the delays they encounter that make them angry when they are behind the wheel. It seems simple enough: you have to go 15 miles across town to a wedding, the speed limit is 30 miles an hour, so you need 30 minutes to get there, right? If only it were so simple.

There are many variables that need to be taken into account when planning any trip. The first thing is to allow ample time. In the example above, driving through a residential area may seem easy enough but what might affect travel time? Could travel time be different on different days of the week or during different timeframes?

When you see black and white rectangular signs posted along the roadways that read: Speed Limit 25 mph, what do they mean? (*Possible responses: You can drive 25 miles per hour, You can't go any faster than 25 mph*) What do you call these signs? (*Response: Speed limit signs*)

**Activity H:** Either in small groups or as individuals, students will produce a list of suggested criteria for determining the speed limit on roadways under various conditions – wet weather, nighttime, work zones, etc. Have students discuss the reasons for their choices.

Speed limits are determined based upon several factors, including the roadway design, location and use.

Maximum speed limits are set in the Code of Virginia. According to the Code, maximum speed limits are:

- 55 mph on interstate highways or other limited access highways with divided roadways, non-limited access highways having four or more lanes, and all state primary highways,
- 55 mph on all other highways if the vehicle is a passenger motor vehicle, bus, pickup or panel truck, or a motorcycle, or
- 45 mph if the vehicle is a truck, tractor truck, or combination of vehicles designed to transport property or is a motor vehicle being used to tow a vehicle designed for self-propulsion, or a house trailer,
- 65 mph on highways constructed pursuant to the Virginia Highway Corporation Act of 1988, rural interstate where permitted by federal law and properly signed, or other limited access highway in any county having a population of at least 45,700 but no more than 45,800 and properly signed.

*(Continued on next page)*

- 45 mph for school buses or the minimum speed allowable on any highway other than interstate and 55 mph on interstate highways. The maximum speed limit for school buses picking up and discharging students is 35 mph between the first stop and the last stop, not including the school,
- 25 mph at school crossings,
- 25 mph in business and residential districts, except on interstate or other limited access highways with divided roadways,
- 35 mph in cities and towns, except on interstate or other limited access highways with divided roadways and in business or residential districts.

The speed limit in VDOT highway work zones is determined by VDOT's Mobility Management staff. Several factors help to set that speed:

- physical length of the work zone,
- type of work taking place and equipment used,
- topography,
- safety of crews and traveling public, and
- inconvenience to traveling public.

At times, it is in the best interest of VDOT and the public to maintain the current travel speed.

## Work Zone Safety Traffic Control Devices

### Know the Signs and the Lights

*Lesson Objective: Highway construction workers depend upon drivers to notice and obey work zone signs and directions. The goal of the following is to assist new drivers in recognizing traffic control devices and work zones and, therefore, in helping workers.*

**The #1 rule of work zone recognition: *The color orange designates a highway work zone.*** When you see orange, slow down and pay attention to the warning devices and signs.

There are four types of traffic control devices commonly used in work zone traffic control:

- ◆ Signs
- ◆ Channelizing devices
- ◆ Lighting devices
- ◆ Truck-mounted attenuators

The first device to be discussed is signs. Signs used in work zone traffic control are classified as regulatory, guide or warning. *Regulatory signs* impose legal restrictions and may not be used without permission. *Guide signs* commonly show destinations, directions and distances. *Warning signs* give notice of conditions that are potentially hazardous to traffic.

The signs with which most drivers in work zones are familiar are warning signs. These signs are normally 48" x 48" diamond-shaped with a black symbol or message on an orange background. Generally, the signs are located on the right side of the roadway or on the right and left sides of roadways divided by an 8' or greater median.

Warning signs intended for nighttime use are fabricated of fluorescent orange prismatic lens sheeting or white encapsulated lens sheeting; those intended for daytime use may be either the fluorescent orange prismatic lens sheeting or an approved flexible sign material.

Advance warning signs are spaced according to highway speeds. Why does the speed of travel affect the placement of these signs? Spacing information follows:

Urban street with 35 mph or less posted speed	250'+
Roadway with 45 mph or less posted speed	350' – 500'
Roadway with greater than 45 mph posted speed (non-limited access)	500' – 800'
Limited Access Highways	1000' – 1500'

Channelizing devices are used to warn drivers of hazards in work zones, to protect workers, and to safely guide and direct drivers past the hazards. Channelizing devices include cones, tubular markers, drums, temporary raised islands, and barriers. The most common channelizing device used in short-term work sites is the traffic cone.

Traffic cones must be orange in color and a minimum of 36" tall. Those used at night must be marked with reflective materials of designated widths placed at designated points.

Other channelizing devices include tubular markers, drums and barricades. Tubular markers are also orange and 36" tall. They are used to mark lanes for both short- and long-term work sites. The drums are 36" tall and a minimum of 18" wide. They are marked with orange and white stripes six inches wide and are used to delineate unmanned work areas. One of the keys to barricades is the stripes on the rails. The stripes slope downward at an angle of 45 degrees in the direction traffic is to pass.

Like signs, channelizing devices are spaced based on the posted speed and the location of the work zone to make it apparent that the roadway or work area is closed to traffic.

Typical lighting devices used for short-term construction, maintenance, and utility work are designed to supplement signs and channelizing devices. Lighting devices include warning lights, vehicle lights and flashing arrow panels. For vehicles, lighting enhances their recognition factor as a slow-moving hazard.

When a lane and/or partial ramp closure occurs on roadways of four or more lanes with a posted speed limit of 45 mph or greater, a truck-mounted attenuator (TMA) vehicle is required. Other situations may require the use of the TMA and the decision to do so is the responsibility of each VDOT District Traffic Engineer. The TMA is placed 50' – 100' in front of the first work crew, equipment or hazard that motorists encounter. At least one rotating amber light or high-intensity amber strobe is also used when the TMA is functioning.

To test the students' understanding of the use of work zone safety traffic control devices, allow students to complete the following exercise either as individual or group work, in class or as homework.

*(Continued on next page)*

## Activity I: Work Zone Safety Traffic Control Devices

To measure your understanding of work zone safety traffic control devices, respond appropriately to each of the following statements:

1. The four types of traffic control devices commonly used in work zone traffic control are:  

<u>Signs</u>	<u>Channelizing devices</u>
<u>Lighting devices</u>	<u>Truck-mounted attenuators</u>
2. Symbols and messages on warning signs are black on an orange background.
3. Three types of signs are used in work zone traffic control.  
Regulatory signs impose legal restrictions and may not be used without permission.  
Guide signs show destinations, directions and distances.  
Warning signs give notice of conditions that are potentially hazardous to traffic.
4. The spacing of advance warning signs is determined by highway speed.
5. The direction of the stripes on barricades indicate the direction in which traffic is to pass.
6. Channelizing devices include cones and tubular markers. (Drums, temporary raised islands and barriers are also acceptable answers.)
7. The most commonly used channelizing device is the traffic cone.
8. Warning signs are normally diamond -shaped.
9. Fluorescent orange prismatic lens sheeting is used to fabricate signs used at night.
10. To delineate unmanned work areas, barrels are used.
11. Most channelizing devices are a minimum of 36" tall.
12. Warning signs normally are placed on the right side of the street or highway.

### Activity J: Answer Key

Instructions: Match the device to the description



- A. Indicates a travel lane is occupied.  
*Fifth sign – four lights at corners*
- B. Indicates that all lanes shift to the right.  
*First sign – three arrows*
- C. Indicates that the center lane is closed, move or merge right or left.  
*Third sign – double-ended arrow*
- D. Indicates that there is a flagger ahead directing the flow of traffic through the work zone.  
*Last sign – flagger figure and 500 feet*
- E. Indicates that the right travel lane is ending requiring the driver to merge left.  
*Fourth sign – straight left side, angled right side*
- F. Indicates that the roadway is divided ahead.  
*Second sign – curved opposing arrows around divider*
- G. Indicates that there is opposing traffic in each lane. Used when one roadway of a normally divided highway is closed.  
*Sixth sign – straight opposing arrows*

## Preparing to Drive: Before You Go!

*Lesson Objective: To learn how to plan routes and gather information to avoid delays.*

When your alarm goes off in the morning, what is the first thing you do? Do you get up, run out the door and head off to school?

That's not likely. You have a routine schedule you follow and you may not even be aware that you do so.

### **Activity K:**

List *in order* the first ten things you do upon awakening each school morning. (Allow several students to read lists (or partial lists) aloud and for others to add things they might have missed to their lists.)

You should now recognize that you have a pattern you follow. You have established certain habits that begin your day. It is important to establish a routine in which you begin each driving experience.

### **Activity L:** Allow students to brainstorm the following questions

How can you prepare for the presence of highway work zones? What steps can be taken to mitigate inconvenience?

One of the first steps you can take to deal with work zones is to know their locations. Many newspapers run weekly "road reports" or work zone columns; numerous radio stations do daily traffic reports. VDOT provides information on the Web at [VirginiaDOT.org](http://VirginiaDOT.org). Live traffic camera images in certain urban areas, such as Washington, D.C. and Hampton Roads, can be viewed on this site or on a number of television outlets. VDOT also publishes a "Road Construction Ahead" brochure highlighting projects on major roadways throughout the state. Other opportunities for information may be available in your area.

If you know a work zone is going to create delay, leave home early. Allow extra time. Use an alternate route or public transportation. In short, plan ahead.

## Appendix

### Reproducible worksheets:

Activity B: "A Sudden Change of Plans"	24
Work Zone Statistics	25-27
Activity C: Complete Sentences and Word Puzzle	28-29
Activity F: Physical and Emotional Reactions to Driving	30
Activity G: Situational Problem: Aggressive Driving?	31-32
Activity I: Work Zone Safety Traffic Control Devices	33
Activity J: Match the device to the description	34

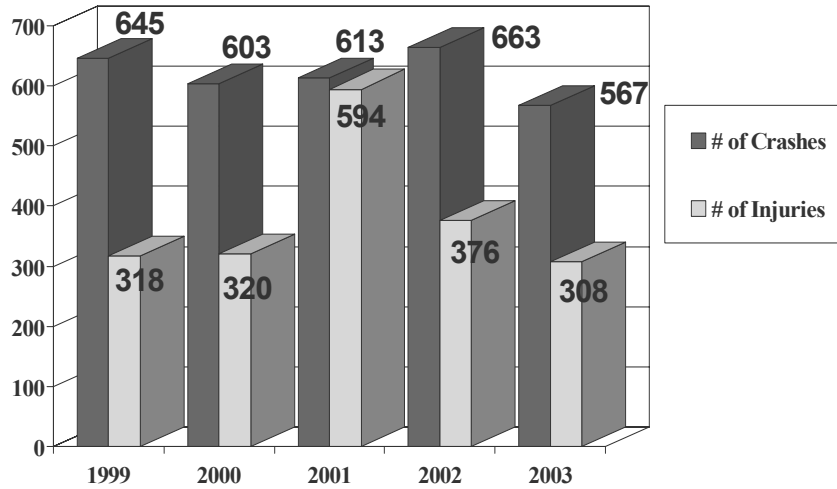


**Activity B:  
Work Zone Safety  
“A Sudden Change of Plans”**

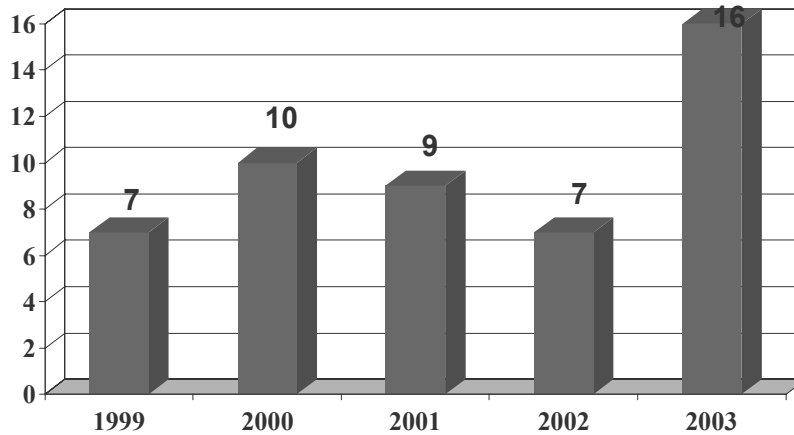
- (1) What are the Three R’s of work zone safety?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (2) What is a work zone and how is one recognized?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (3) What are some of the distractions you might encounter in work zones?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (4) How should you react in a work zone to manage the risks?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (5) If you have an accident in a work zone and someone is hurt or killed, what penalty or penalties might apply?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (6) What is the penalty for speeding in a work zone?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- (7) Reviewing the statistics provided, what trend(s) is/are occurring in work zone safety? Why?

## Work Zone Statistics

### Work Zone Crashes/Injuries on State Roadways from 1999-2003



### Work Zone Fatalities on State Roadways from 1999-2003



## Virginia Work Zone Crash Statistics 2003 Statewide Summary

Crashes      567  
Injuries      308  
Fatalities     16

VDOT DISTRICT	# OF CRASHES	# OF INJURIES	# OF FATALITIES
Bristol	37	27	0
Culpeper	26	10	1
Fredericksburg	26	12	1
Hampton Roads	22	20	1
Lynchburg	20	6	2
Northern Virginia	224	110	5
Richmond	102	64	6
Salem	86	48	0
Staunton	24	11	0
<b>TOTAL</b>	<b>567</b>	<b>308</b>	<b>16</b>

\* Figures are unavailable at this time.

**-VDOT Districts include these counties and cities:**

**Bristol:** Bland, Buchanan, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe.

**Culpeper:** Albemarle, Culpeper, Fauquier, Fluvanna, Greene, Louisa, Madison, Orange, Rappahannock.

**Fredericksburg:** Caroline, Essex, Gloucester, King George, King and Queen, King William, Lancaster, Mathews, Middlesex, Northumberland, Richmond, Spotsylvania, Stafford, Westmoreland.

**Hampton Roads:** Accomack, Greensville, Isle of Wight, James City, Northampton, Southampton, Surry, Sussex, York; cities of Chesapeake, Emporia, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg.

**Lynchburg:** Amherst, Appomattox, Buckingham, Campbell, Charlotte, Cumberland, Halifax, Nelson, Pittsylvania, Prince Edward.

**Northern Virginia:** Arlington, Fairfax, Loudoun, Prince William.

**Richmond:** Amelia, Brunswick, Charles City, Chesterfield, Dinwiddie, Goochland, Hanover, Henrico, Lunenburg, Mecklenburg, New Kent, Nottoway, Powhatan, Prince George.

**Salem:** Bedford, Botetourt, Carroll, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pulaski, Roanoke.

**Staunton:** Alleghany, Augusta, Bath, Clarke, Frederick, Highland, Page, Rockbridge, Rockingham, Shenandoah, Warren.

## Work Zone Safety Statistics and Fact Sheet

### Top Five Offenses Charged in 2003 Work Zone Crashes:\*

6. Following Too Close
7. Reckless Driving - General
8. Failure to Maintain Control
9. Failure to Yield Right-of-Way
10. Improper Lane Change

### Type of Roadway Where 2003 Work Zone Crashes Occurred:\*

4. Primary (41.3%)
  5. Interstate (36.7%)
  6. Secondary (22.0%) *(In Virginia, these are non-interstate roads numbered 600 and higher)*
- On average from 1999-2003, 14.2% of the fatalities resulting from crashes in work zones were non-motorists (pedestrians and bicyclists). #
  - Approximately 48,000 people per year are injured as a result of motor vehicle crashes in work zones. #
  - Between 1999 and 2003, almost half of all work zone crashes occurred during the day and about 70% of fatal, large-truck work zone crashes occurred during the day. #
  - During the same timeframe, almost 64% of work zone crashes occurred on weekdays. #

### **Nationwide Work Zone Fatalities for a 10-Year Period: ^**

<b>1994</b>	<b>828</b>
<b>1995</b>	<b>789</b>
<b>1996</b>	<b>717</b>
<b>1997</b>	<b>693</b>
<b>1998</b>	<b>772</b>
<b>1999</b>	<b>872</b>
<b>2000</b>	<b>1026</b>
<b>2001</b>	<b>989</b>
<b>2002</b>	<b>1186</b>
<b>2003</b>	<b>1023</b>

\* Highway Traffic Records Inventory System (VDOT)

# <http://www.atssa.com/public/downloads/CMZONE03.PDF>

^National Center for Statistics and Analysis, <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/nrsa/>

### Activity C:

Complete sentences below. Locate and circle underlined words in puzzle.

1. \_\_\_\_\_ impairs a driver's ability to drive.
2. An individual's anger behind the wheel may escalate to the point of \_\_\_\_\_.  
\_\_\_\_\_. (Two words, appear together in puzzle)
3. The Virginia Department of \_\_\_\_\_ builds and maintains roads throughout the Commonwealth.
4. The color \_\_\_\_\_ on warning signs alerts motorists to highway construction/maintenance zones ahead.
5. A \$500 \_\_\_\_\_ may be levied on drivers exceeding the posted speed in a highway work zone.
6. A driver's license is a \_\_\_\_\_, not a right.
7. State troopers in helicopters monitor speed limits on major highways. The slang term for one of these is "a \_\_\_\_\_ in the air."
8. When you are behind the wheel, you are \_\_\_\_\_ for your safety and that of others around you.
9. Road crews wear safety \_\_\_\_\_, including hard hats and vests as protection and to alert motorists to their presence.
10. More vehicles on the highways may result in increased \_\_\_\_\_.
11. The work zone is the highway worker's \_\_\_\_\_.
12. Traffic signals, cones and barriers are safety control \_\_\_\_\_.
13. Don't change lanes or \_\_\_\_\_ in highway work zones.
14. There are two types of highway work zones, stationary and \_\_\_\_\_.
15. Stop signs are red in color and \_\_\_\_\_ in shape.
16. Traffic signals are \_\_\_\_\_, amber and green in color.
17. The goal of every student in Drivers' Education is to earn a \_\_\_\_\_.
18. With the popularity of cell phones increasing, driver \_\_\_\_\_ has become a greater problem.
19. The Virginia Road and Transportation Builders Association (\_\_\_\_\_) is comprised of contractors, suppliers and engineers involved in Virginia's transportation construction industry.
20. \_\_\_\_\_ is no accident!
21. \_\_\_\_\_ workers – Give 'em a Brake!
22. In the Commonwealth of Virginia, the Department of \_\_\_\_\_ Vehicles issues driver's licenses.
23. Unless otherwise posted, maintain your vehicle's \_\_\_\_\_ when traveling through highway work zones.
24. Be \_\_\_\_\_ for the unexpected when traveling on our highways.
25. Statistically, a \_\_\_\_\_ is more likely to be injured in a work zone accident than a highway worker.

### Activity C:

E	X	R	S	A	F	E	T	Y	L	J	D	Q	M	C	A	Z	V	G	A
N	K	Y	T	U	S	N	O	I	T	S	E	G	N	O	C	I	R	Y	L
I	D	C	R	Q	E	J	N	F	L	M	O	T	O	R	I	S	T	P	C
F	K	Y	I	B	Q	G	E	A	Z	D	X	S	E	J	L	R	B	D	O
U	C	R	F	S	U	C	E	K	R	K	C	F	V	U	T	E	A	L	H
L	E	H	L	B	I	Y	H	L	P	B	N	Y	Z	F	N	S	L	J	O
D	U	J	K	F	P	U	M	B	I	O	K	L	N	B	D	P	I	B	L
B	H	L	F	O	M	S	H	M	I	V	R	O	D	S	C	O	A	Q	E
L	D	O	M	H	E	Z	R	T	P	C	I	P	E	C	J	N	L	S	R
E	P	C	D	L	N	O	N	O	Y	T	I	R	E	N	K	S	F	M	S
N	I	T	H	J	T	E	G	F	A	N	K	Y	P	U	D	I	J	B	Y
C	M	A	S	B	T	G	T	T	W	D	R	L	S	E	F	B	K	V	K
D	Y	G	C	T	K	B	R	C	H	K	R	M	R	H	Z	L	A	Q	F
R	N	O	A	F	E	O	D	W	G	C	S	A	X	F	Y	E	S	M	I
O	C	N	K	V	P	R	L	Z	I	B	P	O	G	N	B	D	M	O	G
T	I	A	E	S	Z	A	X	K	H	E	Y	L	Q	E	U	K	H	B	J
O	P	L	N	A	I	N	D	S	R	H	F	K	D	C	Y	N	U	I	S
M	D	A	C	F	H	G	C	P	K	N	I	E	S	N	E	C	I	L	K
Q	R	I	S	M	D	E	V	I	C	E	S	R	T	L	L	B	N	E	P
T	J	L	Y	B	K	C	X	N	G	F	F	I	J	B	E	A	R	H	U

**Activity F:  
Physical and Emotional Reactions to Driving**

- (1) What are some of the physical and emotional reactions you might have to driving, especially in congestion or when you are delayed?
  
  
  
  
  
  
  
  
  
  
- (2) How might these reactions affect your ability to drive safely? How might these reactions affect motorists around you?
  
  
  
  
  
  
  
  
  
  
- (3) What causes these reactions?
  
  
  
  
  
  
  
  
  
  
- (4) What are some of the possible consequences of allowing your emotional or physical reactions to affect your driving style?
  
  
  
  
  
  
  
  
  
  
- (5) What can you do to control (or lessen) these reactions?
  
  
  
  
  
  
  
  
  
  
- (6) What is the cause/effect relationship between work zones and “road rage”?

## **Activity G: Situational problem: Aggressive Driving?**

Read the following situational problem and determine:

- what this driver might have been feeling emotionally,
- what physical reactions she might have been experiencing,
- what specific words identify these feelings and/or reactions,
- what happened to possibly create a negative driving experience, and
- what could have been done to prevent (or lessen) the negative effects.

Jackie Alexander plans to meet her friends at the mall after school on Friday. She's going to run a few errands before joining her family for a vacation weekend. As the last bell of the day sounds, she grabs her purse and leaves.

Greeting friends in the hallway, Jackie pushes open the building door and heads toward her car.

"See you in the Food Court," yells her best friend, Tara, "in about 30 minutes."

Jackie nods in acknowledgement, unlocks her car door and slides into the front seat. The fluttering of a paper under her windshield wiper draws her attention. The note from her mother reads:

*Jackie, I have to run into the office for a while before we leave. You need to pick up Nathan at school at 3:00 and take him to put Sparky in the vet's for the weekend. I will be home no later than 5:00 so we can hit the road!*

Glancing at her watch, Jackie sees that it is already 1:15. She mutters to herself, starts the car and pulls out onto the highway.

"You need to pick up Nathan," she echoes in a singsong voice. After turning on the radio, she reaches into the back seat for her purse and cell phone. The purse drops to the back floorboard.

"Great," she barks and leans further over.

"Honk! Honk! Honk!"

The sound of a horn draws her attention back to the road.

"Get in your own lane, lady," bellows another driver from the passing lane.

*(Continued on next page)*



Jackie turns around and drives quickly away from the angry words. As traffic slows in front of her, Jackie again reaches for the purse and phone. The purse has slid under the seat out of reach. The honking of a horn behind her causes her to pull her foot off the brake. Startled, she slams her foot down on the gas pedal and barely misses the highway flagger trying to slow her down.

Hearing a siren, she glances in her rearview mirror at the flashing lights of the police vehicle. She pulls quickly to the side to allow him to pass. The policeman pulls in behind her.

“Great! Just great! Now I’m going to be really late,” she grumbles.

Forty minutes later – with ticket in hand – she pulls into the mall parking lot.

“You’re late,” exclaims Tara. “I’d almost given up on you.”

Wildly gesturing, Jackie tells Tara about the “stupid policeman” who gave her a ticket “because the state is working on some dumb road!”

“And now,” she continues, “my folks are going to kill me. I’ll probably have to pay the stupid thing from my allowance and I’ll never have any money for clothes and stuff.”

“Forget it. Let’s shop,” offers her friend.

“I have to call my mom first and tell her that I can’t pick up my little brother,” Jackie responds while dialing her phone. “Mom, hey! I’m at the mall and I can’t pick ...”

“At the mall?” her mother asks. “Didn’t you get my message? You need to pick your brother up in less than an hour. What’s wrong with you, Jackie?”

“I made plans to shop with Tara today. You were supposed to pick up the brat.”

“We will talk about this when I get home. I don’t have time for this. Get in the car and go get your brother,” her mother said. “If you’re at the mall you can go by and pick up Sparky first and then get your brother. Once you’ve taken care of that you can park that car until your father and I have had a chance to discuss your attitude.”

Click!

After quickly speaking to Tara, Jackie heads to her car to go do what she has been told.

***What happens next to Jackie? You decide.***

## Activity I: Work Zone Safety Traffic Control Devices

To measure your understanding of work zone safety traffic control devices, respond appropriately to each of the following statements:

1. The four types of traffic control devices commonly used in work zone traffic control are:

\_\_\_\_\_

\_\_\_\_\_

2. Symbols and messages on warning signs are \_\_\_\_\_ on an \_\_\_\_\_ background.

3. Three types of signs are used in work zone traffic control.

\_\_\_\_\_ signs impose legal restrictions and may not be used without permission.

\_\_\_\_\_ signs show destinations, directions and distances.

\_\_\_\_\_ signs give notice of conditions that are potentially hazardous to traffic.

4. The spacing of advance warning signs is determined by \_\_\_\_\_.

5. The direction of the stripes on barricades indicate the \_\_\_\_\_.

6. Channelizing devices include \_\_\_\_\_ and \_\_\_\_\_.

7. The most commonly used channelizing device is the \_\_\_\_\_.

8. Warning signs are normally \_\_\_\_\_ shaped.

9. \_\_\_\_\_ orange prismatic lens sheeting is used to fabricate signs used at night.

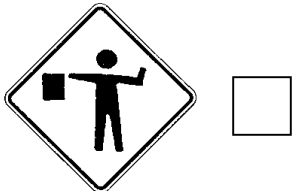
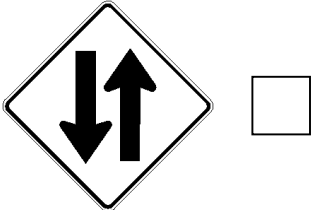
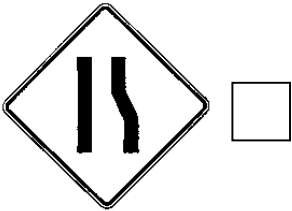
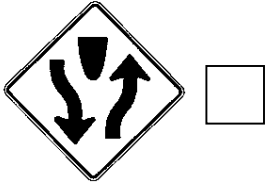
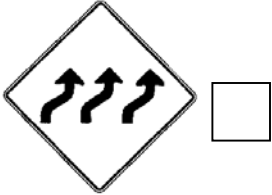
10. To delineate unmanned work areas, \_\_\_\_\_ are used.

11. Most channelizing devices are a minimum of \_\_\_\_\_" tall.

12. Warning signs normally are placed on the \_\_\_\_\_ side of the street or highway.

**Activity J: Answer Key**

**Instructions: Match the device to the description**



- A. Indicates a travel lane is occupied.
- B. Indicates that all lanes shift to the right.
- C. Indicates that the center lane is closed, move or merge right or left.
- D. Indicates that there is a flagger ahead directing the flow of traffic through the work zone.
- E. Indicates that the right travel lane is ending requiring the driver to merge left.
- F. Indicates that the roadway is divided ahead.
- G. Indicates that there is opposing traffic in each lane. Used when one roadway of a normally divided highway is closed.