

Class 1 Mandatory Entry Level Training Practical Training Lesson Plans



MELT Class 1
Practical Training
Lesson Plans

Acronyms used in this manual

ABS – Anti-lock braking system

DVIR – Driver’s vehicle inspection report form

HOS – Hours of service

MELT – Mandatory entry level training

NSC – National Safety Code

PSI – Pounds per square inch (refers to air pressure)

RPM – Revolutions per minute (refers to engine speed)

Information in the guide is partly based on *Learning systems for driving instructors, Heavy motor vehicles* (2010). Adapted with permission from New Zealand Transport Agency.

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These lesson plans supplement B.C. Class 1 MELT classroom materials and address skills and knowledge that can be used for either novice or more experienced students. This allows driving instructors (including company trainers) to select the appropriate learning points from the lesson plans to suit specific needs.

While many learning points appear to be repeated across a range of different lesson plans, this is deliberate as each lesson portion is designed to stand on its own as well as being part of a larger training program. A novice driver might need to start off with the basic lessons and progress gradually through to the more advanced lessons. A more experienced driver — someone who already holds a commercial class licence — might only need to receive instruction in some of the more advanced lessons or components of them.

Responsibilities and attributes of a driving instructor

Driving instructors are critical to the driver education process as they offer a source of professional instruction which provides a means to improve driving standards for both new and experienced drivers.

While delivering training, instructors must comply with the standards set by B.C.

Driving instructors are required to:

1. Have a thorough working knowledge of appropriate driving practices (in relation to industry best practice and legislative requirements) and driver licensing requirements.
2. Have a good working knowledge of general mechanical principles and vehicle technology and dynamics related to commercial vehicles.
3. Be able to demonstrate professional personal driving skills and techniques.
4. Ensure that there is no physical contact with students during the delivery of driving instruction. The only exceptions would be when engaging in normal acceptable forms of greetings or farewells (e.g., a handshake) and in an emergency situation where an instructor must take control of the vehicle.
5. Be sensitive to issues relating to culture, gender, sexual orientation, religion.
6. Use discretion with student's personal information and understand the effects and provisions of the Privacy Act.

7. Ensure that the safety and well-being of students and the general public is paramount at all times.
8. Display professionalism in all aspects of driver training and assessment.
9. Project an image that reflects positively upon the driver training industry.
10. Have a culture of continuous course quality improvement. This includes regular course and instructional evaluation.
11. Provide students with a safe and positive learning environment that is free from unnecessary distractions. This includes silencing all cell phones during driving instruction.
12. Continue to meet B.C. requirements to hold an instructor licence. Any substantiated complaints, traffic or criminal offending may result in a review (and possible revocation) of this licence.
13. Retain records of any driving instruction provided for at least six years.
14. Ensure that any practical driving instruction is carried out in a vehicle that meets all provincial legal requirements and is maintained to certificate of fitness standard at all times.
15. Ensure that any person receiving practical driving instruction holds and carries a valid and appropriate class driver licence.
16. Comply with any other requirements made in writing by ICBC.

Lesson plan layout

The layout for each lesson plan has been standardized and includes the following:

1. An introduction that provides information and context for instructors to begin the lesson.
2. Learning outcomes from the MELT framework addressed (or partially addressed) in the lesson.
3. References to publications or regulations (if applicable) that will provide further information, when required.
4. A performance objective that describes the general standard that must be achieved to be judged as competent.
5. Recommended review (if applicable) of any previous relevant knowledge or skills learned (this should be a component of any lesson).
6. Instructor notes that provide guidance and ideas for teaching the lesson. Instructors can add their own notes.

7. Learning points that should be addressed through instruction and completed when the student is able to demonstrate competency. The order of the learning points or steps may be changed to match how schools or instructors prefer to perform the tasks, for example pre-trip inspection.
8. Common faults and suggested responses to them are also provided. Additions can be made to this list to reflect the instructor's personal experiences and knowledge.

Progression of learning

Practical training needs to be flexible and there are different approaches used by driving instructors. This will depend on the student's previous experience, innate ability, the training location, and school preferences. For example, some instructors start on-road lessons bobtail — to provide fewer tasks initially, while others will start lessons with a trailer — either unloaded or loaded.

Many drivers have no experience with manual transmissions — training for these students must start from scratch. Each student will have specific training needs and some will progress faster than others. A competent driver should be able to consistently achieve all of the relevant learning points in this manual.

Roadway and traffic complexity

Where possible, start on-road lessons in quieter locations and at quieter times of the day. This will make it possible for both student and instructor to focus on fewer tasks and deal with fewer hazards to start with. Ensure you're aware of truck routes in the area and what areas may restrict commercial vehicles based on time of day (typically in urban centres), or what secondary roads may be restricted in the spring due to seasonal weight restrictions.

If you're planning to teach in a new or unfamiliar area, spend time exploring it so there are no surprises.

Generally, levels of road and traffic complexity include:

- Easy roads — flat roads with no or very little traffic, simple intersections with good width and visibility, intersections with and without stop signs, open highway with little traffic and no steep hills.
- Moderate — some traffic, intersections with lights, roundabouts, multi-laned roads, freeway with long exit and merge lanes, and moderate hills.
- Complex intersections with sign restrictions — tight right and left turns, dual right and left turns, a lot of pedestrians and other traffic.
- Steep grades — steep urban hills and mountain roads.

Things to consider when choosing routes:

- Time of day — how busy the roads will be.
- Level of light — in the dark, roads with good street lighting provide better visibility.
- Clearance — width of road and proximity to overhead obstructions such as trees, lamp posts and so on.
- Road camber on narrow roads or right hand lanes — the slope of the road may cause the unit to tilt, causing the top of trailer to hit the polls. In this case avoid these lanes.
- Weather — certain hills in winter may be closed or too dangerous at times, and low lying areas may be subject to flooding during extreme rain events or during spring runoff.
- Construction — know what construction is going on in your area to avoid lengthy delays during work time.

Helping your students learn

Your job is to help your students learn. People learn best when:

- they feel physically and emotionally safe,
- they feel motivated and ready to learn,
- the learning experience is treated as important by the instructor,
- new information is related to what they already know,
- they feel respected for what they already know and can do,
- information is relevant and needed,
- information is given at the right time,
- they're able to practice using the new information right away,
- the instructor is clear and concise,
- the instructor is supportive and gives positive reinforcement,
- the instructor is knowledgeable, and
- the learning is made interesting and fun.

Instruction, coaching and feedback

Here are some things you can do to ensure an effective learning experience for your students:

- Review the training record — where did the student leave off last time?
- Describe the route planned so the student knows what to expect. Where appropriate, involve the student in deciding the route.
- Explain how you'll give directions and information.
- Explain how you'll keep them safe. Learning to drive a big truck is scary for most students.
- Pull over for longer discussions.
- Use visual aids in the cab such as intersection diagrams, short video clips on a tablet, small model trucks, and blank paper to draw scenarios.
- Be flexible with your route, lesson sequencing, and time spent on different manoeuvres based on the student's needs. Sometimes when frustration sets in, it's best to move on to something else.
- Take breaks if your student becomes frustrated or exhausted. If your student is a smoker, they may need to take breaks more often.
- Demonstrate tasks and manoeuvres as needed. Tell your students to ask for a demonstration whenever they want one.
- Encourage student self-assessment. Use questions to guide the student to determine what they're doing wrong and how to fix it.
- Feedback should be calm, constructive, and consistent.
- Use a variety of teaching strategies such as:
 - Running commentary to teach and assess — while driving, do a commentary on potential and real hazards or conflicts, what might happen and what steps to take to avoid conflict, then have the student use running commentary whenever you want to know what they're seeing, thinking and planning to do.
 - Teach-back — the student explains to the instructor the steps or strategies learned. This is a great way to see what they've learned and what needs to be reinforced.
 - Roadside observation — parked in a safe and legal location or standing at the roadside, observe and discuss the behaviour and issues of other drivers.
 - Coaching questions — ask the student thoughtful questions so they're able to reach their own conclusions or find their own solutions, rather than just giving them the information. Coaching improves student's self-awareness and allows them to take responsibility for their decisions.

Tips for delivering a great in-cab lesson

Preparation

- Make sure the vehicle is ready
- Have the lesson plan and materials you'll need
- Be rested and sharp
- Plan your route/locations.

Assess student readiness to learn

- Ask how they're today, engage in friendly conversation
- Check their driver's licence and restrictions (i.e. vision). Ensure Code 15 (air brakes) has been added
- Check for appropriate footwear, clothing, and equipment
- Ask if they have any questions.

1st Lesson introduction

- Ask about previous learning and experience
- Ask about timeline for learning — when is their road test?
- Why are they learning to drive a truck? What are their goals?
- Do they have any specific learning needs or challenges?
- Explain what to expect on the 1st lesson
- Explain controls that you may use and when you may use them
- Explain how you'll keep them safe.

Subsequent lesson introduction

- Review the training plan. Are there any needed changes? What are their goals for this lesson?
- Involve the student in route planning, if appropriate.

Topic intro, objectives, & motivation

- Preview new topics
- Ask questions to pre-assess knowledge of topics
- Discuss the lesson objectives (what they'll be able to do)
- Ask/discuss why specific things are important to learn.

Building rapport

- Include some relaxed conversation and humour
- Find out more about them — hobbies, interests
- Listen carefully — to understand
- Use the student's name.

Practice/coaching/feedback

- Demonstrate masterfully
- Use a variety of teaching methods
- "Chunk" information into manageable, logical bites
- Use ongoing assessment and feedback
- Ask good open questions
- Use visual aids
- Encourage/answer questions
- Allow mistakes when safe
- Teach students to self-assess
- Allow enough practice so they feel successful.

Lesson closing

Ask questions such as:

- What did you do well today?
- What would you like to practice in the next lesson?
- What can I do or change to help you learn?
- Make notes/complete records.

Doing effective demonstrations

Instructor demonstrations can be a very effective teaching method but only when done right. Here are some key safety considerations and some important things for both the instructor and the learner to do.

Demonstration safety

- Clothing and footwear
- Eye protection
- Safely going under and exiting from under truck and trailer
- Entering and exiting the cab
- Precautions to take when working with compressed air
- Visibility clothing
- Where to stand and walk during the demo — students must be able to see you
- Yard safety
- Discuss blind spots with large vehicles

Instructors should

- be confident in their ability to perform the task
- choose a suitable location for the demonstration
- introduce the purpose and theory of the demonstration
- describe steps as they're being demonstrated
- make sure the learners can see and hear clearly
- involve the student, if practical
- proceed slowly and methodically so they can understand
- break longer demos into smaller chunks
- ask questions to review and confirm understanding
- ensure the learner gets enough opportunity to practice
- coach the learner as they practice

Learners should

- understand the purpose of the demonstration
- listen actively and watch carefully
- ask questions when something isn't clear
- ask about or suggest other ideas or alternative methods
- practice the steps
- decide how to best apply the knowledge

2

In-yard activities

The activities in this section may take place in a yard environment with groups of up to four students per instructor.

Entering and exiting the cab

Drivers can be injured from falling or from muscle or joint injuries due to poor ergonomics when getting into, or more commonly, getting out of the cab. Instilling the correct habits for this activity will help ensure future health and safety for drivers.

Learning outcomes	3.1.5 Confirms every time before leaving the driver's seat that the vehicle is secured by the vehicle's parking brake, wheel chocks or suitable blocks. 3.1.6 Enters and exits the cab, or the vehicle cargo area, maintaining a three-point contact, and explains the risks of improperly climbing onto or jumping from equipment.
Performance objective	Demonstrate correct procedures for entering and exiting the cab, without assistance, in the correct sequence.

Instructor notes

1. Ensure that everyone (instructor and students) are wearing appropriate footwear and high-visibility clothing.
2. Explain and demonstrate how to get in and get out of the cab safely. Have student observe from the ground.
3. Review the risks of improperly climbing onto or jumping from equipment.
4. Have students practice. Observe student actions from the ground, correcting them while they practice to ensure safety.

1. Getting in the cab	
a.	Check steps and handles for grease, fuel, oil, mud, and ice. Clean off all residue before entering cab.
b.	Grip the handle on the inside of the door with one hand and the handle on the exterior cab frame with the other. Notice the three points of contact — two hands and one foot.
c.	Place one foot on the step while keeping the other foot securely on the ground.
d.	Move lower foot to the top step, pulling body with arms if necessary. There are still three points of contact.
e.	Bring rear foot to the top step. Both feet are now on the top step so you may release one handle and still maintain three points of contact.
f.	Slide or step into the cab and release the remaining handle.
2. Getting out of the cab	
a.	Before leaving the driver's seat, ensures that the parking brake is applied.
b.	Exit the cab by climbing out backward, as if on a ladder.
c.	Maintain three points of contact at all times.
d.	Never jump out of the cab.
Common faults	Address/check
Doesn't maintain three points of contact at all times. Loses balance.	Review the steps above.
Inappropriate footwear. Risk of injury or slipping.	Require appropriate footwear before practicing.

Vehicle inspections

A key competency in the operation of commercial vehicles is the ability to conduct comprehensive vehicle inspections before commencing work, during the shift, and after work. Students should gain confidence through knowledge and vehicle familiarization and develop an appreciation for vehicle empathy and general vehicle safety.

Learning outcomes	<p>7.1 Inspect and maintain commercial vehicles.</p> <p>7.2 Inspect each component or system listed in the NSC 13 for minor and major defects, as required.</p> <p>10.2 Conduct pre-trip and en route air brake inspections and identify any minor or major defects.</p> <p>10.3 Check and adjust air brake pushrod travel.</p>
References	<p>National Safety Code (NSC)</p> <p>Air brakes inspection checklist</p> <p>Vehicle inspection checklist</p>
Performance objective	<p>Conduct a pre-trip, on road and post-trip vehicle inspections on a commercial vehicle with a trailer. Must be completed without assistance, in a logical sequence, without omitting any inspection points and student must correctly answer any questions posed by the instructor. Completed in daylight or good artificial light, in a safe area away from other traffic, with a checklist, and eventually without a checklist.</p>
Review	<p>Vehicle inspection information taught in the classroom.</p>

Instructor notes

1. There is a lot to remember when learning how to complete a pre-trip inspection on a tractor-trailer, and different strategies for teaching it. Below are a few ideas:

Strategy 1: Consider teaching this content in sections. The instructor could complete a pre-trip on the vehicle before the lesson so it's ready to go. Then have the student practice only one section each day, gradually putting it all together.

Strategy 2: Demonstrate the whole pre-trip to the student and thereafter have them conduct it each day. Coach and correct as needed.

Strategy 3: Demonstrate the pre-trip to a group of four students, then have them work together in pairs, using a checklist and two vehicles parked together. Go back and forth between the vehicles to check on and coach students as needed.

2. Make learning aids available. Have the student use a checklist or inspection form to start with (including a script if desired) until they become familiar with what to say and how to check.
3. Choose terrain that is as level as possible and park the vehicle safely away from traffic. Where needed, place traffic cones to discourage traffic encroaching.
4. Refer to the vehicle manual when needed. Students can also be given an assignment to look up available information online about the truck and inspections.
5. Review/explain safety practices such as three points of contact, wearing of gloves and eye protection, lifting techniques, use of ladders, etc. The first check made on entering the cab must be to check that the parking brake is on and the gear-shift lever is in neutral.
6. To ensure checks are not unintentionally missed, the recommended inspection sequence is:
 - Walk up/approach checks.
 - Under hood checks.
 - In cab checks.
 - Exterior checks.
 - Functions/moving off checks.
7. With cab-over vehicles, before tilting the cab, ensure all internal equipment is secured.
8. Demonstrate and explain each inspection point providing details and highlighting what would be considered minor and major defects.
9. When assessing the lesson, ask the students questions to confirm they understand the tasks.
10. Keep the student's Vehicle Inspection Checklist as part of their record.
11. Emphasize the need to report or rectify all faults identified and explain the methods of reporting.
12. Demonstrate how to safely open and close cargo doors. Have the student practice.
13. When conducting en route spot checks, excessively hot hub temperatures might indicate binding brakes or wheel bearing problems. Cold hubs will indicate brakes not operating correctly/out of adjustment.

General Learning points

a.	Explains reasons for conducting pre-trip, en route and post-trip inspections. Reasons for checks include personal safety, public safety, legal requirements, vehicle awareness, public image, professionalism. The reasons for en route spot checks and post-trip inspections are: <ul style="list-style-type: none"> • To ensure the vehicle remains safe during the shift. • To ensure the vehicle is ready for the next shift.
b.	Where necessary refers to vehicle manuals and/or checklists.
c.	Applies personal safety precautions, including protective equipment, as needed.
d.	Follows a logical sequence for checks.
e.	Records faults on the driver's vehicle inspection report (DVIR).

Pre-trip inspections

1. Walk up/approach checks

- | | |
|----|--|
| a. | Checks vehicle 'posture' due to damaged suspension, flat tires, or incorrect load placement. |
| b. | Checks for water and oil leaks under the vehicle. |
| c. | Checks for panel and glass damage. |
| d. | Purges air tanks of any moisture (unless ADIS equipped). |

2. Under hood checks

- | | |
|----|--|
| a. | Checks for any cracks in the front of the hood before unlatching. |
| b. | Checks condition and security of the compressor and discharge line. |
| c. | Checks governor security and condition. |
| d. | Check air dryer condition and security. |
| e. | Checks engine oil level for level (between 'add' and 'full') and colour. |
| f. | Checks power steering fluid level and condition. Check pump and hose for leaks. Steering mechanism does not have wear or excessive play. |
| g. | Checks coolant level and condition (additives). Proper fitting cap. |
| h. | Checks windshield washer fluid level. Keep at $\frac{3}{4}$ full. |

i.	Checks condition and security of hoses.
j.	Checks condition of fans belts and blades. Not frayed, worn, or twisted. Blades secure.
k.	Checks condition and tension of all other belts. No signs of wear.
l.	Checks electrical connections. All tight and secure. No exposed wiring.
m.	Checks for general leaks around filters, valve/head cover and fuel pumps.
n.	Checks for security, damage and leaks around air intake system.
o.	Checks general security of accessible engine components, lines and wiring.
p.	Checks general cleanliness of the engine.
q.	Checks front suspension springs for security, damage, and distortion.
r.	Checks foundation brake condition/security, push-rod travel on the steering axle and air lines.
s.	Properly closes and secures the hood.
3. In cab	
a.	Properly enters and exits the cab using the three point method.
b.	Parking brake on / gear shift in neutral.
c.	Checks documentation: insurance, registration for both truck and trailer, inspection paper work for both truck and trailer, manifest for load, if applicable.
d.	Checks seat belts for damage and operation (retractor, coupling).
e.	Checks driver's seat position following these procedures: <ul style="list-style-type: none"> • Seat settings function properly • Adjusts height so that feet can rest flat on the floor • Adjusts forward placement of the seat so that the left foot can push the clutch pedal to the floor without having to stretch. Lower back should be fully supported • Adjusts tilt and telescopic steering wheel assembly (if equipped). Confirm that the steering has no excessive play • Sets the back of the seat straight up then adjust it back slightly to maintain a 9 & 3 or 10 & 2 position • Checks that both seats are securely fastened to the floor.

f.	Checks/adjusts mirrors for attachment, damage, clear view and cleanliness. <ul style="list-style-type: none"> • Large flat mirror allows view of traffic and the sides of the trailer • Smaller convex mirror allows view of traffic and tractor drive wheels.
g.	Checks that windows open and close.
h.	Checks that any vehicle equipment or personal gear in cab is secure.
i.	Checks all warning buzzers and lights when key is turned on.
j.	Starts engine with clutch (where fitted) disengaged. <ul style="list-style-type: none"> • Ensures transmission is in neutral and parking brake applied • Depresses clutch pedal to the floor and holds it there • Turns the key or press the start button — release immediately on start up • Listens for unusual noises. Engine should run smoothly • Checks engine oil pressure light or gauge on startup. Should register in a few seconds. If no oil pressure shows, stop the engine at once and check oil dip stick.
k.	Checks fuel level is adequate for the day's operation. Preferably operate in the "top half" of the tank. Discuss the fact that carrying a lot of fuel isn't always practical as sometimes the driver will need to carry less fuel to be legal on axle weights.
l.	Checks operation of switches and controls <ul style="list-style-type: none"> • wipers and washers even if not raining. Blades present and appear undamaged. Must adequately clear driver's field of vision. • horn(s) and backing alarm (if equipped). • heater, air con, defroster and fans.
m.	Checks condition and cleanliness of passenger seating.
n.	Ensures driver's floor is clean and free from damage and obstructions.
o.	Ensures doors open properly and close securely from the inside.
p.	Checks interior emergency equipment, if equipped: <ul style="list-style-type: none"> • Approved warning devices are accessible and operational • Fire extinguisher is charged, secured and pin is in place • First aid kit is full, secure, and accessible.
q.	Checks radio/communication devices, if equipped.

4. Air brakes system checks	
a.	<p>Checks buildup of air pressure on gauges and starts air test:</p> <ul style="list-style-type: none"> • Compressor build-up test — 50–90 psi within three minutes • Governor cut-out at appropriate pressure (105–135 psi) • Confirm governor cuts in 20–25 psi less than cut-out (minimum 80 psi) • States minor defect if air pressure build-up time is greater than three minutes.
b.	<p>Performs air leak test:</p> <ul style="list-style-type: none"> • Engine off and all brakes released • Holds service brake for one minute — observe pressure gauge • States minor defect if air leak can be heard • State major defect if pressure drop exceeds four psi in one minute with one trailer or six psi with multiple trailers
c.	<p>Checks low-air warning and trailer emergency system (if applicable)</p> <ul style="list-style-type: none"> • Reduces air pressure • States major defect if low air warning fails to activate by 60 psi • Further reduces pressure until red button pops between 20 and 45 psi • Exits cab to verify brakes activated on trailer
d.	<p>Checks tractor protection system:</p> <ul style="list-style-type: none"> • Check security/condition of glad hands • Disconnects the (red) supply line from trailer and checks for air loss (should be none) • Disconnects the (blue) service line from the trailer and checks for air loss (should be none) • Apply and hold foot valve (3–5 seconds) and checks for air loss (should be none) • Check condition of O-rings and reconnects both lines • States major defect when air escapes from service line during service brake application, when trailer supply valve is closed
5. Exterior checks	
a.	Checks all lights and signals for operation, damage and cleanliness.
b.	Checks tires for damage, pressure, tread, objects caught between dual wheels.
c.	Checks for loose wheel nuts and visible damage.

d.	Checks springs for security, damage and distortion.
e.	Checks for oil leaks around hubs and differentials.
f.	Checks visible valves for condition/security.
g.	Checks semi-trailer connections visually to ensure jaws have closed.
h.	Checks no gap between skid plate and fifth wheel and release handle fully retracted.
i.	Checks full trailer connections visually to ensure the fifth wheel is locked.
j.	Checks all electrical, air and hydraulic connections for security and damage.
k.	Visually checks fuel tank level if any doubt exists as to accuracy of gauge.
l.	Checks for vehicle battery security and obvious damage or corrosion.
m.	Checks all doors, hatches, and load securing devices.
n.	Checks exterior emergency equipment if stored in exterior space: <ul style="list-style-type: none"> • Approved warning devices are accessible and operational • Fire extinguisher is charged, secured and pin is in place • First aid kit is full, secure, and accessible.
o.	Checks all foundation brakes components for condition/security
6. Functions/moving off checks	
a.	Checks steering for vibration, stiffness, pulling to one side, knocking.
b.	Checks operation of foot brake, trailer control valve, parking brake (Part of air test).
c.	Listens for any unusual engine or transmission noises.
d.	Seat belt is worn in the correct manner.
e.	Checks clutch / clutch brake for operation and free play.
f.	Checks transmission for ease of shifting, noise, gear selection.

En-route inspections

General learning points	
a.	Makes sure the vehicle is completely off the road. Don't make a stop at the bottom of a hill or an uphill slope. The area should have an adequate acceleration lane to allow you to merge on to the highway at an appropriate speed.
b.	Checks that all lights are clean and working.
c.	Checks that there are no air leaks.
d.	Wheels are secure, tires properly inflated and not hot.
e.	Brakes are properly adjusted.
f.	Checks for water and oil leaks under the vehicle.
g.	Checks load security to ensure nothing has shifted or can fall from the vehicle.
h.	Checks suspension for damage, especially if operating in rough, off road conditions.
i.	Checks couplings for trailer security.
j.	Cleans the windshield and mirrors if necessary.
k.	Dangerous goods placards are clean and secure (if applicable).

Post-trip inspections

General learning points	
a.	Refuels at the end of a work period if level is below ½ tank or as per company policy.
b.	<p>Parks and secures the vehicle to meet company and legal requirements.</p> <ul style="list-style-type: none"> • Allows the engine to cool down on low idle. • Shuts down the engine, turn off master switch, if equipped • Secures the trailer. <p>Winter: ensures trailer brakes cool before activating the parking or spring brakes to prevent snow from melting and re-freezing between the brake shoe and drum.</p> <p>Winter: once in the parking area, move the truck and trailer back and forth about 10 feet to allow the tires to cool to prevent the tires melting the snow and forming ice under the tires.</p>

c.	<p>Completes a circle check of the exterior:</p> <ul style="list-style-type: none"> • Body condition (no new damage) • Lights that have been left on • Suspension • Mud flap secure • Fuel cap secure • New leaks • Condition of wheels, tires, tire pressure.
d.	<p>Checks interior:</p> <ul style="list-style-type: none"> • Floor clean, nothing left behind • Seats (no new damage) • Close windows • Set seatbelts back in order • Turn off all lights and switches.
e.	Cleans the vehicle in accordance with any company procedures.
f.	Reports and actions any faults that might have occurred during the work period.
g.	Completes log book entries and load/worksheet documentation.

Common faults	Address/check
Misses specific checks.	Sequence is followed and checklist used correctly.
Fails to identify fault. Insufficient attention to detail.	Understanding of checks to be conducted. Importance of / reasons for all checks.

Chain-up

Depending on driving and weather conditions, commercial vehicle drivers may be required to install tire chains. Lack of ability in this area has caused numerous crashes and major delays on mountain roads.

This mandatory activity can be taught in groups of four students per instructor in a safe yard environment.

Learning outcomes	5.4.1 Correctly fits and secures chains to a tire. 5.4.2 Removes and correctly stores tire chains.
References	Commercial motor vehicle chain configurations handout
Performance objective	Apply chains to a tire on a commercial vehicle, then remove chains and stores them correctly.
Review	Information taught in the classroom.

Instructor notes

1. Discuss safe vs. hazardous places to put on chains, and safety equipment (gloves, visibility vest, cones or warning devices, as needed).
2. Explain and demonstrate each task before the students practice.
3. **Activity idea:** After students have learned how to put on the chains, complete an assessment by providing them the wrong size chain to see if they figure it out.
4. Discuss differences when chaining up bobtail vs. tractor/trailer.

1. General Learning points	
a.	Choses safe location, away from traffic.
b.	Parks vehicle on level ground.
c.	Applies parking brakes.
d.	Wears high visibility clothing.
e.	Gathers needed equipment: chains, plyers, gloves and bungees.

2. Apply Chains	
a.	Checks condition of chains and untangle as needed.
b.	Drapes chain evenly over tire with the middle of the chain at the centre top of the tire.
c.	Move the vehicle to roll onto the chains
d.	Attaches clips inside the dualies.
e.	Attaches outside clips and adjusts. Tighten using an adjustment wrench, if applicable.
f.	Attach bungies, if required.
3. Remove Chains	
a.	Remove bungees, if present.
b.	Release clips on outside and then inside the tires.
c.	Move the vehicle forward or backward to roll off the chains.
d.	Remove chains and check condition.
e.	Properly store chains.

Common faults/symptoms	Address/check
Installs chains inside out — may not fit and could damage tire.	Have the student look at the chains before putting them.
Chain tails flipped through.	Look at the chains when they're laid out paying attention to the outside rails.

Cargo securement

Generally, learning the hands-on portion of cargo inspection and securement is handled by the employer. Depending upon available equipment, students must receive some basic hands-on instruction about cargo securement.

<p>Learning outcomes</p>	<p>9.1.21 Confirms that cargo securing methods or devices are the proper type, and are properly used, strong enough, and in good condition.</p> <p>9.1.22 Inspects cargo, related articles and methods used to secure the cargo before driving, and at specific intervals during the trip to confirm everything is properly secured to comply with regulations.</p> <p>9.1.23 Inspects cargo and related articles at specific intervals during the trip to ensure everything remains properly secure to comply with regulations, and according to workplace practices, procedures and policies.</p> <p>9.1.24 Inspects the condition and integrity of the tie-down devices, and adjust tie-downs as necessary to keep cargo secure during transport</p> <p>9.2.3 Opens cargo access doors in a safe manner, and protects against potential falling cargo when opening doors.</p> <p>9.2.5 Uses appropriate Personal Protective Equipment as required and recognize that such use may be required, inside or outside of every workplace, shipper facility and customer facility.</p>
<p>Performance objective</p>	<p>Checks and explains the load securement in a van trailer, opening and closing doors safely. Demonstrates how to secure tiedown straps.</p>
<p>Review</p>	<p>Information taught in the classroom.</p>

Instructor notes

1. Remind students that while operating a commercial vehicle, drivers are require to secure the cargo and complete regular en route checks. All types of trailers require securement checks, not just open decks.
2. In-yard activities
 - View and discuss any loads available in the yard.
 - At a minimum, have students practice throwing and securing tiedown straps.

3. On-road activities
 - As appropriate, discuss various loads seen on the road, at inspection stations and other commercial vehicle stopping points.
 - Perform en route inspections, as required.

1. General Learning points	
a.	Parks the vehicle in a safe location
b.	Wears high visibility clothing
c.	Gathers equipment needed: Gloves, snipe if working with open trailers
d.	Checks the condition of the tie downs
e.	Checks to ensure the ties are properly secured and are tight
f.	Enforces the regulations required
g.	Opens cargo doors carefully

Common faults/symptoms	Address/check
Slips and falls.	Ensure the student is using three point contact and has good footwear.
Snipe slipping or recoiling — If student is working with open trailers and using a snipe it may slip from their hand. If releasing straps of chains the snipe may recoil hitting the student.	Ensure the student has proper grip on the snipe and caution them to expect pressure on the snipe if releasing straps or chains.
Students may not secure the ends of the chains or straps.	Ensure the student understand how to properly secure the ends.
Students may pinch hands or fingers with load bars.	Ensure the student has their hands clear of pinch points when using load bars.

3

Coupling and uncoupling trailers

An issue of concern for the trucking industry is the loss of trailers due to incorrect coupling procedures or inadequate checks by the driver. While mechanical faults on rare occasions can lead to problems, the majority of these potentially lethal on-road incidents result from inadequate training or inattention to detail. It is also a safety risk for drivers who do not carry out coupling and uncoupling procedures in the recommended manner or as required by company procedures manuals.

Learning outcomes	5.2.1 Couples a tractor-trailer in a safe manner. 5.2.2 Uncouples a tractor-trailer in a safe manner. 5.2.3 Adjust a vehicle's fifth wheel, axle position, or suspension system as necessary.
Performance objective	Demonstrate correct fifth wheel adjustment. Demonstrate sliding rear axles. Demonstrate coupling and uncoupling procedures for a fifth wheel tractor-trailer. Optional: demonstrate coupling and uncoupling with a pintle-hitch trailer. These demonstrations should be performed on flat, firm ground, in daylight or good artificial light, and in a safe area away from other traffic and distractions.
Review	Vehicle inspections. Information taught in the classroom.

Instructor notes

1. Explain and demonstrate each task before the students practice.
2. Explain how some weight of the trailer is transferred to the tractor when coupled through the fifth wheel. Some trailers have sliding tandem axles which assist in transferring weight between the tractor and the trailer in a way to achieve even distribution of weight. For example, when the tandem axles are adjusted toward the rear, the amount of weight on the steering and drive axles of the tractor will increase. When the tandem axles are adjusted forward, the weight will be shifted off the tractor and the amount of weight on the drive and steering axles will be decreased.

3. Explain key safety points, particularly potential danger of “pulling the pin” before the landing legs are down when uncoupling. In the event of the parking brake not being applied, the tractor can be “squeezed” out once the king pin has been released. This can lead to serious injuries.
4. Explain how some trailers have automatic air ride suspension — the air will dump automatically.
5. Reiterate the importance of completing all checks to confirm coupling.
6. Ensure a complete pre-departure check is conducted whenever a new trailer is hooked up. Never take it for granted that a trailer is roadworthy.
7. Emphasize the reasons for checking trailer signals with the signal switch and not by use of the hazard lights. Because turn signals and hazards operate on different circuits, it is possible for a truck to be signaling right while its trailer is signaling left. For a following vehicle this could be a lethal mistake made by the driver.
8. Never allow a student to walk under a loaded semi-trailer that has been disconnected from the truck.

Coupling

1. Coupling a semi-trailer — fifth wheel

a.	<p>Inspects the yard:</p> <ul style="list-style-type: none"> • Walks the area around the trailer and tractor before beginning the coupling procedure. Looks for anything in the path that could damage the tractor and trailer. Makes sure it is clear before beginning the first stages of alignment.
b.	<p>Secures the vehicle:</p> <ul style="list-style-type: none"> • Sets transmission into neutral and applies tractor parking brakes. Identifies if the trailer has spring brakes and if not, blocks trailer wheels to ensure trailer will not roll backward from pressure applied by the tractor as it moves under the trailer.
c.	<p>Checks air, electrical and any hydraulic lines are clear of the fifth wheel so they don't get in the way when backing under the trailer.</p>

d.	<p>Checks the fifth wheel:</p> <ul style="list-style-type: none"> • Checks the fifth wheel isn't damaged and has no missing or bent parts. • If the tractor is equipped with sliding fifth wheel, checks that it is properly locked and free of damage. • Checks for adequate grease on the fifth wheel. • Checks that the mounting to the tractor is secure. • Checks that the fifth wheel is tilted down and the jaws are open. Note: some fifth wheel jaws do not appear to be open even when the release handle is extended.
e.	<p>Inspects the trailer:</p> <ul style="list-style-type: none"> • Checks that any cargo is secure. • Checks the condition of the trailer kingpin and apron (including collar). Checks for excessive wear or cracks. Apron should be flat. • Checks all air and electrical connections for any damage • If the trailer is equipped with spring brakes, makes sure they have applied • Checks location of the trailer kingpin — if it's set far back from the front of the trailer, the fifth wheel may need to be repositioned to allow turning clearance between the front of the trailer and rear of the tractor.
f.	<p>Positions the tractor:</p> <ul style="list-style-type: none"> • Enters the tractor and releases the parking brake. • Drives the tractor to a position directly in front of and in line with the trailer. Checks that it is equally visible in both mirrors.
g.	<p>Backs up to the trailer:</p> <ul style="list-style-type: none"> • Turns off audio system and rolls down window. • Turns on four-way flashers and sounds horn. • Reverses the tractor unit at a walking pace until the trailer kingpin is just clear of, but lined up with, the fifth wheel. The nose of the trailer will be covering the rear set of drive tires. • Uses both mirrors and rear window (if equipped) while backing. If the view of the trailer is the same in both mirrors you should be centred. The centre of the fifth wheel is always in the centre of the tractor frame and the kingpin is always in the centre of the front of the trailer. If the drive tires are just inside of the trailer, on both sides, your alignment will be close. <p>Note: if air bags are fitted to the tractor, lowers these before backing.</p>

h.	<p>Checks height and alignment:</p> <ul style="list-style-type: none"> • Apply tractor-parking brakes and get out to check the alignment of the fifth wheel with the kingpin. It is much easier to notice any extreme offset from the ground than it is from the tractor. • Check height of the fifth wheel with trailer apron and raise or lower landing gear, as required. The trailer apron should be touching the fifth wheel directly above the fifth wheel pivot point — if it's touching behind or ahead of the pivot point, the trailer height needs to be adjusted. There should be no space between the fifth wheel and the trailer. • The coupling surface of the trailer should be 1–2" below the middle of the fifth wheel. If the trailer is too far below the fifth wheel level, the kingpin will hit the tractor frame. If the trailer is too high, the kingpin could slide over top of the fifth wheel when you back under the trailer. • If using an air ride equipped tractor, and the alignment is correct, have the student raise the air ride to remove any day light between the fifth wheel and the apron of the trailer. If day light remains then the landing gear needs to be adjusted.
i.	<p>Connects to the trailer:</p> <ul style="list-style-type: none"> • Re-enters the tractor and shifts into reverse gear, releases tractor parking brake. Uses mirrors to check tractor and trailer alignment as well as trailer's stability. • Sounds horn and ensures that fifth wheel remains in line with trailer king pin while backing tractor slowly. Continues to back until connection is made with the fifth wheel locking around the trailer king pin — this can be felt or heard. • Gently but firmly latches the fifth wheel. Listens for and feels the fifth wheel latching into its locked position.
j.	<p>Confirms fifth wheel is locked:</p> <ul style="list-style-type: none"> • Exits the tractor, takes the keys to ensure that no one tries to move the tractor while underneath the trailer. • Ensures, using a flashlight if necessary, that fifth wheel jaws are properly secured around the trailer king pin. • Fifth wheel release lever is in locked position, by checking the fifth wheel contact, the release handle position and the latch. • Ensure upper plate of trailer is resting firmly on fifth wheel (no space should be visible). • Ensure bolt on front of fifth wheel is all the way in (if applicable).

k.	<p>Conducts a tug test:</p> <ul style="list-style-type: none"> • Partly raises the landing gear until legs are slightly off the ground (about one inch). Re-enters the cab. • Releases the tractor brakes and gently tugs against the trailer spring brakes (or wheel chocks) to check the connection. The tug test must be firm enough to overcome the friction between the plate and the trailer's bolster. This should be done at least twice. • Selects neutral. • Secures the tractor.
l.	<p>Connects air and electrical, and any hydraulic or ABS lines:</p> <ul style="list-style-type: none"> • Checks condition of all lines. • Connects electrical cable to trailer and confirms normal operation. Lines are usually colored red for emergency and blue for service. • Checks the seals and secures each air supply line to the appropriate trailer connection. If the air lines are crossed, supply air will be sent to the service line instead of the trailer air tanks. This will not allow the release of the trailer parking brakes.
m.	<p>Charges the trailer with air:</p> <ul style="list-style-type: none"> • Monitors air pressure gauges and confirms gauges show normal pressure levels. Listens for exhausting air to determine if trailer brakes are operating.
n.	<p>Fully raises the landing gear then releases slightly to prevent sticking during cold weather. Stows the handle into its retainer. Never drive with the landing gear part way up.</p> <p>Remove wheel chocks if used on the trailer.</p> <p>Inflates air ride suspension, if applicable. Check by looking at trailer suspension gauge, if equipped.</p>
o.	<p>Completes a pre-departure check on the trailer.</p>
p.	<p>Drives forward slowly a short distance and applies either the trailer service brakes only, or the full service brakes to test brake operation.</p>

Uncoupling a semi-trailer — fifth wheel

2. Uncoupling a semi-trailer — fifth wheel	
a.	<p>Positions the tractor and trailer so that the trailer is directly in line with the trailer (not at an angle) and checks that ground is flat and stable.</p> <p>If the trailer is equipped, lower the air ride on the trailer. Some trailers will drop the air automatically once the brakes are applied. The trailer may push the truck forward as the air is released from the trailer.</p>
b.	<p>Eases pressure on the fifth wheel locking jaws:</p> <ul style="list-style-type: none"> • Applies trailers brakes and releases tractor brakes. • Backs up gently and apply the tractor brakes while the tractor is pushing against the trailer to relieve pressure of the fifth wheel locking jaws on the trailer kingpin.
c.	<p>Prepare to uncouple:</p> <ul style="list-style-type: none"> • Exits cab and blocks trailer wheels if the trailer does not have spring brakes. • Places blocks or pads under landing gear, if needed. • For trailers with air suspension, the air suspension should be drained before applying the trailer brakes when leaving the trailer parked. • Lower the landing legs until the weight of the trailer is just starting to be eased from the tractor unit. • Removes and secures air, electrical and any hydraulic or ABS lines. Ensures lines are secure to the tractor. • Pulls and locks the release handle in the “open” position. • Re-enters cab, pulls ahead about one foot and, if equipped, lowers the air ride to fully transfer weight to the landing gear. Once there is daylight between the fifth wheel and the apron, then the landing gear is supporting the weight of the trailer.
d.	<p>Uncouples:</p> <ul style="list-style-type: none"> • Moves the tractor slowly forward and stops before the front of the skid plate leaves the fifth wheel. • Applies the parking brake, exits the cab and checks the trailer landing legs are supporting the weight of the trailer. • Re-enters the cab and releases tractor parking brakes. • Charges tractor air suspension if it has been lowered. • Drives slowly clear.

Common faults/symptoms	Address/check
Fails to check king pin/fifth wheel clearance before hook up. Skid plate too low/too high.	Preparation for coupling.
Fails to check fifth wheel jaws are open. Closed jaws contact king pin.	Preparation for coupling.
Fails to apply parking brake. Vehicle rolls forward or backward once air lines are connected.	Personal and vehicle safety. Basic procedures. Do not let student forget this step.
Fails to conduct checks of jaws, release handle, skid plate/fifth wheel clearance, tug test. Loses trailer.	Safety. Basic procedures.
Fails to follow safety procedures — Releases fifth wheel handle before winding down the landing legs. Walks under disconnected trailer.	Safety procedures.
Fails to conduct pre-departure check on trailer.	Basic procedures.

Coupling a pintle-hitch trailer — optional lesson

3. Coupling a pintle-hitch trailer	
a.	<p>Inspects the yard:</p> <ul style="list-style-type: none"> Scans the ground and area of the yard for hazards. Makes sure it is clear before beginning the first stages of alignment. Positions the truck directly in front of and in line with the trailer. You should be able to see an equal portion of each side of the trailer in each mirror.
b.	<p>Secures the vehicle:</p> <ul style="list-style-type: none"> Sets transmission into neutral and applies truck parking brakes. Exits the cab and check if the trailer has spring brakes. If not blocks trailer wheels to ensure trailer will not roll backward when the truck connects.

c.	<p>Inspects pintle hitch and trailer:</p> <ul style="list-style-type: none"> • Checks pintle hook and latch for cracks • Checks that any cargo is secure • Walks the area around the trailer and looks for anything in the path that could damage the truck and trailer. • Checks air, electrical and any hydraulic or ABS lines are clear of the drawbar eye. • Ensures coupling is open. • Checks height and alignment: • The drawbar is at the right height, adjusts if necessary. • The pintle eye is just slightly higher than the pintle hook.
d.	<p>Connects to trailer:</p> <ul style="list-style-type: none"> • Turns on four-way flashers and sounds horn. • Uses mirrors to ensure truck and trailer are correctly lined up. • Backs up so that the pintle eye is directly over the pintle hook. • Exits the cab and lowers the pintle eye onto the pintle hook. • Closes the pintle hook safety latch. • Properly attaches safety cables/chains to towing unit. • Raises landing gear completely. • Connects air and electrical lines. • Removes and stores the wheel blocks, if used.
e.	<p>Pre-trips the trailer.</p>
f.	<p>Prepares to pull away:</p> <ul style="list-style-type: none"> • Re-enters cab. • Charges the trailer with air. If the trailer brakes don't release when you charge the system, the air-lines may be crossed. • Checks for air leaks in the system. • Raises the trailer air suspension if it has been lowered. • Pressurizes the air or hydraulic (no slack) ram, if equipped.
g.	<p>Pulls away and tug test:</p> <ul style="list-style-type: none"> • Releases parking brakes. • Slowly pulls away. • Applies trailer hand valve to check trailer service brake operation and that the trailer connection is secure.

Uncoupling a pintle-hitch trailer — optional lesson

4. Uncoupling a pintle-hitch trailer	
a.	<p>Positions the truck and trailer:</p> <ul style="list-style-type: none"> • Checks ground conditions are level and will support the trailer and surrounding area for hazards • Parks the towing unit and trailer in a straight line. You should be able to see both sides of the trailer in the exterior mirrors.
b.	<p>Uncouples the pintle hitch:</p> <ul style="list-style-type: none"> • Applies truck and trailer brakes. • Releases pressure from the air or hydraulic (no slack) ram, if equipped. • Exits the truck and checks if the trailer has spring brakes, if not blocks trailer wheels. • Removes and secures air, electrical and any hydraulic or ABS lines. • Lowers the support leg, if fitted. • Removes safety cables/chains. • Releases locking mechanism (if fitted) and pulls the coupling handle up to release the connection. (Raise the drawbar so that pintle eye clears the pintle hook.
c.	<p>Pulls away from trailer:</p> <ul style="list-style-type: none"> • Re-enters cab. • Releases truck parking brake. • Drives ahead slowly until pintle eye completely clears pintle hook.
d.	<p>Stops and visually checks that the pintle eye is free of the pintle hook and that the trailer is secure.</p>

Common faults/symptoms	Address/check
Fails to check full trailer coupling open before hook up — pin contacts draw beam eye.	Preparation for coupling.
Fails to check draw beam at correct height — draw beam rides over or under coupler.	Preparation for coupling.
Fails to apply parking brake — vehicle rolls forward or backward once air lines are connected.	Personal and vehicle safety. Basic procedures.
Fails to conduct tug test or visual check of pin position.	Safety. Basic procedures.
Fails to conduct pre-departure check on trailer. Faults not identified.	Basic procedures.

Sliding the fifth wheel

The position of the fifth wheel plays an important role in tractor weight distribution. Sliding the fifth wheel changes the weight distribution between the steering axle and the drive axle. When the fifth wheel is moved forward, more of load is shifted to the steering axle and when moved backwards, the weight shifts to the drive axles. Drivers must know the legal weight that the front axles can accommodate before shifting the load forward.

a.	Ensures the vehicle is parked on an even surface. Pot holes can cause the tractor or trailer to be leaned over slightly which could prevent the fifth wheel from sliding.
b.	Positions the fifth wheel slightly in front of the axle.
c.	Prepares to slide: <ul style="list-style-type: none"> • Lowers the landing gear until resistance is felt, then turns two more cranks. Another method is when lowering the landing gear continue to lower the landing gear until the air ride gauge reads 10–15 PSI. • Enters cab, releases the fifth wheel lock and deflates tractor air bags, both brakes are on. It should be noted that if using the second method then deflating the air bags isn't required. • Exit the cab and check that the locks are released.

d.	<p>Pre-slides the fifth wheel:</p> <ul style="list-style-type: none"> • Re-enter the cab and moves tractor slowly to slide fifth wheel back/ forwards. • Lock the slider locking, apply brakes and exit the cab to check if the locks have locked — moves forward/back a bit, if needed to align locks. • Locks pins. • Enters cab and re-inflates air bags to put pressure back onto the plate. • Double checks that everything is secure.
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Common faults/symptoms	Address/check
Lowers the landing gear too far — truck can lose traction.	Stop the student once the landing gear makes contact with the ground. If the tractor is equipped with air ride dump the air.
Doesn't check that the locks released on both sides — Fifth wheel will not slide and may become jammed.	Check locks before trying to slide.
Locks will not release due to pressure on the locks.	With the locks released gently move the tractor to release the locks.

Sliding trailer axle

The position of the rear axle(s) plays an important role in trailer weight distribution. Think of moving your trailer axles like a teeter totter if you move the axles toward the back of the trailer the front on the trailer would have more pressure on it transferring the weight to the tractor drives, slide the trailer axles toward the tractor would cause the weight to transfer to the back increasing the weight on the trailer axles. Ensure that you know the legal weight that the rear axles can accommodate.

a.	Gather equipment needed: Gloves, chock, vise grips, ties, hammer, tape measure, dish soap, bungee, and optional slide bar stop or a snipe.
b.	<p>Prepares to slide:</p> <ul style="list-style-type: none"> • Ensures the trailer is secure (spring brakes or blocks). • Dumps the air ride (if equipped) on the trailer. This is so when you attempt to slide the axles, the air bag doesn't flex. • Measures and marks trailer with chock line — may use a diagram to determine where to slide to, based on weight distribution — measurement is from the kingpin • Opens pins and locks the handle in the open position. If the handle will not hold open, use vise grips to hold it. • If pins are stuck, releases tractor brakes and puts pressure against the trailer so the pins will release. • Once released, applies dish soap to the rails to help with sliding. Do not use grease or oil as that will collect dirt causing the rails to become more difficult to slide over time. • Places slide bar or snipe in the hole on the slide rail where they want the axles to stop.
c.	<p>Slides the axle:</p> <ul style="list-style-type: none"> • Enters the cab. • Starts the engine, in neutral, with both brakes applied. • Releases tractor brakes. • Backs up slowly. The trailer moves while the wheels remain stationary. Slide the axles to the desired location. • Applies tractor brakes — gets out to check position. • Pulls forward/back again, as needed, to correctly position the wheels. • Remove the slide bar or snipe. • Releases the pin and with the trailer brakes applied, pulls forward or reverse to have the locking pins return to the lock position. • If needed, uses zip-ties or a bungee to secure hanging wires and air lines, at least 18 inches (45 cm) off ground.

Common faults/symptoms	Address/check
Release handle will not move.	Release pressure on the locking pins by gently moving the tractor.

4

Backing

For most drivers, backing a vehicle remains a critical key driving skill and one that takes time to master. While rigid vehicles can be reversed fairly simply, provided the driver makes allowances for size, the various heavy combinations of vehicles present different degrees of difficulty. Instructors will have to plan the training accordingly.

Before backing a tractor-trailer, drivers need to ask themselves: Is it necessary? Is it legal? Is it safe?

Learning outcomes	<p>3.2.17 Watches for potential hazards of unmarked overhead obstructions such as: canopies, roof overhangs and other building protrusions, signs, utility lines, tree limbs, doorway entries, etc.</p> <p>4.1.22 Exits the vehicle whenever necessary to inspect clearances and identify potential obstructions.</p> <p>5.1.1 Performs straight-line backing manoeuvres with a tractor-trailer unit in a safe manner.</p> <p>5.1.2 Performs off-set backing manoeuvres with a tractor-trailer, to the right and to the left, in a safe manner.</p> <p>5.1.3 Performs alley-dock backing manoeuvres with a tractor-trailer, to the right and to the left, in a safe manner</p>
Performance objective	<p>Back up a combination vehicle in a straight line for at least 20 metres, through a 90 degree turn to the right, through a 90 degree turn to the left, slowly and safely, without contact with any obstacle, without stalling or over-revving the engine, without undue stress to the vehicle, in a yard, on a driving range or appropriate public road, in daylight.</p>
Review	<p>Basic vehicle dynamics.</p>

Instructor notes

1. Demonstrating backing manoeuvres is a matter of instructor preference. It isn't necessary to demonstrate these manoeuvres with the student on the ground or in the passenger seat — rather you may choose to just talk them through it, stopping to discuss and getting out of the cab to check clearance, as needed.

2. Encourage students to check manoeuvring areas by foot and remind them that there is no rule that states a backing manoeuvre must be completed on the first attempt. The instructor's aim should be for the student to be able to complete the backing with few realignments but the emphasis must be on completing it safely.
3. Encourage practice. The most experienced operators are not always the most successful in backing situations. Often it is younger operators who practice these skills who impress. Each industry group has its own demands and expectations and a driver who is very competent with a semi-trailer can be much less so with a truck and pintle-hitch trailer. Practice — practice — practice.
4. Steering responses change when a vehicle is backing. Because the steering axle is now at the "rear" of the vehicle, that end is much more responsive to steering input while the leading axles, that are in fact the rear axles, are far less responsive. This demands frequent small steering corrections rather than infrequent large ones.
5. Explain that to straighten the trailer, turn the steering wheel to whichever side of the trailer they see most of in the mirror.
6. Make sure the student understands that corrections should be small on the steering wheel and that it takes time for the movement of the steering wheel to transfer to the rear of the trailer. This is why students often over steer as they keep turning the steering wheel until they see movement rather than making a small adjustment and waiting to see the results in the trailer.
7. Jackknife backing isn't a consideration in this lesson but rather a specialist skill that, unless the student has demonstrated exceptional talent, is best addressed on the job.
8. The position of the hands on the steering wheel isn't an issue with this lesson. Students are most likely to steer with one hand on top of the wheel and change hands frequently.
9. Explain the tire damage issues that can result from hitting a curb.
10. Encourage backing off a road rather than on to it. The driver has a better awareness of prevailing conditions when backing off a road than they would trying to back blind onto it.
11. Encourage backing to the right so that blind spots are minimized and the driver can look out the side window to monitor trailer movement. If this means driving around the block, so be it.
12. If possible, use a yard, parking lot or driving range, with cones and drums, at least for initial lessons. This minimizes interference and develops student confidence.

13. Remind students that, often, the point of contact with obstacles during backing manoeuvres is the front corner of the truck. This part of the vehicle must be included in the ongoing search pattern when backing.
14. The swept path of a backing vehicle is large and includes the tractor and trailer front end swing, combination tracking and rear overhang.
15. B-train combinations in B.C. tend to be 'long/short' combinations which simply means the shorter trailer is generally at the rear. As a consequence, the two trailers will react to steering inputs at different rates. The front trailer will respond more slowly while the rear trailer, because of its shorter wheelbase, will react much more quickly.
16. B-train backing isn't a requirement for the B.C. training course but if you have a student capable, and equipment available, it can be a bonus for the student to experience that.
17. Explain reference points:
 - For bobtail and straight trucks, the point where the vehicle will pivot during backing is the rear axle.
 - For semi-trailers the reference point is the rear axle of the trailer.
 - For truck and trailer (pintle hitch): Explain the reference points should be front and rear axle sets on trailer although primary observation should be on the steering axle set. Draw bar length dictates speed of trailer responses to steering input. Short draw bar = very small steering corrections.
 - For B-trains: Explain where the reference points should be in relationship to trailer curtains / decks / axle sets. Primary observation points should be centre and rear axle sets. To move rear trailer to the right, steer right.
18. To correct trailer "drift" in one direction, steer in the opposite direction in small increments.
19. If the trailer is fitted with steerable axles, make sure these are locked before backing.

Common faults/symptoms	Address/check
Poor accelerator and clutch control. Reverses "jerkily", reverses too quickly.	Practice. Gear selection.
Fails to use key reference points. Turns too soon, turns too late, strikes obstacle.	Practice.

1. General Learning points	
a.	Does a full walk-around if reversing any distance.
b.	Checks clearances before backing — above, below, sides, swept path.
c.	Identifies reference points.
d.	Uses a guide when appropriate.
e.	Explains swept path for the vehicle.
f.	Turns on hazard lights.
g.	Depresses clutch and engages low reverse.
h.	Makes final check for hazards and releases park brake.
i.	Does not slip the clutch excessively.
j.	Covers the brake with the right foot.
k.	Checks front end swing.
l.	Steers in the correct direction to counter trailer "drift", as appropriate.
m.	Corrects steering in small increments and, if in doubt, pulls forward and realigns before starting again.
n.	Makes efficient use of mirrors.
o.	Completes manoeuvre in designated position safely.

2. Vehicle specific points	
a.	Semi-trailer: <ul style="list-style-type: none"> • Locks steering axles, if applicable. • Monitors front end swing on both prime mover and trailer.
b.	B train: explains effects of trailer wheelbase in relation to backing.
c.	Pintle hitch: identifies draw bar length and explains effect on trailer steering responses.

Straight backing

a.	Before reversing, walk around the vehicle in a counter clock-clockwise direction and check for obstacles, possible hazards and clearance.
b.	Checks mirror set up.
c.	Opens window and silences audio devices.
d.	Positions the tractor-trailer for the backing manoeuvre by moving the vehicle forward a total length of 1.5 times the total length of the tractor-trailer until it is aligned and the front wheels are straight.
e.	Secures the vehicle and activate the warning flashers.
f.	Exits the vehicle to examine the manoeuvre space — check up, down, and around the unit.
g.	Re-enters the vehicle, release the park brake and sound vehicle horn.
h.	Uses mirrors to ensure nothing is in the way of the vehicle on either side, behind, and underneath.
i.	Puts the vehicle in reverse, selecting the lowest reverse gear available.
j.	Reverses into the space at idle speed, with brake covered in case they need to stop quickly, and checking the mirrors.
k.	Pulls forward as often as necessary to either readjust the tractor-trailer angle, or to adjust the angle of the trailer to the dock.
l.	Exits the vehicle to examine space and vehicle alignment as often as necessary during the manoeuvre.
m.	Makes efficient use of mirrors.

Alley-dock backing — 90 degree, driver side/left side

a.	Checks mirror set up, opens windows and silences audio devices.
b.	Drives the vehicle forward out of the starting position until the front of the trailer is in line with the left side of the target area.
c.	Turns the steering wheel hard to the right.
d.	Continues to move forward at 5 to 8 km/hr until the tractor is in a straight line with the target space.
e.	Turns to the left and moves forward until the trailer is near a 45-degree angle. The tractor should be at an angle slightly to the left of the trailer and the target space should be visible from the driver's window.
f.	Straightens the front wheels and stops.
g.	Drives the vehicle forward out of the starting position and aligns it with the target space while driving forward into the pull up area.
h.	Secures the vehicle and activates the warning flashers.
i.	Exits the vehicle to examine the manoeuvre space from outside the vehicle and checks vehicle position and clearance if necessary.
j.	Reenters the vehicle.
k.	Sounds the horn briefly.
l.	Starts reversing. Turns the steering wheel hard to the right to move the trailer to the left.
m.	Once the trailer is curving towards the space, turns the steering wheel to the left and lets the tractor follow the trailer into the space at idle speed, with brakes covered.
n.	When the trailer is in line with the parking space, turns the wheel even more to the left to straighten the tractor in relation to the trailer.
o.	Pulls up as often as necessary to align it.
p.	Exits the tractor to examine space and vehicle alignment as often as necessary.
q.	Stops tractor-trailer movement upon reaching the desired position (gently when backing up to a solid fixture).

Alley-dock backing — 90 degree, blind side/right side

Reversing from the blind side follows the same steps as driver side reversing. However, it is harder to see where you're going. Once you begin to reverse, you'll mostly be using the right side mirror, including the convex mirror. Use a guide (extra instructor or trained yard worker) for this activity.	
a.	Checks mirror set up, opens windows and silences audio devices.
b.	Drives the vehicle forward out of the starting position until the front of the trailer is in line with the right side of the target area.
c.	Turns the steering wheel hard to the left.
d.	Turns to the right and moves forward until the trailer is near a 45-degree angle. The tractor should be at an angle slightly to the right of the trailer and the target space should be visible from the driver's window.
e.	Straightens the front wheels and stops.
f.	Drives the vehicle forward out of the starting position and aligns it with the target space while driving forward into the pull up area.
g.	Secures the vehicle and activates the warning flashers.
h.	Exits the vehicle to examine the manoeuvre space from outside the vehicle and checks vehicle position and clearance if necessary.
i.	Reenters the vehicle.
j.	Sounds the horn briefly.
k.	Starts reversing. Turns the steering wheel hard to the left to move the trailer to the right.
l.	Once the trailer is curving towards the space, turns the steering wheel to the right and lets the tractor follow the trailer into the space at idle speed, with brakes covered.
m.	When the trailer is in line with the parking space, turns the wheel even more to the right to straighten the tractor in relation to the trailer.
n.	Pulls up the tractor-trailer as often as necessary to align.
o.	Exits the tractor to examine space and vehicle alignment as often as necessary.
p.	Stops tractor-trailer movement upon reaching the desired position (gently when backing up to a solid fixture).

Offset backing driver side and blind side

<p>Manoeuvre will be into a space that is between 3.5 and 3.7 meters wide, and at least as long as 2/3 the length of the tractor-trailer, into an adjacent space of the same dimensions. The pull-up space in front of the backing target should be no deeper than the length of the vehicle. The manoeuvre will be learned from both sides. Use a guide (extra instructor or trained yard worker) for the blind side backing activity.</p>	
a.	Drives the tractor-trailer forward until the front of the tractor is 1.5 times the total unit length past the front of the parking lane.
b.	Before reversing, secures the vehicle and walks around the vehicle in a counter-clockwise direction and checks for obstacles, possible hazards and clearance.
c.	After re-boarding, checks mirrors and puts the gear in reverse. Always selects the lowest reverse gear available.
d.	Releases the park brake, starts reversing, turning the steering wheel to the right to move the trailer to the left (driver side), or to the left to move the trailer to the right (blind side).
e.	Begins to turn the steering wheel at the appropriate time, aligning the trailer with the adjacent lane.
f.	Straightens the truck and trailer, and continues to reverse into the final parking position.
g.	Stops tractor-trailer movement upon reaching the desired position (gently when backing up to a solid fixture).

Using a guide

a.	Identifies when to use a guide.
b.	Agrees upon guide hand signals.
c.	Ensures that the guide can see the space being backed into and that the driver can see the guide.
d.	Stops the vehicle if they lose sight of the guide.

5

Start up and basic driving

In-cab drills — prepare to drive

For students new to driving a commercial vehicle, it's important to understand that each vehicle, depending on manufacturer and type, will differ in cab layout, control position and complexity and ergonomic efficiency. Many lighter commercial vehicles might be only slightly more complex than a car. However, the larger class vehicles and the rapidly developing technology that applies to them, demand a more methodical and detailed approach to the training of new drivers.

Learning outcomes	<p>2.1.11 Locates and operates all typical and secondary controls, gauges and instruments.</p> <p>2.1.12 Explains the instrument panel indicators displaying important vehicle operating information, warnings and safety system status.</p> <p>3.1.3 Explains the importance of proper start-up and warm up procedures.</p> <p>3.1.4 Applies a method for confirming that they are fully alert, and their judgement is not impaired in any way before beginning to drive</p> <p>3.1.7 Locates required vehicle documents such as permit books, vehicle registration, insurance, bills of lading, etc.</p> <p>3.1.9 Adjusts the driver's seat to the correct position before driving.</p> <p>3.1.10 Inspects, wears and properly adjusts seatbelt before driving.</p> <p>3.1.11 Sets up mirrors to minimize the vehicle's blind spots.</p> <p>3.1.12 Monitors the engine, instrument panel and indicator lamps.</p> <p>3.1.13 Starts the engine correctly.</p> <p>3.1.14 Listens for normal vehicle sounds, while starting the vehicle's engine and avoids unnecessary idling.</p>
References	Vehicle manual
Performance objective	Demonstrate correct procedures for in-cab set-up, starting, and shutting down a commercial vehicle.
Review	Vehicle inspections.

Instructor notes

1. Observe student actions from the passenger’s seat.
2. Explain and demonstrate the location and operation of all controls, lights, gauges and switches on the training vehicle. Emphasize importance of familiarization before operating an unfamiliar vehicle.
3. Discuss the positions of the clutch, clutch brake, dead zone, traction point, and free play.
4. Discuss the shifting pattern, find the shifting map in the truck and review this with the student.
5. Have the student move the shifter to the gear positions with the engine off.
6. Have the student complete a double clutch shift with the engine off. This allows you to correct the clutch use as students tend to push it in too far.
7. Throttle control exercise:
 - With the tractor parked, brakes applied, and the engine running, have the student raise and lower the rpm to become familiar with the sound and feel of the throttle which is very different from a car.
 - Call out rpm and have the student move the throttle to the rpm and hold it there until you call out another one. This teaches the student throttle control which is crucial in successful shifting.

Activity idea: blind spots — With mirror set up, demonstrate blind spots by walking around the vehicle with student following your movements in the mirrors. Get student out of the cab show blind spots using cones to show where the blind spots start and end.

8. Demonstrate or talk student through starting and shut down procedures.
9. Discuss the legal requirements for wearing a seatbelt.

1. In cab drills	
a.	Ensures parking brake is applied.
b.	Checks gear shift lever is in “neutral” (or “Park” for an automated transmission).
c.	Adjusts seat and steering wheel, if necessary, so that lower back is supported and arms are slightly bent when on the steering wheel.
d.	Checks that doors are closed and locked.
e.	Adjusts mirrors so that a clear view is provided down both sides of the vehicle.

f.	Checks location and position of all controls. If in an unfamiliar vehicle, familiarizes with operation of all controls.
g.	Checks operation of seatbelt including retractor and couplings.
h.	Checks that appropriate vehicle documentation is present and valid.
2. Starting the engine	
a.	Switches on ignition key and observes all gauges and warning lights. Allows any electronic diagnostic checks to be completed before attempting to start the engine. If vehicle is equipped with glow plugs, waits for the light to go out before starting the engine.
b.	Depresses the clutch to reduce transmission drag when starting. Releases once the engine has started. Clutch brakes are fitted to many vehicles using non-synchromesh transmissions. By pushing the clutch pedal to the floor the transmission input shaft is stopped and an initial gear, for moving off, can be selected. Counter shaft brakes are sometimes fitted to vehicles and can be identified by the button mounted on the gear-shift lever. Both serve the same purpose.
c.	Starts the engine and allows it to idle with the right foot clear of the throttle. If the engine does not start, turns the starter off and repeats in 60 seconds.
d.	Checks that the engine oil pressure gauge immediately registers pressure or the engine oil light goes out. If this does not happen, immediately switches the engine off.
e.	Checks instrument readings and notes any incorrect responses.
f.	Uses a low rpm level to warm up the engine, between 800–1000 rpm. Avoids excessive idling as it wastes fuel and can result in unnecessary wear and tear on the engine. Engine warm up is complete when the temperature reaches anywhere from 77–90 degrees Celsius or 170–195 degrees Fahrenheit.
g.	Ensures there is sufficient fuel for the journey.
h.	Fastens the safety belt.

3. Shutting down the engine	
a.	Applies service (foot) brake and depresses clutch pedal.
b.	Moves shift lever to "Neutral" and releases clutch pedal.
c.	Applies parking brake.
d.	Allows engine to cool down for 2–3 minutes after high engine speeds.
e.	Turns the engine off and removes the ignition key.

Common faults/symptoms	Address/check
Sitting too low, arms straight, hunched forward.	Seat height and/or position.
Mirrors not correctly adjusted. Leaning forward to check mirrors.	Adjustment of mirrors with student in correct seated position.
Windows dirty or obscured.	Clean all windows, check operation of air-conditioning or defogger.
Unfamiliar with vehicle starting procedure. Does not check park brake or gear-shift lever position. Does not wait for engine diagnostic checks.	Starting procedure for vehicle being driven.
Right foot on throttle during start-up. Over-revving.	Switch engine off and run through procedure again.
Fails to fasten safety belt. Puts it on while starting to move off.	Stop and rectify.

Moving off and stopping

Some students have little or no experience with manual transmissions of any type. It's important to take the time needed with this initial exercise to give the student confidence.

This lesson could be conducted concurrently with *gear changing or non-synchromesh transmissions, and steering*.

Learning outcomes	<p>2.1.13 Operates one or more typical manual transmission and clutch (optional — and automated manual transmission)</p> <p>3.1.15 Scans all controls and instruments before driving.</p> <p>3.3.3 Uses effective observation skills.</p> <p>3.3.4 Manages space and speed.</p> <p>3.3.5 Operates vehicle controls smoothly.</p> <p>3.3.6 Communicates correctly and in a timely manner to other road users.</p>
Performance objective	<p>Demonstrate the ability to move off from a stationary position and bring the vehicle to a stop in the correct sequence.</p>
Review	<p>In-cab drills — prepare to drive</p>

Instructor notes

1. Select initial training areas so there is minimal interference from other road users.
2. Take into account nervousness of students exposed to driving large vehicles for the first time.
3. Explain and demonstrate all activities.
4. Emphasize the need to check blind spots and the time required to move a large vehicle into traffic.
5. If the vehicle is towing a trailer make sure you have discussed the effects of off tracking. Ensure the student makes allowances for this, if turns are involved when moving off and stopping.
6. If the vehicle is bobtail, describe what to expect.
7. Explain that the truck will lift up a bit when the clutch is released, without touching the throttle.
8. Explain how air brakes will feel different from a car braking system.

9. Exercise:

- Have the student find the friction point with the clutch until they're familiar with this.
- Once comfortable, have them move the tractor ahead a short distance and then stop. Ensure the student does not ride the clutch.
- If possible, have the student reverse a short distance to have them use the mirrors and confirm they're adjusted correctly. Repeat this exercise until the student can perform smoothly. Confirm they understand that they need to find the friction point before releasing the foot brake — this will help them later with hill starts.
- Emphasize the importance of signals as the only means of communication between heavy vehicle operators and car drivers.
- Emphasize the need not to rush any aspect of driving.
- Don't use auxiliary brakes in this early lesson. Do discuss the braking effect of the engine in lower gears under deceleration before stopping.

1. Moving off	
a.	Ensures the vehicle is ready to move off and checks air pressure.
b.	Depresses clutch with left foot. Ensures clutch brake, if fitted, is used correctly.
c.	Engages appropriate gear. This may vary according to weight of the vehicle and transmission type.
d.	Checks mirrors to ensure road behind is clear.
e.	Signals for at least three seconds, intention to pull out.
f.	Releases park brake and returns hand to steering wheel.
g.	Checks mirrors again.
h.	Ensures road ahead is clear.
i.	Releases clutch pedal slowly until engine sound changes and the transmission starts to engage.
j.	Ensures left foot is clear of the clutch pedal and that the hands are in the correct position on the steering wheel.
2. Stopping	
a.	Selects a safe place to pull over. Considers size and length of the vehicle and any overhead obstructions.
b.	Checks rear-view mirrors for following or passing traffic.

c.	Signals right for at least three seconds.
d.	Removes right foot from accelerator and gently applies foot brake to slow down.
e.	Steers to the right once vehicle has slowed to the appropriate speed.
f.	In the last few meters, just before stopping, depresses the clutch with the left foot only to the dead zone and brings the vehicle to a complete stop using the foot brake.
g.	Stops in the correct place.
h.	Applies the parking brake.
i.	Moves the gear lever into neutral.
j.	Turns the vehicle off, if required.

Common faults/symptoms	Address/check
Excessive acceleration. Races engine.	Clutch/accelerator control.
Fails to fully depress clutch pedal when stopped. Gear clash. Gear not engaged.	Nervousness. Rushing.
Uses wrong gear to start. Stalls engine.	Range selection. Gear position.
Fails to release park brake. Stalls engine.	Nervousness. Sequence.
Poor clutch/accelerator coordination. Moves off in jerks or stalls.	Clutch/accelerator control.
Moves off without checking other traffic or signaling. Reaction of other road users.	Nervousness. Sequence.
Coasting. Depresses clutch before braking when stopping.	Vehicle control.
Depresses clutch too late when stopping. Stalls engine.	Clutch/brake coordination.
Brakes too hard when stopping. Driver/passengers thrown forward. Load shift.	Brake pedal pressure control for training vehicle.
Stops too far from designated position. Rushed, or delayed, response to instructions.	Rushing, nervousness, sequence.

Basic steering

The steering techniques used when driving a car remain the same when driving larger vehicles. Modern trucks have power steering which means that only a very few revolutions of the steering wheel are required from full lock to full lock. The need to maintain an efficient steering style becomes even more critical with large combinations where unnecessary steering corrections can lead to problems with vehicle instability and vehicle size means that there is less room for error.

Learning outcomes	3.3.8 Drives through curves, to the right and to the left, in a safe manner. 3.3.13 Turns at intersections in an urban setting in a safe manner.
Performance objective	Demonstrate the ability to steer a commercial vehicle in a forward direction, using a two handed "10 and 2" or "9 and 3" hand position.
Review	Moving off and stopping.

Instructor notes

1. Select initial training areas with care so that there is minimal interference from other road users. This lesson can be combined with cornering lesson.
2. Take into account nervousness of students exposed to driving large vehicles for the first time.
3. Check student posture and ensure seating position is correct.
4. Students should be encouraged not to turn the front wheels when stationary. This places undue stress on steering components.
5. Explain reasons for NOT attempting gear changes while turning. These can include excessive driveline stress due to trailer drag through tight turns and poor steering control.
6. Resting the right hand on the gearshift lever can lead to excessive selector linkage and fork wear in the transmission.
7. Emphasize importance of looking well ahead to determine the path of travel. Don't look at the ground immediately in front of the vehicle.
8. Explain effects of steering input and steering amplification on trailer behavior and tracking during cornering (if applicable).
9. Discourage the habit of letting the wheel spin through the hands during centering. While a common habit, this equates to non-existent steering control.

10. Practice both hand-over-hand and push-pull steering techniques, and encourage the use of push-pull as it minimizes oversteer in corners.
11. Do not accept low hand positions on the steering wheel or frequent one handed steering.
12. Explain the effects of steering axle position on manoeuvring. Cab-over vehicles and hooded vehicles have different steering characteristics due to wheelbase dimensions and position of the steering axle(s).

1. Steering	
a.	Seated with lower back supported and arms slightly bent when hands are on the steering wheel.
b.	Maintains two hands on the wheel unless operating other controls.
c.	Applies smooth steering movements.
d.	Positions hands at "10 and 2" or "9 and 3".
e.	Demonstrates hand over hand steering method.
f.	Demonstrates push-pull steering method.
g.	Manoeuvres vehicle using appropriate steering technique.

Common faults/symptoms	Address/check
Incorrect hand position. High or low hand position. Hands too close together.	"10 and 2" or "9 and 3" positions.
Excessive one hand steering. Hands resting on leg, right hand on shift lever, or left arm resting on the door or arm rest.	Steering technique.
Oversteer or understeer. Erratic steering movement.	Encourage "push-pull" steering.
Both hands off the steering wheel. Allows wheel to spin after a turn or removes both hands in physical expression.	Over confidence. Steering technique. Watch for: after completing a turn, they'll shift a gear and will sometimes remove their left hand to cancel the signal light resulting in both hands off the wheel.

Gear changing

While modern technology has seen many manually operated non-synchromesh transmissions replaced by computer controlled (automated) transmissions, this type of transmission is still common with many operators. No other aspect of commercial vehicle driving causes more discussion and debate than how best to operate these transmissions.

Those unable to master the required techniques may end up demonstrating a poor overall standard of driving as a result of driver inattention and frustration. Manufacturers dictate correct operating techniques and any instruction must reflect that guidance.

Of all the skills the driving instructor will teach, this lesson can be the most challenging and rewarding. For the student, it can be the most daunting.

Learning outcomes	2.1.13 Operates one or more typical manual transmission and clutch 3.3.5 Operates vehicle controls smoothly; selecting gears correctly and shifting smoothly.
References	Vehicle manual.
Performance objective	Demonstrate correct gear changing techniques using a non-synchromesh transmission, without rushing, without excessive gear grinding, at the correct engine and road speeds.
Review	Moving off, stopping, and steering.

Instructor notes

1. Demonstrate while explaining each task before the students practice.
2. Student ability will vary greatly. Have suitable training locations for those who have little, or no, experience with manual transmissions.
3. Explain and demonstrate, in detail, all appropriate learning points. Instructors MUST be competent in all aspects of non-synchromesh transmission use.

Activity idea: mock shifting — With the engine off, have the student complete some mock shifting, finding the gear without looking and double clutching.

Activity idea: intro to shifting — During the instructor demo drive, demonstrate the shifting, then have the student shift from the passenger seat while you drive, assisting them as needed.

4. It can be helpful to place your hand on the shaft of the shifter to help guide the student as they practice shifting. It isn't appropriate to place your hand on top of the student's hand or vice versa.
5. Be patient. Once gear changing has been mastered training will likely progress quickly.
6. Leave the use of auxiliary brakes out of initial lessons and concentrate solely on gear changing.
7. If the vehicle tachometer displays a coloured economy range, consider using the top end as the point for changing up and the bottom end the point for changing down. This will quickly assist the student in developing an 'ear' for engine and road speed.
8. If desired during the course, explain the benefits and differences between double-clutch, single clutch and clutch-less shifting.

Double-clutching is a procedure where you depress the clutch pedal just past the friction point, release it and depress it again while shifting gears. On non-synchromesh transmissions, double-clutching allows the driver to make smoother shifts because they can co-ordinate the engine speed and the transmission speed, aligning the gears for easier shifting.

Single-clutching is a method where you depress the clutch pedal just past the friction point, move the transmission from gear to neutral, then use the throttle to match the rpm to the higher or lower gear road speed, before pushing the shifter into the appropriate gear.

Clutchless shifting is a method where shifting is completed without the use of the clutch. To remove the transmission from gear it must not be under load. Forcing the shifter may cause damage to the shifting fork or the clutch. If the load has been removed from the transmission the shifter will slide out of gear with little resistance. Once the transmission is in neutral then use the throttle to match the rpm to the higher or lower gear road speed before pushing the shifter into the appropriate gear.

Note: some companies may have a specific policy about what methods of shifting they allow.

9. Explain that the clutch works like a shock absorber to prevent damage to the transmission.
10. Explain the correct gear to move off in is generally the highest gear that does not require any accelerator. If in doubt, use first gear.
11. Cover gear skipping only once competency is apparent with sequential shifting.

12. Explain that gears must not be forced. Forced gears will normally occur, during downshifting, as a result of excessively high road speeds, insufficient engine speed during the shift or leaving the shift too late. The operation of a particular transmission will reflect the treatment it has received in the past.
13. Explain that gear grinding has two key causes — poor timing (engine speed vs road speed) by the driver and transmission wear and tear. Try to avoid training in a vehicle that has obvious transmission mechanical faults. It will hinder instruction and frustrate both student and instructor.
14. Explain that coasting in neutral should not be an option, as the driver does not have control of the vehicle. It is also illegal.
15. Explain range change buttons and splitters must not be used when the shift lever is in neutral or the vehicle is moving in reverse. They must be pre-selected (unless manufacturer's instructions dictate otherwise). When descending hills the driver should NOT operate the splitter button. This can, and often does, lead to a neutral gear occurring.
16. Clutch brakes and countershaft brakes stop the input shaft of a non-synchronmesh transmission so that an initial gear, to move off, can be selected. Clutch travel, once the vehicle is moving, must be restricted to two to three inches of travel so that the clutch brake isn't activated, thereby causing damage to it. Excessive clutch stroke can also be a cause of clashed gears.
17. Explain basic driving obligations that will assist with smooth, efficient gear changing (following distances, vehicle speed etc.).
18. Before downshifting, the engine and road speed should be reduced by deceleration and braking.

1. Upshifting	
a.	Explains shift pattern and shift lever controls (range change/splitter) for the vehicle being driven.
b.	Positions right hand on shift lever when gear changing and returns hand to steering wheel.
c.	Operates the clutch correctly.
d.	Selects correct gear to move off.
e.	Balances clutch and throttle control when moving off.

f.	Maintains steering control and does not look at shift lever when changing gear.
g.	Applies correct clutch travel when transmission is fitted with clutch brake.
h.	For double-clutching: <ul style="list-style-type: none"> • Right foot eases the accelerator pedal, left foot depresses the clutch pedal while moving gear shift lever into Neutral. • Left foot eases clutch pedal then depresses clutch pedal again while moving gear shift lever into next highest gear. • Left foot eases clutch pedal and right foot depresses accelerator pedal.
i.	Applies progressive shifting techniques and makes effective use of economy range on tachometer (if applicable).
j.	Pre-selects range change and splitter controls.
k.	Demonstrates effective sequential shifting.
l.	Demonstrates effective skip shifting.
m.	Anticipates driving conditions.
2. Downshifting	
a.	Reduces road and engine speed by deceleration and braking before downshifting.
b.	Uses tachometer to assist with downshifting.
c.	Right foot eases accelerator pedal, left foot depresses clutch pedal. Moves gearshift lever into Neutral. Left foot eases clutch pedal, right foot presses accelerator until engine rpm and road speed match, left foot depresses clutch pedal while quickly moving gearshift lever into lower gear. Does not engage clutch brake! Left foot eases clutch pedal.
d.	Avoids excessive, unnecessary downshifting.
e.	Pre-selects range change and splitter controls.
f.	Brings vehicle to a complete stop from road speed, using transmission and brakes.

Common faults/symptoms	Address/check
Mistimed gear changes. Grinding gears.	Progressive shifting. Possible transmission damage.
Excessive clutch travel (clutch brake fitted). Grinding gears.	Clutch pedal stroke.
Fails to achieve progressive shifting technique. Over-revving. Engine speed too low.	Progressive shifting technique.
Difficulties with skip shifting. Over-revving. Grinding gears. Rushing gear shifts.	Use of the tachometer. Gear selection options.
Unsure of shift pattern. Selects wrong gear.	Shift patterns and use of range change button.
Fails to double clutch. Grinding gears.	Clutch / accelerator coordination.
Excessive road speed before downshifting. Grinding gears. Rushing gear shifts. Excessive engine speed.	Management of engine and road speeds. Double-clutching technique.
Operates range change or splitter buttons with transmission in neutral. Fails to engage a gear. Vehicle in neutral.	Correct use of range change and splitter buttons.
Tries to move off in wrong gear. Vehicle stalls.	Moving off.
Forces gears. Grinding gears.	Rushing shifts. Engine and road speeds. Observation.
Fails to select a gear before stopping. Coasting.	Observation. Downshifting. Engine and road speed.

Automated manual transmissions (AMTs) — optional lesson

Many commercial vehicles now have automated transmissions. Students should understand the basic technical differences between automated and automatic transmissions.

Automated transmissions are normal constant mesh transmissions, either synchromesh or non-synchromesh depending on manufacturer. The driver can select “auto” or “manual” mode and the actual shifting is managed by electronics.

While there are a number of manufacturers, most operate using the same technology. While all have clutch assemblies, not all have clutch pedals and this can lead to some confusion when drivers first encounter the technology. The vehicle’s manual must be used to clarify specified operating techniques but driver training should cover the points included in this lesson.

Automatic transmissions simply require the driver to select the required gear, then operate the accelerator and brake pedals. Unlike an automated manual transmission, there is no traditional clutch assembly to link the engine to the transmission but rather a torque converter (a fluid coupling) that hydraulically connects the two driveline components and allows the engine to idle without stalling.

Learning outcomes	2.1.13 Operates automated manual transmission 3.3.5 Operates vehicle controls smoothly; selecting gears correctly and shifting smoothly.
References	Vehicle manual.
Performance objective	Demonstrate correct gear changing techniques with an automated transmission, while meeting manufacturer’s recommendations.
Review	Moving off, stopping, and steering.

Instructor notes

1. Ensure manufacturer’s driver’s handbook is available for the transmission being used and ensure the student has had time to familiarize themselves with the operating guidelines.
2. Allow students to use the handbook to explain fault codes (if any).
3. Make sure that you, as the instructor, have familiarized yourself with the operating guidelines.

4. Demonstrate while explaining each task before the students practice.
5. Ensure starting procedures are covered in detail and that the student can identify all transmission controls and displays.
6. The student should have the opportunity to operate the vehicle bobtail and loaded so that differences in transmission and vehicle responses are identified.
7. Encourage a degree of “inventiveness” and flexibility with the automated transmission selector options.
8. Ensure students keep the left foot away from pedals with any transmission that does not have a clutch pedal. Left foot braking isn’t acceptable — unless using the left foot to hold on a hill before move off.
9. Have students practice stall procedure with the automated transmission on a driving range as this, when it occurs, takes a minute or two for the computer to rectify.
10. Check for the correct use of the “Low” (L) gear position on automated transmissions. This gear does not, generally, provide a means of skip shifting two or three gears at a time but rather allows the transmission to hold a gear, without changing up, at higher rpm during descents.
11. While skip shifting with automated transmissions can cause the engine brake to activate, students should appreciate that it is possible to miss gears out and that some of what isn’t usually acceptable with manual transmissions, is unavoidable with the new technology.
12. With automatic transmissions, have the student practice manual over-ride with the gear selector, particularly before descents, and have them avoid just selecting “Drive” under all driving conditions.

1. Automated	
a.	Explains all transmission controls and gear positions.
b.	Follows correct vehicle starting procedures.
c.	Explains stall procedures.
d.	Explains fault codes (if any).
e.	Demonstrates efficient operation of vehicle in auto mode.
f.	Demonstrates efficient operation of vehicle in manual mode.
g.	Selects mode to suit driving conditions.
h.	Positions left foot away from brake pedal.

i.	Demonstrates skip shifting.
j.	Demonstrates efficient use of auxiliary brake in “auto” and “manual” mode.
k.	Demonstrates effective and safe hill driving techniques.
l.	Reverses the vehicle safely.
m.	Applies correct shut down and parking procedures.

2. Automatic

a.	Explains all transmission controls and gear positions.
b.	Follows correct vehicle-starting procedures.
c.	Explains fault codes (if any).
d.	Selects correct gear options.
e.	Positions left foot away from brake pedal.
f.	Demonstrates accelerator control.
g.	Demonstrates effective and safe hill driving techniques.
h.	Demonstrates efficient use of the auxiliary brake.
i.	Reverses the vehicle safely.
j.	Demonstrates correct shut down and parking procedures.

Common faults/symptoms	Address/check
Fails to select correct gear to move off (automated). Stalls vehicle.	Gear selection procedures.
Fails to follow starting procedure. Vehicle will not start.	Starting procedures.
Incorrect braking. Brakes with left foot.	Right foot speed control.

Observation and hazard perception

The risks associated with driving all relate to the driver's perception and responses to the conflicts and hazards that arise from driving conditions. Every driver action is a reaction to an event in the driving environment. If the driver fails to react to an event the consequences can be disastrous.

The hazard perception and response skills develop with experience but students must be introduced to these at a very early stage in their training to accelerate their development in this area.

This skill begins with paying attention and using good observation skills.

<p>Learning outcomes</p>	<p>3.3.3 Uses effective observation skills including:</p> <ul style="list-style-type: none"> • setting up mirrors to reduce blind spots • scans conditions around the vehicle by looking ahead and using mirrors regularly and systematically • continual observation techniques and monitoring of road conditions • regular traffic checks • monitors vehicle blind spots • observes road signage and pavement markings • maintaining a high level of alertness. <p>4.1.3 Explains the visual clues and other signs of potential hazardous traffic situations.</p> <p>4.1.19 Adapts to the presence of other motorists, pedestrians, cyclists and slow-moving vehicles which share the road with commercial vehicles.</p> <p>4.1.20 Watches for wildlife or livestock which can enter the space around a vehicle, particularly on routes known for collisions involving animals.</p> <p>4.1.21 Scans mirrors, instruments and gauges regularly and systematically.</p> <p>4.1.24 Maintains attention and avoids sources of distraction while driving</p> <p>4.1.26 Monitors the movement and actions of other motorists while passing or being passed</p> <p>4.1.27 Observes traffic patterns and other road users and selects a safe roadside location for stopping and/or parking and resumes safely back into traffic</p>
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Performance objective	Use effective observation skills to assess and react to hazards while driving a commercial vehicle.
Review	Applicable classroom content.

Instructor notes

1. As student confidence grows, use commentary driving as a means of practicing and assessing hazard perception. This should be demonstrated by the instructor and start simply and moving on to more complex commentary.
2. A hazard is any situation that contains an element of actual or potential risk. They arise from the six driving conditions. An actual hazard requires immediate driver reaction to prevent an incident.
3. A potential hazard becomes an actual hazard only when something else occurs. Any hazard can be negotiated successfully even if this means stopping and waiting for conditions to change.
4. The six driving conditions are: road, vehicle, driver, weather, light and traffic. Discuss conflicts, hazards, and risks in these categories as they occur during the lessons.
5. The required observation skills are: scanning ahead, mirror checks, and scanning left-centre-right at intersections.
6. The 12-second (look ahead) rule is designed to remind drivers that they need room to slow down, stop or take evasive action if something happens on the road in front of them. By watching for possible road hazards 12 seconds ahead, drivers will have more of a chance to avoid a collision.
7. Watch your road position and keep glancing in the mirrors at intersections as cyclists and pedestrians maybe present. Cyclists and scooters can move off from a stop as quickly as you at an intersection so keep glancing in your mirrors to know where they are.
8. Review the hazard detection system and action plan: See-think-do.
 - **See** — scan and identify any real or potential hazards or conflicts.
 - **Think:**
 - Predict — Predict likely outcomes.
 - Decide — Decide which course of action will lead to the desired outcome.
 - **Do:** execute your decision — put your plan into action.

(Some schools use the acronym SIPDE — scan, identify, predict, decide, execute)

9. Emphasize that all driving is a series of responses to the conflicts and hazards that arise. How a driver responds (or fails to respond) will change the degree of risk presented, for the better or the worse.
10. Anticipation is the ability, based on knowledge and experience, to predict changes in the existing driving conditions that could require a response. It takes time to develop but all practical training should be conducted with this development in mind..

1. Hazards	
a.	Explains the terms “actual” and “potential” hazards.
b.	Describes the six driving conditions and provides two examples of hazards arising from each.
c.	Explains the visual clues and other signs of potential hazardous traffic situations.
2. Observation	
a.	Applies 12-second search pattern.
b.	Maintains attention and avoids sources of distraction while driving.
c.	Keeps eyes moving.
d.	Checks mirrors frequently including before and after any manoeuvre.
e.	Uses systematic left/centre/right checks at intersections.
f.	Uses vehicle lights to improve visibility to others.
g.	Reacts to real and potential conflicts, hazards, or situations in a timely manner.

Common faults/symptoms	Address/check
Fails to negotiate hazard safely.	Observation skills (see-think-do), vehicle control. Confidence with vehicle type.
Unaware of following traffic. Fails to check mirrors every 5–10 seconds.	Mirror use. Scanning routine.
Fails to identify potential hazards. Stops suddenly. Abrupt steering avoidance.	Search technique, particularly 12-second scan.

Fails to adjust lane position early. Late lane changes.	12-second search. Familiarity with route.
Fails to give-way. Failure to observe signs.	Basic obligations.
Fails to react to hazard warning signs. Does not take steps to deal with potential hazard.	Observation skills. Purpose of hazard warning signs.
Fails to react to mandatory signs and markings. Last moment reactions.	Basic obligations. Observation skills.

Signals and communication

While communications equipment allows truck and bus drivers to talk to each other, the only means of communication they have with all drivers on the road is the use of vehicle signals and lights. A commercial vehicle’s signals will provide information as to the driver’s intentions but their use must be consistent and should be a developed professional driving skill that reduces the risk of on-the-road conflict.

While the law is quite clear when vehicle signals must be given, commercial drivers should be prepared to use them not just to meet legal obligations, but whenever they change direction or lane position, and at any time when they cross the centre line of the road for any reason.

Learning outcomes	3.3.6 Communicates correctly and in a timely manner to other road users. <ul style="list-style-type: none"> • Timely and correct use of vehicle signals • Uses other ways to communicate as appropriate (horn, brake lights, hazard lights, flashing headlight).
Performance objective	Demonstrate the ability to consistently signal the intention to change direction or road position and use other communication methods, as needed, to communicate with other road users.
Review	Traffic law regarding signals.

Instructor notes

1. Any vehicle with faulty lights or signals must not be used for training. Discuss checks required on lights and signals during pre-start checks. Ensure signals are not obscured by dirt, tarps, etc.
2. Encourage signaling early so that other drivers can make adjustments to suit the size of the vehicle.
3. Review requirements for signaling: three second minimum, passing, turning, pulling over, pulling out, changing lanes, roundabouts, merging, passing lanes, avoiding road debris / crossing centreline.
4. Make sure other road users and pedestrians are reacting to the signal before manoeuvring.
5. Explain that road users include pedestrians, cyclists; even a person on a sidewalk might need to know what a driver's intentions are. Emphasize that signaling is always required.
6. Some vehicles may not have self-cancelling turn signals. Make sure these are switched off after use.
7. Explain dangers associated with trailer signals operating on different circuits (truck indicates right, trailer indicates left) and possible consequences of this.
8. Discuss other ways of communicating:
 - Use of service (foot) brake to warn following drivers of intention to slow down or stop.
 - Use of horn as a warning device.
 - Use of flashing headlights as a warning device.
 - Use of hazard lights as warning device.

1. Use of signals	
a.	Correctly uses vehicle signals at intersections, vehicle entrances and roundabouts.
b.	Correctly uses vehicle signals when pulling over or pulling onto the road.
c.	Correctly uses vehicle signals when passing or changing lanes.
d.	Correctly uses vehicle signals when entering or merging from passing lanes.
e.	Signals when changing direction or crossing the centreline for any reason.

f.	Waits to ensure other traffic has reacted before carrying out any manoeuvres.
g.	Ensures signals have cancelled after use.
h.	Uses four-way flashers if driving well below the speed limit, especially when descending or climbing a hill, and when pulled over to the side of the road.

2. Alternate ways of communicating with other road users

a.	Uses the horn to warn other road users, as appropriate.
b.	Activates brake lights before slowing to provide advance notice of slowing to following vehicles.

Common faults/symptoms	Address/check
Fails to signal intentions. Reactions of other motorists.	Legal obligations. Over confidence. Attitude.
Signals too early. Other drivers confused.	Legal obligations.
Signals too late. Fails to signal for at least three seconds.	Legal obligations.
Unclear signals. Unnecessary or incorrect signaling.	Nervousness. Legal obligations.
Wrong signal. Signals right instead of left or vice versa. Faulty electrical connection.	Route planning. Pre-trip inspections.
Fails to signal intention to slow down or stop. Late braking.	Observation.
Fails to use four-way flasher when pull over or climbing or descending a hill well below the posted speed limit. Reactions of other motorists.	Observation, safety

Electronic and communication devices

In the transport industry the way we communicate has greatly improved, helping the driver and the company to better manage freight. Today's driver will receive information from the company much differently than in the past. Ways of communication may include cell phone, satellite tracking and communication, as well as computers and email. Other communication devices the driver may use include CB radios, and VHF radios which can be a useful tool and a necessity in some applications.

Learning outcomes	6.1.5 Uses electronic and communication devices common in commercial vehicle operations, and describes when and where such use is permitted.
Performance objective	Safely and legally uses communication devices found in the driving school vehicle.
Review	Classroom material

Instructor notes

1. Review the rules for the use of handheld communication devices.
2. If possible, connect with a local company that uses satellite communication so the student can see the actual units.
3. If the tractor is equipped have the student use the two-way radios or discuss the use of them.
4. Discuss proper communication etiquette.

1. General learning points	
a.	Correctly operates communication equipment found in the training vehicle, if applicable.
b.	Demonstrates proper communication etiquette.

Space and speed management

While driving a commercial vehicle, managing space and speed is a critical part in safe operation. Some operators feel that if they leave space in front of them, other vehicles will move into it. While at times this may be true, this space is also needed in order to safety stop or perform an evasive manoeuvre. Studies have shown that over an eight hour day you don't lose hours, you only lose minutes in your day by maintaining a safe following distance. Keeping adequate space in front of you also lowers driver stress resulting in less fatigue at the end of the shift.

<p>Learning outcomes</p>	<p>3.3.4. Manages space and speed including</p> <ul style="list-style-type: none"> • Monitoring and adhering to highway speed advisories • keeping a safe following distance to allow adequate time to observe, react, manoeuvre, slow and stop, if necessary, and • maintaining proper road and lane position when traveling and turning • stopping in the correct location at stops • maintaining space around the vehicle based on off-tracking and clearance requirements • adjusting speed and space as needed when entering or exiting traffic and merging.
<p>Performance objective</p>	<p>Maintains safe and legal speed, appropriate pace, and appropriate space around the vehicle at all times, based on conditions.</p>
<p>Review</p>	<p>Strategies covered in the classroom, observation skills.</p>

Instructor notes

1. **Activity — following distance:** at different speeds, have student practice counting one-thousand-and-one, one thousand-and-two, etc. to determine their following distance.
2. Review checking mirrors to determine lane position and if the space around them is being maintain or if they have to make an adjustment.
3. Ask the student what the speed limit is to confirm they're paying attention to signs and changing speed zones. They should be no more than nine km/h below the posted speed limit, unless traffic flow dictates otherwise. As the students become more comfortable driving, make sure they don't start speeding.

4. When turning make sure your student is positioned properly before beginning the turn. They should check the mirror before beginning the turn to confirm that there won't be a conflict with a pedestrian, cyclist, or scooter from behind or in front.
5. Make sure the student maintains a safe distance from all obstacles during the turn.
6. Review correct stopping locations at intersections and mid-block crosswalks to ensure the vehicle doesn't block it and to ensure good visibility.
7. When stopping at a traffic light, stay far enough behind the stop line or crosswalk area to fully see the crosswalk.
8. **Activity — point of no return:** this activity develops safe stopping distance judgement based on the vehicle speed and weight. A straight roadway with multiple traffic lights works best. It involves the student saying “now” as they approach the intersection, when they think they're at the point where it would be impossible to stop the vehicle safely if the light changed to yellow. This is commonly referred to as the “point of no return”. The instructor should demonstrate this first by calling out from the passenger seat.
9. **Activity — pull overs:** Using running commentary, have the student determine safe places to pull over and stop.
10. **Activity — merging:** When merging onto or off a highway, have the student explain the space required and why.

General learning points	
a.	Follows the posted speed limit.
b.	Adjusts speed and pace for conditions.
c.	Maintains safe following distance. This should be at least one second for every 3 m (10 ft) of overall vehicle length or a minimum of five seconds — whichever is greater.
d.	Uses the most appropriate lane and maintains a proper lane position while traveling straight and turning.
e.	Stops at the correct location at intersections whether going straight or turning.
f.	Demonstrates awareness of the space around them front, sides, rear, below and overhead.
g.	Maintains adequate space while merging onto and off a highway.

Common faults/symptoms	Address/check
Stops too close to the vehicle in front of them. Late braking. Creeps up to vehicle in front after initially stopping	Eye lead time, planning. Need to be able to see the ground behind the tires of vehicle in front.
Stops too close to crosswalks or stop lines.	Ask about importance of stopping in the correct location. Discuss planning ahead.
Drifts from their lane. Too close to other vehicles.	Check eye lead time and use of mirrors.
Too slow for conditions.	Lacks confidence. Doesn't know the posted speed limit. Coach the student to maintain speed limit.

Basic vehicle dynamics

To demonstrate competence in a range of commercial vehicle driving skills, students must have an understanding of the dynamics that influence the performance and handling of large vehicles, especially when towing trailers.

Learning outcomes	4.1.8 Explains how the laws of motion apply to driving. 4.1.14 Adjusts driving techniques to match the vehicle configuration, centre of gravity, and driving experience. 4.1.15 Assesses and adapts to changing conditions.
Performance objectives	Explain commercial vehicle dynamics and their effects on vehicle handling and performance.
Review	Vehicle dynamics information covered in the classroom.

Instructor notes

1. This lesson isn't intended to address minute technical detail but rather review and reinforce terminology, techniques and technology. Cover this content at appropriate times during on-road lessons.
2. Vehicle dimensions include length, width, height, wheel base, track, rear axle, forward distance, front and rear overhang and axle spacings.
3. Vehicle weights (mass) include tare (unladen weight), gross vehicle and/or gross combination weight, axle and axle group weight, and the effects of axle spacings.
4. On road vehicle performance and handling can be affected by swept path, high and low speed tracking, wheel base, rear overhang, steering amplification, trailer yaw and roll coupling.
5. Basic dynamic terminology includes gravity, centre of gravity, momentum, friction, kinetic energy, inertia, and speed.
6. Kinetic energy increases at the square of speed. Double the speed = four times the kinetic energy. This is why even small increases in speed can greatly extend stopping distance.
7. Electronic stability control (ESC) uses sensors to anticipate potential truck instability, such as an impending rollover, and automatically adjusts the throttle and the brakes to try to prevent this from occurring.
8. Explain the effects of speed, weight corner radius and vehicle centre of gravity, inertia, load placement and restraint, steering and braking. As you go around a corner, inertia tries to make the vehicle go straight. It is the friction between the steering tires and road surface that make the vehicle turn.

9. The three parts of the corner are the entry, apex and exit. The correct cornering technique is:
 - Set the speed before entering the corner
 - Maintain the speed from the entry to the apex
 - Accelerate progressively from the apex to the exit.
10. Braking efficiency is dependent upon the amount of brake air pressure that is provided to each wheel in relation to the weight that wheel is carrying. Unless load sensing is provided most trucks will be “over braked”. This simply means that whether the vehicle is loaded or empty, the same amount of air pressure is applied. This leads to unbalanced brakes and wheel lock-up if the vehicle isn't equipped with ABS.
11. Explanations for grades should include correct gear selection, use of auxiliary brakes, use of service brakes, brake fade / loss of brakes and risks associated with non-synchro transmissions.

General learning points	
a.	Describes, and identifies, vehicle dimensions for the vehicle being operated.
b.	Describes vehicle tare and gross weights and axle group weights and spacings for the vehicle being operated.
c.	Explains swept path, wheelbase, rear overhang.
d.	Explains the risks associated with cornering in a heavy vehicle and the effects of weight, speed, centre of gravity and load placement.
e.	Explains the effects of weight and speed in braking situations.
f.	Explains the correct technique for descending a steep grade when loaded.

Fuel efficient driving

The largest operating cost for transport operators is fuel. While fuel efficiency has improved greatly over the last 20 years, particularly with the introduction of electronically controlled fuel systems, this has been offset by the increasing cost of fuel.

Students must understand that the greatest single factor that increases fuel use is speed. While this has to be balanced with the demands of the job, the fact is that for every kilometer above 90 km/h, fuel use increases by about one to one and a half percent. For example, a truck or bus doing 100 km/h will be using about 10–15% more fuel than one going 90 km/h. This relates to increases in aerodynamic drag whereby if you double the speed of a commercial vehicle you can increase the power requirements and, the fuel usage, by eight times.

Once introduced, reinforce information from this unit throughout all of the lessons.

<p>Learning outcomes</p>	<p>3.4.3 Accelerates at a smooth and gradual rate.</p> <p>3.4.4 Anticipates when changes in speed, gear selection and surrounding space will be necessary.</p> <p>3.4.5 Operates the engine and transmission close to the fuel-efficient rpm range whenever possible.</p> <p>3.4.6 Chooses a fuel efficient highway speed.</p> <p>3.4.7 Uses progressive shifting and selects the engine rpm and gear that are best for the vehicle.</p> <p>3.4.8 Looks ahead continually, anticipates the need to change speed, and changes speed gradually.</p> <p>3.4.9 Uses cruise control whenever appropriate for driving conditions.</p> <p>3.4.10 Idles the vehicle’s engine as little as possible.</p> <p>3.4.11 Maintains tire pressure for fuel-efficient road performance.</p>
<p>Performance objectives</p>	<p>Demonstrate fuel-efficient driving habits, with a loaded trailer.</p>
<p>Review</p>	<p>City driving and highway driving.</p> <p>Fuel efficiency information in the Student Guide and from the NRCan online course homework assignment.</p>

Instructor notes

1. If the student understands how fuel is expended, they'll better appreciate the reasons for the learning points that follow. Have them explain the four types of resistance: inertial, rolling, aerodynamic and grade.
2. Even though modern electronic fuel systems are achieving far better economies than traditional mechanical systems, what the driver does, or does not do, will dictate the degree of efficiency. Conducting comprehensive pre-trip inspections with particular emphasis on tire pressures, servicing and load weights are key parts of the inspection that will impact on economy.
3. Progressive shifting relates to the technique of only using enough rpm to pick up the next gear. Over-revving and then waiting for engine speed to fall back so a gear change can be made is completely inefficient in terms of fuel use and engine speed. Aim for shifting at approximately 1600 rpm.
4. Skip shifting is skipping unnecessary gears. Truck transmissions usually offer a wide range of gear ratios and any that can be bypassed will save fuel. In low range, for example, half and whole gears can be skipped due to the low ratios involved.
5. The speedometer tells a commercial vehicle operator if they're about to break the law it is also a good tool for the student to use while learning to shift. The tachometer provides the information needed to operate the engine efficiently. Make sure the student understands the economy and operating ranges. While some vehicles will display the economy range in green, some do not. Spend a little time discussing the information presented on the tachometer.
6. Observation and following distances play an integral part in fuel economy driving. Late reactions lead to harsh braking and subsequent speed recovery that wastes fuel.
7. **Activity idea:** this activity can be used throughout the training program in a variety of traffic and roadway settings. The student learns how to save fuel and at the same time drive in a safe and relaxed manner.

Have the student focus on maintaining large safety margins around the vehicle enabling them to maintain a continuous driving speed (avoiding stopping if possible) and to provide plenty of space and time for decisions and actions.

Once they are getting the idea, ask questions to reinforce this driving style such as: How do you feel about driving this way? What effect do you think following distances have on vehicle emissions? How could you use this driving style in your personal vehicles? What benefit would this have to a drivers stress level?

8. Inefficient auxiliary brake use, particularly on flat roads, leads to the need for speed recovery and excessive fuel use. When decelerating for corners, this should be done early simply by decelerating. Excessive downshifting to maximize auxiliary brake effect, is unnecessary when bringing the vehicle to a stop. Encourage students to react early, change down a couple of times and then bring the vehicle to a stop. Turn off the auxiliary brake when not using it and let the terrain work for you.
9. During ascents, monitor the student's management of engine speed through gear selection and explain that high rpm might indicate that the gear selected is too low or the road speed is too high. Simply by lifting the right foot, even just a fraction, engine rpm will drop back within the economy range. This is probably the most difficult aspect of fuel economy driving to teach, so be patient and lead by example!
10. While descents shouldn't use much, if any, fuel, if not done properly excessive downshifting can occur and this certainly does use fuel. Explain that the correct gear needs to be selected early and, that during descents, the wheels are actually driving the engine.
11. Weather conditions affect fuel efficiency. Driving on snow-covered roads can increase fuel consumption by 15–20%. Strong wind also has a significant effect.

1. General Learning points	
a.	Explains the four types of resistance that dictate fuel usage, (inertial, rolling, aerodynamic and grade).
b.	Uses no throttle when starting the engine. When warming up the engine don't increase the engine speed. Five minutes of idling for a warm-up is generally adequate.
c.	Warms the vehicle up after initial idle time by driving easily; don't try to get too much speed out of the engine by pushing the throttle down hard.
d.	Avoids unnecessary idling — five minutes maximum.
e.	Conducts pre-trip inspection.
f.	Pays particular attention to tire pressures. Tires under-inflated by eight psi can increase fuel consumption by up to four percent.
g.	Doesn't exceed posted speed limits.
h.	Backs off the accelerator when going over the top of a hill and lets gravity and momentum do the work.
i.	Uses auxiliary brakes efficiently in general driving, selecting a sufficiently low gear on descents to maximize auxiliary braking.
j.	Uses cruise control where appropriate.

2. City driving	
a.	Selects a gear that will allow engine to operate in economy range.
b.	Avoids unnecessary downshifting.
c.	Avoids/minimizes stop/start driving by anticipating road and traffic conditions.
d.	Applies progressive shifting techniques.
e.	Demonstrates skip shifting techniques.
f.	Uses tachometer and maintains engine speed in economy range, (1400–1600 rpm).
g.	Maintains appropriate following distance.
h.	Applies 12-second visual search pattern to identify potential hazards and reacts early to these.
3. Highway/freeway driving	
a.	Engages the highest gear possible, as soon as possible, for as long as possible.
b.	Avoids unnecessary downshifting before stopping, especially just to maximize engine braking.
c.	Applies progressive shifting techniques.
d.	Demonstrates skip shifting techniques.
e.	Uses tachometer and manages engine speed with efficient gear selection.
f.	Maintains appropriate following distance.
g.	Applies 12 second visual search pattern to identify potential hazards and reacts early to these.
h.	Uses downgrades to achieve momentum and allows engine speed to pull back to bottom end of operating range before downshifting.
i.	Operates within the economy range during ascents.
j.	Explains effects of fatigue on fuel economy. Inconsistent speed control and poor planning can be a sign of fatigue.
k.	Adjusts for snow-covered roads and reduces speed for head winds.

Common faults/symptoms	Address/check
Long idle periods.	Unexpected delays.
Excessive speed. Not observing speed limits, too fast for conditions.	Legal obligations, hazard awareness.
Incorrect gear selection. Engine rpm too high or too low.	Engine speed management, gear ratios.
Follows too close.	Following distances.
Fails to apply 12 second search. Late reaction to hazards.	Observation techniques.
Fails to apply progressive shifting technique. Over-revving during gear shifting.	Progressive shifting technique, confidence.
Unnecessary use of auxiliary brakes. Erratic throttle control, excessive downshifting, late reactions to corners and hazards.	Auxiliary brake use.
Poor use of transmission on hills. Misses gear changes, or selects wrong gear, on hills.	Anticipation of gear shifts, use of tachometer, skip shifting.
Difficulties with gear selection on descents. Fails to select correct gear before commencing descent.	Confidence, descent technique.

Bobtailing

Drivers need to bobtail the tractor from time to time. They need to understand the potential hazards of bobtailing which can be affected by weather conditions.

Performance objective	Drive a tractor safely through a variety of manoeuvres, at a variety of speeds.
Review	Braking and tractor pre-trips

Instructor notes

1. Discuss the difference in a tractor-only pre-trip, highlighting the difference in the air test.
2. Demonstrate a short drive, so the student can hear and feel how the tractor moves.
3. Explain how the tractor alone shifts differently, as there is no inertia from the trailer.
4. Explain that the tractor will have less traction as there is no weight on the drive wheels. This may affect the stopping distance as well as loss of traction in wet and slippery conditions.
5. If you have access to an open parking lot on a wet day, have the student practice accelerating, turning, and braking to discover handling differences and points of traction loss.

1. General Learning points

a.	Explains pre-trip difference in air test.
b.	Adjusts shifting in turns.
c.	Adjusts driving to accommodate lack of weight on drive wheels. Less weight means less traction.
d.	Adjusts stopping distances.

Common faults/symptoms	Address/check
Student pushes both dash valves in causing the tractor to leak air	Have student close the trailer supply valve

Unloaded trailer

Driving with an unloaded trailer is a mandatory activity in MELT. Drivers will frequently run with an unloaded trailer and need to understand the potential hazards which can be affected by weather conditions, as well as the handling differences due to lack of weight on the rear axles.

Learning outcomes	Drive an unloaded trailer safely through a variety of manoeuvres, at a variety of speeds.
Review	Basic vehicle dynamics.

Instructor notes

1. This activity provides a benefit to schools in that it uses less fuel and creates less wear on tires, particularly in urban environments.
2. Suggestions for when to provide lessons with an unloaded trailer:
 - For some of the backing and couple/uncouple activities.
 - For the first few lessons with a trailer. Students will find it easier to shift and deal with hills when first learning.
 - For some of the highway or freeway driving. Students will feel the difference and learn what to watch for in turns and curves. The trailer behaves differently at speed with no weight on the rear axles.
3. Explain how the tractor shifts differently, as there is less inertia from the trailer but more than from a bobtail tractor alone.
4. Explain that the trailer will have less traction as there is no weight on the wheels. This may affect the stopping distance as well as loss of traction in wet and slippery conditions.
5. Discuss hazards of high winds with an empty trailer.

1. General Learning points	
a.	Adjusts shifting as the tractor will shift different then bobtailing and different than a loaded trailer.
b.	Watches the trailer tracking as it can be affected by wind, road rutting, and drift in turns.
c.	Adjusts driving to accommodate lack of weight on the trailer. Less weight means less traction.
d.	Adjusts driving to accommodate the difference in stopping distance.

Common faults/symptoms	Address/check
Trouble shifting misses shifts.	Explain how the trailer slows the tractor but still lacks the inertia of the weighted trailer.
Trailer out of lane / not watching for tracking.	Timing of mirror checks and awareness of road conditions and configuration.

Intersections

Intersections continue to account for a large number of motor vehicle crashes which can result in death and injury. While many of these crashes are caused by poor judgment and a failure to follow simple rules, the problems are worse when large, slow moving vehicles are involved. Students must be encouraged to not only follow the rules at intersections (which include roundabouts) but also to appreciate the effects their vehicles can have on other road users in these busy, and potentially dangerous, locations. This lesson has relevance to intersections in both urban and rural settings.

Learning outcomes	<p>3.3.12 Crosses intersections in an urban setting in a safe manner including:</p> <ul style="list-style-type: none"> • Traffic lights • Two and four-way stops • Uncontrolled intersections • Traffic circles/roundabouts. <p>3.3.13 Turns at intersections in an urban setting in a safe manner including:</p> <ul style="list-style-type: none"> • Traffic lights • Two and four-way stops • Uncontrolled intersections • Traffic circles/roundabouts.
Performance objective	Safely and legally negotiate intersections in a commercial vehicle with a trailer, while turning right, left and proceeding straight through, through controlled and uncontrolled intersections including roundabouts.
Review	Rules, signs, signals and road markings at intersections.

Instructor notes

1. This lesson comprises a number of intersection scenarios and, as a result, will probably require some organization and time to complete.
2. Look for aggressiveness (overconfidence) and nervousness (lacking confidence) that will probably reflect degrees of experience.
3. Emphasize the need to never take it for granted that right-of-way will be yielded especially when other drivers encounter trucks.
4. Emphasize the additional risks associated with trucks, as a result of size and length, when turning.
5. Emphasize observation skills and anticipation of changing conditions.
6. Where possible have the student observe and comment on the movement of other trucks through intersections and roundabouts.
7. The intersection blocking rule states that no vehicle may enter an intersection if the path through it, or exit from it, is blocked by stationary traffic. This includes the vehicle ahead. Students must remember the length of their vehicle and not commit to an intersection if there is insufficient room for the whole vehicle to complete the manoeuvre.
8. Explain the tendency for many car drivers to try and 'beat' a commercial vehicle at intersections. The driver should, if in doubt, give-way even in situations where they might have the right-of-way.
9. While students may be quite competent in intersection techniques in a car, ensure they understand the added potential hazards arising from their heavy vehicle that arise from slower acceleration, vehicle length, weight and width and the effects of off tracking.
10. Discuss determining point-of-no-return at traffic lights. Deciding factors include: speed of the vehicle, road conditions, traffic volume, visibility, type of load, and weight.
11. Turning lanes, centre two-way turn lanes and acceleration lanes all offer the opportunity for any vehicle to move safely out of or into traffic streams. They're not to be used for passing.
12. When turning right into multiple lanes, drivers are required to turn into the lane closest to them. This applies both in urban and highway driving. While ending in the closest lane is the end goal, for most right turns drivers may need to use the other lanes to complete the turn safely. While making the right hand turn check to make sure the vehicles from the other side of the intersection are not going to be turning into the lanes you may need to complete the turn safely. Don't turn into an HOV lane.

13. When turning left into multiple lanes, drivers may turn into any lane on the far side of the centreline. This applies both in urban and highway driving. Before beginning the left turn, ensure the path will remain clear while you make the turn — looking for pedestrians, bicycles and scooters that may be approaching the intersection. Go deep enough into the intersection before beginning the turn. Using your mirrors ensure the trailer tires will clear any objects on the left before beginning the turn. In some intersections the student may need to go straight into the intersection beyond the lane they're turning into to safely complete the turn — this may involve using the shoulder or bike lane to complete the turn.
14. When turning right, drivers should not move into an oncoming lane, unless vehicle length demands this. Where this is necessary, drivers must give-way to other traffic approaching.
15. The risks associated with front and rear overhang, swept path and tail swing, should be emphasized.

1. General Learning points

a.	Observes all road signs and markings at intersections.
b.	Selects lane and lane position that reflects vehicle dimensions, tracking and swept path.
c.	Identifies, in advance, type and status of intersection controls.
d.	Anticipates traffic lights to avoid unnecessary stopping.
e.	Identifies if road is off-camber and explains how this may affect speed and traction.
f.	Identifies, and reacts appropriately, to traffic volume and speeds.
g.	Avoids blocking crosswalks and intersections.
h.	Applies, in all situations, good vehicle control.
i.	Follows merge and yield rules and procedures.
j.	Displays patience and courtesy with other road users.

2. Turning at intersections	
a.	Checks mirrors (entry and exit).
b.	Signals, irrespective of traffic conditions.
c.	Selects the appropriate gear <u>before</u> the turn.
d.	Positions vehicle correctly.
e.	Searches intersection before proceeding.
f.	Understands yield and merge rules, and proceeds only when safe.
g.	Gap selection reflects speed and position of intersecting traffic.
h.	Maintains correct lane position throughout turn.
i.	Checks for clearances to signs, posts, etc.
j.	Appropriate speed throughout turn.
k.	Avoids contact with any objects.
l.	Accelerates steadily and smoothly to road speed after completing turn.
3. Merging lanes	
a.	Obeys all traffic controls (yield, stop, traffic lights, police officer) and if required to stop does so in correct position.
b.	Monitors mirrors before any merge point and signals before merging.
c.	Follows zipper merge procedures, as needed.
d.	Appropriate speed throughout manoeuvre.
4. Roundabouts/traffic circles	
a.	Checks mirrors (entry and exit).
b.	Adopts correct lane position early.
c.	Searches roundabout before entering and yields to traffic from the left.
d.	Enters roundabout and signals right to exit the roundabout when passing the entry point immediately before the required exit.
e.	Monitors wheels up on the "skirt", if applicable.
f.	If there is more than one lane, obeys the posted signs for lane use.
g.	Appropriate speed throughout manoeuvre.

5. Crossing intersections	
a.	Depending on visibility, takes foot off the accelerator and covers the brake.
b.	Checks mirrors for following traffic.
c.	Checks for traffic, bicycles and pedestrians approaching from the left or right, and oncoming vehicles that may be turning left.
d.	If a traffic light, determines point of no return — point at which you can no longer stop if the light turns yellow.
e.	Judges whether or not they can clear the intersection completely on the other side.
f.	When crossing a main road from a side street from a stopped position, it can take at least 12 seconds to cross with a tractor-trailer. This means that you need at least a 15 second gap between your commercial vehicle and cross traffic in order to cross safely.
g.	After passing the intersection, checks mirrors again for any change in traffic patterns behind.

Common faults/symptoms	Address/check
Lacking in confidence. Approaches intersections too slowly. Stops when not required. Unnecessarily gives-way.	Discuss. Use intersections with low traffic density for early lessons and progressively increase the degree of difficulty.
Excessive speed. Approaches too fast.	Vehicle control and see-think-do.
Fails to look both ways. Fails to give-way.	Observation/search techniques.
Proceeds before signal turns green. Poor anticipation.	Patience and pace
Turns from incorrect position on road. Illegal or unsafe turn.	Set-up for turns
Proceeds on "late" amber light. Fails to stop when safe to do so.	Explain consequences of this with long vehicles.

Fails to observe controls including traffic lights. Enters intersection without stopping or giving way.	Check attitude and confidence.
Stops in wrong place to give-way. Stops too far back or, alternatively, in the opposing traffic stream.	Discuss basic obligations.
Fails to give-way. Vehicle with right of way is inconvenienced.	Discuss basic obligations.
Over compensates or fails to compensate for vehicle dimensions. Cuts corners or swings too wide.	Lane positioning, consider further training in controlled training ground.
Fails to stop at a stop sign. Disregards or fails to notice stop sign.	Check basic obligations are understood.
Not completely in correct lane. Straddling lanes/too far right or left.	Discuss road positioning. Provide reference points on vehicle.
Uses wrong lane. Fails to observe road marking arrows.	Observation skills. Discuss markings and lane use, particularly in roundabouts.

Cornering and curves

As a high number of roll-overs occur while cornering, this lesson is an important component of the driver training program. These loss of control incidents occur both in urban settings, at roundabouts, and when turning, and more frequently, at higher speeds on the open road. Almost without exception, they occur as a result of driver error and a failure to react to the prevailing driving conditions. Of these the two key considerations must always be the vehicle and the road.

Learning outcomes	3.3.8 Drives through curves, to the right and to the left, in a safe manner.
Performance objective	Demonstrate correct cornering line and technique, through left and right hand corners and curves.
Review	Basic vehicle dynamics.

Instructor notes

1. Select corners and curves for training that have speed warning signs and, where possible, also include curves that don't have these signs but require reductions in speed.
2. Minimal downshifting should be required in highway curves especially if the vehicle speed is above 55 km/h.
3. Discuss the effects of vehicle load and load placement on the centre of gravity and the effects of load shift and live loads. Question the student on these aspects.
4. Discuss intersections and roundabouts and the need to control vehicle speed especially in roundabouts where there might be three directional changes. Explain the risks associated with road camber (positive and negative).
5. As the vehicle approaches the entry to the corner, the driver should look as far into the corner as they can and base their speed on how far they can see. This is critical when speed warning signs are not present.
6. At no time, should the vehicle cross the centreline or, particularly on blind corners, the right hand fog line.
7. Emphasize that no two corners are the same. Corner radii might be the same but road surface and condition, lane width and camber all differ. Each must be approached with caution.
8. Discuss the importance of the apex of the curve and using mirrors when going through the curve. This will translate to intersections.

1. General Learning points	
a.	Explains effects of incorrect load placement and security on stability.
b.	Explains effects of “live” loads on stability.
c.	Explains static roll threshold limitations for any trailer being towed
d.	Explains the use of reflective roadside and lane markers to assist with cornering at night.
2. Uncontrolled intersections/turning left	
a.	Explains the three points of a corner (entry, apex and exit).
b.	If required, uses auxiliary brakes efficiently.
c.	Identifies, interprets correctly and reacts to any warning signs.
d.	Completes all deceleration, braking and any downshifting before entering the corner.
e.	Sets appropriate speed before entering corner.
f.	Assesses severity of corner by reference to how far they can see.
g.	Maintains speed from the entry to the apex.
h.	Accelerates gently from the apex to the exit.
i.	Uses mirrors to check trailer tracking.
j.	Maintains effective two handed steering control.
k.	For right hand curves, keeps the front of the vehicle closer to the centre of road so the trailer wheels don't roll over the curb or drop off the pavement on the right, while watching the right mirror for the position of the rear of the vehicle.
l.	For left hand curves, keeps the front of the vehicle closer to the outside of the curve (right side of road) so the trailer wheels don't cut into the other lane of traffic on the left, while watching the left mirror.

Common faults/symptoms	Address/check
Fails to observe speed warning signs. Excessive speed during cornering. Late braking or downshifting.	Vehicle control/observation/risk perception.
Runs red or late amber lights. Excessive speed through turns.	Vehicle control/observation technique/risk perception.
Poor cornering technique. Braking in corners.	Vehicle control/observation technique.
Poor cornering line. Crosses centreline/fog line.	Set-up/steering technique.
Poor steering control. One handed steering. Oversteer. Hand position.	Steering technique.

Starting — uphill and downhill

This lesson is a natural progression from moving off and stopping and can be incorporated with that lesson where appropriate. There is a degree of skill required to move off on grade in a commercial vehicle. Instructors should be aware of what constitutes acceptable industry practice and be aware of current technology that will assist in this regard.

Learning outcomes	3.3.9 Ascends steep grades in a safe manner on both urban streets and on higher speed roads. 3.3.10 Descends steep grades in a safe manner on both urban streets and on higher speed roads.
Performance objective	Start in a commercial vehicle with a trailer, on uphill and downhill grades, without excessive clutch slip or over revving the engine, and without stalling or rolling backwards.
Review	Moving off and stopping.

Instructor notes

1. Current technology includes accelerator brake release systems whereby the brakes, once stationary on a grade, are applied in the usual way using the brake pedal. To move off the driver only has to apply the accelerator. This will also release the brakes. For tractors with manual transmission not equipped with hill assist the instructor must confirm the student understands the friction point must be found before taking their foot of the brake pedal.
2. Vehicles running electronic fuel systems will likely not require initial accelerator use to move off. On some steeper grades the student will be required to use the accelerator to have the tractor start smoothly.
3. Consider practicing the uphill sequence on flat ground first if this helps.
4. Discuss the effects of grades and loaded vehicles on other traffic particularly in relation to truck speed when moving off.
5. When teaching moving off — uphill, consider the effects of gravity, vehicle mass, gear selection and use of the splitter (if available), extra power requirements and clutch/accelerator coordination. Explain to the student that on steep hills the first shift will have to be fast as the truck will have no road speed and will slow quickly when the transmission is disengaged. Decide what to do should the vehicle stall or roll back.
6. When teaching moving off — downhill, consider the effects of gravity, vehicle mass and encourage the student to start off in a higher gear and let gravity start the vehicle moving to save on unnecessary shifting. This is also a good time to have the student use the skip shifting technique.

1. Moving off — uphill	
a.	Moves off without inconveniencing other road users.
b.	Moves off meeting all legal requirements.
c.	Uses mirrors and head checks where appropriate.
d.	Selects appropriate gear that reflects vehicle weight and road gradient.
e.	Applies extra rpm (if required).
f.	Co-ordinates clutch and accelerator without excessive clutch slip.
g.	Avoids stalling the vehicle.
h.	Does not roll back.
i.	Uses, where available, trailer control valve effectively.
j.	Accelerates as necessary.
2. Moving off — downhill	
a.	Moves off without inconveniencing other road users.
b.	Moves off meeting all legal requirements.
c.	Selects appropriate gear that reflects vehicle weight and road gradient.
d.	Holds on footbrake and releases park brake.
e.	Releases clutch pedal and footbrake together.
f.	Accelerates and changes gear as necessary.
3. Stopping and parking on hills	
a.	Checks for following traffic using mirrors and signal to pull over to the curb or edge of the road.
b.	Downshifts, if necessary, to reduce speed in preparation to stop.
c.	Applies brakes smoothly and progressively.
d.	Depresses the clutch as you approach a stop; and when stopped, shift to low gear and/or neutral.
e.	Allows extra room between vehicles for safety.

f.	Turns wheels into the curb on a downgrade; away from curb on an upgrade. Ensure front tire makes gentle contact with the curb. If no curb, always turn the wheel to the right on either up or down hill grades. The laws require the wheels of a parked vehicle be no more than 30cm from the curb.
g.	Sets the parking brake and turns off the ignition.
h.	Removes keys.

Common faults/symptoms	Address/check
Excessive engine speed, vibration, slipping clutch.	Practice coordination.
Fails to depress clutch pedal fully. Gear grinding.	Practice coordination.
Poor clutch, accelerator and park brake co-ordination when starting uphill. Vehicle moves off in jerks, stalls or rolls back.	Practice coordination.

Negotiating steep grades

This lesson could be combined with the “Starting uphill and downhill” lesson.

Trucks operating on grades can't climb, or descend a grade under control, as quickly as cars. The weight of the vehicle severely affects the speed of the vehicle during climbs and because of braking limitations, also demands a much more cautious approach when driving downhill. Trucks are all too often involved in very serious crashes when descending steep grades. This is almost always due to driver error.

The correct techniques are very simple, but the students must understand the limitations of the vehicle and accept that there is never any rush to get to the bottom of a hill. They must understand the potentially catastrophic consequences of doing it wrong.

Learning outcomes	2.1.18 Operates engine brake or retarders, and understands how and when to appropriately use these systems to control vehicle speed. 3.2.4 Explains that steep grades require different driving techniques for different locations and how to properly use emergency runaway lanes. 3.3.9 Ascends steep grades in a safe manner on both urban streets and on higher speed roads. 3.3.10 Descends steep grades in a safe manner on both urban streets and on higher speed roads. 3.3.6 Communicates correctly and in a timely manner to other road users. 4.2.5 Explains what to do in the event of emergency situations — loss of brakes. 5.4 Apply chains to a tractor-trailer (weather dependent) 10.2.10 Explains what to check on the air system during an en route brake check inspection.
Performance objective	Ascends and descends steep grades on both urban streets and on higher speed roads, minimizing inconvenience to other road users, while maintaining control, without stopping, using correct gears and efficient engine speeds, using the auxiliary braking system, in a commercial vehicle with a trailer.
Review	Starting uphill and downhill.

How to use the splitter

Uphill

Here are two methods to upshift with the splitter on an uphill:

- The first method is to select the higher gear and come off the throttle, then allow the transmission to engage before accelerating again.
- The second method is once you have selected the higher gear, come off the throttle and push the clutch in just past the friction point and release gently and accelerate.

To downshift while going uphill, preselect the splitter, come off the throttle and then go gently back onto the throttle to engage the transmission.

Downhill

Downshift: slowdown using the brakes to a low rpm, put the splitter into the lower gear position, then using the accelerator, raise the rpm the same way you would on a regular downshift. Note: the road speed will begin to increase and the rpm will need to be raised to compensate for this. That is why it is important to lower the rpm enough to allow you to not hit the governor before the transmission engages in the lower gear.

Upshift: move the splitter button and push in the clutch just past the friction point and gently release the clutch. Note: up shifts will happen quickly as the truck will be gaining road speed.

1. The old adage of “if in doubt, go down a hill in the same gear as you would to come up it” has been superseded by “go down a hill one gear lower than you would to come up it”. This relates to the vastly improved power characteristics of modern engines.
2. When climbing hills behind other trucks, ensure following distances are being maintained. If the driver ahead misses a gear, for example, the driver should be able to avoid the problem without stopping.
3. Explain that loss of control relates, in particular, to a vehicle in neutral and rapidly picking up speed or one that has suffered serious brake fade. In these situations drivers should use everything available including park brakes and look for an “out”. These might include running into a ditch, along a bank or through a fence into a field. Anything that keeps the vehicle on the correct side of the road and brings it to a stop will suffice. This situation will not arise if the correct driving techniques are applied.
4. Remember that effective auxiliary brake use is dependent upon the selection of a low gear and allowing higher rpm. Service brake controls engine speed — engine brake controls vehicle speed. This basic premise applies to most auxiliary brake types. Even hydraulic driveline retarders require high engine speed to circulate the coolant through the retarder.

5. Discuss with the student the use of technology (traction control, differential locks, auxiliary braking systems etc.) and include these in training if they're fitted to the vehicle.
6. Discuss with the student the use of slow vehicle pull-outs. When ascending a hill, if you think the vehicle will have to be brought to a stop if it uses a slow vehicle pull out, keep going until a suitable turnout area is identified. Always stay right in multiple lanes when climbing hills unless passing is necessary and not prohibited.
7. Review the use of four way flashers to notify other drivers of the slow moving vehicle.
8. Review procedures for pre-hill brake checks.
9. Review use of tire chains, if needed.
10. During descents, always use slow vehicle pull-outs if there is following traffic and adjust speed to let all traffic pass. Don't travel on the shoulder or "hang right" when descending hills but stay within the lane until a suitable turn out area has been reached. Make sure the student is alert to overhanging trees, power poles, and any other obstructions on the right, that may prevent or partially restrict the use of the right lane or pull-out.

1. General Learning points

- | | |
|----|---|
| a. | Explains torque and power in relation to negotiating grades. |
| b. | Explains the key reference points on the tachometer for negotiating grades. |
| c. | Identifies and reacts to grade warning and slow vehicle pull-outs/lane signs. |
| d. | Checks following traffic conditions on approach to grades. |

2. Steep ascents

- | | |
|----|---|
| a. | Uses the tachometer effectively to manage engine speed and gear selection. |
| b. | Maintains engine speed in the operating or economy range on the tachometer. |
| c. | Selects correct gears, without grinding, to suit load and road conditions without stopping. |
| d. | Makes use of available lanes to minimize interference to following traffic. |

e.	Maintains correct following distances from other trucks.
f.	Pass (where appropriate) safely.
g.	Displays courtesy to other road users.
3. Steep descents	
a.	Selects suitable gear to reflect road and load conditions before starting descent.
b.	Engages auxiliary brake and uses higher rpm to optimize braking.
c.	<p>Uses intermittent braking action on downgrades to prevent over-speed. The “snub” method of downhill braking or a light consistent brake pressure:</p> <ul style="list-style-type: none"> • Apply the brakes hard enough to feel a definite slowdown • When speed has dropped to 5 km/h below safe speed, release the brakes • When speed increases above the safe speed, repeat the first two steps. The other method is to apply a light consistent pressure.
d.	Monitors tachometer to manage engine and road speed.
e.	Explains actions in the event of a missed gear change.
f.	Explains “brake fade” and what causes it.
g.	Explains actions in the event of a “runaway” vehicle.
h.	Uses slow vehicle pull-outs or lanes to allow following traffic past.
i.	Displays courtesy to other road users.
j.	Avoids passing another vehicle, if possible.

Common faults/symptoms	Address/check
Doesn't down shift soon enough on ascents. Engine begins to labour.	Use skip shifting to regain engine speed and drive.
Changes to incorrect gear (too high) on ascents. Immediate loss of engine speed.	As above.

Follows commercial vehicle ahead too closely. Inadequate following distance. Buildup of traffic behind.	Back off in case vehicle ahead stops suddenly. Drop back and create room for following vehicles to pass.
Incorrect gear (too low) for ascent. Engine over-revving.	Back off the accelerator or change up.
Uses incorrect lane during climbs. Faster traffic passing on right.	Signal and move into right hand lane.
Fails to monitor tachometer. Over-revving, poor gear shifting technique.	Revisit key tachometer references.
Wrong gear selection for downhill grade. Vehicle speed too high or excessively slow.	Identify early, stop or slow down and select appropriate gear.
Excessive service brake use. Vehicle speed high, warning buzzer activating.	Check tachometer for auxiliary braking range. Slow or stop vehicle and select lower gear.
Poor use of auxiliary brake. Inadequate retardation. Gear selection too high.	Use higher rpm. Select a lower gear to improve retardation.
Fails to check mirrors frequently or disregards slow vehicle pull-outs. Buildup of following traffic.	Revisit observation techniques. Use slow vehicle pull-outs to clear following traffic.
Positioned too far to the right. Brushes through foliage or too close to objects. Wheels run off the edge of the pavement.	Adjust positioning to avoid right side hazards.

Auxiliary brakes

Almost every heavy vehicle in British Columbia will have some form of auxiliary braking system. These are designed to improve braking control, increasing the engines retarding force to protect the normal service brake system and reduce brake wear.

While there is a range of options, the most common auxiliaries are:

- exhaust brakes which are normally found on the smaller range of vehicles
- engine brakes which are common on the larger vehicles
- Brakesavers
- Electromagnetic retarder, and hydraulic driveline retarders which are more common to European sourced vehicles.

Combinations of these are not uncommon. While drivers should refer to the operator handbooks for specific operating instructions, there are a number of basic recommendations relating to auxiliary brakes that will maximize efficiency and reduce, especially for engine brakes, issues relating to noise.

Learning outcomes	2.1.18 Operates engine brake or retarders, and understands how and when to appropriately use these systems to control vehicle speed.
References	Vehicle manual
Performance objective	Demonstrate efficient, and effective, use of auxiliary brakes with a tractor-trailer and with consideration to the effects of noise, while complying with all signs.
Review	Transmissions (as appropriate).

Instructor notes

1. Even though switching the auxiliary brake off before stopping or starting the engine is most relevant to engine brakes on older vehicles, it is a good habit to develop as there is a risk of damaging the top end of an engine if it is started from cold with the engine brake on.
2. When activated, exhaust brakes operate through a butterfly valve in the exhaust that creates backpressure in the engine and a degree of retardation. Many modern exhaust brakes are very efficient, particularly on smaller trucks, provided they're used correctly at optimum operating rpm. They're also often found in tandem with engine brakes or retarders giving the driver a range of options.

3. Engine brakes operate at the top end of the engine. When activated, via micro switches at the clutch and accelerator, the valve sequence is interrupted. At the completion of a compression stroke the exhaust valve opens to release the compressed air. Without fuel this turns the engine into a compressor and accounts for the noise associated with engine brakes.
4. Brakesavers, this retarder operates on the torque converter principle. In a normal torque converter, vanes on the input housing (which is attached to the engine crankshaft) transmit power through the fluid coupling to the output shaft vanes of the torque converter, which is connected to the input shaft of the transmission.
5. Electromagnetic brakes operate when electricity is applied to the coil of an electromagnet, the magnetic flux attracts the armature to the face of the brake. As it does so, it squeezes the inner and outer friction disks together. The hub is normally mounted on the shaft that is rotating. The brake housing is mounted solidly to the machine frame.
6. Hydraulic retarders operate on the driveline, usually off the back of the transmission. On activation, a rotor spins in oil creating drag that slows the speed of the driveline and the vehicle. They're very quiet and usually offer a range of retardation levels.
7. The controls that should be familiar to students include engine and exhaust brake switches, (including retardation stage switches), micro switches at the clutch and accelerator, retarder controls and any electronic management switches or controls and any displays. This will be relevant to the training vehicle.
8. Students should understand that the degree of retardation provided by engine and auxiliary brakes is dependent upon engine speed and gear selection. The lower the gear and the higher the engine speed, the better the effect of the auxiliary brake. High rpm (around 1800 rpm) is also required for hydraulic retarders. These are water-cooled and to maintain optimum efficiency the engine water pump has to operate at a relatively high speed to circulate that coolant.
9. Review situations when auxiliary brakes should not be used or should be used on low retardation settings. These include: running empty on wet roads, when 'bobtailing' a tractor unit, on greasy or slippery roads, when the vehicle is in neutral for any reason, where signs prohibit their use and in any residential areas.
10. Emphasize that the drive wheels must have weight over them to reduce the likelihood of wheel lock-up under auxiliary braking and, as a consequence, stalling of the motor and loss of steering control.

11. Auxiliary brake use in general driving should not dictate the overall driving standard. If the engine brake is being used on flat roads make sure it's not bleeding off that much speed that the driver has to accelerate again to regain the desired speed. If this occurs, turn the auxiliary off and just control speed with the accelerator. Remember, the first step to slowing down is just to decelerate.
12. The use of auxiliaries, especially engine brakes, is completely unnecessary in residential or industrial areas unless there are very steep hills. At 50–60 km/h at mid-engine rpm, the engine braking effect is minimal at best. Encourage students to have consideration for others, particularly at night.
13. Excessive downshifting, five or six times, on engine brakes, to slow or stop during highway driving is fuel inefficient and unnecessary. In most cases, the driver's foot will be on the brake pedal in any case, so the actual slowing of the vehicle isn't being achieved by the engine brake at all. Encourage students to use the auxiliary to reduce road speed, but have them try downshifting just a couple of times, without the engine brake, before stopping. Professional gear shifting techniques should dictate this in any case.
14. Bob-tailing has considerable risk attached to the use of auxiliary brakes as a result of no weight over the drive wheels.
15. If a student is in doubt as which gear to select before starting a steep descent, suggest they go into low range. It's much easier, and safer, to change up a gear, on a descent, than to change down. You can't go down a hill too slow but you certainly can go down too fast.

1. General Learning points	
a.	Ensures auxiliary brake is switched off before starting or stopping the engine.
b.	Explains the basic operation of an exhaust brake.
c.	Explains the basic operation of an engine brake.
d.	Explains the basic operation of a hydraulic retarder.
e.	Identifies and explains the auxiliary brake operating controls fitted to the vehicle.
f.	Uses auxiliary brake in optimum rpm range for road conditions.
g.	Explains when auxiliary brakes should not be used.

2. City/urban driving	
a.	Identifies and reacts to engine brake restriction signs.
b.	Avoids the use of engine brakes in any built up area unless road conditions dictate otherwise (steep hills).
3. Highway driving	
a.	Applies 12 second search pattern to identify points where auxiliary braking might be necessary.
b.	Uses the auxiliary brake for speed control in rolling country.
c.	Avoids the unnecessary use of the auxiliary brake.
d.	Avoids unnecessary downshifting and engine braking when slowing or stopping.
4. Descent	
a.	Applies 12-second search pattern to identify warning signs.
b.	Selects a low gear before commencing the descent.
c.	Selects and, if necessary, adjusts the correct auxiliary brake setting.
d.	Runs engine speed out to rated rpm (where necessary) to maximize retardation.
e.	Uses service brakes to control engine rpm not as the primary means of controlling speed.

Common faults/symptoms	Address/check
Tries to start vehicle with engine brake switched on.	Switch off engine brake and explain.
Poor engine speed management. Ineffective retardation.	Use of tachometer, optimum retardation.
Not watching tachometer. Over-revving during descents.	Use of tachometer, descent techniques.
Not observing signs. Engine braking where signs prohibit.	Observation, attitude.

Excessive transmission use. Downshifting excessively before stopping.	Transmission use and techniques.
Too fast / wrong gear downhill. Excessive road speed and service brake use.	Descent techniques, lower gear.
Using auxiliary brakes in high risk situations. Uses auxiliary when running empty on wet roads, on slippery surfaces, when 'bob tailing' or when transmission is in neutral.	Risk factors.

Lane changing

While students have completed lane changes in their personal vehicle, lane changing in a commercial vehicle has some differences. How the vehicle is loaded may affect the lane change at different speeds, and blind spots around the vehicle are larger than on a personal vehicle so mirror use and signaling are key points to changing lanes safely. Lane changes should be smooth to avoid cargo shifting. When you signal to make the lane change, watch your mirrors to ensure that vehicles behind don't "dive out" to get around you.

Learning outcomes	3.3.11 Changes lanes in a safe manner on both urban streets and higher speed roads.
Performance objective	Change lanes safely, legally, and efficiently, without inconveniencing other road users.
Review	Observation.

Instructor notes

1. This lesson should cover lane changing on both city and higher speed roads, including freeway, if available.
2. Emphasize the dangers of blind spots and the need to conduct mirror checks before lane changing.

1. General Learning points

a.	Explains places where lane changing is prohibited (solid white line, near railway or crosswalk).
b.	Applies the 12-second search pattern.
c.	Explains risks associated with lane changing.
d.	Displays a courteous approach to lane changing.
e.	If in doubt, stays in lane.

Lane change steps

Observation	Checks traffic and conditions before signaling.
Communication	Activates turn signal at least 2–3 seconds before lane change.
Speed	Adjusts speed, if needed.
Spacing	Maintains safe following distance in current lane and accurately judge distance needed in target lane.
Execute lane change	Changes lanes where it is safe to do so. Makes a smooth and deliberate lane change.
Cancel turn signal	Cancels turn signal within four seconds of completing lane change.
Adjust speed	Adjusts speed, as needed.

Common faults/symptoms	Address/check
Not using mirrors or checking blind spots. Fails to check for other traffic.	Frequency of mirror checks 5–10 seconds.
Cuts in front of passing vehicle. Flashing lights, horn sounded or braking by vehicle passing.	Use of mirrors. Time and distance.
Illegal lane change. Drives unnecessarily over solid white line.	Revisit knowledge of traffic law.
Fails to indicate early. Signals used at last moment before changing lanes.	Use of signals and defensive driving.
Fails to adjust speed for passing vehicles. Last moment “near misses” for faster vehicles.	Observation and planning in any “being passed” situation.

Passing and use of passing lanes

While passing is an option for any driver in slow traffic, for truck drivers it is a manoeuvre that should only be considered if the vehicle ahead is travelling well below the speed limit and there is a considerable amount of clear road ahead. Much more than the 300–400 m required for car drivers is needed for trucks to complete this manoeuvre safely.

In most situations, the passing option for commercial vehicles on single lane highways isn't possible because of the space needed. The slow rate of acceleration of heavily loaded trucks will generally only make passing an option where passing lanes exist. Professional operators should never be passing vehicles travelling at similar speeds to their own.

The use of passing lanes must also be managed by truck drivers so that they don't interfere with the opportunity for faster following traffic to pass.

Learning outcomes	3.3.11 Changes lanes in a safe manner on both urban and higher speed roads. 3.3.16 Makes efficient and courteous use of passing lanes.
Performance objective	Safely and legally pass a slower vehicle, without inconveniencing other road users, in a commercial vehicle with a trailer.
Review	Lane changes

Instructor notes

1. This lesson should cover both passing in passing lanes and the correct use of slow vehicle pull-outs, if available. Depending on vehicle size it might not be possible to teach or assess passing on a two lane highway. The passing procedures for this are mirrored in the sequence for passing in passing lanes and this might be the more sensible approach to the lesson.
2. Where slow vehicle pullouts exist on steep climbs, do not encourage drivers of heavily loaded combinations to use these if the vehicle will have to be brought to a complete stop to allow traffic to pass. This can lead to problems moving off again and an inability to change gear which can delay following traffic even further.
3. While the road centre line will lead traffic into the passing lane, encourage the use of the right hand indicator as this will often cause tailgating drivers to realize there is a passing lane ahead and delay any ill-considered passing.

4. Before merging left, encourage the use of signals halfway between the advance warning sign and the actual merge point sign. This will allow following drivers a little extra time to decide whether to pass or stay back. Drivers should anticipate smaller vehicles who try to quickly pass the larger vehicle. Adjust your speed and hang right to let them past.
5. Places where passing is prohibited include the following: in advance of corners or the crests of hills, through some intersections, where insufficient room exists for passing, through left turn lanes, over painted medians, over a double-solid yellow lines, within 60m of a railway or pedestrian crossing.
6. The risks associated with passing in trucks relate to the differences in road speed of the two vehicles, acceleration rates and the amount of clear road required.
7. Passing includes not only moving around other slower vehicles but also any other objects or situations that require the driver to cross the road centre line or change lanes for any reason. These might include cyclists, pedestrians, animals, objects lying on the road, road irregularities (potholes etc.) and moving past parked vehicles, and construction sites.
8. Encourage patience and awareness of the effects of larger, slower vehicles on the following traffic behind them. Drivers must appreciate the benefits for everyone of helping to ensure safe interactions between trucks and regular vehicles on the highway. As a general rule, drivers are not required to pull over every few kilometres but they should have regard for long lines of following traffic (six or more vehicles) or for vehicles that have been patient over a reasonable distance or period of time.
9. Review rules for passing stopped vehicles displaying flashing lights. Motorists must slow their speed to:
 - 70 km/h when an an 80 km/h or over zone
 - 40 km/h when in an under 80 km/h zone
10. If travelling on a multi-lane road, drivers must also move into another lane to pass when passing stopped vehicles with a flashing light, where safe to do so.
11. Failing to do so may result in a \$173 violation ticket and three penalty points.
12. Emphasize that signals are the only means of communication between commercial vehicle operators and car drivers. Use them early and consistently in all traffic conditions.
13. Pull-out lanes are not “passing lanes” in the normal sense. Slower vehicles need only use these when there is traffic being held up behind. In passing lanes drivers are obliged to use the right hand lane unless passing.
14. Focus on the student’s ability to judge speed, time and distance. They're the key to so many driving situations, not least of which is passing.
15. Emphasize the dangers of blind spots and the need to conduct mirror checks before passing or merging.

1. General Learning points	
a.	Explains places where passing is prohibited.
b.	Applies the 12-second search pattern.
c.	Explains risks associated with passing in trucks.
d.	Uses good vehicle control.
e.	Displays a courteous approach to passing, passing and being passed.
f.	If in doubt, stays back.
2. Passing stopped vehicle	
a.	Looks for signs that the vehicle may move or disembark passengers.
b.	Checks ahead for sufficient clear road.
c.	Checks mirrors and blind spots for any passing traffic.
d.	When possible, as a courtesy, moves over one lane to provide a safety cushion.
e.	If changing lanes isn't possible, slows down and keeps brake covered, while watching for any movement such as wheels turned out, lights coming on or exhaust.
f.	Signals left for at least four flashes.
g.	Checks mirrors again and moves left to pass the vehicle.
h.	Taps horn or flashes light if this is deemed necessary.
i.	Signals right for at least four flashes.
j.	Checks near side mirrors for clearance.
k.	Moves back into the correct lane position.
l.	Cancel signal and resumes speed.
m.	Has six seconds of clear road throughout the manoeuvre.
n.	Slows down and moves over (if possible) for stopped vehicles displaying flashing lights.

3. Passing slower moving vehicle on two lane road	
a.	Passes only when absolutely necessary.
b.	Maintains correct following distances.
c.	Checks ahead for sufficient gap.
d.	Checks mirrors and blind spots for other passing traffic.
e.	Signals left for at least four flashes.
f.	Checks mirrors again and moves to the left to pass the vehicle.
g.	Accelerates to passing speed but not in excess of speed limit.
h.	Taps horn or flashes light if this is deemed necessary.
i.	After passing, signals right for at least four flashes.
j.	Checks near side mirrors for clearance and centres the vehicle back in the lane or pulls back into the original lane.
k.	Cancels signal and resumes speed.
4. Passing lanes	
a.	Identifies “passing lane ahead” signs in advance.
b.	Signals intention to move into right hand lane.
c.	Moves into right hand lane at soonest opportunity to protect the space and prevent others from passing on the right.
d.	Delays own passing manoeuvre if this will hinder ability of following traffic to pass.
e.	Adjusts speed to allow all following traffic past, as is reasonable.
f.	Indicates, at least three seconds, intention to merge at end of lane.
g.	Checks mirrors before merging.

Common faults/symptoms	Address/check
Not using mirrors or checking blind spots. Fails to check for other traffic.	Frequency of mirror checks 5–10 seconds.
Passing into oncoming traffic — commences passing manoeuvre with inadequate clear road.	Speed, time and distance. Do not allow this.
Cuts in front of passing vehicle. Flashing lights, horn sounded or braking by vehicle passing.	Use of mirrors. Time and distance.
Insufficient clearance. Runs too close to vehicle being passed.	Observation skills, steering technique, spatial awareness.
Initiates an illegal pass.	Revisit knowledge of traffic law. Do not allow this.
Fails to move right for following traffic. Buildup of traffic behind the vehicle in situations where opportunity existed to let vehicles past.	Use of mirrors, attitude.
Fails to indicate early. Signals used at last moment before changing direction.	Use of signals and defensive driving.
Fails to adjust speed for passing vehicles. Last moment “near misses” for faster vehicles.	Speed management in any “being passed” situation.

Emergency braking

Modern technology has improved safety standards for not only light vehicles but for trucks as well. One of the advancements is the introduction of ABS braking systems. While this technology offers a range of advantages in emergency stopping situations, it is managed electronically which means it's not completely fool proof.

In the event of a fault, drivers might have to contend with the normal risks associated with emergency stops, or the consequences of wheel lock-up. Some vehicles still don't have the latest technology. This lesson is designed to introduce drivers to two alternative braking techniques that can be used to minimize the risks of wheel lock-up and any subsequent loss of steering or directional control.

Learning outcomes	2.1.7 Describes how anti-lock braking systems keep wheels from locking, but may not shorten vehicle stopping distance. 4.2.5 Explains what to do in the event of emergency situations.
Performance objective	Demonstrate an emergency stop using threshold braking and ABS, while maintaining steering control, at a speed up to 60 km/h, without contact with any obstacle, without stalling the engine, on a driving range or appropriate location in daylight.
Review	Basic stopping.

Instructor notes

1. While the key teaching points for this lesson are progressive (or threshold) braking, cover the practical use of ABS if the training vehicle is fitted with the technology. Refer to the manufacturer's driver's manual.
2. If the training vehicle does not have ABS discuss the technology and its advantages. The main advantages are the ability to continue steering to avoid hazards and the reduction in risk from jackknife and trailer swing.
3. The practical component of this lesson is optional. Select the training ground carefully and try to avoid the use of public roads. Use cones or drums as braking markers.

4. Create a stopping area about four metres wide and about 30 metres long. At the start of the area place a braking marker — this is where the student should apply the brakes. Have the student do several runs at 30 km/hr using threshold braking and then ABS braking. Increase speeds in increments of 5–10 km/hr once the student is competent. It is not recommended to do this exercise beyond 60 km/hr.
5. The vehicle must be loaded for this lesson so that weight is over the axle groups, particularly the drive axles. Unless ABS is fitted, an unloaded vehicle will experience wheel lock up very quickly.
6. Discuss the effects the load can have on the axle groups under harsh braking and the need for correct load distribution and restraint. These include weight transfer forward, sufficient weight over all axle groups, load shift, the effects of live loads.
7. Emphasize the risks associated with combinations when the truck is fitted with ABS but the trailer isn't. Under emergency braking, while the truck is reacting to the ABS, the trailer axles can lock up, leading to a loss of trailer stability.
8. Emphasize that drivers must not increase road speed or cornering speed, or reduce following distances, just because their vehicle is equipped with ABS technology. The normal professional driving practices still apply. ABS may not shorten vehicle stopping distances.
9. Emphasize that emergency stops require the driver only to brake. If there is time to downshift it's not an emergency!
10. ABS operates when electronic sensors detect a wheel, or axle, about to lock up and repeatedly releases the brake air pressure and reapplies the brakes automatically until the risk has passed.
11. Roll stability control is usually fitted to trailers. This automatically applies trailer brakes if cornering speed is too high but isn't fool proof. In the event of an electronic failure, the whole system returns to pneumatic operation with normal limitations.
12. Demonstrate and explain each task before the student practices.

1. Progressive/threshold braking	
a.	Initially applies foot brake firmly.
b.	Progressively applies brake pedal pressure as vehicle speed decreases.
c.	Looks ahead, not at the ground in front of the vehicle.
d.	Maintains two-handed steering and avoids any obstacles.
e.	Backs off pressure just enough to avoid wheel lockup or ABS activation, then constantly adjusts brake pressure throughout the stop.
f.	Depresses clutch pedal just before stopping to prevent stalling.
g.	Stops short of any designated obstacle without excessive wheel lock-up.
2. Antilock Braking Systems (ABS)	
a.	Explains basic operation and key advantages of ABS.
b.	Pushes the clutch just beyond the friction point and the brake pedal to the floor.
c.	Looks ahead, not at the ground in front of the vehicle.
d.	Maintains two-handed steering and maintains a straight path.
e.	Stops short of any designated obstacles.

Common faults/symptoms	Address/check
In progressive/threshold braking, applies too much initial pressure. Axle groups lock up.	Practice. Confidence.
In progressive/threshold braking, applies too little pressure. Vehicle does not slow quickly enough.	Practice. Nervousness.
During ABS braking, fails to maintain solid hard pressure on the brake pedal. Pumps the brakes.	Practice with coaching.
Doesn't depress clutch pedal or depresses it too much, activating the clutch brake. Vehicle stalls.	Practice.

Doesn't look far enough ahead during braking. Vehicle wanders.	Identify point of visual reference.
Doesn't maintain two-handed steering. One hand on gear lever. Poor steering avoidance.	Over confidence.
Anticipates instructions. Begins braking too early.	Ensure student understands sequence and instructions. Practice.

Railway crossing

While operating a commercial vehicle, your student will encounter many railway crossings. There are different types of crossings and they take longer to cross in a truck than with a car due to the length and weight of the vehicle. Railway incidents involving commercial vehicles are often catastrophic. Students must understand this activity is critically important and the importance of keeping themselves and others safe at railway crossings.

Learning outcomes	3.2.14 Takes care when crossing railway tracks, and before crossing, determines if the space available is adequate for the vehicle they're driving. 3.2.15 Shifts gears while crossing the railroad tracks only when necessary.
Performance objective	Crosses a variety of railway tracks safely, ensuring adequate space is available.

Instructor notes

- Discuss the risks associated with crossing tracks with a commercial vehicle:
 - Time to get across the tracks — hard to judge approach speed of trains — do not risk.
 - Enough space on the other side if a stop is likely — don't commit until you're sure.
 - High spots and the risk of getting hung up on the tracks, especially with a low trailer.
- Discuss what to watch for when approaching a railway crossing.
 - Identify the type of crossing (controlled or uncontrolled) and the number of tracks.
 - Obstructions blocking clear view of the crossing on approach.
 - General rule of stop, look, and listen — radio off and window down.

3. Discuss gear choice and dangerous goods requirements — if possible, avoid changing gears over the tracks at low speeds.
4. Have students do a running commentary of what they're looking for and their decisions.
 - Students will need to understand the distance required for them to clear the tracks and confirm they have enough room on the other side before starting to cross.
 - If there is a train coming within five blocks of the crossing they need to wait for the train to clear before crossing

1. General learning points	
a.	When approaching, watches surrounding traffic. Decides “what ifs” in advance
b.	Maintains appropriate speed and distance to provide options
c.	Uses hazard lights, if appropriate
d.	Silences radios and opens window a bit to listen for trains
e.	Obeys all signs and signals
f.	Shows caution if approaching train within five blocks.
g.	Follows requirement to stop if carrying dangerous goods

Common faults/symptoms	Address/check
<p>Fails to recognize the require space for their vehicle.</p> <p>Part of the vehicle is stopped on the tracks — risk of being hit by a train.</p>	<p>Space recognition. Do not let a student proceed if they can't clear the tracks.</p>
<p>Stops to close or too far away from tracks. To close possibility hit by crossing arms, to far back unable to have clear view of tracks.</p>	<p>Review distance for proper stopped position.</p>
<p>Misses shift while crossing tracks. Stops on tracks or delayed crossing.</p>	<p>Avoid shifting on tracks.</p>

8

Driving environments

Information in this section is presented based on the conditions of driving.

City/town driving

While rural highway driving makes up a large part of a semi-truck driver's time, there's also a lot of time spent operating in busy towns or cities. Restricted manoeuvrability, high traffic volumes and a much wider range of potential hazards all present a real challenge for drivers and to manage these requires patience and a high degree of skill and knowledge.

Driving a large vehicle does not give the operator any rights over other drivers. Students need to quickly develop the ability to anticipate and predict the movements of other road users and an awareness of vehicle dimension issues, particularly those relating to tracking, swept paths and overhead and roadside clearances.

Learning outcomes	3.2 Comply with operational regulations that apply to commercial vehicles. 3.3 Operate a commercial vehicle in a safe manner and perform basic driving maneuvers. 3.4 Use fuel-efficient driving habits. 4.1 Use defensive driving techniques.
Performance objective	Drive safely, legally and efficiently in town, without inconveniencing other road users, in a commercial vehicle with a trailer.
Review	Intersections

Instructor notes

1. This driving environment contains more potential hazards and risks than any other. Effective observation skills become paramount and the development of the ability to anticipate and predict the movement of other road users has to be a priority. Instructors must stay well ahead of the student in observation and planning.

2. Do a commentary drive as part of your demonstration and have them do the same. This tool remains the only reliable method of assessing driver observation and anticipation skills.

Activity — vulnerable road users: When driving in an area with plenty of pedestrian crossings and bicycle paths ask the student to tell you whenever they see a pedestrian, cyclist, skater, etc. The student should then think how this person perceives the traffic situation. In other words, put themselves in the shoes of the vulnerable road user. Highlight vehicle blind spots and discuss how to track the behaviour of these road users.

Use questions to prompt discussion such as: What do you think the pedestrian/cyclist will do next? How can you tell if they see you?

3. Encourage an unrushed driving style and the benefits of applying correct lane positions and following distances.
4. Discuss situations where a tap of the horn to warn others or gain their attention would be a good idea.
5. Ensure that students have mastered the potential pitfalls of tracking and swept paths before committing to busy city driving.
6. This session offers the opportunity to assess progress relating to a large number of the early lessons and the student should, by now, be consistently competent in all basic driving skills.
7. To achieve fuel economy in town, the student should be selecting a gear that allows the engine to run in the 1400–1600 rpm range as much as possible.
8. Excessive downshifting, before stopping, should be discouraged. It adds unnecessary and distracting activity and is pointless in many situations. If the vehicle is running in the economy range, the driver should just bring the vehicle to a stop in the gear it's in. Skip-shifting techniques will allow the correct gear to be selected if the stop becomes unnecessary.
9. Bright and low light conditions demand different reactions by the driver. If the risk of glare exists, the windshield must be kept clean and sun visors and sunglasses used. In low light conditions, even in the middle of the day, ensure headlights are on to improve conspicuity.
10. Vehicle dimensions for tracking, swept paths and clearances must be monitored closely.

1. Road conditions	
a.	Maintains correct lane position.
b.	Observes and reacts to all traffic lights, road signs and markings.
c.	Reacts to railway crossings in the correct manner.
d.	Reacts to pedestrian crossings in the correct manner.
e.	Applies a cautious, courteous and patient driving style around busy shopping areas and schools.
2. Traffic conditions (other road users)	
a.	Maintains appropriate following distance.
b.	Monitors mirrors every 5–10 seconds.
c.	Stays right in multiple lanes unless setting up to turn left.
d.	Identifies and anticipates actions of turning and oncoming traffic.
e.	Monitors the road side and adjusts lane position around parked vehicles.
f.	Monitors and anticipates the movement of pedestrians, cyclists, and other people moving devices.
g.	Identifies and reacts to avoid any animal on the road.
h.	Identifies and, where appropriate, gives-way to emergency vehicles.
3. Vehicle conditions	
a.	Driving behavior reflects an appreciation of the power and weight characteristics of the vehicle.
b.	Checks the load and vehicle condition.
c.	Vehicle speed reflects the driving conditions and posted speed limits.
d.	Monitors the behavior and operating condition of the vehicle.
4. Weather conditions	
a.	Adjusts to the prevailing weather conditions.

5. Light conditions	
a.	Takes steps to minimize the effects of any glare.
b.	Uses vehicle headlights.
c.	Slows, as needed, to adjust for reduced light conditions.
6. Driver conditions	
a.	Displays a courteous and patient driving style.
b.	Knowledge, skill, and attitude demonstrates a professional driving standard.

Common faults/symptoms	Address/check
Vehicle straddles lanes.	Lane position. Lane choice.
Interference to other traffic. Well below speed limit.	Confidence. Is this lesson too soon?
Unnecessary changes in speed.	Confidence. Spatial awareness.
Unaware of surrounding traffic, pedestrians, bicycles or other road users.	Observation skills
Exceeds speed limit.	Observation. Legal obligations. Overconfidence.
Too close to vehicle ahead.	5-second rule.
Fails to react to crossings in correct manner. Too fast at railway or pedestrian crossings.	Observation. Vehicle control. Legal obligations.

Freeway driving

While British Columbia has a limited number of freeways compared to other areas of the world and almost all of these service the main centres, they're used extensively by commercial vehicles and present their own potential risks. There are also a large number of multi-lane roadways that present similar problems and much of what follows can be related to both of these busy traffic environments.

Depending on your location, this lesson could be combined with hills and curves.

Learning outcomes	<p>3.2 Comply with operational regulations that apply to commercial vehicles.</p> <p>3.3 Operate a commercial vehicle in a safe manner and perform basic driving manoeuvres.</p> <p>3.4 Use fuel-efficient driving habits.</p> <p>4.1 Use defensive driving techniques.</p>
Performance objective	Enter, drive along, and exit the freeway safely, legally and efficiently, without inconveniencing other road users, in a commercial vehicle with a trailer.
Review	Merging, lane changing, communication.

Instructor notes

1. For the purpose of this lesson, the driving environment must include on ramps and off ramps.
2. Encourage an unrushed driving style and the benefits of applying correct following distances. Even in peak traffic, correct following distance can be applied quite successfully.
3. Gap selection and the time it takes to enter a higher speed roadway is very important to consider. Drivers must consider the options other road users when merging.
4. While much of our freeway system has two lanes in each direction, there are areas that have many more lanes. While keeping right is the basic rule on these roads it is acceptable for commercial vehicle drivers to adopt and maintain a centre lane position so that repeated lane changes (as a result of traffic joining and leaving the freeway), and the associated risks are avoided. Vehicle speed, should not be such that it is causing interference for faster traffic. If this occurs, use the right hand lane. On four-lane roads always use the right hand lane unless moving around slower traffic or adjusting lane choice for joining traffic.

5. Unnecessary lane changes increase driving risk and consistently changing lanes in medium to heavy traffic in the belief that you'll get to where you're going much quicker is simply not acceptable with large vehicles. The biggest issue for truck drivers when changing lanes are the blind spots that exist around the vehicle. Emphasize the risks associated with these.
6. To achieve fuel economy in freeway driving, the student should be selecting a gear that allows the engine to run in the 1400–1600 rpm range when vehicle speed is reduced and maintaining the operating range at higher road speeds.
7. Common hazards include faster traffic, slow traffic, traffic not signaling, late lane changes, particularly to exit the freeway, and tailgating traffic.
8. Emphasize the importance of looking ahead to read signs.
9. Bright and low light conditions demand different reactions by the driver. If the risk of glare exists the windshield must be kept clean and sun visors and sunglasses used. Always drive with the headlights on.
10. This driving environment demands effective observation skills and the development of the ability to anticipate and predict the movement of other road users.
11. Emphasize that the three key ingredients for safe freeway driving in a large vehicle are correct lane choice, safe following distance, and early responses to all planned moves.
12. Teach students to expect frustrations on freeways and accept that other drivers are not as professional, or even as competent, as they are.

1. Road conditions	
a.	Adopts, and maintains, appropriate lane position.
b.	Checks mirrors and blind spots and indicates for at least three seconds before any lane change.
c.	Observes all road markings and reacts early to all freeway signs.
d.	Accelerates, checks mirrors and blind spots, indicates for at least three seconds and merges efficiently.
e.	Identifies exit, adjusts lane position early, indicates intention to leave the freeway for at least three seconds and exits safely.

2. Traffic conditions (other road users)	
a.	Maintains appropriate following distance.
b.	Passes slower traffic safely and legally.
c.	Monitors mirrors every 5–10 seconds.
d.	Stays right in multiple lanes.
e.	Identifies and, where necessary, adjusts speed for traffic joining the freeway.
f.	Identifies and, where necessary, adjusts speed for traffic leaving the freeway.
g.	Anticipates the movement of other road users.
3. Vehicle conditions	
a.	Driving performance reflects an appreciation of the power and weight characteristics of the vehicle.
b.	Checks the load and vehicle condition.
c.	Vehicle speed reflects the driving conditions and posted speed limits.
d.	Manages fuel economy by operating in operating range on tachometer and staying in the highest gear possible for as long as possible.
4. Weather conditions	
a.	Adjusts to the prevailing weather conditions.
5. Light conditions	
a.	Takes steps to minimize the effects of any glare.
b.	Uses vehicle headlights.
c.	Slows, as needed, to adjust for reduced light conditions.
6. Driver conditions	
a.	Displays a courteous and patient driving style.
b.	Knowledge, skill and attitude demonstrates a professional driving standard.

Common faults/symptoms	Address/check
Fails to keep right when appropriate.	Use of lanes.
Unreasonably slow. Interference to other traffic. Well below speed limit.	Confidence. Is this lesson too soon?
Improper use of acceleration lane. Doesn't adjust speed to traffic flow. Too slow or too fast.	Vehicle control. Overconfident or lacking confidence?
Fails to signal intentions. Inconveniences traffic.	Legal obligations. Courtesy.
Too fast. Exceeds speed limit.	Legal obligations. Overconfidence.
Follows too closely. Too close to vehicle ahead.	5-second rule.
Fails to frequently check mirrors. Unaware of movement of other traffic.	Confidence? Check every 5–10 seconds.
Fails to observe signs. Misses, or late response to, exit.	Observation. Nervousness. Lesson too soon?
Fails to maintain constant lane position. Unnecessary lane changes.	Over confidence. Correct lane use. Risk assessment.
Not completely in correct lane. Straddles lane markings.	Spatial awareness. Vehicle references.

Rural highway driving and mountain roads

British Columbia provides one of the best training grounds for professional drivers in the world. Our hills, weather and road conditions offer challenges that would test any self-proclaimed expert. Our trucking industry is innovative and works hard to meet the economic demands of the country and this produces large, powerful combinations that require skill and a responsible attitude to operate efficiently and safely.

Unfortunately, these same conditions also play a large part in far too many commercial vehicle crashes, often with fatal results. It is in these high speed, mainly rural on-highway conditions that most operators spend most of their time and where they must take particular care. Previous lessons have addressed topics such as cornering, hills and fuel economy and these are covered again, but not in great detail. This lesson concerns itself with vehicle control, driving conditions and the potential hazards that might exist on our highways. This is an advanced lesson that brings together many of the points covered in earlier sessions.

Learning outcomes	3.2 Comply with operational regulations that apply to commercial vehicles. 3.3 Operate a commercial vehicle in a safe manner and perform basic driving manoeuvres. 3.4 Use fuel-efficient driving habits. 4.1 Use defensive driving techniques.
Performance objective	Drive safely, legally, and efficiently on rural highways and mountain roads, without inconveniencing other road users, in a commercial vehicle with a trailer.

Instructor notes

1. This lesson will not be achieved in one session. Instructors should select a training environment that provides as much variety as possible.
2. Encourage an unrushed driving style and the benefits of applying correct following distances. This should be at least one second for every 3 m (10 ft) of overall vehicle length and a minimum of five seconds. There will be reductions in braking and fuel use, a less stressful drive, more room for passing traffic and better visibility. Emphasize maintaining good distance and the consideration that if you don't plan to, or can't, pass the vehicle ahead there is no point in increasing the risk factors.
3. Teach a systematic approach to driving that is crucial in all open road conditions.

4. Some believe that the faster you go, the sooner you'll get there. Average speed is the distance the vehicle will travel in one hour. In reality, this is about 65–75 km/h depending on the route. Grades, corners, towns, intersections, traffic etc. all influence the actual distance covered in that hour. If one vehicle travels at 100 km/h and another at 90 km/h, for one hour over the same route, the actual arrival times will differ very little because of those delays. However, the faster vehicle will have incurred much higher fuel and maintenance costs and considerably increased the risk factors.
5. Auxiliary brake use should reflect an appreciation of the nuisance factor and the benefits of these systems. The student should be managing the use of the auxiliary brake — it should not be dictating the driving style.
6. To achieve fuel economy in highway driving, the student should be running in as high a gear as possible, as soon as possible, for as long as possible. During ascents the engine speed should be kept in the economy range and during descents it should be up to rated rpm for optimum auxiliary braking.
7. Common hazards include faster traffic, slow traffic, road work, hills, curves, intersections, wildlife.
8. Bright and low light conditions demand different reactions by the driver. If the risk of glare exists the windshield must be kept clean and sun visors and sunglasses used. Drive with headlights on.
9. This aspect of driving can be monotonous but distractions must be managed as much as possible. These include eating, drinking, smoking, stereo use, cell phone use, texting and some external distractions. While texting and cell phone use must be avoided at all times, others require a little thought as to the appropriate time and place.
10. Emphasize that the three key ingredients for safe driving on a highway in a large vehicle are correct lane choice, safe following distance, and early responses to all planned moves.
11. Quiz the student about personal fatigue management strategies, both at home and at work, and look for any signs of fatigue.
12. The way in which other trucks are operated on the highway should not influence the student. The fact is that many of our heavy vehicle drivers do not operate professionally in this environment, especially in relation to speed. Students should never feel pressured by other drivers to increase speed.
13. Commentary driving should be demonstrated by the instructor during teaching and then by the student to confirm observation skills.
14. Signs of livestock movement might include warning signs (open range cattle), broken fences, road discoloration, open gates etc.
15. Discuss highway speed advisory signs and the information presented on them.
16. Discuss resting one hand during long drives.

1. Road conditions	
a.	Checks mirrors and blind spots and indicates for at least three seconds before any change in direction that causes the vehicle to cross the road centreline.
b.	Observes all road markings and reacts early to all warning and advisory signs.
c.	Ascends and descends hills an appropriate gear, at the correct engine speed.
d.	Negotiates corners according to advisory speed signs, applying the correct cornering line and technique and with regard to the type of load and vehicle centre of gravity.
e.	Where appropriate, slows for narrow bridges and obeys any right-of-way signs.
f.	Positions vehicle to avoid contact with bridge structure or any oncoming vehicles.
g.	Observes temporary speed limits and obeys all controls.
h.	Identifies gravel roads by sign or colour and reduces speed.
i.	Maintains correct road position and avoids road shoulders.
2. Traffic conditions	
a.	Maintains appropriate following distance.
b.	Uses mirrors every 5–10 seconds.
c.	Maintains lane position and speed.
d.	Monitors passing traffic.
e.	Where necessary reduces speed and applies correct passing procedures in response to cyclists and pedestrians.
f.	Separates hazards by adjusting speed to avoid passing oncoming vehicles and cyclists / pedestrians at the same time.
g.	Reacts to any signs that might indicate livestock on the road.
h.	If livestock is encountered, slows down or covers brake and, if necessary, prepares to stop.
i.	Applies cautious approach to slow farm machinery.
j.	Follows safe and legal passing procedures.
k.	Anticipates abrupt, or late, passing manoeuvres from other vehicles when encountering oncoming farm vehicles or machinery.

3. Vehicle conditions	
a.	Driving performance reflects an appreciation of the power and weight characteristics of the vehicle.
b.	Checks the load and vehicle condition.
c.	Vehicle speed reflects the driving conditions and posted speed limits.
d.	Uses auxiliary braking systems in the correct rpm ranges to achieve optimum efficiency.
e.	Avoids the use of auxiliary brakes where signs prohibit their use.
4. Weather conditions	
a.	Adjusts to the prevailing weather conditions.
5. Light conditions	
a.	Takes steps to minimize the effects of any glare.
b.	Uses vehicle headlights.
c.	Slows, as needed, to adjust for reduced light conditions.
6. Driver conditions	
a.	Displays a courteous, unrushed and patient driving style.
b.	Avoids moving right for faster traffic unless safe to do so.
c.	Explains simple steps to avoid driver fatigue.
d.	If tired, asks to pull over and take a break.
e.	Avoids internal and external distractions that might affect vehicle control and observation.
f.	Maintains two-handed steering unless operating other controls or resting a hand in a low-risk situation on long trips.

Common faults/symptoms	Address/check
One handed steering. Hand resting on gear shift lever, excessive trailer movement.	Steering technique, overconfidence.
Unreasonably slow. Interference to other traffic. Well below speed limit.	Confidence. Is this lesson too soon?
Fails to recognize signs of livestock movement. Late braking.	Observation technique.
Fails to indicate intentions. Inconveniences traffic.	Legal obligations.
Too fast. Exceeds speed limit.	Legal obligations. Overconfidence.
Too close to vehicle ahead.	5-second rule.
Fails to frequently check mirrors. Unaware of movement of other traffic.	Confidence? Check every 5–10 seconds.
Fails to observe signs. Late responses.	Observation.
Fails to let following traffic past. Does not use available opportunities to move right.	Observation. Attitude.
Not completely in correct lane. Straddles fog line.	Courtesy. Safety limitations.

Night driving

The demands of the trucking industry mean that trucks are on the road 24/7 and drivers are frequently operating in the dark as a result of shift work. While many drivers prefer this environment over daylight driving since there are reduced traffic volumes, there are risks associated with night driving just as there are with any other aspect of operating trucks. Even a basic understanding of the risks associated with night driving, and the use of the night driving aids provided on the road, are not always apparent to many drivers.

Learning outcomes	4.1.11 Explains how to adapt to driving at night. 4.1.16 Drives safely at night (dependent on time of year).
Performance objective	Drive safely and efficiently at night and in fog or smoke, while correctly interpreting night driving aids, in a commercial vehicle with a trailer, on urban roads and highways.
Review	Information taught in the classroom.

Instructor notes

1. While this is a night driving lesson, the risks associated with low visibility driving conditions (winter driving, fog etc.) should also be discussed.
2. Check all vehicle lighting before the lesson.
3. Discuss reflective driving aids in detail and expect the student to react to these in the correct manner. Bridge abutments are marked with diagonal markers. The severity of a corner may be reflected in the distance between marker posts — the closer they're together, the tighter the corner. This is because drivers must be able to see, within their headlight beam, at least three marker posts at all times. Corner chevron boards, with speed advisory signs, should also be discussed.
4. Legal requirements for driving at night include low beam use and being able to stop within the distance of visible clear road. Legally, headlights must be on 30 minutes before sunset and remain on until 30 minutes after sunrise, and anytime you can't see clearly 150 metres (500 feet) in front of you. Daytime running lights are not bright enough to be used at night.
5. Discuss the advantages of following other vehicles at night, especially on unfamiliar roads, where their headlights and brake lights can provide information on conditions ahead.

6. The use of high beam in retaliation to oncoming vehicles failing to dim their lights isn't acceptable. This will result in two drivers, who are closing at a very high combined speed, being unable to see. The human eye takes about seven seconds to recover from headlight glare. At 80 km/h a vehicle would travel 156 metres in those seven seconds.
7. Don't cut corners at night. This usually results from a belief that there is no oncoming traffic because there is no visible sign of approaching headlights. Extending the available lane simply increases the likely risks.
8. Discuss awareness of how the truck's lighting may affect other drivers. The slope of the road and the size of the vehicles ahead may have drivers ahead being blinded by even low beam lights.
9. Discuss the causes of fatigue when driving at night, especially monotony, boredom, vibration, noise and cab temperature and suggest ways of alleviating these, most particularly regular breaks and napping strategies. Dimming dash lights may relieve eye fatigue.
10. Discuss the hazards of passing other vehicles at night and the fact that there could be an oncoming vehicle without lights on.
11. Discuss not over-driving the headlights. It simply means that a driver will not be able to stop in time if a hazard appears in the headlight beam.

1. General learning points

a.	Checks all lights and signals for operation, damage and cleanliness. Ensures headlights are properly aimed.
b.	Meets all legal obligations in relation to driving at night.
c.	Drives at a speed whereby the vehicle can be brought safely to a stop at any time.
d.	Does not drive with interior lights on.
e.	In the event of oncoming traffic with high beams on, slows down and looks down and to right edge of the driving lane and does not retaliate by switching to high beam.
f.	Explains colours and purposes of reflective road markers (cat's eyes).
g.	Uses roadside markers and signs to identify corner directions and speed.
h.	Explains bridge abutment reflectors.
i.	Explains how to watch for animals at night by looking for light reflecting in their eyes.
h.	Maintains correct road position at all times.

Common faults/symptoms	Address/check
Fails to turn on headlights early enough.	Legal obligations, defensive driving.
Overdriving headlights. Driving too fast, late reactions to potential hazards.	Legal obligations, over confidence.
Lack of courtesy. Fails to “dim” headlights for oncoming traffic, pedestrians, cyclists etc.	Legal obligations, attitude.

Gravel roads — optional lesson

At some point, all drivers will encounter gravel roads in construction zones or they may be required to travel on gravel roads as part of the job. While some of your students may have driven on gravel roads there are some key things the student should be aware of while driving a commercial vehicle under those conditions.

Learning outcomes	<p>2.1.17 Operates a differential lock or inter-axle differential lock, if equipped.</p> <p>3.2.19 Identifies and reads all road signs indicating the weight capacity of roadways or bridges — including seasonal weight restrictions.</p> <p>3.3.17 Applies safe driving techniques when proceeding through construction zones and detours.</p> <p>4.1.9 Describes how steering control is lost when tires skid during heavy brake use or when braking with poor traction.</p> <p>4.1.13 Monitors the actions of other drivers, changing weather, and changing road surfaces and conditions.</p> <p>4.1.20 Watches for wildlife or livestock which can enter the space around a vehicle, particularly on routes known for collisions involving animals.</p>
Performance objective	Drives safely at a reduce speed on a gravel road while monitoring the trailer, road width and surface.
Review	Information covered in the classroom.

Instructor notes

1. Provide students with a gravel road experience if one can be accessed in your area or within a longer lesson day.
2. Discuss the similarities between gravel roads and going through construction zones.
3. Explain that the road may be washboard and discuss the effects washboard has on the load, the securement of the load, and traction.
4. Discuss the use of traction aids, power divider, axle locks, and tire chains.
5. The student must watch the travel of the trailer as the lane might be narrower than a regular lane. They must also be aware that the surface near sides of the road may be soft.
6. Explain to them that driving on gravel will reduce traction and increase stopping distance. Steering may be less responsive.
7. Explain they may have reduced visibility due to dust or construction equipment.
8. If traveling through a construction zone at night there will be no painted lines to aid in lane positioning, so increased mirror checks will be required. The lane and surface may suddenly change so drivers must be alert.
9. Review how rocks can become lodged between the tires, and what hazards that poses.

1. General learning points	
a.	Identifies switches for the power divider and axle locks, if equipped.
b.	Drives at a reduced speed while traveling on gravel roads.
c.	If travelling on a gravel road for an extended period, stops once clear and checks: <ul style="list-style-type: none"> • load securement • tires for anything lodged between them.
d.	Watches and obeys special signage and traffic control personal.
e.	Increases mirror checks to monitor the trailer and avoid contact with objects close to lane.
f.	Identifies possible soft shoulders.

Common faults/symptoms	Address/check
Drives too fast on gravel. Loss of control unable to stop, poor steering responses	Watch road signs, discuss hazards of going too fast
Not enough mirror checks. Appears unaware of surroundings	Coaching to increase
Unfamiliar with traffic control personal or signage. Fails to react or obey	Procedures, review signage

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En route activities

Fuel stop

When possible, provide each student with an opportunity to refuel the truck during a lesson.

Learning outcomes	2.1.14 Locates fuel tanks and filler caps, and apply proper fueling methods. 7.1.11 inspects the level of operating fluids including fuel, engine oil, engine coolant, power steering oil, windshield washer, diesel exhaust fluid, etc. — and top up when necessary.
References	Vehicle manual
Performance objectives	Safely fuel a commercial vehicle with or without a trailer, at a commercial fuel station.
Review	Personal safety equipment

Instructor notes

1. Demonstrate while explaining each task before the student's practice
2. If possible demonstrate Cardlock fueling, using satellite pumps, and obtaining a receipt.
3. Have the student record the mileage on the receipt and confirm the time on the receipt. In a road side inspection officers may compare the time of the fuel receipt to your log.

1. General Learning points

a.	Positions the truck correctly.
b.	Shuts down the engine and radio transmitter before fueling.
c.	Avoids entering the cab during refueling (to avoid creating static electricity).
d.	Pays close attention so as not to overfill.
e.	In the event of a major or minor spill, notifies the attendant to get it cleaned up immediately using an approved absorbent material.
f.	Does not smoke or use a cell phone while fueling.

Common faults/symptoms	Address/check
Fails to obtain a receipt. Lack attention to detail	Explain the importance re-fuel tax, road side inspections
Does not hold fuel hose while fueling	Remain with the one task
Attempts to use cell phone or smoke while fueling	Safe fueling procedures. Do not allow this to happen.

Scales and inspection stations

Part of being a commercial driver will be going through scales and inspection stations. The first time can be intimidating for the student, so when possible, take the student through a scale.

Learning outcomes	<p>3.2.12 Explains safe and legal procedures when entering/exiting a scale and when being pulled over by enforcement officers.</p> <p>3.2.16 Enters vehicle inspection facilities, or pulls off the roadway, when instructed by an officer or highway signage.</p>
Performance objective	Safely enter and drive through a scale, following all directions of sign boards and inspectors.

Instructor notes

1. Before taking your student through a scale explain to them what to expect and what hazards may be encountered.
2. When entering the scale have them watch for signage to tell them what to do and where to go. Some scales have a pre weigh and may send them to the bypass lane. Procedures at some scales may be different.
3. When traveling through the scale ensure the student is using mirrors as they may be passing close to buildings, other commercial vehicles, and inspectors.
4. Watch the lights that will tell them what to do.

5. Note the time you're in the scale so when you update your log you'll have the correct time to enter.
6. **Activity: chat with CVSE officers** — If you have an appropriate opportunity, park the truck and take the student into the booth to chat with the scale officers. If they have time, they can discuss expectations and procedures with the student.
7. Once you have been cleared from the scale make sure the student starts to pick up speed to merge back into traffic.

1. General learning points	
a.	Reduces speed and follows signage and lights for entering the scale
b.	Uses mirrors and caution while in the scale
c.	Checks mirrors to properly align the tires with the scale pad
d.	Makes eye contact with the scale inspector to see if there are further directions
e.	Follows directions to move ahead to the next axle, stop, backup, and stop and bring in paperwork, or proceed
f.	Follows inspectors direction
g.	Safely reenters traffic

Common faults/symptoms	Address/check
Misses the lights to enter scale	Discuss legal requirements to enter scale
Fails to align the tires with scale pad — inaccurate weighing of axles	Mirror use
Fails to stop on scale pad. Not watching the direction given by the lights	Overwhelmed nervous. Coach to correct
Fails to accelerate once cleared to merge back into traffic — enters the road way too slow	Lack of confidence, merging procedures

