

Learning systems for driving instructors

Heavy motor vehicles



Acknowledgements

The NZ Transport Agency (NZTA) acknowledges the assistance of the following organisations in the development of this manual:

Tranzqual ITO

Roadtrain (NZ) Ltd.

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NZ Transport Agency
Published October 2010

ISBN: 978-0-478-36494-1 (online)

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This document is available on the NZ Transport Agency's website at www.nzta.govt.nz.

Record of amendment

Amendment number	Description of change	Effective date	Updated by

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Introduction

This syllabus supplements the NZ Transport Agency (NZTA) publication *Learning system for driving instructors* (LSFDI) and offers driving instructors and road transport industry trainers a resource that can be used in teaching knowledge and driving skills specific to heavy motor vehicles. This syllabus must therefore be read in conjunction with the above mentioned publication to provide a recognised industry standard for driving instructors and the delivery of driver training in New Zealand.

This syllabus uses the basics of instruction as a framework and is intended not to dictate teaching style or the method of delivery but rather to identify the learning and assessment points that might be relevant to individual trainees.

About driving instructor (I) endorsements

- Clause 22 of the Land Transport (Driver Licensing) Rule 1999 requires the following persons to hold a driving instructor endorsement on their driver licence;
'A person who, for financial or commercial gain, provides instruction on a road in driving a motor vehicle must hold a driving instructor endorsement for those classes of licence that relate to the motor vehicles for which the person intends to provide instruction.'
- The driving instructor endorsement is specific to the class of vehicle in which you may provide instruction. The full range of driving instructor endorsements are I1, I2, I3, I4, I5, I6. For example, if you wish to teach in a class 4 vehicle you must hold a current I4 endorsement on your driver licence.
- Once you have obtained a driving instructor endorsement it will be valid for either 1 or 5 years (depending on the period of time you applied for). The expiry date of the 'I' endorsement will appear on the back of your driver licence. You must also ensure that your base licence is current at all times (expiry date of your base licence is the date shown under 4b on the front of your driver licence). Note that the expiry date of the 'I' endorsement will be different from the expiry date of your base licence.
- If the address details provided to the NZTA are correct (current), you will be sent a reminder notice before your driving instructor endorsement is due to expire. The renewal process can be completed at any approved NZTA driver licensing agent. You may elect whether you wish to renew your endorsement for either 1 or 5 years. When renewing please remember that you may not provide instruction unless you have a current endorsement on your driver licence, so please allow at least 8 weeks for the process to be completed and a new licence to be received in the mail. Remember that it is your responsibility to ensure that your endorsement (and base driver licence) remains current.
- If you do not wish to renew your driving instructor endorsement you may let it lapse (expire) for up to 5 years. This means that during this time you may renew the endorsement via the normal renewal process, but once it has been expired for 5 years or more you will be required to apply as a new applicant and satisfy all requirements (including completing the 'I' endorsement course).

Responsibilities and attributes of a driving instructor

Driving instructors are critical to the driver education process as they offer a source of professional instruction and therefore provide a means of improving driving standards across the board for both new and experienced drivers.

In delivering professional instruction all approved driving instructors must comply with the standards set by NZTA. Together this syllabus for heavy motor vehicles, the core syllabus *Learning system for driving instructors* (LSFDI) and relevant legislative requirements, form the basis of the standards required by the NZTA.

As an approved driving instructor you are required to:

- have a thorough working knowledge of appropriate driving practices (in relation to industry best practice and legislative requirements), driver licensing requirements including progression requirements for the graduated driver licensing system. (Refer to flow chart on page 6 for the graduated driver licensing system (GDLS) progression for classes 2-5)
- have a good working knowledge of general mechanical principles and vehicle technology and dynamics
- be able to demonstrate professional personal driving skills and techniques
- have the desire and patience to pass on those attributes to your trainees
- comply with the NZTA requirement that there must be no physical contact with students during the delivery of driving instruction. The only possible exceptions to this requirement would be when engaging in normal acceptable forms of greetings or farewells (eg, a handshake) and in an emergency situation where an instructor is required to take control of the vehicle to preserve safety and the resulting contact was unavoidable
- be sensitive to issues relating to culture, gender, sexual orientation, religion etc
- apply discretion in relation to information pertaining to trainees and understand the effects and provisions of the Privacy Act
- ensure that the safety and well-being of your trainees and the general public is paramount at all times
- display professionalism in all aspects of driver training and assessment
- project an image that reflects positively upon the driver training industry
- have a culture of continuous quality improvement. This includes having systems of regular course and instructional evaluation
- provide trainees with a safe and positive learning environment that is free from unnecessary distractions. This includes turning off any cell phones for the duration of practical driving instruction
- continue to meet NZTA requirements in being a fit and proper person to hold approval as a driving instructor (I endorsement). Any substantiated complaints, traffic or criminal offending may result in a review (and possible revocation) of this approval
- retain records of any driving instruction provided for at least 12 months
- ensure that any practical driving instruction is carried out in a vehicle that meets all relevant legal requirements and is maintained to warrant of fitness or certificate of fitness standard at all times
- ensure that any person receiving practical driving instruction holds and carries an appropriate and current driver licence
- comply with any requirements made in writing by the NZTA.

Motor vehicles able to driven under each class of driver licence

Classes 1F, 1L, and 1R

- A motor vehicle (including a tractor but excluding a motorcycle) that has a gross laden weight of not more than 4500kg, or a combination vehicle that has a gross combined weight of not more than 4500kg.
- A motorised mobile home or self-propelled caravan that has a gross laden weight of not more than 6000kg, provided its on-road weight does not exceed 4500kg.
- A tradeperson's vehicle that has a gross laden weight of not more than 6000kg, provided its on-road weight does not exceed 4500kg.

Class 1F only

- a. A special-type vehicle that is a forklift or runs on rollers or self-laying tracks and has a gross laden weight of not more than 18,000kg.
- b. A special-type vehicle that runs on wheels and has a gross laden weight of:
 - not more than 4500kg, or
 - more than 4500kg but not more than 18,000kg, if driven at a speed not exceeding 30 km/h.
- c. Any tractor with a gross laden weight of more than 4500kg but not more than 18,000kg, if driven at a speed not exceeding 30 km/h.
- d. A combination vehicle, consisting of a tractor towing a trailer, with a gross combined weight of not more than 25,000kg, if it is being used in agricultural or land management operations and is driven at a speed not exceeding 30 km/h.

Class 2F & 2L

- a. A rigid vehicle with a gross laden weight of more than 4500kg but not more than 18,000kg.
- b. A combination vehicle (other than a combination vehicle that comes within paragraph (d) of the definition of Class 1F licence) that has a gross combined weight of not more than 12,000kg.
- c. A combination vehicle (other than a combination vehicle that comes within paragraph (d) of the definition of Class 1F licence or paragraph (b) of this definition) consisting of a rigid vehicle (with a gross laden weight of not more than 18,000kg) towing a light trailer.
- d. A rigid vehicle with a gross laden weight of more than 18,000kg with not more than 2 axles.
- e. A tractor with a gross laden weight of more than 4500kg but not more than 18,000kg, if driven at a speed exceeding 30 km/h.

Class 2F only

- A special-type vehicle that is a forklift or runs on rollers or self-laying tracks and has a gross laden weight of more than 18,000 kg.
- A special-type vehicle that runs on wheels and has a gross laden weight of more than 4500kg but not more than 18,000kg, if driven at a speed exceeding 30 km/h.
- A special-type vehicle that runs on wheels and has a gross laden weight of more than 18,000kg, if driven at a speed not exceeding 30 km/h.

Classes 3F and 3L

- A combination vehicle (other than a combination vehicle that comes within paragraph (d) of the definition of Class 1F licence or paragraph (c) of the definition of classes 2F and 2L licences) that has a gross combined weight of more than 12,000kg but not more than 25,000kg.

Classes 4F and 4L

- A rigid vehicle (including a tractor) with a gross laden weight of more than 18,000kg.
- A combination vehicle consisting of a rigid vehicle (with a gross laden weight of more than 18,000kg) towing a light trailer.

Class 4F only

- A special-type vehicle that runs on wheels and has a gross laden weight of more than 18,000kg if driven at a speed exceeding 30 km/h.

Classes 5F and 5L

- A combination vehicle with a gross combined weight of more than 25,000kg.

Legal definitions

Combination vehicle means any motor vehicle (other than a special-type vehicle) with a trailer attached or that has any pivot points to allow any part of the chassis of the vehicle to move or rotate in relation to any other part of the chassis of the vehicle.

Forklift means a motor vehicle (not being fitted with self-laying tracks) designed principally to lift, carry, or stack goods by means of one or more tines, platens, clamps, or other similar attachments.

Gross combined weight means the aggregate of the gross laden weights of the vehicles that make up a combination vehicle.

Gross laden weight, in relation to a motor vehicle, means:

- a. The greatest of the following weights:
 - A weight specified (subsequent to the latest modification specified, if any) as the gross laden weight of the vehicle by the manufacturer of the vehicle.
 - A weight specified as the gross laden weight of the vehicle, or of a vehicle of that kind, by or under regulations or rules made under the Act.
 - The weight of the vehicle, together with the load that the vehicle is for the time being carrying, including equipment and accessories.
- b. If evidence is adduced in respect of any but not all of the 3 weights referred to in paragraph (a), the greater of the weights, or (as the case may be) the only weight, in respect of which evidence is adduced.
- c. If evidence is not adduced in respect of any of the weights referred to in paragraph (a), the total of the unladen weight of the vehicle and the weight of the maximum load that the vehicle may safely carry.

Light trailer means a trailer whose gross laden weight does not exceed 3500kg.

Mobile home means a motor vehicle permanently fitted for accommodation by the inclusion of sleeping and cooking facilities with more than half of the vehicle floor area (including the floor area of both the tractor and trailer if a combination vehicle) fitted out for accommodation.

Motorcycle means a motor vehicle running on 2 wheels, or not more than 3 wheels when fitted with a sidecar; and includes any vehicle with motorcycle controls declared by the Agency to be a motorcycle; but does not include a moped.

Rigid vehicle means a vehicle that does not have any pivot points to allow any part of the chassis of the vehicle to move or rotate in relation to any other part of the chassis of the vehicle; and includes an articulated bus and a pivot steer vehicle.

Special-type vehicle means any motor vehicle that:

- a. is a forklift, or
- b. runs on rollers, or
- c. runs on:
 - self-laying tracks, or
 - wheels, but is not a passenger vehicle, a trade vehicle, a tractor, a fire engine, or a vehicle recovery service vehicle.

Tradesperson's vehicle means a motor vehicle whose body is designed or adapted for use principally by tradespersons to carry special purpose trade equipment or trade goods (excluding general freight).

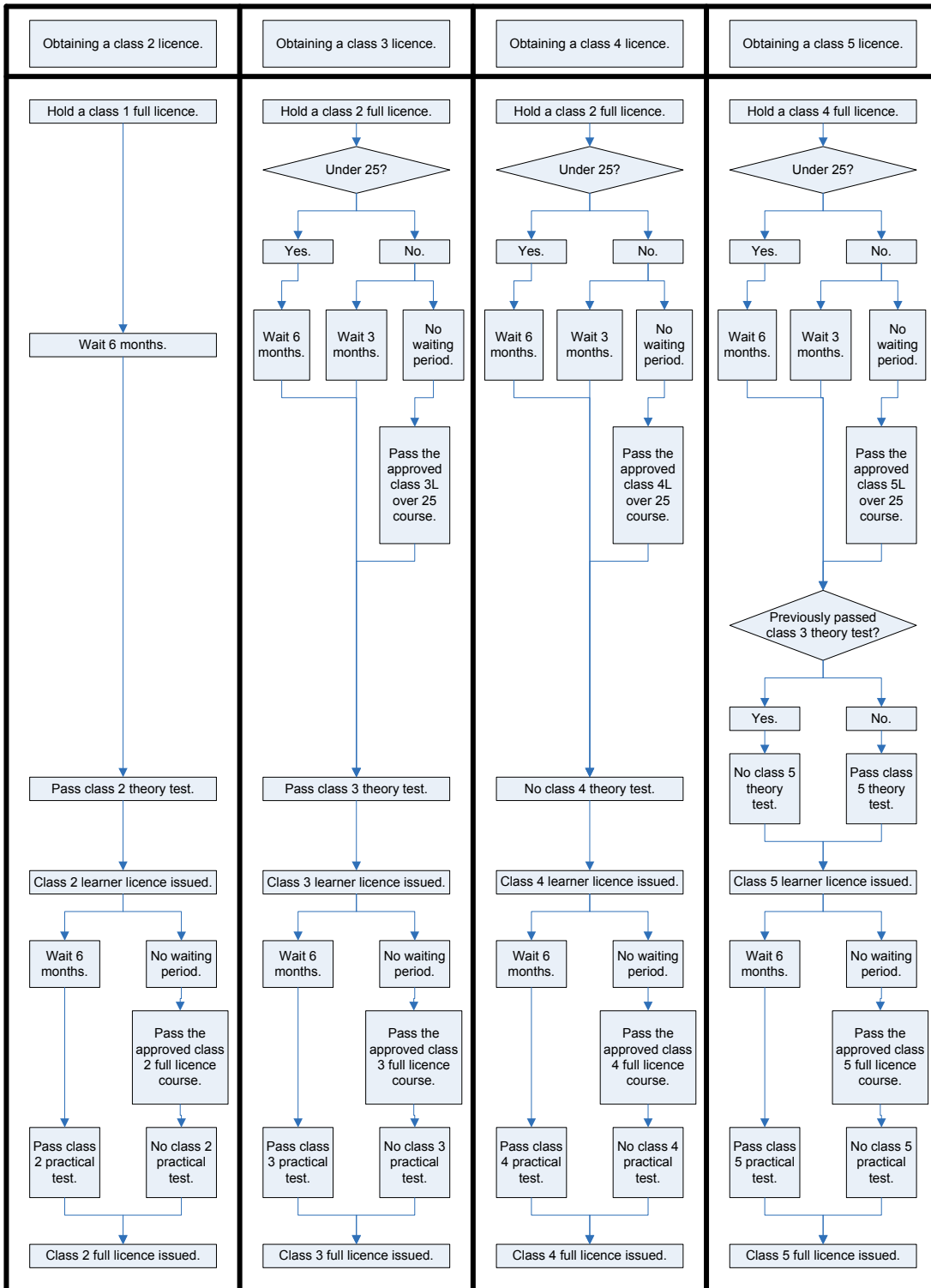
Trailer means a vehicle without power that is capable of being drawn or propelled by a motor vehicle from which it is readily detachable; but does not include:

- a. a sidecar attached to a motorcycle, or
- b. a vehicle normally propelled by mechanical power while it is being temporarily towed without the use of its own power.

Tractor means a motor vehicle (other than a traction engine) constructed principally for towing an agricultural trailer or powering agricultural implements.

Note: This information was correct at the time of publication but is subject to change from time to time. To confirm current requirements please refer to the interpretations section in part 1 and schedule 3 as contained in the Land Transport (Driver Licensing) Rule 1999. This Rule is available for viewing on the NZTA website at: www.nzta.govt.nz/resources/rules/driver-licensing-1999-index.html.

Progression through the graduated driver licensing system: classes 2-5



Section 1: Heavy motor vehicle training

Performance objectives

Performance objectives continue to be a simple means of identifying what a trainee must achieve, to what standard and with what resources.

Each performance objective has been presented as a lesson plan which addresses a specific skill and/or knowledge set that, in light of current technology, can be used for either novice or more experienced trainees. This allows driving instructors and company trainers to select the appropriate learning points from within the lesson plan to suit specific needs, whether that relates to preparation for driver licence testing or assessment, or industry inhouse training.

The vehicle(s) used for training will dictate which components (learning points) of the lesson plans need to be addressed. Rigid or combination, combination type, truck or bus, transmission and braking technology are examples of factors that might influence the training package.

While many learning points appear to be repeated across a range of different lesson plans, this is deliberate as each document is designed to stand on its own as well as being part of a larger training programme. A novice driver, someone hoping to gain a class 2 driver licence for example, 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 class 2, 3 or 4 licence or someone from industry, might only need to receive instruction in some of the more advanced lessons or components of them. Those sections of the lesson plans that are not relevant should be marked 'NA'.

Photocopying will produce individual lesson plans that can be adapted to meet individual training needs.

The detail contained on the lesson plans reduce the detail required on the individual training record (a copy of which is on the next page). These documents together provide ample evidence of training completed and would meet NZTA auditing requirements.

When delivering a lesson plan remember that the concept of demonstration, explanation and practice has particular relevance in that repetition develops skills and knowledge with visual and kinaesthetic learning playing primary roles.

One point to consider is that as young drivers progress through the graduated licensing system more and more will appear who have very little, or no, experience with manual transmissions. This means, in effect, that training for these people will have to start from scratch. Even the basic performance objectives will have to be met and confidence developed progressively.

The duration of an individual's training cannot be pre-determined just to meet the commercial demands of the training provider. Each trainee will have specific training needs and some will progress much quicker than others. A competent operator, particularly in the larger combination classes of vehicles, should be able to consistently achieve all of the relevant learning points set out in this manual. Where this is achieved, success in the practical test or assessment required by the driver licensing system should follow.

Individual training record

Trainee name	
Address	
Driver licence number	
Licence expiry date	
Phone	
Classes held	
Date of birth	
Driving school/company reference number (if applicable)	

	Performance objectives	Learning points	Comments	Date completed	DI initials
1	Vehicle inspections	General			
		Walk up/approach checks			
		Under bonnet checks			
		Interior checks			
		Exterior checks			
		Functions/moving off checks			
		Spot checks			
		Post-trip checks			
2	Coupling and uncoupling trailers	Coupling semi-trailer			
		Uncoupling semi-trailer			
		Coupling full trailer			
		Uncoupling full trailer			
3	In-cab drill	Starting the engine			
		Shutting down the engine			
4	Moving off and stopping	Moving off			
		Stopping			
5	Steering	Steering			
6	Basic gear changing (synchromesh)	Changing up			
		Changing down			
7	Non-synchromesh transmissions	Changing up			
		Changing down			

8	Automated/automatic transmissions	Automated			
		Automatic			
9	Signals	Use of indicators			
10	Basic dynamics	Dimensions and mass			
		Terminology			
		Cornering			
		Braking			
		Grades			
11	Hazards and system of vehicle control	Hazards			
		Observation			
		Hazard action plan			
		System of vehicle control			
12	Intersection techniques	General			
		Uncontrolled turning left			
		Uncontrolled turning right			
		Controlled turning left			
		Controlled turning right			
		Controlled straight through			
		Roundabouts			
13	Cornering	General			
		Technique			
		Cornering line right			
		Cornering line left			

14	Moving off-uphill and downhill	Moving off uphill			
		Moving off downhill			
15	Negotiating steep grades	General			
		Steep ascents			
		Steep descents			
16	Overtaking and use of passing lanes	General			
		Overtaking			
		Passing lanes			
17	Town driving	General			
		Road conditions			
		Traffic conditions			
		Vehicle conditions			
		Weather conditions			
		Light conditions			
		Driver conditions			
18	Motorway driving	General			
		Road conditions			
		Traffic conditions			
		Vehicle conditions			
		Weather conditions			
		Light conditions			
		Driver conditions			
19	Highway driving	General			

		Road conditions			
		Traffic conditions			
		Vehicle conditions			
		Weather conditions			
		Light conditions			
		Driver conditions			
20	Night driving	Night driving			
21	Reversing	General			
		Rigid			
		Semi-trailer			
		Full trailer			
		B-train			
22	Emergency stops	Progressive braking			
		Cadence braking			
		ABS			
		EBS			
23	Fuel economy driving	General			
		Town driving			
		Highway driving			
		Hills			
24	Auxillary brakes	General			
		Town/urban driving			
		Highway driving			

		Descents			
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Lesson plan layout

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

- a. Space for the name of the trainee, the location of training and the training vehicle details.
- b. An introduction that provides some information that can be built upon for instructors to commence a lesson.
- c. References to NZQA unit standards that might offer some additional information for the instructor/trainer or have some relevance to the trainee in relation to qualifications and driver licensing assessments.
- d. References to publications that will provide the instructor/trainer with further information and the trainee with a study resource, if required.
- e. The performance required of the trainee, the standard that must be achieved by the trainee to be judged as competent and the conditions that must be provided for that to occur.
- f. Recommended revision of any previous relevant knowledge or skills learnt (this should be a component of any lesson).
- g. A reminder to demonstrate each learning point, explain their actions and the reasons for doing them in the way they have and to have the trainee practice each learning point as often as possible.
(DEMONSTRATE – EXPLAIN – PRACTICE)
- h. Each performance objective is broken down into learning points that should be addressed through instruction and completed when the trainee is able to demonstrate competency by performing the specified knowledge or skill to the required standard. As each learning point is completed the date and the instructor's/trainer's initials are entered. Each learning point is numbered for easy reference. 13-2e for example, relates to objective 13 (cornering) learning point 2e (entry speeds into corners). 2-4b relates to objective 2 (coupling and uncoupling trailers) learning point 4b (application of the park brake before uncoupling full trailers).
- i. Comments can be added, as appropriate, during and at the conclusion of any lessons. These latter comments should include, by reference, any learning points that need to be revisited.
- j. Instructor's notes provide a raft of information that has relevance to achieving the objective. Instructors/trainers can add their own notes to these as required.
- k. Common faults, symptoms of those faults and suggested responses to them are also provided but additions can be made to this list to reflect personal experiences and knowledge.

The lesson plans contained in this section are also supported by a selection of full page illustrations (section 2) which you may choose to laminate and use during training to enhance lesson delivery.

Lesson plans

1 Vehicle inspections

1 Vehicle inspections	
Trainee name	
Location	
Vehicle details	
<p>A key competency in the operation of heavy vehicles is the ability to conduct comprehensive vehicle inspections before commencing work, during the shift and after work has been completed. Trainees should gain confidence through knowledge and vehicle familiarisation and develop an appreciation for vehicle empathy and general vehicle safety. A checklist has been provided for the trainee's use.</p>	
Relevant NZQA unit standards	15158 <i>Carry out pre-drive vehicle checks on a heavy motor vehicle, start it up and shut it down.</i>
References	<p>Tranzqual ITO publication, <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publication, <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication, <i>Roadside inspection guidelines for heavy vehicles.</i></p>
Resources	Illustration - plan view of truck and trailer and bus (section 2).
Performance	Conduct pre-trip, on road and post-trip vehicle inspections.
Standard	<p>Without assistance.</p> <p>In a logical sequence.</p> <p>Without omitting any inspection points.</p> <p>Correctly answering any questions posed by the instructor.</p>
Conditions	<p>On a heavy motor vehicle with, or without, a heavy trailer.</p> <p>In daylight or good artificial light.</p> <p>In a safe area away from other traffic.</p>

With a checklist.

Explain - demonstrate - practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Explains reasons for conducting pre-departure checks.			
b.	Where necessary refers to the driver's handbook.			
c.	Applies personal safety precautions.			
d.	Follows a logical sequence for checks.			
e.	Records faults on vehicle checklist.			
2. Learning points (Walk up/approach checks)		Comments	Date completed	DI initials
a.	Checks vehicle 'posture' due to damaged suspension, flat tyres, incorrect load placement.			
b.	Checks for water and oil leaks under the vehicle.			
c.	Checks for panel and glass damage.			
3. Learning points (Under bonnet checks)		Comments	Date completed	DI initials
a.	Checks engine oil level for level (between 'add' and 'full') and colour.			
b.	Checks power steering oil level and condition.			
c.	Checks coolant level and condition (additives).			
d.	Checks condition and security of hoses.			

e.	Checks condition and tension of belts.			
f.	Checks for general leaks around filters, rocker cover and fuel pumps.			
g.	Checks for security, damage and leaks around air intake system.			
h.	Checks general security of accessible engine components, lines and wiring.			
i.	Checks general cleanliness of the engine.			
j.	Checks front suspension springs for security, damage, distortion.			
k.	Checks windscreen washer fluid level and additive.			
4. Learning points (Interior checks)		Comments	Date completed	DI initials
a.	Checks park brake on / gear shift in neutral.			
b.	Checks adjustment of mirrors for clear view and check cleanliness.			
c.	Checks seat position so that lower back is fully supported.			
d.	Checks seat belt for damage and operation (retractor, coupling).			
e.	Checks that any vehicle equipment or personal gear in cab is secure.			
f.	Checks all warning buzzers and lights when key is turned on.			
g.	Starts engine with clutch (where fitted) disengaged.			
h.	Checks engine oil pressure light or gauge on start up.			
i.	Checks operation of wipers and washers even if not raining.			

j.	Checks operation of horn.			
k.	Checks build up of air pressure on gauges.			
l.	Checks condition and cleanliness of passenger seating.			
5. Learning points (Exterior checks)		Comments	Date completed	DI initials
a.	Checks all lights and indicators for operation, damage and cleanliness.			
b.	Checks tyres 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.	Purges air tanks of any moisture.			
g.	Checks semi-trailer connections visually to ensure jaws have closed. Checks no gap between skid plate and fifth wheel and release handle fully home. Checks full trailer connections visually to ensure the locking pin is fully home and the lock indicator is in the correct position. Checks all electrical, air and hydraulic connections for security and damage.			
h.	Visually checks fuel tank level if any doubt exists as to accuracy of gauge.			
i.	Checks for vehicle battery security and obvious damage.			
j.	Checks all doors, curtains, valves, hatches, load securing devices.			
k.	Checks road user charges licence (RUL), certificate of fitness (CoF), vehicle licensing (VL), and loading certificate for legal compliance.			

6. Learning points (Functions/moving off checks)		Comments	Date completed	DI initials
a.	Checks steering for vibration, stiffness, pulling to one side, knocking.			
b.	Checks operation of foot brake, trailer control valve, park brake.			
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.			
7. Learning points (Spot checks during shift)		Comments	Date completed	DI initials
a.	Checks tyres for punctures and damage and wheels for security.			
b.	Checks hub temperatures.			
c.	Checks for water and oil leaks under the vehicle.			
d.	Checks load security to ensure nothing has shifted or can fall from the vehicle.			
e.	Checks suspension for damage, especially if operating in rough, off road conditions.			
f.	Checks couplings for trailer security.			
g.	Cleans the windscreen and mirrors if necessary.			
8 Learning points (Post-trip checks)		Comments	Date completed	DI initials
a.	Refuels at the end of a work period.			
b.	Cleans the vehicle in accordance with any company procedures.			

c.	Reports and actions any faults that might have occurred during the work period.			
d.	Completes log book entries and load/worksheet documentation.			
e.	Parks and secures the vehicle to meet company and legal requirements.			

Comments

Instructor's notes

1.	Reasons for checks include: personal safety, public safety, legal requirements, vehicle empathy, public image, professionalism.
2.	Encourage reference to manufacturer's driver's handbook. Where possible, ensure a copy of the driver handbook is available for the vehicle being used.
3.	Encourage and explain general safety practices such as three points of contact, wearing of gloves, lifting techniques, use of ladders etc. The first check made on entering the cab MUST BE to check that the park brake is on and the gear-shift lever is in neutral.
4.	The recommended inspection sequence so that checks are not unintentionally omitted is: 1. Walk up/approach checks. 2. Under bonnet checks. 3. Interior checks. 4. Exterior checks. 5. Functions/moving off checks.
5.	With 'cab over' vehicles, tilting the cab would more likely be a weekly activity so that engine checks can be made in detail. Before tilting the cab, ensure all internal equipment is secured. However, make sure the cab is tilted for training and assessment.
6.	The reasons for spot checks and post-trip inspections are: 1. To ensure vehicle remains safe during shift. 2. To ensure vehicle is ready for next shift.

7.	Demonstrate and explain, in detail, each inspection point.
8.	When assessing the lesson, ask questions to confirm the trainees understanding of the tasks.
9.	Retain the trainee's Vehicle Inspection Checklist as part of the trainee record.
10.	Emphasise the need to report or rectify all faults identified and explain the methods of reporting, driver repair limitations, CoF obligations.
11.	When conducting 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.
12.	For bus and coach drivers, additional checks will need to be made to meet company procedures.

Common faults	Symptoms	Address/check
Misses specific checks.	Checklist items not marked.	Sequence is followed and checklist used correctly.
Insufficient attention to detail.	Fails to identify fault.	Understanding of checks to be conducted. Importance of / reasons for all checks.

Daily vehicle inspection checklist

Prime mover rego		Trailer rego			
CoF/VL expiry		CoF/VL expiry			
RUL max		RUL max			
Hubo reading		Hubo reading			
Prime mover					
General condition		In cab		Exterior	
<input type="checkbox"/>	Body panels	<input type="checkbox"/>	Gauges	<input type="checkbox"/>	Lights/indicators
<input type="checkbox"/>	Windscreen	<input type="checkbox"/>	Horn	<input type="checkbox"/>	Suspension
<input type="checkbox"/>	Leaks/heater/air con	<input type="checkbox"/>	Wipers/washers	<input type="checkbox"/>	Tyres
<input type="checkbox"/>	Other	<input type="checkbox"/>	Mirrors	<input type="checkbox"/>	Wheels
		<input type="checkbox"/>	Seat/safety belt	<input type="checkbox"/>	Batteries
Under bonnet		Moving off			
<input type="checkbox"/>	Oil level	<input type="checkbox"/>	Steering	<input type="checkbox"/>	Ringfeder/5 th wheel
<input type="checkbox"/>	Coolant level	<input type="checkbox"/>	Transmission	<input type="checkbox"/>	Coupling
<input type="checkbox"/>	Belts	<input type="checkbox"/>	Service brake	<input type="checkbox"/>	Load restraint
<input type="checkbox"/>	Hoses	<input type="checkbox"/>	Trailer brake	<input type="checkbox"/>	Other
<input type="checkbox"/>	Air intakes	<input type="checkbox"/>	Park brake		
<input type="checkbox"/>	Other	<input type="checkbox"/>	Other		
Remarks					
Trailer					
<input type="checkbox"/>	Body/chassis	<input type="checkbox"/>	Suspension	<input type="checkbox"/>	Brakes
<input type="checkbox"/>	Load restraint	<input type="checkbox"/>	Tyres	<input type="checkbox"/>	Landing legs
<input type="checkbox"/>	Lights/indicators	<input type="checkbox"/>	Wheels	<input type="checkbox"/>	King pin/draw bar
Other					
Remarks					
Driver name		Location		Date	
Repair action					

2 Coupling and uncoupling trailers

2 Coupling and uncoupling trailers	
Trainee name	
Location	
Vehicle details	
<p>An issue that continues to be of concern to the road transport industry is the loss of trailers resulting from faulty 'hitches' due to incorrect coupling procedures or inadequate checks by the driver. While mechanical faults do, on rare occasions, lead to problems, the vast majority of these potentially lethal on-road incidents result from inadequate training or inattention to detail. A very real safety risk also exists for drivers who do not carry out coupling and uncoupling procedures in the recommended manner or as required by company procedures manuals.</p>	
Relevant NZQA unit standards	<p>US 17575 <i>Operate a combination vehicle to meet the requirements of a full class 3 driver licence.</i></p> <p>US 17577 <i>Operate a combination vehicle to meet the requirements of a Full Class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication, <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publication, <i>Study guides for classes 3 and 5 driver licences.</i></p> <p>NZTA publication, <i>Roadside inspection guidelines for heavy vehicles.</i></p>
Performance	Demonstrate correct coupling and uncoupling procedures for a heavy trailer.
Standard	<p>Without assistance.</p> <p>In the correct sequence.</p> <p>Without omitting any points.</p>
Conditions	<p>On flat, firm ground.</p> <p>With a prime mover and a semi-trailer or full (dog) trailer.</p> <p>In daylight or good artificial light.</p> <p>In a safe area away from other traffic and distractions.</p>
Revision	Performance objective 1: <i>Vehicle inspections.</i>

Explain - demonstrate - practice

1. Learning points (Coupling a semi-trailer)		Comments	Date completed	DI initials
a.	Checks air, electrical and any hydraulic lines are clear of the 5 th wheel.			
b.	Ensures the 5 th wheel jaws are open.			
c.	Reverses the tractor unit until the trailer kingpin is just clear of, but lined up centrally with, the 5 th wheel.			
d.	Checks trailer height is about 25-50mm (1-2") lower than centre of 5 th wheel.			
e.	If air bags are fitted to the tractor, lowers these before reversing.			
f.	Reverses tractor so that 5 th wheel picks up front of trailer or, if air bags are fitted, raise these to support the weight of the trailer.			
g.	Continues reversing until jaws are heard to lock.			
h.	Selects first gear and conduct a short 'tug test'.			
i.	Applies park brake.			
j.	Visually checks, with a torch if necessary, that the jaws have locked, the release handle is fully home and locked and that there is no gap between the 5 th wheel and the skid plate.			
k.	Raises the trailer legs and stow the handle.			
l.	Connects air, electrical and any hydraulic or ABS lines.			
m.	Charges the trailer with air.			
n.	Completes a pre-departure check on the trailer.			
2. Learning points (Uncoupling a semi-trailer)		Comments	Date completed	DI initials
a.	Checks ground is flat and stable.			
b.	Applies park brake.			
c.	Removes and secures air, electrical and any hydraulic or ABS lines.			

d.	Winds down the landing legs until the weight of the trailer is just starting to be eased from the tractor unit.			
e.	Pulls and locks the release handle in the 'open' position.			
f.	Moves the tractor slowly forward and stops before the front of the skid plate leaves the 5 th wheel.			
g.	Applies the park brake, dismounts and checks the trailer landing legs are supporting the weight of the trailer.			
h.	Drives slowly clear.			
3. Learning points (Coupling a full trailer)		Comments	Date completed	DI initials
a.	Checks air, electrical and any hydraulic or ABS lines are clear of the drawbar 'eye'.			
b.	Ensures coupling is open.			
c.	Checks the drawbar is at the right height.			
d.	Uses mirrors to ensure truck and trailer are correctly lined up.			
e.	Backs into drawbar slowly until connection is made.			
f.	Selects first gear and carries out short 'tug test'.			
g.	Applies park brake.			
h.	Visually checks that the coupling pin has dropped fully through the drawbar eye and that the lock indicator is in the correct position.			
i.	Connects air, electrical and any hydraulic lines and raises the support leg if fitted.			
j.	Charges the trailer with air.			
k.	Conducts a pre-departure check on the trailer.			

4. Learning points (Uncoupling a full trailer)		Comments	Date completed	DI initials
a.	Checks ground conditions.			
b.	Applies park brake.			
c.	Removes and secures air, electrical and any hydraulic or ABS lines.			
d.	Lowers the support leg if fitted.			
e.	Releases locking mechanism (if fitted) and pulls the coupling handle up to release the connection.			
f.	Drives clear slowly.			
Comments				

Instructor's notes

1.	Explain key safety points, particularly potential danger of 'pulling the pin' before the landing legs are down when uncoupling. In the event of the park brake not being applied, the tractor can be 'squeezed' out once the king pin has been released. This can lead to serious injuries.
2.	While not related to coupling and uncoupling, this lesson offers the opportunity for the trainer to explain the information contained on a heavy trailer Certificate of Loading: ie, HVBC, NZS 5444, NZS 5446, SRT, Tare and axle group ratings, axle spacings, wheel base etc.
3.	Reiterate the importance of completing all checks to confirm coupling, particularly with semi-trailers.
4.	Explain importance of trailer spring brakes during coupling and uncoupling. Leave the attachment of air-lines until last on coupling and remove them first when uncoupling. This ensures that the trailer is braked while the rest of the driver activities are taking place.
5.	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.
6.	Emphasise the reasons for checking trailer indicators as indicators and not by use of the hazard lights. Firstly, turn signals and hazard's operate on different circuits and, secondly, it is possible for a prime-mover to be signalling right while it's trailer is signalling left. For a following vehicle this could be a lethal combination.
7.	Never allow a trainee to walk under a loaded semi-trailer that has been disconnected from its prime mover.

Common faults	Symptoms	Address/check
Fails to check king pin/5 th wheel clearance prior to 'hook up'.	Skid plate too low/too high	Preparation for coupling.
Fails to check 5 th wheel jaws are open.	Closed jaws contact king pin.	Preparation for coupling.
Fails to check full trailer coupling open prior to '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 park brake.	Vehicle rolls forward or backward once air lines are connected.	Personal and vehicle safety. Basic procedures.
Fails to conduct sufficient checks on connection of semi-trailer.	Does not conduct visual checks of jaws, release handle, skid plate/5 th wheel clearance, tug test. Loses trailer.	Safety. Basic procedures.
Fails to conduct sufficient checks on connection of full trailer.	Does not conduct tug test or visual check of pin position.	Safety. Basic procedures.
Does not follow procedures relating to safety.	Releases 5 th wheel handle before winding down the landing legs. Does not release air lines in correct sequence. Walks under disconnected trailer.	Safety.
Fails to conduct pre-departure check on trailer.	Faults not identified.	Basic procedures.

3 In-cab drills

3 In-cab drills	
Trainee name	
Location	
Vehicle details	
<p>For trainees new to the role of driving a heavy vehicle, it is important to understand that each vehicle, depending on manufacturer and type, will differ in cab layout, control position and complexity and ergonomic efficiency. While lighter vehicles, particularly those requiring a class 2 driver licence to operate, might be only slightly more complex than a car, the larger classes, and the rapidly developing technology that applies to them, demand a more methodical and detailed approach to the training of new operators.</p>	
Relevant NZQA unit standards	US 15158 <i>Carry out pre-drive vehicle checks on a heavy motor vehicle, start it up and shut it down.</i>
References	Tranzqual ITO publication, <i>Professional skills for driving trucks.</i>
Performance	Demonstrate correct procedures for starting and shutting down a heavy motor vehicle.
Standard	<p>Without assistance.</p> <p>In the correct sequence.</p> <p>Without omitting any points.</p> <p>While observing the manufacturers requirements or recommendations.</p> <p>Correctly answering any questions posed by the trainer.</p>
Conditions	<p>On a heavy motor vehicle with, or without, a heavy trailer.</p> <p>In daylight or good artificial light.</p> <p>In a safe area away from other traffic.</p>
Revision	Performance objective 1: <i>Vehicle inspections.</i>

Explain - demonstrate - practice

1. Learning points (Starting the engine)		Comments	Date completed	DI initials
a.	Ensures park brake is applied.			
b.	Checks gear shift lever is in 'Neutral' (or 'Park' if fitted with an automatic 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 doors are closed. Does not lock these.			
e.	Adjusts mirrors if necessary 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, familiarises with operation of all controls.			
g.	Checks operation of seatbelt including retractor and couplings.			
h.	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.			
i.	Depresses the clutch (if fitted) to reduce transmission drag when starting. Releases once the engine has started.			
j.	Starts the engine and allows it to idle with the right foot clear of the throttle.			
k.	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.			
l.	Checks instrument readings and notes any incorrect responses.			
m.	Ensures air pressure gauges register build up of air pressure.			
n.	Ensures there is sufficient fuel for the journey.			
o.	Fastens the safety belt.			
2. Learning points (Shutting down the engine)		Comments	Date completed	DI initials
a.	Applies service (foot) brake and depresses clutch pedal.			

b.	Moves shift lever to 'Neutral' and releases clutch pedal.			
c.	Applies park brake.			
d.	Allows engine to 'warm down' for 2-3 minutes after high engine speeds (if fitted with turbocharger).			
e.	Turns the engine off and removes the ignition key.			

Comments

Instructor's notes

1.	Explain and demonstrate all actions required of trainee. Observe trainee actions from the passenger's seat.
2.	Explain and demonstrate the location and operation of all controls, gauges and switches on the training vehicle. Emphasise importance of familiarisation before operating an unfamiliar vehicle.
3.	Explain reason for not locking doors is to allow access in event of an emergency.
4.	Clutch brakes are fitted to many vehicles using non-synchromesh transmissions. By pushing the clutch pedal to the floor the gearbox input shaft is stopped and an initial gear, for moving off, can be selected. Counter shaft brakes are usually fitted to Japanese vehicles and can be identified by the button mounted on the gear-shift lever. Both serve the same purpose.
5.	Explain the legal requirements for the wearing of seatbelts. They must be worn correctly if fitted in a heavy motor vehicle. They must not be removed and must be in good working order.
6.	Explain the significance and function of all lights and gauges.

Common faults	Symptoms	Address/check
Seat not correctly adjusted.	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 trainee in correct seated position.
Windows dirty or obscured.	Unable to see clearly through windscreen or side windows.	Clean all windows, check operation of air-con or demisters.
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.	Tries to fit seatbelt before moving starting to move off.	Stop and rectify.

4 Moving off and stopping

4 Moving off and stopping	
Trainee name	
Location	
Vehicle details	
<p>This lesson, on its own, is probably not required in instruction given the current pre-requisites for achieving a heavy vehicle driver licence. Because of the difficulties encountered by some trainees in initial driving lessons, particularly when the vehicle is fitted with a non-synchromesh transmission or they have little or no experience with manual transmissions of any type, it has been included so that, should the trainee need to stop the vehicle and move off again, the activities are completed safely with due regard for other road users. This lesson might very well be conducted concurrently with Lesson 6 Basic gear changing or Lesson 7 Non-synchromesh transmissions.</p>	
Relevant NZQA unit standards	US17574 and US17576, <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence</i> and US17575 and US17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence</i> .
References	Tranzqual ITO publication, <i>Professional skills for driving trucks</i> . Tranzqual ITO publication, <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences</i> .
Performance	Demonstrate the ability to move off from a stationary position onto a road and, after moving off, bring the vehicle to a complete stop.
Standard	In the correct sequence. Without inconveniencing any other road users. Without stalling. Without over-revving the engine. In repeated trials. While meeting all legal obligations.
Conditions	On a heavy motor vehicle with, or without, a heavy trailer. In daylight. On a public road.
Revision	Performance objective 2: <i>In-cab drills</i> .

Explain – demonstrate – practice

1. Learning points (Moving off)		Comments	Date completed	DI initials
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 rear-view mirrors to ensure road behind is clear. Checks over shoulder into blind spot.			
e.	Indicates for at least 3 seconds, intention to pull out.			
f.	Depresses accelerator slightly with right foot to increase engine speed (if required).			
g.	Checks rear-view mirrors and blind spot again.			
h.	Releases clutch pedal slowly until engine note changes and drive is starting to engage.			
i.	Ensures road ahead is clear.			
j.	Releases park brake and returns hand to steering wheel.			
k.	Depresses accelerator slowly to increase engine speed and slowly releases the clutch while steering onto the road.			
l.	Ensures left foot is clear of the clutch pedal and that the hands are in the correct position on the steering wheel.			
2. Learning points (Stopping)		Comments	Date completed	DI initials
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 overtaking traffic.			
c.	Indicates left for at least 3 seconds.			
d.	Removes right foot from accelerator and gently applies foot brake to slow down.			
e.	Steers to the left once vehicle has slowed to the appropriate speed.			

f.	In the last few metres, just prior to stopping, depresses the clutch with the left foot and brings the vehicle to a complete stop on the foot brake.			
g.	Stops in the correct place.			
h.	Applies the park brake.			
i.	Moves the gear lever into neutral.			
j.	Turns the vehicle off, if required.			

Comments

Instructor's notes

1.	Select initial training areas with care so that there is minimal interference from other road users.
2.	Take into account nervousness of trainees exposed to driving large vehicles for the first time.
3.	Explain and demonstrate all activities.
4.	This lesson might very easily be combined with Lessons 5 and 6 (Steering and Basic gear changing).
5.	Emphasise need to check blind spots and time required to move a large vehicle, especially a combination, into traffic.
6.	Check to ensure the trainee does not ride the clutch.
7.	If the vehicle is towing a trailer make sure you have discussed the effects of swept paths and trailer tracking. Ensure the trainee makes allowances for these when moving off and when stopping.
8.	Emphasise the importance of indicators as the only means of communication between heavy vehicle operators and car drivers.
9.	Emphasise the need NOT to rush any aspect of driving.
10.	Don't use auxiliary brakes in this early lesson but rather leave these for later lessons. Do discuss the braking effect of the engine in lower gears under deceleration prior to stopping.

Common faults	Symptoms	Address/check
Excessive acceleration.	Races engine.	Clutch/accelerator control.
Fails to fully depress clutch pedal.	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 signalling.	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.

5 Steering

5 Steering	
Trainee name	
Location	
Vehicle details	
<p>The steering techniques that should be applied when driving a car remain applicable when driving larger vehicles. Modern trucks and buses have power steering which means that only a very few revolutions of the steering wheel are required from full lock to full lock but 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.</p>	
Relevant NZQA unit standards	US 17575 <i>Operate a combination vehicle to meet the requirements for a full class 3 licence.</i> US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 5 licence.</i>
References	Tranzqual ITO publication, <i>Professional skills for driving trucks.</i> Tranzqual ITO publication, <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i>
Performance	Demonstrate the ability to steer a heavy motor vehicle in a forward direction.
Standard	While maintaining a two handed '10 to 2' or 'quarter to 3' steering method. In repeated trials. While meeting all legal obligations.
Conditions	On a heavy motor vehicle with, or without, a heavy trailer. In daylight. On a public road.
Revision	Performance objective 4: <i>Moving off and stopping.</i>

Explain – demonstrate – practice

1. Learning points (Steering)		Comments	Date completed	DI initials
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 to 2' or 'quarter to 3'.			
e.	Demonstrates hand over hand steering method.			
f.	Demonstrates push-pull steering method.			
g.	Manoeuvres vehicle using appropriate steering technique.			

Comments**Instructor's notes**

1.	Select initial training areas with care so that there is minimal interference from other road users.
2.	Take into account nervousness of trainees exposed to driving large vehicles for the first time.
3.	Check trainee posture prior to commencement and ensure seating position is correct.
4.	Candidates 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 left hand on the gear shift lever can lead to excessive selector linkage and fork wear in the transmission.
7.	Emphasise 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 behaviour 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 the latter as it minimises 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 bonneted vehicles have different steering characteristics due to wheelbase dimensions and position of the steering axle(s).
13.	For bus and coach drivers, steering technique will have an influence on passenger comfort and safety and this needs to be emphasised.

Common faults	Symptoms	Address/check
Incorrect hand position.	High or low hand position. Hands too close together.	'10 to 2' or 'quarter to 3' positions.
Excessive one hand steering.	Hands resting on leg or left hand on shift lever or right 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.

6 Basic gear changing (synchronmesh)

6 Basic gear changing (synchronmesh)	
Trainee name	
Location	
Vehicle details	
Transmission	
<p>Probably the biggest stumbling block for the trainee drivers of heavy motor vehicles is exposure to manual gearboxes that can range from five gears up to 18 gears. Many trainees will have very little, or no, experience with manual transmissions of any type and lessons may very well need to start at a very basic level. This lesson deals with synchronmesh transmissions as might be found on the smaller class 2 vehicles or on larger European vehicles. The presentation of this lesson will be largely dictated by trainee experience and the complexity of the vehicle transmission.</p>	
Relevant NZQA unit standards	US 17575 <i>Operate a combination vehicle to meet the requirements for a full class 3 licence.</i> US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 5 licence.</i> US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i>
References	Tranzqual ITO publication, <i>Professional skill for driving trucks.</i> Tranzqual ITO publication, <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i>
Performance	Demonstrate correct gear changing techniques.
Standard	Without rushing. At the correct engine and road speeds. In repeated trials. While meeting all legal obligations.
Conditions	With a synchronmesh transmission. On a heavy motor vehicle with, or without, a heavy trailer. On public roads.
Revision	Performance objective 4: <i>Moving off and stopping</i> and 5: <i>Steering</i> .

Explain – demonstrate – practice

1. Learning points (Changing up)		Comments	Date completed	DI initials
a.	Explains shift pattern and shift lever controls (range change/splitter) for the vehicle being driven.			
b.	Positions left hand (open hand) on shift lever when gear changing and returns hand to steering wheel.			
c.	Selects correct gear to move off. (This will depend on weight, gradient, manufacturer's recommendations, ratios of available gears.)			
d.	Applies effective clutch and throttle control when moving off.			
e.	Applies acceptable steering control and does not look at shift lever when changing gear.			
f.	Right foot eases the accelerator pedal, left foot depresses the clutch pedal. Moves gear shift lever to next higher gear position. Left foot eases clutch pedal and right foot depresses accelerator.			
g.	Demonstrates progressive shifting techniques and uses the economy range on tachometer (if applicable).			
h.	Applies sequential shifting effectively.			
i.	Applies skip / block shifting effectively.			
j.	Anticipates driving conditions.			
2. Learning points (Changing down)				
a.	Anticipates need to down shift and then reduces speed by deceleration and braking before downshifting.			
b.	Uses the tachometer to assist with downshifting.			
c.	Right foot eases accelerator pedal, left foot depresses clutch pedal. Moves gear lever to the required gear. Left foot eases clutch pedal, right foot depresses accelerator (if required).			
d.	Avoids excessive or unnecessary downshifting.			

e.	Brings vehicle to a complete stop from road speed using transmission and brakes.		
Comments			

Instructor's notes	
1.	Trainee ability will vary greatly. Have suitable training venues for those who have little, or no, experience with manual transmissions.
2.	Range change buttons and splitters must not be used when the shift lever is in neutral or when the vehicle is moving in reverse. This can lead to transmission damage.
3.	Be patient. Once gear changing has been mastered training will likely progress quickly.
4.	Commence this lesson with an unloaded vehicle but assess final performance with one that is loaded.
5.	Leave the use of auxiliary brakes (if fitted) out of initial lessons and concentrate solely on gear changing.
6.	Teach progressive shifting techniques. This means using only enough engine speed on each up-shift to pick up the next gear. 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 trainee in developing an 'ear' for engine and road speed.
7.	Explain that synchromesh gearboxes must not be double-clutched as this leads to accelerated wear on synchroniser cones.
8.	The correct gear to move off in is generally the highest gear that does not require any accelerator but this will depend on weight, gradient, manufacturer's recommendations and the ratios of available gears. If in doubt, always use first gear.
9.	Cover skip/block shifting only once competency is apparent with sequential shifting. The technique is possible even with smaller vehicles. This technique allows drivers to miss gears out when gear shifting but is dependant upon vehicle weight and available gear ratios.
10.	Explain that gears must not be forced. Truck gearboxes will not shift as quickly as car manual transmissions due to size, complexity and gear inertia. Forced gears will normally occur, during downshifting, as a result of excessively high road speeds or leaving the shift too late.
11.	Before down-shifting, vehicle speed, and therefore engine speed, must be reduced by deceleration and braking. Don't try and change down at high road speeds.
12.	Explain that coasting in neutral should not be an option.
13.	Explain basic driving obligations that will assist with smooth, efficient gear changing (following distances, vehicle speed etc).
14.	Explain that the purpose of a gearbox is to provide a range of gears to suit all road and load conditions. It also provides reverse and a neutral position.

Common faults	Symptoms	Address/check
Difficulty changing gear.	Mistimed hand and foot coordination.	Basic gear shifting.
Not changing gear soon enough.	Over-revving.	Progressive shifting technique.
Changes gear too soon.	Vehicle labours or stalls.	Progressive shifting technique.
Selects reverse too soon.	Selects reverse before vehicle has stopped moving forward.	Potential damage to transmission.
Clashes gears.	Noise.	Basic shifting technique. Clutch operation. Rushing.
Lacks confidence.	Looks at gear shift lever when changing gear.	Confidence. Hand position and gear positions.
Fails to use tachometer.	Difficulty in changing gear.	Progressive shifting.
Coasts in neutral.	Transmission in neutral. Foot on clutch.	Slowing and stopping.
Poor knowledge of gears.	Hesitancy.	Gear positions.
Rides clutch.	Foot on clutch pedal.	Potential damage to clutch assembly.

7 Non-synchromesh transmissions

7 Non-synchromesh transmissions	
Trainee name	
Location	
Vehicle details	
Transmission	
<p>While modern driveline technology has seen many manually operated non-synchromesh transmissions superseded by computer controlled (automated) gearboxes, this type of transmission still remains the preferred option for many operators and will continue to be so into the foreseeable future. No other aspect of heavy vehicle driving, however, causes more discussion or 'debate' than how best to operate these gearboxes. There are a large number of inappropriate techniques being used, even by very experienced drivers, and poorly considered advice is often the only information new drivers receive when first exposed to vehicles fitted with non-synchro transmissions. An inability to master the required techniques can very quickly lead to a very poor overall standard of driving as a result of driver inattention and frustration.</p> <p>The manufacturer's dictate the correct operating techniques and any instruction must reflect that guidance.</p> <p>Of all the skills the driving instructor will teach, this lesson is perhaps the most challenging, and rewarding, and, for the trainee, the most daunting.</p>	
Relevant NZQA unit standards	US 15166 <i>Operate a constant mesh non-synchromesh transmission.</i> US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i> US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i>
References	Tranzqual ITO publication, <i>Professional skills for driving trucks.</i> Tranzqual ITO publication, <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i> Manufacturer's driver handbooks.
Performance	Demonstrate correct gear changing techniques using a non-synchromesh gearbox.
Standard	Without rushing. Without excessive gear clashing. At the correct engine and road speeds. In repeated trials. While maintaining vehicle control. While meeting all legal obligations.

Conditions	With a non-synchromesh transmission. On a heavy motor vehicle with, or without, a heavy trailer. On public roads.
Revision	Performance objective 4: <i>Moving off and stopping</i> and 5: <i>Steering</i> .

Explain - demonstrate - practice

1. Learning points (Changing up)		Comments	Date completed	DI initials
a.	Explains shift pattern and shift lever controls (range change/splitter) for the vehicle being driven.			
b.	Positions (open) left hand on shift lever when gear changing and returns hand to steering wheel.			
c.	Operates the clutch or countershaft brake 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.	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/block shifting.			
m.	Anticipates driving conditions.			

2. Learning points (Changing down)				
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 gear lever into Neutral. Left foot eases clutch pedal, right foot taps accelerator, left foot depresses clutch pedal while moving gear lever into lower gear. Left foot eases clutch pedal. (Left/right/left)			
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.			
Comments				

Instructor's notes	
1.	Trainee ability will vary greatly. Have suitable training venues for those who have little, or no, experience with this type of transmission.
2.	Explain and demonstrate, in detail, all appropriate learning points. Instructors MUST be competent in all aspects of non-synchromesh gearbox use.
3.	Be patient. Once gear changing has been mastered training will likely progress quickly.
4.	Commence this lesson with an unloaded vehicle but assess final performance with one that is loaded.
5.	Leave the use of auxiliary brakes (if fitted) out of initial lessons and concentrate solely on gear changing.
6.	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 trainee in developing an 'ear' for engine and road speed.
7.	Explain that non-synchromesh gearboxes must always be double-clutched. Clutchless shifting, unless recommended by the manufacturer, must not be permitted. It will lead to accelerated wear on the sliding clutches.
8.	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.

9.	Cover skip/block shifting only once competency is apparent with sequential shifting.
10.	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 gearbox will reflect the treatment it has received in the past.
11.	Explain that gear clashing has two key causes - poor timing (engine speed v road speed) by the driver and gearbox wear and tear caused by poor driver technique, ie clutchless shifting, forcing gears. Try and avoid training in a vehicle that has obvious transmission mechanical faults. It will hinder instruction and frustrate both trainee and trainer!
12.	Explain that coasting in neutral should not be an option as the driver does not have control of the vehicle.
13.	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.
14.	Clutch and countershaft brakes stop the input shaft of a non-synchromesh transmission so that an initial gear, to move off, can be selected. Clutch travel, once the vehicle is moving, must be regulated (2" - 3") so that the clutch brake is not activated, thereby causing damage to it. Excessive clutch stroke can also be a cause of clashed gears.
15.	Explain basic driving obligations that will assist with smooth, efficient gear changing (following distances, vehicle speed etc).
16.	Before down-shifting, the engine and road speed should be reduced by deceleration and braking. When the accelerator is 'kicked' half way through the down-shift, the engine speed should reflect what it will be once the new gear is engaged.

Common faults	Symptoms	Address/check
Mistimed gear changes.	Clashing gears.	Progressive shifting. Possible transmission damage.
Excessive clutch travel (clutch brake fitted).	Clashing gears.	Clutch pedal stroke.
Fails to achieve progressive shifting technique.	Over-revving. Engine speed too low.	Progressive shifting technique.
Difficulties with skip/block shifting.	Over-revving. Clashing 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.	Clashing gears.	Clutch / accelerator coordination.
Excessive road speed prior to down-shifting.	Clashing 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.	Clashing gears. Over-revving.	Rushing shifts. Engine and road speeds. Observation.

Fails to select a gear prior to stopping.

Coasting.

Observation. Downshifting. Engine and road speed.

8 Automatic/automated transmissions

8 Automatic/automated transmissions	
Trainee name	
Location	
Vehicle details	
Transmission	
<p>While the greater majority of heavy vehicles, in New Zealand, operate manual gearboxes, there are a growing number of automated transmissions appearing in trucks and a large number of automatic transmissions being used in buses and in some specialist transport roles, ie concrete agitators and refuse collection vehicles. Trainees should understand the basic technical differences between the two types of transmission and driving instructors should be prepared to conduct familiarisation training for both.</p> <p>Automated gearboxes are, in fact, normal constant mesh transmissions, either synchromesh or non-synchromesh depending on manufacturer, but the driver can select 'auto' or 'manual' mode and the actual shifting is managed by an electronics package. While there are a number of manufacturers most, if not all, operate using the same technology. While all have clutch assemblies, not all have clutch pedals and this can, and does, lead to some confusion when drivers first encounter the technology. Driver's handbooks must be used to clarify specified operating techniques but driver training should cover the points included in this lesson.</p> <p>Automatic transmissions, like those fitted to cars, simply require the driver to select the required gear and 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 drive line components and allows the engine to idle without stalling.</p>	
Relevant NZQA unit standards	<p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	Manufacturer's driver handbooks.
Performance	Demonstrate correct gear changing techniques with an automated or automatic transmission.
Standard	<p>While meeting manufacturer's recommendations.</p> <p>In repeated trials.</p> <p>While maintaining vehicle control.</p> <p>While meeting all legal obligations.</p>
Conditions	<p>With an appropriate transmission.</p> <p>On a heavy motor vehicle with, or without, a heavy trailer.</p> <p>On public roads.</p>

Revision

Performance objective 4: *Moving off and stopping* and 5: *Steering*.

Explain – demonstrate – practice

1. Learning points (Automated)		Comments	Date completed	DI initials
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.	Demonstrates skip/block shifting.			
i.	Demonstrates efficient use of auxiliary brake in 'auto' and 'manual' mode.			
j.	Demonstrates effective and safe hill driving techniques.			
k.	Reverses the vehicle safely.			
l.	Applies correct shut down and parking procedures.			
2. Learning points (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/kick down.			
g.	Demonstrates manual over-ride.			

h.	Demonstrates effective and safe hill driving techniques.			
i.	Demonstrates efficient use of the auxiliary brake.			
j.	Reverses the vehicle safely.			
k.	Demonstrates correct shut down and parking procedures.			

Comments

Instructor's notes

1.	Ensure manufacturer's driver's handbook is available for the transmission being used and ensure the trainee has had time to familiarise themselves with the operating guidelines.
2.	Allow trainees to use the handbook to explain fault codes (if any).
3.	Make sure that you, as the instructor, have familiarised yourself with the operating guidelines.
4.	Ensure starting procedures are covered in detail and that the trainee can identify all transmission controls and displays.
5.	The trainee should have the opportunity to operate the vehicle unloaded and loaded so that differences in transmission and vehicle responses are identified.
6.	Encourage a degree of 'inventiveness' and flexibility with the automated transmission selector options. Drivers should be comfortable with selecting between modes to suit road and load conditions.
7.	Ensure trainees make the left foot redundant with any transmission that does not have a clutch pedal. Left foot braking is not acceptable.
8.	Have trainees 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.
9.	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 2 or 3 gears at a time but rather allows the transmission to hold a gear, without changing up, at higher rpm during descents.
10.	While skip shifting with automated transmissions can cause the engine brake to activate, trainees should appreciate that it is possible to miss gears out and that some of what is not usually acceptable with manual transmissions, is unavoidable with the new technology.
11.	With automatic transmissions, have the trainee practice manual over-ride with the gear selector, particularly prior to descents, and have them avoid just selecting 'Drive' under all driving conditions.
12.	Accelerator control includes the ability to balance the accelerator to cause the engine to change up and to change down early. The first is achieved by lifting off the accelerator and the latter by kicking the accelerator down.

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.

9 Signals

9 Signals	
Trainee name	
Location	
Vehicle details	
<p>While modern communications equipment allows truck and bus drivers to talk to each other, the only means of communication they have with the greater driving population is the use of vehicle signals. A heavy motor vehicle's indicators will provide information as to the driver's intentions but their use must be consistent, irrespective of traffic conditions, and should be a developed professional driving skill that reduces the risk of on-the-road conflict. While the law is quite clear on when vehicle signals must be given, heavy vehicle operators 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 centreline of the road for any reason. During training driving instructors should be encouraging, and developing, this very important driving skill.</p>	
Relevant NZQA unit standards	US 17575 <i>Operate a combination vehicle to meet the requirements of a full class 3 driver licence.</i> US 17577 <i>Operate a combination vehicle to meet the requirements of a full class 5 driver licence.</i>
References	Tranzqual ITO publication <i>Professional skills for driving trucks.</i> Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i> NZTA publication <i>The Official New Zealand road code for heavy vehicle drivers.</i>
Performance	Demonstrate the ability to consistently indicate the intention to change direction or road position.
Standard	Using the vehicle indicators (turn signals). In repeated trials. To meet all legal obligations. With due consideration for other motorists.
Conditions	In a heavy motor vehicle with, or without, a heavy trailer. On public roads.
Revision	General traffic law.

Explain – demonstrate – practice

1. Learning points (Use of indicators)		Comments	Date completed	DI initials
a.	Demonstrates correct use of vehicle indicators at intersections, vehicle entrances and roundabouts.			
b.	Demonstrates correct use of vehicle indicators when pulling over or pulling out onto the road.			
c.	Demonstrates correct use of vehicle indicators when overtaking or changing lanes.			
d.	Demonstrates effective use of vehicle indicators when entering or merging from passing lanes.			
e.	Demonstrates effective use of indicators when changing direction or crossing the centreline for any reason.			
f.	Indicator use reflects an appreciation of the need to reduce risk.			
g.	Waits to ensure other traffic has reacted before carrying out any manoeuvre.			
h.	Ensures signals have cancelled after use.			
i.	Explains details of pre-start checks that will eliminate this risk and ensure indicators are working properly (cleanliness, damage, operation) and does not use hazard lights to check indicators.			
j.	Explains alternate ways of communicating with other road users.			

Comments**Instructor's notes**

1.	Any vehicle with faulty lights or indicators must NOT be used for training.
2.	Ensure indicators are not obscured by dirt, tarpaulins etc.
3.	Encourage indicating early so that other drivers can make adjustments to suit the size of the vehicle.
4.	Legal requirements for indicating: 3 second minimum, overtaking, turning, pulling over, pulling out, changing lanes, roundabouts.
5.	Other situations for indicating: merging off passing lanes, avoiding road debris / crossing centreline.

6.	Make sure other motorists are reacting to signal before manoeuvring.
7.	Some vehicles, especially US sourced vehicles, may not have self-cancelling turn signals. Make sure these are switched off after use.
8.	Explain dangers associated with trailer indicators operating on different circuits. (Prime mover indicates right - trailer indicates left etc) and possible consequences of this and discuss checks required on lights and indicators during pre-start checks.
9.	Other ways of communicating: Use of service (foot) brake to warn following motorists of intention to slow down or stop. Use of horn as a warning (signalling) device. Use of flashing headlights as a warning device. Use of hazard lights as warning device.
10.	Explain that 'road users' include pedestrians, cyclists etc. Even a person on a footpath might need to know what a driver's intentions are. Emphasise that signalling is required irrespective of traffic conditions.

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 3 seconds.	Legal obligations.
Unclear signals.	Unnecessary or incorrect signalling.	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.

10 Basic dynamics

10 Basic dynamics	
Trainee name	
Location	
Vehicle details	
<p>To demonstrate competence in a range of heavy vehicle driving skills, trainees must have an understanding of the dynamics that influence the performance and handling of large vehicles, especially when towing trailers. Instructors must ensure they are familiar with the dimension and mass limitations of heavy rigid and combination vehicles, the information contained on the loading certificates, the purpose of, and compliance with static roll threshold limits and braking, steering, tracking and cornering dynamics. While this is a 'theory' lesson, conducted in the classroom and around the vehicle, the trainee should be applying much of the knowledge gained into their practical driving, particularly in the more advanced lessons. Practical assessments should reflect the application of that knowledge.</p>	
Relevant NZQA unit standards	<p>US 17972 <i>Demonstrate knowledge of heavy rigid vehicle dynamics and handling for safe driving.</i></p> <p>US 18079 <i>Demonstrate knowledge of heavy combination vehicle dynamics and handling for safe driving.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publications <i>An introduction to heavy rigid vehicle stability and dynamics</i> and <i>Heavy combination vehicle stability and dynamics.</i></p> <p>NZTA Factsheets 13, 13a, 13b, 13c, 13e.</p>
Resources	Illustration: Centre of gravity/side view of truck and bus (section 2).
Performance	Explain heavy vehicle dynamics and their effects on vehicle handling and performance.
Standard	<p>Covering all learning points.</p> <p>To the satisfaction of the instructor.</p>
Conditions	<p>In a written or oral assessment.</p> <p>With access to an appropriate vehicle.</p> <p>With access to references.</p>
Revision	N/A

Explain – demonstrate – practice

1. Learning points (Dimensions and mass)		Comments	Date completed	DI initials
a.	Describes, and identifies, vehicle dimensions for the vehicle being operated.			
b.	Explains the information contained on the Certificate of Loading.			
c.	Describes vehicle tare and gross weights and axle group weights and spacings for the vehicle being operated.			
d.	Explains the information contained on the trailer Certificate of Loading (If applicable).			
2. Learning points (Terminology)		Comments	Date completed	DI initials
a.	Explains terminology and effects on vehicle performance of swept path, high and low speed tracking, wheelbase, rear overhang and, if applicable, steering amplification, trailer yaw and roll coupling.			
b.	Explains, in simple terms, dynamic terminology including kinetic energy, gravity, centre of gravity, centrifugal force, velocity, speed, friction.			
3. Learning points (Cornering)		Comments	Date completed	DI initials
a.	Explains the risks associated with cornering in a heavy vehicle and the effects of kinetic energy, centre of gravity and load placement.			
b.	Describes the cornering line.			
c.	Describes the cornering technique.			
4. Learning points (Braking)		Comments	Date completed	DI initials
a.	Explains, in simple terms, brake coding.			
b.	Explains the effects of kinetic energy in braking situations.			
c.	Describes the basic operation of hydraulic, air, ABS and EBS braking systems.			
5. Learning points (Grades)		Comments	Date completed	DI initials
a.	Explains the correct technique for descending a steep grade when loaded.			
b.	Describes the correct use of service and auxiliary braking systems on a steep grade.			

Comments

Instructor's notes

1. This lesson is flexible and not designed to address minute technical detail but rather introduce trainees to new terminology, techniques and technology
2. Consider dividing teaching time between short class-room sessions and at the vehicle. Use the vehicle to explain much of the terminology.
3. Explanations relating to braking, cornering and grades might, in many instances, be best addressed on the road during practical lessons.
4. Ensure you have as many of the references as possible available for trainee use and ensure your own explanations are correct and valid. If the trainee is driving only a rigid vehicle, then you need explain only those points that relate to the vehicle type.
5. Vehicle dimensions include length, width, height, wheel base, track, rear axis, forward distance, front and rear overhang and axle spacings. These have particular relevance for bus and coach drivers.
6. The Certificates of Loading will display number of passengers, tare and manufacturers gross weights, axle weights, axle spacings, wheelbase, NZ Standards references for load anchorage points and, perhaps, draw bars, compliance with heavy vehicle brake coding and, for heavy trailers, static roll threshold details.
7. Vehicle weights (mass) include tare, gross vehicle and/or gross combination mass, axle and axle group mass, effects of axle spacings.
8. 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.
9. Basic dynamic terminology includes gravity, centre of gravity, momentum, friction, kinetic energy, centrifugal force, speed and velocity.
10. Static roll threshold (SRT), while applicable to all heavy vehicles, is only displayed on the loading certificate of heavy trailers. Its purpose is to limit the height of the centre of gravity of the trailer, therefore improving stability and reducing the likelihood of a roll-over.
The minimum standard is 0.35g and each trailer is limited by load height and weight.
11. Cornering should be addressed by explaining the effects of speed, corner radius and vehicle centre of gravity, centrifugal force, kinetic energy, load placement and restraint, steering and braking. Advisory speed signs should be discussed and the importance of these in relation to loaded vehicles in particular.
The 3 parts of the corner are the entry, apex and exit.
The correct cornering technique is:
 - a. Set the speed before entering the corner.
 - b. Maintain the speed from the entry to the apex.
 - c. Accelerate gently from the apex to the exit.

	<p>The correct cornering line for a right hand corner is to start the turn from the left side of the lane, apex on the right side of the lane and exit back out on the left side of the lane.</p> <p>The correct cornering line for a left hand corner is to start the turn from the right side of the lane, apex on the left side of the lane and exit back out on the right side of the lane.</p>
12.	Brake coding and the Heavy Vehicle Brake Rule ensure adequate brake balance between a prime mover and any trailers it is towing. To run at high gross weights (44 tonne) combinations first registered before 1 July 2008 must meet brake code standards. All heavy vehicles registered after that date must meet the standards of the brake rule.
13.	Kinetic energy increases at the square of speed. Double the speed = four times the kinetic energy.
14.	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. Braking efficiency also relates to the same issues between a prime mover and its trailer(s).
15.	Braking systems can be air or hydraulically operated, and these should be explained, and can also be fitted with ABS or EBS and these too, should be explained. (Refer to Instructors Notes Performance Objective 22.)
16.	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. (Refer to Instructors Notes Performance Objective 15.)

11 Hazards and the system of vehicle control

11 Hazards and the system of vehicle control	
Trainee name	
Location	
Vehicle details	
<p>The risks associated with driving all relate to the driver's perception of, and responses to, the hazards that arise from the six driving conditions. Every driver action is, in fact, a reaction to an event in the driving environment. If the driver fails to react to an event the consequences can, almost invariably, be costly and often dangerous. The hazard detection and response skills develop with experience but trainees must be introduced to these at a very early stage in their training. While, in general terms, the driving conditions remain the same, irrespective of vehicle type, the operation of heavy motor vehicles introduces new levels of risk related, in particular, to vehicle mass and dimensions.</p>	
Relevant NZQA unit standards	US 3465 <i>Describe driving hazards and risk reduction strategies and responses to driving hazards.</i> US 3466 <i>Apply risk reduction techniques and strategies while driving.</i>
References	Tranzqual ITO publication <i>Professional skills for driving trucks.</i> Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i>
Performance	Demonstrate the ability to observe, assess and react to hazards while driving a heavy motor vehicle.
Standard	Safely. Without inconveniencing other road users. While applying the system of vehicle control and the hazard action plan. While meeting all legal obligations.
Conditions	In a heavy motor vehicle with, or without, a trailer. On public roads. In repeated trials.
Revision	N/A

Explain – demonstrate – practice

1. Learning points (Hazards)		Comments	Date completed	DI initials
a.	Defines a hazard.			
b.	Explains the terms 'actual' and 'potential' hazards.			
c.	Describes the six driving conditions and provides two examples of hazards arising from each.			
2. Learning points (Observation)		Comments	Date completed	DI initials
a.	Applies 12-second search pattern.			
b.	Creates a space cushion around the vehicle and uses correct lanes.			
c.	Avoids a fixed stare and reliance on peripheral vision.			
d.	Checks rear-vision mirrors frequently including before and after any manoeuvre.			
e.	Applies 4-second rule and observes correct speeds.			
f.	Uses vehicle lights to reflect prevailing light conditions.			
g.	Uses vehicle signals in accordance with legal requirements.			
3. Learning points (Hazard action plan)		Comments	Date completed	DI initials
a.	Identifies potential hazards.			
b.	Predicts possible developments.			
c.	Decides what action to take should the hazard develop.			
d.	Acts upon that decision using the system of vehicle control.			
e.	Identifies early and reacts safely to all driving hazards.			
4. Learning points (System of vehicle control)		Comments	Date completed	DI initials
a.	Selects appropriate lane or road position to avoid hazards.			
b.	Checks mirrors to determine position of other traffic.			
c.	Signals intentions (if necessary) and observes reactions of other traffic.			

d.	Brakes to reduce vehicle speed in advance of any hazard.			
e.	Downshifts to the correct gear for any manoeuvre.			
f.	Executes the manoeuvre to avoid the hazard.			
g.	Accelerates away from the hazard.			
h.	Applies the system of vehicle control consistently in all hazard avoidance.			

Comments

Instructor's notes

1.	As trainee confidence grows, try commentary drives as a means of assessing hazard detection skills.
2.	The system of vehicle control does not have to be applied in its entirety for each hazard. Indicators, for example, may not be required or a change of course necessary.
3.	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. 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.
5.	The required observation skills are: aim high, get the big picture, keep your eyes moving, leave yourself an out and make sure they see you.
6.	The hazard action plan is: identify, predict, decide and act.
7.	While much of this lesson can be assessed practically, elements of it require explanation and practical teaching. The learning points can be integrated into other lessons as required.
8.	Emphasise that all driving is a series of responses to the hazards that arise from the six driving conditions and, therefore, each response will influence the degree of risk that those hazards present.
9.	Anticipation is the ability, based on knowledge and experience, to predict changes in the existing driving conditions that will, or might, require a response by the driver. It takes time to develop but all practical training should be conducted with this development in mind.

Common faults	Symptoms	Address/check
Fails to negotiate hazard safely.	Breaches legal or safety requirements.	Understanding of hazard action plan and the system of vehicle control. Confidence with vehicle type.
Unreasonably slow.	Inconveniences other traffic. Travels well below posted speeds limits.	Driver confidence issues.
Erratic speed.	Unnecessary changes in speed.	Familiarity with vehicle. Driver confidence.
Infrequent use of mirrors.	Unaware of following traffic. Fails to check mirrors every 5-10 seconds.	Mirror use.
Fails to identify potential hazards.	Stops suddenly. Violent steering avoidance.	Search technique, particularly 12-second scan.
Fails to select correct gear for road speed.	Jerky progress. Engine labours.	Familiarity with vehicle transmission.
Fails to adjust lane position early.	Late lane changes.	12-second search. Familiarity with route.
Uncertain of obligations.	Hesitation.	Knowledge of traffic regulations. Vehicle familiarity.
Fails to give way.	Reactions of opposing traffic. 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 (speed, stop, no entry etc).	Does not act on advice of signs. Last moment avoidance or braking.	Basic obligations. Observation skills.

12 Intersection techniques

12 Intersection techniques	
Trainee name	
Location	
Vehicle details	
<p>Intersections continue to account for a large proportion of motor vehicle crashes resulting in death and injury. While many of these crashes are attributable to poor judgement and a failure to abide by simple rules, the problems are exacerbated when large, slow moving vehicles are added into the equation. Trainee drivers must be encouraged to not only meet their legal obligations in relation to intersections (which include roundabouts) but also to appreciate the effects their vehicles can have on other road users in these busy, and potentially dangerous, road features.</p> <p>This lesson has relevance to intersections in both urban and rural settings.</p>	
Relevant NZQA unit standards	US 3465 <i>Describe driving hazards and risk reduction strategies and responses to driving hazards.</i> US 3466 <i>Apply risk reduction techniques and strategies while driving.</i>
References	Tranzqual ITO publication <i>Professional skills for driving trucks.</i> Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i> NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i>
Resources	Illustrations: Intersection layouts including a roundabout (section 2).
Performance	Negotiate intersections in a heavy motor vehicle.
Standard	Safely, while turning right, left and proceeding straight through. Without inconveniencing other road users. While applying the system of vehicle control. While reacting to changing conditions. While meeting all legal obligations.
Conditions	In a heavy motor vehicle with, or without, a trailer. On public roads. Through controlled and uncontrolled intersections including roundabouts. In daylight. In repeated trials.

Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>
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Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
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, and reacts appropriately, to traffic volume and speeds.			
f.	Abides by intersection blocking rule.			
g.	Applies, in all situations, the system of vehicle control.			
h.	Understands and applies correctly, in all intersections, the give way rule.			
2. Learning points (Uncontrolled intersections/turning left)		Comments	Date completed	DI initials
a.	Checks mirrors (entry and exit).			
b.	Indicates, irrespective of traffic conditions.			
c.	Selects the appropriate gear BEFORE the turn.			
d.	Positions vehicle as close as practicable to the left but allows sufficient room for turn and, if necessary stops in correct position.			
e.	Searches intersection before proceeding.			
f.	Applies the give way rule and proceeds only when safe to do so.			
g.	Gap selection reflects speed and position of intersecting traffic.			
h.	Maintains correct lane position throughout turn.			
i.	Appropriate speed throughout turn.			
j.	Avoids contact with road signs, poles shop frontages etc.			

k.	Accelerates steadily and smoothly to road speed after completing turn.			
3. Learning points (Uncontrolled intersections/turning right)		Comments	Date completed	DI initials
a.	Checks mirrors (entry and exit).			
b.	Indicates, irrespective of traffic conditions.			
c.	Selects the appropriate gear BEFORE the turn.			
d.	Positions vehicle to left of centreline OR, if other vehicles are moving fast, following too closely or the road is narrow, indicate left and pull over to the left hand side of the road (road shoulder permitting) until way is clear.			
e.	Searches intersection before turning.			
f.	Applies the give way rule and proceeds only when safe to do so.			
g.	Gap selection reflects speed and position of intersecting traffic.			
h.	Appropriate speed throughout turn.			
i.	Maintains correct lane position throughout the turn.			
j.	Makes allowances for tracking of any trailer through turn.			
k.	Accelerates steadily and smoothly to road speed after completing turn.			
4. Learning points (Controlled intersections/turning left)		Comments	Date completed	DI initials
a.	Checks mirrors (entry and exit).			
b.	Indicates intentions early irrespective of traffic conditions.			
c.	Pays close attention to near side mirrors immediately prior to the turn to ensure no following traffic attempts to pass on left.			
d.	Selects correct gear before the turn.			
e.	Searches intersection before proceeding (even if holding the right of way).			
f.	Checks for clearances with signs, posts, shop frontages etc.			

g.	Adopts correct lane position with regard to vehicle tracking.			
h.	Obeys all controls (give way, stop, traffic lights, police officers) and if required to stop does so in correct position.			
i.	Maintains correct lane position throughout the turn.			
j.	Appropriate speed throughout turn.			
k.	Accelerates steadily and smoothly to road speed after completing turn.			
5. Learning points (Controlled intersections/turning right)		Comments	Date completed	DI initials
a.	Checks mirrors (entry and exit).			
b.	Indicates intentions early irrespective of traffic conditions.			
c.	Selects correct gear before turn.			
d.	Searches intersection before proceeding (even if holding the right of way).			
e.	Adopts correct lane position early. If more than two turning lanes use left lane to minimise risks from any trailer tracking.			
f.	Any turning bays/flush medians/acceleration lanes are used correctly.			
g.	Obeys all controls (give way, stop, traffic light, police officer) and if required to stop does so in the correct position.			
h.	Maintains correct lane position throughout the turn.			
i.	Appropriate speed throughout turn.			
j.	Accelerates steadily and smoothly to road speed after completing the turn.			
6. Learning points (Controlled intersections/straight through)		Comments	Date completed	DI initials
a.	Checks mirrors (entry and exit).			
b.	Adopts correct lane position early and where possible, stays in left hand lanes so faster traffic can move past on the right.			
c.	Searches intersection prior to proceeding (even if holding right of way).			

d.	Obeys all controls (give way, stop, traffic lights, police officer) and if required to stop does so in correct position.			
e.	Monitors mirrors prior to any merge point and indicates prior to merging.			
f.	Appropriate speed throughout manoeuvre.			
7. Learning points (Roundabouts)		Comments	Date completed	DI initials
a.	Check mirrors (entry and exit).			
b.	Adopts correct lane position early.			
c.	Searches into roundabouts before entering and gives way to traffic from the right.			
d.	Indicates intentions early. -If moving straight through at a roundabout does not indicate right and only indicates left to exit the roundabout when passing the entry point immediately before the required exit. -If turning left, indicates left on approach and leaves on until the roundabout has been exited. -If turning right, indicates right on approach and in the roundabout, then indicates left to exit when passing the entry point immediately before the required exit.			
e.	If there are more than two lanes, uses the left lane for turning left and moving straight through and the right lane for turning right if there is sufficient room to do so.			
f.	Negotiates, where applicable, traffic light/roundabout combinations safely.			
g.	Speed reflects road camber and load characteristics.			

Comments

Instructor's 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.	Emphasise the need to never take it for granted that right of way will be yielded especially when other drivers encounter trucks.
4.	Use the system of vehicle control as the basic framework for teaching and developing these particular skills.
5.	Emphasise the additional risks associated with heavy vehicles, as a result of size and length, when turning.
6.	Where appropriate, consider the use of a training ground, with suitable obstacles, for initial training, to limit vehicle paths during turns.
7.	Emphasise observation skills and anticipation of changing conditions.
8.	Where possible have the candidate observe and comment on the movement of other heavy vehicles through intersections and roundabouts.
9.	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. Trainees 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.
10.	Explain the tendency for many car drivers to try and 'beat' a heavy motor vehicle at intersections. The candidate should, if in doubt, give way even in situations where they might have the right of way.
11.	While trainees may be quite competent in intersection techniques in a light vehicle, 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 swept path and tracking.
12.	Turning bays, flush medians and acceleration lanes all offer the opportunity for any vehicle to move safely out of or into traffic streams. They are not to be used for overtaking.
13.	When turning into multiple lanes, drivers are required to turn into the lane closest to them. This applies both in urban and highway driving. Trainees should not move across into a left hand lane if turning right, unless vehicle length demands this. Where this is necessary, drivers must give way to other traffic approaching from the left.
14.	The risks associated with front and rear overhang, swept path and tail swing, particularly for buses and coaches, should be emphasised.

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.	System of vehicle control.
Fails to look both ways.	Fails to give way.	Observation/search techniques.
Proceeds before signal turns green.	Poor anticipation.	System of vehicle control.
Turns from incorrect position on road.	Illegal or unsafe turn.	System of vehicle control.

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.	Check that basic obligations are understood.
Fails to give way.	Vehicle with right of way is inconvenienced.	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.

13 Cornering

13 Cornering	
Trainee name	
Location	
Vehicle details	
<p>Given the high number of heavy vehicle roll-overs that occur in corners this lesson is an important component of the driver training programme. These loss of control incidents occur both in urban settings, at roundabouts and when turning, and, much 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'. This lesson focuses on cornering technique and line and, once again, the system of vehicle control. While the issue of cornering is most directly associated with heavy combination vehicles, instructors should consider including the lesson into rigid vehicle programmes as the early introduction to key operating skills will logically carry over into larger vehicle classes at a later date and add value to courses.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 3466 <i>Apply risk reduction techniques and strategies while driving.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication <i>An introduction to heavy rigid vehicle stability and dynamics</i> and <i>Heavy combination vehicle stability and dynamics.</i></p> <p>NZTA Factsheet 13e.</p>
Resources	Illustration: 90 degree curve (section 2).
Performance	Demonstrate correct cornering line and technique.
Standard	<p>Without inconveniencing other road users.</p> <p>While applying the system of vehicle control.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p>

	Without exceeding any posted advisory speeds.
Conditions	In a heavy motor vehicle with, or without, a trailer. On public roads. Through left and right hand corners. In daylight. In repeated trials.
Revision	Performance objectives 10: <i>Basic dynamics</i> and 11: <i>Hazards and the system of vehicle control</i> .

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
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.	Vehicle loading and load security meet legal requirements.			
e.	Applies the system of vehicle control in all turning or cornering manoeuvres.			
f.	Explains the use of roadside markers to assist with cornering at night.			
2. Learning points (Cornering technique)		Comments	Date completed	DI initials
a.	Explains the three points of a corner (entry, apex and exit).			
b.	Uses auxiliary brakes efficiently and in a manner that does not interfere with good driving techniques.			
c.	Identifies, interprets correctly and reacts to any advisory speed 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 the search limit point at entry.			

g.	Maintains speed from the entry to the apex.			
h.	Accelerates gently from the apex to the exit.			
i.	Maintains effective two handed steering.			
3. Learning points (Cornering line/right hand bends)		Comments	Date completed	DI initials
a.	Adopts left hand lane position prior to entering corner.			
b.	Maintains speed and follows cornering line from left hand lane position at entry to right hand lane position at apex.			
c.	Accelerates gently from right hand lane position at the apex back to left hand lane position at the exit.			
d.	Uses mirrors to check trailer tracking.			
e.	Maintains two handed steering control throughout the manoeuvre.			
4. Learning points (Cornering line/left hand bends)		Comments	Date completed	DI initials
a.	Adopts right hand lane position prior to entering corner.			
b.	Maintains speed and follows cornering line from right hand lane position at entry to left hand lane position at apex.			
c.	Accelerates gently from left hand lane position at the apex back to right hand lane position at the exit.			
d.	Uses mirrors to check trailer tracking.			
e.	Maintains two handed steering control throughout the manoeuvre.			
Comments				

Instructor's notes

1. Select corners for training that have advisory speed signs and, where possible, also include corners that do not have these signs but require reductions in speed.

2.	With intersections, concentrate on situations where the trainee, on approach, has a green light and must, therefore, set the vehicle up correctly for a turn by using the system of vehicle control.
3.	Minimal, if any, downshifting should be required in highway cornering especially if the vehicle speed is above 55km/h.
4.	Emphasise the system of vehicle control in all cornering.
5.	Discuss the effects of vehicle loading (including load placement) on the centre of gravity and the effects of load shift and live loads. Question the trainee on these aspects.
6.	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).
7.	Explain highway speed advisory signs and the information presented on them. NZTA recommendations are for drivers of fully loaded vehicles to negotiate corners 10km/h below the advisory speed.
8.	Discuss the importance of making the final corner assessment by reference to the search limit point on approach to the entry. This means that, as the vehicle approaches the entry to the corner, the driver looks as far into the corner as he can and bases his cornering speed on this. This, obviously, is critical when advisory speed signs are not available.
9.	Leaving the designated lane is not an option during cornering. This means that, at no time, should the vehicle cross the centreline or, particularly on blind corners, the left hand 'fog' line.
10.	Emphasise 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.
11.	For bus and coach drivers, cornering technique has a direct influence on passenger comfort.

Common faults	Symptoms	Address/check
Fails to observe speed advisory signs.	Excessive speed during cornering. Late braking or downshifting.	System of vehicle control/observation techniques.
Runs red or late amber lights.	Excessive speed through turns.	System of vehicle control/observation technique/risk awareness.
Poor cornering technique.	Braking in corners.	System of vehicle control/observation technique.
Poor cornering line.	Crosses centreline/fog line.	Steering technique/lane position.
Poor steering control.	One handed steering. Oversteer. Hand position.	Steering technique.

14 Moving off – uphill and downhill

14 Moving off – uphill and downhill	
Trainee name	
Location	
Vehicle details	
<p>While this lesson is a natural progression from lesson 4 <i>Moving off and stopping</i>, and can be incorporated with that lesson where appropriate, there is a degree of skill required to move off on grade in a heavy vehicle. This is particularly true with fully laden combinations and instructors must be aware of what constitutes acceptable industry practice and be aware of current technology that will assist in this regard.</p>	
Relevant NZQA unit standards	US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i> US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i>
References	Tranzqual ITO publication <i>Professional skills for driving trucks.</i> Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i>
Performance	Move off on an uphill grade. Move off on a downhill grade.
Standard	Without inconveniencing other road users. While meeting all legal obligations. While maintaining vehicle control. Without excessive clutch slip or over revving the engine. Without stalling. Without rolling backwards/forwards.
Conditions	In a heavy motor vehicle with, or without a trailer. On public roads. On uphill and downhill grades. In daylight. In repeated trials.
Revision	Performance objective 4: <i>Moving off and stopping.</i>

Explain – demonstrate – practice

1. Learning points (Moving off -uphill)		Comments	Date completed	DI initials
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. Learning points (Moving off -downhill)		Comments	Date completed	DI initials
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.			
Comments				

Instructor's notes

1. This lesson is a continuation of Lesson 4. Initial practice should be with an unloaded vehicle but this should progress to a loaded vehicle as confidence and ability improves.
2. 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.
3. Vehicles running electronic fuel systems will likely not require initial accelerator use to move off.
4. Where trailers are being towed, the use of any trailer control valve to hold the combination on a grade is acceptable.
5. Consider practicing the uphill sequence on flat ground first if this helps.
6. Discuss the effects of grades and loaded vehicles on other traffic particularly in relation to truck speed when moving off.
7. When teaching moving off - uphill, consider the effects of vehicle mass, gear selection and use of the splitter (if available), extra power requirements and clutch/accelerator coordination. Decide what to do should the vehicle stall or roll back.
8. When teaching moving off - downhill, follow the basic sequence of lesson 4 but consider the effects of vehicle mass and encourage the trainee to start off in a higher gear and let the slope start the vehicle moving. This saves unnecessary gear shifting.

Common faults	Symptoms	Address/check
Races engine when moving off uphill.	Excessive engine speed, vibration, slipping clutch.	Practice. Coordination.
Fails to depress clutch pedal fully.	Gear clashing.	Confidence/practice. Coordination.
Poor clutch, accelerator and park brake co-ordination when moving off uphill.	Vehicle moves off in jerks, stalls or rolls back.	Practice. Coordination.

15 Negotiating steep grades

15 Negotiating steep grades	
Trainee name	
Location	
Vehicle details	
<p>It is a simple dynamic fact that heavy vehicles operating on hills cannot climb, or descend them under control, as quickly as a car can. The gross weight of the vehicle severely affects the speed of the vehicle during climbs and, because of braking limitations, demands a much more cautious approach when driving downhill. Heavy vehicles are all too often involved in very serious crashes when descending steep hills. This is, almost without exception, due to driver error. The correct techniques are very simple but the trainees must understand the limitations of the vehicle, accept that there is never any rush to get to the bottom of a hill, and appreciate the possible consequences of doing it wrong, not only to themselves but also to other motorists.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p>
Performance	<p>Negotiate a steep ascent.</p> <p>Negotiate a steep descent.</p>
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p> <p>Without stopping the vehicle.</p> <p>While applying correct gear shifting techniques without gear clashing.</p> <p>Utilising efficient engine speeds.</p> <p>Utilising the vehicle's auxiliary braking system.</p>

Conditions	In a heavy motor vehicle with, or without a trailer. On public roads. On steep uphill and downhill grades. In daylight. In repeated trials.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
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 bay/lane signs.			
d.	Checks following traffic conditions on approach to grades.			
2. Learning points (Steep ascents)		Comments	Date completed	DI initials
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 excessive clashing, to suit load and road conditions without stopping.			
d.	Makes use of available lanes to minimise interference to following traffic.			
e.	Maintains correct following distances from other heavy vehicles.			
f.	Overtakes (where appropriate) safely.			
g.	Displays courtesy to other road users.			
3. Learning points (Steep descents)		Comments	Date completed	DI initials
a.	Selects suitable gear to reflect road and load conditions before commencing descent.			
b.	Engages auxiliary brake and runs engine speed out to rated rpm (where necessary) to optimise			

	auxiliary braking.			
c.	Uses service brakes to control engine rpm.			
d.	Monitors tachometer to manage engine and road speed.			
e.	Explains actions in the event of a missed gear change.			
f.	Avoids the use of the splitter during descents.			
g.	Explains 'brake fade' and what causes it.			
h.	Explains actions in the event of a 'runaway' vehicle.			
i.	Uses slow vehicle bays or lanes to allow following traffic past.			
j.	Displays courtesy to other road users.			

Comments

Instructor's notes

1.	Where possible use an unloaded vehicle to practice this lesson initially and then progress to a loaded vehicle.
2.	Prepare the lesson to reflect the type of vehicle being used and the on-board technology available.
3.	Ensure the trainee has mastered the various shifting options before committing to this lesson. The use of the tachometer is a key teaching point and trainees should understand the benefits of being able to select a range of gear ratios at any time. Split shifting 1½ or 2 gears, sequentially shifting just one gear or using the splitter to achieve a half gear are all options. The lower the engine revs drop, the greater the ratio change should be.
4.	Take time to ensure the trainee understands the key references on the tachometer. These consist of rated rpm, peak torque, peak horsepower and the economy or operating range.
5.	Ideally, the initial training should be conducted in an area where it is possible to use a circuit that has both moderate ascents and descents. Have the trainee experiment with descending the slopes in various gears to appreciate the effectiveness of the engine compression (augmented by the auxiliary braking system) and the ability of the various gear ratios to control descent speed. It is important to also demonstrate the effect of turning off the engine or exhaust brake so the trainee knows what to expect when they are in an area where their use is prohibited.
6.	The use of the splitter button on a downhill run must be avoided. While the transmission is still turning in the normal way, the wheels are now driving the engine and gearbox loading is reversed. This can lead to an incomplete or missed engagement if the splitter is operated. This, in turn, will lead to a 'neutral' situation with its associated risks.
7.	Do not practice the missed gear drill on a descent! This should be an explanation and, perhaps, demonstration at low speed in a safe environment. The drill applies to non-synchromesh transmissions. If possible stop the truck and start again. If not, leave the clutch out and increase engine speed on the accelerator with pressure on the gearshift lever. Once gear speeds match, the desired lower gear should engage.

8.	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.
9.	When climbing hills behind other heavy vehicles, ensure following distances are being maintained. If the truck ahead misses a gear, for example, the driver should be able to avoid the problem without stopping, and trucks do miss gears!
10.	There is no 'correct' gear for descending a hill. The question that must be asked is 'Was it done safely? One driver might select one or a half gear higher than another driver and use a little more service brake. Another driver might select one, or a half gear lower and use less service brake but take just a little longer to make the descent. All drivers would probably be doing just fine. As the instructor you must keep this point in mind.
11.	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 use everything available including park brakes and look for an 'out'. These might include running into a drain, along a bank or through a fence into a paddock. Anything that keeps the vehicle on the correct side of the road and brings it to a stop will suffice. Remember, however, that the situation will not arise if the correct driving techniques are applied.
12.	Remember that effective auxiliary brake use is dependent upon the selection of a low gear and allowing the engine speed to run out to rated 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.
13.	Discuss with the trainee the use of technology (traction control, diff locks, auxiliary braking systems etc) and include these in training if they are fitted to the vehicle. If automated or automatic transmissions are fitted adjust the lesson accordingly and make reference to the manufacturer's driver's manual.
14.	Discuss with the trainee the use of slow vehicle bays. When ascending a hill, if you think the vehicle will have to be brought to a stop if it uses a slow vehicle bay, keep going until a suitable turnout area is identified. Always stay left in multiple lanes when climbing hills unless overtaking. During descents, always use slow vehicle bays if there is following traffic and adjust speed to let all traffic past. Don't 'hang' left when descending hills but stay within the lane until a suitable turn out area has been reached. Make sure the trainee is alert to overhanging trees, power poles, and any other obstructions on the left, that may prevent or partially restrict the use of the left lane or shoulder.

Common faults	Symptoms	Address/check
Doesn't down shift soon enough on ascents.	Engine begins to labour.	Use skip/block shifting to regain engine speed and drive.
Changes to incorrect gear (too high) on ascents.	Immediate loss of engine speed.	As above.
Follows heavy vehicle ahead too closely.	Inadequate following distance. Build up of traffic behind.	Back off in case vehicle ahead stops suddenly. Drop back and create room for following vehicles to overtake.
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 left.	Indicate, move into left 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.	Allow engine speed to run out to rated rpm. Select a lower gear to improve retardation.
Fails to check mirrors frequently or disregards slow vehicle bays.	Build up of following traffic.	Revisit observation techniques. Use slow vehicle bays to clear following traffic.
Positioned too far to the left.	Brushes through foliage. Wheels run off the edge of the seal.	Adjust positioning to avoid left side hazards.

16 Overtaking and use of passing lanes

16 Overtaking and use of passing lanes	
Trainee name	
Location	
Vehicle details	
<p>While overtaking is an option for every driver who encounters slower traffic, it is, for the drivers of heavy vehicles, 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, much more than the 300-400m required for car drivers, for the manoeuvre to be carried out safely. This latter point will, in most situations, negate the overtaking option for most heavy motor vehicles on single lane highways. The slow rate of acceleration of heavily laden vehicles will generally make overtaking an option only where passing lanes exist. Professional operators should not, in any case, be overtaking vehicles travelling at similar speeds to their own.</p> <p>The use of passing lanes must also be managed by drivers so that they don't interfere with the opportunity for faster following traffic to overtake. Driver responses to these road features influence the public perception of both the transport companies and the industry as a whole.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p> <p>US 3466 <i>Apply risk reduction techniques and strategies while driving.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i></p>
Resources	<p>Illustrations: Passing lane and slow vehicle bay (section 2).</p>
Performance	<p>Safely overtake a slower vehicle.</p> <p>Make efficient and courteous use of passing lanes.</p>
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p>

	While maintaining vehicle control. Using the system of vehicle control.
Conditions	In a heavy motor vehicle with, or without a trailer. On public roads. In daylight. In repeated trials.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Explains places where overtaking is prohibited.			
b.	Applies the 12-second search pattern.			
c.	Explains risks associated with overtaking in heavy vehicles.			
d.	Applies the system of vehicle control.			
e.	Displays a courteous approach to overtaking, passing and being passed.			
f.	If in doubt, stays back.			
2. Learning points (Overtaking)		Comments	Date completed	DI initials
a.	Maintains correct following distances.			
b.	Checks ahead for sufficient clear road.			
c.	Checks behind in mirrors and blind spots for other overtaking traffic.			
d.	Signals right for at least 3 seconds.			
e.	Checks mirrors again and moves to the right to overtake any road user.			
f.	Accelerates to overtaking speed but not in excess of speed limit.			
g.	Taps horn or flashes light if this is deemed necessary.			

h.	Signals left for at least 3 seconds.			
i.	Checks near side mirrors for clearance.			
j.	Moves left back into the correct lane position.			
k.	Cancels signal and resumes speed.			
l.	Has 100m clear road throughout the whole overtaking manoeuvre.			
3. Learning points (Passing lanes)		Comments	Date completed	DI initials
a.	Identifies warning signs in advance.			
b.	Signals intention to move into left hand lane or slow vehicle bay.			
c.	Moves into left hand passing lane (or slow vehicle bay).			
d.	Delays own overtaking manoeuvre if this will hinder ability of following traffic to overtake.			
e.	Adjusts speed to allow all following traffic past.			
f.	Indicates, at least 3 seconds, intention to merge at end of lane.			
g.	Checks mirrors before merging.			
h.	In general driving does not attempt to move left for following traffic in situations where vehicle stability may be compromised or overtaking vehicles are still forced to cross the centreline.			

Comments

Instructor's notes

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

4.	Indicating the intention to merge at the end of passing lanes should not occur immediately prior to moving right. Encourage the use of indicators 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 overtake or stay back. Drivers should, however, anticipate the last second 'mad dash' to get past the larger vehicle and adjust speed, where possible, to let them past.
5.	Places where overtaking is prohibited include the following: in advance of corners or the crests of hills, through some intersections, where insufficient room exists for overtaking, through right turn bays, over flush medians, over a solid yellow line, within 60m of a railway crossing, pedestrian crossings.
6.	The risks associated with overtaking in heavy vehicles relate to the differences in road speed of the two vehicles, acceleration rates and the distance of clear road required.
7.	Overtaking 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.
8.	Encourage patience and awareness of the effects of larger, slower vehicles on following traffic. Drivers must appreciate the benefits for themselves, their companies and the industry as a whole, of doing everything possible, within reason, to assist with the smooth, safe interaction of 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 queues of following traffic (six or more vehicles) or for lesser numbers of vehicles that have been patient over a reasonable distance or period of time.
9.	Emphasise that indicators are the only means of communication between heavy vehicle operators and car drivers. Use them early and consistently in all traffic conditions.
10.	Slow vehicle bays or lanes are not 'passing lanes' in the normal sense. Slower vehicles (including cars) need only use these when there is traffic being held up behind. In passing lanes drivers are obliged to use the left hand lane unless overtaking.
11.	Assess the trainee's ability to judge speed, time and distance. They are the key to so many driving situations, not least of which is overtaking.
12.	Emphasise the dangers of blind spots and the need to conduct shoulder checks before overtaking or merging.

Common faults	Symptoms	Address/check
Not using mirrors or checking blind spots.	Fails to check for other traffic.	System of vehicle control/frequency of mirror checks 5-10 seconds.
Overtaking into oncoming traffic.	Commencing overtaking manoeuvre with inadequate clear road.	System of vehicle control/speed, time and distance.
Cuts in front of overtaken vehicle.	Flashing lights, horn sounded or braking by vehicle overtaken. Oncoming vehicle.	System of vehicle control/use of mirrors. Time and distance.
Insufficient clearance.	Runs too close to vehicle being overtaken.	Observation skills, steering technique, spatial awareness.
Illegal overtaking.	Overtakes in the wrong place in breach of traffic law.	Revisit knowledge of traffic law.
Fails to move left for following traffic.	Build up of traffic behind the vehicle in situations where opportunity existed to let vehicles past.	Use of mirrors, attitude.
Fails to indicate early.	Indicators used at last moment before changing direction.	Use of indicators and defensive driving.
Fails to adjust speed for overtaking vehicles.	Last moment 'near misses' for faster vehicles.	Speed management in any 'being overtaken' situation.

17 Town driving

17 Town driving	
Trainee name	
Location	
Vehicle details	
<p>While highway driving, particularly for heavy combination vehicles, occupies a large part of a driver's time, there is 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 operators and to manage these requires patience and a high degree of skill and knowledge. The basic obligations that apply to all drivers in this environment have obvious relevance to the driver of a heavy motor vehicle but, to achieve these, even more care must be taken and a responsible and courteous attitude applied. Driving a large vehicle does not give the operator any rights over other drivers.</p> <p>Trainees need to develop, quite quickly, 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 roadside clearances.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 3466 <i>Apply risk reduction techniques and strategies while driving.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i></p>
Performance	Drive safely and efficiently in town.
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p> <p>Using the system of vehicle control.</p> <p>Applying the hazard action plan.</p>

Conditions	In a heavy motor vehicle with, or without a trailer. On public roads. In daylight.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Identifies potential hazards, predicts developments, decides on a course of action and acts on that decision.			
b.	Applies the system of vehicle control in all hazard avoidance situations.			
c.	Anticipates the movement of other road users.			
d.	Manages fuel economy by operating in economy range on tachometer and avoiding unnecessary downshifting.			
2. Learning points (Road conditions)		Comments	Date completed	DI initials
a.	Maintains correct lane position.			
b.	Applies the system of vehicle control at intersections and obeys all controls.			
c.	Observes and reacts to all road signs and markings.			
d.	Reacts to railway crossings in the correct manner.			
e.	Reacts to pedestrian crossings in the correct manner.			
f.	Applies a cautious, courteous and patient driving style around busy shopping areas and schools.			
3. Learning points (Traffic conditions)		Comments	Date completed	DI initials
a.	Applies 4-second rule.			
b.	Monitors mirrors every 5-10 seconds.			
c.	Stays left in multiple lanes unless setting up to turn right.			

d.	Identifies and anticipates actions of turning, oncoming traffic.			
e.	Monitors parked vehicles and adjusts lane position around parked vehicles.			
f.	Monitors and anticipates the movement of pedestrians.			
g.	Identifies and reacts to avoid any animal on the road.			
h.	Identifies and, where appropriate, gives way to service vehicles.			
i.	Monitors and anticipates the movement of cyclists.			
4. Learning points (Vehicle conditions)		Comments	Date completed	DI initials
a.	Vehicle meets certificate of fitness standard.			
b.	Driving performance reflects an appreciation of the power and weight characteristics of the vehicle.			
c.	Manoeuvres the vehicle safely with consideration to dimensions and handling characteristics.			
d.	Secures and distributes the load to meet legal and stability parameters.			
e.	Vehicle speed reflects the driving conditions and posted speed limits.			
f.	Maintains correct road position in all driving situations.			
5. Learning points (Weather conditions)		Comments	Date completed	DI initials
a.	Driving performance reflects the prevailing weather conditions.			
6. Learning points (Light conditions)		Comments	Date completed	DI initials
a.	Takes steps to minimise the effects of any sun strike or glare.			
b.	Uses vehicle headlights in any low light conditions.			
7. Learning points (Driver conditions)		Comments	Date completed	DI initials
a.	Displays a courteous and patient driving style.			
b.	Applies knowledge and skills to produce a professional driving standard.			

Comments

Instructor's notes

1.	Consider doing commentary drives as part of your demonstration and, if the trainee is capable, have them do the same once the teaching phase has been completed. This tool remains the only reliable method of assessing driver observation and anticipation skills.
2.	Encourage an unrushed driving style and the benefits of applying correct lane positions and following distances.
3.	The system of vehicle control, yet again, provides a systematic approach to driving that is crucial in these conditions.
4.	Progression through the licence classes should eliminate many of the problems associated with vehicle dimensions and handling characteristics, but ensure that trainees, especially those in Class 3 and Class 5 vehicles, have mastered the potential pitfalls of tracking and swept paths etc in a controlled environment before committing to busy metropolitan driving.
5.	This session offers the opportunity to assess progress relating to a large number of the early lessons and the trainee should, by now, be consistently competent in the basic driving skills.
6.	To achieve fuel economy in town driving, the trainee should be selecting a gear that allows the engine to run in the 1400–1600rpm range as much as possible.
7.	Excessive downshifting, prior to 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 is in. Skip shifting techniques will allow the correct gear to be selected should the need to stop be negated.
8.	Bright and low light conditions demand, for obvious reasons, different reactions by the driver. If the risk of sun strike exists the windscreen must be kept clean and sun visors and sunglasses used. In low light conditions, even in the middle of the day, consider the colour of the vehicle and encourage the trainee to switch on headlights to improve conspicuity.
9.	Keep in mind that 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 encouraged and targeted as a priority. Assess progress of this aspect of driving by applying the hazard action plan.
10.	Vehicle dimension effects such as tracking, swept paths and clearances must be monitored closely.

Common faults	Symptoms	Address/check
Fails to keep left.	Vehicle straddles lanes or stays in right hand lane.	Use of lanes.
Unreasonably slow.	Interference to other traffic. Well below speed limit.	Confidence. Is this lesson too soon?
Erratic speed.	Unnecessary changes in speed.	Confidence. Spatial awareness.
Unaware of surrounding traffic.	Not using mirrors.	System of vehicle control.
Too fast.	Exceeds speed limit.	Legal obligations. Overconfidence.
Follows too closely.	Too close to vehicle ahead.	4-second rule.
Too fast at railway or pedestrian crossings.	Fails to react to crossings in correct manner.	Observation. System of vehicle control. Legal obligations.

18 Motorway driving

18 Motorway driving	
Trainee name	
Location	
Vehicle details	
<p>While, by world standards, New Zealand has a very limited number of motorways and expressways and almost all of these service the main centres, they are used extensively by heavy motor vehicles and present their own potential risks. There are also a large number of dual carriageways that present similar problems and much of what follows can be related to both of these busy traffic environments.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 3466 <i>Apply risk reduction techniques and strategies while driving.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i></p>
Resources	Illustration: Dual carriage motorway with on and off-ramps (section 2).
Performance	Enter, leave and drive safely and efficiently on a motorway.
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p> <p>Using the system of vehicle control.</p> <p>Applying the hazard action plan.</p>
Conditions	<p>In a heavy motor vehicle with, or without a trailer.</p> <p>On a motorway or expressway.</p>

	In daylight.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Explains the basic rules of motorway driving.			
b.	Applies the system of vehicle control in all hazard avoidance situations.			
c.	Identifies potential hazards, predicts developments, decides on a course of action and acts on that decision.			
d.	Anticipates the movement of other road users.			
e.	Manages fuel economy by operating in operating range on tachometer and staying in the highest gear possible for as long as possible.			
2. Learning points (Road conditions)		Comments	Date completed	DI initials
a.	Adopts, and maintains, appropriate lane position.			
b.	Checks mirrors and blind spots and indicates for at least 3 seconds prior to any lane change.			
c.	Observes all road markings and reacts early to all motorway signs.			
d.	Accelerates, checks mirrors and blind spots, indicates for at least 3 seconds and merges efficiently with traffic when joining motorway.			
e.	Identifies exit, adjusts lane position early, indicates intention to leave the motorway for at least 3 seconds and exits safely.			
3. Learning points (Traffic conditions)		Comments	Date completed	DI initials
a.	Applies 4-second rule.			
b.	Overtakes slower traffic in the same lane safely and in accordance with traffic law.			
c.	Monitors mirrors every 5-10 seconds.			
d.	Stays left in multiple lanes.			
e.	Avoids unnecessary lane changes.			

f.	Identifies and, where necessary, adjusts speed for traffic joining the motorway.			
g.	Identifies and, where necessary, adjusts speed for traffic leaving the motorway.			
4. Learning points (Vehicle conditions)		Comments	Date completed	DI initials
a.	Vehicle meets CoF standard.			
b.	Driving performance reflects an appreciation of the power and weight characteristics of the vehicle.			
c.	Vehicle speed reflects the driving conditions and posted speed limits.			
d.	Maintains appropriate road position in all driving situations.			
5. Learning points (Weather conditions)		Comments	Date completed	DI initials
a.	Driving performance reflects the prevailing weather conditions.			
6. Learning points (Light conditions)		Comments	Date completed	DI initials
a.	Takes steps to minimise the effects of any sun strike or glare.			
b.	Uses vehicle headlights in any low light conditions.			
7. Learning points (Driver conditions)		Comments	Date completed	DI initials
a.	Displays a courteous and patient driving style.			
b.	Applies knowledge and skills to produce a professional driving standard.			
Comments				

Instructor's notes

1. For the purpose of this lesson, the driving environment must include on ramps and off ramps. Motorways and expressways will both provide these features.
2. Encourage an unrushed driving style and the benefits of applying correct following distances. While most drivers, at least initially, will disagree with the ability to maintain correct following distances in heavy motorway traffic, this is, in fact, a fallacy. Even in peak traffic, the 4-second rule can be applied quite successfully.
3. The system of vehicle control, yet again, provides a systematic approach to driving that is crucial in these conditions.
4. While most of our motorway systems are dual carriageways, there are those that have three, and sometimes more, lanes. While keeping left is the basic rule on these roads it is acceptable for heavy vehicle drivers to adopt, and maintain, a centre lane position so that repeated lane changes (as a result of traffic joining and leaving the motorway), and their inherent risks, are avoided. Vehicle speed, however, should not be such that it is causing interference for faster traffic. If this occurs use the left hand lane. On dual carriageways always use the left hand lane unless moving around slower traffic or adjusting lane position for joining traffic.
5. Unnecessary lane changes increase driving risk and the habit, of many drivers, to consistently change lanes in medium to heavy traffic in the belief that they will get to where they are going much quicker is simply not acceptable with large vehicles. The biggest issue for truck operators, when changing lanes, is the large number of blind spots that exist around the vehicle. Emphasise the risks associated with these.
6. To achieve fuel economy in motorway driving, the trainee should be selecting a gear that allows the engine to run in the 1400-1600rpm 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 indicating, late lane changes particularly to exit the motorway, tailgating traffic.
8. Bright and low light conditions demand, for obvious reasons, different reactions by the driver. If the risk of sun strike exists the windscreen must be kept clean and sun visors and sunglasses used. In low light conditions, even in the middle of the day, consider the colour of the vehicle and encourage the trainee to switch on headlights to improve conspicuity.
9. Keep in mind that this driving environment demands effective observation skills and the development of the ability to anticipate and predict the movement of other road users has to be encouraged and targeted as a priority.
10. Emphasise that the three key ingredients for safe motorway driving in a large vehicle are the maintenance of an appropriate lane position, correct following distances and early responses to all planned moves.
11. Teach trainees to expect frustrations on our motorways and accept that other drivers are not as professional, or even as competent, as they are.
12. The way in which other heavy vehicles are operated on the motorway should not influence the trainee. The fact is that many of our heavy vehicle drivers do not operate professionally.

Common faults	Symptoms	Address/check
Fails to keep left.	Stays in right hand lane.	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.	System of vehicle control. Overconfident or lacking confidence?
Fails to indicate intentions.	Reactions of other drivers. Inconveniences traffic.	Legal obligations.
Too fast.	Exceeds speed limit.	Legal obligations. Overconfidence.
Follows too closely.	Too close to vehicle ahead.	4-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.

19 Highway driving

19 Highway driving	
Trainee name	
Location	
Vehicle details	
<p>New Zealand provides one of the best training grounds for professional drivers in the world. We have more corners and hills per thousand kilometres than most other developed countries and our weather and road conditions offer challenges that would test any self proclaimed expert. Our transport industry is innovative and works hard to meet the economic demands of the country and this, in turn, produces large, powerful combinations that require skill and a responsible attitude to operate efficiently and safely.</p> <p>Unfortunately, these same conditions play a large part in far too many heavy 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 issues such as cornering, hill work and fuel economy and these are covered again, but not great detail. This lesson concerns itself, once again, with the system of vehicle control and the six 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.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 3466 <i>Apply risk reduction techniques and strategies while driving.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i></p>
Performance	Drive safely and efficiently on a highway.
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p> <p>Using the system of vehicle control.</p>

	Applying the hazard action plan.
Conditions	In a heavy motor vehicle with, or without a trailer. On rural roads. In daylight.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Applies the system of vehicle control in all hazard avoidance situations.			
b.	Identifies potential hazards, predicts developments, decides on a course of action and acts on that decision.			
c.	Anticipates driving conditions and the movement of other road users.			
d.	Manages fuel economy with efficient use of the tachometer and transmission			
2. Learning points (Road conditions)		Comments	Date completed	DI initials
a.	Adopts, and maintains, appropriate lane position.			
b.	Checks mirrors and blind spots and indicates for at least 3 seconds prior to any change in direction that causes the vehicle to cross the road centre line.			
c.	Observes all road markings and reacts early to all warning and advisory signs.			
d.	Ascends and descends hills an appropriate gear, at the correct engine speed.			
e.	Negotiates corners in accordance with advisory speed signs, applying the correct cornering line and technique and with regard to the type of load and vehicle C of G.			
f.	Where appropriate, slows for narrow bridges and obeys any right of way signs.			
g.	Positions vehicle to avoid contact with bridge structure or any oncoming vehicles.			
h.	Adopts correct turning positions.			
i.	Observes all controls or applies the give way rule correctly.			

j.	Indicates intention to turn at least 3 seconds in advance.			
k.	Reacts early to warning signs.			
l.	Observes temporary speed limits and obeys all controls.			
m.	Identifies unsealed roads by sign or road discolouration.			
n.	Reduces speed on unsealed roads.			
o.	Maintains correct road position and avoids road shoulders.			
p.	Monitors traffic conditions.			
q.	Uses left lane unless overtaking.			
r.	Adjusts speed to allow faster traffic past.			
s.	Uses indicators effectively.			
3. Learning points (Traffic conditions)		Comments	Date completed	DI initials
a.	Applies correct following distance.			
b.	Uses mirrors every 5-10 seconds.			
c.	Overtakes in accordance with legal requirements.			
d.	Overtakes safely.			
e.	Maintains lane position and speed.			
f.	Monitors overtaking traffic.			
g.	Where necessary reduces speed and applies correct overtaking procedures in response to cyclists and pedestrians.			
h.	Adjusts speed to avoid passing oncoming vehicles and cyclists / pedestrians at the same time.			
i.	Reacts to any signs that might indicate stock on the road.			
j.	If stock is encountered, slows down or covers brake and, if necessary, prepares to stop.			
k.	Observes any requests or directions from drovers.			

l.	Applies cautious approach to slow farm machinery.			
m.	Applies correct overtaking procedures.			
n.	Anticipates abrupt, or late, overtaking manoeuvres from other vehicles when encountering oncoming farm vehicles or machinery.			
4. Learning points (Vehicle conditions)		Comments	Date completed	DI initials
a.	Vehicle meets CoF standard.			
b.	Driving performance reflects an appreciation of the power and weight characteristics of the vehicle.			
c.	Vehicle speed reflects the driving conditions and posted speed limits.			
d.	Maintains appropriate road position in all driving situations.			
e.	Uses auxiliary braking systems in the correct rev ranges to achieve optimum efficiency.			
f.	Avoids the use of auxiliary brakes where signs request or prohibit their use.			
g.	Uses the transmission without excessive gear clashing (if applicable).			
h.	Anticipates driving conditions with gear selection.			
5. Learning points (Weather conditions)		Comments	Date completed	DI initials
a.	Driving performance reflects the prevailing weather conditions.			
6. Learning points (Light conditions)		Comments	Date completed	DI initials
a.	Takes steps to minimise the effects of any sun strike or glare.			
b.	Uses vehicle headlights in any low light conditions.			
7. Learning points (Driver conditions)		Comments	Date completed	DI initials
a.	Displays a courteous and patient driving style.			
b.	Avoids moving left for faster traffic unless safe to do so.			
c.	Displays an unrushed, patient driving style.			
d.	Applies knowledge and skills to produce a professional driving standard.			

e.	Explains simple steps to avoid driver fatigue.			
f.	If tired, pulls over and takes a break/nap.			
g.	Avoids internal and external distractions that might affect vehicle control and observation technique.			
h.	Maintains two-handed steering unless operating other controls.			

Comments

Instructor's notes

1.	It is unlikely that this lesson will be achieved in one session. Instructors should select a training environment that reflects as many of the learning points as possible and teach and assess accordingly. It is likely that some elements will arise during other lessons and these can be addressed as, and when, they occur.
2.	Encourage an unrushed driving style and the benefits of applying correct following distances. While the 4 second rule takes some practice to maintain, the benefits should be obvious to trainees. There will be reductions in braking and fuel use, a less stressful drive, more room for overtaking traffic and better visibility. Emphasise 'rugby field' distance and the consideration that if you don't plan to, or can't, overtake the vehicle ahead there is no point in increasing the risk factors.
3.	The system of vehicle control, yet again, provides a systematic approach to driving that is crucial in all open road conditions. This should form the basis for teaching many of the specific points contained within the lesson.
4.	Misconceptions of speed relate to the belief that the faster you go, the sooner you will get there. Average speed is the distance the vehicle will travel in one hour. In reality, on NZ roads, this is about 65-75km/h depending on the route. Maximum legal speed is 90km/h but grades, corners, towns, intersections, traffic etc all influence the actual distance covered in that hour. If one vehicle travels at 100km/h and another at 90km/h, whenever they can, for one hour over the same route, the actual arrival times will differ very little, if at all, because of those delays. The faster vehicle will, however, have incurred much higher fuel and maintenance costs and considerably increased the risk factors. The operating skills of the 'slower' driver might have them arriving first!
5.	Auxiliary brake use should reflect an appreciation of the nuisance factor and the benefits of these systems. The trainee 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 trainee 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 works, hills, corners, intersections.
8.	Bright and low light conditions demand, for obvious reasons, different reactions by the driver. If the risk of sun strike exists the windscreen must be kept clean and sun visors and sunglasses used. In low light conditions, even in the middle of the day, consider the colour of the vehicle and encourage the trainee to switch on headlights to improve conspicuity.
9.	This aspect of driving can be monotonous but distractions must be avoided as much as possible. These include eating, drinking, smoking, RT use, stereo use, cell phone use, texting and some external distractions. While some, like texting and cell phone use, must be avoided at all times, others require a little thought as to the appropriate time and place.

10.	Emphasise that the three key ingredients for safe driving on a highway in a large vehicle are the maintenance of an appropriate speeds, correct following distances and early identification of potential hazards.
11.	Quiz the trainee in relation to personal fatigue management strategies, both at home and at work, and look for any signs of tiredness.
12.	The way in which other heavy vehicles are operated on the highway should not influence the trainee. The fact is that many of our heavy vehicle drivers do not operate professionally in this environment, especially in relation to speed. Trainees should not feel pressured by other drivers to increase speed.
13.	Commentary driving should be used by the trainer during teaching and considered an option for trainees to confirm observation skills.
14.	Signs of stock movement might include warning signs, broken fences, road discolouration, open gates etc
15.	Explain highway speed advisory signs and the information presented on them. NZTA recommendations are for drivers of fully loaded vehicles to negotiate corners 10km/h below the advisory speed.

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 recognise signs of stock movement.	Late braking.	Observation technique.
Fails to indicate intentions.	Reactions of other drivers. Inconveniences traffic.	Legal obligations.
Too fast.	Exceeds speed limit.	Legal obligations. Overconfidence.
Follows too closely.	Too close to vehicle ahead.	4-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 left.	Observation. Attitude.
Not completely in correct lane.	Straddles fog line.	Courtesy. Safety limitations.
Fails to indicate.	Responses from other drivers.	Legal obligations.

20 Night driving

20 Night driving	
Trainee name	
Location	
Vehicle details	
<p>The demands of the road transport industry mean that heavy vehicles are on the road 24/7 and drivers are frequently operating during the hours of darkness as a result of shift work. While many drivers prefer this environment over daylight running, due mainly to the much reduced traffic volumes, there are risks associated with night driving just as there are with any other aspect of operating heavy vehicles. 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 most drivers.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p> <p>US 17677 <i>Demonstrate knowledge of safe night driving.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p> <p>Tranzqual ITO publication <i>Study guide for US 17677: Demonstrate knowledge at safe night driving.</i></p> <p>Land Transport (Vehicle Lighting) Rule 2004.</p> <p>NZTA publication <i>The official New Zealand road code for heavy vehicle drivers.</i></p>
Performance	Drive safely and efficiently at night.
Standard	<p>Without inconveniencing other road users.</p> <p>While meeting all legal obligations.</p> <p>While maintaining vehicle control.</p> <p>Using the system of vehicle control.</p>

	Applying the hazard action plan. While correctly interpreting night driving aids.
Conditions	In a heavy motor vehicle with, or without a trailer. On public roads including urban roads and highways. At night.
Revision	Performance objective 11: <i>Hazards and the system of vehicle control.</i>

Explain – demonstrate – practice

1. Learning points (Night driving)		Comments	Date completed	DI initials
a.	Checks all lights and indicators for operation, damage and cleanliness.			
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 switched on.			
e.	In the event of oncoming traffic not 'dipping' headlights, slows down and looks to left of road 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.	Maintains correct road position at all times.			

Comments

Instructor's 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 prior to the lesson to be satisfied that everything operates correctly.

3.	Discuss reflective driving aids in detail and expect the trainee to react to these in the correct manner. 'Cats eyes' consist of white (centreline), yellow (no passing), blue (fire hydrant) and red (left edge of road where this is considered necessary). Bridge abutments are marked with white diagonal markers left side and yellow diagonal markers right side. Marker posts on left side of road have one white reflector and those on the right, where a left hand corner exists, have two yellow reflectors. The severity of a corner will be reflected in the distance between marker posts. The closer they are 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 (half this distance on roads without a centreline)
5.	Discuss the advantages of following other vehicles at night, especially on unfamiliar roads, where their tail and brake lights can provide information on conditions ahead.
6.	The use of high beam in retaliation to oncoming vehicles failing to 'dip' their lights is not acceptable. This will result in two drivers, who are closing at a very high combined speed, being unable to see.
7.	Any tendency to cut corners at night must be eliminated. 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.	The issue of heavy vehicle lighting is a very complex one, particularly in relation to what is permitted and what isn't. Don't get 'tied up' with this aspect of legislation but do familiarise yourself with what is NOT permitted.
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.
10.	While 100m of clear road must be visible throughout any overtaking manoeuvre, remember that it can take 300-400m of actual road to carry out the manoeuvre (and often much more for trucks) and therefore at least this much clear road must be available before committing. In low light conditions, unless the driver can see clearly 300-400m of clear road, the manoeuvre shouldn't take place. There might be oncoming traffic without its lights on.
11.	'Out driving' headlights is a common fault. It simply means that a driver will not be able to stop in time if a hazard appears in the headlight beam. See note 4.

Common faults	Symptoms	Address/check
Fails to turn on headlights early enough.	Other traffic with lights on.	Legal obligations, defensive driving.
Out driving headlights.	Driving too fast, late reactions to potential hazards.	Legal obligations, over confidence.
Lack of courtesy.	Fails to 'dip' headlights for oncoming traffic, pedestrians, cyclists etc.	Legal obligations, attitude.

21 Reversing

21 Reversing	
Trainee name	
Location	
Vehicle details	
<p>Traditionally, one measure of a professional heavy vehicle operator has been their ability to reverse a combination under difficult conditions.</p> <p>Although many modern operators spend little, if any, time going backwards, for many drivers this 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 present different degrees of difficulty and instructors will have to plan training accordingly. They must ensure that they have the requisite skills and these will only be achieved and retained through constant practice. Paying 'lip service' to this lesson is likely the result of a deficiency in instructor ability. Reversing vehicles is included in the driver licence assessment and, therefore, the skills must be developed by the trainee prior to that.</p>	
Relevant NZQA unit standards	<p>US 17574 and US 17576 <i>Operate a rigid vehicle to meet the requirements for a full class 2/class 4 driver licence.</i></p> <p>US 17575 and US 17577 <i>Operate a combination vehicle to meet the requirements for a full class 3/class 5 driver licence.</i></p> <p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p>
Resources	Illustrations: Reversing truck and trailer, semi-trailer, B-train and bus (section 2).
Performance	Reverse a heavy rigid or heavy combination vehicle.
Standard	<p>In a straight line for at least 20 metres.</p> <p>Through a 90 degree turn to the right.</p> <p>Through a 90 degree turn to the left.</p> <p>With no more than one correction for each manoeuvre.</p> <p>Slowly and safely, without contact with any obstacle.</p> <p>Without stalling or over-revving the engine.</p>

	Without undue stress to the vehicle. Meeting all legal requirements.
Conditions	In a heavy motor vehicle with, or without, a trailer. On a driving range or public road. In daylight.
Revision	Performance objective 10: <i>Basic dynamics</i> .

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Checks planned reversing path on foot, if necessary.			
b.	Checks clearances before reversing.			
c.	Uses a guide where this is appropriate.			
d.	Turns on hazard lights.			
e.	Depresses clutch and engages low reverse.			
f.	Makes final check for hazards and releases park brake.			
g.	Does not slip the clutch excessively.			
h.	Covers the brake with the right foot.			
i.	Checks front end swing.			
j.	Uses minimal steering corrections.			
k.	Makes efficient use of mirrors.			
2. Learning points (Rigid vehicle)		Comments	Date completed	DI initials
a.	Identifies reference point.			
b.	Explains swept path for the vehicle.			
c.	Corrects steering in small increments and, if in doubt, pulls forward and realigns before starting			

	again.			
d.	Completes manoeuvre in designated position safely.			
3. Learning points (Semi-trailer)		Comments	Date completed	DI initials
a.	Locks steering axles, if applicable.			
b.	Identifies reference point.			
c.	Steers in the correct direction to counter trailer 'drift'.			
d.	Explains swept path for the combination.			
e.	Monitors front end swing on both prime mover and trailer.			
f.	Corrects trailer 'drift' in small increments.			
g.	If in doubt, stops, pulls forward and realigns before starting again.			
h.	Completes manoeuvre in designated position safely.			
4. Learning points (Full trailer)		Comments	Date completed	DI initials
a.	Identifies draw bar length and explains effect on trailer steering responses.			
b.	Identifies reference points.			
c.	Steers in the correct direction to counter trailer 'drift' and makes steering corrections in small increments.			
d.	If in doubt, stops, pulls forward and realigns before starting again.			
e.	Completes manoeuvre in designated position safely.			
5. Learning points (B train)		Comments	Date completed	DI initials
a.	Explains effects of trailer wheelbase in relation to reversing.			
b.	Identifies reference points.			
c.	Steers in the correct direction to counter trailer 'drift' and makes steering corrections in small increments.			
d.	If in doubt, stops, pulls forward and realigns before starting again.			

e.	Completes manoeuvre in designated position safely.		
Comments			

Instructor's notes

1. Encourage trainees to check manoeuvring areas by foot and remind them that there is no rule that states a reversing manoeuvre must be completed on the first attempt. The instructor's aim should be to achieve a trainee standard that allows them to complete the manoeuvres with no more than one realignment, but the emphasis must be on completing it safely.
2. Encourage practice. The most experienced operators are not always the most successful in reversing 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 trailer. Practice - practice - practice.
3. Steering responses change when a vehicle is reversing. 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.
4. Jack-knifing trailers is not a consideration in this lesson but rather a specialist skill that, unless the trainee has demonstrated exceptional talent, is best addressed on the job.
5. The position of the hands on the steering wheel is not an issue with this lesson. Trainees are most likely to steer with one hand on top of the wheel and change hands frequently.
6. Explain the tyre damage issues that can result from kerb strikes.
7. Encourage reversing off a road rather than on to it. The driver has a better awareness of prevailing conditions when backing off a road than he would trying to reverse blind onto it.
8. Encourage reversing to the right so that blind spots are minimised and the driver can look out the side window to monitor trailer movement. If this means driving around the block, so be it.
9. Use driving ranges, with cones and drums, at least for initial lessons. This minimises interference and develops trainee confidence.
10. Remind trainees that, often, the point of contact with obstacles during reversing manoeuvres is the front left corner of the prime mover/truck. This part of the vehicle must be included in the ongoing search pattern during reversing.
11. The swept path of a reversing vehicle is large and includes prime mover and trailer front end swing, combination tracking and rear overhang.
12. B train combinations in NZ 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.
13. **For rigid trucks:** Explain the reference point (the point where the vehicle will pivot during reversing) is the rear axis.
14. **For semi-trailers:** Explain the reference point is the rear axis of the trailer.
If the trailer is fitted with steerable axles, make sure these are locked before reversing.

	To move the trailer to the right, steer left.
15.	For truck and trailer: 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. To move the trailer to the right, steer right. To correct trailer 'drift' steer in the opposite direction in small increments.
16.	For B trains: Explain the reference points should be relationship between trailer curtains / decks / axle sets. Primary observation points should be centre and rear axle sets. To move rear trailer to the right, steer right. To correct trailer 'drift' in one direction, steer in the opposite direction in small increments.
17.	For buses and coaches: Explain the effects and potential consequences of extended front and rear overhangs and the influence of wheelbase.

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.

22 Emergency stops

22 Emergency stops	
Trainee name	
Location	
Vehicle details	
Brake system	
<p>Modern technology has improved safety standards for not only light vehicles but for heavy vehicles as well. One of the advancements made in this respect relates to heavy vehicle braking and the introduction of ABS and EBS braking systems. While this technology offers a range of advantages in emergency stopping situations, it is managed electronically which, in turn, means it is not completely 'bullet proof'. In the event of a fault, drivers might have to contend with the normal risks associated with emergency stops, most importantly the consequences of wheel lock-up. Many vehicles still do not have the latest technology. This lesson is designed to introduce new drivers to two alternative braking techniques that can be used on any vehicle to minimise the risks of wheel lock-up and any subsequent loss of steering or directional control.</p>	
Relevant NZQA unit standards	US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i> US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i>
References	Tranzqual ITO publication <i>Professional skills for driving trucks.</i> Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i> Manufacturer's driver handbooks.
Performance	Demonstrate progressive and cadence braking techniques.
Standard	While maintaining full steering control of the vehicle. Stopping in a straight line. At a speed of 60km/h. Without contact with any obstacle. Without stalling the engine.
Conditions	In a heavy motor vehicle with, or without, a trailer. With a load of at least 50% of payload. On a driving range. In daylight.

In repeated trials.

Explain – demonstrate – practice

1. Learning points (Progressive braking)		Comments	Date completed	DI initials
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.	Depresses clutch pedal just before stopping to prevent stalling.			
f.	Stops short of any designated obstacle without excessive wheel lock-up.			
2. Learning points (Cadence braking)		Comments	Date completed	DI initials
a.	Depresses clutch pedal to the floor and holds it there.			
b.	Stabs brake pedal repeatedly to apply and release brakes.			
c.	Looks ahead, not at the ground in front of the vehicle.			
d.	Maintains two handed steering and steers around any hazards.			
e.	Stops short of any designated obstacle without excessive wheel lock-up.			
3. Learning points (ABS)		Comments	Date completed	DI initials
a.	Explains basic operation and key advantages of ABS.			
b.	Pushes both clutch and brake pedal to the floor and leaves them there.			
c.	Looks ahead, not at the ground in front of the vehicle.			
d.	Maintains two-handed steering and steers around any hazards.			
e.	Stops short of any designated obstacles.			
4. Learning points (EBS)		Comments	Date completed	DI initials

a.	Explains basic operation and key advantages of EBS.		
b.	Pushes both clutch and brake pedal to the floor and leaves them there.		
c.	Looks ahead, not at the ground in front of the vehicle.		
d.	Maintains two handed steering and steers around any hazards.		
e.	Stops short of any designated obstacles.		

Comments

Instructor's notes

1.	While the key teaching points for this lesson are progressive and cadence braking, cover the practical use of ABS and/or EBS if the training vehicle is fitted with the technology. Use every opportunity to make sure that trainees understand how to use that technology. Where vehicles are fitted with the technology, ensure the manufacturer's driver's handbooks are available.
2.	If the training vehicle does not have ABS/EBS explain the technology anyway and the advantages that accrue from it. Remember, the main advantages are the ability to continue steering to avoid hazards and the reduction in risk from jack-knife and trailer swing.
3.	Select the training ground carefully and try to avoid the use of public roads. Use cones or drums as braking markers and obstacles and start slowly increasing speed as trainee confidence grows.
4.	Depressing the clutch prevents momentary stalling of the drive wheels, which can happen on slippery surfaces, even with ABS. If this occurs the engine will stall and power steering will be lost.
5.	The vehicle must be loaded for this lesson so that weight is over the axles groups, particularly the drivers. Unless ABS is fitted an unloaded vehicle will experience wheel lock up very quickly.
6.	Discuss, with the trainee, 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.	The speed at which the trainee should stab the brake pedal, when cadence braking, will be dictated by the speed at which the brake relays activate and release. Make sure you have practiced the technique yourself, in the training vehicle, to identify the required trainee response.
8.	Expect trainees to be quite hesitant about stabbing the brake pedal during cadence braking and allow time for confidence to develop. The final results will surprise the trainee.
9.	Emphasise the risks associated with combinations when the prime mover 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. Cadence braking is one option to overcome this potential risk.
10.	Emphasise that drivers must not increase road speed or cornering speed, or reduce following distances, just because their vehicle is equipped with ABS / EBS technology. The normal professional driving practices still apply.

11.	Emphasise that emergency stops require the driver only to brake. If there is time to downshift it isn't an emergency!
12.	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.
13.	<p>With EBS the brake relays are operated electronically and provide almost instantaneous braking. ABS is fitted as standard and load sensing is included so that brake pressure to axle groups reflects the weight over those axles, preventing 'over braking'.</p> <p>A roll stability programme is usually fitted to trailers. This automatically applies trailer brakes if cornering speed is too high but is not fool proof. In the event of an electronic failure, the whole system returns to pneumatic operation with normal limitations.</p>

Common faults	Symptoms	Address/check
In progressive braking, applies too much initial pressure.	Axle groups lock up.	Practice. Confidence.
In progressive braking, applies too little pressure.	Vehicle does not slow quickly enough for emergency situation.	Practice. Nervousness.
In cadence braking, stabs brake pedal too quickly or does not fully release brake pressure.	Axle groups lock up.	Practice. Explain operation of relay valves.
In cadence braking stabs brake pedal too slowly.	Vehicle lurches.	Practice. Confidence.
Does not depress clutch pedal.	Vehicle stalls.	Practice.
Does not look far enough ahead during braking.	Vehicle begins to step out of line.	Identify point of visual reference.
Does not maintain two-handed steering.	One hand on gear lever. Poor steering avoidance.	Over confidence.
Anticipates instructions.	Begins braking too early.	Ensure trainee understands sequence and instructions. Practice.

23 Fuel economy driving

23 Fuel economy driving	
Trainee name	
Location	
Vehicle details	
<p>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 diesel. There are, however, a number of techniques drivers can use that will produce further economies. Trainees 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 kilometre above 90km/h (the legal speed limit) fuel use increases by about one to one and a half percent. A truck or bus doing 100km/h, for example, will be using about 10-15% more fuel than one observing the speed limit. This relates to increases in aerodynamic drag whereby if you double the speed of a heavy motor vehicle you can increase the power requirements and, therefore, the fuel usage, by eight times.</p>	
Relevant NZQA unit standards	<p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p>
Performance	Demonstrate fuel efficient operating techniques.
Standard	<p>While operating at the correct road speeds</p> <p>While operating at correct engine speeds.</p> <p>While managing engine speed with efficient transmission use.</p>
Conditions	<p>In a heavy motor vehicle with, or without, a trailer.</p> <p>With a load of at least 50% of payload.</p> <p>On public roads.</p>
Revision	Performance objectives: 17 <i>Town driving</i> and 19 <i>Highway driving</i> .

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
a.	Explains the four types of resistance that dictate fuel usage, (inertial, rolling, aerodynamic and grade).			
b.	Avoids unnecessary idling, (5 minutes max).			
c.	Conducts pre-trip inspection.			
d.	Pays particular attention to tyre pressures.			
e.	Does not exceed posted speed limits.			
2. Learning points (Town driving)		Comments	Date completed	DI initials
a.	Selects a gear that will allow engine to operate in economy range.			
b.	Avoids unnecessary downshifting.			
c.	Avoids/minimises stop/start driving by anticipating road and traffic conditions.			
d.	Applies progressive shifting techniques.			
e.	Demonstrates skip / block shifting techniques.			
f.	Uses tachometer and maintains engine speed in economy range, (1400-1600 rpm).			
g.	Observes 4-second rule to minimise unnecessary changes in road speed.			
h.	Applies 12-second search pattern to identify potential hazards and reacts early to these.			
3. Learning points (Highway driving)		Comments	Date completed	DI initials
a.	Engages the highest gear possible, as soon as possible, for as long as possible.			
b.	Avoids unnecessary downshifting prior to stopping, especially just to maximise engine braking.			
c.	Applies progressive shifting techniques.			
d.	Demonstrates skip/block shifting techniques.			
e.	Uses tachometer and manages engine speed with efficient gear selection.			

f.	Observes 4 second rule to minimise unnecessary changes in road speed.			
g.	Applies 12 second search pattern to identify potential hazards and reacts early to these.			
h.	Uses down grades to achieve momentum and allows engine speed to pull back to bottom end of operating range before downshifting.			
i.	Explains effects of fatigue on fuel economy.			
j.	Uses auxiliary brakes efficiently in general driving.			
4. Learning points (Hills)		Comments	Date completed	DI initials
a.	Stays in the highest gear possible for as long as possible.			
b.	Uses skip/block shifting, where necessary to recover engine speed.			
c.	Changes down at the lower end of the operating range. (depending on engine power)			
d.	Operates within the economy range during ascents.			
e.	Manages gear shifting efficiently.			
f.	Selects a sufficiently low gear to maximise auxiliary braking.			
g.	Operates engine at rated rpm for best effect.			
Comments				

Instructor's notes	
1.	If the trainee understands how fuel is expended, he/she will appreciate, better, the reasons for the learning points that follow. Have them explain the four types of resistance. Refer to the lesson references for more information.
2.	Even though modern electronic fuel systems are achieving far better economies than the 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 tyre 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.

4.	Skip / block shifting is missing out 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 heavy vehicle operator if he/she is about to break the law. The tachometer provides the information needed to operate the engine efficiently. Make sure the candidate is comfortable with what constitutes the economy and operating ranges and use these as the basis of any teaching. While some vehicles will display the economy range in green, many, especially the US manufactured vehicles, do not. Spend a little time discussing the information presented on the tachometer with the trainee.
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.	Inefficient auxiliary brake use, particularly on flat roads, again leads to speed recovery and excessive fuel use. When decelerating for corners, this should be done early simply by decelerating. In the same vein, excessive downshifting to maximise auxiliary brake effect, is unnecessary when bringing the vehicle to a stop. In reality, the actual braking is probably being done by the driver's right foot while the engine brake is in 'full song'. Encourage trainees, once again, to react early, change down a couple of times and then bring the vehicle to a stop.
8.	During ascents, monitor the trainee'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!
9.	While descents shouldn't actually use much, if any, fuel, if it isn't 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.

Common faults	Symptoms	Address/check
Long idle periods.	Engine left running.	Unexpected delays.
Not conducting pre-departure checks.	Not checking servicing, engine oil, tyres etc.	Pre-trip inspections.
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.
Fails to apply 4-second rule.	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.

24 Auxiliary brakes

24 Auxiliary brakes	
Trainee name	
Location	
Vehicle details	
Auxiliary brake	
<p>Almost every heavy vehicle in New Zealand, and certainly those above class 2, 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.</p> <p>While there is a range of options, the most common auxiliaries are exhaust brakes, normally found on the smaller range of vehicles, engine brakes, common on the larger vehicles and hydraulic driveline retarders, common to European sourced vehicles. Combinations of these are also 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 maximise efficiency and reduce, especially for engine brakes, adverse public comment relating to noise.</p>	
Relevant NZQA unit standards	<p>US 22215 <i>Drive a heavy combination goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 22216 <i>Drive a heavy rigid goods service vehicle in a safe and fuel efficient manner.</i></p> <p>US 15163 <i>Drive a large passenger service vehicle in a fuel efficient manner.</i></p>
References	<p>Tranzqual ITO publication <i>Professional skills for driving trucks.</i></p> <p>Tranzqual ITO publications <i>Study guides for classes 2 and 4 and classes 3 and 5 driver licences.</i></p>
Performance	Demonstrate efficient, and effective, use of auxiliary brakes.
Standard	<p>At optimum engine speeds.</p> <p>While maintaining control of the vehicle.</p> <p>Without excessive use of service brakes.</p> <p>With consideration to the effects of noise.</p> <p>While complying with all signs.</p>
Conditions	<p>In a heavy motor vehicle with, or without, a trailer.</p> <p>With a load of at least 50% of payload.</p> <p>On public roads including hills.</p>

	In repeated trials.
Revision	Performance objectives: 6, 7 or 8 <i>Transmissions (as appropriate)</i> .

Explain – demonstrate – practice

1. Learning points (General)		Comments	Date completed	DI initials
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 rev range for road conditions.			
g.	Explains when auxiliary brakes should not be used.			
2. Learning points (Town/urban driving)		Comments	Date completed	DI initials
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. Learning points (Highway driving)		Comments	Date completed	DI initials
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. Learning points (Descent)		Comments	Date completed	DI initials
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 maximise retardation.			
e.	Uses service brakes to control engine rpm not as the primary means of controlling speed.			

Comments

Instructor's notes

1.	Switching the auxiliary brake off prior to stopping or starting the engine is most relevant to engine brakes on older vehicles but a good habit to develop. There is a risk of damaging the top end of an engine if it is started from cold with the engine brake on.
2.	Exhaust brakes operate through a butterfly valve in the exhaust that, when activated, creates backpressure in the engine and a degree of retardation. Many modern exhaust brakes are very efficient, particularly on smaller trucks, provided they are used correctly at optimum operating rpm. They are also often found in tandem with engine brakes or retarders giving the driver a wider 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.	Hydraulic retarders operate on the driveline, usually off the back of the transmission. On activation, a rotor spins in oil creating drag that, in turn, slows the speed of the driveline and, as a result, the vehicle. They are very quiet and usually offer a range of retardation levels.
5.	The controls that should be familiar to trainees 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, obviously, be relevant to the training vehicle.
6.	Trainees should understand that the degree of retardation provided by engine and auxiliary brakes is dependant 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 1800rpm) 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.
7.	Trainees must be able to describe 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.
8.	Emphasise 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.
9.	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 is 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.

10.	The use of auxiliaries, especially engine brakes, is completely unnecessary in residential or industrial areas unless there are very steep hills. At 50-60km/h at mid engine rpm, the engine braking effect is minimal at best. Encourage trainees to have consideration for others, particularly at night.
11.	Excessive down-shifting, 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 is not being achieved by the engine brake at all. By all means encourage trainees to use the auxiliary to reduce road speed, but have them try down-shifting just a couple of times, without the engine brake, before stopping. Professional gear shifting techniques should dictate this in any case.
12.	'Bob-tailing', is operating a tractor unit without a semi-trailer attached. This has considerable risk attached to the use of auxiliary brakes as a result of no weight over the drive wheels.
13.	If a trainee is in doubt as which gear to select before starting a steep descent, have him/her go into low range. It is 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 sure can go down 'too fast'.

Common faults	Symptoms	Address/check
Tries to start vehicle with engine brake switched on.	Fails to check engine brake switch is in 'off' position.	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 prior to stopping.	Gearbox use and techniques.
Too fast / wrong gear down hill.	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.

Section 2: Illustrations

