MANITOBA
PUBLIC INSURANCE

MANDATORY ENTRY-LEVEL TRAINING
MANITOBA CLASS 1
Lesson 9

Instructor's Guide

Overview

Purpose/Objectives

This lesson is intended to educate students on proper cargo securement procedures.

Upon completing this lesson, students should be able to:

- Comply with basic cargo securement laws and requirements
- Safely distribute cargo weight during loading

How long should it take?

Classroom (hours)			In-Yard (hours)			In-Cab (hours)			Total Training Duration (hours)
Deliver	Apply	Assess	Deliver	Apply	Assess	Deliver	Apply	Assess	
2.0		0.5	0.5	0.5					3.5

Required materials

- Whiteboard or flipchart
- Markers
- Projector
- PPT presentation
- Printed and electronic quizzes
- Pens

Using this document

This document is intended to guide you through the session. It includes the following icons for reference:

▶ **Direction on what you need to <u>do</u>**

Sample language for what you need to <u>say</u>

? Sample wording for what you need to ask

ⓘ Extra information to consider

Lesson Outline

Time (Approx. mins)	Topic	Materials	Slides
5	Introduction		1-3
20	Cargo Securement and Regulations		4-9
45	Cargo Placement and Restraint		10-14
40	Tie-downs and Working Limits		15-20
10	Specific Cargo		21-24
20	Wrap Up		25-28
30	In-Class Quiz		29
30	Practical In-Yard Demo		30
20	Practical In-Yard Application		31
10	Practical In-Yard Assessment		32

Total time = 3.5 hrs

ⓘ Times are an approximation of what is expected in a 15-student class with active participation. Times also include in-yard demonstration, application and assessments.

Student Materials

- Lesson 9: Exercise Book
- Textbook
- Lesson 9 Practical Job Aid
- Load Related Injuries Poster

Introduction

Objectives: Introduce the lesson to the students.

Time: 5 minutes

Slide: 1 Type: Presentation

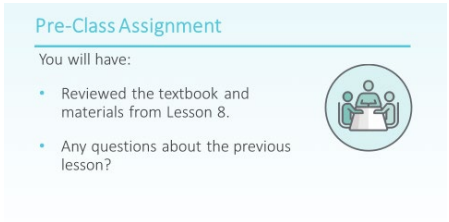
- Welcome students and allow time to settle if this is a new day of classroom delivery.

Slide: 2 Type: Discussion

- After the last class, you were asked to review the materials from Lesson 8.

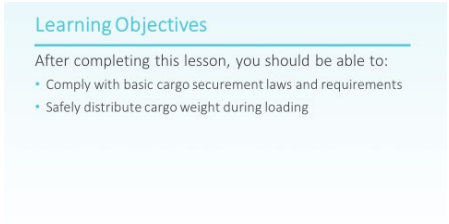
Do you have any questions about that lesson?

- Answer any questions that may come up in the discussion.



Slide: 3 Type: Presentation

- After completing this lesson, you should be able to:
  - comply with basic cargo securement laws and requirements.
  - safely distribute cargo weight during loading.



Cargo Securement and Regulations

Objectives: This lesson will provide an introduction to cargo securement and explain the regulations regarding cargo securement.

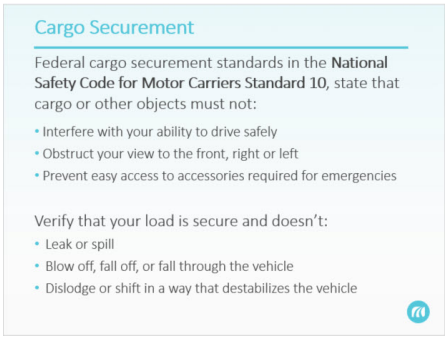
Time: 20 minutes

Slide: 4 Type: Presentation

- After completing this section, you should be able to:
  - Explain that every commercial vehicle transporting cargo must have the cargo secured according to the regulations.
  - Explain that the requirement to secure cargo includes any material, equipment or other loose articles carried on the vehicle, including dunnage, blocking, tarps, tools, equipment, spare materials, etc.
  - Explain that all cargo must be secured so that it cannot fall off the vehicle, or in any way be lost.

Hand out **Load Related Injuries Poster** from Trucking Safety Council of BC: https://safetydriven.ca/resource/load-related-fall-injuries-to-drivers/

Slide: 5 Type: Presentation



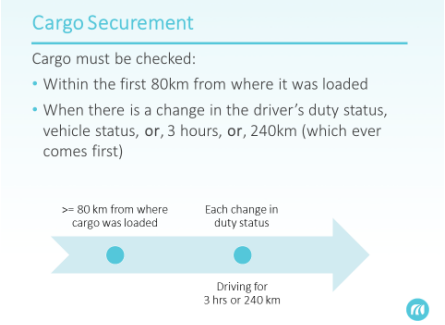
- You are responsible for the safe operation of your truck, including its cargo. You are subject to fines and penalties if cargo is not properly secured.

What is the basis for cargo regulations in Manitoba?

- Refer students to the "National Safety Code for Motor Carriers - Standard 10" as this is the basis of provincial cargo regulations. https://www.cvse.ca/nacs/NSC_10_Cargo%20Securement.pdf
- Federal cargo securement standards (NSC - 10) states that cargo or any other object must not:
  - Interfere with your ability to drive safely, such as restricting the free movement of your arm and leg, or block vehicle entry or exit
  - Obstruct your view to the front, right or left
  - Prevent easy access to accessories required for emergencies
  - You may not have to load or supervise loading, but you do need to verify that your load is secure and doesn't:
    - Leak or spill
    - Blow off, fall off, or fall through the vehicle
    - Dislodge or shift in a way that destabilizes the vehicle

ⓘ **Textbook Reference:** Section 9 – Cargo Securement

Slide: 6 Type: Presentation

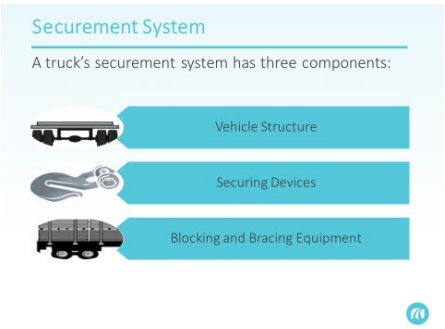


- You must check on cargo securement as part of daily vehicle inspections and during the trip at the following intervals to make adjustments as needed:
    - Not more than 80 km from where the cargo was loaded.
    - When there is a change in your duty status, or the vehicle, or when the vehicle has been driven three hours or 240 km (whichever comes first).
    - The three hour/240 km rule does not apply if the cargo is sealed and you have been ordered not to open it to inspect the cargo, or if the cargo is fully or partly inaccessible.

- You may wish to share the CCMTA Cargo Securement Interpretations and Guidance document: https://ccmta.ca/web/default/files/PDF/Interpretations_and_Guidance_2016.pdf

ⓘ Information on daily vehicle inspections were covered in Lesson 4.

Slide: 7 Type: Presentation



- A truck's securement system has three components:

  Vehicle structure - floors, walls, decks, headboards, bulkheads, stakes, posts, or anchor points. You must ensure that all these vehicle elements are in good working condition.

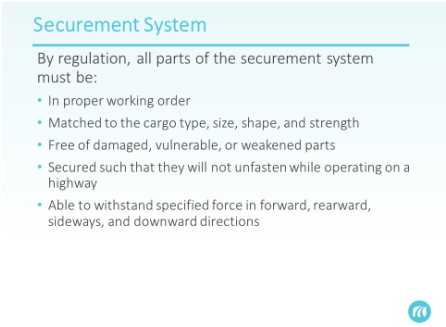
  Securing devices - devices specifically designed and manufactured for cargo securement to a vehicle or a trailer, such as ropes, fasteners, etc. A key securing device is the tie-down, which is an assembly of securing devices that can be adjusted for tightness.

  Blocking and bracing equipment- structures, devices or articles placed against or around cargo to prevent horizontal movement or tipping. This equipment must be strong enough to withstand splitting or crushing by the cargo. When wood is used, it must be a hardwood, properly seasoned and free from rot, knots, and splits.

ⓘ **Textbook Reference:** Section 9 - Cargo Securement – Securement System.

Slide: 8 Type: Presentation

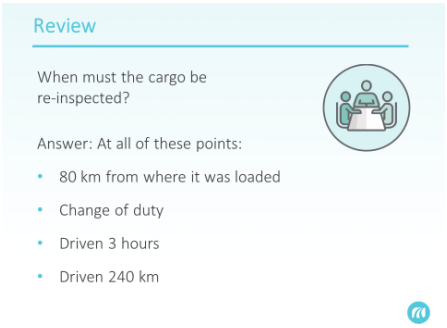
- By regulation, all parts of the securement system must be:
  - In proper working order
  - Matched to the cargo type, size, shape, and required strength
  - Free of damaged, vulnerable, or weakened parts
  - Secured such that they will not unfasten while operating on a highway
  - Able to withstand specified force in forward, rearward, sideways, and downward directions.



Slide: 9 Type: Discussion

- When must the cargo be re-inspected?

▶ Ask question to class and get some responses, then click to reveal answers.

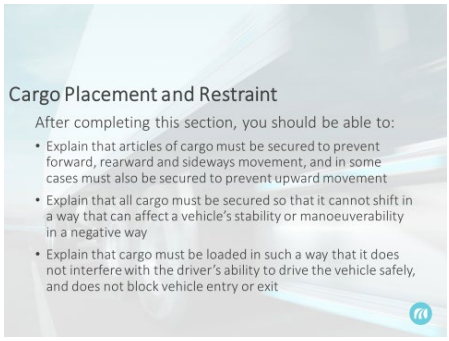


Cargo Placement and Restraint

Objectives: This lesson explains how cargo should be placed and restrained.

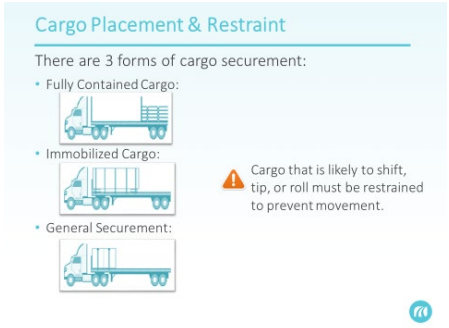
Time: 45 minutes

Slide: 10 Type: Presentation



- After completing this section, you should be able to:
  - Explain that articles of cargo must be secured to prevent forward, rearward and sideways movement, and in some cases must also be secured to prevent upward movement.
  - Explain that all cargo must be secured so that it cannot shift in a way that can affect a vehicle's stability or manoeuverability in a negative way.
  - Explain that cargo must be loaded in such a way that it does not interfere with the driver's ability to drive the vehicle safely, and does not block vehicle entry or exit.

Slide: 11 Type: Presentation



- There are 3 ways cargo may be secured. A carrier must use one of these methods for general cargo securement.

  Fully Contained Cargo:
  - Cargo must be contained in a vehicle of adequate strength.
  - Cargo is restrained against horizontal movement by the vehicle structure, other cargo, or by other devices such as tie-downs or webbing.
  - Cargo cannot shift, tip, leak, spill, blow off, fall from, fall through, or otherwise be dislodged from the vehicle.

  Immobilized Cargo:
  - Cargo must be secured by proper tie-downs, blocking or bracing.
  - Cargo cannot shift, tip, leak, spill, blow off, fall from, fall through or otherwise be dislodged from the vehicle.
  - Securement involves the combination of vehicle structure, blocking and bracing which safely secures the cargo from shifting or tipping.

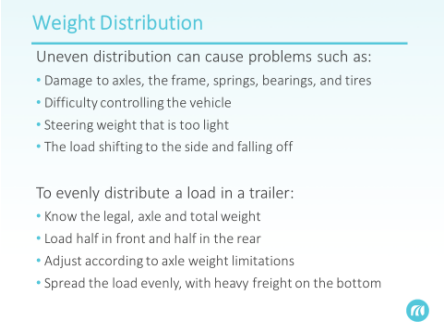
  General Securement:
  - All cargo must be secured on or in a vehicle with tie-downs along with blocking, bracing, friction mats, other cargo, or a combination of these things.
  - Cargo cannot shift, tip, leak, spill, blow off, fall from, fall through or otherwise be dislodged from the vehicle.

Articles of cargo that are likely to shift, tip or roll must be restrained by chocks, wedges, or a cradle to prevent movement. These restraints must stay fastened or secured while the vehicle is moving.

The proper securement of cargo is important not only for the protection of the cargo itself, but also for ensuring the safety of you and the motoring public. Cargo that shifts or tips may cause a vehicle to tip or operate in an unsafe manner.

ⓘ **Textbook Reference:** Section 9 - Cargo Securement – Cargo Placement and Restraint.

Slide: 12 Type: Presentation



- Cargo weight must be balanced between the drive and rear axles to allow easy handling and steering of the vehicle.

  Uneven distribution can cause problems such as:

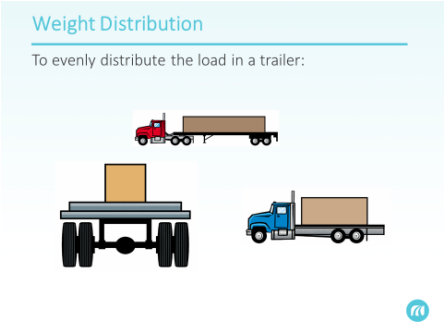
  - Damage to axles, the frame, springs, bearings, and tires
  - Difficulty controlling the vehicle if you have to perform an evasive manoeuvre
  - Steering weight that is too light, if front axles are underweight
  - The load shifting to the side and falling off, if the center of gravity of a flatbed is too high

  To evenly distribute a load in a trailer:

  - Before you start, know:
    - The legal weight of the tractor-trailer
    - Axle weights
    - Total weight of the cargo
  - If possible, load half in front and half in the rear
  - Adjust according to axle weight limitations
  - Spread the load evenly over the trailer floor to prevent sideways shifting
  - Load heavy freight on the bottom to avoid tipping, and spread it out evenly to prevent concentrated stress on the trailer's floor
  - When unloading, remove freight strategically to allow for even weight distribution

Slide: 13 Type: Presentation

- In these pictures. you can see how cargo loading techniques are applied to evenly distribute weight on the trailer.



Slide: 14 Type: Presentation

- Review the images and explain why this is not proper cargo loading techniques, moving from left to right, top to bottom.
  - A very heavy concentrated load should not be positioned against the cab as the distribution of the load may cause the frame to bend, perhaps permanently. It will also overload the front tires and may even cause a blowout on a worn tire. Steering will also be difficult.

  The type of loading shown in this image should never be permitted. The frame could bend, the rear tires are extremely overloaded and enough weight is taken from the front tires to make steering almost impossible.

  A very heavy load should not be positioned on one side. This overloads one spring and the tires on that side. This loading could cause the brakes to lock the wheels on the lighter side and cause flat spots on the tires or a skid on a wet surface.

  The type of loading shown below results from using the wrong vehicle for the job. On rough roads, loading your vehicle like this can make your truck pivot on its rear wheels, taking the front wheels entirely off the road.

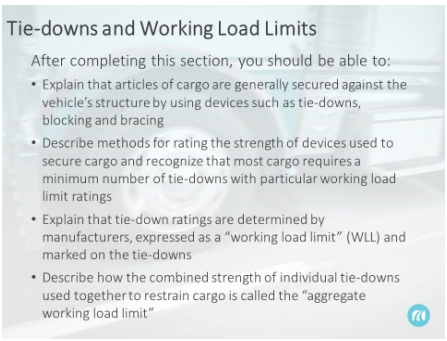
- You may wish to play a video or use an online tool to help reinforce cargo securement techniques. The following are some sources that you may use:
  - Cargo Securement Tips brochure https://safetydriven.ca/resource/cargo-securement-tips/
  - Load Securement video https://safetydriven.ca/resource/load_securement/
  - Tarping safety online tool https://safetydriven.ca/resource/flatbed-tarping-best-practices-safety-driven/
- Below are links to previews of videos from J.J. Keller. The full videos can be purchased directly if you wish to show them in your class.
  - Flatbed securement https://www.youtube.com/watch?v=_onyIEFUL-g
  - Dry Van Cargo securement https://www.youtube.com/watch?v=NUFqYV_2PDs

Tie-downs and Working Load Limits

Objectives: This section of the lesson will explain how secure the cargo with tie-downs and how to calculate the required number of tie-downs using working load limits.

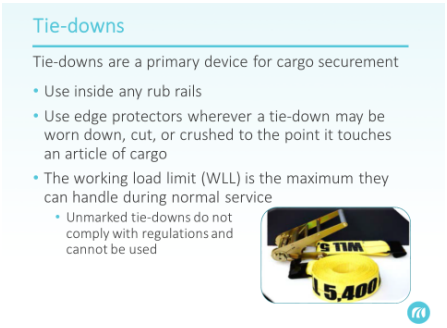
Time: 40 minutes

Slide: 15 Type: Presentation



- After completing this section, you should be able to:
  - Explain that articles of cargo are generally secured against the vehicle's structure by using devices such as tie-downs, blocking and bracing.
  - Describe methods for rating the strength of devices used to secure cargo and recognize that most cargo requires a minimum number of tie-downs with particular working load limit (WLL) ratings.
  - Explain that tie-down ratings are determined by manufacturers, expressed as a WLL and marked on the tie-downs.
  - Describe how the combined strength of individual tie-downs used together to restrain cargo is called the "aggregate working load limit".

Slide: 16 Type: Presentation



- Tie-downs are a primary device for cargo securement. Because of their importance, the manufacture and use of tie-downs is regulated.

  Manufacturers test securing devices to determine their working load limit (WLL) - the maximum they can handle during normal service. The aggregate (combined) WLL is the sum of WLLs of individual devices in a tie-down.

  Tie-downs must have a manufacturer's mark indicating their WLL. Unmarked tie-downs do not comply with regulations and cannot be used.

  Whenever practical, tie-downs and other parts of a cargo securement system must be located inside any rub rails (side rails that protect the vehicle from impact). Use edge protectors wherever a tie-down may be worn down, cut, or crushed to the point it touches an article of cargo.

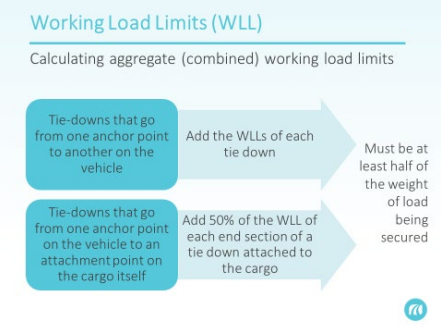
  The number of tie-downs needed to secure the cargo depends on the cargo's length and weight, and whether the cargo is blocked or positioned to prevent forward movement by a headboard, bulkhead, or other means.

- Provide additional scenarios of vehicles and cargo in order to provide more real world practice of calculating working load limit.

Additional information regarding working load limits can be found here:
https://safetydriven.ca/resource/the-bolo-method/
https://www.truckingtruth.com/cdl-training-program/page125/aggregate-working-load-limit

Slide: 17 Type: Presentation

- To calculate aggregate WLL:
  - For tie-downs that go from one anchor point to another on the vehicle, add the WLLs of each tie-down.
  - For tie-downs that go from one anchor point on the vehicle to an attachment point on the cargo itself, add 50% of the WLL of each end section of a tie-down attached to the cargo.



Slide: 18 Type: Presentation

- The number of tie-downs needed to secure the cargo depends on the cargo's length and weight, and whether the cargo is blocked or positioned to prevent forward movement.

  For blocked/positioned cargo:
  - 1 tie-down for cargo less than 3.04 metres
  - 1 tie-down for each 3.04 meters and any remaining length

  For cargo not blocked/positioned:
  - 1 tie-down for cargo 1.52 metres or less and not more than 500 kg
  - 2 tie-downs for cargo 1.52 metres or less and more than 500 kg
  - 2 tie-downs for cargo 1.52 - 3.04 metres regardless of weight
  - For cargo longer than 3.04 metres, 2 tie-downs for the first 3.04 metres plus 1 tie-down for each additional 3.04 metres and any remaining length.

  There are specific examples of these in your textbook. You will want to review those examples before your next exercise.

ⓘ **Textbook Reference:** Section 9 - Tie-downs.

Slide: 19 Type: Self-paced Activity

- You will have 10 minutes to complete Exercise 1 in the Exercise Book.

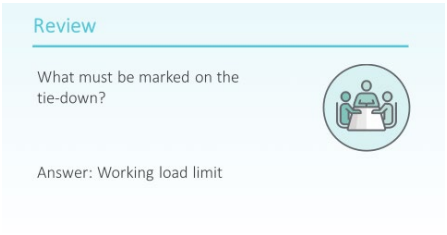
▶ If time permits, you should review the questions after the students have completed the exercise. Alternatively, you may provide a copy of the **Lesson 9 - Exercise Book Answer Key** at the end of the lesson for them to review on their own time.

Hand out **Lesson 9 - Exercise Book**.

Slide: 20 Type: Discussion

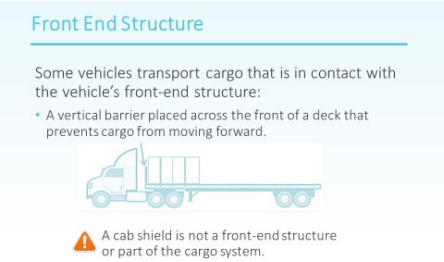
What must be marked on the tie-down?

- Wait for students to answer then click to reveal.



Slide: 21 Type: Presentation

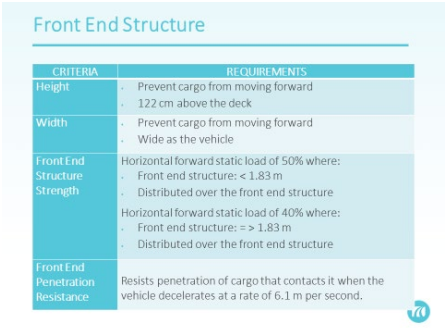
- Some vehicles transport cargo that is in contact with the vehicle's front-end structure. A vertical barrier is placed across the front of a deck that prevents cargo from moving forward.



ⓘ **Textbook Reference:** Section 9 - Cargo Securement - Front End Structure on Commercial Vehicles.

Slide: 22 Type: Presentation

- Front end structures must meet the following requirements:
  - Tall enough to prevent cargo from moving forward, and 122 cm above the deck
  - Wide enough to prevent cargo from moving forward, and wide as the vehicle
  - Front End Structure withstands a horizontal forward static load of 50% of total cargo weight where:
    - The height of the front end structure is shorter than 1.83 m
    - The cargo is uniformly distributed over the front end structure
  - Withstands a horizontal forward static load of 40% of total cargo weight where:
    - The height of the front end structure is 1.83 m or higher
    - The cargo is uniformly distributed over the front end structure
  - Front End resists penetration by an article of cargo that contacts it when the vehicle decelerates at a rate of 6.1 m per second.



Slide: 23 Type: Presentation

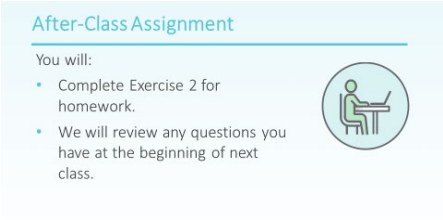
- Certain types of cargo have specific securement requirements:
  - Logs
  - Dressed Lumber
  - Metal Coils
  - Paper Rolls
  - Concrete Pipe
  - Intermodal Container
  - Vehicles as Cargo
  - Roll-On/Roll-Off and Hook Lift Containers
  - Boulders

- Refer students to the "Cargo with Specific Securement Requirements" section of the textbook to discuss the individual requirements for each cargo type listed.

ⓘ **Textbook Reference**: Section 9 - Cargo Securement: Cargo with Specific Securement Requirements

Slide: 24 Type: Presentation

- Your exercise book for this lesson has questions related to specific cargo securement. Please complete Exercise 2 on your own time after reviewing the section on cargo securement in the textbook.



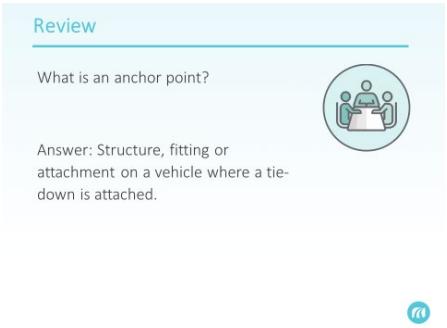
Wrap Up

Time: 20 minutes

Slide: 25 Type: Discussion

What is an anchor point?

- Ask question to class and wait for responses, then click to reveal answer.



Slide: 26 Type: Discussion

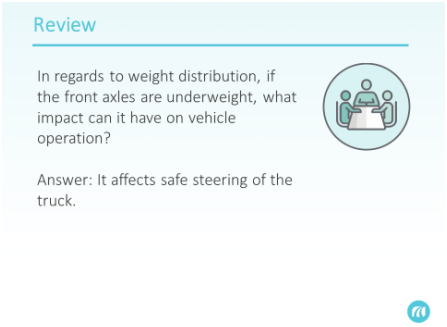
What are the 3 ways cargo can be transported?

- Ask question to class and wait for responses, then click to reveal answer.

Slide: 27 Type: Discussion

In regards to weight distribution, if the front axles are underweight, what impact can it have on vehicle operation?

- Ask question to class and wait for responses, then click to reveal answer.



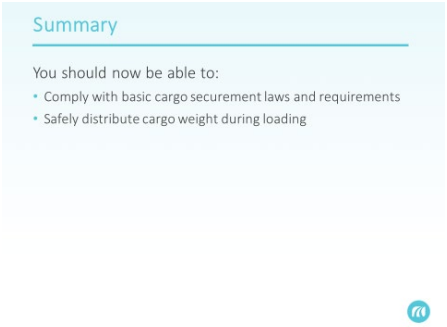
Slide: 28 Type: Discussion

Where can you find specific cargo securement regulations?

- Ask question to class and wait for responses, then click to reveal answer.

Slide: 29 Type: Presentation

- You should now be able to comply with basic cargo securement laws and requirements and safely distribute cargo weight during loading.



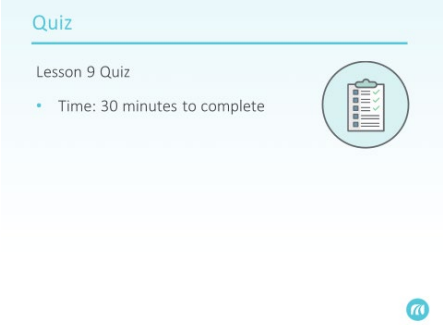
Knowledge Check

Time: 30 minutes

Slide: 30 Type: Lesson Quiz

- Provide students with a printed copy of the Lesson 9 Quiz. Time provided for this quiz is 30 minutes. Remind students of the scoring and weight of the quiz. Explain what is required for a passing grade.

  When complete, fill out the assessment tracker for each student and the classroom assessment tracker.



Practical In-Yard Training

Time: 50 minutes

Preparation

- Organize students and time in-yard in order to maximize efficiency.
- Print **Lesson 9 - Practical Job Aid** for each student.
- Ensure the yard and vehicle are prepared for training.

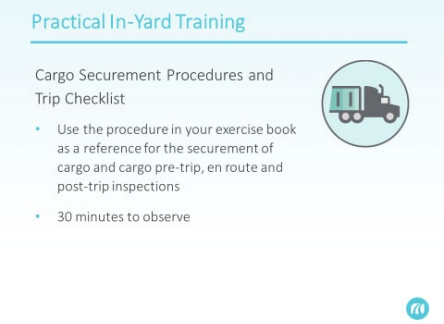
Slide: 31 **Type: Practical Training**

- Go into the yard and practice tie-downs and securing cargo on a truck. As an instructor, you may need to adjust this slightly based on your available yard space and equipment. If full demonstration and simulation of a real-world scenario is not feasible, we encourage you to use the time to work with something that may be smaller in scale but still provides students with an opportunity to demonstrate their skills.

  We will now head out to the yard where an instructor will demonstrate how to properly secure cargo using the correct procedure in according with regulations.

  You may wish to take your textbook as it provides details on how to secure the cargo.

  Each time you attempt the activity during training, you will be provided a copy of your assessment, which you can then review to improve your skills in this area.



Are there any questions about the practical training?

- Wait for students to respond and answer any questions that come up.

  At the end of the classroom session, the instructor and the students will proceed to the yard for the cargo securement activities. The instructor will have about 20 minutes to demonstrate cargo securement and cargo inspection procedures to the student, after which the student will perform the activities.

  The students will have a minimum of 20 minutes to practice these activities. Make decisions about how to organize yard time based on numbers of students, available instructors for proper yard ratio, and physical training space.

ⓘ It is critical to stress that cargo securement is not only part of loss prevention, but also (and more importantly) about workplace health and safety.

ⓘ Also refer to MELT Requirements for Schools regarding PPE.

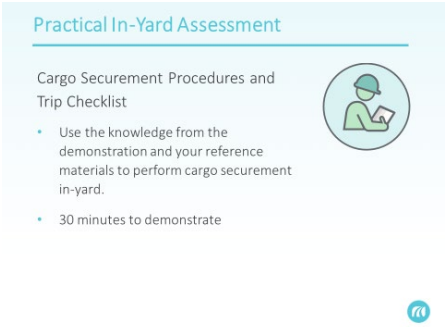
Practical In-Yard Assessment

Time: 10 minutes

Preparation

- Ensure the yard and vehicle are set up for assessment.
- Print the **Practical Assessment Rubric Evaluator Job Aid** for the evaluator.
- Review **Performing Practical Assessments.**
- Prepare to record assessment performance either on printed **Lesson 9 – Practical Job Aid** sheets or directly into the **Practical Assessments** Excel file.
- Ensure you have access to the **Practical Assessments** Excel file.
- Print **Instructors Class Summary**.
- Print **Instructors Student Summary**.

Slide: 32 Type: Practical Assessment



You will now have a practical assessment where your instructor will assess your understanding and skill competency. Each time you attempt the activities, your instructor will provide you with a copy of your in-yard assessment which you should review to improve your skills in this area.

Are there any questions before beginning the practical assessment?

▶ Wait for students to respond.

ⓘ You must be familiar with the assessment rubric before evaluating the student's practical knowledge and skills.

▶ The instructor will evaluate students using the practical assessment sheet. The list may then be shared with the student to improve their performance. Use one practical assessment sheet each time the student performs the activities.

A minimum of 10 minutes will be used for in-yard assessment.

The instructor will grade students using the checklist in order to assess students on their cargo securement skills as it relates to regulations and road safety. The mark obtained in the In-Yard Assessment is not counted towards their final course mark because this is often covered in detail by an employer, and the specific process and procedures may be different in their work instructions.

Check the recorded time in the log as well to confirm accuracy and proper completion of required paperwork for Hours of Service compliance.

ⓘ Use the rubric for evaluating in-yard and in-cab assessments. You are required to enter the results of the assessments in the Excel spreadsheet to calculate the final grades. Assessment sheets can then be printed and signed.