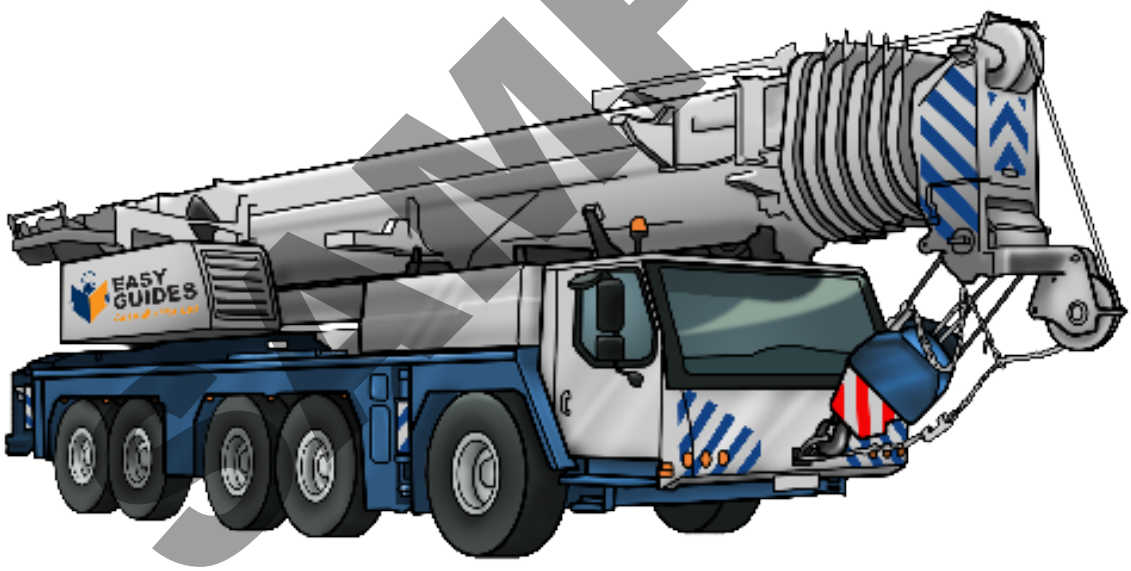
# SLEWING MOBILE CRANE LEARNER WORKBOOK

TLILIC0021 Licence to operate a slewing mobile crane (up to 100 tonnes)

## With load chart calculations similar to NAI






EASY GUIDES
Australia Pty Ltd

www.easyguides.com.au

National Licence
RTO-VET Learning Materials

# Contents

# Learning and practical tasks

If you can, have your students train with other learners. Learning is more powerful when you and your learners share ideas and experiences. Below is a brief explanation of how you can use the training tasks in this workbook. Please advise your students if they are to fill in tasks on their own at home or wait until they are in the training room with you.

## Theory training tasks

These tasks help the learner understand the underpinning knowledge to safely operate a vehicle loading crane. To help them complete these tasks the learner can use the Information Book and speak to other learners and you, the licensed operator/trainer.

## Thinking questions

Thinking questions train your learner to think for themselves.
For example, the Information Book does not directly state the answer.

## Practical training tasks

These tasks help the learner acquire the practical skills to safely operate a vehicle loading crane. The tasks use high-risk equipment or machinery. Only a licensed operator/trainer can supervise the learner's practical training tasks.

## Review

At the end of each element in the workbook, the learner gets to review their training. The review gives the learner a chance to talk with classmates and you about what they learned. Sharing their learning experiences with others helps them learn.

## Review questions

You'll find the review questions on the Trainer's Resource CD. Give the questions to the learner toward the end of training to determine if they understand the information they have covered. You can ask your learner to fill in these questions alone or as a group by using the matching questions in the PowerPoint quiz section.

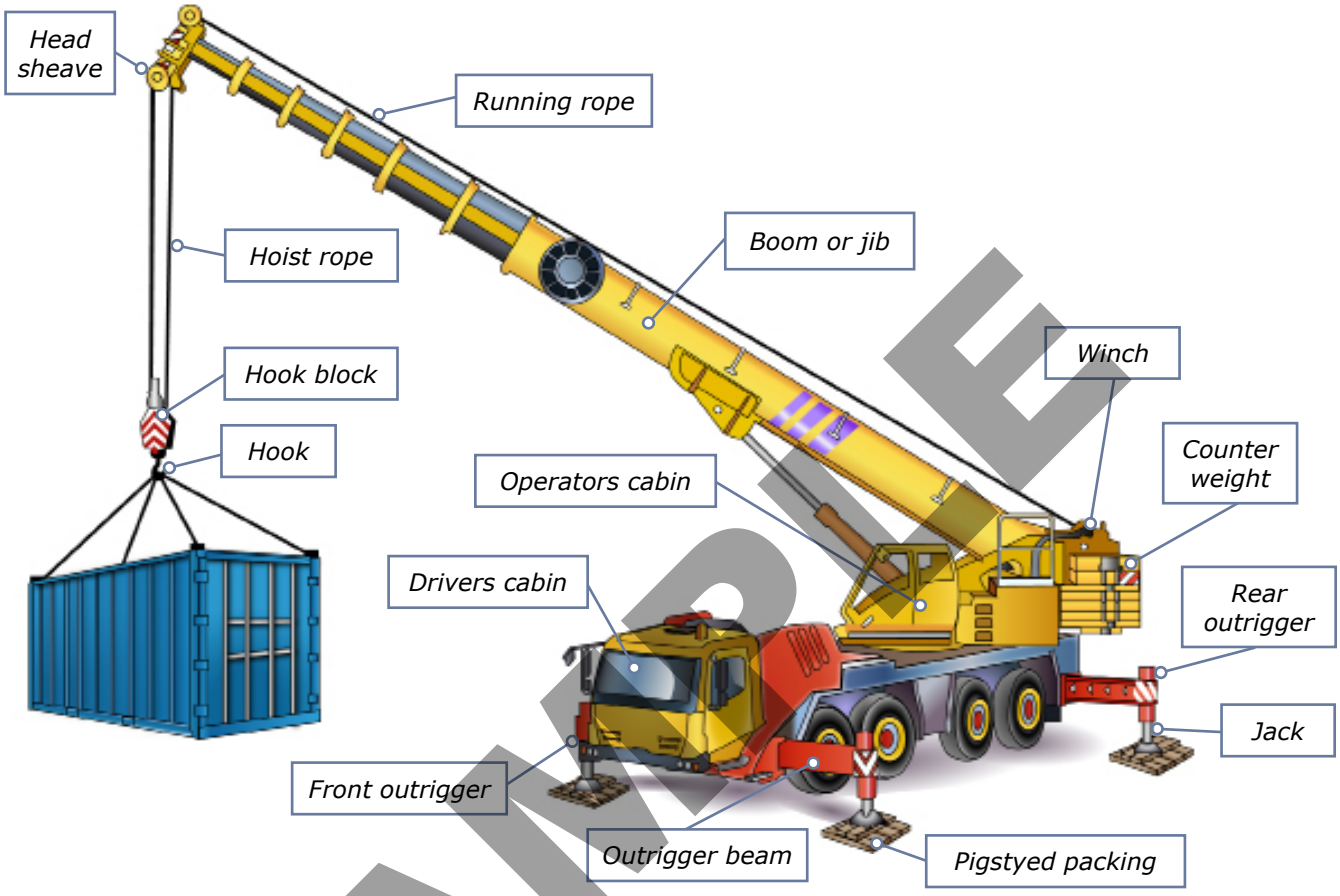
## Review—practical tasks

The practical tasks handout is on the Trainer's Resource CD. There is one task for each element and the learner should do all tasks under your supervision.

# What is a slewing mobile crane?

A slewing mobile crane is a powered crane which features a boom or jib that can slew from front to back. The crane is mounted on a vehicle.

**Parts of a slewing mobile crane**




Slewing mobile crane

Rough terrain slewing crane

Crawler crane

This learner resource does not cover front-end loader, backhoe, excavator or similar equipment when configured (arranged or set up) for crane operations.

Part 1

# Prepare for hazards

# Theory Training Task 1

*Performance Criteria: 1.5, 2.9, 2.10*

Identify (know) workplace hazards. A hazard is anything that can harm you or others while you work. You need to identify (know) workplace hazards before you start work. Look for hazards. Look above you, look around you and check the ground below you.

a) Give examples of hazards you should look for before you begin work

**Above head height**

**Ground level to eye level**

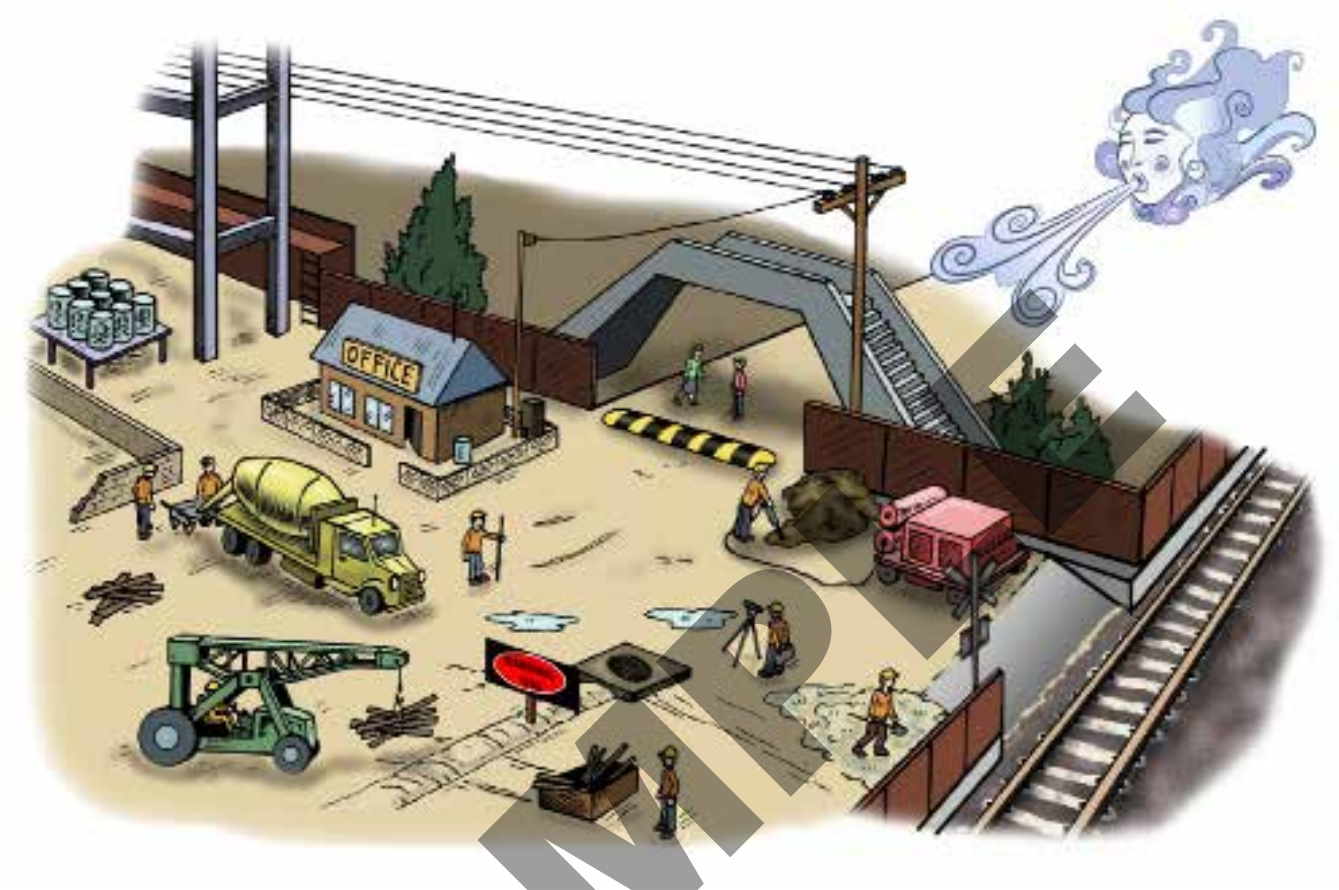
**Ground level (and below)**

b) Tick any of these hazards you may have come across in past or present workplaces.

# Theory Training Task 2

*Performance Criteria: 1.5, 2.2, 1.4*

a) **Circle** all the hazards you can find in the picture below.




b) Can you explain why the people in this picture might be a hazard if you were to operate a slewing mobile crane nearby?

c) Can you think of ways to make sure these people do not get in the way of the slewing mobile crane?

# Theory Training Task 3

*Performance Criteria: 2.2*

You are working on ground that might be above an underground service, for example, a water pipe. Where can you find out?

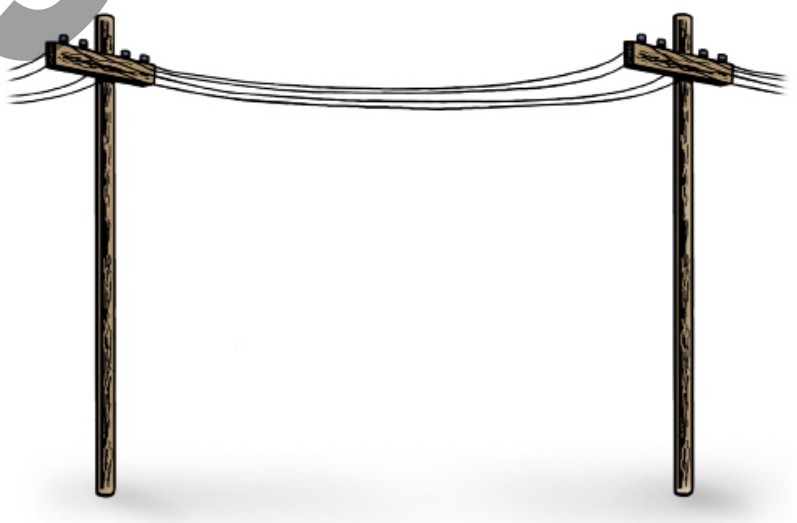
# Theory Training Task 4

*Performance Criteria: 1.5, 2.2*

Check the safe working distances for powerlines in your state or territory. How many metres is the NO GO zone for **distribution lines on poles in your state or territory?**

The NO GO zone for ..... (state/territory)

is ..... metres.



*Performance Criteria: 1.5, 2.2*

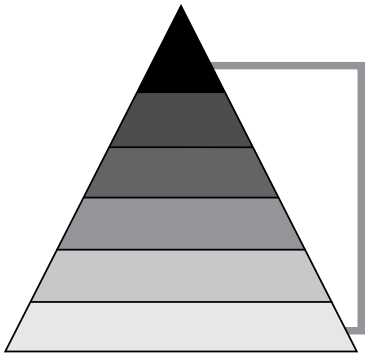
## Hazard control measures

Hazard control measures are actions you take to control or prevent a danger that can injure or hurt you. You use the actions to lower the risk to people and property. Set up the hazard controls before you start work.

## Theory Training Task 5

*Performance Criteria: 1.5, 2.2*

a) List the **six** levels of the Hierarchy of Hazard Control.



1. .....
2. .....
3. .....
4. .....
5. .....
6. .....

b) What is the first thing you should try if you find a hazard?

.....

## Theory Training Task 6

*Performance Criteria: 1.5*

Tick the **hazard control measures** you may need to put in place when using a slewing mobile crane.

- ☐ Warning signs and barriers
- ☐ Flag person
- ☐ Traffic control
- ☐ Flashing hazard and lights
- ☐ Wash the crane so it looks nice
- ☐ Pedestrian exclusion zone
- ☐ A hoarding, gantry or scaffolding
- ☐ Recharge the battery so it works

Part 2

# Communicate clearly

*Performance Criteria: 1.7*

## Communicate clearly

Choose the communication equipment you will use for the job. After you have made your choice, test the equipment to make sure it's working.

Make sure you understand the dogger's hand signals if you use hand signals.

## Theory Training Task 12

*Performance Criteria: 1.7, 3.7*

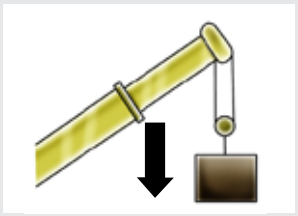
You can communicate many different ways. What are some of the ways you can communicate with other workers while moving a load?

# Theory Training Task 15

*Performance Criteria: 3.4, 3.7*

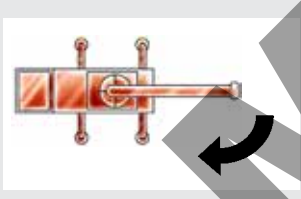
Match the crane boom motion on the left with the correct hand or whistle signals on the right.

**Hoisting down**



**Stop**

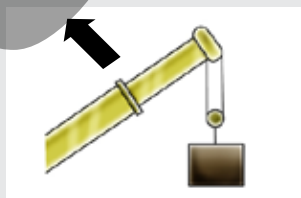

**Slewing right**



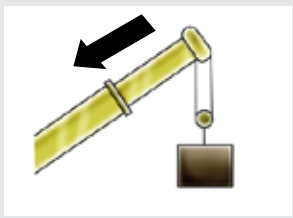
**Travel and transverse**

Indicate the direction you want the crane to go

**Luffing boom up**



**Telescoping boom retract. Jib-trolley in.**



1 long

1 long, 2 short

Part 4

# Plan the lift

*Performance Criteria: 1.3*

## Find out the weight of the load

You are planning the lift. Find out or estimate the weight and size of the load you are going to lift.


## Theory Training Task 29

*Performance Criteria: 1.3*

Give some examples of how you find the weight of an unmarked load.



# Theory Training Task 30

*Performance Criteria: 1.3*

a) You will lift a steel universal beam. The dimensions are:

- Weight of structural steel = 7840 kg per cubic metre

  1 mm = 0.001 m
- Flanges (top and bottom)
  - Length = 12 m
  - Width = 250 mm
  - Thickness = 15 mm
  - Flange = L × W × D × 2 × weight of structural steel
- Web
  - Length = 12 m
  - Width = 275 mm
  - Thickness = 40 mm
  - Web = L × W × D × weight of structural steel

What is the total weight of the steel universal beam in kilograms?



*Performance Criteria: 2.5, 3.1*

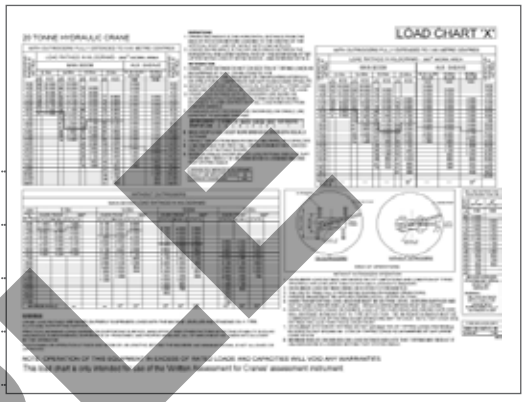
# Check the load charts

Check the load charts and make sure the crane can lift the load.

## Theory Training Task 31

*Performance Criteria: 2.5, 2.6, 3.1*

a) How do you find out the crane's lifting capacities to make sure the crane can lift the load?

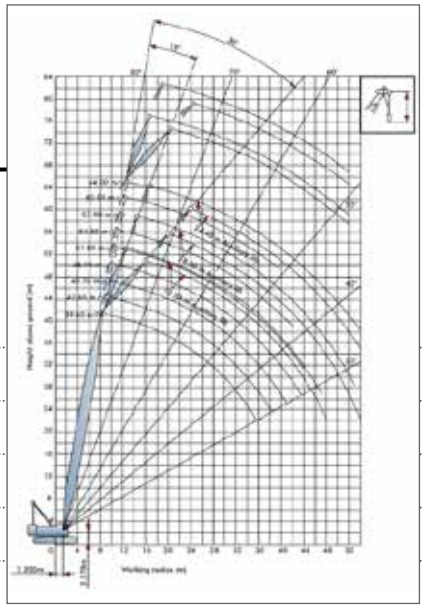



b) List at least three (3) things a load chart tells you.

## Theory Training Task 32

*Performance Criteria: 2.5, 2.6, 3.1*

Name at least three (3) things a range diagram shows you.



# Theory Training Task 33

*Performance Criteria: 1.3*

a) You are doing a multiple crane lift with two cranes.
The load is 20 tonnes.
How much capacity does each crane need to lift this load safely?

b) How much extra capacity (safety margin) do you need for a three crane lift?

*Performance Criteria: 1.4*

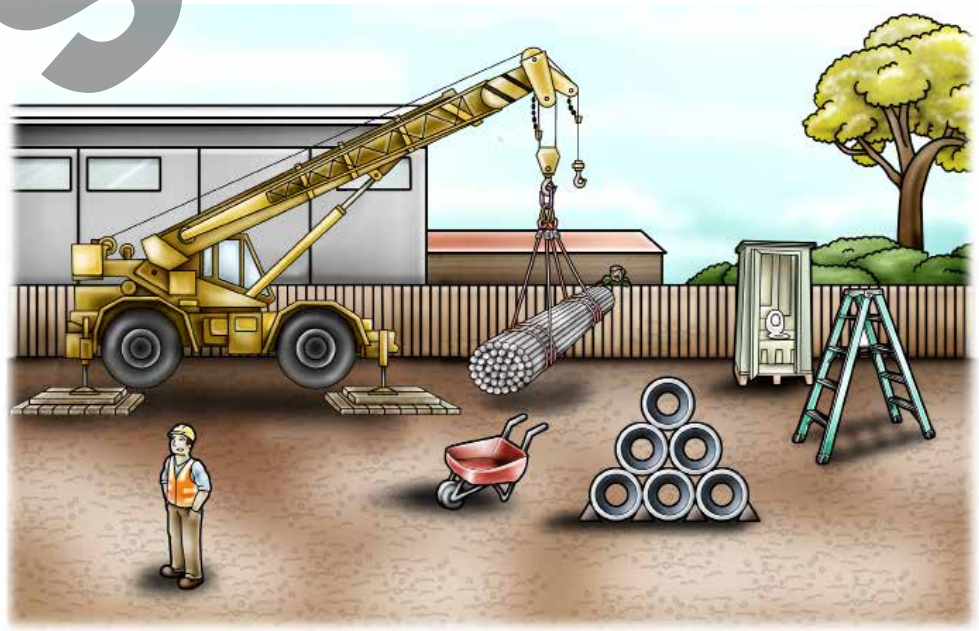
## Plan your path

Plan the path you will take to move the load, and look out for hazards.

# Theory Training Task 34

*Performance Criteria: 1.4*

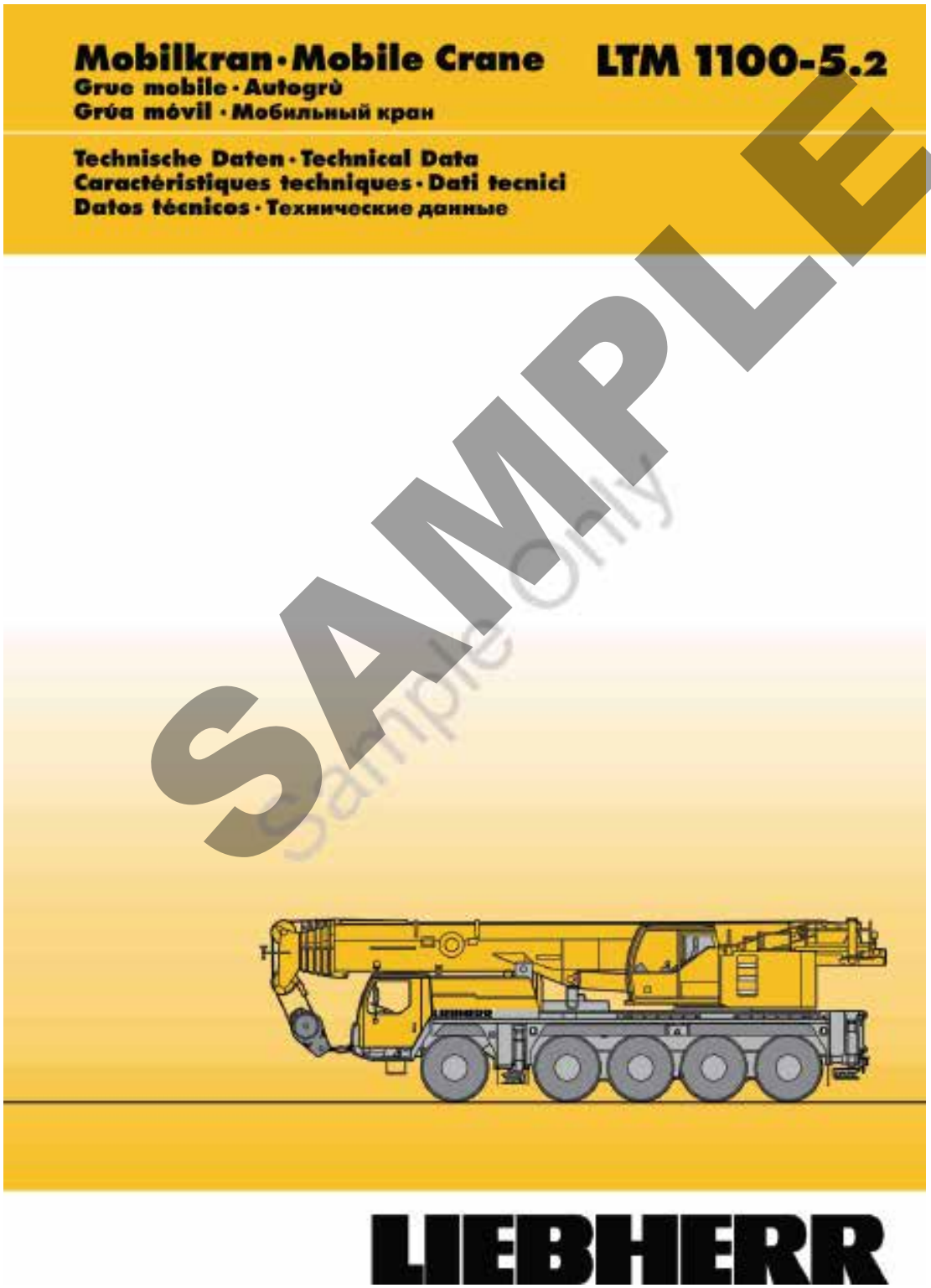
Check the path of movement of loads to avoid hazards.
Circle the **hazards** you should look out for when moving a load.



# Slewing mobile crane charts (up to 100 tonnes)

Answer these questions if you are studying the **TLILIC0021 Licence to operate a slewing mobile crane (up to 100 tonnes)**.
If you are studying for a different licence, skip to that section.

**Note: For the following crane exercises us the LIEBHERR TM1100-5.2 load chart. This is located in the 'Trainer's Resource' of the Easy Guides training material. Your trainer will provide you with this crane chart.**



# Load Chart Activity 1

*Performance Criteria: 2.7, 3.1, 1.3,*

**Use C1 Load charts**

**Note: Use the LIEBHERR TM1100-5.2 load charts**

**General load chart questions**

a) Locate the cranes mass if it is to maintain a axle loading of 12t per axle?

b) At what rate does the second winch wind on its hoist rope?

d) The fly jib has 3 off-set settings on the load chart, what are the off-sets?

e) When the crane is maintaining a 12t per axle weight, how much counter ballast is on the crane carrier?

The LTM1100 you are operating has 26t of counterweight fitted and a main boom length of 45m and the 3-sheave hook block fitted

**Question 1**

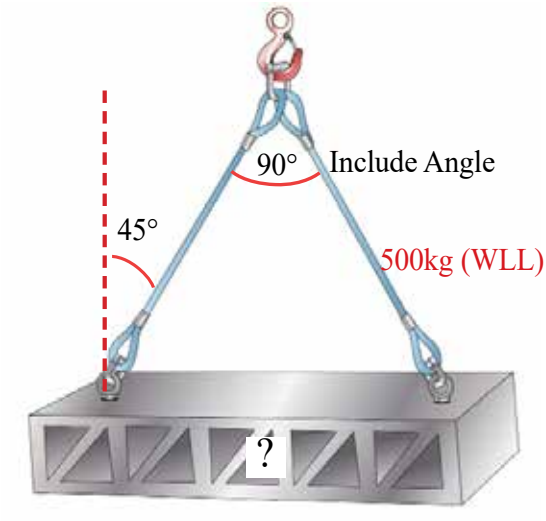
The load you are about to lift weighs 6000kg, and 75kg of rigging is required, in between which 2 radii would you expect the 90% rated capacity alarm to activate?

# Theory Training Task 41

*Performance Criteria: 2.11, 2.12*

Calculate the maximum safe working load with the following slinging configuration description scenarios using the angle sling mode factor.

a.) Calculate the maximum safe working load.




| Angle Factors | |
|---|---|
| 0° | = 2 |
| 30° | = 1.93 |
| 45° | = 1. 85 |
| 60° | = 1.73 |
| 90° | = 1.41 |
| 120 | = 1 |

**Scenario / Description:**

2 legged angle sling

WLL of each sling: 500kg.

Angle from vertical: 45° and an

Include angle of 90°

**Calculation:**

# Theory Training Task 85

*Performance Criteria: 3.6, 3.5*

i). Choose the correct words to complete the sentence for the reason why we should monitor the transfer of a load?

The reason why we monitor a load and a cranes movement is to _____ tasks to be performed.

a. on next load lift we can add more items to

b. ensure safe operation of

c. be amazed that load does not fall during

ii). What sequence of hand singles would you use to tell the crane operator to stop and make adjustments to the crane lift;

So that the load can be lifted up by 2 meters and swing to the right of the vehicle and lowered because a tree branch fell and caused a major hazard, choose a) ,b), or c)?

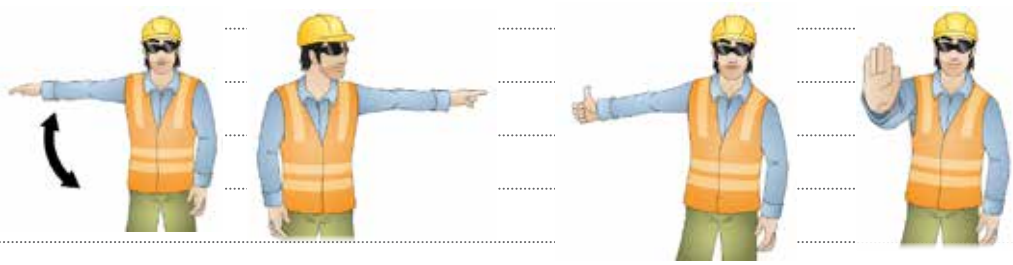
**a).**

Stop | Luffing boom up | Slew right /Travel right | Lower

**b).**

Stop | Stop | Stop | Lower

**c).**



Lower | Slew right /Travel right | Luffing boom up | Stop

*Performance Criteria: 1.5, 3.5, 3.2*

## Identify what hazards can be found when sling a load

To prevent harm on one's self and others, you would need to identify hazards and use appropriate risk controls while slinging a load.

# Theory Training Task 86

*Performance Criteria: 1.5, 3.5, 2.2*

i). Identify what hazards can be found when slinging a load, assess the risk level, identify the consequences and likelihood of them occurring and what control options you would put in place to eliminate the risk

Hazards that can be found with slinging a load, can be;

*Sling hazard 1. Sharp edges on load,*

*Sling hazard 2. _____ and _____ on sling equipment,*

*Sling hazard 3. _____ In-balance,*

*Sling hazard 4. Incorrect use of _____ that makes up _____ configuration*

*Sling Hazard 5. WLL. – Incorrect reading of _____ and calculations of load to become _____ or _____.*

| Hazard Item | Likelihood / Risk Level | Consequences / Likelihood | Control options or protection measures |
|---|---|---|---|
| 1 | 1 = low | Could - Cause load to fall | Use protective material around sling to prevent break and damage to sling |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| Approved By: | | | |

| Hazard Item | 1. Elimination | 2. Substation | 3. Administrative | 4. preferred control options | 5 use ppe |
|---|---|---|---|---|---|
| 1 | Yes | Yes | Yes – have an equipment checklist | See notes | N/A |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |

Additional notes for sling risks:



ii). What 3 questions would you ask to confirm that people are following the correct control measure procedures in the work place?

a. Does everyone know what they are doing on how to get to site?

b. Are control measures in place?

c. Are controls preventing or minimizing the risk?

d. Are there any new problems with the risk?

*Performance Criteria: 1.5, 2.2 Risk Control and Hazards*

Conducting, applying hazard and risk assessment strategies.

Risk assessment management and mitigation strategies, including hierarchy of control..

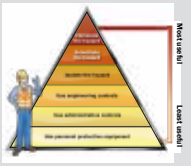
# Theory Training Task 87

*Performance Criteria: 1.5, 2.2*

i). From the following work order identified hazard, demonstrate how you can use the Hierarchy of hazard controls to fill out and make comments or explain your choice about what would be the most effective hazard control method or risk strategies to use, to eliminate the risk hazard.

**Task / Work order:** You have been given the task of relocating a load which sits next to a fuel tank containing a flammable substance. The fuel tank has a vent which allows fuel vapors to escape. The fuel tank is partially under a concrete floor and the contents cannot be removed or eliminated as they are used to supply equipment in the building. **Hazard:** Vapors given off from the fuel are highly flammable.



| | Control Measures | | | | | | Explain your Choice / comments |
|---|---|---|---|---|---|---|---|
| **Hazard Item**   | **1. Elimination** | **2. Substation** | **3. Isolation** | **4. Engineering** | **5.** | **6. PPE** |  |
| 1 Fuel vapours from the tank vent | No | | | | | | Ask yourself, Can the hazard be **eliminated**? (Removed)<br><br>e.g. This would be the most effective control but is not possible because the fuel tank is partially under the concrete floor. |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Practical Training Task 7

*Part 6—Do the lift*
*Performance Criteria 1.2, 2.3, 2.5, 2.6, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.10, 3.9, 2.2*

# Do the lift

**Learners**: You **must** do this task under the **control of a licensed operator**.
Please wait for your trainer to advise you before trying the task.

First, your trainer will take you to an area where you will use a crane to transfer a load.

Second, your trainer will choose a load for you to transfer and a place for you to transfer it to.



- ☐ Crane is accessed in a safe manner. This means you get on and off the crane as safely as you can.
- ☐ Inspect all the lifting equipment and gear for defects and defective items are isolated, labeled and reported.
- ☐ Lifts are determined within the capacity of the crane. This means you always stay with the safe working load (SWL) of the crane.
- ☐ Boom/jib and hoist block is positioned over load following directions from relevant workplace personnel. This means you put the lifting hook over the load's center of gravity.
- ☐ Test lift is carried out in accordance with procedures to allow for safety checks to be safely made, in consultation with relevant personnel. This means you do a test/trial lift before you use the crane to move a load.
- ☐ Loads are transferred using all relevant crane movements in accordance with procedures and the appropriate standard. This means you need to think about a number of things to move the load correctly.
- ☐ Crane is operated in accordance with procedures. This means you follow Australian Standards and site procedures.
- ☐ Load movement is monitored constantly to ensure safety of personnel and load, and crane stability. This means you always keep the load in view while moving it.
- ☐ Unplanned and/or unsafe situations are responded to in accordance with procedures. This means things can go wrong when you use your crane.

Part 7

# Shut down and pack up

*Performance Criteria: 4.1*

## Stow the boom

You've finished the lift. Stow the boom as shown in the user manual or manufacturer's instructions.

## Theory Training Task 88

*Performance Criteria: 4.1*

Explain how you should stow/put away the boom, jib and equipment.

*Performance Criteria: 4.3*

## Use motion locks

Turn on all motion locks and brakes.

## Theory Training Task 89

*Performance Criteria: 4.3*

a) You have finished using the crane. How can you stop unauthorised people from using the crane?

b) Where can you find out more information?