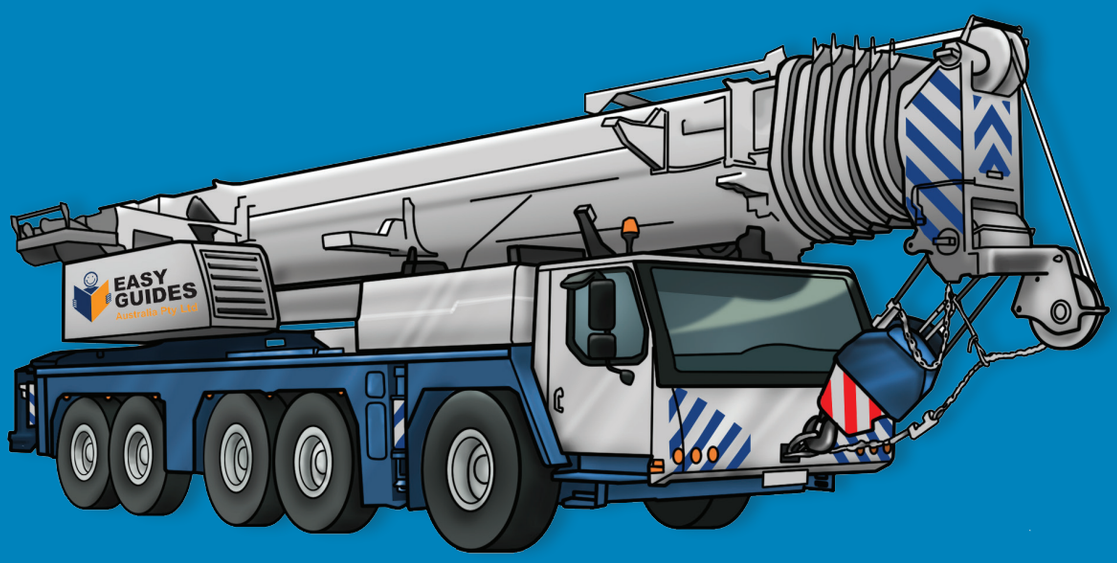
SLEWING MOBILE CRANE
LEARNER WORKBOOK

TRAINER'S MARKING GUIDE WITH MODEL ANSWERS

TLILIC0022 Licence to operate a slewing mobile crane

With load chart calculations similar to NAI



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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.

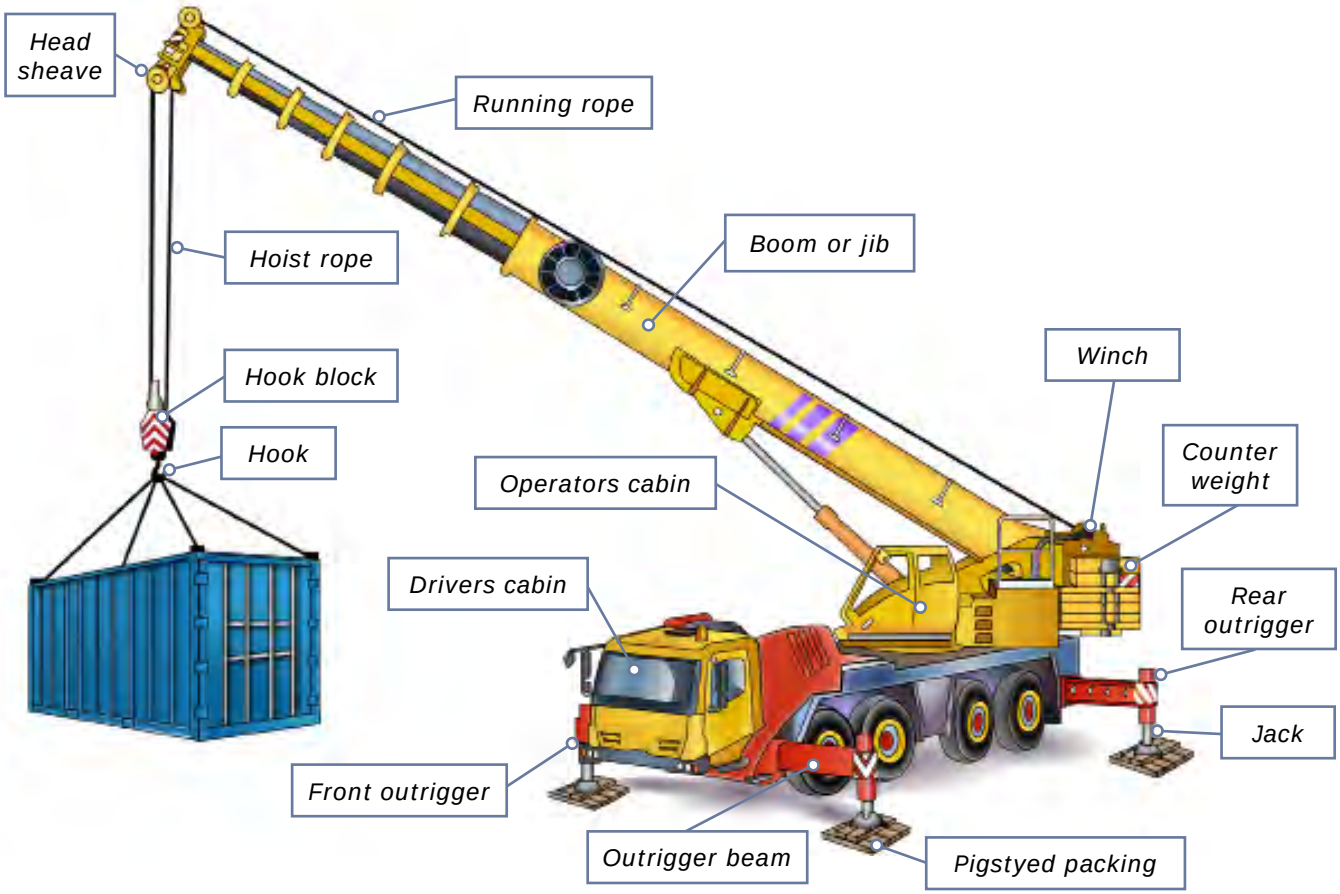
Review—practical tasks

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

Crawler crane

Rough terrain slewing crane

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

Notes

Part 1

Prepare for hazards

Trainers please note:
The answers in this book are in no way conclusive and are to be used as a guide only. Use your own knowledge and experience to correct the variation of answers that may be given by learners.

Performance Criteria: 1.5

Prepare for hazards

A **hazard** is anything that can harm you or others while you work.

A **risk** is the chance of a hazard hurting someone.

Theory Training Task 1

Performance Criteria: 1.5, 2.9

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

Answers may include but not limited to:

Above head height

- **powerlines and overhead service lines**
- **trees**
- **buildings**
- **other obstructions**

Ground level to eye level

- **other equipment**
- **machinery/plant**
- **people and pedestrians**
- **things in the path of travel**
- **environmental conditions**
- **surrounding structures**
- **facilities**
- **dangerous materials**
- **other obstructions**
- **insufficient lighting**

Ground level (and below)

- **stable/level surface**
- **spills or wet surfaces**
- **debris and rubbish**
- **trenches or recently filled trenches**
- **unstable ground**
- **underground services**
- **surface is strong enough to support the weight of any equipment/materials**

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

Trainers: encourage your learners to place a tick beside hazards they have seen in their past or present places of employment.

Performance Criteria: 1.5, 2.2

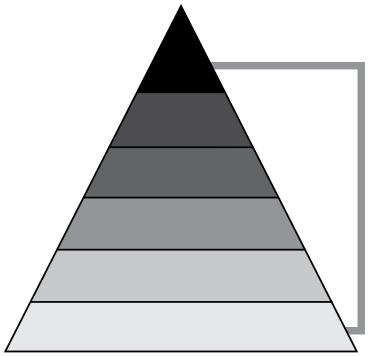
Hazard control measures

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. **Elimination**
2. **Substitution**
3. **Isolation**
4. **Engineering Control Measures**
5. **Administrative Controls**
6. **PPE**

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

Elimination – you should try to remove the hazard entirely.

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

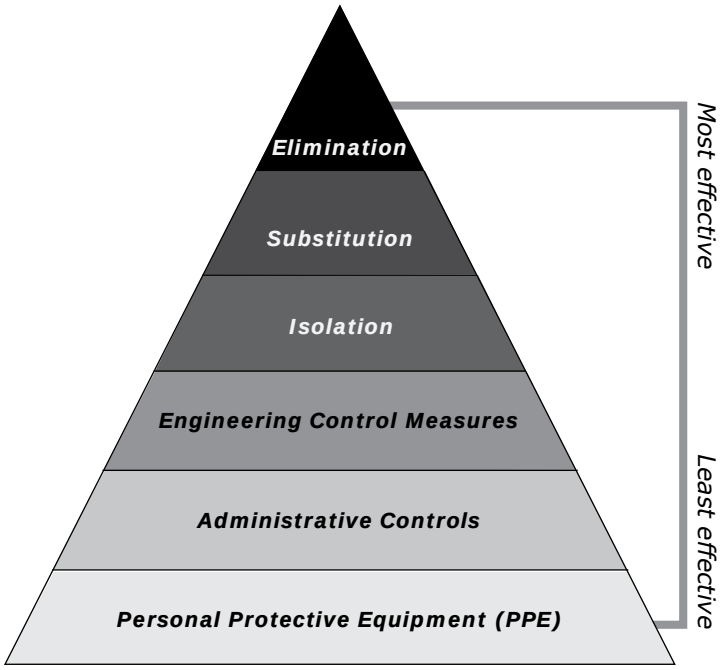
Applying the Hierarchy of Hazard Control

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.

Your trainer will help you to choose a common hazard that may be found in the area where you work.

In this training task you will put the hierarchy of hazard control into action!



Hierarchy of Hazard Control

Go through as many steps as you need to until you eliminate (get rid of) or control the hazard.

HAZARD: .....

Step 1: Elimination

Can you remove or take away the hazard?

Yes ☐ / **No** ☐

.....

.....

.....

Step 2: Substitution

Can you use a safer method if you cannot remove the hazard?

Yes ☐ / **No** ☐

.....

.....

.....

Part 2

Communicate clearly

Trainers please note:
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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 9

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?

Answer may include:

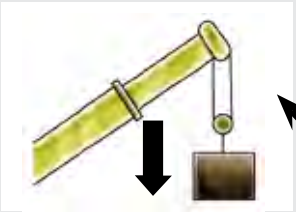
- **Whistle**
- **Hand signals**
- **Two-way radio**
- **Mobile phones**
- **Written instructions**
- **Speaking, listening, asking questions**
- **Signs (ensure you can read and write enough to understand spoken and written instructions and safety signs).**

Theory Training Task 12

Performance Criteria: 3.4, 3.7

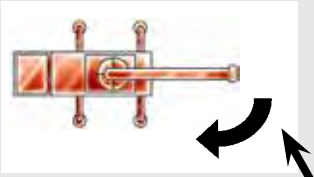
Match the crane boom motion on the left with the correct hand or whistle signals on the right.

Hoisting down



Stop

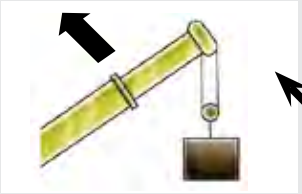
Slewing right



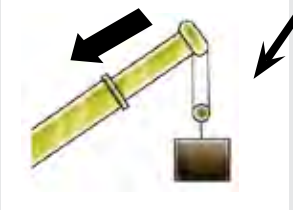
Travel and transverse

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 3

Check the crane

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Performance Criteria: 2.4

Do visual checks

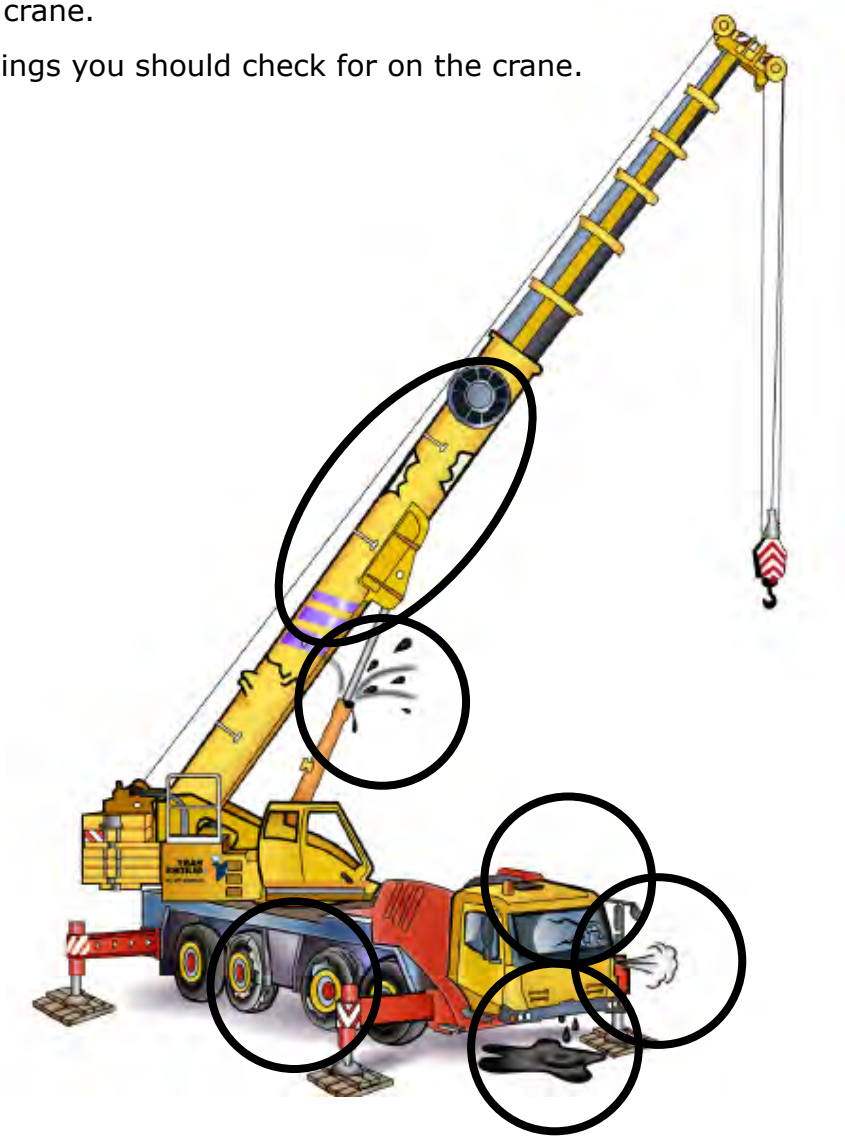
Before you start working, there are important crane safety checks you need to do first. Start with the visual check. Look around the crane for obvious problems such as leaks and damage.

Theory Training Task 13

Performance Criteria: 2.4

Look at this crane.

Circle the things you should check for on the crane.



Performance Criteria: 2.4

Check signs and labels

Check the signs, labels and decals on the crane. These will tell you the crane's load limits and what it can and can't do. All signs and labels must be readable and clear.

Theory Training Task 16

Performance Criteria: 2.4

List at least 2 things you should be able to read on a data plate.

Answer may include:

- **Weight (GVM)**
- **Dimensions**
- **WLL/SWL**
- **Model number**
- **Date of manufacture**
- **Serial number**

Performance Criteria: 2.4

Do the pre-operational checks

Do the pre-operational checks to make sure the crane is safe to use.

Theory Training Task 17

Performance Criteria: 2.4, 2.12

What are four (4) pre-operational checks you need to do on the crane?

Answer may include:

- **No safety tags on the crane**
- **Load charts**
- **Tyres (condition, pressure)**
- **Ropes, wires and anchorages**
- **Fluid levels and leaks (oil, water)**
- **Logbook is present and in good condition**
- **Structural damage to crane (including boom/jib)**
- **Signage (including manufacturer's data plate and working load limit)**
- **Rope drums**
- **Lifting hook**
- **Communication system**

Part 5

Set up the crane

Trainers please note:
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Performance Criteria: 1.4, 1.6

Follow safety procedures

Follow all of the safety procedures when you drive the crane to the work area.

Theory Training Task 36

Performance Criteria: 1.4, 1.6

Circle the correct answer for the following statements.

a) When driving a crane you do not have to obey road signs.

True **False**

b) When driving a crane you must check for clearances below tunnels and powerlines.

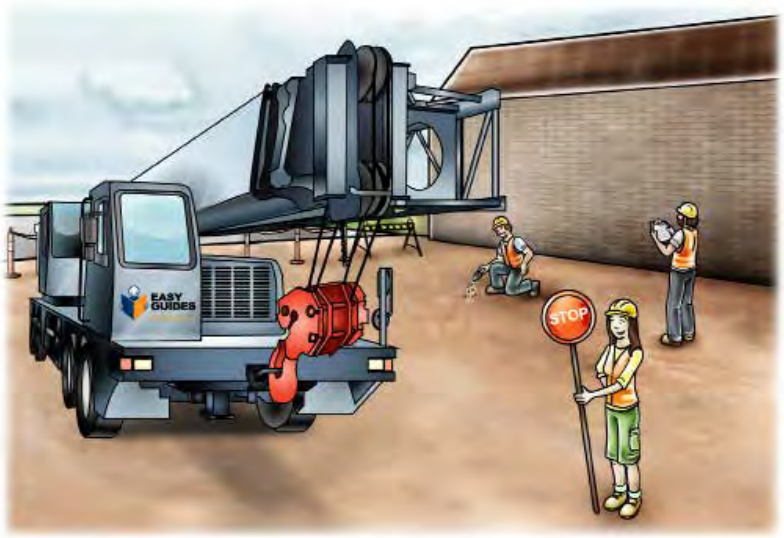
True **False**

c) When driving a crane outriggers/stabilisers do not have to be retracted.

True **False**

d) Pedestrians don't need to be a safe distance from the crane.

True **False**



Performance Criteria: 1.2, 2.1

Position the crane

Position the crane in a spot which is good for balance and the lift.

Theory Training Task 37

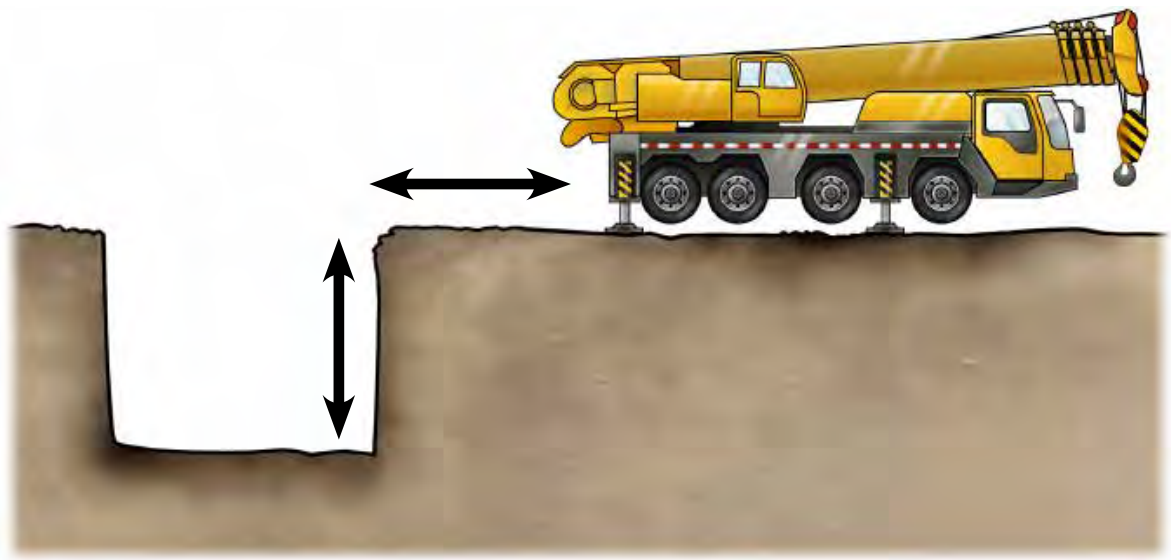
Performance Criteria: 1.2, 2.1

a) How far away should you set up your crane from a 4 metre deep trench or excavation?

At least four metres away.

b) If the ground is soft near the trench, what should you do?

You might need to set up further away from the trench.



Theory Training Task 38

Performance Criteria: 1.2

Write a number in each box to show the right order in which you **set up** a slewing mobile crane on **sloping ground**.

2	Chock the wheels
1	Put on the parking brake
3	Set up the outriggers on the lowest side to level the truck

Theory Training Task 39

Performance Criteria: 3.3

Why are outriggers and packing important when you use a slewing mobile crane?

- **Outriggers help keep the crane stable.**
- **Packing distributes the weight of the crane and load over a bigger area.**

Theory Training Task 40

Performance Criteria: 1.8, 1.9, 3.3

a) What is the formula for calculating packing?

Area = $\frac{0.65 \times (Cm + L)}{V}$

b) Use the figures below to estimate the area needed for packing.

Cm (crane mass) = 42 t

L (load mass) = 21 t

V (bearing pressure of the ground in tonnes m²) = 25 t

Round up to the nearest whole centimetre.

Area = 1.638 m²

Round up to the nearest whole centimetre

Area = 1.64 m²

c) What is the length of one side of packing?

$\sqrt{1.64}$ = 1.28 m

Theory Training Task 41

Performance Criteria: 1.2

Label the types of packing shown below.

Pigsty timber packing

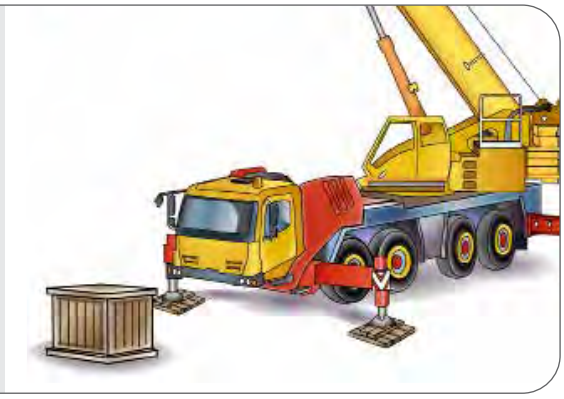
Sleeper mats

Steel plates

Performance Criteria: 1.8, 2.6, 3.1, 3.3

Set up the crane

Check the rated capacity, and set up the crane properly for the lift.



Theory Training Task 42

Performance Criteria: 1.8, 3.1, 3.3

What does 'rated capacity' mean?

The rated capacity tells you how much the crane can lift at a specific boom length, boom angle and boom radius.

Theory Training Task 43

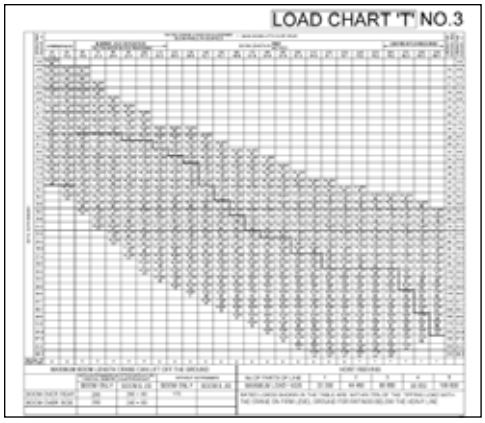
Performance Criteria: 2.5

a) Where can you find out the configuration you need for the load you'll lift?

On the load chart.

b) Where can you find the crane's load chart?

The load chart must be in the cabin of the crane.



Performance Criteria: 1.3

Enter data into the computer

Enter the boom/jib and counterweight configuration into the computer.

Theory Training Task 44

Performance Criteria: 2.6, 1.3, 2.10,

What does the load meter/crane computer show you?

- **Boom length**
- **Boom angle**
- **Capacity of the crane in its configuration**
- **Actual load on the crane**
- **Outrigger position**
- **Which hook is being used (main or auxiliary).**

Theory Training Task 45

Performance Criteria: 2.6, 1.3. 2.10

What data do you enter into the crane's computer?

Some examples are:

- **Boom length**
- **Operating radius**
- **Number of falls of rope**
- **Attachments**
- **Outrigger extension**

Theory Training Task 46

Performance Criteria: 1.3, 2.10

a) What is the purpose of the crane's computer?

The crane's computer is used as a guidance system. You don't rely on it alone. Check the load chart first and use the computer to cross check.

b) How does the crane's computer help improve safety when you're lifting a load?

- **The computer helps prevent the crane from overloading and overturning.**
- **The computer has a load limiting/indicating system.**

Set up the crane

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 slewing mobile crane.

Second, your trainer will choose a crane for you to set up.

Third, you'll set up the crane including positioning the crane, positioning the boom/jib and entering the load data into the crane's computer.

- ☐ Crane is driven to the work area in accordance with procedures. This means you follow all procedures and guidelines when driving the slewing mobile crane to the work site.
- ☐ Crane is positioned for work application and stability in accordance with procedures. This means you put the slewing mobile crane where you can do the job safely and effectively.
- ☐ Appropriate crane configuration for work task is determined in accordance with procedures. This means checking the crane's load chart and rated capacity to make sure you set up the crane properly.
- ☐ Boom/jib and counterweight configuration data is input into crane computer as required. This means the load your crane can lift will depend on the type of boom/jib and counterweight you use during a lift.

Your trainer will check how you set up the slewing mobile crane. After you finish, the licensed operator/trainer will then sign and date the box below.

Part 5: **Competent** ☐ **Not yet competent** ☐

Signature (licensed operator/trainer) ..... Date .....

Review

Part 5—Set up the crane

Sharing your knowledge can be a good way to remember things you have learnt. Talk about and/or record below the key points you have learnt in 'Set up the crane' and share your experiences with other learners and/or your trainer.

Further learning (optional)

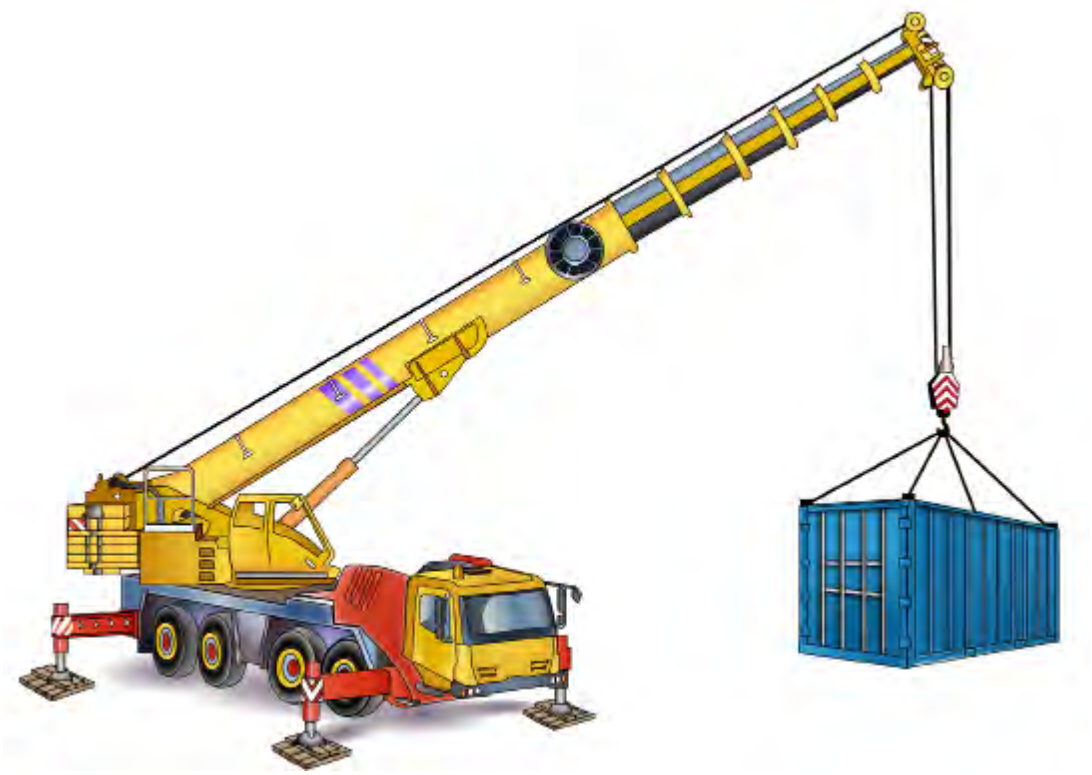
Apply

Try to find a licensed person with a slewing mobile crane.
Ask them if you can help them set up the crane at a work site.
You'll need to set up the crane on different sites so you know how to set up the crane in new situations.

Notes

Part 6

Do the lift



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Performance Criteria: 2.3

Access the crane safely

Climb in and out of the crane's cabin safely.

Theory Training Task 47

Performance Criteria: 2.3

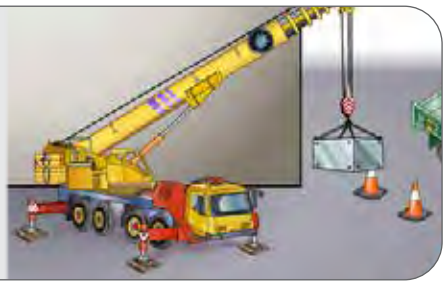
How should you get in and out of the crane's cabin?

- **When you're climbing into the cabin, 3 body parts should be touching the crane at the same time.**
- **Use 2 feet and 1 hand, or 2 hands and 1 foot.**
- **Using 3 body parts at the same time will keep you stable while you are climbing in or out.**

Performance Criteria: 1.3, 2.5, 2.6

Check the crane's capacity

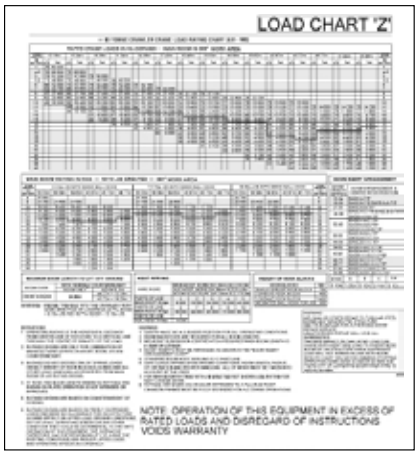
Check the crane's load capacity, and always stay within the safe working limit (SWL) of the crane and boom.



Theory Training Task 48

Performance Criteria: 1.3, 2.5, 2.6

How do you know that the load is within the limits of the crane?



- **Check the load chart.**
- **Keep an eye on the crane's computer.**

Theory Training Task 49

Performance Criteria: 2.6, 3.2

What do you need to plan for when moving a load within the crane's working radius?

Plan for:

- **Boom/jib deflection**
- **Boom angle**

Theory Training Task 50

Performance Criteria: 2.5

Can you exceed the safe working load (SWL) at a given radius of the crane?

No. Not ever.

Performance Criteria: 3.2

Position the boom/jib

Position the boom/jib and hoist block over the load's centre of gravity.

Theory Training Task 51

Performance Criteria: 2.6, 3.2

Who guides you when you're positioning the boom/jib and hoist block over the load?

The dogger.

Theory Training Task 52

Performance Criteria: 3.2

Why is it important to put the lifting hook over the load's centre of gravity?

Answer includes:

- **To reduce the risk of overloading the crane.**
- **To prevent load swinging on lift.**
- **To prevent damaging the crane.**
- **To prevent damage to the load caused by load toppling.**

Performance Criteria: 3.4

Do a test lift

Once you've set up, do a test lift to make sure the lift can be done safely.

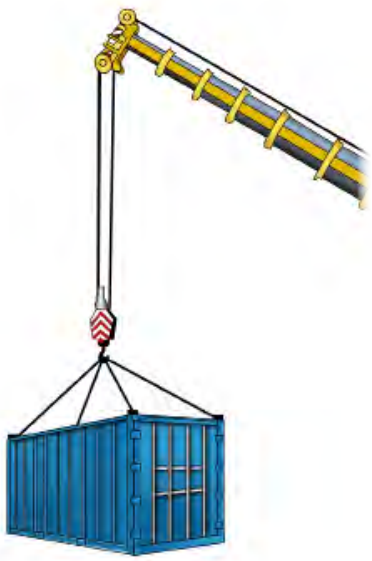
Theory Training Task 53

Performance Criteria: 3.4

Why should you do a test/trial lift?

Answer includes:

- **To check the crane can do the lift.**
- **To see if all crane equipment works properly.**
- **To check the load is stable.**
- **To make sure there is enough clearance for the boom movement.**
- **To ensure the outriggers/packing are secure.**



Part 7

Shut down and pack up

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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 68

Performance Criteria: 4.1

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

- **You remove the load, stow the boom, jib and equipment as shown in the operator's manual.**
- **Take off any lifting parts and attach them to the crane.**

Performance Criteria: 4.3

Use motion locks

Turn on all motion locks and brakes.

Theory Training Task 69

Performance Criteria: 4.3

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

Apply the motion lock and brake to disable the motions of the crane and to prevent unauthorised people using the crane..

b) Where can you find out more information?

Australian Standard (AS 2550 6.5 c).