Trainer Value Pack

RIGGING INTERMEDIATE
SAFETY & LICENCE GUIDE

LLN READY

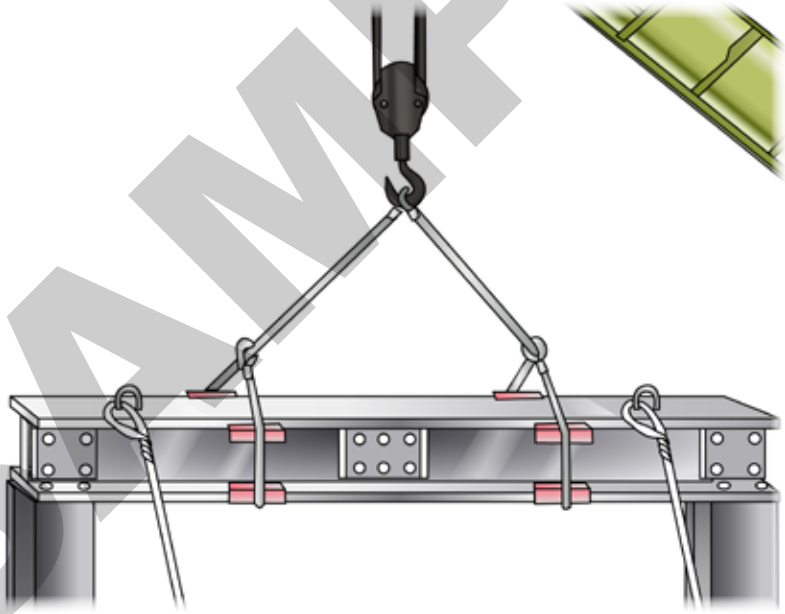
Training support material for:

CPCCLRG3002
Licence to perform rigging intermediate level

EASY GUIDES
Australia Pty Ltd

CONTENTS

INTRODUCTION TO INTERMEDIATE RIGGING



What is intermediate rigging?

Intermediate rigging covers all the work done by riggers at the basic level, and also includes:

- Rigging of cranes
- Rigging of conveyors
- Rigging of dredges and excavators
- Rigging tilt slabs
- Demolition work
- Dual crane lifts.

Intermediate rigging includes using mechanical load shifting equipment to move, place or secure a load. It also involves using plant, equipment or part of a structure/building to set up and dismantle cranes and hoists.

Prerequisite

- CPCCLRG3001
  Licence to perform rigging basic level
- A valid licence for basic rigging (RB)

PLAN TASK

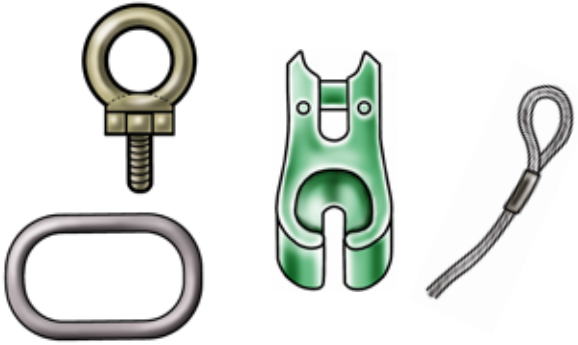
Element 1

Weights of materials and equipment

Tools specific to the task

Loads and forces on equipment or structure

Plant and equipment needed to perform the task safely



QUESTION 1.2 (A)

What is meant by a crane lifting plan (sometimes known as a safe work method statement)?

A Safe work method statement (SWMS) is a document that:

- lists the types of high risk construction work being done
- states the health and safety hazards and risks arising from that work
- describes how the risks will be controlled
- describes how the risk control measures will be put in place.

AS 2550 suggests planning for crane work should begin as soon as possible. The plan should include how cranes will get into the site, making sure the ground or supporting structure can support the crane, what loads will be lifted and where they will be lifted to.

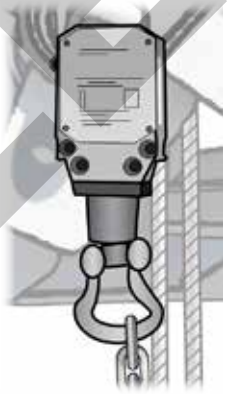
QUESTION 1.6 (B)

You will be using a crane to lift people in a workbox.

What equipment must the crane have?

Safety hook

Upper-limit switch on the hoist boom



Lockout control to stop the workbox free-falling

Powered lowering of hook

QUESTION 1.7 (A)

Explain what is meant by the following forces and loads:

- Dead loads
- Live loads
- Static load
- Dynamic force
- Wind loads.

Give an example of each.

Live loads
The load being lifted by a crane or hoist. It includes anything hanging from the boom (for example, hook blocks, slings etc.)

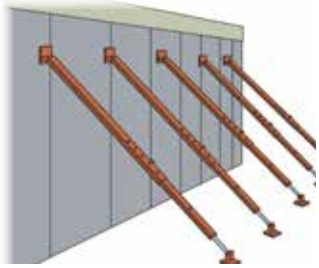
For example, a qualified rigger being lifted in a work box built to Australian Standards or a tilt-up concrete panel being lifted by a crane.

Dead loads
The actual weight of a crane before it is loaded.

For example, a large mobile crane.

Static load
A load that is at rest and applies consistent (steady) downward pressure only.

For example, the weight imposed on a structure by concrete panels.



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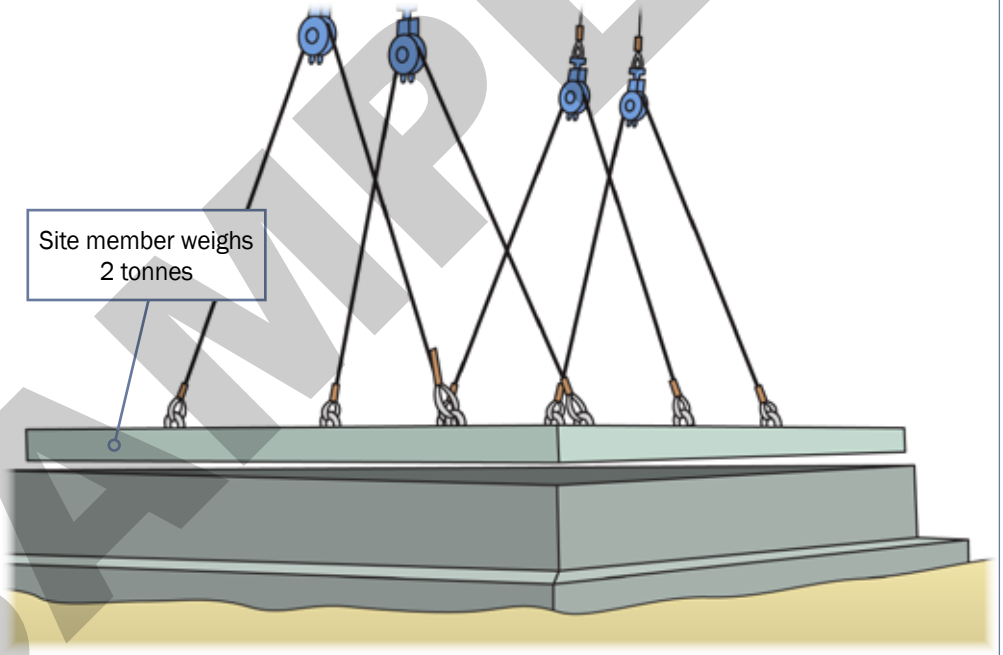
QUESTION 1.7 (F)

What extra loading should you allow for when demolishing in position members (concrete members cast on-site during construction)?

You should increase the calculated load by 50% (1.5 × Calculated load)

Example:
2.0 × 1.5 = 3.5 t



SET UP TASK

Element 3

QUESTION 3.1 (A)

What are some standard directions a rigger might give to a crane operator?

Over the two-way radio, speak clearly and give the name of the part of the crane to be moved first.

Examples include:

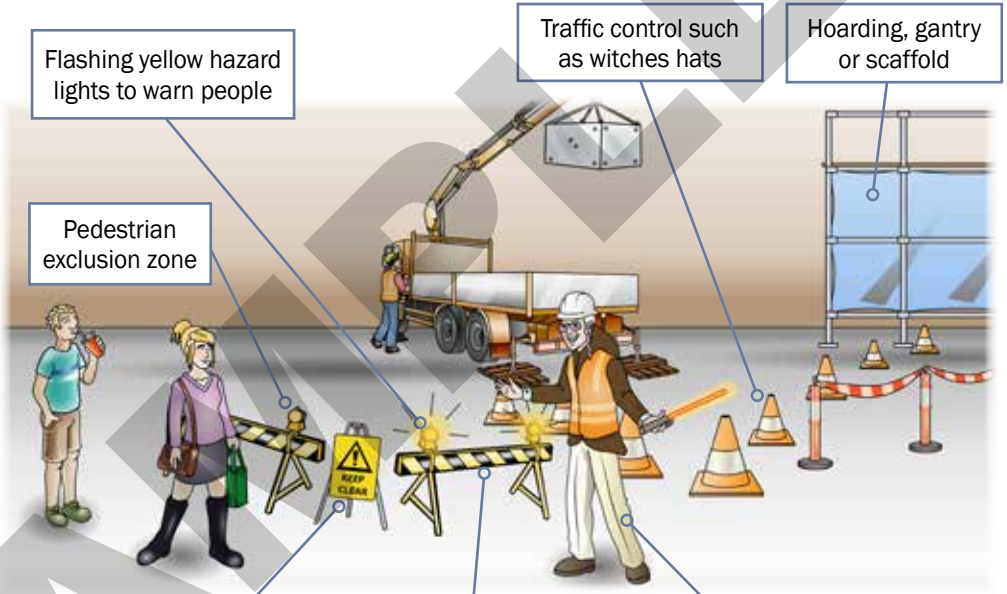
- Hook movement: 'Up on the hook' and 'Down on the hook'
- Boom movement: 'Boom up' and 'Boom down', 'Boom extend' and 'Boom retract'
- Slewing: 'Slew left' and 'Slew right'
- OK to raise: 'All clear'
- Do not move: 'Stop'

QUESTION 3.1 - 3.2 (G)

You will be working near a footpath.

How can you warn and control people near the site?

Some methods you can use are:



QUESTION 3.2 (A)

You are going to use a fall arrest system:

What safety concerns do you need to think about?

You must choose, install and use the equipment correctly

You must make sure fall distance is as short as possible

Demolition

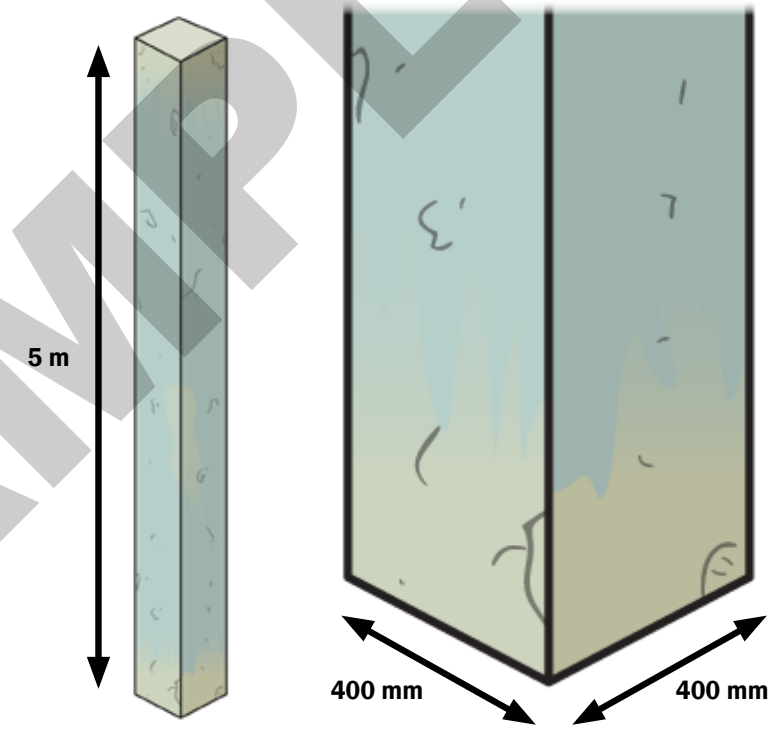
You are demolishing an encased concrete column.

You will use a winch and flexible steel wire rope (FSWR) to lower the column to the ground.

Column dimensions are:

400 mm × 400 mm × 5 metres high

Use these dimensions to answer the next five questions.



QUESTION 3.4, 4.1, 4.4, 4.5 (C)

What is the closest allowable distance between the column and the winch?

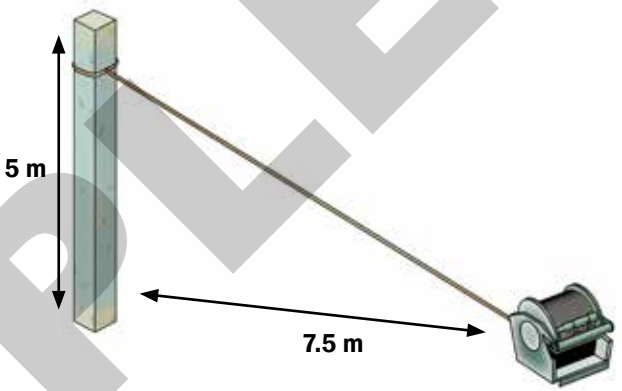
Minimum distance between winch and column

= 1.5 (safety factor) times vertical distance from winch to top of column

= 1.5 × 5

Answer =

Minimum distance between winch and column is 7.5 metres



QUESTION 3.4, 4.1, 4.4, 4.5 (D)

When pulling has started, how close to the rope can someone stand?

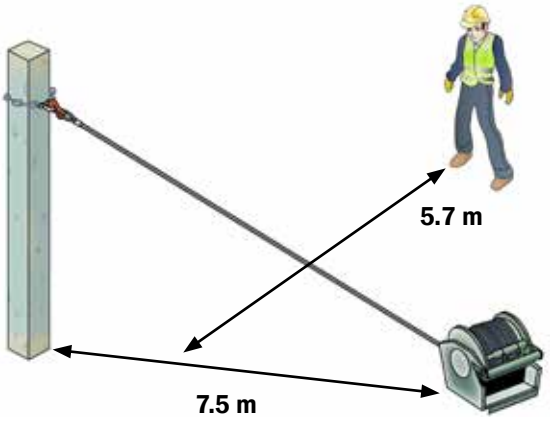
Assume the distance between the column and the winch is 7.5 metres.

When pulling has started, no one must be closer to the FSWR than ¾ of the horizontal distance from winch to load.

= 0.75 times 7.5 metres

Answer =

Distance away from rope must be 5.7 metres or more



QUESTION 3.4, 3.2, 4.1 (A)

You are going to fell a column using a winch.

The winch must be a safe distance away from the column.

Calculate the safe distance to put the winch from a 6 metre high column.

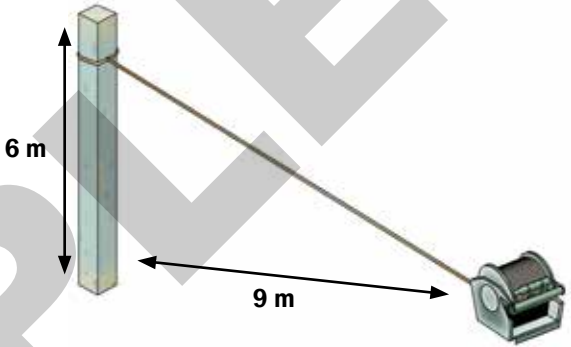
Minimum safe distance between winch and column

= 1.5 (safety factor) times vertical distance from winch to top of column

= 1.5 × 6

Answer =

Minimum distance between winch and column is 9 metres



QUESTION 3.4, 3.2, 4.1 (A)

How do you correctly fit and wear safety equipment?

Safety harness:
The safety harness has to fit you properly and the connectors must work. The safety harness should be connected to the lanyard on your back between the shoulder blades.

Follow AS 2626 Industrial safety belts and harnesses – Selection use and maintenance.

QUESTION 3.4, 4.2 (A)

You want to find out the length of each top sling and each bottom sling when lifting a tilt-up panel. You are using the rigging configuration below.

Dimension D is 3.8 metres.
Dimension E is 2.9 metres.

Sling length formula for top sling

= 4.5 times Dimension D or E (whichever is longer)

= 4.5 × 3.8

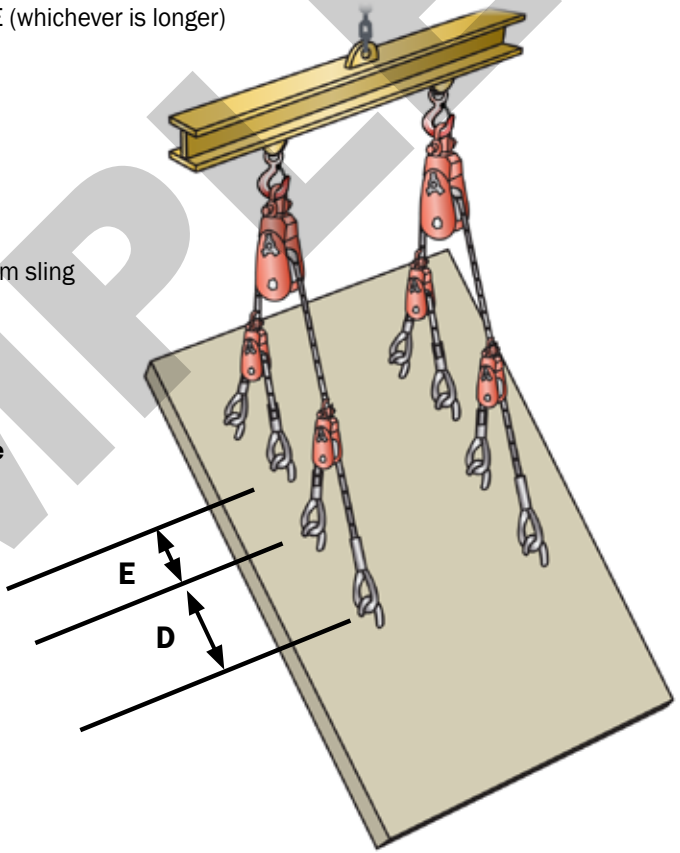
Answer =
Each top sling must be
17.1 metres long

Sling length formula for bottom sling

= 3 times Dimension D

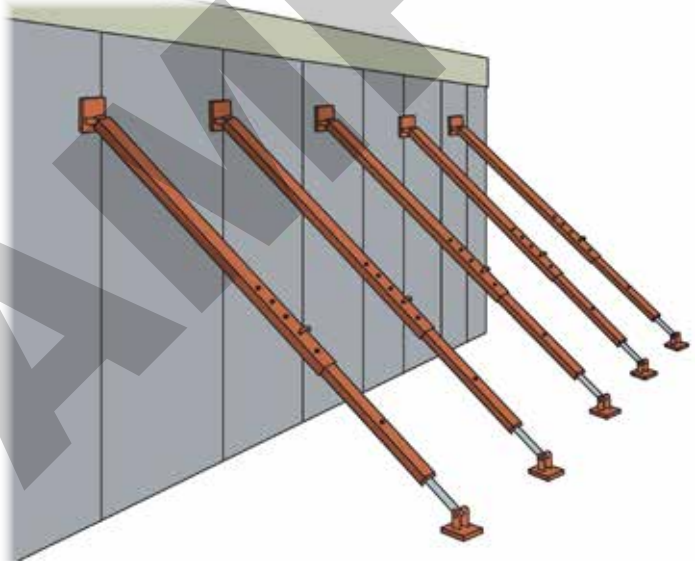
= 3 × 3.8

Answer =
Each bottom sling must be
11.4 metres long



UNDERTAKE INTERMEDIATE RIGGING ACTIVITIES

Element 4



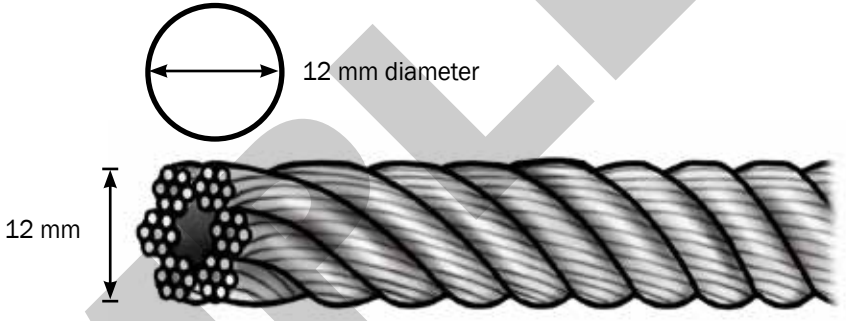
QUESTION 4.1 (G)

Demolition rigging involves felling columns, walls and towers by pulling them over.

What is the minimum diameter of:

- Flexible steel wire rope (FSWR) used for felling
- Grade 80 chain used for felling?

Felling FSWR must have a minimum diameter of 12 mm



Felling grade 80 chain must have a minimum diameter of 8 mm

QUESTION 4.1 (I)

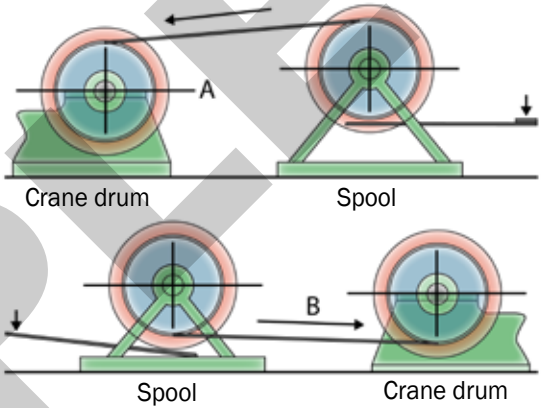
How do you load new FSWR on to the drum of a crane?

To stop the rope from kinking, set up the spool of new rope so that the rope runs:

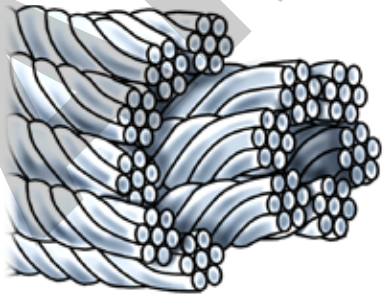
- from the top of the spool to the top of the crane drum

or

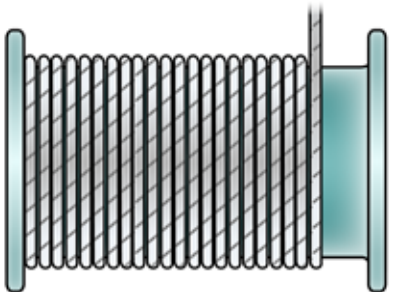
- from the bottom of the spool to the bottom of the crane drum.



Secure the rope firmly to the drum. If you don't, the inner strands can pull out leaving only the outer strands holding the rope.

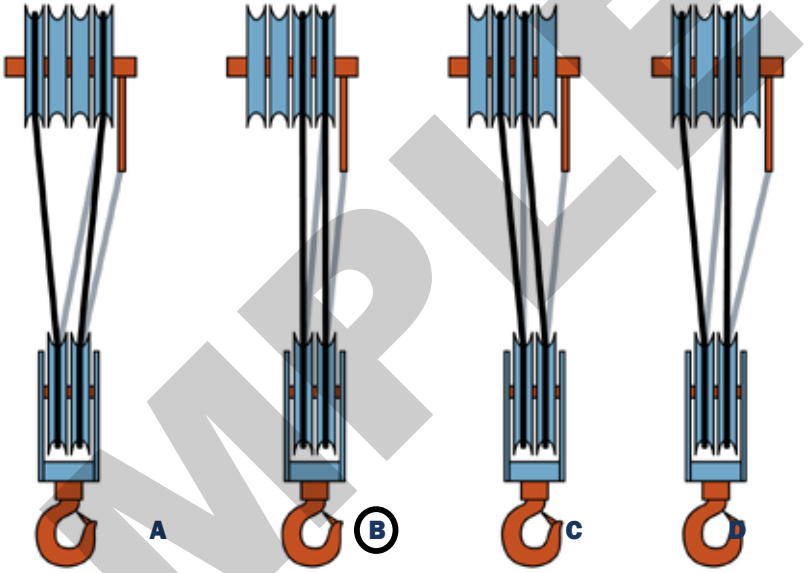


Tightly wind the bottom layers of the rope onto the drum. If it is an ungrooved drum, use a mallet with a piece of timber to tap the turns together so there are no gaps.



QUESTION 4.1 (L)

Select the diagram that shows the right way to reeve the hook block to reduce boom head torque (twisting).



Reeving tips:

- Always aim to keep the rope straight and make sure no part of the rope chafes (rubs on) another part of rope.
- If the stationary block has more than two (2) sheaves, the lead rope should be placed in the centre sheave to balance the block.

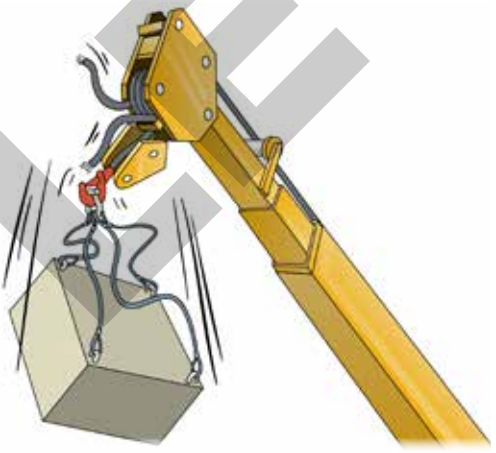
QUESTION 4.1 (M)

What damage can be caused by double blocking?

Double blocking is when the hook block hits the head sheaves. One possible cause is if the hoist limit switch/cut-out stops working.

Double blocking causes damage such as:

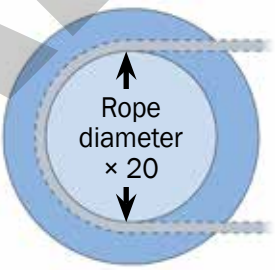
- FSWR can break
- The sheave can be damaged
- Structural damage to the crane
- The load can drop.

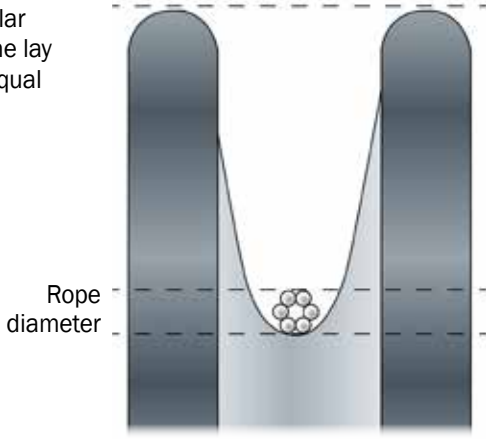


QUESTION 4.1 (N)

If you don't know the lay (construction) of the rope, how do you know what size sheave to use?

Sheaves are designed to take rope of a particular diameter and construction. If you don't know the lay of the rope, the diameter of the sheave must equal 20 times rope diameter (20 × rope diameter).



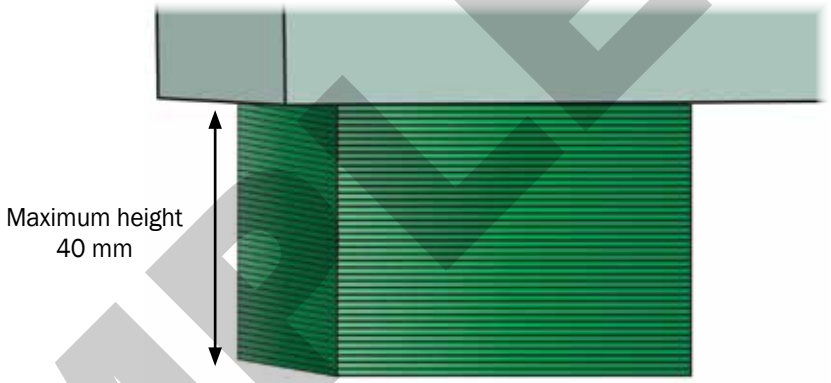


QUESTION 4.1, 4.4 (A)

You are packing shims under a tilt-up panel.

What is the maximum height of shim packing allowed?

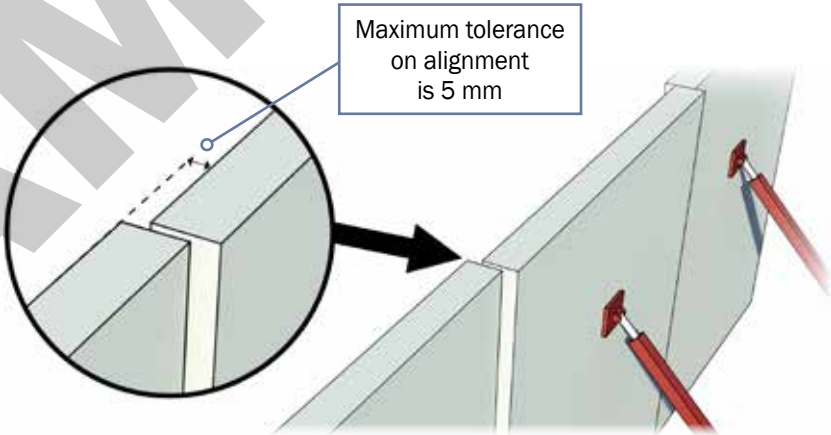
Maximum height is 40 mm



QUESTION 4.1, 4.4 (B)

When a panel has been placed in position, what variation (tolerance) on the alignment is allowed?

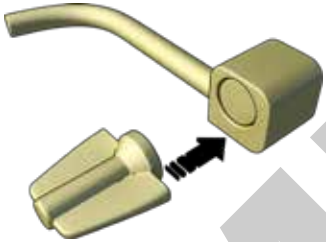
5 mm



QUESTION 4.1, 4.4 (C)

Explain some safe practices you should follow when using braces to support tilt-up panels.

Adjustable brace locking pins must be fitted with retaining devices, for example lock boxes that you need a key to open.



If you are using chemical anchors to fix braces, you must proof test all (100%) of the anchors to the working load limit (WLL).

Never remove the braces from a tilt-up panel until the roof or other supporting structure is in place.

QUESTION 4.1, 4.4 (D)

What are some of the symbols you might find on a shop drawing for a tilt-up concrete slab project?

Lifting insert

Bracing insert

Fixing insert

Panel/floor connection

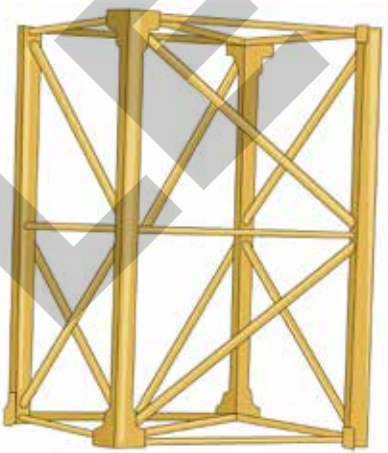
QUESTION 4.1, 4.4 (F)

You are about to erect a tower crane.

How do you know what each component (section) of the tower weighs?

You can check:

- Manufacturer's specifications
- Labels or marks on each section
- Information provided by the crane owner.



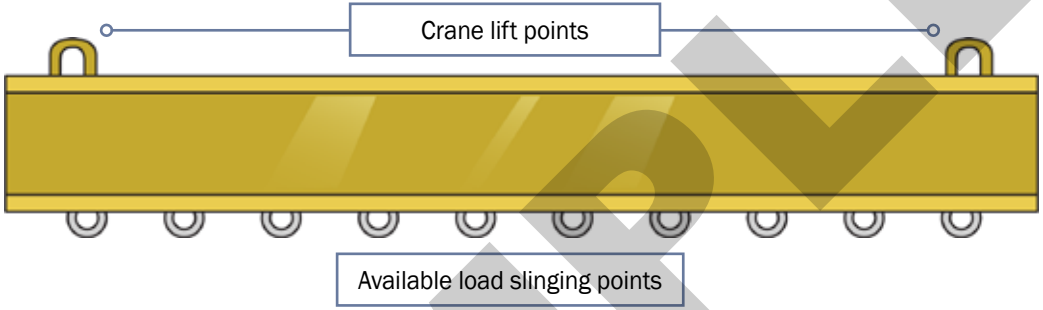
QUESTION 4.1, 4.4 (G)

How do you know how many towers you can erect on a free-standing tower crane before you need to tie it to the building?

Follow the engineer's instructions or check the manufacturer's specifications.

Two-crane lifts

When you need to lift a load such as a concrete column which is heavier than the capacity of one crane, and there is another crane of a lower capacity available, the two cranes can be used close together with an equaliser beam.



Each crane will have a different share of the load with each slinging point.

To calculate the load share in dual lifts you need to do calculations in 3 steps.

Calculation 1:

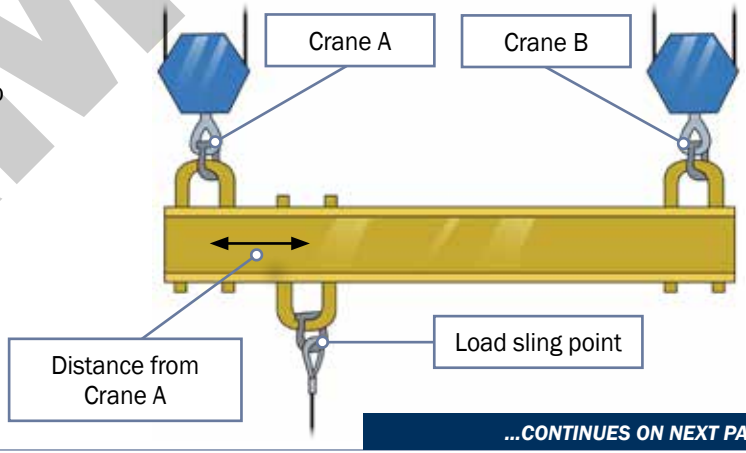
Work out the total load.

Calculation 2:

Find the slinging point distance from Crane A.

Calculation 3:

Work out the minimum capacity for Crane B.



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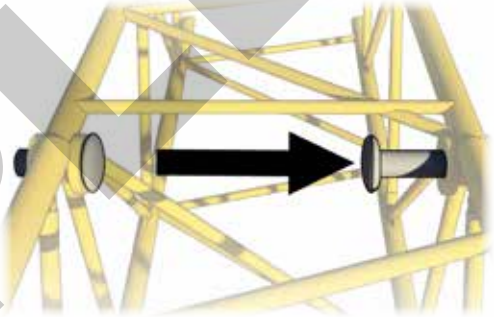
QUESTION 4.2, 4.3 (A)

You are connecting lattice boom sections for a mobile crane.

Which way do you install the pins?

You always fit the pins from the inside of the boom to the outside. The reason for this is to stop workers from getting under or inside the boom when removing the pins as the crane is being dismantled. It forces them to drive out the pins from the outside of the lattice.



QUESTION 4.2, 4.3 (B)

You are preparing for multiple crane lifts. Each crane in a multi-crane lift must have a greater capacity than its share of the load.

What extra capacity must each crane have in a 2-crane, 3-crane and 4-crane lift?

For a 2-crane lift, each crane must have capacity 20% more than its share of the load

For a 3-crane lift, each crane must have capacity 33% more than its share of the load

For a 4-crane lift, each crane must have capacity 50% more than its share of the load

QUESTION 4.3 (G)

You are about to climb an internal climbing tower crane.

How do you get the crane to equilibrium (or equalised balance) on top of the tower?

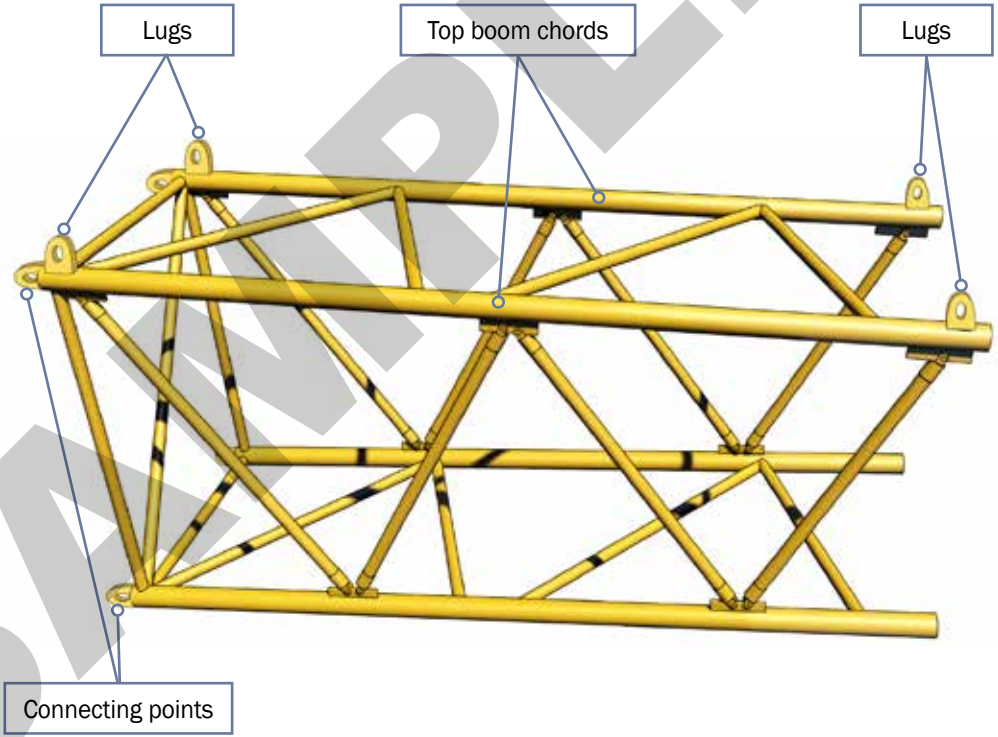
You slowly luff the boom in or out until it reaches the radius that balances the crane.

QUESTION 4.3 (H)

You want to lift boom sections as part of erecting a tower crane.

Where do you connect the slings?

- By the top boom chords
- By lifting lugs on the boom chords
- As per manufacturers specifications

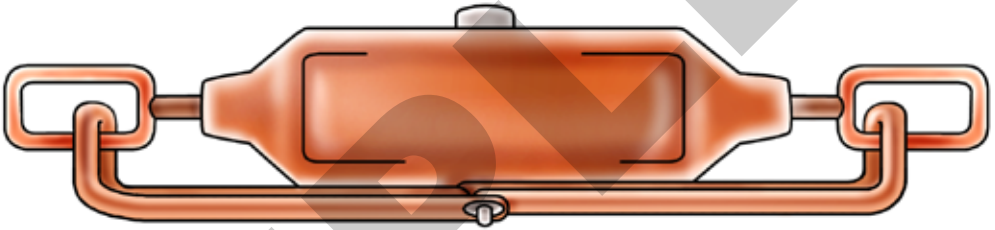


QUESTION 4.3, 4.4 (A)

Tower cranes use turnbuckles to tension (tighten) the counterweight ropes. The turnbuckles can become loose because of vibration.

How do you stop this?

Use lockable turnbuckles, for example turnbuckles with a lockable plate.



QUESTION 4.3, 4.4 (B)

When two cranes work close together to lift columns or tilt-up panels.

What rigging gear is used to share the load?

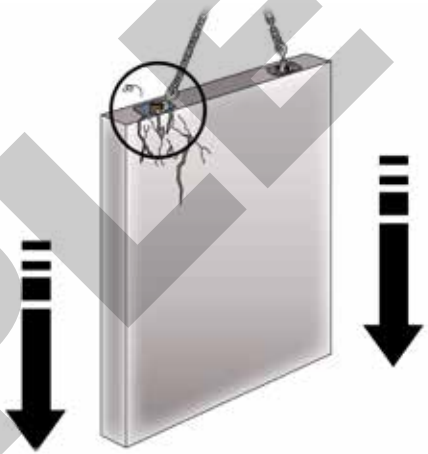
Equalising gear, for example spreader beams.

QUESTION 4.3, 4.4 (C)

Correct slinging must be used when lifting tilt-up panels.

What can happen if you use the wrong slinging method?

- The panel could be overstressed
- The panel might break

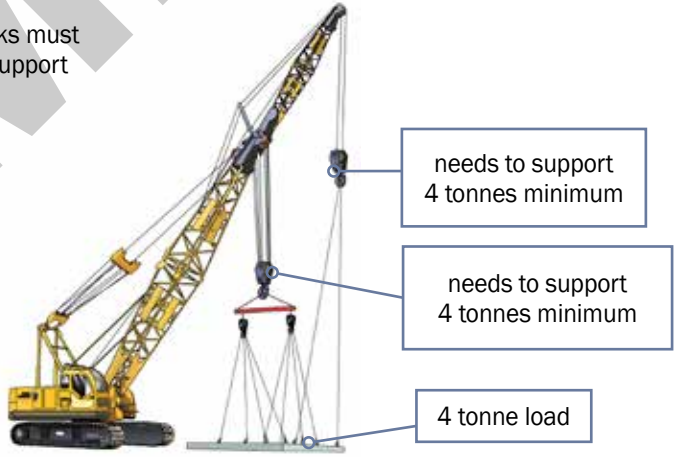


QUESTION 4.3, 4.4 (D)

You are using a single mobile crane with main hook and auxilary hook to lift and rotate a tilt-up panel.

How is the panel supported?

The main and auxiliary hooks must each have the capacity to support the weight of the panel.



COMPLETE TASK

Element 5

QUESTION 5.1, 5.2 (A)

You have finished a rigging task. There are some checks you have to do.

Can you name some of these checks?

Has the finished work been completed according to:

Safe work method statement (SWMS)

Site plans

Building and construction standards

Safe work practices

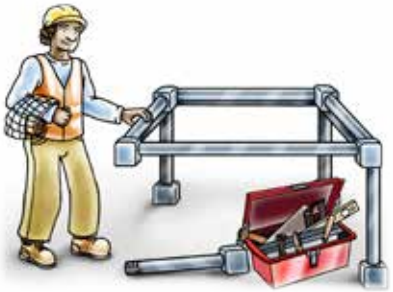
QUESTION 5.1, 5.2 (B)

After you have finished the rigging job, you need to clean up. Leaving a mess could hurt someone or cause a fire.

What are some of the things you need to clean up?

Pack up lifting gear

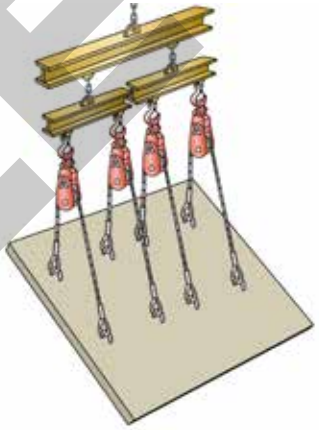
Pack up tools and equipment



QUESTION 5.2 (B)

How often should you check lifting clutches for damage and defects?

Every six (6) months.

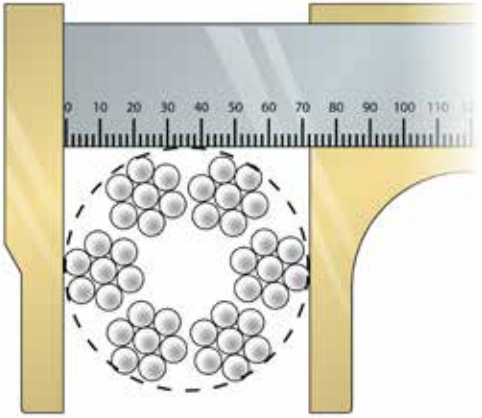


QUESTION 5.2 (C)

You check the FSWR after using it on a crane and find the rope diameter has decreased.

When should you discard it (throw it away)?

If the rope diameter has decreased to 85 per cent or less of the original diameter, you throw it away.



RIGGING INTERMEDIATE LEARNER WORKBOOK

CPCCLRG3002
Licence to perform rigging intermediate level

EASY GUIDES
Australia Pty Ltd

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Contents

What is intermediate rigging?

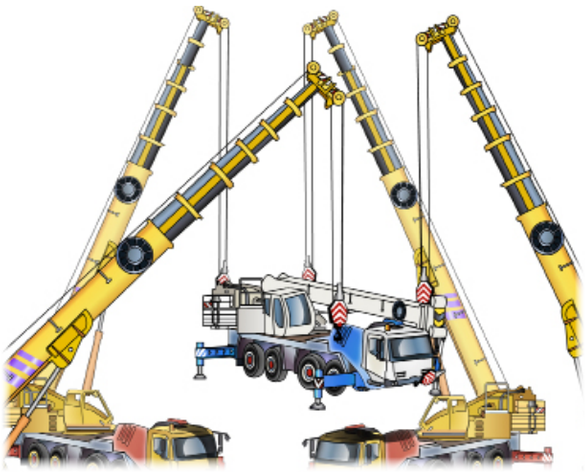
Intermediate rigging covers all the work done by riggers at the basic level and also includes:

- Rigging of cranes
- Rigging of conveyors
- Rigging of dredges and excavators
- Rigging tilt slabs
- Rigging associated with demolition work
- Dual crane lifts.

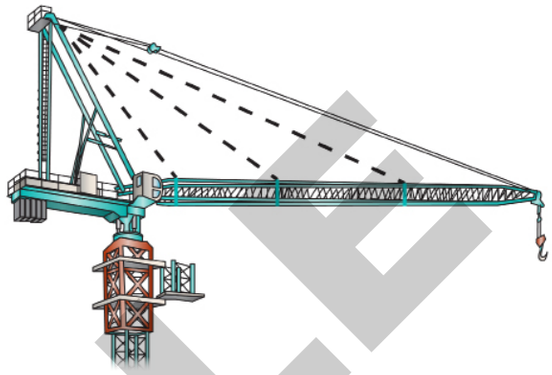
Intermediate rigging concepts

Here are some examples of work an intermediate rigger can do:

Set up and control dual and multiple crane lifts

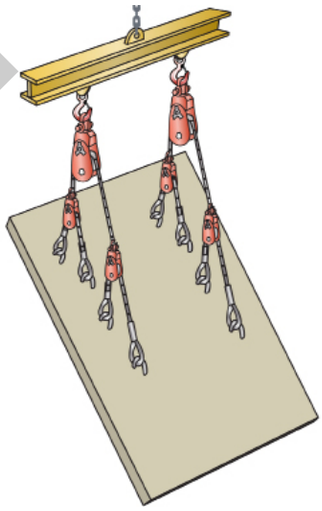


Add sections to tower cranes

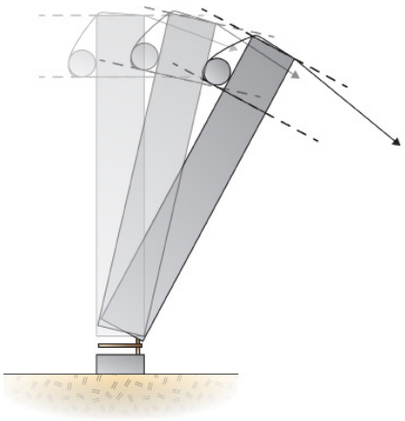


Rig mobile cranes

Set up and use load equalising gear



Conduct demolition work



Element 1

Plan Task

This element covers performance criteria:

1.1. Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.

1.2. Obtain and interpret information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.

1.3. Obtain and interpret information required to ensure that equipment inspection, use, maintenance and storage complies with manufacturer requirements.

1.4. Identify workplace and task-specific hazards and determine required risk controls and safety measures and equipment, including signs and barricades, personal protective equipment (PPE), and fall prevention and fall arrest equipment.

1.5. Identify methods of moving and placing tools, equipment and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous manual tasks.

1.6. Identify required rigging equipment and associated gear

1.7. Calculate loads associated with mechanical load shifting equipment and associated gear required to erect and dismantle structures and plant

1.8. Establish required communication methods with relevant persons

Theory Training Task 2

Performance Criteria: 1.1

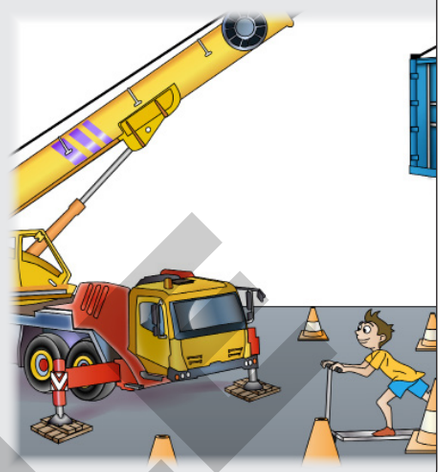
a) Name four (4) rigging tasks you cannot do as an intermediate rigger.

Theory Training Task 3

Performance Criteria: 1.4

Performance Criteria: 1.4

Identify workplace hazards



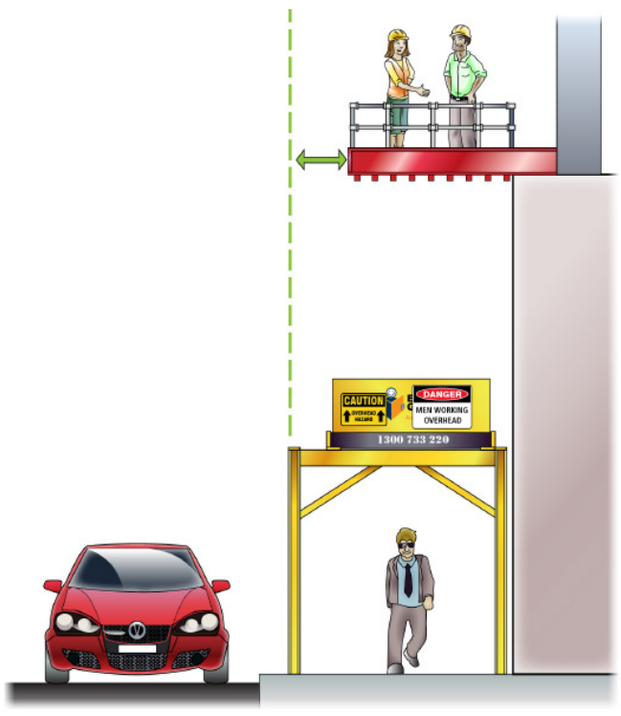
What is a hazard? A hazard is anything that can hurt you or others while you work. The government classes rigging as high risk. By law, only a licensed person can do rigging work. The licence includes knowing what workplace hazards to look for and the causes of these hazards..

Before starting any job on a worksite, it is important you talk to appropriate people to find out about any site rules, procedures or policies that may affect the way you carry out your work.

a) List three (3) people you may need to check with about site hazards and issues related to working on a site.

A rigger should know what hazards to look for in the workplace and the kinds of situations that may cause them.

You should be aware of possible hazards above head height, between ground and eye level and below ground level.



Element 2

Select and Inspect Equipment

This element covers performance criteria:

2.1. Select risk controls and equipment, including prevention and fall arrest equipment, and check that it is working and fit for purpose.

2.2. Select and check PPE.

2.3. Select rigging equipment and associated gear, inspect for defects, and isolate, tag out, report and record defective items.

2.4. Select communication equipment and check that it is working and fit for use.

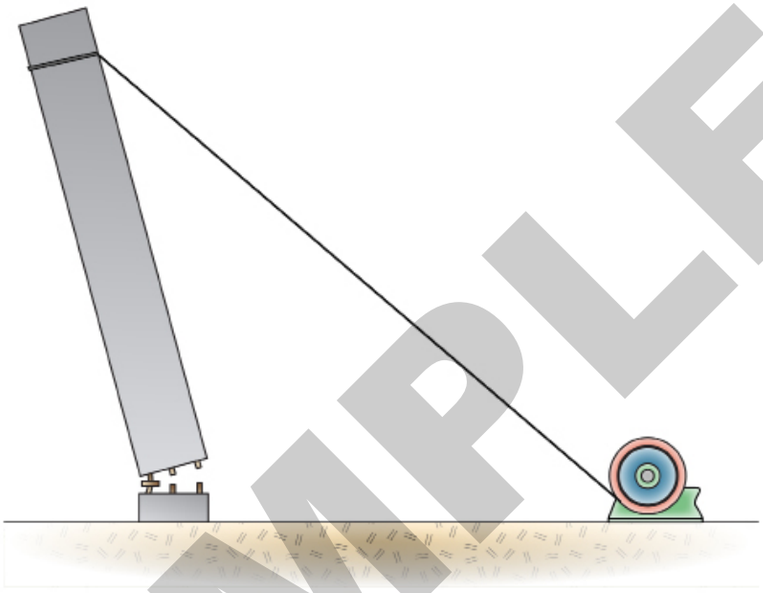
Theory Training Task 28

Performance Criteria: 1.2, 1.5, 3.4, 3.6, 5.1, 5.3

Felling

You have to fell an encased concrete column, the fell must be controlled by a winch and FSWR.

For example, the column is 330 mm square and 4.6 metres high.



Calculate the following:

1. The weight of the column in tonnes.

2. What weight must the winch support?

3. The minimum horizontal distance from the demolition work to the winch, if the vertical distance from the winch to the highest part of the concrete column is 4.6 metres.

5. Calculate how close to the FSWR or chains used in the felling operation a person may stand or work.

Show all workings for these calculations on the following pages.

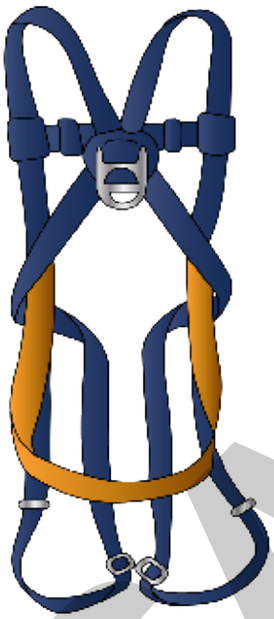
Theory Training Task 29

Performance Criteria: 1.6, 2.2

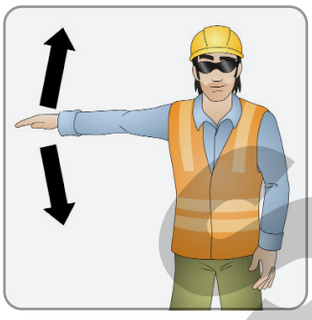
Work with your group.

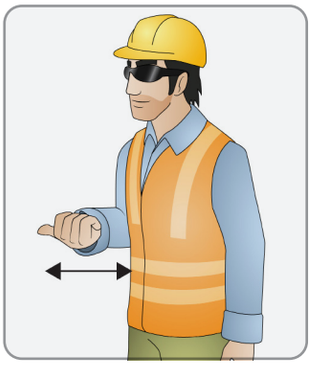
Use the sample **Working at heights rescue plan form** on the next page plus the completed **SWMS form** from the previous Practical Training Task 2 to help you develop a **rescue plan** for the tasks you will be doing.

Use your SWMS form to make sure that all the risks that were identified for working at heights are covered in the rescue plan.



3. **Match up** the **hand** and **whistle signal** with the **instruction it gives** to others on site. Draw a line from the correct signal to the matching instruction.





Hook up

Hook down

Boom up

Boom down

Boom retract

Boom extend

Slew left

Slew right

Element 3

Set up Task

This element covers performance criteria:

3.1 Establish and maintain communication with relevant persons to ensure task plan and risk controls are communicated clearly, including any impact on other workplace activities

3.2 Ensure risk controls and safety measures and equipment have been put in place, including the fitting, adjusting and anchoring of fall protection equipment

3.3 Consult with relevant persons to ensure that ground and foundation have been assessed as suitable for task

3.4 Consult with relevant persons to ensure that the structure has been assessed as suitable for load bearing task

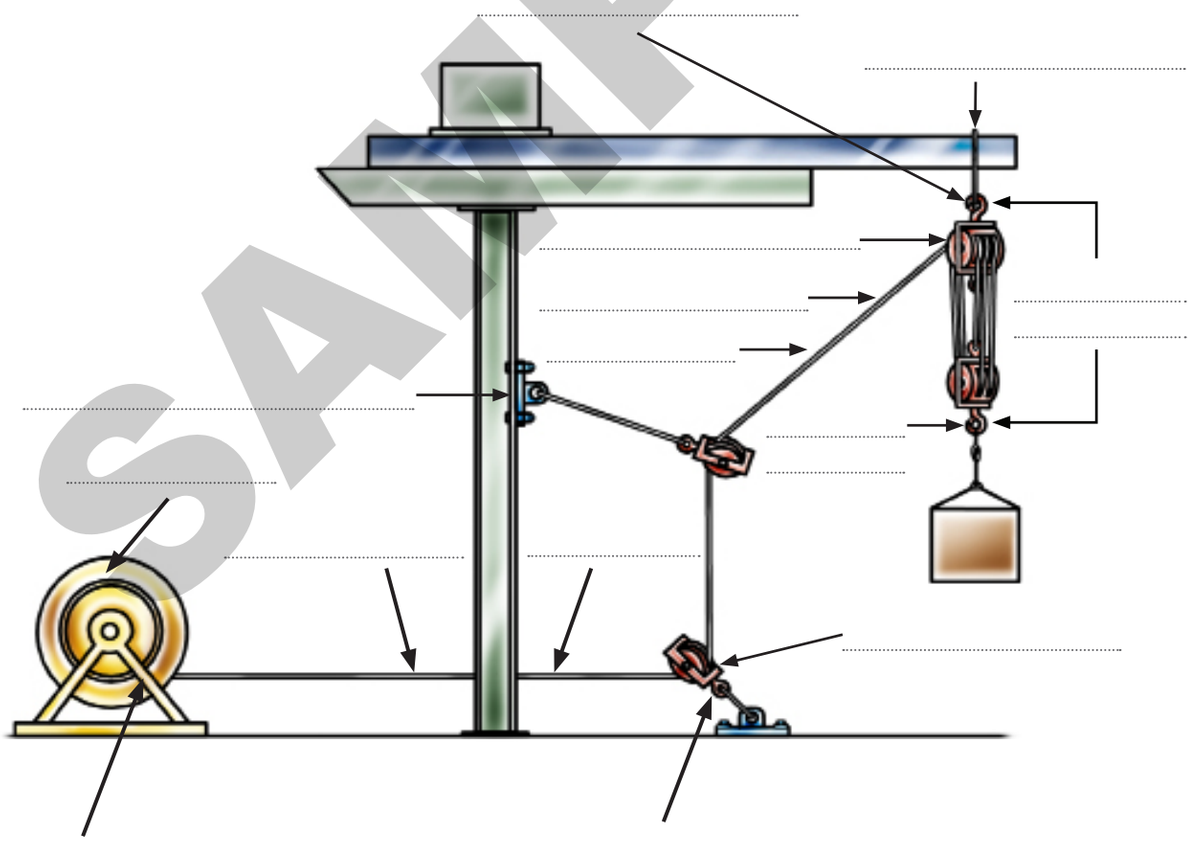
Theory Training Task 42

Performance Criteria: 3.4

A winch is a device which enables a load to be hoisted or hauled.

A wire rope runs from the winch to the load through a number of sheaves. This is called a **purchase**.

Fill in the blank labels on the winch and purchase shown below.



To set up and use a powered winch to lift a load

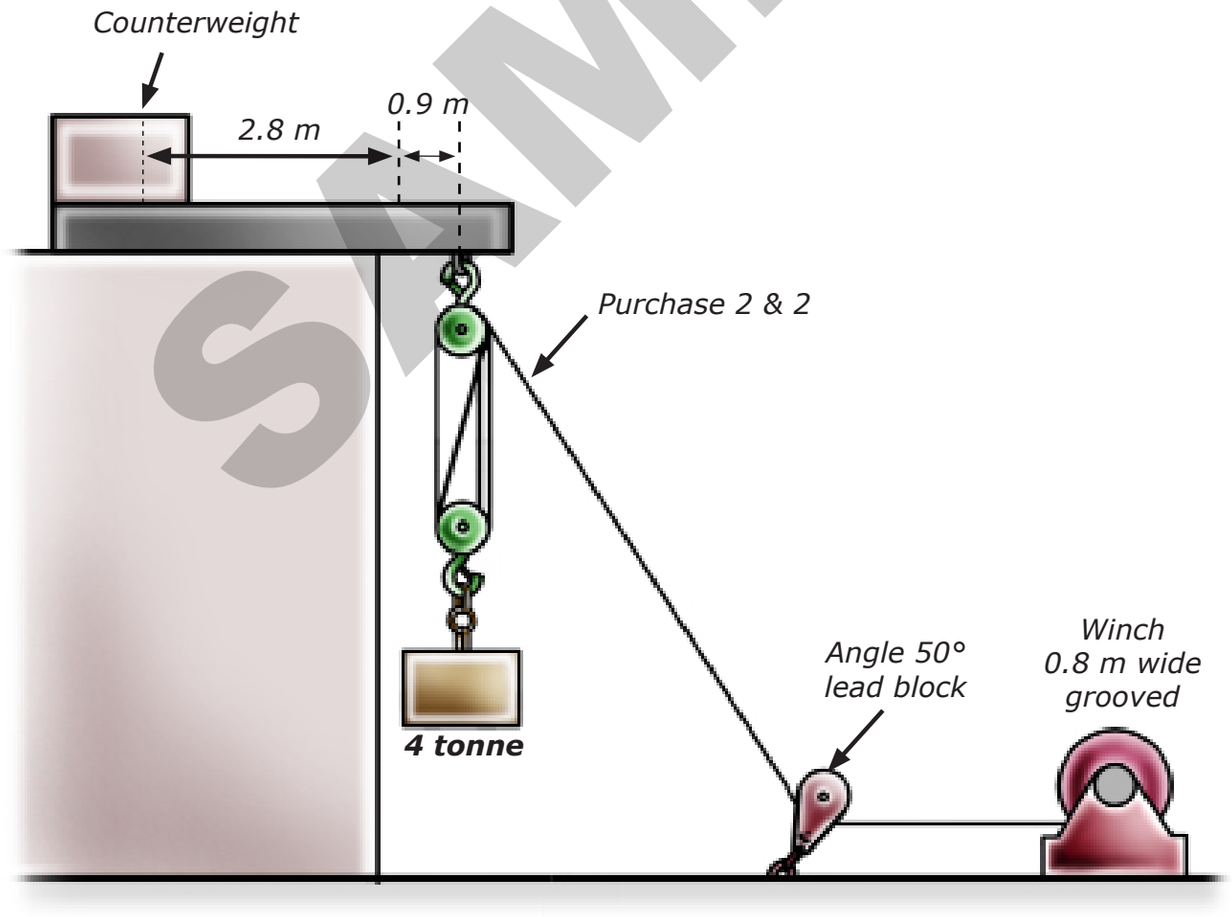
You are required to set up and use a powered winch to lift a load.

An arrangement of the winch, purchase, load and needle is shown below.

You will need to **calculate** the following. Use the information provided in **Diagram 1**.

1. The distance from the winch to the lead sheave?
2. The becket load in the purchase?
3. The lead line pull?
4. Diameter of the winch wire required? (Note: use kgs.)
5. Total head sling load?
6. Counterweight required for the needle?
7. Total load on the lead sheave?

Diagram 1



MAPPING

CPCCLSF2001 - Licence to perform basic scaffolding

Performance Evidence		Safety and Licence Guide/PowerPoint Presentation	Learner workbook	Review Questions	Practical Formative Assessment	Assessment Instrument Summative Assessment (Part 1: Knowledge Assessment)	(Part 3: Performance Assessment)
1.1	Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.	Page 14-15, 18-24	Page 22-23, 37, 66, 66, 77, 107, 109	Question 7-8, 11	Practical training task 1-2	Question 1-8	All tasks
1.2	Obtain and read information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.	Page 20-23, 25	Page 22, 33, 36, 85, 107, 109	Question 7-8, 11-12	Practical training task 1-2	Question 1-8	All tasks
1.3	Obtain and read information required to ensure that equipment inspection, use, maintenance, and storage complies with manufacturer requirements.	Page 20-22	Page 33, 36, 93	Question 8-11	Practical training task 1-2	Question 7, 12	All Tasks
1.4	Identify methods of moving and placing tools, equipment, and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous manual tasks.	Page 20-23, 26-35	Page 24-29, 33-34, 36, 123	Question 9, 12, 14-15	Practical training task 1-2	Question 7, 9-17, 38	Task 1, 3, 6A, 6B

1.5	Identify methods of moving and placing tools, equipment and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous tasks	Page 36	Page 85, 93	Question 10	Practical training task 1-2	Question 14	Task 1, 3, 6A, 6B
1.6	Identify required rigging equipment and associated gear.	Page 36-38	Page 57, 59, 61-64, 95	Question 11, 16	Practical training task 1-2	Question 21	Task 3
1.7	Calculate loads associated with mechanical load shifting equipment and associated gear required to erect and dismantle structures and plant.	Page 39-44, 108	Page 38-56, 84, 93	Question 13	Practical training task 1-2	Question 8, 18, 40, 42, 44, 54	Task 2
1.8	Establish required communication methods with relevant persons	Page 45-48	Page 65-66, 77, 97-98, 100, 111-112	Question 11, 17	Practical training task 1-2	Question 14-15, 17, 19-20, 22-23, 31, 35	Task 2, 4A, 4B, 4C, 5A, 5C, 5D,
2.1	Select risk controls and equipment and fall protection, and check that it is working and fit for purpose.	Page 50-53	Page 82-83, 93, 110-111, 138-139	Question 18-19	Practical training task 3	Question 21, 32	Task 3, 4A, 4B, 4C, 6A, 6B
2.2	Select and check PPE.	Page 51-53	Page 82-84, 95, 121	Question 16, 20	Practical training task 3	Question 12	Task 3
2.3	Select rigging equipment and associated gear, inspect for defects, and isolate, tag out, report and record defective items.	Page 50, 54-56	Page 82-84	Question 21	Practical training task 3	Question 64	Task 3, 4A, 4B, 4C, 7
2.4	Select communication equipment and check that it is working and fit for use.	Page 56	Page 97-98, 100, 111-112	Question 22	Practical training task 3	Question 19-20, 22-23, 31, 35	Task 2, 4A, 4B, 4C, 5A, 5C, 5D, 6A, 6B

3.1	Establish and maintain communication with relevant persons to ensure task plan and risk controls are communicated clearly, including any impact on other workplace activities.	Page 58-66, 119	Page 106-107, 109, 111-112	Question 23-26	Practical training task 4	Question 19-20, 22-23, 31-32, 35	Task 2, 4A, 4B, 4C, 5A, 5C, 5D, 6A, 6B
3.2	Ensure risk controls and safety measures and equipment have been put in place, including the fitting, adjusting and anchoring of fall protection equipment.	Page 59-65, 67-69, 79	Page 106-107, 110-111, 121-123, 138-139	Question 15, 24	Practical training task 4	Question 32	Task 2, 6A, 6B
3.3	Consult with relevant persons to ensure that ground and foundation have been assessed as suitable for task.	Page 70-73	Page 108	Question 24, 27-28	Practical training task 4	Question 17-18	Task 2
3.4	Consult with relevant persons to ensure that the structure has been assessed as suitable for load bearing task.	Page 74-83, 109-111, 123	Page 85, 109, 113, 116, 121	Question 29-30	Practical training task 4	Question 8, 18, 40, 42, 44, 54	Task 2
4.1	Erect and dismantle all structures and operate plant while maintaining stability, in accordance with workplace and manufacturer requirements.	Page 76-79, 86-105	Page 125-127, 129, 131-132, 134	Question 31-33	Practical training task 5	Question 24-25, 36, 55, 62-63	Task 6A, 6B
4.2	Conduct a multiple-crane lift.	Page 80-81, 106-112	Page 128, 134	Question 34	Practical training task 5	Question 40-43	Task 5A
4.3	Erect and dismantle a tower crane section or a crane lattice boom section.	Page 96-101, 112-121	Page 128, 134	Question 35	Practical training task 5	Question 24-34, 36-39	Task 4A, 4B
4.4	Lift and install a series of tilt-up concrete panels.	Page 66, 76-78, 82-83, 102-105, 120-126	Page 126-127, 130, 134	Question 36	Practical training task 5	Question 21, 25, 44-53	Task 6A, 6B