Model Answers

Domain	Forestry > Forest Silvicultural Operations				
Unit	6950	v6	Demonstrate knowledge of thinning plantation trees and equipment used	Level 3	Credits 5

Entry information

There are no pre-requisite requirements for this unit.

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Assessment instructions

You will need to be able to show you can:

- Demonstrate knowledge of thinning plantation trees.
- Demonstrate knowledge of equipment used for thinning plantation trees.

Important information

- Carefully read through the rest of this Assessment so you know exactly what is expected.
- All evidence you provide for this assessment must be your own work.
- Clearly name and label all attached evidence.

What you need to do

Question Set 1 – Selecting the Right Trees
Question Set 2 – Thinning Considerations
Question Set 3 – Timing
Question Set 4 – Thinning Equipment

You can also attach additional evidence which shows you have the required skills and knowledge, e.g. photos, worksite documents, checklists, work samples, videos.

Unit standard information

Definitions

- *Accepted industry practice* – approved codes of practice and standardised procedures accepted by the wider forestry industry as examples of best practice.

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Unit standard evidence map

Unit 6950 v6	Demonstrate knowledge of thinning plantation trees and equipment used	Level 3	Credits 5
Outcomes and Performance Criteria		**Evidence**	**No.**
Outcome 1:	Demonstrate knowledge of thinning plantation trees.		
1.1	Basic thinning terminology is described in accordance with accepted industry practice. Range: cull trees, crop trees, final crop tree, canopy gap trees, posting, stem diameter, stocking, brushing, hang ups, stems per hectare (SPH), scar damage, stump heights, scarf, back cut.	Question Set 2	1
1.2	The purpose of thinning is explained in terms of the effect on the final crop in accordance with accepted industry practice.	Question Set 1	1
1.3	Factors which may influence whether a stand is waste or production thinned are explained in accordance with accepted industry practice. Range: terrain, market for products, cost, tree species.	Question Set 2	2
1.4	Selection criteria for thinning are described in accordance with accepted industry practice. Range: form, dominant trees, spacing, stocking, tree health.	Question Set 1	2
1.5	Factors affecting the timing of thinning are explained in accordance with accepted industry practice. Range: may include but is not limited to – branch size, stem growth and height, stem stability, wind blow, wood quality, job ease, hindrance level, cost, damage, disease; evidence of six is required.	Question Set 3	1
1.6	The importance of directional felling in thinning operations is described in accordance with accepted industry practice. Range: may include but is not limited to – stem damage, hang-ups, extraction, roadways, waterways, drop tree damage, working of the block; evidence of five is required.	Question Set 2	3

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1.7	The interrelationships between thinning and other operations are explained in accordance with accepted industry practice. Range: impact of thinning on pruning, impact of pruning on thinning operations.	Question Set 3	2,3
1.8	The consequences of poor selection and quality in a thinning operation are described in terms of the quality and value of the final crop.	Question Set 3	4
Outcome 2:	Demonstrate knowledge of equipment used for thinning plantation trees.		
2.1	Equipment used for thinning is named and its function explained in accordance with accepted industry practice.	Question Set 4	1
2.2	Stand factors affecting the choice of equipment for thinning are explained in accordance with accepted industry practice.	Question Set 4	2

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Question Set 1 – Selecting the Right Trees

These questions are about the purpose of thinning and selection criteria.

Use your own words. Your assessor may ask you more questions to check your understanding.

Judgement statement

☐ Answers are in accordance with accepted industry practice.

1. Explain the effect thinning has on the final crop. ☑

Assessor

This question supports PC 1.2.

Judgement statement

☐ The candidate correctly explains the purpose of thinning in terms of the effect on the final crop.

Example answer

May include but is not limited to:

- Increased stem diameter growth.
- Increased crop volume.
- Improved crop quality.
- Increased crop value.
- Improved tree health.

2. Describe the thinning selection criteria for each of the listed factors. ☑

Assessor

This question supports PC 1.4.

Judgement statement

☐ The candidate correctly describes the selection criteria for thinning.

Example answers

Form
Allowable measurements for sweep, butt sweep, double leaders and kink are in the job prescription.

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Dominant Trees
Dominant trees of good form are to be selected first.
Spacing
Minimum spacing is described in the prescription, usually more than 2 metres.
Overall stocking
The minimum and maximum range for stocking is given in the prescription and must be achieved.
Tree health
Trees with healthy green needles and good growth will be selected before suppressed and unhealthy trees.

Assessor – record key points from candidate's verbal answers as accurately and fully as possible.		
These answers were written by:	☐ Candidate	☐ Assessor

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Question Set 2 – Thinning Considerations

These questions are about basic terminology, waste and production thinning and directional felling.
Use your own words. Your assessor may ask you more questions to check your understanding.

Judgement statement

☐ Answers are in accordance with accepted industry practice.

1. Describe what each thinning term means. ☑

Assessor

This question supports PC 1.1.

Judgement statement

☐ The candidate correctly describes each term.

Example answers

Thinning Term	Meaning
Cull trees	Trees that are removed during thinning.
Crop trees	All live standing trees from which the final crop is selected.
Final crop trees	The trees selected for harvest at clearfell.
Canopy gap trees	Large trees with thick canopies or foliage coverings.
Posting	Cutting a hung-up tree into short lengths to bring it to the ground.
Stem diameter	Diameter measured at 1.4m from the ground on the uphill side. Also referred to as DBH – diameter at breast height.
Stocking	Number of trees in an area of forest.
Brushing	Using a cull tree to brush past and bring down a hung-up tree.
Hang-ups	A tree that has not completely fallen as it is resting in another tree.
Stems per hectare (SPH)	The number of trees within one hectare of forest.
Scar damage	Damage to standing tree when bark is removed.

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Stump height	The distance from the ground on the uphill side of the stump to the top of the stump.
Scarf	Notch cut in tree to establish its direction of fall.
Back cut	Final felling cut, the back cut will progress until the tree starts to fall in its intended direction or the hingewood is reached.

2. How do the following factors influence whether a stand is waste or production thinned? ☑

Assessor

This question supports PC 1.3.

Judgement statement

☐ The candidate correctly explains how each factor influences whether a stand is waste or production thinned.

Example answers

Terrain
Trees on steep terrain (cable harvesting) tend to be waste thinned because of high extraction and processing costs versus low recovered value, and high potential for residual stand damage.
Market for products
There must be a profitable market for products for production thinning to be viable, i.e. posts and pulp.
Cost
Waste thinning is cheaper than production thinning as no extraction and processing is required. Less operational costs with no machines required to extract and process the thinned trees. Production thinning allows the forest owner to receive some income before the final crop is harvested.
Tree species
Higher quality trees are selected for production thinning. This usually occurs when the trees are between 12 and 18 years old. Thin to waste usually occurs between the age of 3 and 12.

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3. Name **five** reasons why it is important to direction fell when thinning. ☑

Reasons may include:

- Stem damage, hang-ups, extraction, roadways, waterways, drop tree damage, working of the block, other (please write).

Assessor

This question supports PC 1.6.

Judgement statement

☐ The candidate correctly describes the importance of directional felling when thinning for six factors.

Example answers

Reason 1:	Stem damage
Why it is important So the stem is not damaged when falling to the ground.	
Reason 2:	Hang-ups
Why it is important So that the tree falls in a certain direction depending on its lean.	
Reason 3:	Extraction
Why it is important So that the butts are all facing the same way.	
Reason 4:	Roadways
Why it is important To ensure that trees fall away from the roadway.	
Reason 5:	Waterways
Why it is important To keep felled trees out of streams, creeks, river etc.	

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Question Set 3 – Timing

These questions are about factors that affect thinning.

Use your own words. Your assessor may ask you more questions to check your understanding.

Judgement statement

☐ Answers are in accordance with accepted industry practice.

1. Name **six** factors that affect when to thin. ☑

   Factors may include:

   - Branch size, stem growth and height, stem stability, wind blow, wood quality', job ease, hindrance level, cost, damage, disease, other (please write).

Assessor

This question supports PC 1.5.

Judgement statement

☐ The candidate correctly explains factors that affect the timing of thinning.

Example answers

Factor 1:	Wood quality
How it affects when to thin Removing the smaller, weaker and poorer quality trees allows better growth for the remaining trees resulting in greater volume of quality and larger diameter trees.	
Factor 2:	Wind blow
How it affects when to thin Each tree is protected by neighbouring trees and its root system develops just enough to provide adequate anchorage in sheltered conditions. Thinning suddenly introduces gaps which can cause roots to be unable to provide adequate anchorage resulting in windthrow.	
Factor 3:	Stem growth and height
How it affects when to thin Correct thinning (timing and degree) will increase the stem diameter growth in the stand by decreasing competition for light, water and nutrients.	

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Factor 4:	The cost of thinning
How it affects when to thin The later the thinning operation, the greater the cost. This may be offset by producing saleable products from the thinning.	
Factor 5:	Damage to the trees
How it affects when to thin Where unacceptable damage to the trees is present in a stand, thinning may be used to remove the damaged trees.	
Factor 6:	Disease
How it affects when to thin Where unacceptable tree suppression or disease is present in a stand, thinning may be used to reduce competition and/or remove diseased trees.	

2. What is the impact of thinning on pruning? ☑

Assessor

This question supports PC 1.7.

Judgement statement

☐ The candidate correctly explains the impact of thinning on pruning operations.

Example answer

If the thinning is completed before the pruning, then branch growth may accelerate thereby increasing pruning workloads and costs.

Or

Good thinning will assist pruning selection by removing poor quality trees but will increase walk hindrance in the block.

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3. What is the impact of pruning on thinning? ☑

Assessor

This question supports PC 1.7.

Judgement statement

☐ The candidate correctly explains the impact of pruning on thinning operations.

Example answer

If the pruning is completed before the thinning then final crop tree selection will have been made.

4. If there is poor selection and quality in the thinning operation what can happen to the quality and value of the final crop? ☑

Give **four** consequences.

Assessor

This question supports PC 1.8.

Judgement statement

☐ The candidate correctly describes **four** consequences of poor selection and quality in a thinning operation.

Example answers

May include but is not limited to:

- Damage to the residual stand.
- Incorrect tree spacing and stocking rate, therefore increasing branch size.
- Late thinning may result in unacceptable wind damage.
- Incorrect tree selection for form/quality.
- Suppressed diameter height growth.
- Serious loss of crop value.

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Question Set 4 – Thinning Equipment

These questions are about the equipment used for thinning plantation trees.

Use your own words. Your assessor may ask you more questions to check your understanding.

Judgement statement

☐ Answers are in accordance with accepted industry practice.

1. List **five** types of thinning equipment and describe what each is used for. ☑

Assessor

This question supports PC 2.1.

Judgement statement

☐ The candidate correctly names and describes the function of **five** types of thinning equipment.

Example answers

Thinning equipment	Use
Chainsaw	Used to clear hindering vegetation and fell the cull trees.
Wedges	Used to control weight distribution in a partially cut tree and assist in controlling the direction of tree fall.
Hammer/maul	Used to drive in wedges.
Scrub cuter	Used to thin very young stands (i.e. naturally regenerating stands of very high stocking).
Felling lever	Used to assist with directional felling and bringing down hung-up trees.
Machines	Used for machine assist production thinning on fence lines and protected areas or for felling dangerous trees.

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2. How do the following stand factors affect the choice of equipment you would use for thinning? ☑

Assessor

This question supports PC 2.2.

Judgement statement

☐ The candidate correctly explains the stand factors affecting the choice of thinning equipment.

Example answers

Stand factors	Equipment I would use and why
Size of trees	I would use chainsaws for larger trees, scrub cutter for smaller trees.
Hindrance	I would use scrub cutters, a slasher, or chainsaw depending on the type of hindrance. For example, a chainsaw for larger native scrub and a scrub cutter for smaller native vines.
Windblow	I would use a harvesting machine because it is safer than manual thinning.
Fence lines and waterways	I would use a machine assist to keep trees off fences and protected areas in production thinning operations.

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