

National Certificate in Building, Construction and Allied Trades Skills (BCATS)
Teacher Information & Resources

**Demonstrate knowledge of timber
and other construction materials
used in BCATS projects**

Unit Standard – 24360

Level 2, Credit 5





Teaching and assessment tips

Intent – The intent of the unit standard is that the learner is able to show that they understand

- the different types of timber, and
- the parts and structure of a variety of trees.
- the different strengths and qualities of sawn timber.

They need to be able to identify common defects in timber and identify causes of these defects.

A broad knowledge of the processes for conversion, treatment, handling and storage of timber is also required.

The learner must understand a range of other materials used in construction and identify their use, and how they are handled and stored.

The skills and knowledge required for this unit standard are best assessed using the worksheet provided.

A worksheet (and model answers) to be used for assessment of this unit standard are included in this document.

Assessment



Assessment of this unit standard consists of:

- Completion of the worksheet

Worksheet US 24360

Student Name: _____

1. Explain the following terms:

a) Indigenous

b) Exotic:

c) Imported:

2. Using the list provided below, identify a timber that matches with each of the following terms:

Radiata pine
NZ kauri

Rimu
Totara

Tawa
Douglas fir

Fijian kauri
Kwila

a) Indigenous:

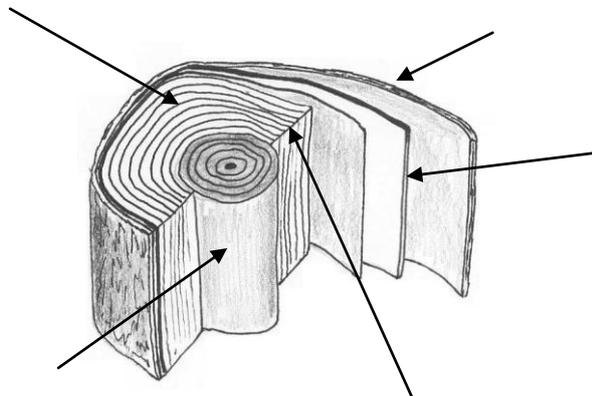
b) Exotic:

c) Imported:

d) Hardwood:

e) Softwood:

3. In the spaces provided, identify the parts of the log.



- 4. Two samples of freshly cut timber are shown below.

In the space provided, sketch the effects of shrinkage on each of the samples.

Sample A	Plain, flat or tangential sawn

Sample B	Quarter or radial sawn

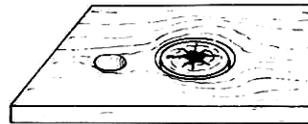
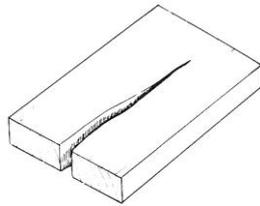
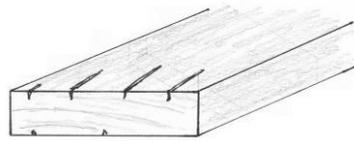
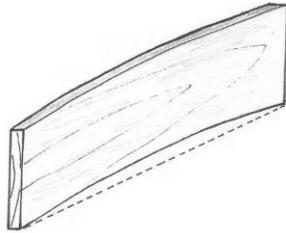
- 5. Of the two samples provided above which will provide:

- The greatest stability?
- The strongest beam?
- The hardest wearing surface?

- 6. A large knot is running through the face of a board. Identify the effects that the knot will have on the working and structural qualities of the timber.



7. Identify the following defects



8. What are the signs that timber is affected by:

a) Borer:

b) Wet rot:



9. Give 4 reasons why timber can deteriorate and describe the effect each will have?

Reason	Effect



10. What is the difference between rough sawn and dressed timber?

11. What is the difference between air seasoning and kiln seasoning timber?

Air seasoning:

Kiln seasoning:

12. Complete the following table:

Type of timber treatment	How is it applied to the timber?	When is the treated timber used?
Boron salts		
Copper-chrome-arsenate (CCA)		
Light organic solvent-borne preservative (LOSP)		

13. Answer the following questions about safe working and handling procedures for timber.

a). List 3 requirements needed when stacking timber.

b). List 3 precautions to be taken when handling treated timber.

c). Why should treated timber not be used for food containers or burnt in fire places?



14. Why should fillets be placed between the boards when seasoning?

15. Describe the consequences of storing timber in direct contact with the ground.

16. Choose 3 construction materials from different categories shown below, and complete the following tables:

- metals
- glass
- composite materials
- plastics
- manufactured boards
- concrete

Material 1 name:	
What is it made of?	
What are its basic structural properties?	
How is it used (ie what can it be used for)?	
What are 2 tips for handling/working with it safely?	<ul style="list-style-type: none"> • •
Describe any special handling requirements?	
How should it be stored?	





Material 2 name:	
What is it made of?	
What are its basic structural properties?	
How is it used (ie what can it be used for)?	
What are 2 tips for handling/working with it safely?	<ul style="list-style-type: none"> • •
Describe any special handling requirements?	
How should it be stored?	

Material 3 name:	
What is it made of?	
What are its basic structural properties?	
How is it used (ie what can it be used for)?	
What are 2 tips for handling/working with it safely?	<ul style="list-style-type: none"> • •
Describe any special handling requirements?	
How should it be stored?	

Assessor Sign off:

Assessor name:	RESULT: A = Achieved, N = Not Yet Achieved
Assessor signature:..... Date:.....	

US 24360

Demonstrate Knowledge of Timber and Other Construction Materials Used in BCATS Projects

(Level 2, Credit 5)

Worksheet Model Answers

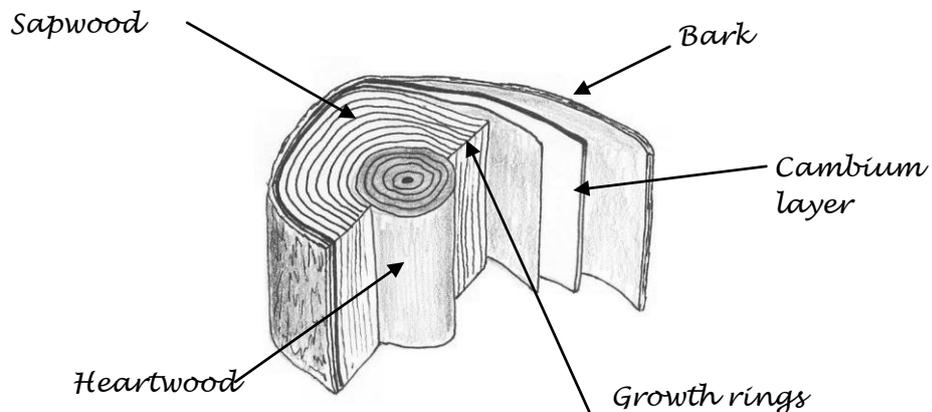
1. Explain the following terms:
 - a. Indigenous *Trees that are native to New Zealand*
 - b. Exotic *Trees that are native to another country, grown in New Zealand.*
 - c. Imported *Imported timber is grown in another country and brought into New Zealand in a finished state*

2. Using the list provided below identify a timber that matches with each of the following terms:

Radiata pine	Rimu	Tawa	Fijian kauri
NZ kauri	Totara	Douglas fir	Kwila

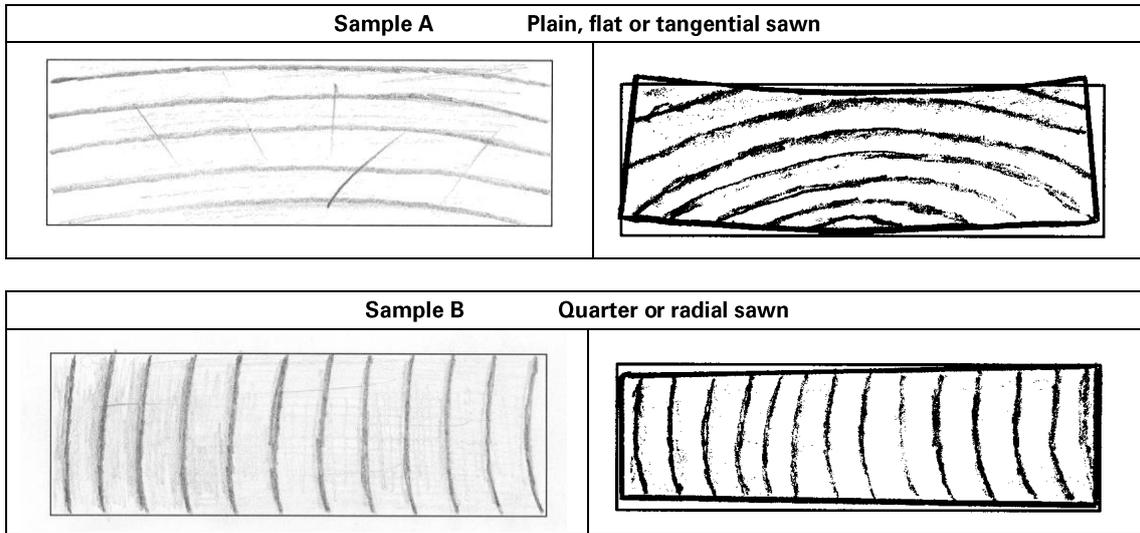
 - a. *Rimu, Tawa, NZ kauri, totara (any one of the answers provided).*
 - b. *Radiata pine, Douglas fir.*
 - c. *Fijian kauri, kwila.*
 - d. *Tawa, kwila.*
 - e. *Radiata pine, rimu, Fijian kauri, NZ kauri, totara, Douglas fir.*

3. In the spaces provided, identify the parts of the log.



4. Two samples of freshly cut timber are shown below.

In the space provided, sketch the effects of shrinkage on each of the samples



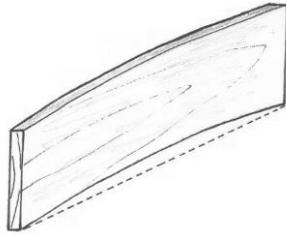
5. Of the two samples provided above which will provide:

- The greatest stability? **B**
- The strongest beam? **A**
- The hardest wearing surface? **B**

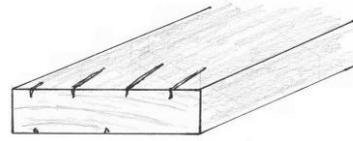
6. A large knot is running through the face of a board. Identify the effects that the knot will have on the working and structural qualities of the timber.

The irregular grain pattern around the knot will reduce the strength of the timber as well as making it more difficult to obtain a good finish.

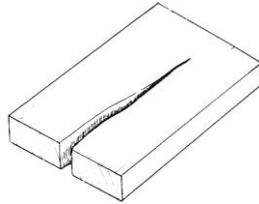
7. Identify the following defects:



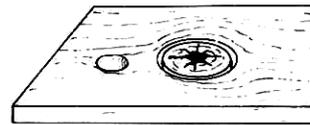
warp



Check



Split



Knot

8. What are the signs that timber is affected by:

a. Borer?

Small tunnels of varying lengths running along the grain. Flight holes appear on the darker side of the infested timber.

b. Wet rot?

The timber is soft, with a bleached, fibrous appearance.

9. Give 4 reasons why timber can deteriorate and describe the effect each will have?

Reason	Effect
<i>Exposed to weather</i>	<i>Discoloration and destroys wood fibres making it weak.</i>
<i>Stored incorrectly</i>	<i>Deforms or bends timber</i>
<i>Rot or insect damage</i>	<i>Destroys wood fibres, changes the appearance</i>
<i>Not seasoned</i>	<i>Timber is heavy and difficult to work</i>
<i>High moisture content</i>	<i>Will result in timber expanding and contracting as moisture content fluctuates</i>

10. What is the difference between rough sawn and dressed timber?

Rough sawn timber has a rough surface. Dressed timber is machined so it is smooth.

11. What is the difference between air seasoning and kiln seasoning timber?

Air seasoning - *The boards are stacked with spaces both horizontally and vertically between them to allow for natural air flow over a period of time to dry the boards out.*

Kiln seasoning - *The boards are stacked in the same manner as air seasoning and placed in a kiln that heats the timber to dry out the moisture.*

12. Complete the following table:

Type of timber treatment	How is it applied to the timber?	When is the treated timber used?
Boron salts	<i>Freshly sawn unseasoned timber is soaked in solutions of boron salts then the timber is allowed to dry.</i>	<i>Used where the main hazard is insect attack but also has valuable anti-fungal action.</i>
Copper-chrome-arsenate (CCA)	<i>Chemicals forced into the timber under high pressure.</i>	<i>Because the treatment is resistant to leaching, it can be used on timber that will be exposed to the elements or used in-ground.</i>
Light organic solvent-borne preservative (LOSP)	<i>A solution of fungicides and/or insecticides in a light organic solvent, such as white spirit, is applied by a vacuum process.</i>	<i>Unchanged in appearance and does not swell with the treatment so it is used for external joinery such as windows, and house framing.</i>

13. Answer the following questions about safe working and handling procedures for timber.

a). List 3 requirements needed when stacking timber

Keep clear of the ground.

Stack on aligned bearers and filleted above the support bearers.

Cover to protect from the elements.

b). List 3 precautions to be taken when handling treated timber

Wear protective clothing.

Wash hands before eating and drinking.

Allow solvent damp timber to dry before using.

Wash work clothes separately.

Ventilate work spaces.

c). Why should treated timber not be used for food containers or burnt in fire places.

Because treated timber contains chemicals that can cause long term health problems in people.

14. Why should fillets be placed between the boards when seasoning?

Fillets should be spaced between the boards at even spacings to allow for air circulation around the timber.

15. Describe the consequences of storing timber in direct contact with the ground.

The timber will absorb moisture.

The timber may swell.

The timber may rot.

Stones and other foreign objects may become imbedded in the face of the timber (This will damage cutter heads when machining.)

16. Choose 3 construction materials, other than timber, and complete the following:

Note to assessor: As this requires student choices, a definitive model answer is not possible. You must rely on your expertise and judgement. Broad information on these topics for materials is included in the student resource.

Oral Questions & Answers

1. Name an indigenous timber that is commonly used for high quality furniture making.

Heart rimu or kauri.

2. Name the most commonly used exotic timber for construction in New Zealand.

Radiata pine.

3. Identify three advantages of using seasoned timber over unseasoned timber

Greater stability. Timber is stronger, lighter and harder with greater stability. Less corrosive to nails.

4. Identify two methods of seasoning timber.

Air dried - natural seasoning.

Kiln dried

5. What is moisture content within timber?

It is the amount of moisture that is contained within the cell walls

6. Identify two methods of determining the moisture content in timber.

Moisture meter method.

Oven dry method.

7. What effects would the following defects have on timber?

Knot

Loss of strength.

Irregular grain pattern.

Split

Loss of strength.

Lower visual appearance.

Warp

An uneven surface - the sides of the timber deviate from a flat surface.

8. Name a type of timber destroying insect that is commonly found in New Zealand.

Borer.

9. Describe the measures that should be taken if timber infested with wood destroying insects is discovered in a job.

Remove infested timber and replace with treated timbers. Check the surrounding timbers for signs of additional infestation.

10. Identify 2 means of preventing fungal growth in timber

Use treated timber.

Keep the timber dry with moisture content below 20%.

Maintain adequate ventilation.

11. What are the four main ingredients that are needed to produce concrete?

Cement.

Aggregate.

Sand.

Clean water.

Assessment Schedule

US 24360 Demonstrate knowledge of timber and other construction materials used in BCATS projects (Level 2, Credit 5)

Outcome 1	Demonstrate knowledge of types and structure of timber.	Assessment evidence and judgement
ER 1.1	Types of timbers are described.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q1, Q2 showing knowledge of indigenous, exotic, imported, hardwood, and softwood is correct.
ER 1.2	The parts and structure of a tree are identified.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q3 showing identification of bark, cambium layer, sapwood, heartwood, growth rings, and knots is correct.
ER 1.3	The strength and working qualities of sawn timber boards are described.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q4, Q5 showing description of the strength and working qualities of tangential and quarter sawn timber is correct.
Outcome 2	Demonstrate knowledge of common defects in timber.	Assessment evidence and judgement
ER 2.1	Common structural defects in timber are explained.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q6, Q7 showing explanation of structural defects (knots, splits, checks, warps).in timber is correct.
ER 2.2	Common forms of insect and fungal attack are identified and described in terms of the resulting deterioration of timber. .	<ul style="list-style-type: none"> Evidence gathered from worksheet Q8 showing description of insect and fungal attack, including common house borer, wet rot, on timber is correct.
ER 2.3	Common environmental causes of timber deterioration are identified and described.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q9 showing description of environmental causes on timber deterioration is correct.
Outcome 3	Demonstrate knowledge of the conversion, treatment, handling and storage of timber.	Assessment evidence and judgement
ER 3.1	The process of conversion is described.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q10 showing description of the process of conversion, including rough sawn and dressed, is correct.
ER 3.2	Methods of seasoning of timber are described.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q11 showing description of air and kiln drying timber is correct.
ER 3.3	Types of preservation treatment for building timbers are described and the applications of each are explained.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q12 showing knowledge of: Boron salts, Copper Chrome Arsenate, and Light Organic Solvent Preservativesare correct.
ER 3.4	Safe working and handling procedures when working with timber are explained.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q13 showing explanation of safe working and handling procedures is correct.
ER 3.5	Basic storage and care of timber is explained.	<ul style="list-style-type: none"> Evidence gathered from worksheet Q14, Q15 showing explanation of basic storage and care of timber is correct.
Outcome 4	Demonstrate knowledge of other construction materials. Range: three of – metals, glass, concrete, composite materials, plastics, manufactured boards.	Assessment evidence and judgement
ER 4.1	The structural properties and basic uses of the materials are explained.	Evidence gathered from worksheet Q16 showing; <ul style="list-style-type: none"> Explanation of the structural properties and uses of 3 construction materials from the range statement is correct. Explanation of the safe working and handling procedures for 3 construction materials from the range statement is correct. Explanation of the storage and care for 3 construction materials, other than timber from the range statement is correct.
ER 4.2	Safe working and handling procedures for the materials are explained.	
ER 4.3	Basic storage and care of the materials are explained.	