

# Measuring and plans

## What you will learn

When you have finished this session, you should be able to:

- Read simple construction plans.
- Say why plans are important.
- Measure and mark timber to fit a plan.
- Work out the amount and cost of timber for a simple plan.

# What types of plans do we use?

Traditional ways of building may not use plans:

- you use the timber you have available
- craftsmen know when “it looks right”

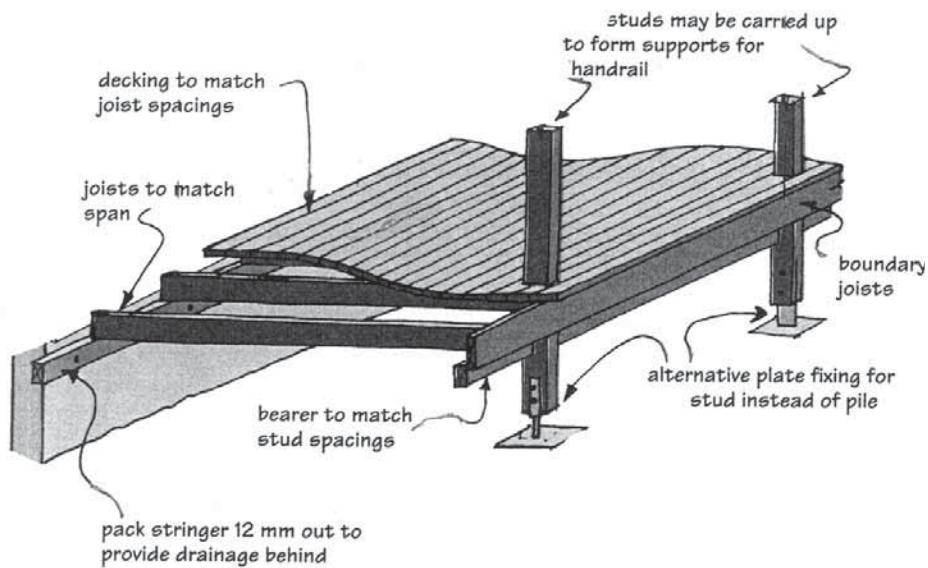
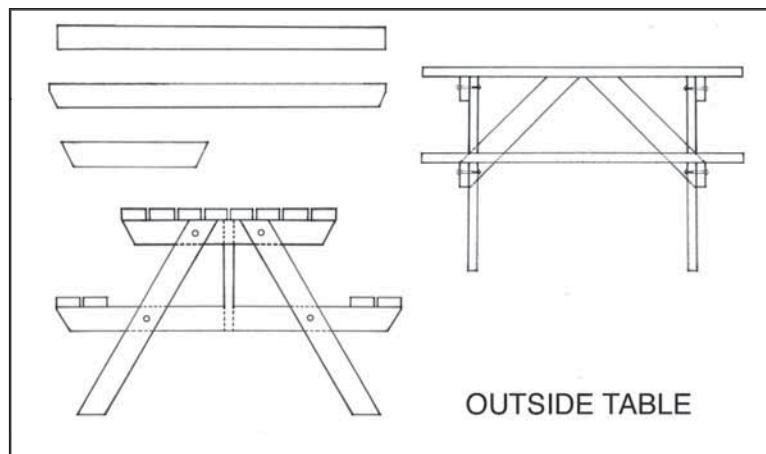
When you make things using non-traditional or western methods you need to read plans to see what sizes of timber to use and how things go together.

Here are some different types of plans.

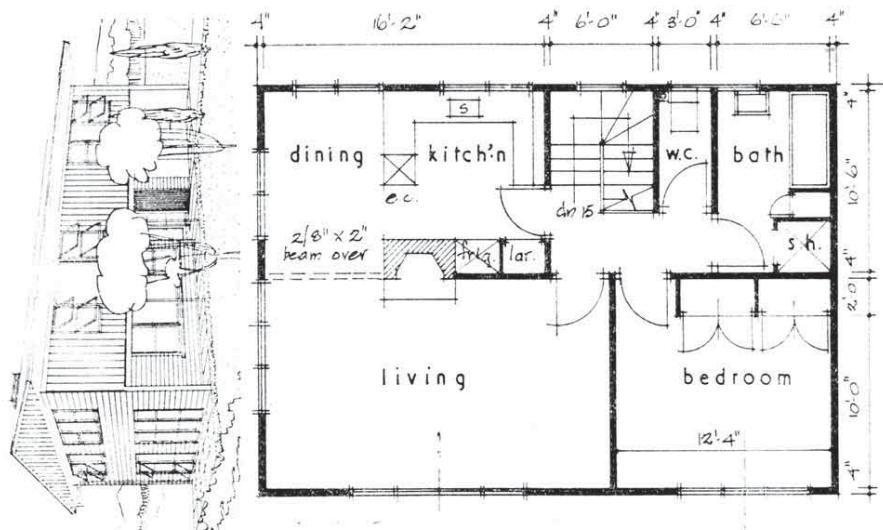
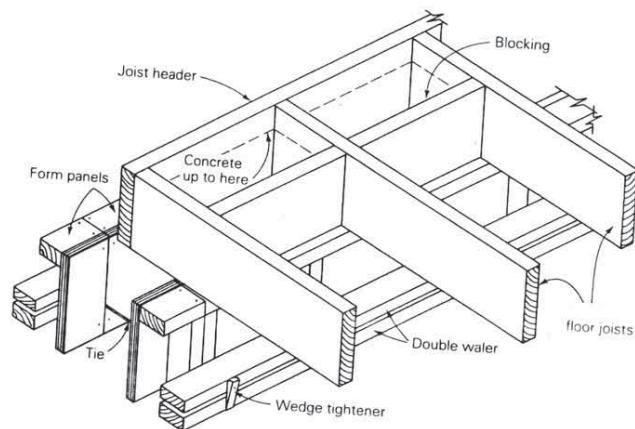
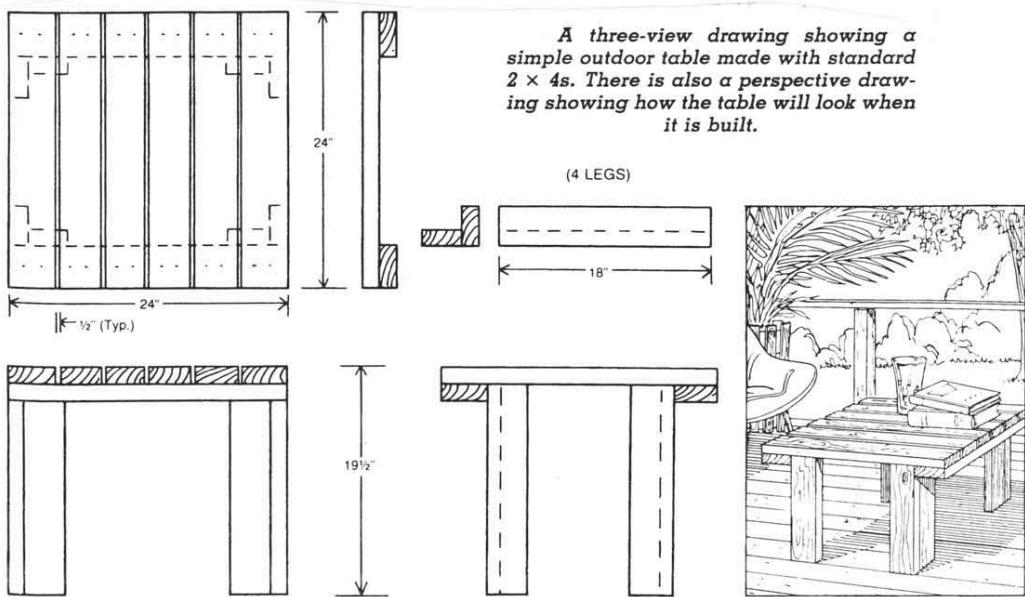
Your tutor will show you some other types.



*Plan for an outside table*



*Plan for a deck*



## Plans are good because they help us to:

- build things properly and
- make things strong enough, but not waste materials.



## Plans show:

- how things go together
- how big things are
- how much timber is needed
- what sort and size of timber is needed.

Can you see these things in the plans you have?

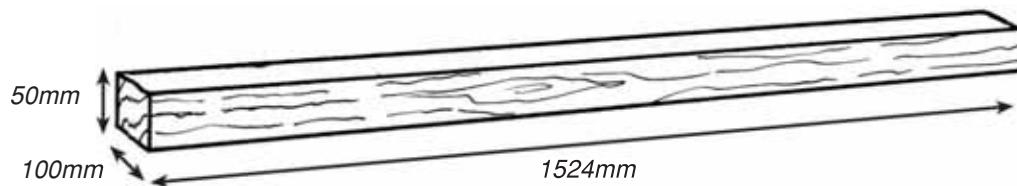
# Measures and timber sizes

## Metric and imperial measures

Most places use the metric system to measure things.

Measurements are usually given in millimetres (mm) for length and size.

This piece of timber is 1524mm long, 100mm wide and 50mm thick.



It is called 1524 x 100 x 50.

Some places still use the imperial system of **feet** ('') and **inches**(").

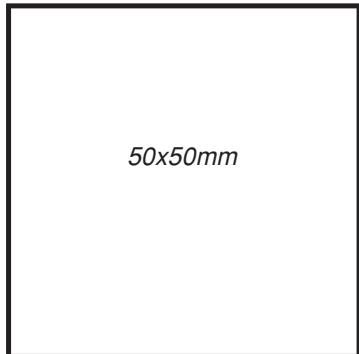
The same piece of timber above would be called a 5' x 4" x 2"

This means it is 5 feet long, 4 inches wide and 2 inches thick

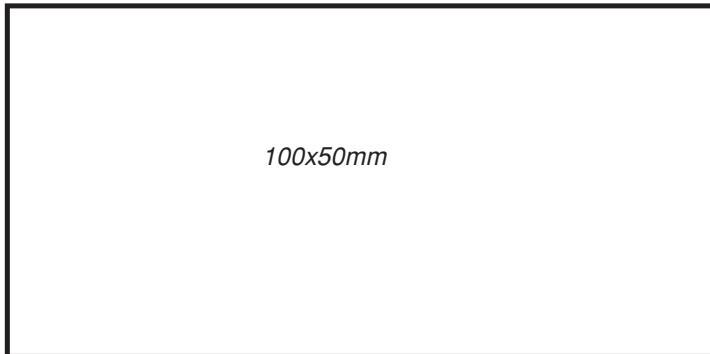
## Timber sizes

Timber comes in many different sizes

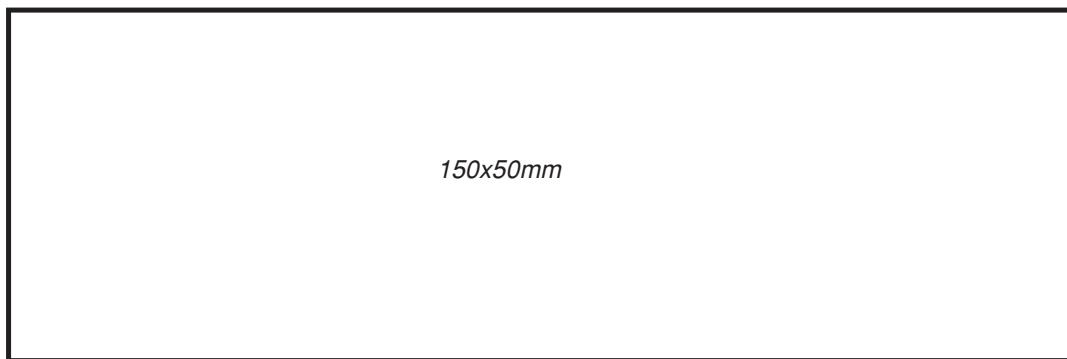
Most plans use standard sizes like these:



*50x50mm*



*100x50mm*



*150x50mm*

**BUT, there is a problem!**

Remember that you can buy timber 'rough-sawn' and 'dressed or planed' ?

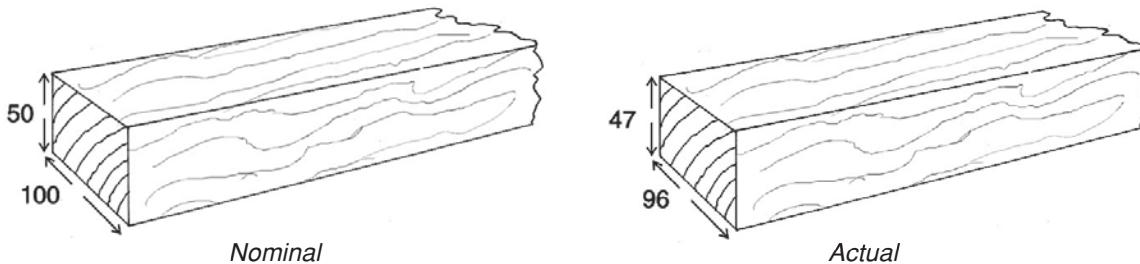
The standard size you buy — say 100 x 50mm — is called the **nominal** size. It is the size of the timber when it was first sawn.

**Rough sawn** timber is about the same as the nominal size. It may have shrunk a little as it dried.

**Dressed or planed** timber is several millimetres smaller than the nominal size because some wood was taken off by a machine to make it smooth.

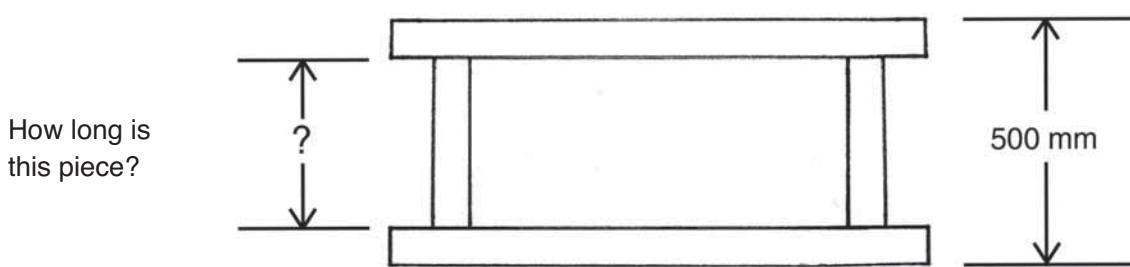
The *actual* size can vary from piece to piece because of shrinking and machining differences.

Both of these pieces would be called 100 x 50mm.



Because of this different size, some timber lengths cannot be given exactly on a plan.

**Look at this plan.**



It is 500mm less the thickness of the actual top and bottom pieces!

## Activity

Your tutor will give you some pieces of timber in different sizes.

Choose at least three of the pieces and measure them.

Write down for each piece:

- What size you measured ( for example 370mm X 94 X 46)
- What ‘nominal’ size of timber you think it is

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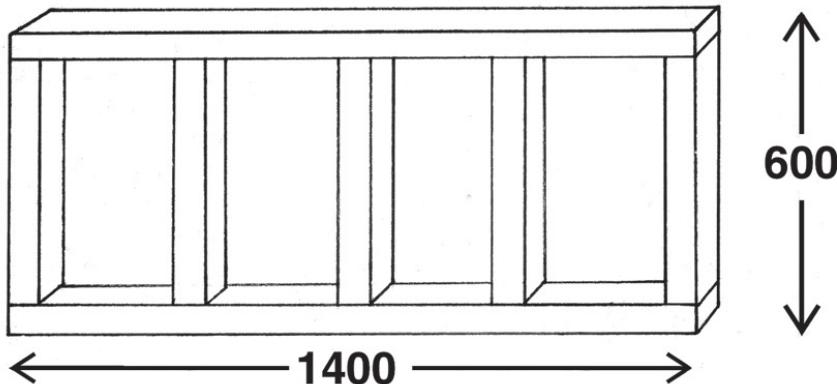
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Check your answers with friends and your tutor.

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# Measuring and marking from a plan

This is an example of a simple plan for a framework.



Timber size — 100 x 50mm (nominal size)

Studs to be at 450mm centres

The frame is 600 high X 1400 wide

## What does the plan show you ?

### The names for things

In building construction:

- the top and bottom pieces are often called “**plates**”
- the upright pieces are usually called “**studs**”

You may have different names for them. If so, what do you call them?

### Pieces of timber

The plan shows:

- a top plate and a bottom plate and
- four upright studs
- the size of the frame is 1400mm wide and 600mm high.

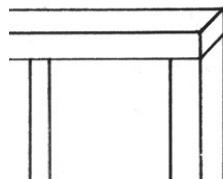
The writing says that the timber should be 100 x 50mm (nominal).

## How the pieces fit together

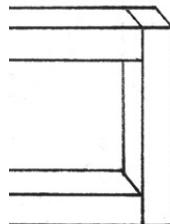
The plan shows where to put things

For example, look at the top corner.

The plan tells you to make it this way



**NOT** this way



## Centres

The writing says “studs at 450mm centres”.

This tells you how to put the studs in the right place in the frame.

You put the middle (centre) of each stud 450mm apart.

You will learn how to mark this later.

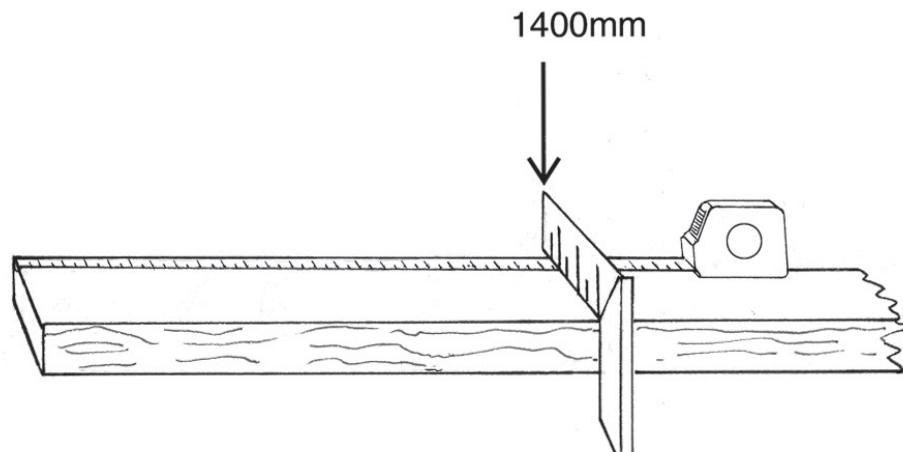
# How do you work from the plan?

Your tutor will show you how to mark the timber to make the frame above.

**Do these steps**

## Measure and mark the top and bottom plates

Length is 1400mm — from your plan



## Measure and mark the centres for the uprights (studs)

This gets the right spacing between studs

The plan says 'studs at 450mm centres'

Mark the first centre at 25mm in from one end of the top plate —

that is, half the thickness of the timber (or the 'centre') of the end stud

mark the top and side of the plate.

Then mark the next point at 450mm (centre) from your first mark. Keep doing this until you have marked the centres for all four studs.

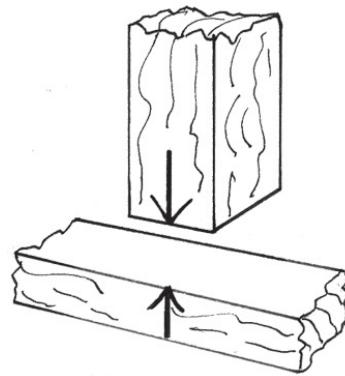
25+	450	+	450	+	450	+	450	+ 25	Top
25+	450	+	450	+	450	+	450	+ 25	Bottom

You can mark the top and bottom plates at the same time

## Mark position for studs

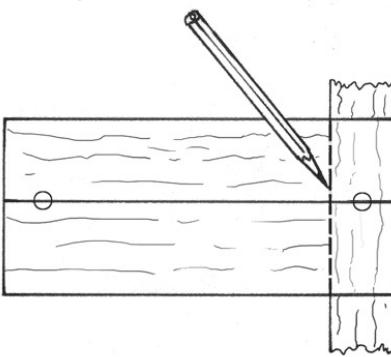
Use a piece of the stud timber you will use.

Measure and mark the middle of the stud timber.



Put this mark on the mark you made on the plate.

and mark the width of the stud down the sides of the plates.



## Length of studs

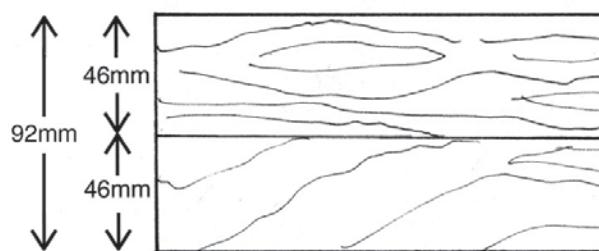
To work out how long the studs need to be, you could either:

### 1. calculate

**Measure the thickness of the top and bottom plates together**

(the actual size, not nominal size).

In the drawing below, it is 92mm.



The stud length would be:

600mm (from your plan) — (less) your measure of the two plates (92mm)

$$600 - 92 = 508\text{mm}$$

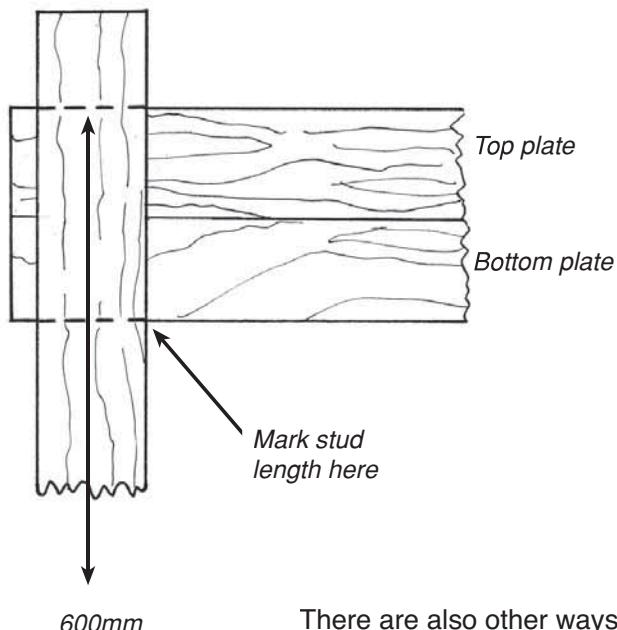
**OR you could**

## 2. Use the timber itself

Mark across at 600mm on one piece of timber that you will use as a stud.

Put the top and bottom plates together and lay them on top of the stud at the 600mm mark.

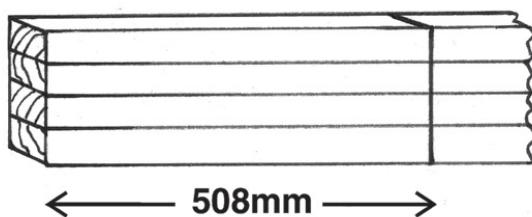
Use the thickness of the two plates to guide you where to mark the stud to be cut to size.



There are also other ways to work this out. Ask your tutor for ideas.

## Mark and cut the studs to the length you need

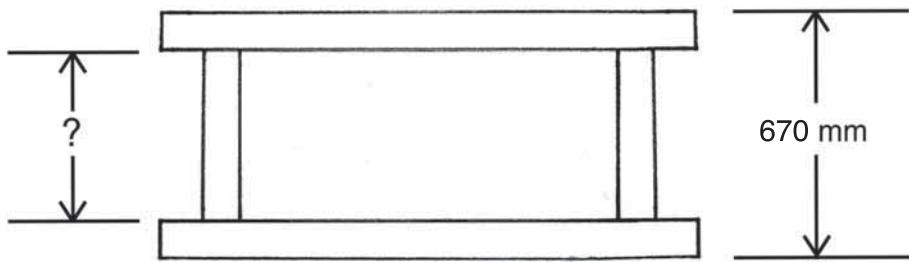
Mark all the studs together.



## Activity

Try working out some lengths for yourself.

Here is the plan for another frame.



For the top and bottom pieces of the frame, use two of the sample pieces of timber you measured in the activity earlier.

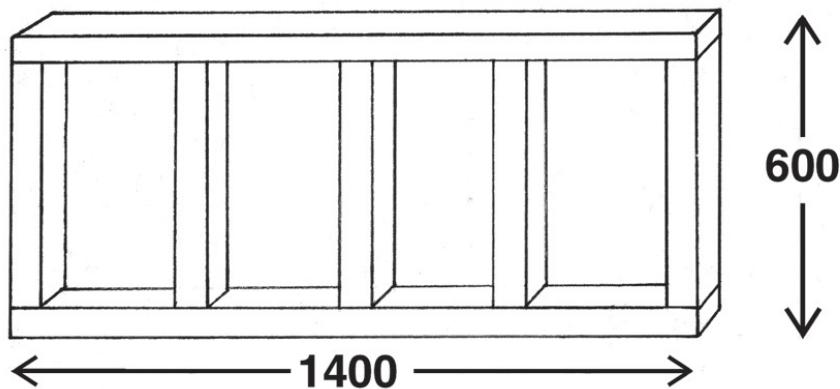
How long would the upright pieces (studs) have to be?

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# Cost of the timber in the plan

You can work out the amount and the cost of the timber from the plan:

Here is the plan again



## How much timber?

There are:

two plates.(top and bottom)  $2 \times 1400\text{mm}$  lengths = 2.8 metres

four studs                           $4 \times 508\text{mm}$  lengths = 2.32 metres

$$2.8 + 2.32 = 5.12$$

so, you need a **total**                          = **5.12 metres of 100 X 50mm size timber**

## But

Timber is usually sold only in certain lengths— so there will be some wastage.

In this case, if the longest length of timber available was 5 metres (5000mm)

From one 5 metre length, you could cut

- both top and bottom plates                   $2 \times 1400\text{mm} = 2800\text{ mm}$
- and three of the studs at 508mm     $3 \times 508 = 1524\text{mm}$

-leaving a short piece of about 475mm that is waste.

You need to buy another 1 metre length to cut the other stud. This will leave another 492mm of waste.

So, you will need to buy a **total of 6 metres**.

## How much will it cost?

Timber is usually sold in metres and at a price per metre (for each metre).

For example, a price for 100 x 50mm could be \$2.70 per metre

Find out the cost from your local timber supplier. Your tutor may know already.

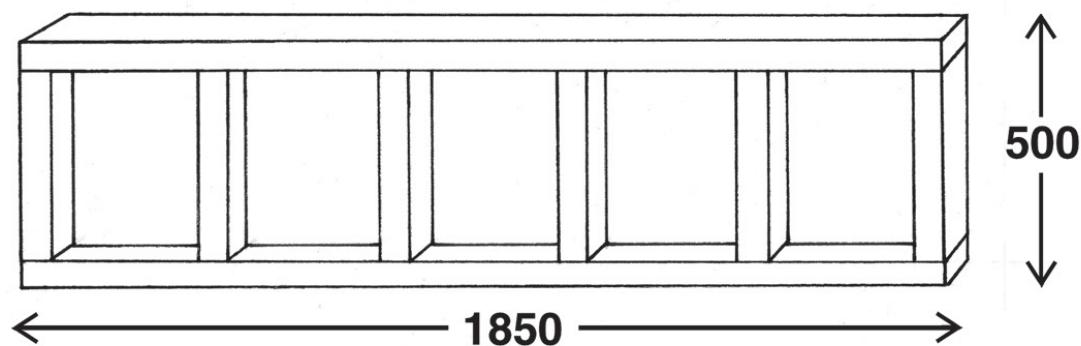
So the cost for this frame would be 6 (metres) x your local price

Put in your local price and work out the cost for the timber.

$$6 \times \$\dots\dots\text{(local price)} = \$\dots\dots\text{??}$$

### Activity

Here is another frame plan



Timber size is 100 x 50mm

Studs are at 450mm centres

Overall frame size is 1850mm wide x 500mm high.

1. Measure and mark out all pieces of timber
2. Find out the longest length of timber you can buy locally and the price per metre (your tutor may have found this for you).
  - How much timber will you need?
  - What is the total timber cost?

Work with your friends or other students and check each other's work.

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