

Mix and lay concrete

— tutor notes

What students will learn

When they have finished this module, students should be able to:

- Prepare the ground for a concrete slab
- Build formwork
- Mix concrete by hand and in a mixer
- Pour and compact concrete
- Screed and finish concrete
- Allow concrete to cure correctly

Things you need before you start:

Information

You will need ideas and a specification for a concrete project or job for the students to work on.

- What will the concrete be used for?
- What materials are needed?
- What do they cost?
- Are any local or Council building regulations or permits or approvals needed in your area? How do students meet the requirements or get permits?

Materials

Materials for a project for the students:

- Cement, sand, rock and water
- Timber for formwork

Tools or equipment

Students will need tools and equipment for the project:

- | | |
|--|---|
| <input type="checkbox"/> measuring and marking tools | <input type="checkbox"/> screed |
| <input type="checkbox"/> spade, shovel, pick | <input type="checkbox"/> float |
| <input type="checkbox"/> timber for formwork | <input type="checkbox"/> finishing trowel |
| <input type="checkbox"/> bucket/measure | <input type="checkbox"/> jointer |
| <input type="checkbox"/> mixer | <input type="checkbox"/> hose/water can |
| <input type="checkbox"/> wheelbarrow | <input type="checkbox"/> polythene sheets |

Course resources

Video player. Course Video.

Concrete project

The activities in this module require the students to actually plan, prepare, mix, pour and finish concrete.

You need to provide your students with a concreting project (or projects) to work on so they can apply the skills they have learned. Ideally, the project should be a real, useful project rather than just a small practice concrete slab that is of no lasting use.

Students should work together in small groups to plan and construct the projects.

Suitable projects could include:

Concrete: a path, part of a roadway, foundations for a wall or small building.

The foundations could be for the blocks project later in the course.

Look out for any suitable project in your area – it needs to involve the students in all the stages of preparation and laying concrete, but not be too large or require engineering plans or complex steel reinforcing.

Plans or pictures for some of these are included in the modules. You can suggest others that fit local materials and conditions.

The module

The workbook sections for this module are:

- **Plan for concrete**
- **Getting your site ready**
- **Mixing concrete**
- **Pour and compact concrete**
- **Finish and cure concrete**

Copies of the workbook sections are included in your manual here as well as in the Student Workbook.

You need to work through each section with the students, talking about each step and showing the students how to do it.

Remember: The workbooks are **not** designed to be used by the students learning on their own.

Read through the notes on the next page on how to use the workbook.

General module introduction — tutor notes

To start the module, talk to the students generally about the main things they will learn and what they will do in each section.

The module introduction in the workbook shows each of these steps:

- Work out the type and the amount of concrete they need
- Get the site ready
- Mix concrete
- Pour and compact the concrete
- Finish and cure the concrete.

Explain that in the module on *Choosing concrete* they learned all about types of concrete and what goes into it; here they will get to mix and use it.

Plan for concrete — tutor notes

In this section, students:

- work out the size and thickness of concrete they need for a job
- identify the need for reinforcement
- estimate the amount of concrete needed for a job

Work with students through each part of the section.

In addition — talk about:

The need for advice and assistance

It is **very** important that students understand the limits of what they learn on this course. They learn only about simple, small-scale concreting jobs such as paths, drives and small slabs and footings.

Larger scale or commercial jobs **need expert knowledge and skill** to calculate the loads and stresses involved and to decide on the correct concrete mixture and construction.

Engineering plans are needed for any house or structural concrete work.

Make sure students understand that they need expert assistance for any larger or safety related work.

Talk about the types and requirements of any Local, Council or Island building regulations or permits or approvals that are needed in your area. Explain what is needed— and how to go about meeting the requirements or getting permits.

Very small jobs are easy and only need a little planning, but for larger or more important jobs, you need to think about things more.

Reinforcing

The section on reinforcing is very simple. Talk to the students about reinforcing steel — rods and mesh — and what they do.

The design and placement of steel reinforcing in a structure needs expert and/or engineering advice that is outside the scope of this course.

Make sure the students understand the need for reinforcing in structural work, house slabs or foundations and in any safety related building work. They **must** have expert assistance and plans.

Show students

Some existing concrete structures.

You could take students to look at some local paths, roads and other concrete work.

- Look at the size and how deep they are.
- Do they have steel reinforcing?
- What is the earth or ground like?

Help students with estimating amounts of materials

Work through the concrete calculations with students.

The numbers do not have to be accurate, but they should give students a good guide to how much concrete and materials they will need for a job.

One example is given in the workbook, but you could work through other examples of your own as well.

The activity gets students to work out another example — and then work together to estimate the concrete they need for their project.

Getting your site ready — tutor notes

In this section, students:

- Prepare the ground
- Make the formwork to lay concrete

Work with students through each part of this section.

In addition — talk about:

- The type of soil or ground you have locally. For example, is it soft or sandy, soft and wet, hard rock or coral?
- The digging and preparing needed in your local ground:
 - How deep do you dig to make a solid base?
 - How much fill with rock?
 - Fill with hard rock — or old broken concrete (some people call it 'hardcore').
 - Cover with sand and compact (press) it all down to get level and firm
- Underlay (some people call it a 'damp course') sometimes used under a house slab
- The surface level needed for the concrete — flat or level, or with a run-off slope for rain outside.
- Different types of formwork — for example: for post holes, foundations.

Show

- How to mark out the ground — with marks in the earth and with string lines (builders lines)
- How to make strong formwork with the timber you have available.

Help

Help students prepare the ground and formwork for their Activity project.

Mixing concrete — tutor notes

In this section, students:

- Measure correct amounts of water, cement, sand and rock
- Mix concrete by hand
- Mix concrete in a mixer

Work with students through each part of this section.

In addition — talk about:

Getting the mix correct:

- Use a bucket or a box to measure the cement, sand, rock and water. Spades and shovels are not accurate.
- Use **JUST** enough water. Too little and the mix is difficult to work with. Too much and it is sloppy and will be weak.
- Mix and mix and mix — for at least 2 minutes.

Hand mixing is **very** hard work. Use only for small jobs.

Show

- How to measure and mix correctly.
- How to start, use and look after the concrete mixer you have available.

Help

And give guidance as students mix the concrete for their project.

Pour and compact concrete — tutor notes

In this section, students:

- Pour mixed concrete into formwork
- Compact concrete correctly
- Screed or level the surface

Work with students through each part of this section.

In addition — talk about:

- The need to plan ahead for pouring concrete:
 - How much can they mix in one session?
 - How far will this fill the formwork?
 - Should they put dividers/timber in the formwork at places where they can stop?
- The need to work quickly once they start pouring:
 - Pour from one end
 - Pour onto 'wet edges' only
- The importance of compacting:
 - Fill all the spaces
 - Get rid of air bubbles

Show

How to screed with a long piece of timber. It is a movement that is difficult to describe:

- Up and down to compact
- Side to side to level
- Along the formwork across all the concrete

Help

And give guidance as students pour and level the concrete for their project.

Finish and cure concrete — tutor notes

In this section, students:

- Finish concrete to the type of surface they need
- Put joints in the concrete if needed
- Cure the concrete before use

Work with students through each part of this section.

In addition — talk about:

- The types of finish on concrete and how these are made:
 - Rough, finished and polished.
- The type of finish the students will need on their project.
- The time delay between each finishing stage:
 - How many hours, in your local climate and temperature?
- How to cure the concrete on their project:
 - Water? Polythene? or Both?
 - How long will they cure it?
 - When will they take off the formwork?
 - How will they keep the dogs and children off it until it's set?

Show

How to float and final polish concrete with a float and finishing trowel. This is difficult to describe, but simple to demonstrate.

Help

And give guidance as students finish and cure the concrete for their project.