Working with drawings Introduction to Module 3

Working drawings are critical to construction work. It is essential that everyone in the building team is able to understand and interpret them as appropriate to their needs. To do this requires good spatial skills, an understanding of scale and the ability to interpret symbols and metric measurement.

In this module learners have the opportunity to practise these skills using real drawings available in the Source material. The focus pages aim to help the learner to:

- interpret construction drawings using their knowledge of space and shape
- understand the technical language and abbreviations
- read and convert metric measurements
- understand scale.

Encourage learners to find drawings from their workplace and identify which parts of the drawings they are currently involved in or have been involved in. It is important that learners see the link between the work they are asked to do and the structure as a whole.

Skills checklist

Without drawings and plans, you and the building team would have no idea of what to build and how it should look. Understanding and interpreting drawings accurately requires particular skills. You need to be able to understand what is on the plan and to visualise the real building that is represented.

You will need the following skills to understand and use drawings in the workplace. Tick the skills you have already and then look again at the checklist when you have used the materials.

Skills for working with drawings	Now	Later
Finding your way around a construction drawing – understanding that it is a two-dimensional representation of a three-dimensional shape		
Understanding scale		
Understanding the technical language and abbreviations used in drawings		
Following job specifications from drawings		
Interpreting measurements from a plan		

PAGES 3:1–3:6

Working drawings, views, floor plans and elevations

This theme is about understanding working drawings. It acts as an introduction to the rest of the module by focusing on the different features of drawings. Drawings are a critical component of all construction work. An understanding of how drawings provide each trade with the necessary information to contribute to the overall structure and the concept of how drawings work are essential to the progression of the learner and his/her efficiency in the workplace. Good spatial skills are required for this.

Materials

3D model of 7 Oakwood Lane (see plans) or a similar house, if possible

Scale drawings (plan views, elevations and cross-sections) from the workplace

From the Source material: 7 Oakwood Lane – drawing 38/1 (0:07), 7 Oakwood Lane – drawing 39 (0:09), drawings for 26 Dovetail Lane (at the rear of the file)

Learning outcomes

1 To understand that drawings show several different views of the same construction (focus page)

2 To know the basic features of drawing views, elevations and cross-sections and use each of these terms correctly (focus page, Tasks 1–3)

3 To recognise how these three views relate to one another in 3D form (Tasks 4–13)

Introduction

- Building plans show several different views of the same construction and provide information about the purpose of each view.
- Learners need to become familiar with the language used to describe drawings.
- The discussion arising from the focus page will provide opportunities for learners to hear and use the correct terminology.
- The focus page also provides opportunities for learners to learn about the basic features of drawing views, elevations and cross-sections, together with opportunities to explore and discuss how these views relate to each other in 3D form.

Focus page

- A 3D model of 7 Oakwood Lane or a similar house would facilitate understanding of the plans.
- Look at the whole plan first. What building is this plan for? How did you find this out? Draw attention to the key, which provides this information.
- Discuss how plans are a way of representing a real-life object on paper. Explain that because it is not possible to make detailed drawings in 3D form, it is necessary to draw the building from several different views in order to provide all the necessary information.
- Use the focus page to highlight the different views used on plans. Learners need to be aware of compass points in order to read the labels on the elevations.
- Look in detail at the floor plans on the focus page and in the Source material. Explain that floor plans provide a view looking down on the building – a bird's-eye view. *What is a plan view? What can you see on the plan view?*
- Look at the elevations in detail. *Which elevations have the same roof shape? Why is that? Which elevation belongs to which side of the plan view? How can you work it out?*
- Look at the cross-section in detail. *What is being depicted? How does the cross-section relate to the elevations?*
- During discussion, encourage learners to use the correct terminology to describe plans.
- Be aware that most measurements are in millimetres but some are in metres.
- If necessary, enlarge plans so that the labelling is easier to read.

Curric. refs	NOS/NVQ	Key Skills
MSS2/L1.2	VR211	N2.1a
MSS2/L2.1	VR40	
Rw/L2.1		

Task 1

Match different views on a plan

MSS2/L2.1

- Reinforce the concept that a plan provides various two-dimensional views of the same building. To get a good understanding of the building, you need to use different views together.
- Let learners work in pairs to encourage discussion of strategies to work out the answers to the questions.
- Ask learners to share their answers and explain the strategies they used.

If the learner has difficulty

- Some learners may have difficulty understanding the wording of the questions. Read through each question with the learner, asking them to point to the cross-section, side elevation, front elevation, uprights and floor plan when mentioned in the question.
- If learners have major difficulty understanding plans, you could try to construct a 3D model of the plans. Use this to demonstrate each view.
- In the first question, ensure learners look at the outline shapes in order to match the views. Use colour to highlight the outline.
- In the second question, ensure learners are using all three views. Mark the uprights on each view in the same colour.

Extension

Ask learners to match views on other plans.

Task 2

Match different features on a plan

MSS2/L2.1

- Remind learners that different views are used for different purposes, but they relate to one another.
- Explain that the task is about matching features drawn in different views.
- Explain that learners should use the same colour to represent a feature (i.e. one colour to mark the doors in the first question, a different colour for the door and window in the second question, and so on).
- Let learners work in pairs to encourage discussion of strategies.

If the learner has difficulty

- Some learners may have difficulty understanding the wording of the questions. Read through each question with the learner, asking them to point to the appropriate elevation and floor plans when mentioned in the question. Highlight key points.
- Some learners may have difficulty translating features from elevations into plan or other views. Ask them to draw what a door would look like from a bird's-eye and other views. Can they spot the features on the floor plan now? Can they identify the same position on the foundations? Use the 3D model if available.
- Provide similar activities on simple plans.

Extension

Ask learners to match views on other non-rectangular floor plans.

Task 3

Draw simple plans

MSS2/L1.2

- Remind learners of the terms used to describe different views on a plan.
- Discuss how windows and doors are shown in plan view.
- Explain the nature of the task and encourage learners to consider the relative position and size of windows and doors in the room they are in.

If the learner has difficulty

- Work through the task with the learner, from the shape of the room, to adding features such as doors and windows in appropriate places.
- Offer squared paper to aid drawing.

Extension

- Ask learners to extend their plans to include other rooms in the building.
- Ask learners to draw a plan view of their home, or a building with a ground floor and first floor.

Task 4

Using different views on a plan

MSS2/L2.1

- Point out that:
  - elevations on plans are useful for showing how the outside of a building will look once construction work is completed
  - written positional information describes how each side of the building relates to neighbouring buildings and plots of land
  - additional information on the location of the building can be found in the notes at the bottom right-hand side of the plan.
- Explain the task and confirm that 7 Oakwood Lane – drawing 38/1 provides all the necessary information to complete the sentences.

If the learner has difficulty

- Go through the plan with the learner. Point out the labelling of elevations. Ask them to look at the roof shape of each elevation. Which elevations will be opposite one another when the building is constructed? Relate it to the model if available.
- Some dyslexic learners will experience difficulty with the positional vocabulary of this task (e.g. rear, opposite, left, right). Work will need to be done to find strategies to overcome this (e.g. using a 3D model).
- A 3D model of the building will help learners to understand the relationship between elevations.

Extension

- Ask learners to write similar sentences about other plans. Ask them to draw block plans based on information gleaned from architects' drawings.

Task 5

Using different views on a plan

MSS2/L2.1

- Ask learners to describe the illustration. Is it an elevation, a plan view or a cross-section?
- Ask what is being shown and how it relates to 7 Oakwood Lane – drawing 38/1 and the model.
- Explain the task and confirm that 7 Oakwood Lane – drawing 38/1 provides all the information required to label the other two plots.

If the learner has difficulty

- Remind the learner that positional information is written on the plan beside each elevation.
- Remind the learner that elevations with the same roof shape will be opposite one another.
- Use colours on the block plan to locate the rear elevation, for example, and then match this to plot 17.

Extension

- Ask the learner to sketch the elevation that will be visible from: a) Plot 17; b) Plot 8; c) Oakwood Lane; d) the left side of the house at plot 7.

Tasks 6 and 7

Interpret 2D plans as 3D objects

MSS2/L2.1

- Remind learners that a plan view provides a 2D view of a 3D object and discuss some of the features shown on the plan (i.e. walls, doors and windows).
- Ask learners to imagine that they are standing in the garage looking in the direction indicated by the arrow. Ask which features they will see.
- Ask learners to study the four views in the answer options. Explain that they have to decide which of these views most accurately represents what they will see.
- Remind learners to use other information on the plan to help them to decide (e.g. measurements, side elevations).
- Let learners work in pairs to encourage discussion of strategies.

If the learner has difficulty

- Learners may have difficulty discerning differences between the views and/or translating from the floor plan. The following activities will provide opportunities for the learner to hone their skills, as well as opportunities for the teacher to identify difficulties and misconceptions.
- Use the four views and/or similar views and get the learner to match views that are the same as each other.
- Write descriptions of each of the four views based on 3D interpretations. Ask the learner to match each description with the correct view. (Be aware that this may complicate the task for those with weak literacy skills.)

- Ask the learner to describe the differences between views 1 and 2; views 2 and 3; views 3 and 4; views 4 and 1; views 1 and 3; views 2 and 4. Encourage them to describe the differences in terms of 3D interpretations (e.g. a wall between the doors, a wall on the outer edges of the doors, door width, etc.).
- Cut out the four views. Ask the learner to match the edges of the doors and walls with the same features on the floor plan.

Extension

- Give learners the ground floor plan for the proposed dwelling at 26 Dovetail Lane, from the Source material. Explain to the learner that they should imagine they are standing in the kitchen and sketch what they will see for each of the four walls. Encourage them to think carefully about the position of windows and doors. Repeat for other rooms.

Task 8

Recognise and use 2D representations of 3D objects
MSS2/L2.1

- Remind learners that a floor plan is drawn for each level so that the details of each floor can be seen in isolation. In reality of course the floors will be situated one above the other.
- Introduce the term 'storey.' Point out the anomaly in terminology – a house with two storeys has a ground floor and a 1st floor. Ask learners to name the floors in a three-storey building without a basement and with a basement. Be aware that there is a different system of numbering floors (storeys) in other countries.
- Ask learners to study the footprints of the ground floor and first floor. Do they notice any differences? How can these be explained?
- Cut out the footprints and place them one above the other in order to match rooms at different levels.
- Ask which rooms are single storey (i.e. they don't have a room above them). Ask learners how they worked this out.
- Explain the task.

If the learner has difficulty

- Some learners may have difficulty with the positional vocabulary in this task (e.g. below, above).
- Provide some further ground floor and first floor plans where each construction has a different footprint. Ask the learner to match up the different storeys from the same construction. Provide opportunities for the learner to match rooms on different floors.
- Use tracing paper to trace the upper-storey rooms and superimpose this on the plan of the lower floor so that the rooms are visible and the two footprints can be compared.
- If the learner continues to have difficulties, get them to cut out the footprints and place one above the other in order to match rooms from different levels.

Extension

- Ask the learner to study further plans and consider whether upper floors always have walls directly above those on lower floors, and whether stairwells are always aligned. If this is the case, why might that be?

Tasks 9 and 10

Interpret 2D plans as 3D objects
MSS2/L2.1

- Ask learners how windows are represented on the plan views. Ask them to count the number of windows on the ground floor and the number on the first floor.
- Get learners to imagine they are standing in the sitting room looking out of the bay window. Ask them whether there is a window in the same position in the room immediately above them. Repeat for the kitchen.
- Explain Tasks 9 and 10.

If the learner has difficulty

- Learners may have difficulty with the symbols on the plan or in matching the features on the different floors. The following activities provide opportunities for the learner to hone their skills as well as opportunities for the teacher to identify difficulties and misconceptions.
- Ask the learner to highlight all the windows on the ground floor and first-floor plans.
- Provide opportunities for learners to match rooms and windows on the different floors. Use the cutouts/3D model.

Extension

Ask the learner to match the elevations to the floor plans using window position as the basis for their decisions.

Tasks 11 and 12

Interpret 2D plans as 3D objects
MSS2/L2.1

- Remind learners that elevations provide a view of the building from the front, rear and sides, and that they should show how the completed building will look. Reinforce the fact that the view is drawn from the outside or *exterior* of the building.
- Get learners to match the front elevation with the ground-floor plan. What do they notice about the garage, the utility room and the porch? Point out that elevations do not show which structures are positioned forwards or backwards relative to others. Elevations are shown in two dimensions, so there is no sense of depth.
- Ask learners to match the garage doors on the elevation with the same doors on the ground floor. Can learners work out where the gate to the right of the garage doors leads to? Can they find the same gate on the floor plan?
- Introduce the tasks.

If the learner has difficulty

- The learner may not have understood that the elevation cannot show which parts of the building are set back from others. Get the learner to cut out the front elevation and then position the garage, utility room, porch and bay window in the correct positions.
- Provide other plans that allow opportunities for the learner to develop these skills.
- In Task 12, the learner may not understand that the elevation is drawn from the *exterior* of the building, and in order to interpret it against the plan view, they have to 'rotate' the elevation so that it is orientated in the correct position against the plan view.
- Get the learner to cut out the rear elevation and position it against the ground-floor plan. Can they match the doors and window now? Use the opportunity to reinforce that elevations are in 2D, with no sense of depth.
- Provide other plans that allow opportunities for the learner to develop these skills.

Extension

Ask the learner to match features shown on the elevations with the same features shown on the ground-floor plan. They should highlight the sun room, utility, house and porch in each view, using colours or a key to indicate parts that match.

Task 13

Interpret 2D plans as 3D objects
MSS2/L2.1

- Remind learners that elevations provide a view of all four sides of the building (front, rear and both sides), and that the features on the elevations match up exactly with the features on the floor plans.
- Point out that matching features on the floor plan to the elevation enables us to work out which elevation matches which side of the floor plan. This in turn enables us to interpret the structure in 3D terms.
- Introduce the task.

If the learner has difficulty

- Lead the learner to the correct answer by asking structured questions. The purpose of this is to provide a method for the learner to follow in future practice situations. Ask them to consider the height of the upstairs windows. Check that they can locate the window of bedroom 1 on the front elevation. Get them to explain how they worked this out. Ask them to point to the same window on the plan view. Draw their attention to the other window in bedroom 1. Which of the side elevations has an upstairs window?
- Provide additional opportunities for the learner to practice these skills. Encourage the learner to explain their approaches, methods and answers – this will help to promote active learning.

Extension

Ask learners to sketch front, rear and side elevations for a building they are familiar with, together with floor plans showing windows and doors. Drawings do not need to be to scale.

Theme assessment

- Ask learners to interpret a range of drawings from their own work settings, explaining how they are used and how different parts of the plan relate to one another. They could then prepare some quiz questions, based on these drawings and relating to the Tasks in this theme.
- The interpretation of the drawings in the classroom could be followed up by site visits to check accuracy.

Working drawings, views, floor plans and elevations

Focus

A builder's drawing shows what a building will look like and how it will be built. In order to give enough information, it is necessary to draw the building from several different view points. These different views are often shown on the same sheet.

Side elevation

A view of each side of the building

Rear elevation

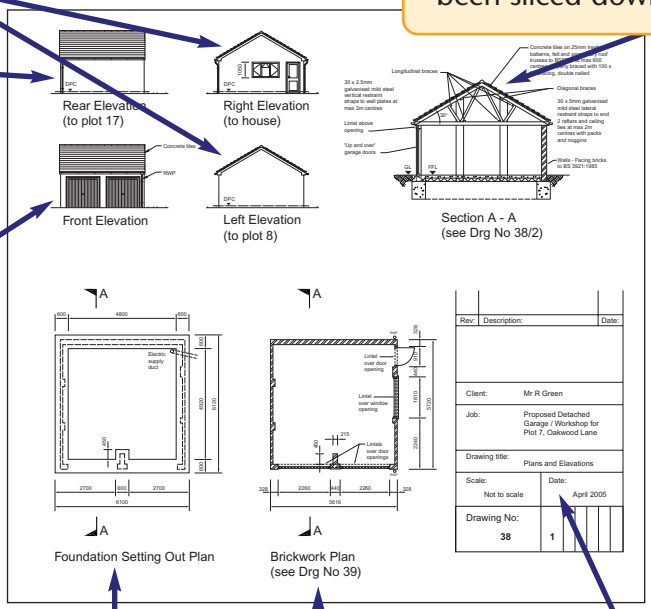
A view of the back of the building

Front elevation

A view of the front of the building

Cross-section

A view of the building as though it has been sliced down from roof to floor



Tip

Beside the elevations you will find extra information that tells you which way each side of the building faces.

Plans

A plan of the foundations showing the position of the footings and a plan of the building showing the position of the walls, windows and doors.

Tip

These notes tell you what type of building is to be constructed and where it is to be built.

An **elevation** is a view of the building from the side, front or rear. Elevations are useful for showing how the outside of the building will look once work is completed.

A **cross-section** is a view of how the building would look if it was sliced through with an imaginary saw. Cross-sections are useful for showing structural features such as footings, beams and roof angles.

A **plan** provides a view looking down on the building. It is like a bird's-eye view. Sometimes it is referred to as a 'plan view.' Floor plans are useful for showing how different levels of the building relate to one another. Sometimes you will see a plan view of the foundations. For houses with two or more storeys there will be a floor plan of each floor.

Working drawings, views, floor plans and elevations

Task

A plan shows different views of the same building. In order to get a good understanding of the building, you need to understand all the different views.

Task 1

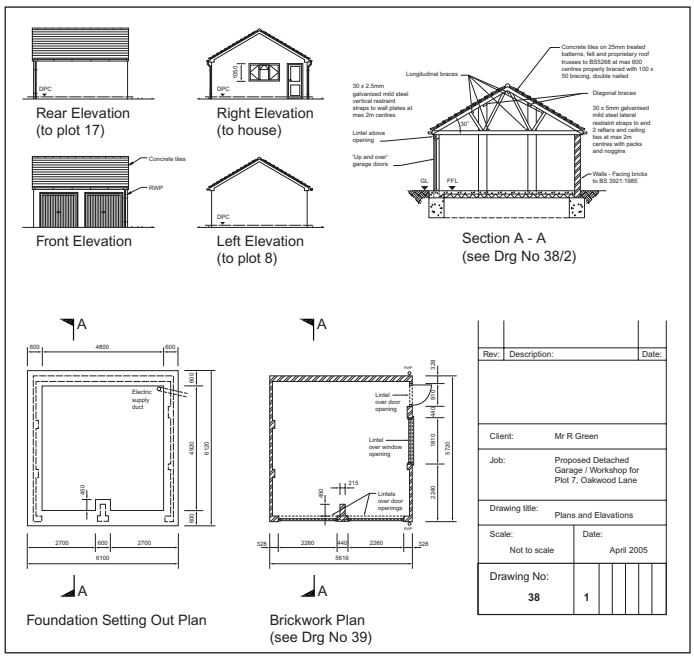
Look carefully at the different views of the detached garage for Plot 7 Oakwood Lane (drawing number 38/1).

a Does the cross-section give you a view of the garage from the front or the side?

_____

b Look at the cross-section. Does the roof truss span the garage from front to back or from left side to right side?

_____



Task 2

Highlight these items on the drawing, using these colours.

a The doors on the front elevation and the position of the same doors on the floor plans in blue

b The door and window on the right elevation and the position of the same door and window on the floor plans in yellow

c The wall of the rear elevation and the position of the same wall on the floor plans in red

d The wall of the left side elevation and the position of the same wall on the floor plans in green

Tip

Using colour on a plan can help you to sort things into groups.

Task 3

On a separate piece of paper, draw the floor plan and four elevations for the room that you are currently in. Do not worry about drawing it to scale.

Working drawings, views, floor plans and elevations

Task

In order to get a good understanding of the building, you need to use the written information on the drawings as well as the different views.

Task 4

Use the 7 Oakwood Lane drawing from the Source material. Fill in the missing words to complete the sentences.

On drawing number 38/1, the rear elevation has _____ doors. It is on the opposite side to the _____ elevation, which has _____ doors. The _____ elevation faces plot 8. The right elevation faces the _____. It has one _____ and _____ door.

Tip

Front and rear elevations are always on opposite sides of the building.

Left and right elevations are always on opposite sides of the building.

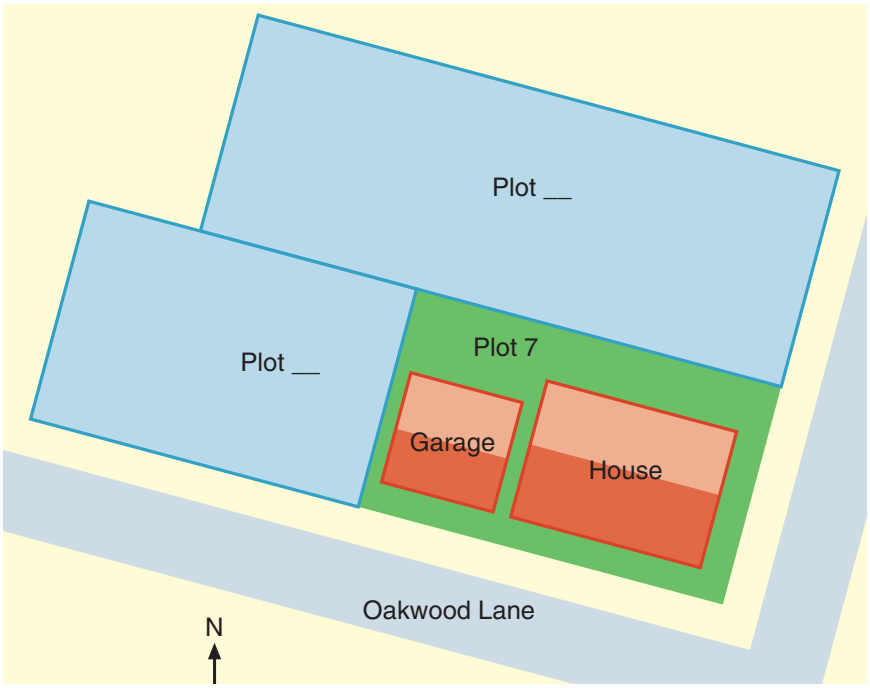
Task 5

Here is a block plan showing the position for the proposed garage at Plot 7, Oakwood Lane in relation to neighbouring building plots.

Use the information on the drawings to label each of the neighbouring plots with the correct number.

REMEMBER!

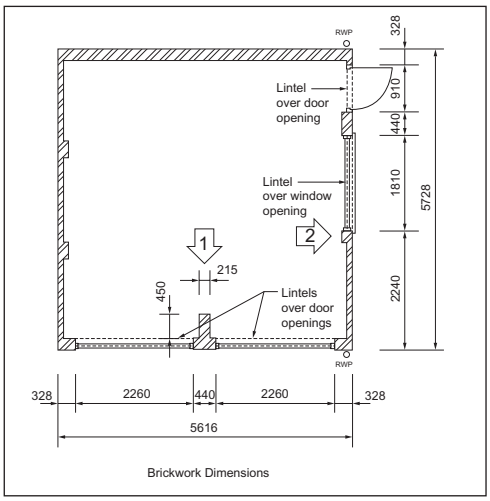
Information by the front, rear and side elevations tells you which way each side of the building faces.



Working drawings, views, floor plans and elevations

Task

Floor plans can be tricky to use because just two dimensions are shown: the width and the length, whereas the room has three dimensions: width, length and height. It helps to look at the elevations together with the floor plan to get extra information about the height and position of features such as windows and doors.

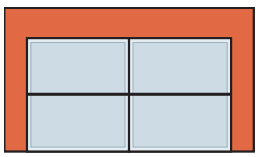


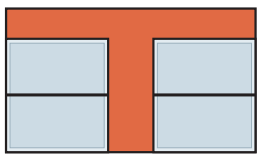
Task 6

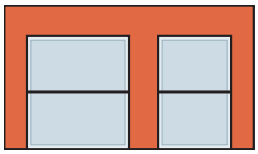
Imagine that you are standing inside the garage, facing the wall that arrow 1 is pointing to.

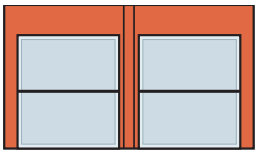
a Which of these four views is the one that you will see?
b Say why you did not choose each of the other views.

REMEMBER!
Remember to look at the measurements to get an idea about the size of features such as windows and doors.

1 

2 

3 

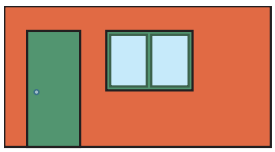
4 

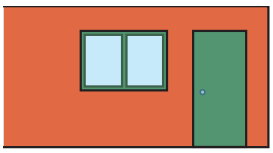
Task 7

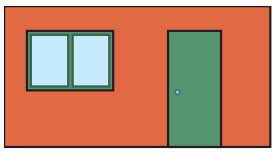
Now imagine that you are standing inside the garage, facing the wall that arrow 2 is pointing to.

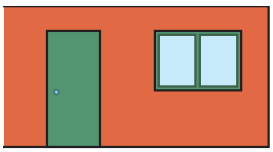
a Which of these four views is the one that you will see?
b Say why you did not choose each of the other views.

Tip
You can turn the floor plan round if it helps you.

1 

2 

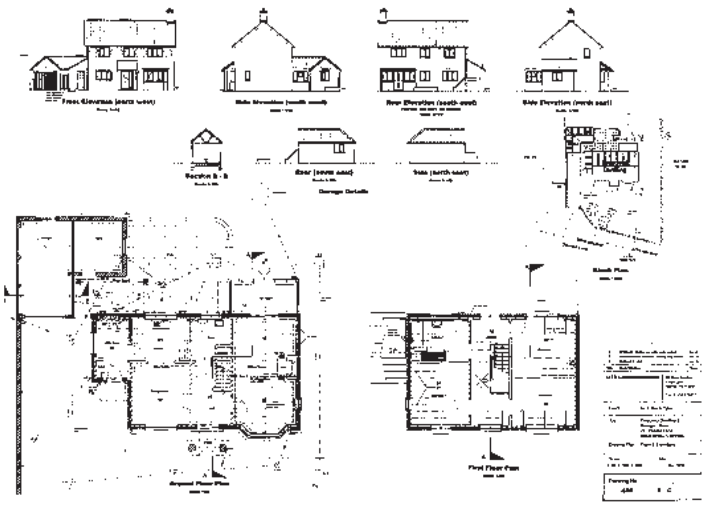
3 

4 

Working drawings, views, floor plans and elevations

Task

Floor plans are drawn for each level so that you can see the details for each floor separately. In reality, the floors will be one above the other. It is useful to look at the floor plans and then work out how the different levels of the building relate to one another.



Task 8

The following questions are all about the proposed dwelling at 26 Dovetail Lane. You will need the ground floor plan and the first floor plan in the Source material to help you answer the following questions.

a Which room in the house is below Bedroom 1?

b What is above the sitting room?

c Which rooms or structures do not have a room above them?

d Why do you think there is a trap door on the first floor plan, but not on the ground floor plan?

e Why do you think the bathroom is situated above the kitchen?

f What is below the landing?

g What is above the cupboard in the toilet?

Tip

You might find it useful to look at the elevations to decide which parts of the building are single storey.

Task 9

Imagine that you are standing in bedroom 1. You have your back to the door and you are looking out of a window.

Is there a window in the same position in the room directly below you?

Task 10

Now imagine that you are looking out of the dining room window.

Is there a window on the same wall in the room directly above you?

Working drawings, views, floor plans and elevations

Task

Elevations provide a view of the building from the side, front or rear. They show you how the exterior of the building will look once work is completed, but they can also help you to understand the floor plans more clearly.

Use the plans for 26 Dovetail Lane in the Source material to answer these questions.

Task 11

Refer to the front elevation and the ground floor plan.

Looking from the exterior of the building:

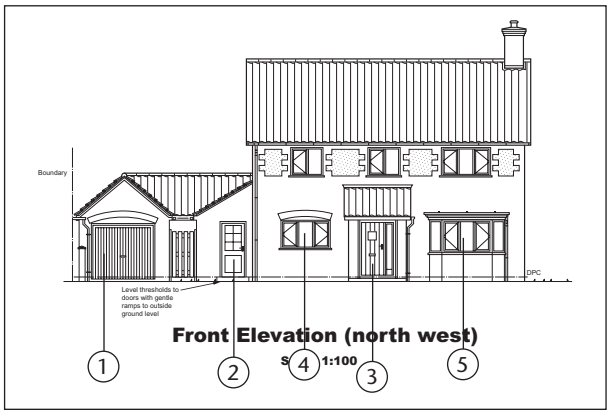
a Where does door 1 lead to?

b Where does door 2 lead to?

c Where does door 3 lead to?

d Which room will you see into by looking through window 4?

e Which room will you see into by looking through window 5?



Task 12

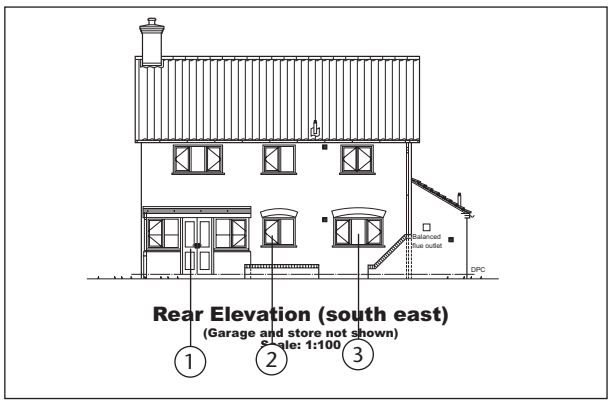
Refer to the rear elevation and the ground floor plan.

Looking from the exterior of the building:

a Which room does door 1 lead to?

b Which room will you see into by looking through window 2?

c Which room will you see into by looking through window 3?



Task 13

Look at the four elevations shown on the plan.

Bedroom 1 has two windows. One of the windows is shown on the front elevation. Which elevation is the other window shown on?

PAGES 3:7–3:8

Understanding technical language and abbreviations

Construction plans, by their very nature, include descriptions that contain technical language. Abbreviations are also a common feature. In order to read and interpret plans effectively, learners need a range of strategies for finding the meaning of unfamiliar words and abbreviations.

Materials

A selection of construction drawings, sector-specific glossaries and dictionaries

7 Oakwood Lane – drawing 38/1 from the Source material (0:07)

Learning outcomes

1 To know that there are different sources of information for finding the meaning of unfamiliar words (focus page, Tasks 1–3)
2 To understand the purpose of glossaries and where they are likely to be found (Task 1)
3 To understand that images can be used to convey additional information to that in the printed text (Task 3)

Introduction

Learners will have different levels of knowledge/experience in this area and it is worth spending some time ensuring that all have a common understanding of frequently used terms.

Focus page

- Look at the focus page and identify all the technical vocabulary.
- Confirm the four ways to find out about technical terms and their advantages and disadvantages:
  – a dictionary (this may cause more problems than it solves, as there will be alternative definitions)
  – a specialist glossary or website (need to identify the best/most useful)
  – working meanings out from context clues, for example the abbreviation 'rwp' on the drawing has an arrow pointing to the gutter, so it is possible to guess that this might mean 'rain water pipe' (risk that you may guess incorrectly)
  – asking someone (risk that the definition may not be accurate).

Curric. refs	NOS/NVQ	Key Skills
Rw/L1.1	VR211	C1.2
Rw/L1.3	VR40	

Task 1

Use a glossary to find out the meaning of technical words and terms found on plans and drawings
Rw/L1.1

- Point out that the aim of the following exercises is for learners to develop skills and language that will help them make full sense of the information contained on plans.
- Ask learners to highlight any unfamiliar technical terms on 7 Oakwood Lane – drawing 38/1 for discussion.
- Remind learners of the purpose of glossaries and where they are likely to be found.
- Briefly discuss the structure and layout of glossaries before asking learners to do the task.

If the learner has difficulty

- Support learners whose alphabetic skills are insecure. Support may be needed for second- and third-letter clues. Offer an alphabetic strip. Explain quartiles and guide words.
- Confirm that glossaries are specific to an area of work and give only one meaning.

Extension

Ask the learner to list any unfamiliar technical terms in other drawings and find out the meanings from glossaries.

Task 2

Use a dictionary to find out the meaning of unfamiliar (non-technical words) found on plans and drawings

Rw/L1.1

- Point out that glossaries list only technical words and terms, but that there may be other unfamiliar words on drawings that are not technical. The meaning of such words can be found in a dictionary.
- Discuss the fact some words have more than one meaning, so a sense of context is essential for choosing the correct meaning.

If the learner has difficulty

- Support learners whose dictionary skills are insecure. Support may also be needed for second- and third-letter clues.
- Support may be needed to interpret dictionary definitions, especially where there are alternative definitions.

Extension

Ask the learner to list any unfamiliar non-technical terms in other drawings and find out the meanings using a dictionary.

Task 3

Find out the meaning of abbreviations on plans and drawings, using inference from the image as a strategy

Rw/L1.3

- Offer some examples and ask learners to think of abbreviations used in everyday life. Reinforce the concept that some abbreviations are shortened versions of words or phrases (max is short for maximum) and that in others, each letter stands for a word (asap is short for as soon as possible).
- Remind learners that the text on plans relates to the images that are depicted and that clues can be taken from the drawings to work out the meaning of some abbreviations. The meaning of an abbreviation in common everyday use can be found in a dictionary. An abbreviation relating to a technical term may be listed in a glossary that accompanies the text.

If the learner has difficulty

- Support the learner in the task.
- Support the learner to develop a personal glossary of terms, including abbreviations, using a small alphabetically indexed notebook.

Extension

Ask the learner to list any further abbreviations they can find on plans and drawings, together with their meanings.

Theme assessment

- Develop a quiz, or other game, based on technical words used commonly in the learners' workplaces.
- Ensure that learners use appropriate technical vocabulary during teaching and practical sessions.

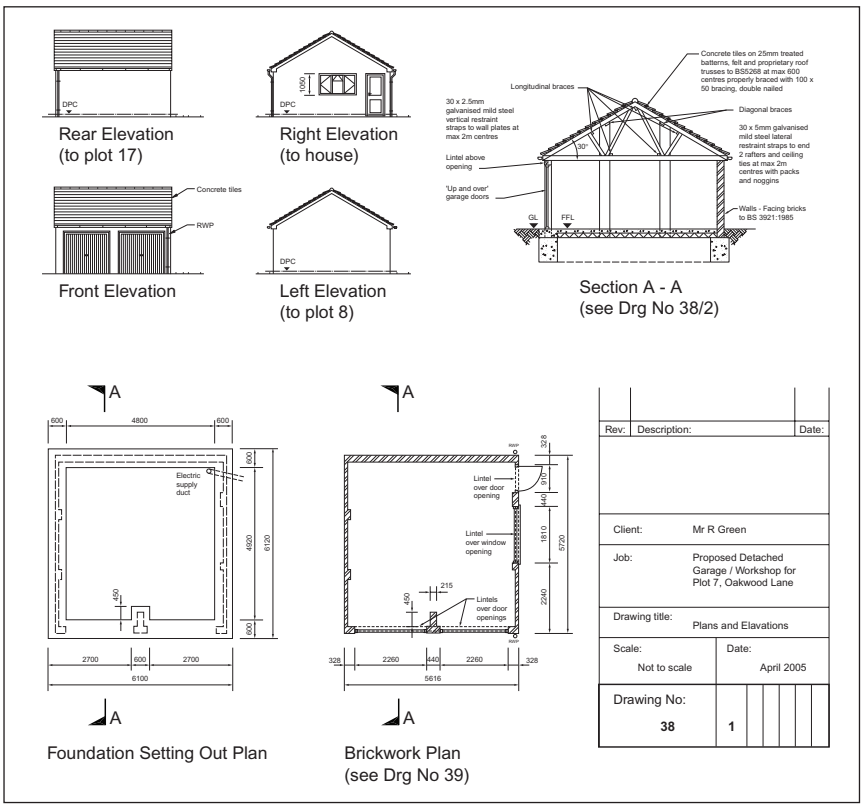
Understanding technical language and abbreviations

Focus

Builder's drawings contain lots of technical words and abbreviations. They can make it tricky to make full sense of the drawing. Here are some tips to help you find out what different technical words and abbreviations mean.

Work it out using clues from the plan

Sometimes you can work out the meaning of words or abbreviations by where they appear on the plan. For example, on the front elevation of this drawing, 'RWP' is shown going from the roof line to the ground. Because of its position, you can work out that 'RWP' probably stands for 'Rain Water Pipe.'



Tip

You cannot remember everything! It's a good idea to keep a small notepad to jot down important technical words and their meanings. If you are in any doubt about words or abbreviations on building plans, then ask someone for help. It's important to get it right.

Use a dictionary

Dictionaries are useful for looking up the meaning of everyday words including mathematical terms and abbreviations. For example, 'max.' is short for maximum. It means the largest possible size.

Use a specialist glossary or website

A specialist glossary is the best place to find out the exact meaning of technical terms such as 'proprietary roof trusses' or 'lintels'. You may find additional information by looking on a specialist website.

Understanding technical language and abbreviations

Task

There are different ways you can find out or check the meaning of technical words and abbreviations.

Task 1

Use a glossary to find out the meaning of these words.

Technical words	Meaning
facing bricks	
common bricks	
engineering bricks	
blocks	
lintel	
lateral restraint	
hardcore	

Task 2

Use a dictionary to find out the meaning of these words.

Technical words	Meaning
diagonal	
gauge	
vertical	
compression	
elevation	
nominal	
proprietary	
galvanised	

Task 3

On a separate piece of paper, list all the abbreviations on the plan and work out what they mean.

REMEMBER!

A glossary and a dictionary both list words in alphabetical order.

A glossary contains words about a specialist subject. For example, this study guide has a glossary of all the specialist words used in it, together with their meanings.

Tip

Some words have more than one meaning, so you need to choose the meaning that makes sense in the context used on the plan.

Tip

Abbreviations are shortened versions of words or phrases. Sometimes the first part of the word has been written down. Sometimes each letter in an abbreviation is the first letter of a word.

Rw/L1.1; Rt/L1.3

PAGES 3:9–3:10

Reading specifications from working drawings

In addition to being able to read and understand all the graphical information contained on plans and drawings, it is vital that learners are equipped with the necessary skills to access and read specifications relevant to their occupation.

Materials

Drawings containing specifications

7 Oakwood Lane – drawings 38/1 and 38/2 from the Source material (0:07–0:08)

Learning outcomes

- To use different reading strategies to find and obtain relevant information (scanning for key words to locate information and detailed reading to obtain specific information) (focus page, Tasks 1–4)
- To use the organisational features of drawings to locate relevant information (focus page, Tasks 1–4)

Introduction

- Look at plans to see how specifications for different aspects of building are shown: roofing, foundations, block and brick work, timber work, etc.

Focus page

- Look at the drawing on the focus page. Locate the different sets of specifications and who they are intended for.
- Confirm that it may not be necessary to read all the specifications, but that you need to read specifications for your aspect of the work in detail.

Curric. refs	NOS/NVQ	Key Skills
Rt/L1.5	VR211 VR40	C1.2

Tasks 1–4

Use different reading strategies to find relevant information
Rt/L1.5

- Discuss the purpose of specifications found on plans and drawings. What kind of information do they contain? What function do they serve? Who uses them? How are they organised on the plan?
- Learners may need reminding of reading techniques, such as skimming and scanning.
- Reinforce the concept that it is essential to read the specifications relevant to the job that you are doing, but that it is not necessary to read the other details. Introduce learners to the tasks, using 7 Oakwood Lane – drawing 38/2 from the Source material.

If the learner has difficulty

- Discuss learners' strategies for locating relevant information. Introduce learners to additional strategies that they may have overlooked by using objects to hand.
- Provide further opportunities for learners to practise the skills highlighted on the focus page. Help dyslexic learners and learners experiencing visual-processing difficulties to use the organisational features of the drawings as much as possible.
- Ensure learners understand that a code will include both letters and numbers.
- Make sure learners understand that they only need to list the materials referred to on the drawing. They are not being asked to include all materials (e.g. sand, cement, water, etc.).

Extension

- Find specific information using the specifications from other drawings.
- Make a list of materials needed for various other tasks.

Theme assessment

This skill is best assessed using a range of drawings, of varying complexity, from the learners' workplaces. Set questions and tasks based on these drawings, testing the skills developed in this theme (skimming, scanning, detailed reading, use of keys, use of glossary).

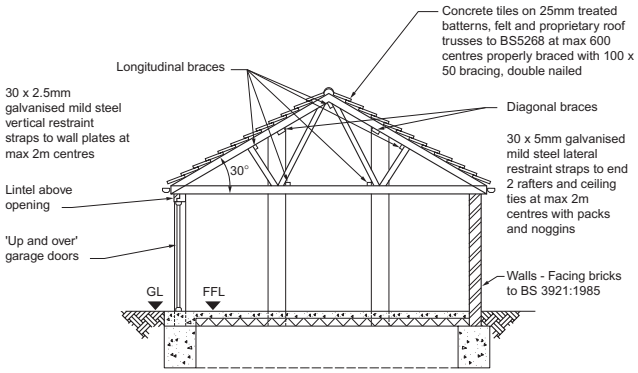
Reading specifications from working drawings

Focus

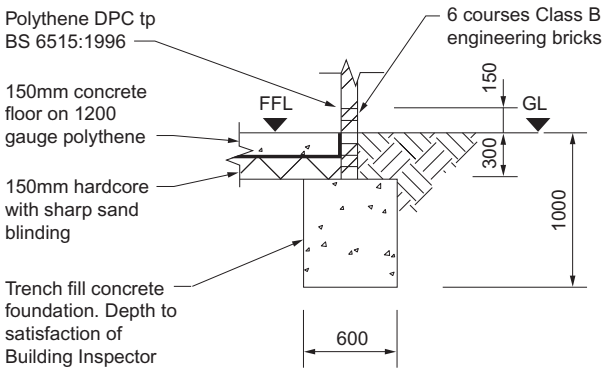
Architects' drawings contain written instructions that tell you exactly what material to use for the construction work. These are called 'specifications'. To meet building regulations, it is vital to read and follow the details accurately. Here are some tips to help you read this information.

Tip

If you're a bricklayer, for example, the specifications that you need to read are likely to be written beside the walls on the cross-section. It's also a good idea to check specifications next to the footings.



Section A - A



Section Through Foundation

You don't have to read every specification

Specifications give details about all the materials that are needed and how they are to be used. Unless you are constructing the whole of the building yourself, you only need to read specifications that apply to the materials that you will be using.

How to find the specifications that are relevant to your job

On most drawings, specifications are written close to the items that they are describing. For example, specifications about the roof are written beside the roof elements on the cross-section. Think about the position of the elements that you will be working with and read the information that is close to that position on the drawing.

How to check if you have found all the relevant information

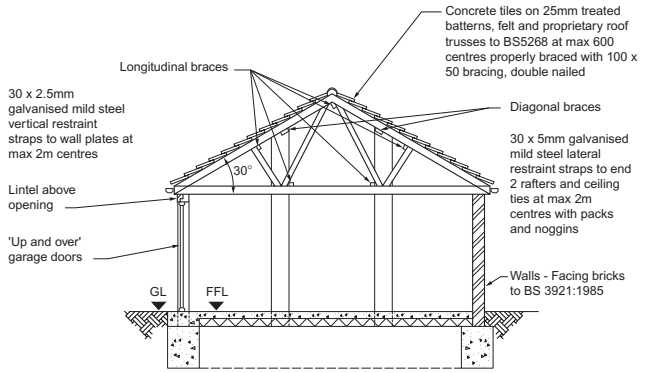
Let your eyes scan over the drawing looking for key words. For example if you are a bricklayer, key words to look out for are 'walls' and 'bricks'. If you spot any of the key words, then read the information in detail.

Reading specifications from working diagrams

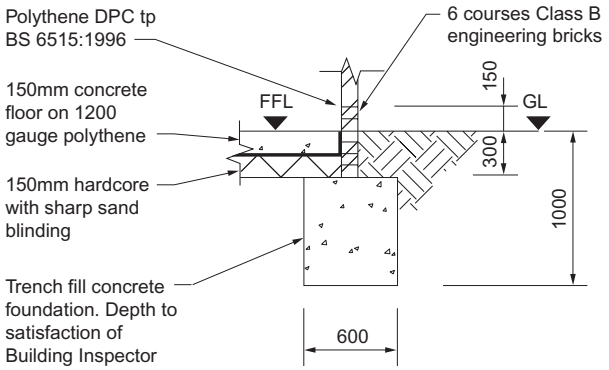
Task

Task 1

Mark the specifications that are relevant to a bricklayer.



Section A - A



Section Through Foundation

REMEMBER!

Look for information that is written near to the walls. Remember to scan the text for key words such as 'walls' and 'bricks'.

Task 2

There is a British Standard for all clay bricks. Which is the British Standard that relates to the facing bricks?

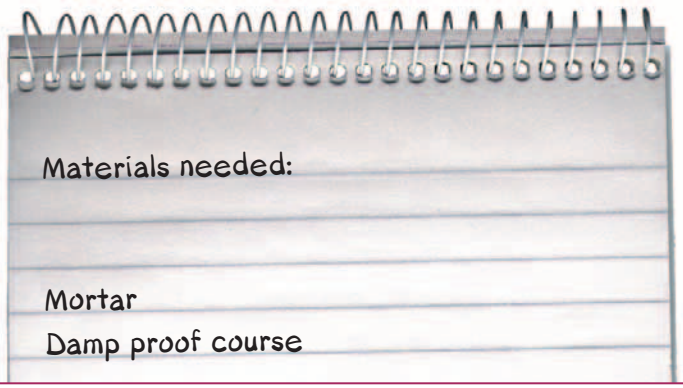
_____

Task 3

How many courses of engineering bricks are required? _____

Task 4

Make a list of the materials needed for the brickwork. Do not worry about quantities at this stage.



PAGES 3:11–3:12

Symbols used on drawings

One of the basics for the effective reading of plans and drawings is a sound understanding of the use of symbols to represent components and features, and an ability to interpret them.

Materials

A selection of drawings and plans

Learning outcomes

To use symbols to obtain meaning from plans and drawings (focus page, Tasks 1–3)

Introduction

- Check that learners recognise all the symbols. You could make this into a quiz.
- The tasks allow practice of this skill.
- Ask learners to study a plan and describe what is shown. Draw attention to the fact that different symbols are used to represent different features. Focus on precise language for describing location and relative position.

Focus page

Discuss the symbols used on the focus page. Draw attention to the notes and the fact that symbols are used to provide additional information about the height of features.

Curric. refs	NOS/NVQ	Key Skills
Rt/L1.3	VR211	C1.2b
MSS2/L2.1	VR40	
N1/L1.3		

Task 1

Derive meaning from symbols that is not explicit in the text
MSS2/L2.1

- Discuss how drawings show the 'whole picture' but that different aspects of the plan will be more/less important to different people.
- Ask learners to name the other trades/ operatives who will use the information on the focus page.

If the learner has difficulty

- Some learners may lack a basic awareness of the other trades involved in construction. You may wish to take the opportunity to provide an overview of construction work, with particular attention to work that precedes and follows on from trowel work.
- Make sure learners are aware of the materials that need to be included in the materials list: light switches, power sockets, telephone sockets and TV aerial sockets.

Extension

List the materials requirements for other trades on this and other plans using different units.

Task 2

Understand symbols on drawings
MSS2/L2.1

- Point out that symbols and text must be read together.

If the learner has difficulty

Provide the learner with some simplified floor plans. Ask them to describe the features shown on each wall. Point out how a measurement is provided for each opening. Ask them to find the length of each of the openings they identified.

Extension

Read measurements for other features on this and other plans.

Task 3

Use images to convey additional meaning to that in the printed text
N1/L1.3

- Explain that you can find the height of a window opening by finding the height of the top of the window from the floor and subtracting the height of the bottom of the window from the floor. Refer learners to the example in the tip.

If the learner has difficulty

- Some learners may have difficulty following the language of the sequential number operations described in the tip. They may also find the abstract mathematical concept hard to grasp. Provide some practical measuring tasks in which they can check for themselves the validity of the calculation used in the example. Get learners to measure the height from the floor to the top of a window, from the floor to the bottom of the window and of the window itself. Then assist them in following the steps in the calculation to see if the answer is the same as the measurement they have taken. It is acceptable for learners to use a calculator.
- Some learners may find it easier to count on the difference rather than perform a subtraction.

Extension

Provide more challenging plans and drawings for the learner to hone and extend the skills practised in each of the above tasks.

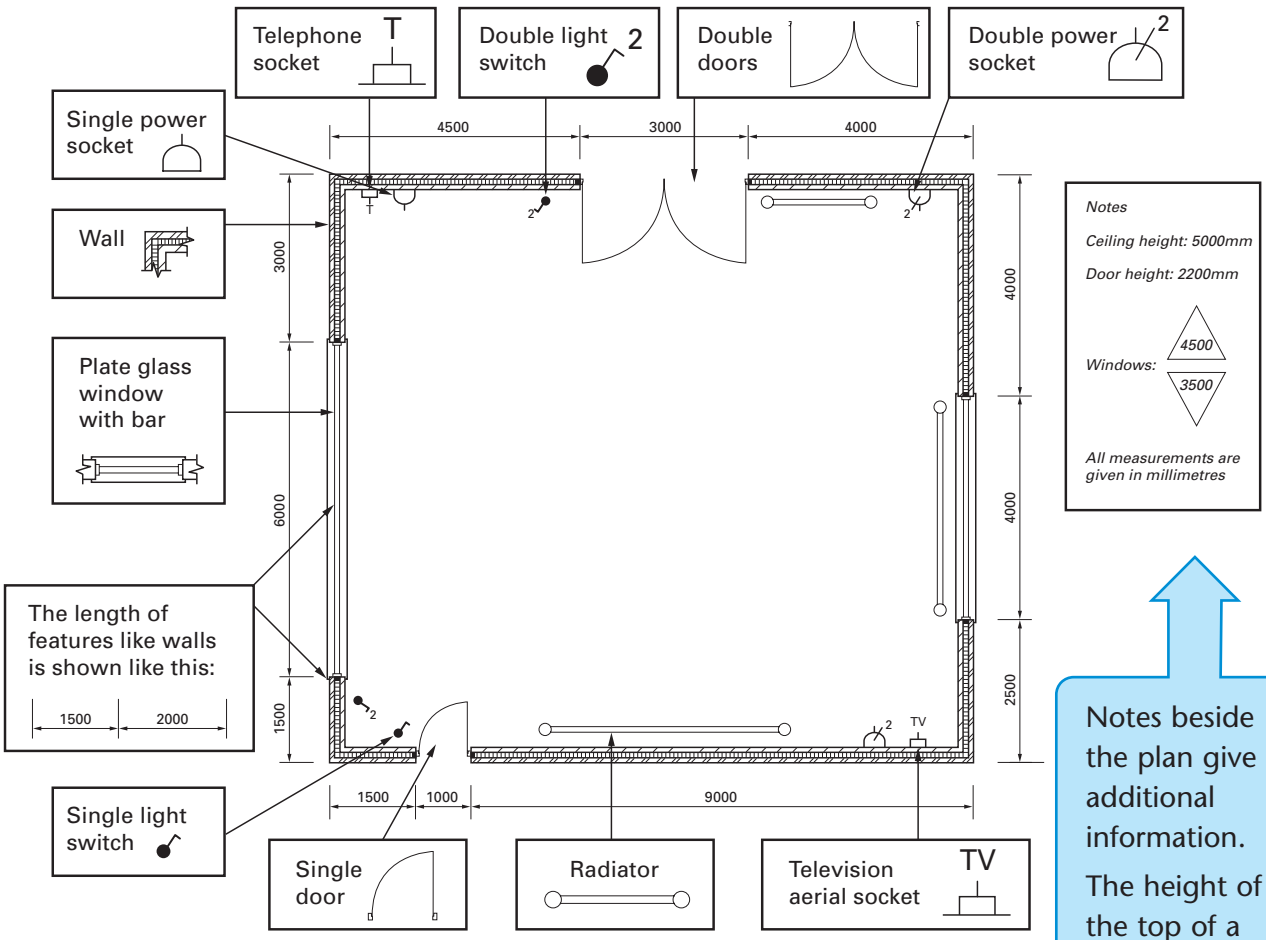
Theme assessment

This skill is best assessed using a range of drawings, of varying complexity, from the learners' workplaces. Set questions and tasks based on these drawings, testing the skill developed in this theme (knowledge of symbols).

Symbols used on drawings

Focus

A builder's drawing is a tool for working. It shows you what a building or part of a building will look like. It gives the dimensions of walls and uses symbols to represent different features. You need to know what each symbol means in order to read the information contained in the plan.



Notes beside the plan give additional information.

The height of the top of a feature from the floor is shown like this: △

The height of the bottom of a feature from the floor is shown like this: ▽

This building plan shows an extension for a sitting room.

Different symbols are important to different people.

For example, as a bricklayer you will need to know about the dimensions of walls and openings.

An electrician would be interested in features such as light switches and electrical sockets.

Symbols used on drawings

Task

Architects' drawings use symbols to represent different features. The lengths of walls and openings are shown with numbers. Additional information is provided about the heights of windows and doors.

Task 1

Use the floor plan on the focus page to draw up a list (on a separate piece of paper) of the materials and quantities an electrician would need.

Task 2

What length of opening is needed for each of these?

a The single door _____ mm

b The double doors _____ mm

c The larger plate glass window _____ mm

d The smaller plate glass window _____ mm

Task 3

Use the notes that accompany the plan to answer the following questions.

a What is the height of the top of the windows from the floor? _____ mm

b What is the height of the bottom of the windows from the floor? _____ mm

c What height opening is needed for the windows? _____ mm

Tip

The 'Notes' section of the plan gives additional information about the height of features.

You can calculate the height of the window opening by finding the height of the top of the window from the floor and subtracting the height of the bottom of the window from the floor.

Example:

In this example the height of the window opening is 1000 mm (3000 mm – 2000 mm = 1000 mm)

MSS2/L2.1; Rt/L1.3; N1/L1.3

PAGES 3:13–3:14

Understanding measurements on working drawings

Plans and drawings are substantial documents, and many learners will be daunted by the amount of information they contain. One of the basic features of plans is that they convey information about measurements. It is important that learners are aware of the conventions used for showing measurements on plans and that they are able to perform the number calculations required.

Materials

A selection of plans and drawings showing measurements

Plans for 26 Dovetail Lane, from the Source material (at rear of file)

Learning outcomes

1 To familiarise learners with the conventions used to show measurements on plans (focus page)

2 To extract and interpret measurements from plans (Tasks 1–3)

Introduction

- Check learners' understanding of millimetres and their relationship to metres. Discuss why millimetres are used on plans.
- Deal with any issues about imperial measurements that arise, but do not introduce the topic if it does not arise.

Focus page

- Ask learners to study the plan and describe what is being shown. Remind learners that different symbols are used to represent different features, and that rooms are labelled on plans.
- Discuss the way that arrows are used to signify dimensions on the plan.
- Draw attention to instances where overall dimensions are given and where dimensions are stated for sections of walls with openings.
- Ask if there is sufficient information about the length of the walls on the plan shown on the focus page.

Curric. refs	NOS/NVQ	Key Skills
MSS2/L2.1 Wt/L1.3 N1/L1.3	VR211 VR40	N2.2f

Task 1

Extract and interpret measurements from a plan MSS2/L2.1

- Discuss the fact that the dimensions shown on a plan allow you to compare sizes of rooms. It is important to understand these for estimating quantities of materials.
- Check understanding of 'exactly square'.

If the learner has difficulty

- Some learners will have difficulty with the comparative language used (e.g. wider, larger) and the language of space (e.g. width). Look out for this and support learners by giving specific examples where necessary.
- You may need to help learners to define 'exactly square'.

Extension

Ask further, similar questions based on other plans.

Task 2

Interpret measurements from a plan MSS2/L2.1 Wt/L1.3

- Explain that an overall measurement on a plan is always equal to the total of the constituent walls and openings that run along its length.
- Ask learners to locate each of the measurements described in Task 2.

If the learner has difficulty

- Read through the task together, to ensure that the learner understands the question.
- Learners may need support to understand the impact of the dividing wall.
- Ask the learner to verbalise their answer if they are having difficulty writing their response.
- Learners with insecure number skills may struggle with large numbers. Refer to *Skills for Life* Numeracy Entry 3, Unit 1. Watch out for zero as a place holder.

Extension

Set further tasks based on this and other plans.

Task 3

Interpret measurements from a plan

MSS2/L2.1

N1/L1.3

- Introduce the task.
- Draw attention to the tip, and work through it if necessary.

If the learner has difficulty

- Some learners may have difficulty following the language of the sequential number operations described in the tip. They may also find the abstract mathematical concept hard to grasp. Support them in carrying out practical measuring tasks so that they can check the validity of the calculation used in the example for themselves.
- Some learners may struggle with the numeracy skills involved. Additional support could come from *Skills for Life* Numeracy Entry 3, Unit 1.

Extension

- Provide more challenging plans and drawings so that the learner can hone and extend the skills practised in each of the above tasks.
- Ask for answers to be given in different units.

Theme assessment

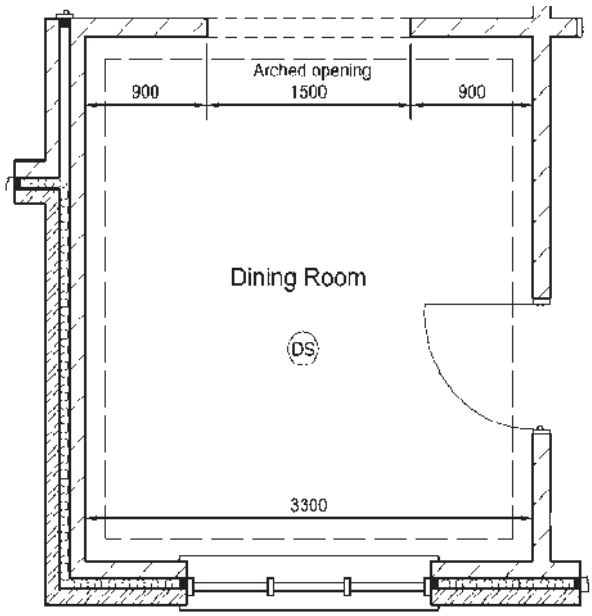
This skill is best assessed using a range of drawings, of varying complexity, from the learners' workplaces. Set questions and tasks based on these drawings, testing the skills developed in this theme (extracting and interpreting measurements on working drawings).

Understanding measurements on working drawings

Focus

Great care is taken to show the measurements on working drawings. Without measurements, it would be impossible to know how long to build a wall, where to position openings and how much material to order. When you are reading a drawing it is very important to understand the measurements and how they work. Here are a few facts to help you.

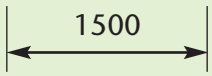
Most measurements on plans are in millimetres (mm). However, there are so many measurements to show that it would take up too much space to write 'mm' after every single measurement. Instead, it is assumed that measurements are in millimetres. If a different unit of measurement is ever used, you will see the unit on the plan (e.g. m or cm).



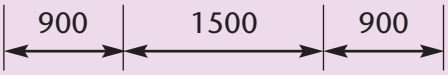
Each measurement is shown alongside a double-headed arrow. The arrow heads point to the positions where the measurement starts and ends.

Sometimes a line is drawn level with the arrowhead to make things clearer.

For example: the distance between each side of the arched opening is 1500 mm.



Sometimes several dimensions are shown end to end like this:



You can calculate the total distance by adding the measurements together. 900 + 1500 + 900 = 3300 mm

This should match the dimensions shown for the opposite wall.

Understanding measurements on working drawings

Task

You will need the first floor plan for the proposed dwelling at 26 Dovetail Lane from the Source material to help you answer the following questions.

Task 1

Look carefully at the first floor plan.

a Which room is larger, bedroom 2 or bedroom 3? _____

b Which room is smaller, bedroom 1 or the bathroom? _____

c Is the landing wider than the bathroom? _____

d Is the trap door on the landing exactly square? _____

e What are the external dimensions of the linen cupboard, including the space for the hot water cylinder? _____

Task 2

The plan shows the overall width for the first floor as 6000 mm. Bedroom 2 measures 3200 mm and bedroom 3 measures 2700 mm. If you add together the width of the two bedrooms you get 5900 mm. Explain why this dimension is not the same as the overall width of the first floor.

_____

_____

_____

_____

Tip

Look carefully at each arrow head to see where it is pointing to. Remember, these are the positions where measurements start from and end at.

Task 3

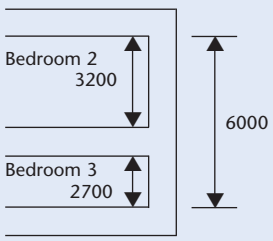
What is the thickness of the wall that separates bedroom 2 and bedroom 3?

_____

Tip

You can calculate the thickness of the dividing wall by adding together the two measurements that go up to the dividing wall and subtracting your answer from the overall measurement.

Example:



MSS2/L2.1; Wt/L1.3; N1/L1.3

PAGES 3:15–3:16

Understanding and using scale in drawings (1)

Understanding that scale allows for real structures to be represented on paper in exact proportion is critical for the understanding and interpretation of architects' drawings (Unit No. VR211, Unit No. VR40).

Materials

Scale drawings

Calculator

Learning outcomes

1 To understand that the dimensions used in scale plans/drawings are in exact proportion to the real object (focus page, Tasks 1 and 3)
2 To know that if the number used in the scale is multiplied by the measurements used to draw the plan, the actual measurements can be found (focus page, Tasks 2 and 3)
3 To understand that, superficially, plans can all look the same; it is essential to look at the scale (focus page)
4 To remind learners that to convert millimetres to metres, you divide by 1000 (focus page, Tasks 1–3)

Introduction

- Ask learners what they understand by the word **scale** in the context of construction.
- Demonstrate 1:1 scale and the construction of a plan by drawing round a box onto paper – exact size in plan form.
- Give the dimensions of the box (e.g. 300 mm × 200 mm) and ask them to draw it 1:2, then 1:10, then 1:100.

Focus page

- Go through the main scales used in construction.
- Talk about the two walls A and B and how important it is to look at the scale used; the walls look the same on paper but the scales are different.
- Discuss the calculation relating to wall A and how it is used to find the size in real life. Check that learners understand how to convert millimetres to metres (divide by 1000). Suggest they do this with a calculator and remind them to be careful to enter the correct number of zeros.
- Ask them to try working out the height of wall B (they could work in pairs).

Check

- Ask learners to draw some lines using different scales.
- Measure some real-life objects and draw them to scale.

Apply

Ask learners to find at least one scale drawing in their place of work, to note the scale(s) and to highlight any part of the building they have helped with.

Curric. refs	NOS/NVQ	Key Skills
MSS1/L1.7	VR211	N1.1
MSS1/L2.10	VR40	N1.2b

Task 1

Interpret a measurement using a scale of 1:50 MSS1/L2.10

- Ask learners to explain what they are looking at (cross-section – a 'slice' of the garage from roof to floor).
- Get learners to identify the bottom member of the roof truss, labelled 'long brace', which measures 98 mm on the plan.
- Draw attention to the scale.

If the learner has difficulty

- Go through the meanings of the words used in the question by using other situations in construction (e.g. a bridge spans a river – in other words it goes from one side to the other, just like the beam).
- If the learner has difficulty understanding that the drawn beam is 50 times smaller than the actual beam, revisit the concept of scale. e.g. ask the learner to draw a line 1:1, then 1:2 and then 1:5, etc. to see that the line gets smaller and smaller (using division) as the scale number gets bigger.
- To find the original size, the reverse is done – multiply the scale number by the size of the drawn line to find the real size.
- If the learner has difficulty with scale, they will need a lot of reinforcing work of this type together with division and multiplication practice. (Extra practice on division/multiplication can be found in *Skills for Life* Numeracy Entry 3 and Level 1).

Extension

Ask the learner what the measurement would represent if the scale had been 1:200.

Task 2

Multiply in millimetres and convert to metres by dividing by 1000

MSS1/L1.7

- Remind the learners that there are 1000 mm in a metre. Using a calculator, put in the mm measurements for the beam and divide by 1000.

If the learner has difficulty

- Provide the learner with a list of large whole numbers and ask him or her to enter each one into the calculator, divide by 1000 and write down the answer. You will see if their difficulty is in entering the numbers correctly (are they always accurate about using three zeros for 1000?) (Note: the learner will need to do more practice at this before attempting Task 3.)

Extension

Ask the learner to work out the approximate length/height of other features on the cross-section.

Task 3

Multiply and divide by two- and three-digit numbers

MSS1/L1.7

MSS1/L2.10

- Remind learners that to bring a scale measurement up to the one in real life, you are making it larger – multiplying makes things larger. The inverse also applies: when bringing a real-life measurement down to scale you are making it smaller – dividing makes things smaller.

If the learner has difficulty

- Use cards with mm and m equivalents in Pelmanism activities.
- Direct learners to *Skills for Life* Numeracy materials for more practice. (See Entry 3, Unit 2 for calculator work.)

Extension

- Ask the learner to add three more measurements of their own to the table and then swap with another learner at the same stage to complete them.

Theme assessment

- Ask learners to draw some lines using different scales.
- Measure some real-life objects and draw them to scale.
- Ask learners to interpret scales shown on drawings from their place of work.

Understanding and using scale in drawings (1)

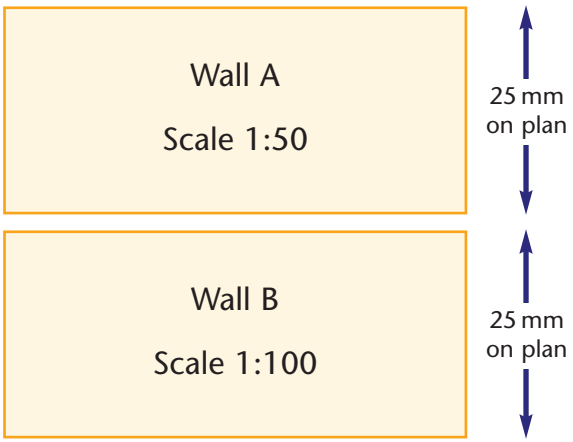
Focus

Drawings used in construction are normally drawn to scale. This means that every measurement is in proportion to the real thing, but smaller.

The main scales used in construction are shown in this table.

Scale	Drawing is:	Scale	Drawing is:
1:1	The same size as the object	**1:100**	100 times smaller than the object
1:5	5 times smaller than the object	**1:200**	200 times smaller than the object
1:10	10 times smaller than the object	**1:500**	500 times smaller than the object
1:20	20 times smaller than the object	**1:1250**	1250 times smaller than the object
1:50	50 times smaller than the object		

Look at these drawings of two walls. A scale of 1:50 has been used for Wall A whereas a scale of 1:100 has been used for Wall B. They both look the same on paper but in real life they would be very different sizes!



What is this in metres?

What is the height in real life?
25 mm × 50 = **1250 mm**

Divide by 1000 to convert mm to m
= 1.25 m

What is the height in real life? _____ mm

The bigger wall in real life is Wall _____

Try this

Write in the scale that would make Wall C 5 times bigger than Wall B in real life.

Wall C

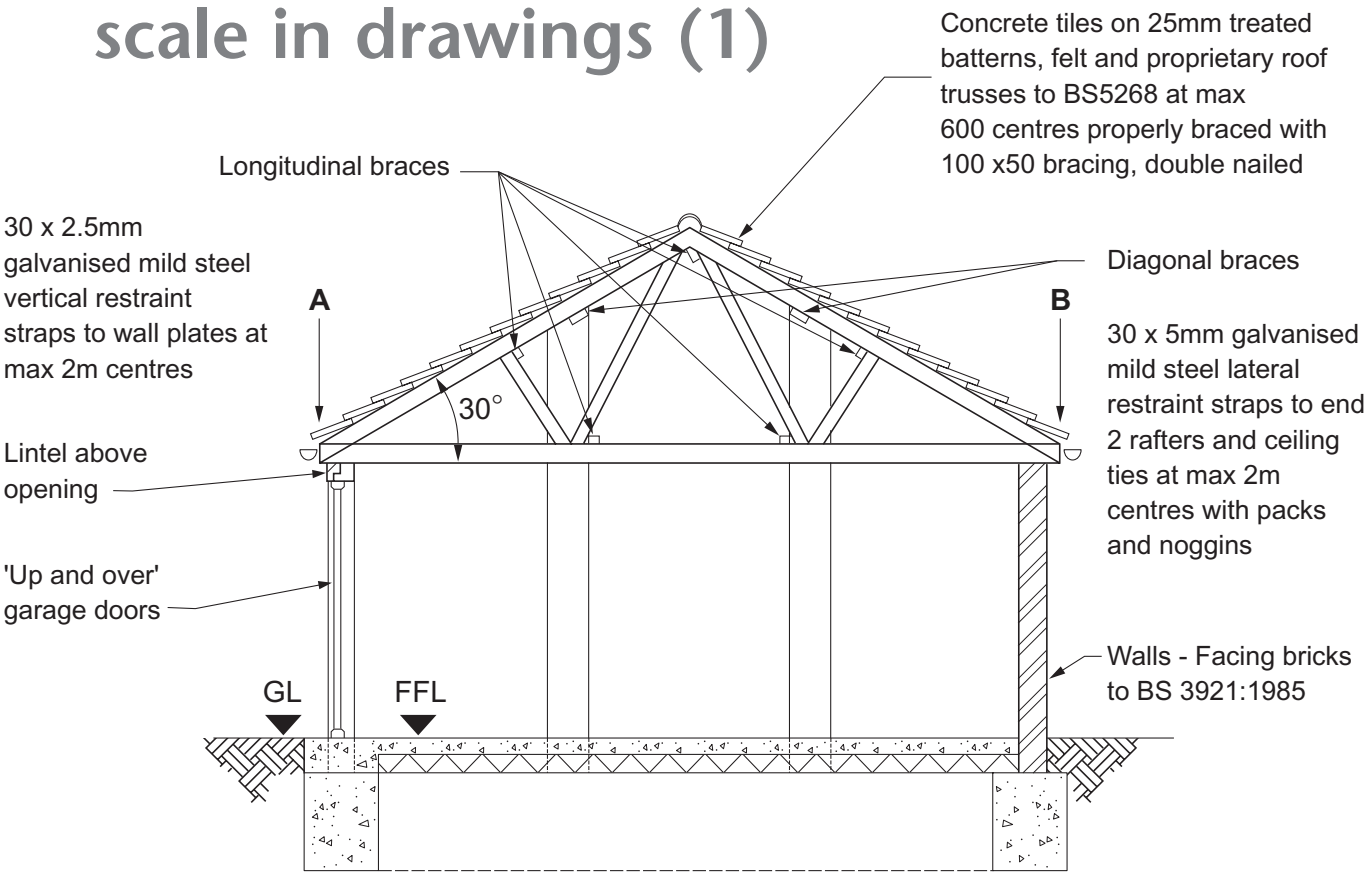
Scale 1: _____

REMEMBER!

On plans, the second number in a scale tells you how many times bigger than the drawing the actual building will be.

Understanding and using scale in drawings (1)

Task



Section A - A

The drawing shows the cross-section of a garage. It has been drawn using a scale of 1:50.

Task 1

The roof truss that spans the width of the garage from points A to B measures 98 mm on the drawing. What is the actual size of the beam?

_____ mm

Task 2

Convert the actual measurement of the beam to metres.

_____ m

Tip

To convert millimetres to metres you have to divide by 1000.

Task 3

Complete the table below.

Scale	1:1	1:5	1:10	1:50	1:100	1:20	1:200
Size drawn	100 mm	250 mm	100 mm	125 mm	150 mm		
Actual size in mm	100	1250				4000	5000
Actual size in m	0.1	1.25				4	

Using the scale on a drawing and converting measurements.

MSS1/L2.10; MSS1/L1.7

PAGES 3:17–3:18

Understanding and using scale in drawings (2)

Scale rules are used to create drawings and are also very useful for quickly interpreting dimensions (Unit No. VR211, Unit No. VR40).

Materials

1:100 scale rules

selection of other scale rules

Learning outcomes

1 To see the connection between the mm measurement on a 1:100 scale rule and the measurement in real life (focus page, Tasks 1–3)

2 To reinforce the fact that lines can be represented on paper in many different lengths depending on the scale (Focus page, Tasks 1–3)

Introduction

- Hand out examples of scale rules. Ask learners to share rules and to pass them on after noting down the different scales they spot on each one.
- Ask learners to find, for example, 6 m on their particular scale rule and to say what the equivalent measurement is immediately above it and record the answers. Ask learners why they are getting different answers. Record the different scales next to each answer so that comparisons can be made.
- Ask learners to decide when an architect would use different scales. If they are uncertain, ask them to look at the drawing for 26 Dovetail Lane in the Source material (at rear of file) and discuss the scales used.

Focus page

- Spend time looking at the scale rule. Point out that because everything is 100 times bigger on a scale rule (1:100), when you are looking at 70 mm on the top edge, this represents $70 \times 100 = 7000$ mm or 7 m in real life.
- Ask learners to find other equivalent measurements using the 1:100 scale rule. For example, if a pier has been built to a height of 1.5 m in real life, what would be the height drawn on the paper to represent it? (15 mm) If the length of a wall is 138 mm on paper, what is the length in real life? (13800 mm =13.8 m)
- Demonstrate how each line can represent different lengths in real life simply by the use of different scales.
- Make some cards containing two out of three of the following: a real-life measurement; a length drawn on a plan; a scale written as a ratio. Ask learners to find the missing item on each card.

Check

Using any scale rule, ask the learner to draw three different lines to scale (e.g. 2.5 m, 12 m, 10.2 m).

Curric. refs	NOS/NVQ	Key Skills
MSS1/L1.7	VR211	N1.1
MSS1/L2.10	VR40	N1.2b
MSS1/L2.3		

Task 1

Measure unmarked lines with different scale rules
MSS1/L2.3
MSS1/L1.7
MSS1/L2.10

- Remind learners that in scales such as 1:50 and 1:100, the second number tells you how many times smaller the drawing has been made compared with the object in real life. (Note: this only applies when the first number is 1.)
- Remind learners that scale is independent of units – it is about exact proportions.

If the learner has difficulty

- Ask learners to measure each line using an ordinary metric ruler and record their results. If this is done accurately then ask them to find the length represented by multiplying the length they have found by the scale asked for. If this is not achieved then they may be having difficulty using the scale rule.
- More one-to-one work using the scale rules may be necessary.

Extension

Ask the learner to use the scale to read dimensions on their drawings.

Task 2

Use a scale rule to work out the lengths represented on a plan

MSS1/L1.7

MSS1/L2.10

- Check that everyone understands the terminology – elevation, width, height, ground, lower edge.

If the learner has difficulty

There may be a difficulty with expressing mm as metres. Show the learner how to do this, using a calculator to divide by 1000. Work through some examples together.

Extension

Set further questions based on other drawings.

Task 3

Use a scale rule to represent real-life measurements on a plan

MSS1/L1.7

MSS1/L2.10

- Ask learners which parts of the scale rule they will look at to convert a real-life measurement into a 1:100 scale drawing.
- 2.5 m is an unmarked measurement on the rule – remind learners of where they should look to identify half-metre measurements.
- Stress that once a scale has been chosen, it must be used throughout a particular drawing. (NB: some plans have floor plans drawn in one scale and elevations drawn in another; however scales are never mixed within the same part of the drawing.)

If the learner has difficulty

Make a set of cards for the learner to match mm and m measurements (e.g. 78 mm and 7.8 m, etc.).

Extension

- Using the same measurement of 2.5 m, record the scaled measurements using three other scale rules.
- Using a 1:100 scale rule, draw the floor plan of a garage measuring 6.5 m × 5.5 m.

Theme assessment

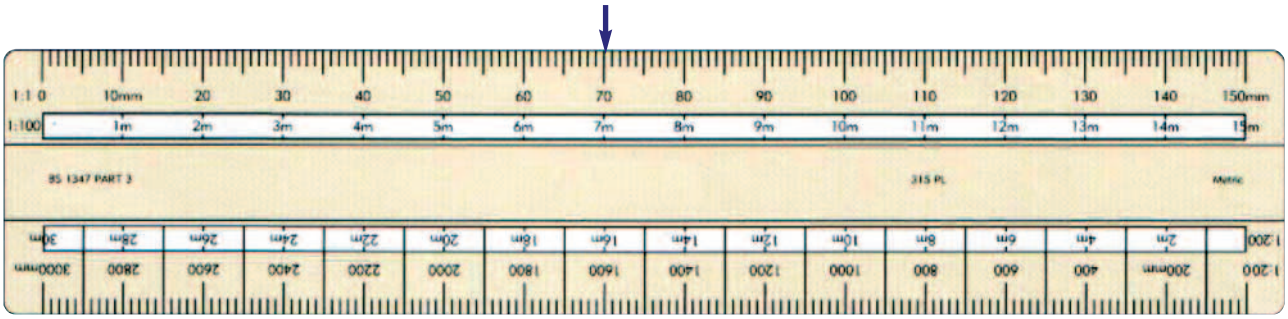
- Using any scale rule, ask learners to draw different lines to scale (e.g. 2.5 m, 12 m, 10.2 m).
- Using a scale rule, ask learners to interpret drawings from the workplace.

Understanding and using scale in drawings (2)

Focus

Scale rules are used to create scale drawings. Many drawings are also created electronically using a 'computer-aided design' programme.

If the wall of a proposed building is to be 7 m long, and the scale on the drawing being created is 1:100, then the line drawn to represent it will be 70 mm. Look at the scale rule carefully to see how it shows you this.



In the table below, see how these three lines can represent different real-life lengths by using different scales.

Line 1 40 mm

Line 2 60 mm

Line	Scale	Length represented
1	1:1	40 mm
	1:100	4000 mm or 4.0 m
	1:50	2000 mm or 2.0 m
2	1:5	300 mm
	1:100	6000 mm or 6.0 m
	1:50	3000 mm or 3.0 m
3	1:20	1700 mm or 1.7 m
	1:200	17000 mm or 17.0 m
	1:100	8500 mm or 8.5 m

If a drawing uses a **1:1 scale**, it is drawn on paper the **same size** as it is in real life.

If the drawing uses a 1:20 scale then the lines or objects drawn on paper are 20 times smaller than they are in real life.

For example:
Line 3 has been drawn 85 mm long. On a scale of 1:20, it will represent 1700 mm or 1.7 m in real life (85 × 20 = 1700).

Line 3 85 mm

Try this:

Use the scale rule above to help you answer this question.

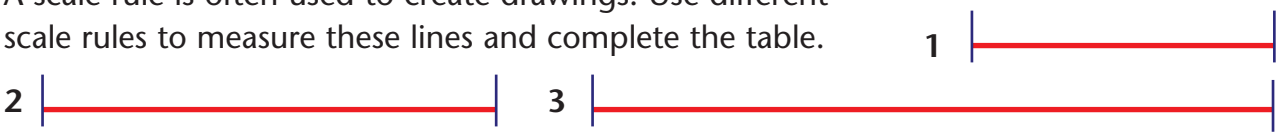
Using scale rule 1:100 draw a line to represent 6.5 m.

Understanding and using scale in drawings (2)

Task

Task 1

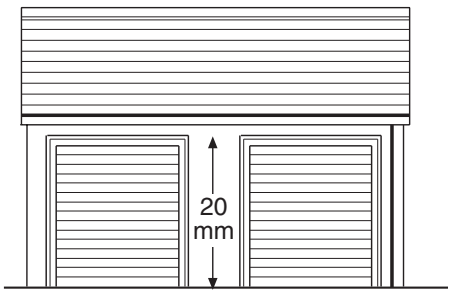
A scale rule is often used to create drawings. Use different scale rules to measure these lines and complete the table.



Length of line on drawing	Scale of drawing	Length represented
1 _____ mm	1:5	
	1:50	
2 _____ mm	1:1	
	1:100	
3 _____ mm	1:20	
	1:200	

Task 2

The elevations of this garage have been drawn using a scale of 1:100. Use a scale rule that measures 1:100 to find out what these measurements represent.

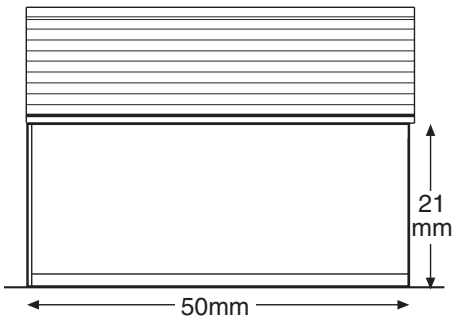


Front Elevation

a The height of each garage door shown on the front elevation measures 20 mm on the drawing. What will be the height of the doors when the garage has been built? _____ mm or _____ m

b The width of the wall on the rear elevation measures 50 mm on this drawing. It represents: _____ m

c The height of the wall from the ground to the lower edge of the roof on both elevations has been drawn to measure 21 mm on the drawing. This represents: _____ mm or _____ m



Rear (to plot 17)

Task 3

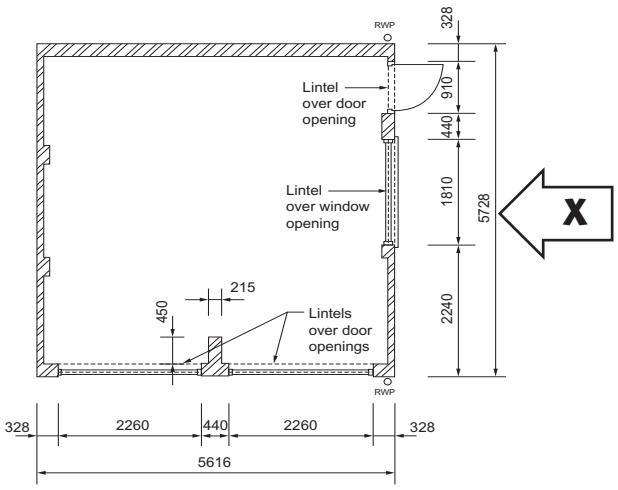
If the width of a patio door is 2.5 m, what measurement would you read on your 1:100 scale rule? _____ mm

Using the scale on a drawing and converting measurements.

MSS1/L2.3; MSS1/L2.10; MSS1/L1.7

Check it

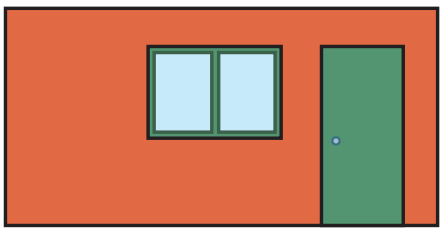
Look at the plan of a garage.



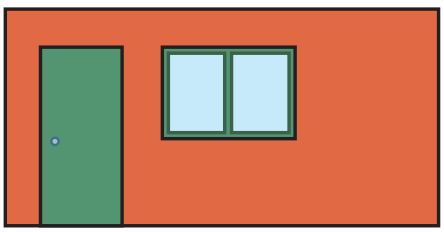
Brickwork Dimensions

1 Imagine that you are standing outside the garage, facing the wall that arrow X is pointing to. Which of these four views is the one that you will see?

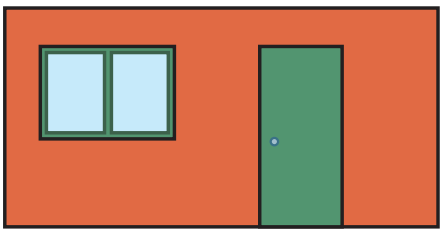
A



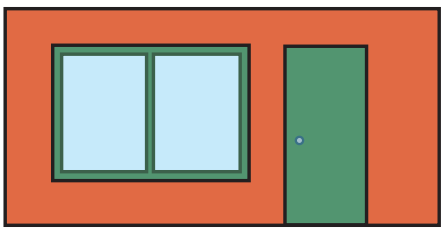
B



C



D



MSS2/L2.1

2 How wide is the garage door designed for car entry?

A 910 mm

B 1810 mm

C 2240 mm

D 2260 mm

MSS2/L2.1

3 Which of these types of drawing would show you what a building would look like on the outside from the back?

A Cross-section

B Floor plan

C Front elevation

D Rear elevation **MSS2/L2.1**

4 Which of these definitions describes a lintel?

A A beam that supports a ceiling

B Covering or coating on a structure

C A beam that forms part of the framework of a roof

D A beam that supports the wall above a window or a door. **Rw/E3.1**

5 A window measures 2134 mm. What is this in metres?

A 21.34 m

B 2.134 m

C 213.4 m

D 0.2134 m **MSS1/L1.7**

6 A wall shows running dimensions of 850-425-850. What is this in metres?

A 2125 m

B 21.25 m

C 2.125 m

D 0.2125 m **MSS1/L1.7**

7 A plan uses a scale of 1:200. A wall is shown measuring 32 mm on the plan. How long would the wall be in real life?

A 3200 m

B 6400 m

C 64 m

D 6.4 m **MSS1/L2.10**

8 A floor is 3.7 m wide in real life. When it is drawn on a plan using a scale of 1:50, how long is the line?

A 74 mm

B 7.4 mm

C 18.5 mm

D 185 mm **MSS1/L2.10**

9 A plan uses a scale of 1:20. A window is shown measuring 56 mm wide on the plan. How wide would the window be in real life?

A 1.12 m

B 112 m

C 11.2 m

D 0.112 m **MSS1/L2.10**

10 A driveway is 2.23 m wide in real life. When it is drawn on a plan using a scale of 1:100, how long is the line?

A 223 mm

B 2.23 mm

C 0.223 mm

D 22.3 mm **MSS1/L2.10**

Answers

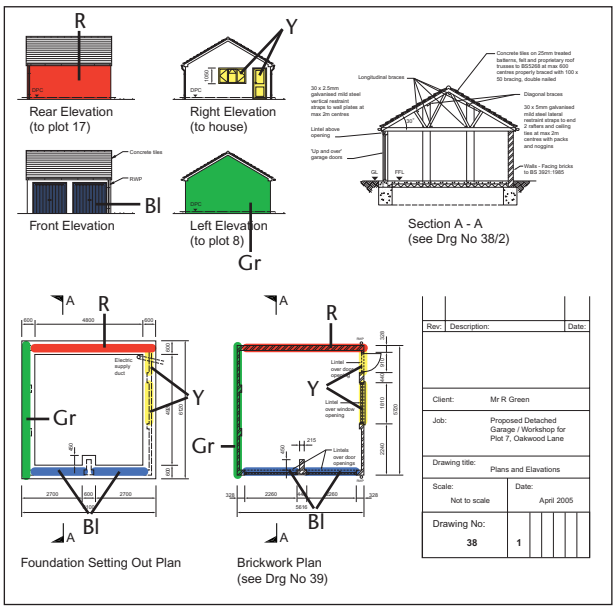
PAGES 3:1–3:6

Working drawings, views, floor plans and elevations

Task 1

a From the side
b From the front to the back

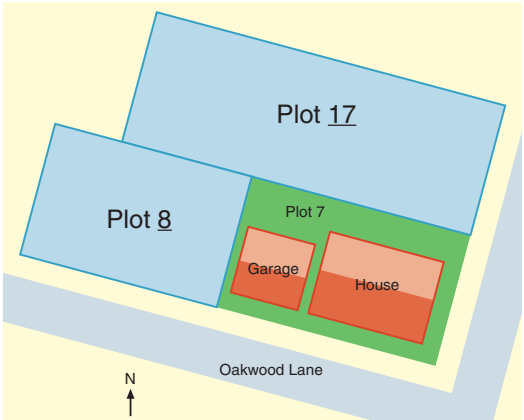
Tasks 2 and 3



Task 4

On drawing number 38/1, the rear elevation has no doors. It is on the opposite side to the front elevation, which has two doors. The left elevation faces plot 8. The right elevation faces the house. It has one window and one door.

Task 5



Task 6

a View 4
b In view 1 there is no pier between the double doors. In view 2 there is no wall at the outer edges of the doors. In view 3 the doors are not the same size.

Task 7

a View 1
b In views 2 and 3, the door is on the wrong side of the window. In view 4 the window is not in the right position.

Task 8

a The dining room.
b Bedroom 2 and bedroom 3.
c The utility, the sunroom, the porch and the bay window off the sitting room.
d The trap door on the first floor provides access to the loft. A trap door on the ground floor could only provide access to a space the thickness of the ceiling above it.
e To minimise on plumbing.
f The toilet and the hall.
g The top half of the stairs.

Task 9

No

Task 10

Yes

Task 11

a The garage
b The utility room
c The hall
d The dining room
e The sitting room

Task 12

a The sun room
b The toilet
c The kitchen

Task 13

The North East elevation

PAGES 3:7–3:8

Understanding technical language and abbreviations

Task 1

Technical words	Meaning
facing bricks	Bricks chosen for their attractive appearance. The finished surface is sanded, smooth or rusticated
common bricks	Basic bricks used mostly for internal work or for rendered or cladded external work
engineering bricks	Very strong and durable bricks that are resistant to water
blocks	Walling units normally made from concrete. They are larger than bricks
lintel	A piece of concrete, stone or metal across the top of a door or window
lateral restraint	Equipment to prevent sideways movement
hardcore	A layer of crushed stone laid over the ground to form a bed for the floor.

Task 2

Technical words	Meaning
diagonal	A straight line joining opposite corners of a rectangle or square
gauge	An instrument that measures the amount, level or contents of something
vertical	Exactly upright; at right angles to the ground
compression	Squeezing together
elevation	A scale drawing showing the side of a building
nominal	The size that something is intended to be
proprietary	With a trade name
galvanised	Coated to prevent rusting

Task 3

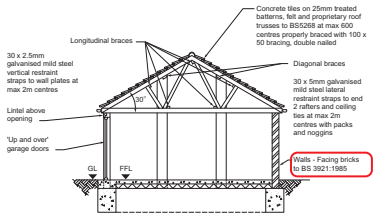
Abbreviation	Meaning
BS	British Standard
DPC	damp proof course
Drg	Drawing
FFL	Finished Floor Level
GL	Ground Level
m	metres
max	maximum
mm	millimetres
No.	Number
Rev	Revision
RWP	Rain Water Pipe

PAGES 3:9–3:10

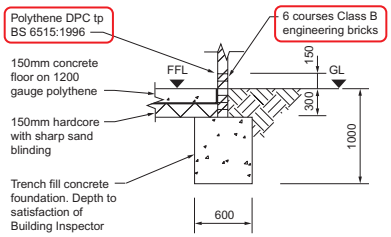
Reading specifications from working drawings

Task 1

The specifications relevant to a bricklayer are circled.



Section A - A



Section Through Foundation

Task 2

BS 3921:1985

Task 3

6

Task 4

facing bricks BS 3921:1985
Class B engineering bricks

PAGES 3:11–3:12

Symbols used on drawings

Task 1

Materials	Quantity
Light switches	1 single and 2 double
Power sockets	1 single and 2 double
Telephone sockets	1
TV aerial sockets	1

Task 2

a The single door 1000 mm
b The double doors 3000 mm
c The larger plate glass window 6000 mm
d The smaller plate glass window 4000 mm

Task 3

a 4500 mm

b 3500 mm

c 1000 mm

PAGES 3:13–3:14

Understanding measurements on working drawings

Task 1

a Bedroom 2

b Bathroom

c No

d Yes

e 2100 mm by 700 mm

Task 2

The overall width for the first floor is 6000 mm, which includes the widths of the two rooms and the wall that separates them. The measurement for each room only goes as far as the dividing wall. The difference between the measurements for the two rooms added together and the overall width of the first floor is the thickness of the dividing wall.

Task 3

100 mm

PAGES 3:15–3:16

Understanding and using scale in drawings (1)

Task 1

4900 mm

Task 2

4.9 m

Task 3

Scale	1:1	1:5	1:10	1:50	1:100	1:20	1:200
Size drawn	100 mm	250 mm	100 mm	125 mm	150 mm	**200 mm (4000 ÷ 20)**	**25mm (5000 ÷ 200)**
Actual size in mm	100	1250	**1000 (100 × 10)**	**6250 (125 × 50)**	**15 000 (150 × 100)**	4000	5000
Actual size in m	0.1	1.25	**1 (1000 ÷ 1000)**	**6.25**	**15 (15 000 ÷ 1000)**	4	5

PAGES 3:17–3:18

Understanding and using scale in drawings (2)

Focus page

Try this:
Your line should be 65 mm long.

Task 1

Length of line on drawing	Scale of drawing	Length represented
1 40 mm	1:5	200 mm (0.02 m)
	1:50	2000 mm (2 m)
2 60 mm	1:1	60 mm (0.06 m)
	1:100	6000 mm (6 m)
3 90 mm	1:20	1800 mm (1.8 m)
	1:200	18 000 mm (18 m)

Task 2

a 2000 mm or 2 m

b 5 m

c 2100 mm or 2.1 m

Task 3

25 mm

Check it

1 A
2 D
3 D
4 D
5 B
6 C
7 D
8 A
9 A
10 D