Setting out
Introduction to Module 4

Setting out requires the bricklayer to transfer measurements from working drawings to the building plot. There are implications for the whole structure if the measurements are incorrectly interpreted at this stage in the building. Knowing how to read and handle metric measurements is therefore an essential skill for the bricklayer.

In this module learners will have the opportunity to practise the basic requirements of measuring – reading and understanding large numbers, calculating with metric measurements, and accurate metric measuring using a range of builders' tape measures. The module also includes:

- basic setting out techniques using pegs and profiles
- calculation of running dimensions
- checking for 'square' by using a builder's square and the 3:4:5 method.

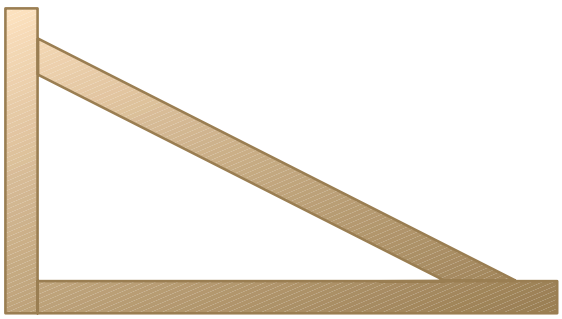
The summary activity for this module asks learners to check their skills and understanding by posing questions about setting out. The correct language of setting out is used and learners are encouraged to explain technical terms (e.g. running dimensions) in their own words with the support of the glossary.

Skills checklist

Setting out involves transferring measurements from drawings to the ground. Getting this right is critical to the whole building so you need to develop the skills to read measurements from a plan and to measure accurately.

You will need the following skills to set out a building accurately. Tick the skills you already have and then look again at the checklist when you have used the materials.

Skills for setting out	Now	Later
Understanding measurements on plans		
Calculating metric measurement in mm and m		
Understanding that there is more than one way to say a number		
Using metric tape measures accurately		
Understanding tape measures that use metric and imperial units of measurement		
Converting between units of the same measurement, e.g. metres to millimetres		
Checking corners for 'square' – 90°		
Checking the setting out for 'square' by measuring the diagonals		



PAGES 4:1–4:2

Measurements for setting out and the language of measurement (1)

Once the ground workers have finished putting in the foundations, the bricklayers can start setting out, ready for masonry structures (Unit No. VR41). Setting out requires the bricklayer to transfer measurements from working drawings to the building plot. Knowing how to interpret and handle large numbers in measuring is an essential skill for the bricklayer.

Materials

Calculator

Tapes

Drawings from Source material (0:07, 0:08, 0:09, 0:10 and at rear of file)

Flipchart paper/roll of lining paper

Whiteboard

Learning outcomes

1 To understand that dimensions marked in separately on a plan can be turned into running dimensions by adding each measurement along the plan to the one before it (focus page)

2 To add large numbers in a step-by-step way on paper (focus page, Tasks 1 and 2)

3 To use a calculator to calculate efficiently using whole numbers (focus page, Task 1)

Introduction

- Confirm that some drawings show separate measurements for individual features such as walls, windows and doors. Others show running dimensions, where, starting at one corner, all the measurements along the plan are added in sequence. These measurements should agree with the overall measurement.
- Using an enlarged drawing (or OHT), demonstrate how to add separate dimensions to make running dimensions. Check with a calculator.
- Take another part of a drawing and repeat, asking for volunteers to do it in the same way as you have just modelled.
- Ask other learners to check using a calculator that the overall dimension found using the running dimensions method is correct.

Focus page

- Explain to learners that they have just been doing the preparation work for setting out – translating dimensions from drawings, the first critical part towards building structures. Talk through the vocabulary used in the top part of the focus page (e.g. pegs, profiles, features).
- Point out how the separate dimensions in the example on the focus page have become running dimensions. Give further practice if necessary.
- Ask what would happen if there were slight errors in adding up the measurements. Errors at this stage would have a knock-on effect throughout the structures.

Curric. refs	NOS/NVQ	Key Skills
N1/L1.3	VR41	
N1/E3.3		
N2/E3.4		

Task 1

Mark in the running dimensions on the drawing N2/E3.4
N1/L1.3

- Discuss with learners the features they are looking at on this section of a plan (window, bay window, door).
- Remind learners to use the calculator for a final check – running dimensions are worked out by adding one number to the next. When adding large numbers on paper, care must be taken to line up numbers correctly. When using the calculator as a check, care must be taken to enter numbers correctly.

- Finally check that everyone knows that the missing number at the 'start here' point is a zero.

If the learner has difficulty

- Go through the principle of running dimensions using smaller numbers (e.g. adding on in multiples of 10). Gradually make the numbers larger. Allow the learner to use a calculator for the whole task if it helps.
- Encourage dyslexic learners to double-check their calculator work, as errors like reversing/inverting digits (e.g. 9 for a 6, 21 for 12) can occur.

Extension

Give learners (in pairs) some running dimensions to measure out. Get them to add up the running dimensions and check if their overall measurement is the same in reality as it is in their calculation. What (if any) is the discrepancy? Can they explain how discrepancies arise?

Task 2

Check for errors in running dimensions
N1/E3.3

- Discuss the need for accuracy when setting out. Discuss possible problems caused by inaccuracy (over/under measuring).
- Ask learners to say how many measurements will be affected by the extra 1 mm (6).

If the learner has difficulty

Mark in the extra 1 mm next to each of the measurements. The learner can see how many extra millimetres this entails (6 mm in total).

Extension

Ask the learner to solve a problem, for example eight running dimensions have been measured out but the overall measurement ends up 21 mm too long. The person doing the measuring was accurate on the first dimension but then measured everything else inaccurately by the same amount. Mark in how many more millimetres that person was measuring on each dimension (3 mm). If this person carried on measuring inaccurately like this for another ten dimensions, how many millimetres altogether would have been added to the overall measurement? (51 mm)

Theme assessment

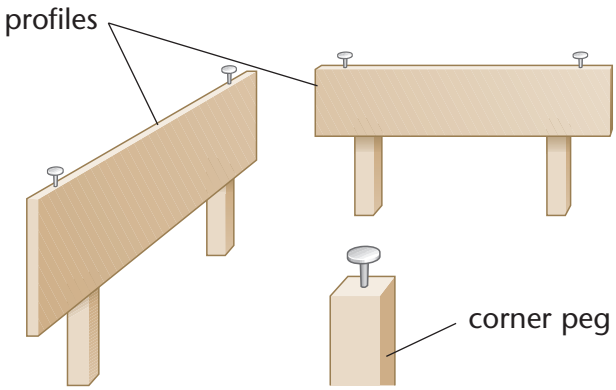
- In pairs, learners should mark out a line with pegs or chalk, using dimensions taken from part of a plan from the workplace. Restrict the use of a calculator, encouraging learners to make dimensions shown on the plan into running dimensions using the more manageable step-by-step adding-on method.
- Repeat this activity with a range of plans of increasing complexity.

Measurements for setting out and the language of measurement (1)

Focus

Setting out is all about transferring measurements from working drawings to the building plot.

Pegs and profiles are set out to mark the positions of corners, walls and foundations.

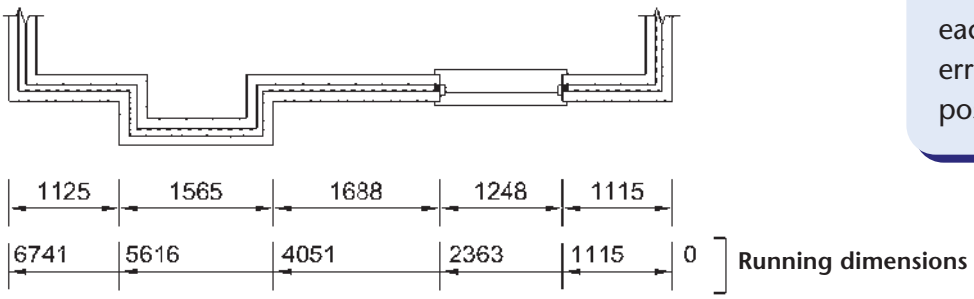


Most working drawings show **separate measurements** for individual features such as walls, windows and doors.

For setting out, it is useful to turn these separate measurements into **running dimensions**. To do this, each measurement along the plan is added to the ones before it.

REMEMBER!

If separate dimensions are used for setting out, each tiny measuring error will make all later positions wrong.



Calculating running dimensions

Write 0 at one corner of the working drawing.

Add on the dimension shown between the 1st set of arrows: 0 + 1115 = 1115. Write it at the tip of the 1st arrow.

Add on the dimension shown between the 2nd set of arrows: 1115 +1248 = 2363. Write it on the drawing.

Add on the dimension shown between the 3rd set of arrows: 2363 + 1688 = 4051. Write it on the drawing.

Add each dimension to your new total and write your answer on the drawing.

Your running dimension is complete when you reach the corner of the building opposite your starting point.

Check your answer

Make sure that the separate measurements add up to your last running dimension.

Tip

Check your answer. Make sure the separate measurements add up to your last running dimension.

```
  1115
  1248
  1688
+ 1565
  1125
  ----
  6741   ✓ Number equal   OK
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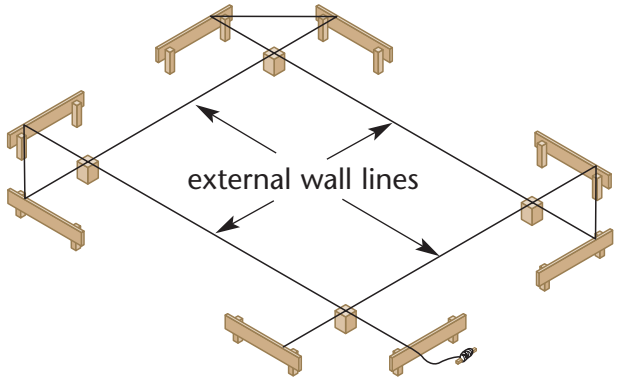
Measurements for setting out and the language of measurement (1)

Task

Measurements from working drawings have to be set out accurately on the site before any building work can begin.

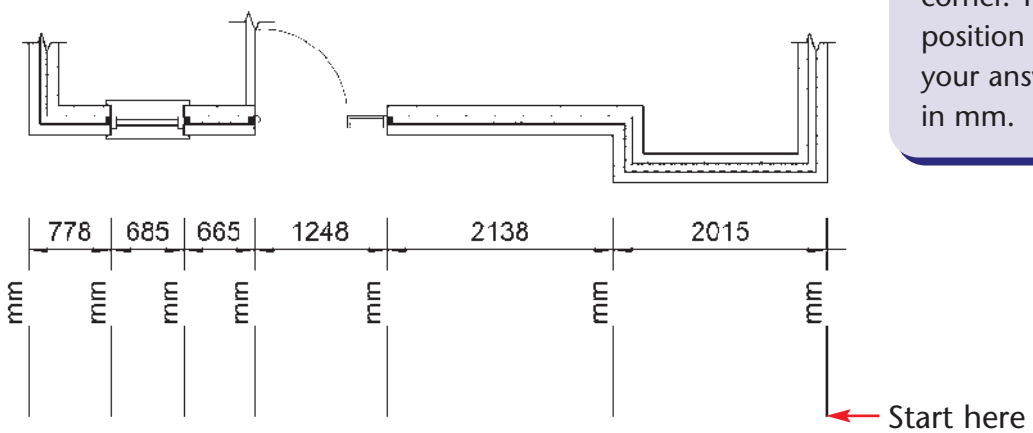


Task 1

This working drawing has separate dimensions shown on it. Mark the running dimensions on the drawing.

Tip

Start at the right-hand corner. Your starting position is 0 mm. All your answers will be in mm.



Check your answer.

Task 2

If you set out each of the dimensions from this drawing separately, and you measured each dimension 1 mm too big by mistake, what would the error be?

_____

PAGES 4:3–4:4

Measurements for setting out and the language of measurement (2)

Bricklayers are required to carry out work practices to comply with given information (Unit No. VR41). This information can be given verbally or in writing. In many situations, especially when setting out the building with workmates, the information will be given and received verbally. However, calling out a measurement to someone else can be tricky because there is more than one way of saying the same number. These differences need to be understood by workers in construction in order to avoid errors or misunderstanding.

Learning outcomes

1 To know at least three ways of expressing a number (focus page, Tasks 1 and 2)

2 To express a number by understanding that the value of digits is known by their position within the number (partitioning) (focus page, Tasks 1 and 2)

3 To understand the value of zero as a place holder (focus page, Tasks 1 and 2)

Introduction

- Point out that working in millimetres creates very large numbers. Discuss conventional ways that numbers are spoken (e.g. 18 521 = eighteen thousand five hundred and twenty-one). Ensure learners have a good grounding in partitioning spoken numbers like this. Repeat for decimals (18.521 = eighteen point five two one).
- Point out to learners that they may also hear measurements read out in unconventional ways. Write a number on the board (e.g. 2009 mm) and ask for other ways it can be said (two 'O' 'O' nine mm; two thousand and nine mm; two zero, zero nine mm; twenty 'O' nine).
- Call out some longer numbers using different formats and ask learners to write them down. This could be a problem for ESOL learners, who may need additional interpreting time.

Focus page

- Look at the points made on the focus page about saying the digits separately to avoid any confusion about hearing the number correctly.
- Discuss the second learning point about grouping digits in order to say numbers more quickly and to avoid mistakes. This depends on confidence in reading and understanding large numbers. A person will only say 18, 5, 2, 1 if they have realised that 18 represents a number 'chunk' (i.e. eighteen thousand). It is more likely that they will have said 1, 8, 5, 2, 1.
- Discuss the points made on the focus page about zero as a place holder. Give the group some numbers expressed as thousands to write down (e.g. four thousand one hundred and twenty = **4120** – three digits follow the thousands number).
- Give the group some numbers expressed as hundreds and remind them that there will be two digits after hearing the word hundred (e.g. six hundred and five = **605** (two digits). Confirm that the zero is important, whenever it occurs in a measurement. Ask learners to say the value of zero in numbers such as 405, 450, 2704, etc. What would the numbers be if the zero were omitted? If learners have problems with zero as a place holder, they will benefit from additional support or further practice with *Skills for Life* materials (Numeracy Entry 3 Unit 1 Activity H4).

Curric. refs	NOS/NVQ	Key Skills
N1/L1.1	VR41	

Task 1

Write down three different ways of saying some measurements
N1/L1.1

- Remind learners that, when you work in a team, it is important to understand what everyone is saying, particularly when it comes to measuring accurately.

- Being able to read, say and understand numbers in various ways relies on an understanding of place value – if a person can only read a number as a string of unconnected digits it may mean that there is little real understanding about the value of each digit in that number. There may be difficulty understanding zero as a place holder.
- Do the first dimension together. Ask learners which way they would find the easiest to understand if someone called it out to them.

If the learner has difficulty

- Reduce the size of numbers. Give the learner five two-digit numbers and ask them for two ways of saying them (e.g. 64 = six, four; sixty-four).
- Give the learner five three-digit numbers and ask for two ways of saying them (e.g. 356 = three, five, six; three hundred and fifty-six).
- Give more practice at partitioning and blending numbers, for example partition numbers into hundreds, tens and units (e.g. 356 is made up of 300, 50 and 6). Give learners numbers presented in this partitioned way and ask them to blend them back (e.g. 200, 60 and 8 is 268). In this way the idea about place value should be reinforced.

Extension

Ask the learner to write down a few important phone numbers (e.g. home, family, etc.) and circle groups of two or three digits. Can learners interpret the groups of digits? Discuss how they should interpret a group of digits that starts with a zero.

Task 2

Interpret and write numbers written as words N1/L1.1

- Encourage learners to read each measurement aloud, which will help them to visualise the number.
- Remind them that if they hear the word 'hundred' there will only be two digits after the word, (e.g. five hundred = 500). There are no other digits mentioned after the word hundred so zeros have to take up the two places that would have been occupied by additional tens and units if there were any.

If the learner has difficulty

- Model the first two measurements, writing the digits as you go. Ask the learner what number you have written down to establish how much is understood. For example, eleven 'O' nine = 11/0/9 =1109 = one thousand, one hundred and nine, or eleven hundred and nine (both are valid answers in this context).
- Ask the learner to try another with your support.

Extension

Ask the learner to think of four- and five-digit measurements and to write down different ways of saying/writing them.

Theme assessment

Working in pairs, learners should take turns to measure out a length on the wall/floor according to the dimension their partner calls out (keep measurements to centimetres and within the length of the tape measure). Each person must prepare for five measurements to be made – these are recorded before starting. The numbers measured are recorded and checked against the originals.

Measurements for setting out and the language of measurement (2)

Focus

Setting out is often a job for two or more people sharing one working drawing. Measurements from the plan need to be read out and communicated to the rest of the team. This can be trickier than it sounds, especially if you are some distance from the rest of your team and the sound of machinery or passing traffic is making communication difficult. On top of any practical difficulties, numbers can also be very confusing because there are lots of ways of saying the same number.

719 — *Seven one nine*

or

790 — *Seven nine zero* / *Seven nine 'O'*

One way to read out a measurement is to **say each of the digits separately**.

This is particularly useful for distinguishing between numbers that end in '-teen and numbers that end in '-ty'.

For example, at a distance it may be tricky to hear the difference between **seven hundred and nineteen** and **seven hundred and ninety**. Saying each digit separately helps to avoid any confusion.

Seven nine zero and seven nine 'O' are different ways of saying the same number.

If there are several digits in the measurement, it is often better to **group together some of the digits** rather than to read each one separately.

18 521 mm could be read out like this: **eighteen five two one**.

It is a quick way of saying 'eighteen thousand five hundred and twenty-one'.

These are the thousands, hundreds, tens and units.

Zeros are very important.

Take care to picture the correct number of zeros when a number is read out to you.

When you listen to measurements being read out, it often helps to picture the number in your head.

One thousand seven hundred / *Seventeen hundred* / *One seven zero zero* / *1700*

Twenty 'O' five / *Two double 'O' five* / *2005* / *Two thousand and five*

REMEMBER!

- Zeros are an important part of the number.
- Hundreds are followed by two digits.
- Thousands are followed by three digits.

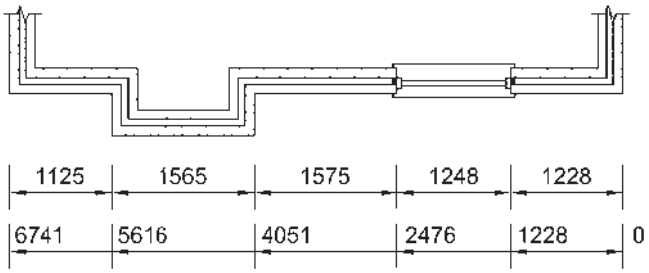
If you are ever unsure about a measurement read out to you, check it with the person who is reading from the plan.

Measurements for setting out and the language of measurement (2)

Task

Setting out requires team work and good communication skills.

Task 1



Write down in words three different ways you could say each of these running dimensions. In each case, highlight the one you think is clearest.

a 1228 mm _____

_____

_____

b 2476 mm _____

_____

_____

c 4051 mm _____

_____

_____

d 5616 mm _____

_____

_____

Tip

There is often more than one way to say a number. Remember to choose the one that will be easiest for other people to understand.

Task 2

Different people say numbers in different ways. Here are some measurements that you may hear. Write down each of these measurements in numbers. All the measurements are in millimetres.

a Eleven 'O' nine _____mm

b Two five 'O' five _____mm

c Five thousand five hundred _____mm

d Twelve hundred and eighty-eight _____mm

Tip

Zeros are an important part of the measurement. Sometimes people say 'O' or 'nought' instead of 'zero'.

Some people group numbers in unusual ways.

PAGES 4:5–4:6

Setting out and checking using a tape measure (1)

Accurate measuring is a critical skill in construction. Working drawings are drawn to show measurements to the exact millimetre. It is not surprising, therefore, that this precision is expected to be maintained by everyone involved in translating the drawing into an actual building. Setting out the building to the nearest millimetre needs a good tape measure that uses millimetres (Unit No. VR41).

Materials

Millimetre tapes

Other types of tapes of varying lengths

Plans/drawings from the Source material

Learning outcomes

1 To confidently read marked and unmarked millimetre measurements from a tape (focus page, Task 1)

2 To find and mark millimetre measurements on a tape (focus page, Task 2)

Introduction

- Give learners five minutes to examine the range of tapes, noting differences between them, and to come up with a description of the tape (e.g. it is a 5 m/16 foot tape with imperial measurements in inches and feet down one edge and metric on the other edge marked at every 10 centimetres right through to the end of the tape).
- Discuss the differences. Stress that, as these different tapes can be found throughout the construction trade, it is important to use each one correctly and to choose a tape that is suitable for the job (e.g. it is no good choosing a 5 m tape to measure a 10 m gap).
- Examine the 'start' of different tapes. Where is the zero point? Discuss the importance of starting the measurement from zero and keeping the tape taut.

Focus page

- Look at the millimetre tape and the focus page. Ask learners why a millimetre tape may be the easiest to use in setting out (numbers on the drawing match those on the tape).
- Call out a series of numbers ending in zero and ask learners to draw the marks on their paper. Talk through the focus page and the fact that the main divisions on the millimetre tape are labelled in tens.

Curric. refs	NOS/NVQ	Key Skills
MSS1/E3.5	VR41	

Task 1

Read the millimetre measurement marked out on each peg
MSS1/E3.5

- Remind learners that marking out accurately is essential in setting out the building. Any inaccuracies at this point will get worse as the structure grows.
- Remind learners to be careful that they read four digits each time and not to leave out the all-important place-holding zeros.

If the learner has difficulty

- Try counting on from smaller numbers first (e.g. one-digit, two-digit and three-digit measurements) at the start of the tape measure to develop this skill.
- Ask the learner to use a pencil to mark every unmarked millimetre as he/she counts from the marked division (one-digit, two-digit and three-digit measurements).
- Try doing the activity using a real tape measure and pegs.
- Learners who are still having difficulty will need additional support and more opportunities to do practical measuring.

Extension

- Ask the learner to write down the measurements in order of size, smallest first.
- Ask the learner to work out the difference in millimetres between the largest measurement and the smallest.

Task 2

Find given measurements on a millimetre tape and mark them in
MSS1/E3.5

- Point out that the graphic is of a section of tape from 5990 mm to 6060 mm. It is not the start of the tape. Encourage learners to locate each of the 10 mm marks and count on to given measurements before tackling the questions.
- Remind learners to be aware of zeros, especially when numbers have four or more digits and look similar, as in the questions.

If the learner has difficulty

- Start with shorter numbers (e.g. one-, two- and three-digit numbers) to develop the skill.
- Support the learner to do the task. Point out that as each number begins with the same two digits, the *third* digit gives the clue about which marked division to look at first.
- The *fourth* digit tells you exactly how many millimetres to count along from the marked division you are on.
- Learners with dyslexia may have difficulties with the sequence (order) of the digits in these numbers and may make errors in reading them. Encourage careful examination of each number, saying it aloud as you go.
- Start with easier numbers, for example two- and three-digit numbers at the start of the tape.

Extension

Give the learner two measurements to add and mark the total on the scale on the page and/or on a tape measure.

Theme assessment

- Give learners some previously drawn lines, ideally on a plan, to measure in millimetres.
- Give learners several measurements in millimetres to mark out, ideally outside, with their millimetre tape.

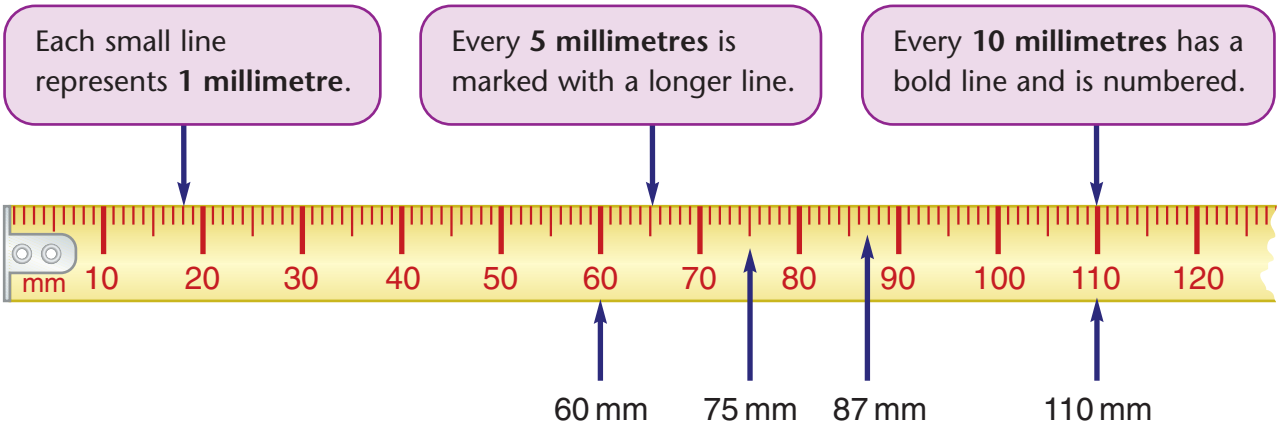
Setting out and checking using a tape measure (1)

Focus

Accurate measuring skills are essential for everyone who works in trowel trades. Working drawings show measurements to the exact **millimetre**. It is essential that you set out the measurements that you take from the drawings precisely. Remember, if one dimension is set out incorrectly, it will have a 'knock-on' effect on other dimensions.

Not all measuring tapes show measurements in exactly the same way.

Some measuring tapes show all the measurements in **millimetres**.



How do you use this kind of measuring tape?

This sort of measuring tape is the easiest to use.

If the measurement on the plan ends in a zero, you will find the same number of millimetres labelled on the tape. For example, 60 mm and 110 mm.

Try this: Draw a mark on the tape to indicate 30 mm.

If the measurement on the plan does not end in a zero, you will not find the same number of millimetres labelled on the tape. You will need to work out the exact position to measure out by counting the number of millimetre marks after a labelled number.

For example, 75 mm is 5 millimetres after the 70 mm mark.
87 mm is 7 millimetres after the 80 mm mark.

Try this: Draw a mark on the tape to indicate 39 mm.

Setting out and checking using a tape measure (1)

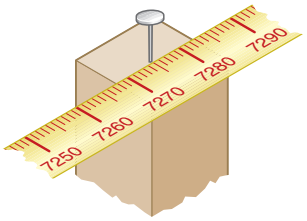
Task

Measurements from working drawings have to be marked out accurately on the site. Nails are hammered into corner pegs or profiles to mark the exact positions for the foundations and the walls.

Task 1

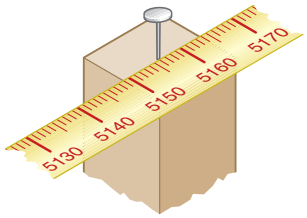
What measurements have been marked out on each of these pegs?

a



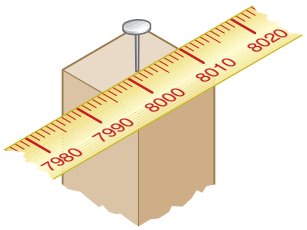
_____mm

b



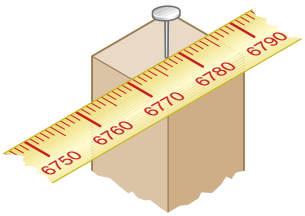
_____mm

c



_____mm

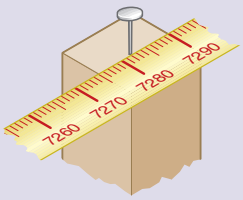
d



_____mm

Tip

Each small division represents 1 mm. So if the nail is positioned two small divisions after 7280 mm, it is marking 7282 mm.



Task 2

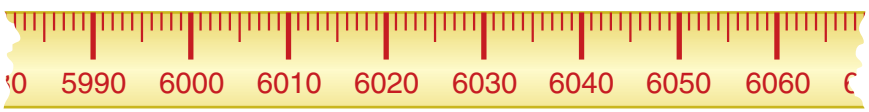
Mark and label the following measurements on the tape provided. Use a sharp pencil or a fine pen.

a 6006 mm

b 6060 mm

c 6013 mm

d 6031 mm



Tip

When you are working on site, it is best to mark positions with a nail or with a fine cut from a saw. This is because pencil and pen marks tend to weather and fade over a period of time.

PAGES 4:7–4:10

Setting out and checking using a tape measure (2)

It is likely that workers in the trowel trades will come across and be expected to use a variety of different measuring tapes. Although imperial measurements are used less and less, there are still some situations in which imperial measurements may be needed or at least referred to (particularly in the renovation of old buildings). The most common 'standard' tapes display both imperial and metric scales. The metric part of these standard tapes is presented in centimetres and metres. Translating millimetre measurements from drawings using these tapes presents additional challenges for the bricklayer when setting out the building (Unit No. VR41).

Materials

Standard tapes – displaying both metric and imperial scales

Cards showing measurements in mm, and equivalent measurements in m, cm and mm for matching

Learning outcomes

1 To recognise measurements are the same whether they are written as cm or mm (focus page, Tasks 1, 2 and 5)
2 To convert mm measurements to m and cm (focus page, Tasks 1–5)
3 To understand that tapes use cm divisions from 1 to 100 between each marked metre (Tasks 1 and 2)

Introduction

- Give learners a standard tape to look at. Ask if they know of occasions when imperial measurements have been used (they may suggest carpet fitting, woodworking). Discuss why imperial is not used very often nowadays.
- Look at the metric side of the tape and describe the features.
- Ask learners how they will use this side of the tape with main divisions marked in cm when they are reading drawings with dimensions marked in mm.
- Remind them that the millimetres are still there but are not labelled – they are the little divisions between each centimetre. Ask how many mm divisions they can see between each centimetre.

Focus page

- Look at the focus page and the description of how to convert from mm to cm and vice versa. Ask how you multiply/divide by 10. Discuss in the context of place value (i.e. as each digit increases/decreases by 10, it moves one column to the left/right). Repeat for 100 and 1000.
- Discuss 'quick' methods of multiplying/dividing by 10, 100 and 1000, including movement of the decimal point. Give practice.
- Look at the description of converting between mm, cm and m. Give some practice in this.
- Look at the two different ways of noting measures in metres (3 m 10.5 cm = 3.015 m). Learners need to understand that these are the same and that the second version is the correct notation.
- Learners need plenty of varied practice to confirm this important skill. Pay particular attention to zero as a place holder.
- Allow opportunities for practical use of these skills. For example, have some cards with measurements in mm. Working in pairs, one learner reads out the measurement for their partner to mark out on the floor. The first learner checks the measurement.

Curric. refs	NOS/NVQ	Key Skills
MSS1/L1.4	VR41	N1.1c
MSS1/L1.7		N1.2b
N1/L1.4		

Task 1

Recognise equivalent mm measurements
MSS1/L1.4
MSS1/L1.7

- Remind learners that to read a measuring tape accurately, they must look carefully at the way that particular tape presents the units of measurement. Give each learner a tape to examine. Ask for the value of the unmarked divisions.
- Ask learners to measure the width of a window and write down the measurement in m and cm, and then convert it to mm.
- Remind learners that:
  – to convert cm to mm, **multiply** by 10
  – to convert m to mm, **multiply** by 1000.
- Ask learners to confirm their understanding of the decimal point and 'quick' methods for multiplying by 10 and 1000. Ask how they can use these methods with whole numbers and with decimals.
- Refer to Task 1. Ask learners the value of the unmarked divisions on the tapes displayed on the page (1 mm).
- Before starting the task, ask learners to estimate the length of 860 mm.

If the learner has difficulty

- Present the learner with smaller measures to establish the concept of equivalent measurements (e.g. 1 cm = 10 mm, 2 cm = 20 mm, etc.) Have a series of cards with equivalent measurements in mm/cm/m to match up.
- Use real tape measures and work together on measuring tasks. Explain and exemplify each step. Work through difficulties together as they arise, using a step-by-step approach.
- Provide further practical measuring tasks to consolidate skills.
- Further work on the decimal point can be found in *Skills for Life* Numeracy Entry 3, Unit 2.
- If difficulties continue to appear at this level, the learner needs some additional support.

Extension

Learners work directly from a plan. They convert measurements from mm to m and cm, and then mark out the measurements using a tape measure, pegs and profile boards.

Task 2

Recognise equivalent mm measurements
MSS1/L1.4
MSS1/L1.7

- Point out that the skills required for this task are the same as in the previous task, but with large measurements.
- Ask learners to estimate the length of 5019 mm before starting the task.

If the learner has difficulty

- Use real tape measures to work on this task.
- If appropriate, ask a learner who is getting on well to partner a learner who is having difficulty and to help by talking through what they are doing.
- Have two sets of cards, one with whole cm and mm equivalents, the second with whole m and mm equivalents. Use these in Pelmanism activities. Use one-digit cm and m measurements to start with. Progress to two-digit whole cm and m measurements.
- You may need to work through each problem verbally with learners who find this difficult.

Extension

Set additional problems to solve.

Task 3

Convert mm measurements into centimetres and metres
MSS1/L1.7

- Ask learners to explain how they will convert mm into m and cm.
- Work through the first example with them.

If the learner has difficulty

- Suggest that the learner uses a calculator. Do the first number together to ensure that the learner inputs the numbers in the correct order. Model how to read and record the number displayed.
- Ask the learner to convert the other measurements and to read back the display on the calculator, so that you know if they understand the task.

Extension

- Ask the learner to take another set of dimensions from a drawing in the Source material and to convert them in the same way.
- Ask the learner to record measurements in metres (e.g. 1 m 22 cm becomes 1.22 m).

Task 4

Convert between units

N1/L1.4

MSS1/L1.7

- Explain the task and how the chart has been used to record the same measurements in a range of different ways.
- Work through the example on the first row of the chart.
- Ask learners to say how they will convert mm into m (divide by 1000; e.g. 4255 mm = 4.255 m) or into m and cm (divide by 1000 to find the number of whole metres, then divide the millimetres that do not make a whole metre by 10 to convert them to centimetres; e.g. 4255 mm = 4 m 25.5 cm).
- Work through some examples with learners, allowing plenty of practice.
- Ask learners to say how they will convert metre measurements written as decimal fractions into metres and centimetres. (Draw attention to the fact that the number to the left of the decimal point is the number of whole metres; the numbers to the right of the decimal point are fractions (hundredths) of a metre.) Ask learners how they will convert to millimetres.
- Work through some examples with learners, allowing plenty of practice.

If the learner has difficulty

- Dyslexic learners may have some directional difficulties with this, as the task requires the learner to move from left to right and right to left. Encourage the learner to use a ruler or piece of paper to assist visual tracking.
- Learners experiencing difficulty with the right-hand column of the chart may need additional support to understand place value – see *Skills for Life* Numeracy Entry 3, Units 2 and 4.

Extension

Apply to other tasks.

Task 5

Understand place value in measurements

N1/L1.4

- Discuss the first three examples. You may need to demonstrate the measurements using a tape measure, so learners can see and understand the difference made by zero as a place holder.
- Discuss the fourth and fifth examples in the context of being answers arrived at after moving the decimal point when converting mm to m.
- Ask learners if they can explain why the zeros in 4.000 m and 4.350 m are not needed. (We would normally say 4 metres and 4.35 metres.) Can learners think of any situations when it may be preferable to leave the zeros in place? (To show the level of accuracy measured to.)
- Ask learners if they can think of a rule that explains which zeros may be left off the measurement in situations when it is not necessary to indicate the level of accuracy.
- Explain the task. Allow learners to use a tape measure to check answers, if necessary.

If the learner has difficulty

- Make some cards with easier numbers for the learner to match.
- Work with the learner, using a tape measure.

Extension

Ask the learner to write all the measures in mm.

Theme assessment

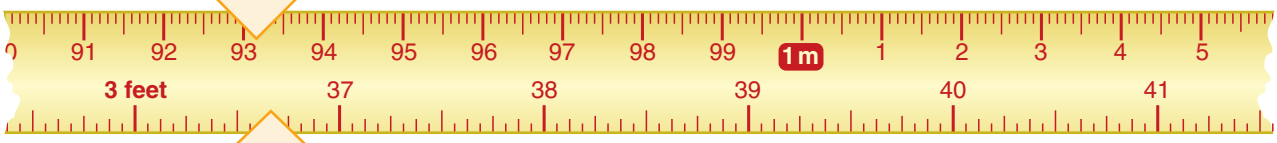
- Using tapes, ask learners to draw a series of measurements on a piece of paper. Give mixed measurements so that learners have to convert between mm and cm, and vice versa. Give measurements verbally and in writing.
- Take mm dimensions from a drawing in the Source material or other workplace drawing, for learners to measure and mark out using standard tapes.

Setting out and checking using a tape measure (2)

Focus

Lots of builders use tape measures like this one.

One side of the tape shows **millimetres**, **centimetres** and **metres**. This is the side of the tape that you use to set out measurements from working drawings. If you look carefully, you will notice that each centimetre is split into 10 small parts. These are the millimetres.



The other side of the tape shows **inches** and **feet**. These are old-fashioned measurements and are no longer used on plans and drawings. You can ignore this side of the tape.

How do you use this type of measuring tape?

When you use this type of measuring tape, you have to refer to the centimetres in order to measure out the correct number of millimetres.

For example:

These are the measurements you read on the drawing.

34 mm is equal to 3.4 cm
210 mm is equal to 21.0 cm
3105 mm is equal to 310.5 cm

These are the measurements you read on the tape measure.

Remember: Divide the number of mm by 10 to convert them to cm.

Try this: 884 mm is equal to _____ cm.

Sometimes you will need to refer to the metres on your measuring tape as well as the centimetres. First convert the mm to cm as described above. Then convert any hundreds of centimetres to metres (100 cm = 1 m).

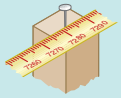
These are the measurements you read on the drawing.

4000 mm is equal to 400.0 cm or 4 m

3105 mm is equal to 310.5 cm or 3 m 10.5 cm or 3.105 m

4210 mm is equal to 421.0 cm or 4 m 21 cm or 4.210 m

These are the measurements you read on the tape measure.



Try this: 3071 mm is equal to _____ cm or _____ m _____ cm or _____ · _____ m.

Setting out and checking using a tape measure (2)

Task

Some measuring tapes show millimetres, centimetres and metres. When you measure or set out using this type of tape you need to refer to the centimetres and sometimes a combination of metres and centimetres to measure out the distance shown in millimetres on the working drawing.

Tip

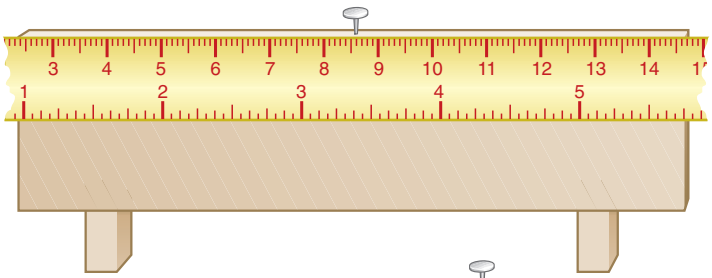
1 centimetre = 10 millimetres. To convert centimetres to millimetres, multiply by 10.

1 metre = 1000 millimetres. To convert metres to millimetres, multiply by 1000.

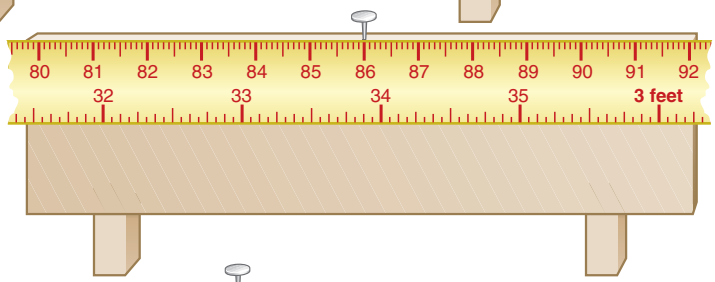
Task 1

These profile boards mark the position of external and internal walls. Which of them shows 860 mm? Profile _____

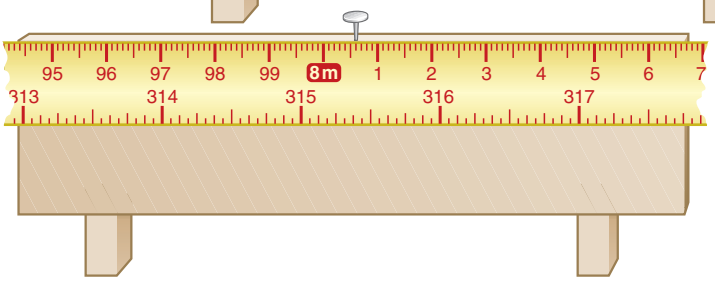
a



b



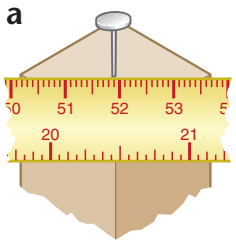
c



Task 2

Which of these corner pegs shows 5019 mm? Peg _____

a



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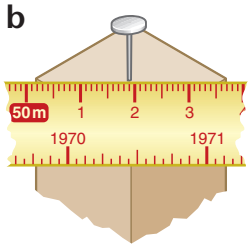

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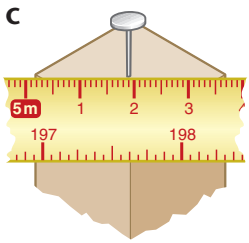
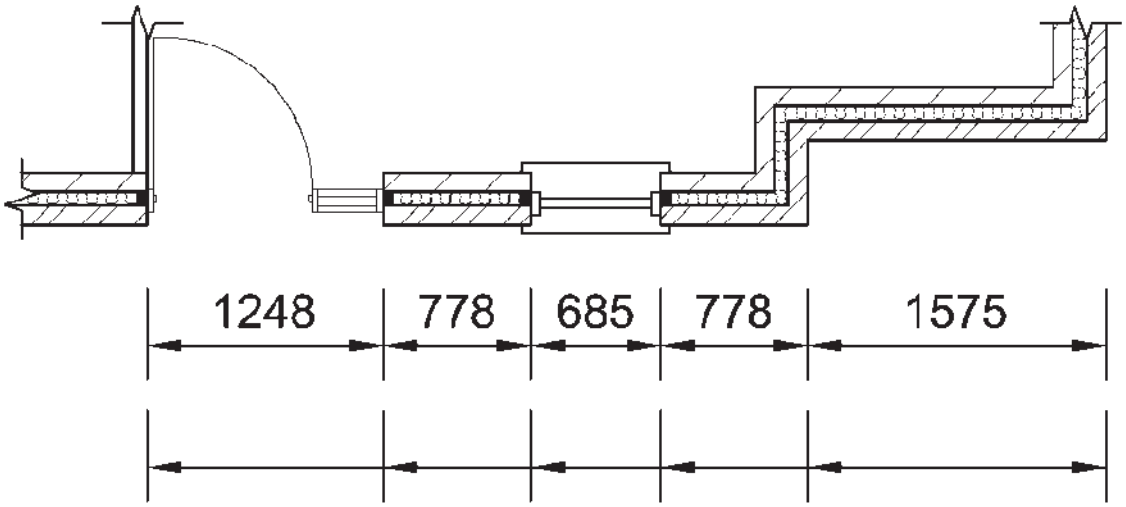


Setting out and checking using a tape measure (2)

Task

Task 3

Convert the millimetre measurements from the plan into metres and centimetres.



___m ____ cm ____ cm ____ cm ____ cm ___m ____ cm

Task 4

Fill in the gaps in whatever order is easiest for you.

5275 mm	5 m 27.5 cm	5.275 m
____ mm	___ m ____ cm	1.050 m
____ mm	1 m 500 cm	____ m
2250 mm	___ m ____ cm	____ m
____ mm	___ m ____ cm	3.5 m
5055 mm	___ m ____ cm	____ m

Tip

- To convert mm to m ÷ by 1000.
- To convert m to mm × by 1000.
- To convert cm to m ÷ by 100.
- To convert m to cm × by 100.
- To convert mm to cm ÷ by 10.
- To convert cm to m × by 10.

Setting out and checking using a tape measure (2)

Task

When you convert measurements, zeros can be quite tricky.

Some zeros make a huge difference to the measurement.

For example:

1500 mm **does not mean the same** as 15 mm
1.050 m **does not mean the same** as 1.5 m
1 m 0.5 cm **does not mean the same** as 1 m 5 cm

However, some zeros don't make any difference to the measurement, and for quickness, you can leave them out.

For example:

4.000 m **means the same** as 4 m.
4.350 m **means the same** as 4.35 m.

Task 5

Some of these measurements mean the same. Others do not. Match the measurements that mean the same.

1.015 m	*1 m 2 cm*
21 m 50 cm	*1.15 m*
2.500 m	*21.500 m*
2.505 m	*2.55 m*
1 m 20 cm	*2 m 5.5 cm*
2 m 05.5 cm	*2.5 m*

PAGES 4:11–4:14

Setting out and checking using a tape measure (3)

Setting out and checking the corner positions, and identifying and marking positions on the profiles for a building need to be done with great accuracy (Unit No. VR41). Using a standard tape measure with measurements labelled in metres and centimetres entails converting measurements shown in metres and centimetres into millimetres, in order to check that the measurements are the same as those on the drawing. It is important that learners can do this accurately and quickly. Repeated practice will be required.

Materials

Standard measuring tapes labelled in metres and centimetres

Calculators

Learning outcomes

1 To understand that there is more than one way to convert metric measurements (focus page)

2 To recognise equivalent measurements (focus page, Tasks 1–4)

3 To convert metric measurements (focus page, Tasks 1–4)

Introduction

- Write a measurement in metres (e.g. 4 m) on the board and ask learners to convert it to mm. Ask how they did it and record their methods.
- Increase the challenge by writing a measurement in metres and centimetres (e.g. 6 m 25 cm) for learners to convert to millimetres. Ask how they did it and record their methods.
- Stress that all methods are acceptable, providing the end result is the same. However, it is good to share methods because:
  – some methods may be quicker than others
  – some methods may work better than others depending on the numbers being used
  – it is helpful to know that there is no one way to do a number calculation and that your method is as correct as the next person's.

Focus page

- Go through the method on the focus page, getting learners to do additional examples as you go along.
- Work through some examples of converting measurements by multiplying and dividing by 10, 100 and 1000.
- Look carefully at the tip box showing the correct notation of measurements in whole metres. You may need to spend some time looking at place value.

Curric. refs	NOS/NVQ	Key Skills
MSS1/L1.4	VR41	C1.2
MSS1/L1.7		N1.1
		N1.2

Task 1

Check measurements

MSS1/L1.4

MSS1/L1.7

- Explain the task. You may want to set this up as a practical activity, using real tapes and pegs.
- Remind learners of the need to record their answers in mm.

If the learner has difficulty

- Use simpler questions first. Revise counting and counting back.
- This task may be easier using a real tape.
- Remind learners how to read the tape and record the measure.
- Then work with the learner to convert the measure to mm.

Extension

- Set a number of similar problems, using different tapes if possible.

- Vary the need to record in millimetres to recording in metres expressed as a decimal fraction.

Task 2

Read measurements and make calculations
MSS1/L1.4
MSS1/L1.7

- Check that learners have a method for converting cm and m to mm.
- Check they understand the task – to read measurements and convert them to mm to check if they have been recorded accurately.

If the learner has difficulty

- Use real tapes to show these measurements.
- Work through each measurement one by one, checking to see where the learner's misunderstandings/misconceptions lie.
- Use simpler measurements to consolidate what the learner knows.

Extension

Use real plans and set out pegs/profiles for the learner to check.

Task 3

Read measurements and make calculations
MSS1/L1.4
MSS1/L1.7

- Check learners understand the task: to record measures correctly and to calculate the difference this makes to the running dimension.

If the learner has difficulty

- Work through the task with the learner.
- Encourage the learner to partition the measurement (e.g. 5 m = 5000 mm, 2 cm = 20 mm, so 5 m 2 cm = 5020 mm, and 3 mm more is 5023 mm).
- Encourage the learner to use a calculator if necessary.

Extension

Use real workplace examples.

Task 4

Mark and convert measurements
MSS1/L1.4
MSS1/L1.7

- Check that learners have a method for converting mm to cm and m. Use a calculator for checking if necessary.
- Check learners understand the task: to read running dimensions and mark them onto profile boards using a tape. Explain how to do the task in steps: read the measurement; convert it from mm to m and cm; mark it on to the profile. Point out that the illustrations of the tapes give clues for the task.

If the learner has difficulty

- Point out the tip on the page.
- Show the learner how to use a calculator for this task.
- Work through the measurements one by one, getting the learner to convert the measurement to cm and m, then refer to the tape.

Extension

- Use real tapes to mark out these measurements.
- Use real plans and profiles.

Theme assessment

- Ask learners to convert some measurements from workplace drawings using a paper-based method. Discuss answers.
- Ask learners to convert the same measurements using a calculator – remind them that sometimes it is necessary to do the task in two parts, recording the interim steps in the calculation on paper.
- Choose any mm measurement from a drawing in the Source material, or from workplace drawings, and measure it out on a hard surface using the standard tape.
- Set out profiles from workplace drawings correctly on the ground, using chalk or pegs as appropriate.

Setting out and checking using a tape measure (3)

Focus

Accuracy is very important in construction.

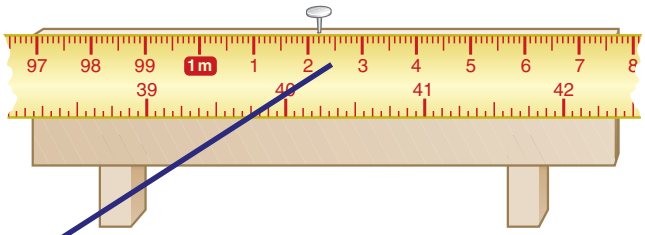
When you are setting out pegs and profiles, double check your measurements against your working drawing.

Any mistakes spotted now will save you time later.

If you are measuring with a standard tape, you need to convert your measurements from **centimetres** and **metres** into **millimetres**. Then you can check if your measurement is the same number of millimetres as the dimension shown on the working drawing.

Here is one method you can use.

Step 1: Read the measurement marked on your peg or profile. Separate the measurement into metres and centimetres.



1 m 2.2 cm

Step 2: Change the **metres** into millimetres.

1000 mm

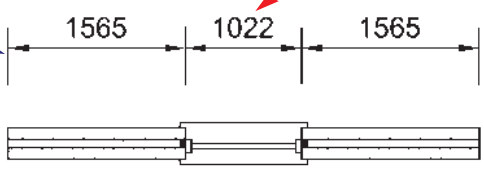
Step 3: Change the **centimetres** into millimetres.

22 mm

Step 4: Add the **millimetres** from steps 2 and 3.

1000 mm + 22 mm = 1022 mm

Step 5: Check that this is the same number of **millimetres** shown on your working drawing.



Tip

1 m = 1000 mm

Multiply the number of metres by 1000 to convert to millimetres.

Tip

1 cm = 10 mm

Multiply the number of centimetres by 10 to convert to millimetres.

Another method you could use.

Change the whole metres into centimetres (1 m = 100 cm).

Add the extra centimetres: 100 cm + 2.2 cm = 102.2 cm.

Change the centimetres into millimetres by multiplying by 10.

102.2 cm × 10 = 1022 mm.

REMEMBER!

If your working drawing shows **metres**, the measurement will look like this: 1.022 m

MSS1/L1.7; N2/L1.4; N2/L2.6

Setting out and checking using a tape measure (3)

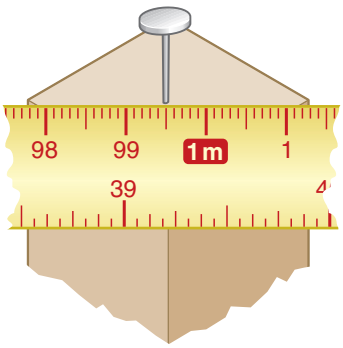
Task

It is important to double check your measurements against your working drawing.

Task 1

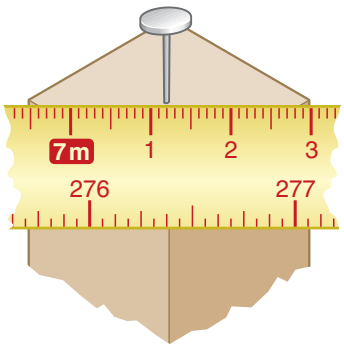
How many millimetres have been marked out on these pegs?

a



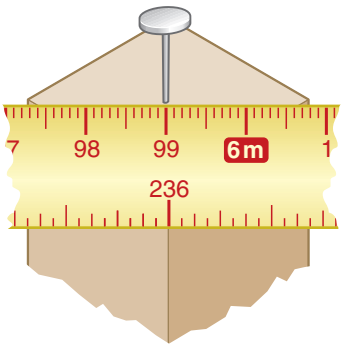
_____ mm

b



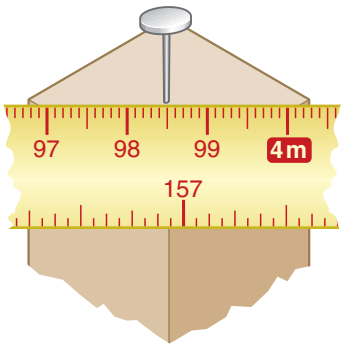
_____ mm

c



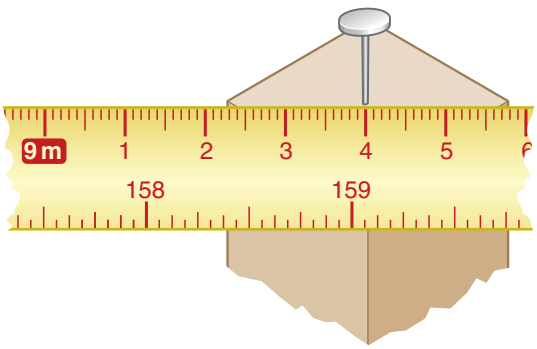
_____ mm

d



_____ mm

e



_____ mm

Tip

Follow one of the methods on the focus page.

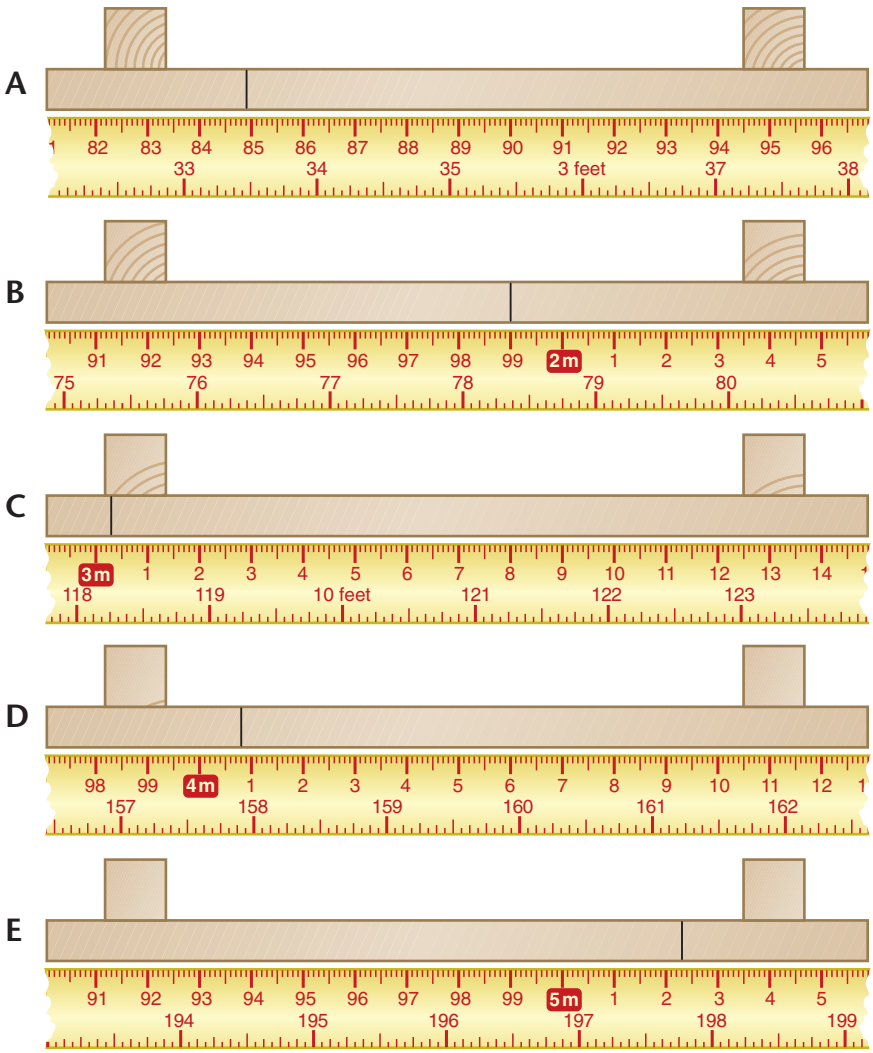
MSS1/L1.4; MSS1/L1.7

Setting out and checking using a tape measure (3)

Task

Task 2

The running dimensions, marked a to e, have been set out on the profiles marked A to E. Can you spot any errors? Tick the profile if the measurement has been set out correctly. Put a cross if it has not been set out correctly.



Task 3

How many millimetres are showing on each of the incorrect profiles? Write the answer next to the profile.

Tip

Convert the measurements on the tape into millimetres, then check your answer against the measurement on the plan.

Setting out and checking using a tape measure (3)

Task

Task 4

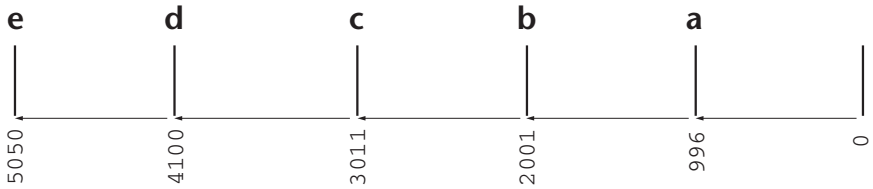
Mark the running dimensions a to e onto profiles A to E. Remember to double check your setting out by converting the measurement shown on the tape into millimetres.

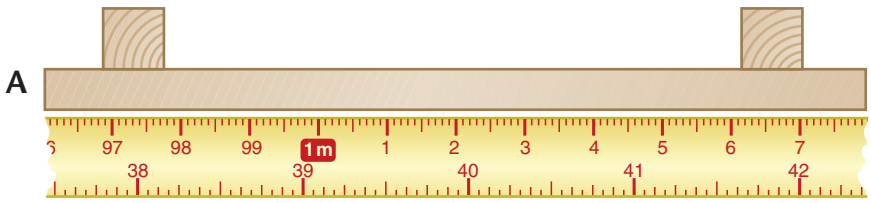
Tip

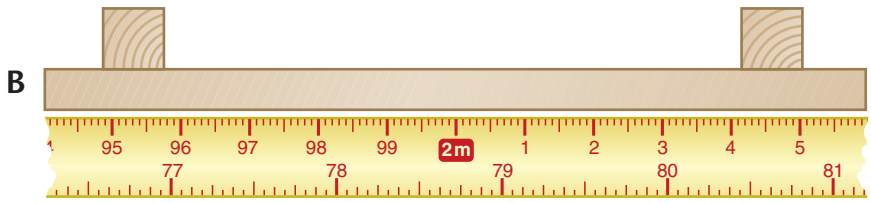
10 mm = 1 cm

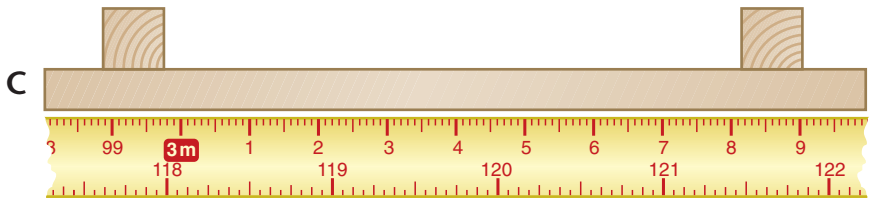
100 mm = 10 cm

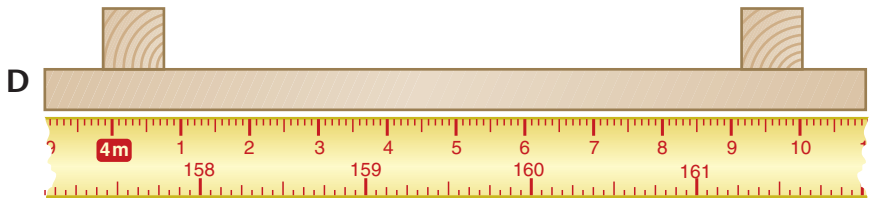
1000 mm = 100 cm or 1 m

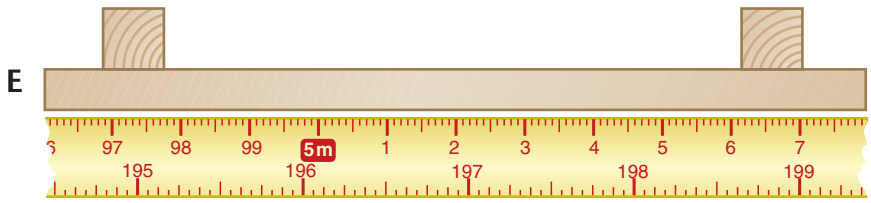












MSS1/L1.4; MSS1/L1.7

PAGES 4:15–4:16

Checking angles and diagonals (1)

All the measuring for setting out a building must be done accurately, and corners are no exception. For structures that are to be built as squares or rectangles – most buildings – it is critical that that the corners are 'square', that is, created from 90-degree angles (right angles) (Unit No. VR41).

Materials

Set squares

Builder's squares

Large sheets of paper

Sample sheets of paper – some 'square' and others not

Learning outcomes

1 To understand that the corners of squares and rectangles are created from 90-degree angles (focus page)

2 To know how to check that a corner is 'square' using a set square/builder's square (focus page, Task 1)

3 To know how to check that a corner is 'square' using the 3:4:5 method (focus page, Task 2)

Introduction

- Ask learners what they understand by the word 'square' – record their replies. If 'angle' and '90 degrees' do not come up, introduce them.
- You may need to discuss the number of degrees in a circle and look at other angles, in order to confirm learners' security with this information. Check understanding of the notation of degrees.
- Hold up sample sheets of paper one at a time. Ask learners to decide, by eye, if they are entirely square (make some non-90° angles very subtle). Learners can record their findings in a table and then check the angles by measuring.

Sheet	Square by eye	Square by checking
A	✓	✗
B	✗	
C	✓	
D	✗	

- Discuss the implications of not getting corners square.
- Point out the magnification effect of the amount a line will be 'out': a 1° error will be more catastrophic over a 6 m length than over a 6 cm length.
- Ask learners if they have seen or know of any buildings that do not have square corners.

Focus page

- Talk through the vocabulary used in the creation of a corner (e.g. pegs, profiles, angles, 90°, right angle, builder's square, ranging line).
- Discuss what must be done to correct an angle to 90° – repositioning of the ranging line; point this out on the graphic. Examine the builder's square. Invite one or two learners to use the builder's square to check some right angles around the room.
- Move the focus to using the 3:4:5 method to check for 'square'. Start by asking learners when this method might be used, for example setting out a very large building with long ranging lines, when they are without a builder's square.
- Stress the point made on the page that it does not matter what units of measurements are used, providing they are all the same units (i.e. mm, cm or m). The important thing is to keep the exact ratio/proportion of 3:4:5. Draw attention to the notation of the ratio 3:4:5. Discuss how this is verbalised.

- Explain how, by using a constant multiplier/divider, the measurements in the ratio 3:4:5 can be increased/decreased in direct proportion. In the context of the 3:4:5 rule, explain that if one side measures 3000 mm, and the second measures 4000 mm, the third will measure 5000 mm, provided the first two sides are at right angles. Ask learners to check this out with a tape measure and builder's square.
- If possible, have learners use pegs and ranging lines to measure out 3:4:5 where 1.5 m represents the **3** of the ratio. Get them to check the angle with a builder's square.

Curric. refs	NOS/NVQ	Key Skills
MSS2/L1.1 MSS1/L1.4	VR41	

Task 1

Check angles for 'square'
MSS2/L1.1

- Remind learners that checking for 'square' just by eye is not accurate enough – angles can be deceptive. Ask where, when looking at the side of a house, would you definitely expect to find right angles (ground/base corners).
- Ask what would happen if a roof was built with right-angled roof trusses (the sides would never meet to form a ridge).
- Discuss the task. Point out that the right-hand graphic represents ranging lines. Check learners understand which angles they are to measure.

If the learner has difficulty

- Enlarge the graphics. Mark the angles that the learner is to measure.
- Work through a few angles together to ensure that the learner understands how to use the set square.
- Ask the learner to identify right angles in the room and to check them with a builder's square.

Extension

Ask the learner to adjust the ranging lines of the plan to 'square' it up. Use a different colour so the new positions can be seen.

Task 2

Identify 90° angles and use the 3:4:5 method to check
MSS1/L1.4
MSS2/L1.1

- Discuss with learners the need to have another method for creating and checking corners for 'square'.
- Stress that only the proportion matters, not the actual units of measurements used – although all the measurements must be in the same units.
- Do the first angle together. Ask learners to measure and mark one line to 3 cm, then measure and mark the second line to 4 cm, then draw the line that joins the two together. If this third line measures 5 cm then the angle is a right angle. Double check with a set square.

If the learner has difficulty

- Check that the learner uses a ruler accurately, and that they are measuring from zero.
- Explain more about ratio – remind the learner of the ratio they probably use for mixing concrete (1:4). Explain that a bricklayer is unlikely to mix a small amount using just one spadeful of cement with four of sand. They mix more but they keep the **same** ratio. (Further practice can be found in *Skills for Life* Numeracy Level 1, Unit 1.) Come back to the 3:4:5 method and work on other examples of this together.

Extension

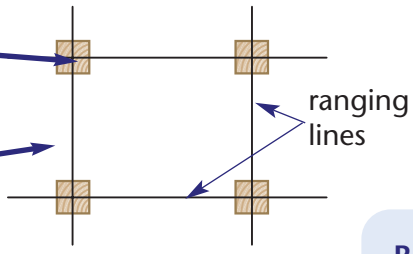
Ask the learner to draw a rectangle measuring 150 mm by 200 mm using the 3:4:5 method. Get them to check angles with a set square.

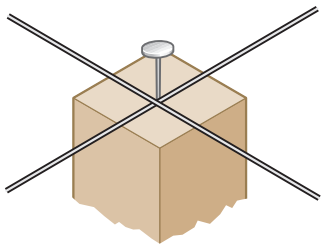
Theme assessment

- Ask learners to write down at least five things they can see around them that have a right angle. Check these with a builder's square.
- Ask learners about occasions when they have created and checked for 'square' at work and to state what method they used to do it.

Checking angles and diagonals (1) Focus

- Corner pegs are put in place to show where the corners of the building are to be built.
- Ranging lines are connected to the pegs to show the position of the foundations and wall lines.
- Before any building work can be carried out, the angles of the corners must be checked to make sure they measure **90°**.



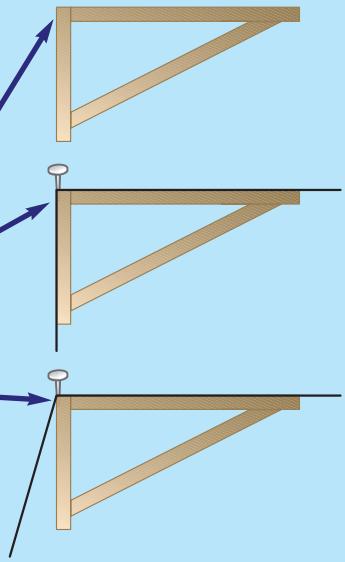


REMEMBER!

90° angles are also known as **right angles**.

One way to check that an angle measures **90°** is to use a builder's square.

- This corner of a builder's square measures exactly **90°**.
- The corner where these two ranging lines meet measures 90°.
- The corner where these two ranging lines meet **does not** measure **90°**.

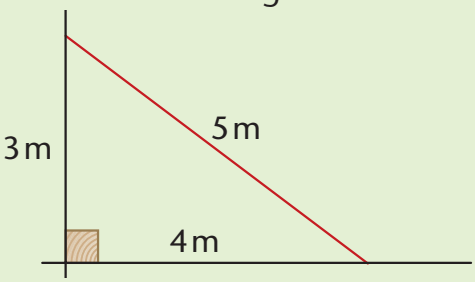


Tip

If the corner angle does not measure 90°, one of the ranging line needs to be repositioned.

Another way to check that the angle where ranging lines meet measures **90°** is to use the **3:4:5 method**.

Measure exactly **3 units** along one ranging line.
Measure exactly **4 units** along the other ranging line.
Measure the distance between these two points.
If your third measurement is exactly **5 units**, it means that the corner angle is **90°**.



REMEMBER!

Units can be **centimetres**, **metres**, or even **tens of metres**, providing that you use the same units for all three sides.

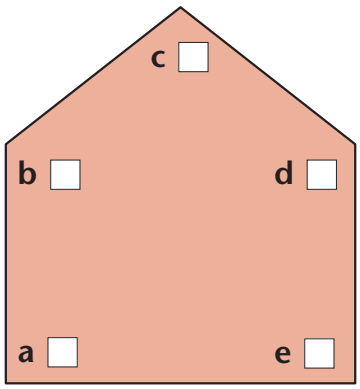
The **3:4:5** rule works exactly the same for a triangle measuring 3 cm, 4 cm and 5 cm, and a triangle measuring 30 m, 40 m and 50 m.

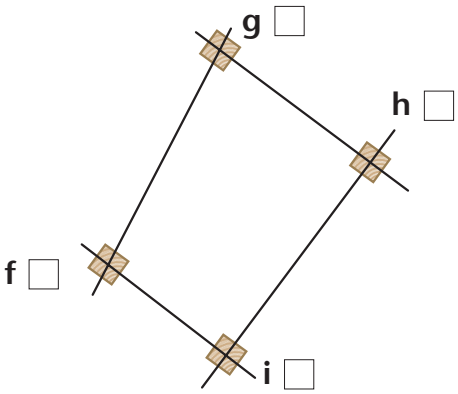
Checking angles and diagonals (1) Task

Angles have to be checked to ensure walls are built in the correct position.

Task 1

Which of these angles measure 90°? Use a set square to check. Put a tick or a cross in the boxes to show whether or not each angle measures 90°.





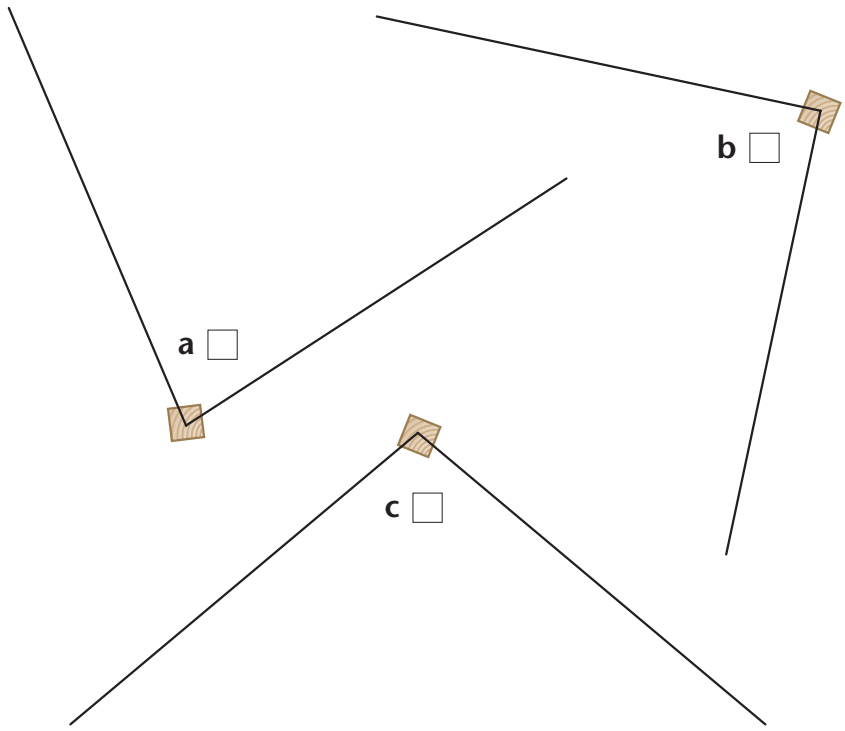
Tip

A set square is a miniature version of a builder's square.

If you do not have a set square, you can use the corner of a complete sheet of paper to check.

Task 2

Which of these angles measure 90°? Use the 3:4:5 method to check. Show your answer with a tick or a cross.

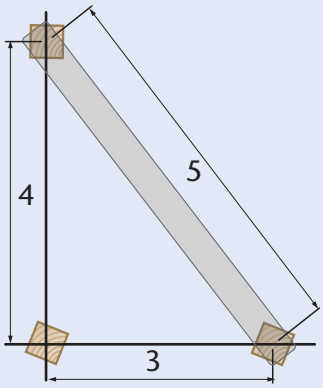


Tip

Measure 3 units along one ranging line and draw a pencil mark.

Measure 4 units along the other ranging line and draw a pencil mark.

Measure the distance between your pencil marks. If it measures exactly 5 units, then the angle where the ranging lines meet is 90°.



PAGES 4:17–4:18

Checking angles and diagonals (2)

The last stage of setting out is to check the diagonal measurements. This is the final check to make sure that all the corners measure 90°. If the diagonals are exactly the same length, then the setting out is 'square' (Unit No. VR41).

Materials

Drawings of set-out buildings, some with equal diagonals, some with unequal diagonals

Learning outcomes

1 To understand that when the diagonals of a completely set-out building (quadrilateral) measure the same, the angles of each corner measure 90° (focus page, Task 1)

2 To measure accurately (Task 1)

3 To know that 90° angles can be achieved by adjusting the ranging lines (sides of the quadrilateral) (Task 1)

Introduction

- Draw a rectangle on the board and invite a learner to put in the diagonals. Does everyone feel that they are the same length? Draw other four-sided shapes that do not have diagonals of equal length.
- Give each pair of learners three or four drawings of set-out buildings. Ask learners to draw in the diagonals and to measure them carefully. Sort the drawings into those that have equal diagonals and those in which the diagonals are not equal. Ask learners what the latter means. (Those with unequal lengths do not have four 90° angles.)

Focus page

- Talk through the points that have been made by the previous introductory activities.
- Particularly mention how adjustments in setting out can be made by carefully moving the nails on the profiles.
- Remind learners that it all takes time.

Curric. refs	NOS/NVQ	Key Skills
MSS1/E3.5	VR41	N1.1

Task 1

Measure diagonals in mm
MSS1/E3.5

- Remind learners that accurate measuring is vital, whether it is done in metres across a building site or is a few millimetres on a piece of paper.
- Check learners can measure to this level of accuracy.

If the learner has difficulty

- Draw lots of lines for the learner to measure in millimetres.
- Go back to the original task. If the learner still has difficulty measuring accurately, check that they are starting from zero. Check if the difficulty arises in recognising the points they are measuring from and to, or whether they are having difficulty in reading from the ruler or in recording the measurements.
- If the final free-writing part of the task is a problem, ask the learner to verbalise what he/she knows about diagonals that measure the same.
- Ask the learner what he/she knows about diagonals that do not measure the same, and what can be done about it.

Extension

Ask the learner to construct on paper another set-out building with diagonals that measure the same.

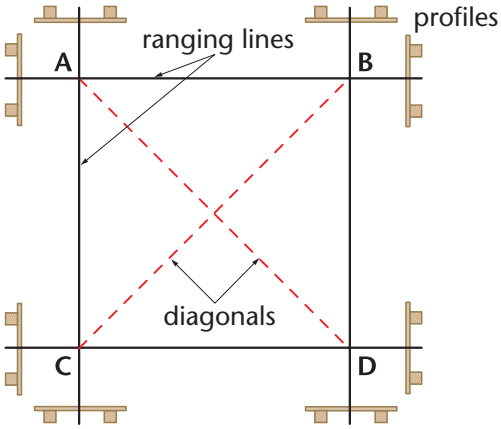
Theme assessment

- In groups of four, ask learners to set out the base for a small shed, using pegs and ranging lines and checking with a builder's square and/or the 3:4:5 method.
- The final task is to create the diagonals and measure them to check for the 'squareness' of their setting out. Get them to make adjustments until the setting out is 'square'.

Checking angles and diagonals (2)

Focus

The last stage of setting out is to check the **diagonal** measurements. This gives you proof that the corners measure 90° and that the setting out is 'square'.



First, measure the distance from one corner to the opposite corner. For example, the distance from **A** to **D**.

Measure the other diagonal. For example, the distance from **B** to **C**.

Compare your two measurements.

If the two diagonals measure exactly the same, this is proof that the corners measure 90°.

What if the diagonals are not the same length?

If the diagonals are not the same length then something has gone wrong during setting out.

Fixing the problem

These are the things you must do.

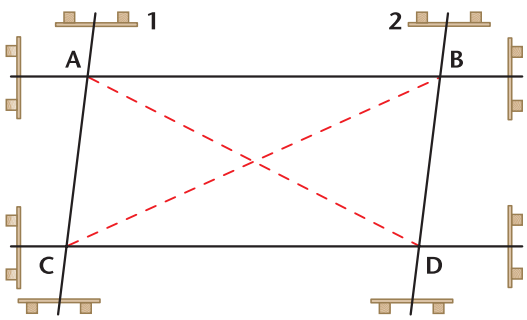
1. Re-check the measurements between all the profiles. Make sure the measurements are the same as the measurements shown on the working drawing. Make any adjustments and check the diagonals again.
2. If the measurements between the profiles are correct but the diagonals are still not the same, you can fix the problem by adjusting the position of two profiles positioned next to one another, for example, profiles 1 and 2. Move nails by the same distance and in the same direction. Then recheck the length of the diagonals.

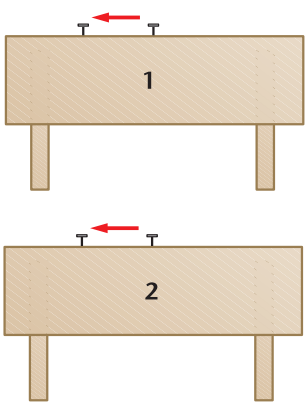
REMEMBER!

Diagonals are straight lines that go from one corner to the opposite corner.

REMEMBER!

Checking measurements for accuracy is an important part of setting out. It does take time, but it is important to get it right.





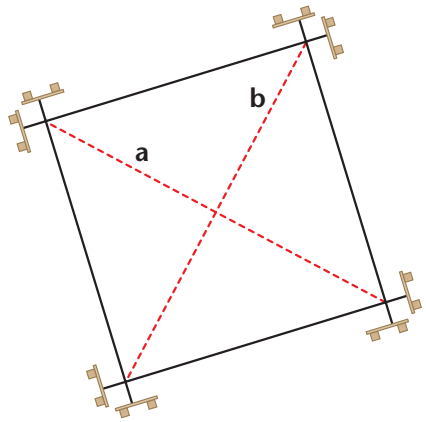
Checking angles and diagonals (2) Task

Checking the length of the diagonals is the last stage of setting out. It is an important job that must not be left out.

Task 1

Check the length of the diagonals and note down each measurement. What does this tell you?

1



a = _____ mm **b** = _____ mm

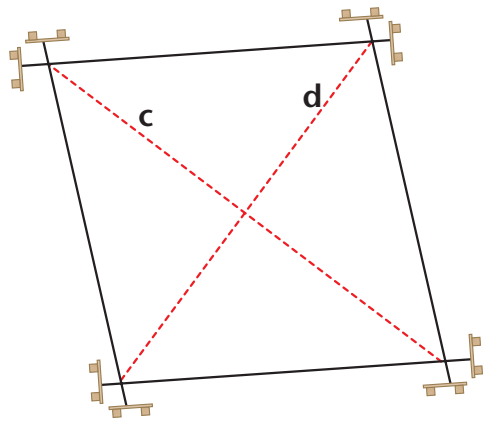
Are the diagonals the same length?

_____

If you were setting out, what would this tell you?

_____

2



c = _____ mm **d** = _____ mm

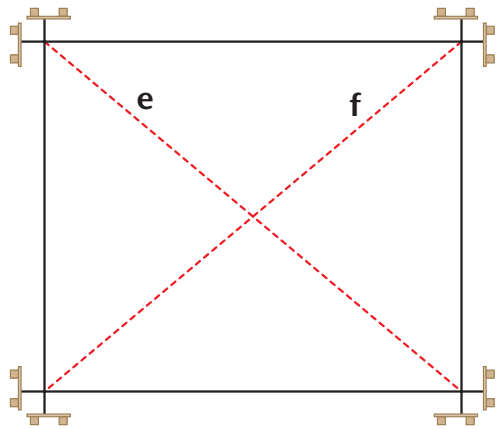
Are the diagonals the same length?

_____

If you were setting out, what would this tell you?

_____

3



e = _____ mm **f** = _____ mm

Are the diagonals the same length?

_____

If you were setting out, what would this tell you?

_____

PAGES 4:19–4:20

If in doubt, ask!

Setting out a building correctly and accurately is critical if the structures are to go up as the architect planned. Setting out involves following many procedures and lots of measuring (Unit No. VR41). Setting out also requires working cooperatively with others in the building team, and lots of practice.

Curric. refs	NOS/NVQ	Key Skills
Rw/L1.2	VR41 VR02	

Materials

Builder's squares

Tapes

Drawings of set-out buildings (one per pair)

Learning outcomes

1 To check knowledge and understanding of the terminology used for setting out (focus page, Tasks 1 and 2)

Introduction

- Ask learners to work in pairs to draw a plan view of a building. As you call out the words or phrases, they: draw on one diagonal; mark on the right angles; put a cross where a builder's square will have to be used, etc.
- Pin up each sketch and discuss.

Focus page

- Look through the focus page. Discuss the example given of different meanings for the word 'square'. Discuss how this has the potential to cause problems in the workplace.
- Discuss and share any other issues about terminology.
- Encourage learners to keep a personal glossary of terms.

Task 1

Show understanding by writing a description of the technical words used in setting out Rw/L1.2

- Remind learners to look back at their work on setting out and at the focus pages, which have a lot of useful guidance.
- Encourage learners to look in the glossary **after** they have written descriptions in their own words.

If the learner has difficulty

Check alphabetic skills and support the learner if necessary.

Extension

- Ask the learner to check meanings of other technical terms.
- Set a quiz based on understanding of technical terms.

Task 2

Match meanings to technical words Rw/L1.2

- Remind learners that they can use the glossary to check that they have chosen the right words for the meanings.

If the learner has difficulty

Read the statements to the learner and give further prompts. Guide them to use the glossary.

Extension

Ask the learner to list other tools used in setting out and to explain their function in their own words.

Theme assessment

- Develop a quiz or other game about technical vocabulary and terminology, to test knowledge and understanding of these terms.
- Check learners' understanding of terms whilst they undertake building operations.
- Listen for learners' use of appropriate terminology during practical sessions.

If in doubt, ask!

Focus

There is no doubt about it. Setting out is a complicated task, and it takes time and practice to get it right.

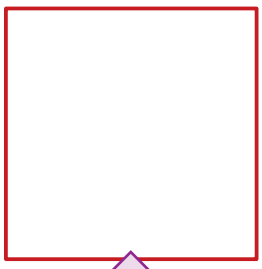
There are lots of procedures to follow, and you will hear lots of technical terms used to describe these procedures.

You are bound to come across words and phrases that are new to you. You will also come across familiar words that have a completely different meaning in the context of setting out.

If ever you are in doubt about the meaning of words or are unsure about how to carry out a particular measuring task, just ask. After all, nobody will expect you to know everything.

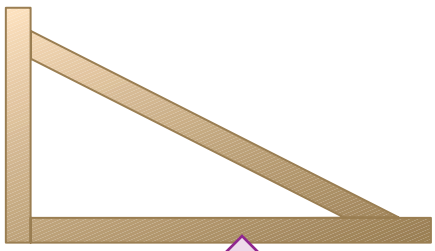
Consider this question: **Which of these would you describe as square?**

1



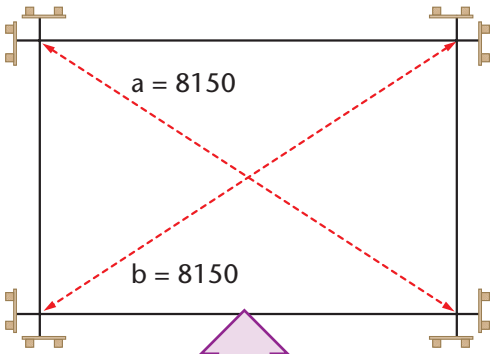
You would describe this shape as square because it has four sides of the same length and a 90° angle in each corner.

2



Although this tool is triangular in shape, it is a tool called a builder's square. It is used to check that angles measure 90°.

3



Although the shape of the proposed building is rectangular, it has been 'set out square.' This is a term you use in setting out to describe the fact that all the angles measure 90°.

Check for 'square' by measuring the diagonals. If they measure the same, your setting out is 'square'.

So the answer is, all of these things can be described as square.

In setting out, however, you are **more likely** to hear the term 'square' used in the way described in **2** and **3**, rather than used to describe a shape with four sides of the same length.

REMEMBER!

Some familiar words have a completely different meaning in the context of setting out.

If in doubt, ask!

Task

One way to check your understanding is to describe what you think is meant by the technical term.

Task 1

What do you think is meant by each of these terms in the context of setting out? Write the meaning on a separate piece of paper.

a Pegs
b Profiles
c Running dimensions
d Tape
e Feet
f Checking for 'square'
g Ranging lines
h Right angle
i 3:4:5 method

Tip
Looking through the previous pages may help you.

Task 2

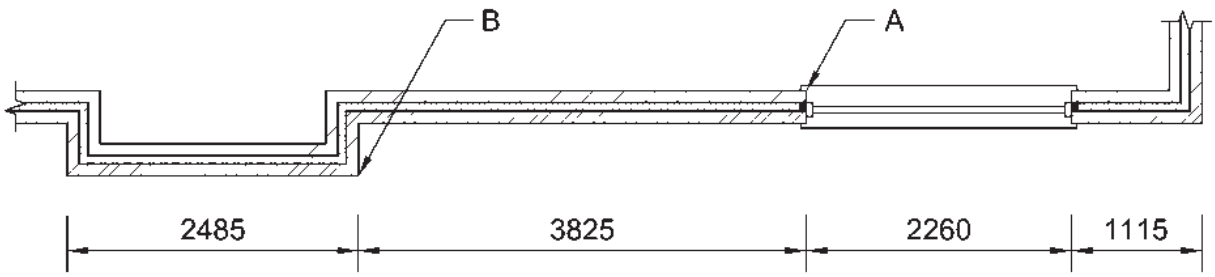
What name is given to the items of equipment being described?

a They are used to mark the position of the external corners of a proposed building.
b It is made of wood and you use it for checking that angles measure 90°.
c They are tied to the profiles to mark the positions of walls and foundations.
d You use it for measuring out the distances shown on the working drawing.

Tip
You can use the glossary to check that you have chosen the correct words for the equipment.

Check it

1



This drawing shows separate dimensions. What is the running dimension at point A?

A 2260

B 3375

C 1115

D 1145 **MSS1/L1.6**

2 What is the running dimension at point B?

A 6085

B 3825

C 7200

D 2485 **MSS1/L1.6**

3 What is the overall dimension?

A 2485

B 6310

C 1340

D 9685 **MSS1/L1.6**

4 What is the value of 10 in this number? 10 793

A ten

B one hundred

C ten thousand

D one thousand **N1/L1.1**

5 What is the value of 78 in this measurement? 1.078 m

A 78 cm

B 78 mm

C 7.8 mm

D 0.78 mm **N1/L2.1**

6 Which of these numbers is 32 079?

A thirty-two seventy-nine

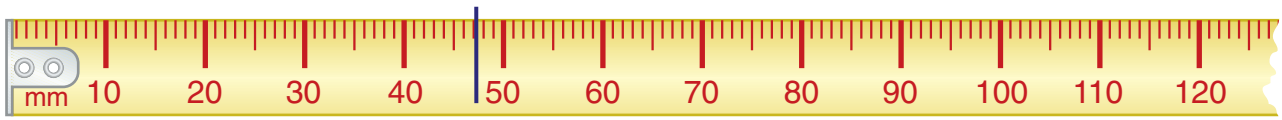
B thirty-two thousand seven hundred and nine

C thirty-two thousand seven ninety

D thirty-two zero seven nine

N1/L1.1

7 What is the measurement marked on this rule?



A 43 mm

B 4.7 mm

C 47 mm

D $4\frac{1}{2}$ cm

MSS1/L1.4

8 Which of these is the odd one out?

A 5790 cm

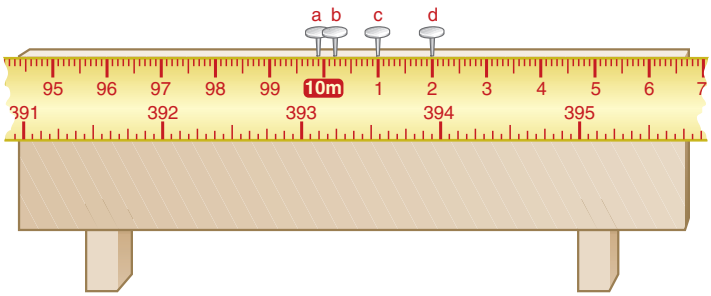
B 57.9 m

C 579 m

D 57 900 mm

MSS1/L1.7

9 Which of these pins shows 10 002 mm on the measuring tape?



A pin a

B pin b

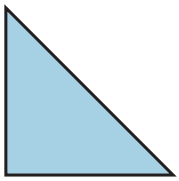
C pin c

D pin d

MSS1/L1.7

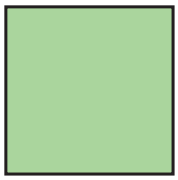
10 Which one of these shapes does not contain a right angle?

A

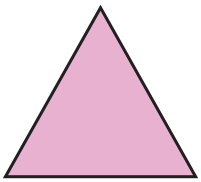


B

C



D



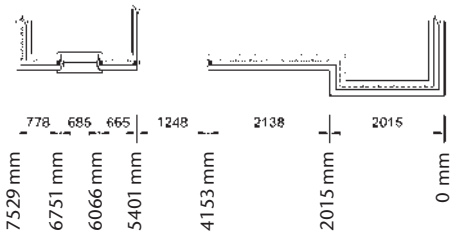
MSS2/E3.1

Answers

PAGES 4:1–4:2

Measurements for setting out and the language of measurement (1)

Task 1



Task 2

6 mm

PAGES 4:3–4:4

Measurements for setting out and the language of measurement (2)

Task 1

Check your answers with your teacher.

Task 2

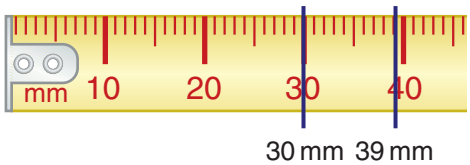
a 1109 mm
b 2505 mm
c 5500 mm
d 1288 mm

PAGES 4:5–4:6

Setting out and checking using a tape measure (1)

Focus page

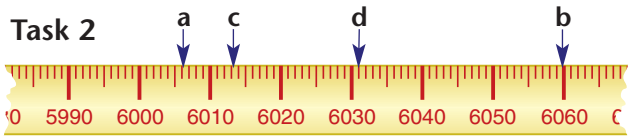
Try this:



Task 1

a 7275 mm
b 5156 mm
c 8002 mm
d 6778 mm

Task 2



PAGES 4:7–4:10

Setting out and checking using a tape measure (2)

Focus page

Try this:

884 mm is equal to 88.4 cm.
3071 mm is equal to 307.1 cm or 3 m 7.1 cm or 3.071 m.

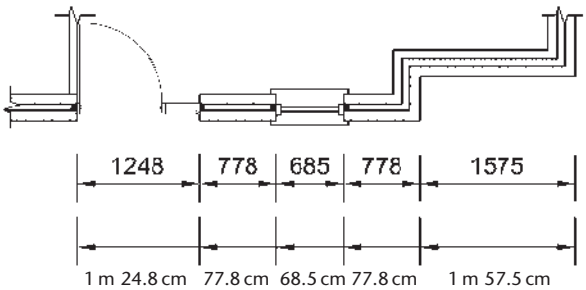
Task 1

Profile **b**

Task 2

Peg **c**

Task 3



Task 4

5275 mm	5 m 27.5 cm	5.275 m
1050 mm	1 m 5 cm	1.050 m
1500 mm	1 m 500 cm	1.5 m
2250 mm	2 m 25 cm	2.25 m
3500 mm	3 m 500 cm	3.5 m
5055 mm	5 m 5.5 cm	5.055 m

Task 5

Measurements that are the same:
21 m 50 cm and 21.500 m
2.500 m and 2.5 m
2 m 05.5 cm and 2 m 5.5 cm

PAGES 4:11–4:14

Setting out and checking using a tape measure (3)

Task 1

a 995 mm
b 7012 mm
c 5990 mm
d 3985 mm
e 9040 mm

Task 2

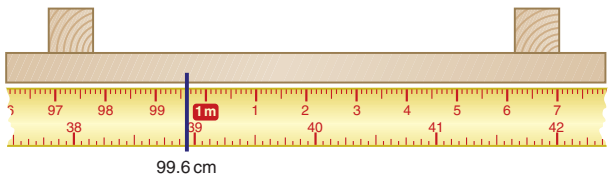
A ✓
B ✗
C ✓
D ✗
E ✗

Task 3

Profile B 1990 mm
Profile D 4008 mm
Profile E 5023 mm

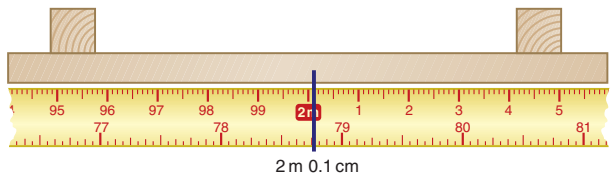
Task 4

A



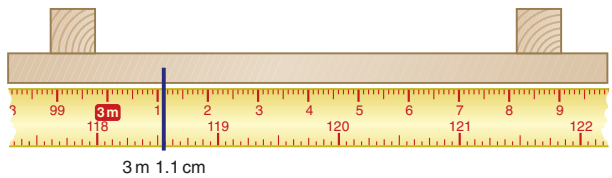
99.6 cm

B



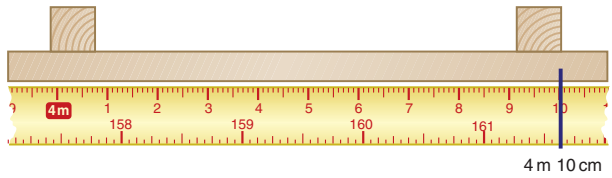
2 m 0.1 cm

C



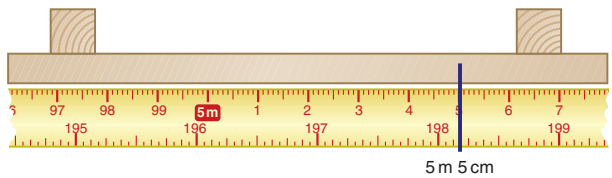
3 m 1.1 cm

D



4 m 10 cm

E



5 m 5 cm

PAGES 4:15–4:16

Checking angles and diagonals (1)

Task 1

a ✓
b ✗
c ✓
d ✗
e ✓
f ✗
g ✗
h ✓
i ✓

Task 2

a ✗
b ✓
c ✗

PAGES 4:17–4:18

Checking angles and diagonals (2)

Task 1

1
a = 50 mm
b = 50 mm

The diagonals are the same length.

If you were setting out, this would tell you that all the corners measure 90° and that the setting out is 'square'.

2
c = 65 mm
d = 56 mm

The diagonals are not the same length.

If you were setting out, this would tell you that the corners do not all measure 90° so something must have gone wrong during setting out. You would need to check the measurements between the profiles to make sure they are the same as the measurements shown on the working drawing.

3
e = 72 mm
f = 72 mm

The diagonals are the same length.

If you were setting out, this would tell you that all the corners measure 90° and that the setting out is 'square'.

PAGES 4:19–4:20

If in doubt, ask!

Task 1

a **Pegs:** wooden stakes that are set out to mark the positions of corners
b **Profiles:** wooden boards that are set out to mark the positions of foundations, external walls and load-bearing internal walls
c **Running dimensions:** you calculate running dimensions by adding each measurement along the side of a proposed building to the measurements before it. Running dimensions are used for setting out.
d **Tape:** a measuring tape
e **Feet:** old-fashioned (imperial) units of measure. They are no longer used on plans or drawings, but you still see them on some measuring tapes.
f **Checking for 'square':** checking that all angles measure 90° and that the diagonals are the same length
g **Ranging lines:** these are made from nylon or hemp. They are attached to pegs and profiles and are used to trace the lines of walls and foundations.
h **Right angle:** an angle that measures 90°
i **3:4:5 method:** a method for checking if walls or ranging lines are positioned at 90° to one another

Task 2

a pegs or profiles
b builder's square
c ranging lines
d measuring tape

Check it

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