

4

Gardening



My name is John. I have always enjoyed working outdoors. I work as a handyman. I do heavy gardening jobs for customers, like laying patios and building walls. I also construct garden ponds and lay decking. There are so many aspects to gardening that it seems like I am doing a different job everyday.

Talk about it

Which of you has a garden?

Who watches gardening programmes on TV?

Has anyone ever built anything in a garden?

Has anyone ever built a wall? Discuss what can be used – shapes, ease of use etc.

These are the skills you will practise in this unit.

Which are the most useful for you? Tick the boxes.

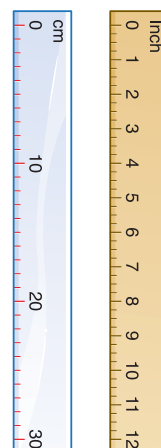
- ☐ Working with metric and imperial measurements
- ☐ Working out perimeters and areas including circles
- ☐ Understanding scale
- ☐ Understanding a 2-D drawing
- ☐ Solving problems involving 2-D shapes
- ☐ Finding areas of composite shapes
- ☐ Working out volumes

Skill code

- MSS1/L2.3, 5, 6
- MSS1/L2.7
- MSS1/L2.10
- MSS2/L2.1
- MSS2/L2.2
- MSS1/L2.8
- MSS1/L2.9

What measure?

In the building trade measurements are given in millimetres and metres. Some of John's older customers have never measured in metres and millimetres (metric measures). They measure in feet and inches (imperial measures), so John has to be able to change measurements from millimetres to metres and from feet and inches to metres and millimetres.



Activity 1

John is often asked to lay decking. Deck boards are usually 2.4 m long and 140 mm wide. Although 2.4 m looks less than 140 mm but it is much longer. To compare them we need to change them to the same unit.

Deck board length = 2.4 m = 2.4×1000 mm = 2400 mm

- 1 Change 1.8 m to millimetres.

$$1.8 \text{ m} = 1.8 \times 1000 = \boxed{} \text{ mm}$$

- 2 Change 140 mm to metres.

$$140 \text{ mm} = 140 \div 1000 = \boxed{} \text{ m}$$

- 3 Change these measurements to millimetres.

$$2.3 \text{ m} = \dots\dots\dots \text{ mm}$$

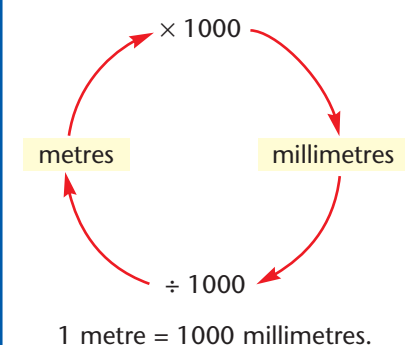
$$1.4 \text{ m} = \dots\dots\dots \text{ mm}$$

- 4 Change these measurements to metres.

$$1034 \text{ mm} = \dots\dots\dots \text{ m}$$

$$3096 \text{ mm} = \dots\dots\dots \text{ m}$$

Remember



Talk about it

- What measures of length do you know?
- Which are imperial and which are metric?
- Did you know that 1 foot is about 30 cm? If you are using a calculator you can be more accurate and use 1 foot = 305 mm (30.5 cm)

Activity 2

The dimensions of garden sheds and stores are often given in feet (ft) and inches (in).

A tool chest is 3 ft 11 in \times 2 ft 6 in \times 3 ft 2 in.

Step 1 Change the length to millimetres.

$$3 \text{ ft} = 3 \times 305 = 915 \text{ mm}$$

$$11 \text{ in} = 11 \times 25.4 = 279.4 \text{ mm}$$

$$3 \text{ ft } 11 \text{ in} = 915 \text{ mm} + 279.4 \text{ mm} = 1194.4 \text{ mm}$$

Step 2 Change from millimetres to metres.

$$1194.4 \text{ mm} \div 1000 = 1.1944 \text{ m}$$

The length is 1.19 m correct to two decimal places.

1 Change 2ft 6in to metres.

$$2 \text{ ft} = 2 \times 305 = \boxed{} \text{ mm}$$

$$6 \text{ in} = 6 \times 25.4 = \boxed{} \text{ mm}$$

$$2 \text{ ft } 6 \text{ in} = \boxed{} \text{ mm}$$

$$= \dots\dots\dots \text{ m}$$



2 Change 3 ft 2 in to metres.

$$3 \text{ ft} = \dots\dots\dots$$

$$2 \text{ in} = \dots\dots\dots$$

$$3 \text{ ft } 2 \text{ in} \dots\dots\dots$$

3 A garden shed measures 10 ft \times 8 ft \times 7 ft 6 in.

Work out the dimensions in metres.

$$10 \text{ ft} = \dots\dots\dots$$

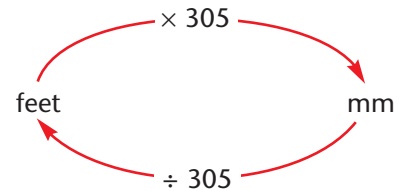
$$8 \text{ ft} = \dots\dots\dots$$

$$7 \text{ ft } 6 \text{ in} = \dots\dots\dots$$

Remember

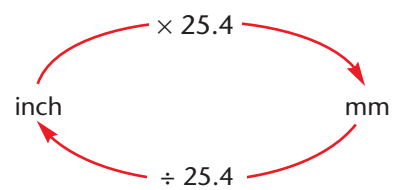
$$1 \text{ foot} = 305 \text{ mm}$$

so to change between the units



$$1 \text{ inch} = 25.4 \text{ mm}$$

so to change between the units



Review

Do you need more practice in converting measurements?

Yes ☐ No ☐

For more work on this, go to H1 (page 13).

Laying a patio

When I have to lay a patio
I work from a scale plan.



Activity 3

This plan of a patio has a scale of 1 : 200.



Check that the patio measures 32 mm × 46 mm on the scale plan.

- 1 Work out the actual dimensions of the patio.

$$\text{Actual length} = 46 \times 200 = \boxed{} \text{ mm} = \boxed{} \text{ m}$$

$$\text{Actual width} = 32 \times 200 = \boxed{} \text{ mm} = \boxed{} \text{ m}$$

$$\text{Area} = \text{length} \times \text{width} = \dots\dots\dots \text{ m}^2$$

- 2 The scale of this plan is 1 : 50.
Measure the scale plan of the
patio and work out the actual
dimensions.

Scale plan of patio



a The scale length = $\boxed{}$ mm

b The scale width = $\boxed{}$ mm

c The actual length = $\dots\dots\dots$ mm = $\boxed{}$ m

d The actual width = $\dots\dots\dots$ mm = $\boxed{}$ m

e The area = $\dots\dots\dots$ m²

Remember

Understanding scales

A scale of 1 : 75 means that 1 mm on the scale diagram represents 75 mm on the ground.

Scale measurement = 32 mm

Actual length is $32 \times 75 = 2400 \text{ mm} = 2.4 \text{ m}$

Scale measurement = 46 mm

Actual length = $46 \times 75 = 3450 \text{ mm} = 3.45 \text{ m}$

Remember

Area of a rectangle
= length × width

Activity 4

John's mate, Tom, has to work out how many
 $450 \text{ mm} \times 450 \text{ mm}$ slabs he needs for a patio measuring
 $2.4 \text{ m} \times 3.45 \text{ m}$.

$$2400 \text{ mm} \div 450 \text{ mm} = 5.33333333 \text{ slabs}$$

$$3450 \text{ mm} \div 450 \text{ mm} = 7.66666666 \text{ slabs}$$

So to build the patio he will need 6×8 slabs = 48 slabs
 (otherwise there will be gaps down two sides)

All measurements
 have to be in the same units
 so I'm going to work in millimetres.
 $2.4 \text{ m} = 2400 \text{ mm}$
 $3.45 \text{ m} = 3450 \text{ mm}$

- 1 How many slabs will he need for a $9.2 \text{ m} \times 6.4 \text{ m}$ patio?

$9.2 \text{ m} = \dots\dots\dots \text{ mm}$

$6.4 \text{ m} = \dots\dots\dots \text{ mm}$

$9200 \text{ mm} \div 450 \text{ mm} = \dots\dots\dots \text{ slabs}$

$\dots\dots\dots \div 450 \text{ mm} = \dots\dots\dots \text{ slabs}$

The total number of slabs = \times =

Draw sketches
 to help you

- 2 How many slabs will he need for a $3.6 \text{ m} \times 2.8 \text{ m}$ patio?

$\dots\dots\dots$

$\dots\dots\dots \text{ slabs}$

The total number of slabs =

Activity 5

I lay slabs on a bed of sand 50 mm deep.
 This is to make sure the slabs stay
 level. I have to work out the volume
 of sand that I need.

The length and width
 are in metres so I am
 going to work in metres
 $50 \text{ mm} = 0.05 \text{ m}$

The volume of sand 50 mm deep needed for a patio
 2.4 m by $1.2 \text{ m} = 2.4 \text{ m} \times 1.2 \text{ m} \times 0.05 \text{ m} = 0.144 \text{ m}^3$

- 1 Work out the volume of sand, laid 50 mm deep,
 needed for these patios

a A patio 9.2 m by 6.4 m . Volume = $\dots\dots\dots \text{ m}^3$

b A patio 3.6 m by 2.8 m . Volume = $\dots\dots\dots \text{ m}^3$

Remember

Calculating volume

Volume = length \times width \times height = $l \times w \times h$
 Volume is given in cubed units e.g. m^3 , mm^3

Review

Do you need more practice in working out how many slabs are needed?

Yes ☐ No ☐

For more work on this, go to H2 and H3 (pages 13–14).
 This work links to mini-project M1 (page 16).

Starting the job

When I start a new job in a garden I use string to mark out the perimeter of features.



Activity 6

John has to lay a patio measuring 2.4 m by 1.2 m.

To work out the length of string he needs to mark it out, John adds all the sides together. This is the **perimeter** of the patio.

John adds up the lengths of all 4 sides of the patio.

$$2.4 \text{ m} + 1.2 \text{ m} + 2.4 \text{ m} + 1.2 \text{ m} = 7.2 \text{ m}$$

He needs 7.2 metres of string to mark out the patio.

Work out these perimeters.

- 1 A rectangular base for a garden shed measuring 2.1 m by 1.8 m.

.....

- 2 A triangular flower bed measuring 1.5 m by 1.5 m by 2.4 m.

.....

- 3 A raised bed 3 m long and 1 m wide.

.....

- 4 A path 4.3 m long and 75 cm wide.

.....

Remember

Perimeter means the distance all around the outside of a shape.

Remember that all units must be the same.

Draw sketches to help you



Activity 7

A wall in the garden is 2.4 m long and 600 mm high.

- 1 Area of the face of the wall = $2.4 \text{ m} \times 0.6 \text{ m} =$

There are approximately 60 bricks per m^2 of area.

- 2 Number of bricks needed = $\text{area} \times 60 =$ bricks

To make sure that there are enough bricks John buys 10% more than his estimate.

- 3 10% of = extra bricks

- 4 Total number of bricks = + =

Remember

Area of rectangle = $\text{length} \times \text{width}$,
 $A = l \times w$.

Remember

An easy way to find 10% is to divide by 10.

Activity 8

The flower bed is to be 3 metres long, 1 metre wide and 450 mm high. John needs to order the bricks so first he works out the area of each side.

I have been asked to build a raised flower bed for a wheelchair user.

1 Area of long side = $3 \text{ m} \times 450 \text{ mm} = 3 \text{ m} \times \boxed{} \text{ m} = \dots\dots\dots \text{ m}^2$

2 Area of short side = $\dots\dots\dots \text{ m}^2$

3 Total area = $2 \times \text{long sides} + 2 \times \text{short sides} = \dots\dots\dots \text{ m}^2$

There are approximately 60 bricks per m^2 .

4 Number of bricks = $\text{area} \times 60 = \dots\dots\dots$ bricks.

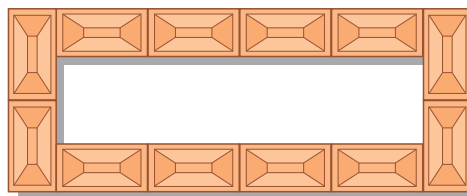
To make sure that he has enough bricks, John buys 10% more than his estimate.

5 10% of $\boxed{}$ = $\boxed{}$ extra bricks.

6 Total number of bricks $\dots\dots\dots + \dots\dots\dots = \dots\dots\dots$

Activity 9

Now I want to fill a different raised bed with soil. To work out the volume of soil I need I have to find the inside measurements of the bed.



Walls in a raised bed are one brick thick so to get the inside length, John has to take two brick widths from the outside measurement (one for each side).

A brick is 102.5 mm wide so two bricks are $2 \times 102.5 = 205 \text{ mm} = 0.205 \text{ m}$.

This raised bed is 2.5 m long, 0.75 m wide and 400 mm high.

With all these different measurements I have to cope with I am going to work in metres all the time.

1 a The inside length = $2.5 \text{ m} - 0.205 \text{ m} = 2.295 \text{ m}$
= $\dots\dots\dots$ to 2 decimal places.

b Inside width = $\dots\dots\dots \text{ m} - 0.205 \text{ m} = \dots\dots\dots \text{ m}$
= $\dots\dots\dots \text{ m}$ correct to 2 decimal places.

c Volume of soil = $\text{inside length} \times \text{inside width} \times \text{height} = \dots\dots\dots \text{ m}^3$

2 How much soil will be needed for my new raised bed 3 m long, 1 m wide and 450 mm high?

Use separate paper and follow the method shown in question 1.

Remember

Volume = length \times width \times height

Review

Do you need more practice in perimeters, areas and volumes?

Yes ☐ No ☐

For more work on this, go to H2 (page 13) or E1 (page 15).

This work links to mini-project M1 (page 16).

Making a splash!

Some of my customers want ponds or pools in their gardens. Circular ponds and pools are popular.



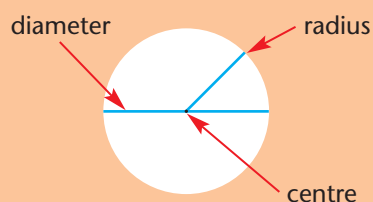
Activity 10

I have to mark out the circumference of the circle before I can begin to dig the hole. I can use string to do this. I have to be able to work out the circumference and area of the pond or pool.

Circumference = perimeter of the circle = C

Diameter (d) = the distance across the circle through the centre

Radius (r) = Distance from the centre to the edge



Give all answers to 2 decimal places.

One customer wanted a circular pebble pool 650 mm wide and 220 mm deep.

This means that the diameter = 650 mm or 0.65 m
and the radius = 325 mm or 0.325 m.

John needs the circumference in m and the area in m^2 so he works in metres.

The circumference = $\pi \times \text{diameter} = \pi \times 0.65 \text{ m} = 2.04 \text{ m}$
to 2 decimal places.

The area = $\pi \times \text{radius} \times \text{radius} = \pi \times 0.325 \times 0.325$
 $= 0.3318 \text{ m}^2 = 0.33 \text{ m}^2$ to 2 decimal places.

Find the circumference and area of these ponds.

a A pond with a diameter of 1.6 m.

1 The circumference = $\pi \times \dots\dots\dots = \dots\dots\dots \text{ m}$

2 The area = $\pi \times \dots\dots\dots \times \dots\dots\dots = \dots\dots\dots \text{ m}^2$

b A pond with a diameter of 1.2 m.

3 The circumference = $\dots\dots\dots \text{ m}$

4 The area = $\dots\dots\dots \text{ m}^2$

Remember

Formulae

Radius = $\frac{1}{2}$ diameter

Circumference = $\pi \times \text{diameter}$

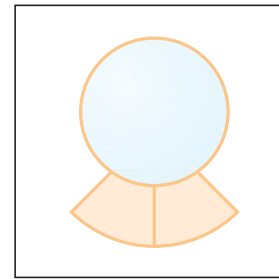
Area of a circle = $\pi \times r \times r = \pi r^2$

π is a constant.

Use $\pi = 3.142$ or the calculator value.

Activity 11

I have to lay slabs around the pond. The slabs are curved.



John needs to work out how many slabs he will need.

John doesn't want to cut any slabs. He leaves gaps between the slabs so that he only needs to use whole ones.

Number of slabs = circumference of pond \div length of slab

John has to lay 300 mm length slabs around a pond with a circumference of 3.7 m or 3700 mm.

1 The number of slabs needed = $3700 \div 300 =$ which means slabs.

A pool has a circumference of 1.9 m. It will be surrounded by 230 mm slabs.

2 The number of slabs needed = slabs.

3 How many 300 mm slabs does John need to go round a pond 1.5 m in diameter?

a Circumference = mm

b The number of slabs = slabs

Activity 12

When the pond or pool is finished I fill it with water. I work out the **volume** to find how many litres of water I will need.

The pebble pool has a radius of 325 mm and it is 220 mm deep.

Volume = $\pi \times 0.325 \text{ m} \times 0.325 \text{ m} \times 0.22 \text{ m} = 0.073 \text{ m}^3$

1 John needs 0.073×1000 litres = litres

2 A pond has a radius of 900 mm and a depth of 500 mm.

Water needed = $\pi \times$ m^3
= litres

3 A pond has a radius of 750 mm and a depth of 600 mm

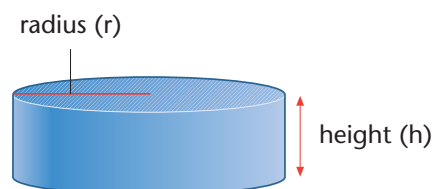
Water needed = $\pi \times$ m^3
= litres

Remember

Volume of a prism

Volume of a prism = area of the base \times height

Volume of a cylinder (circular-based prism)
= $\pi \times \text{radius} \times \text{radius} \times \text{height} = \pi \times r \times r \times h$



Remember

1 $\text{m}^3 = 1000$ litres

Review

Do you need more practice in working with circles?

Yes ☐ No ☐

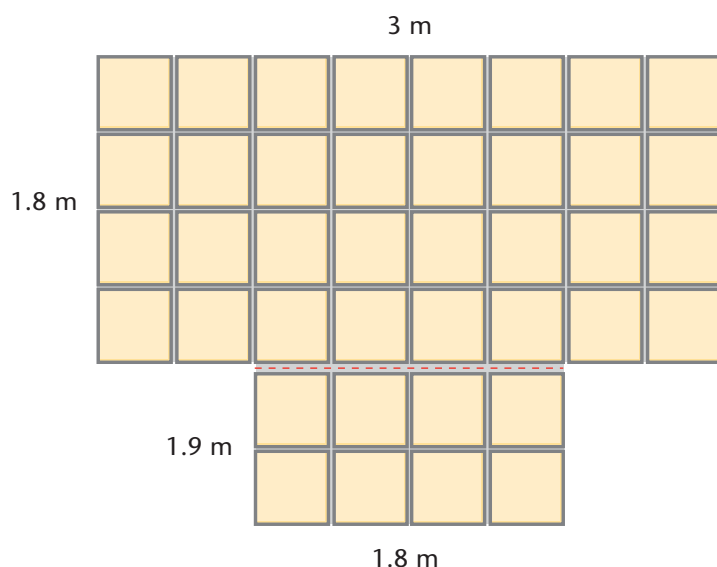
For more work on this, go to H4 (page 14) or E2 (page 15).

This work links to mini-project M2 (page 16).

Painting the town!

Most patios are square or rectangular.
But sometimes my customers want
patios that are different shapes.

Activity 13



Remember

Finding the area of a complicated shape

Break down a complicated shape into simple shapes like rectangles and triangles. Then work out the area of these shapes.

This patio is not a simple rectangle, so John splits it into two rectangles to work out the area.

- Area of the large rectangle = $3 \text{ m} \times 1.8 \text{ m} = 5.4 \text{ m}^2$
Area of the smaller rectangle = $1.8 \text{ m} \times 0.9 \text{ m} = 1.62 \text{ m}^2$

Total area of the patio = $5.4 \text{ m}^2 + 1.62 \text{ m}^2 = \boxed{} \text{ m}^2$

- Another patio was built round the corner of the house. It looked like the shape on the right.

Work out the area of the patio.

.....

.....

.....

.....

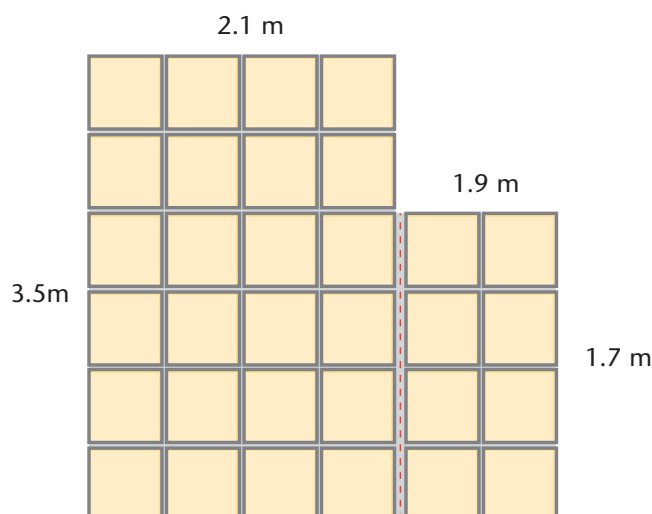
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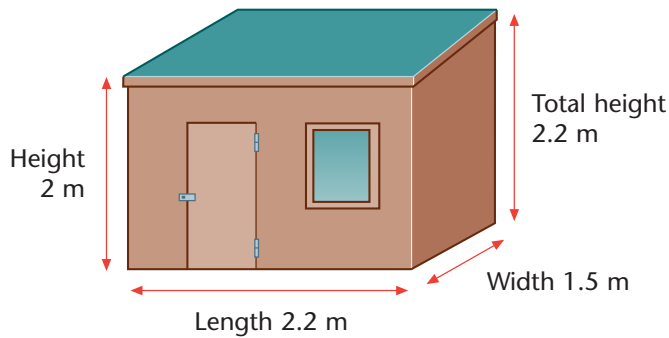


I have to paint sheds for my customers. Some paints are very expensive. I have to work out the total area to be painted, to make sure there isn't a lot left over.

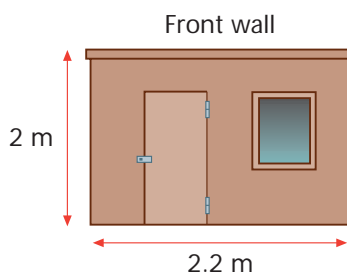
A shed is not a simple shape but you can work out the areas one side at a time. A 3-D diagram usually helps.

Activity 14

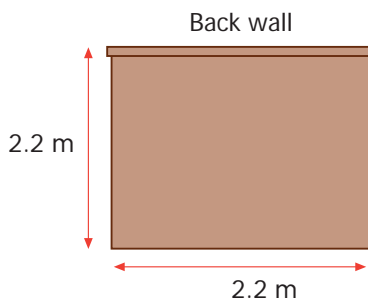
Garden shed



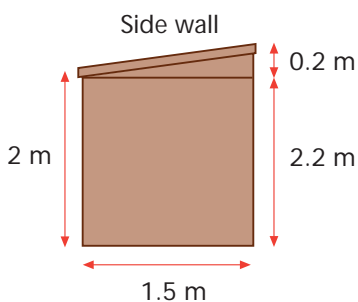
I have sketched out each wall separately to work out its area.



$$\text{Area} = \dots \times \dots = \dots \text{ m}^2$$



$$\text{Area} = \dots \times \dots = \dots \text{ m}^2$$



$$\text{Area of triangle} = \times \frac{1}{2} \dots \times \dots = \dots \text{ m}^2$$

$$\text{Area of rectangle} = \dots \times \dots = \dots \text{ m}^2$$

$$\text{Area of one side} = \dots + \dots = \dots \text{ m}^2$$

$$\text{Area of two sides (both sides are the same)} = \dots \text{ m}^2$$

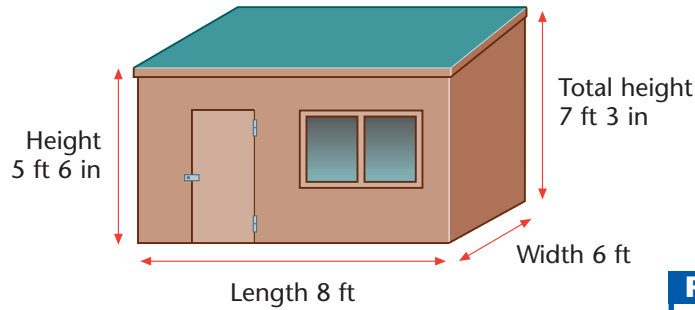
$$\text{Total surface area of the shed is} = \dots \text{ m}^2$$

1 litre covers 12 m² so John needs $\dots \div 12 = \dots$ litres of paint.



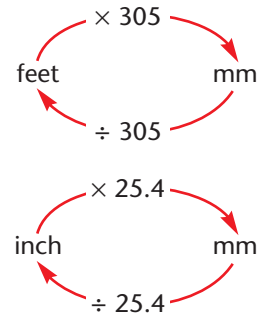
Activity 15

This is an old shed.
The customer gave the
measurements to John
over the phone in feet
and inches.



Remember

To change between the
units



Imperial to metric

1 foot = 305 mm

1 inch = 25.4 mm

- 1 Change each of the measurements to metres.

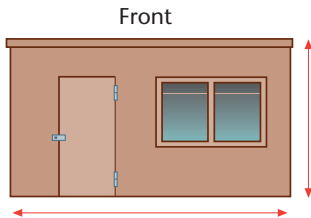
6 ft = mm = m

8 ft = mm = m

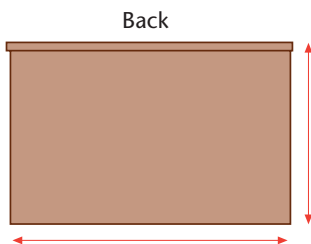
5 ft 6 in mm = m

7 ft 3 in mm = m

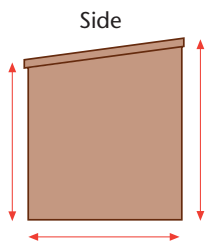
- 2 Mark the lengths in metres on the diagrams and work out the total
surface area of the shed. Give your answer to one decimal place.



Area = m²



Area = m²



Area of triangle = m²

Area of rectangle = m²

Area of one side = m²

Area of 2 sides = m²

Total area = m²

Review

Do you need more practice in 3-D diagrams and areas of composite shapes?

Yes ☐

No ☐

For more work on this, go to H5 (page 14).

This work links to mini-project M3 (page 16).



Activity H1

A fence panel measures 4 ft 6 ins by 6 ft. Convert these measurements to metres (to two decimal places).

6 ft =

.....

4 ft =

.....

6 ins =

.....

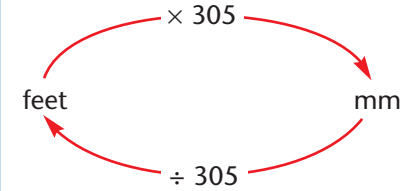
4 ft 6 ins =

.....

Remember

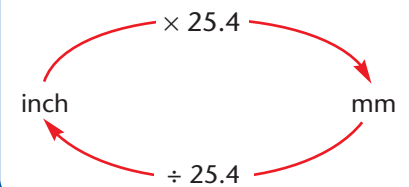
1 foot = 305 mm

so to change between the units



1 inch = 25.4 mm

so to change between the units



Activity H2

A scale drawing for a concrete base for a garden shed measures 61 mm by 53 mm.

The scale is 1 : 40.

1 The actual length = mm = m

2 The actual width = mm = m

3 The perimeter = m

4 The area = m²

The concrete is to be 25 mm deep.

5 25 mm = m

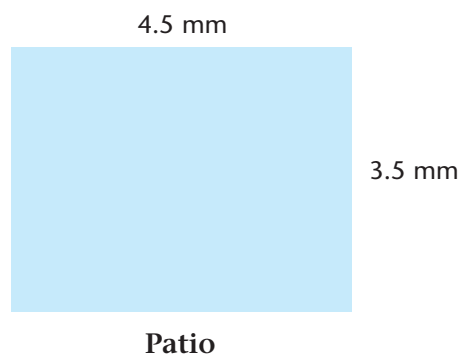
6 The volume of concrete = m³



Activity H3

The diagrams show a paving slab and a patio.

500 mm
 500 mm
Paving slab





- 1 How many slabs will fit along the length? slabs
- 2 How many slabs will fit along the width? slabs
- 3 The total number of paving slabs = slabs
- 4 The area of the patio = length \times width = m^2

The slabs are to be laid on a 40 mm deep bed of sand.

5 40 mm = m

6 The volume of sand = area of patio \times depth of sand = m^3



Activity H4

- 1 A circular pond has a radius of 800 mm and a depth of 650 mm.
 - a Calculate the volume in m^3 .
Volume =
 - b Calculate the number of litres of water needed to fill the pond.
Number of litres =
- 2 Another garden has a circular pond with radius 620 mm and a depth of 430 mm.
 - a Calculate the volume in m^3 .
Volume =
 - b Calculate the number of litres of water needed to fill the pond.
Number of litres =

Activity H5

1 Side a measures $4.5 \text{ m} - 2.5 \text{ m} =$ m

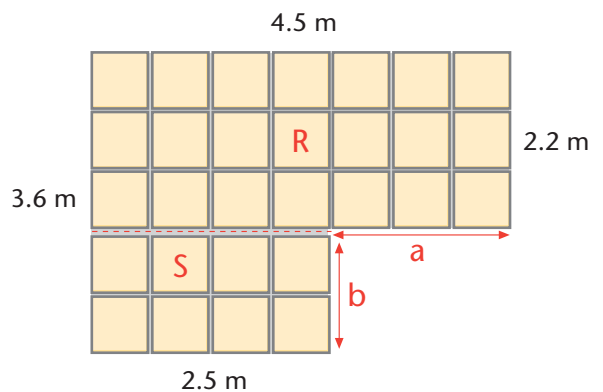
2 Side b measures m

A line has been used to divide the patio into two rectangles.

3 The area of rectangle R =
..... m^2

4 The area of rectangle S =
..... m^2

5 The area of the patio = area R + area S = m^2





Extension



Activity E1

Scale 1:10



- 1 Measure the width and height of wall in the diagram and complete the table.

	Scale measurement	Actual measurement
Height		
Width		

- 2 Work out the area of the part of the wall you can see in the diagram. Give your answer in metres squared (m^2).
..... m^2
- 3 Work out how many bricks would be needed to build this wall by using the formula
number of bricks = area (in m^2) \times 60
=



Activity E2

You have to make a round flower bed 4 ft in diameter.

- 1 4 ft = mm = m
- 2 The circumference = $\pi \times$ = m
- 3 The area = $\pi \times$ radius \times radius = m^2
- 4 You put a 200 mm layer of topsoil in the bed.
- 5 The volume of topsoil = Area of base \times height
=
..... m^3

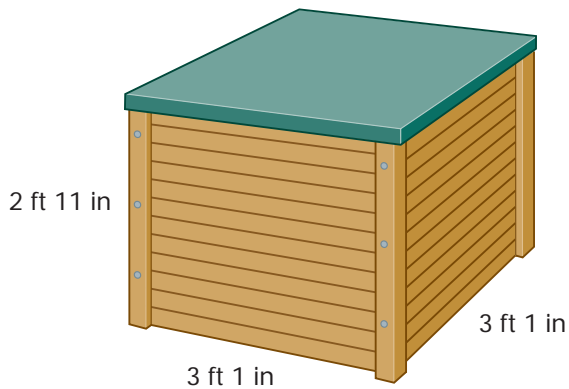


Mini-projects



Activity M1

Wooden compost bins are sold at a DIY store.



Two compost bins are to be built side by side.

The area must be paved and the paving must extend 500 mm all round the compost bins.

Draw a scale plan showing the paved area and the position of the compost bins.



Activity M2

Visit a DIY store and collect leaflets on how to build a pond.

Design a pond for your garden or a local play area.

Draw a plan to show what the pond will look like.

Work out the materials that you will need.



Activity M3

Decide on a feature you would like to build in a garden.

Draw a plan of the feature.

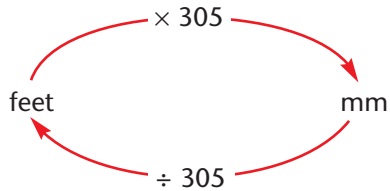
Visit a builders' merchant or search on the Internet to find the cost of the items needed to build your feature.



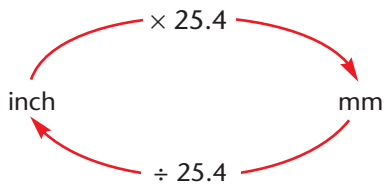
Check it

Remember

1 foot = 305 mm
so to change between the units



1 inch = 25.4 mm
so to change between the units



Activity C1

Complete the following

- 1 1200 mm = m
- 2 1.6 m = mm
- 3 1865 mm = m
- 4 2.354 m = mm
- 5 2800 mm = m

Convert these measurements in feet and inches to millimetres.

- 6 3 ft =
- 7 8 ft =
- 8 6 ft =
- 9 3 in =
- 10 6 ft 3 in =

Activity C2

A rectangular patio measures 4.8 m by 3.5 m.

- 1 The perimeter = m
- 2 The area = m²



Activity C3

A circular pond is 1.4 m wide and 550 mm deep.

- 1 The circumference = m
- 2 The area = m^2
- 3 The volume = m^3

How am I doing?

Now look back at the skills listed on page 1.
Then complete the sentences below.

I am confident with

.....
.....

I need more practice with

.....

Date

Activity 1

- 1800 mm
- 0.14 m
- 2300 mm
1400 mm
- 1.034 m
3.096 m

Activity 2

- | | | | |
|----------|----------|----------|----------|
| 1 610 mm | 152.4 mm | 762.4 mm | 0.7624 m |
| 2 915 mm | 50.8 mm | 965.8 mm | 0.9658 m |
| 3 3.05 m | 2.44 m | 2.287 m | |

Activity 3

- 9200 mm = 9.2 m, 6400 mm = 6.4 m,
area = 58.88 m²
- 72 mm
 - 54 mm
 - 3600 mm = 3.6 m
 - 2700 mm = 2.7 m
 - 9.72 m²

Activity 4

- 9200 mm 6400 mm
20.44 = 21 slabs, 14.22 = 15 slabs
total = 21 × 15 = 315 slabs
- 8 slabs, 6.22 = 7 slabs total = 8 × 7 = 56 slabs

Activity 5

- 2.944 m³
- 0.504 m³

Activity 6

- 7.8 m
- 5.4 m
- 8 m
- 10.1 m

Activity 7

- 1.44 m²
- 86.4 ⇒ 87 bricks
- 8.7 ⇒ 9 bricks
- Total number of bricks is 96.

Activity 8

- 3 × 0.45 = 1.35 m²
- 1 × 0.45 = 0.45 m²
- 3.6 m²
- 3.6 × 60 = 216 bricks
- 21.6 = 22 bricks
- 216 + 22 = 238

Activity 9

- 2.30 to 2 decimal places
 - 0.75 – 0.205 = 0.545 m = 0.55 m correct to two decimal places
 - 2.30 × 0.55 × 0.4 = 0.506 m³ correct to two decimal places or 0.5 m³ correct to one decimal place
- inside length** = 2.80 m correct to two decimal places
inside width = 0.80 m correct to two decimal places
volume = 0.9 m³ correct to one decimal place

Activity 10

- 5.03 m
- 2.01 m²
- 3.77 m
- 1.13 m²

Activity 11

- 12.3333 = 12 slabs
- 8.26 ⇒ 8 slabs
- 4.7123 ⇒ 4712 mm
 - 15.7 ⇒ 15 slabs

Activity 12

- 73 litres
- $\pi \times 0.9 \times 0.9 \times 0.5 = 1.2723 \text{ m}^3$
 $= 1.272345 \times 1000 = 1272.35 \text{ litres}$
- $\pi \times 0.75 \times 0.75 \times 0.6 = 1.06028 \text{ m}^3$
 $= 1.06028 \times 1000 = 1060.29 \text{ litres}$

Activity 13

- 7.02 m²
- Area of large rectangle = 2.1 × 3.5 = 7.35 m²
 Area of small rectangle = 1.9 m × 1.7 = 3.23 m²
 Total area = 10.58 m²

Activity 14

- Front wall: Area = 2 × 2.2 = 4.4 m²
 Back wall: Area = 2.2 × 2.2 = 4.84 m²
 Side wall: Area of triangle = $\frac{1}{2} \times 1.5 \times 0.2 = 0.15 \text{ m}^2$
 Area of rectangle = 2 × 1.5 = 3.0 m²
 Area of one side = 0.15 + 3.0 = 3.15 m²
 Area of two sides = 2 × 3.15 = 6.30 m²
 Total surface area = 15.54 m²
 Paint needed 15.54 ÷ 12 = 1.295 litres

Activity 15

- 6 ft = 1830 mm = 1.83 m
8 ft = 2440 mm = 2.44 m



- $5 \text{ ft } 6 \text{ in} = 1677.4 \text{ mm} = 1.6774 \text{ m}$
 $7 \text{ ft } 3 \text{ in} = 2211.2 \text{ mm} = 2.2112 \text{ m}$
 2 Front $1.6774 \times 2.44 \text{ m}^2 = 4.09256 \text{ m}^2$
 Back $2.2112 \times 2.44 \text{ m}^2 = 5.395328 \text{ m}^2$
 Triangle $= 0.5 \times (1.83 \times 0.5338) = 0.488427 \text{ m}^2$
 Side area rectangle $= 1.83 \text{ m} \times 1.6774 \text{ m}^2 = 3.069642 \text{ m}^2$
 Area of one side $= 3.558069 \text{ m}^2$
 Area of two sides $= 7.116138$
 Total area $= 16.604322 = 16.6 \text{ m}^2$ (to one decimal place)

Help

Activity H1

- $6 \text{ ft} = 6 \times 305 = 1830 \text{ mm} = 1.83 \text{ m}$
 $4 \text{ ft} = 4 \times 305 = 1220 \text{ mm} = 1.22 \text{ m}$
 $6 \text{ in} = 6 \times 25.4 = 152.4 \text{ mm} = 0.15 \text{ m}$
 $4 \text{ ft } 6 \text{ in} = 1.22 \text{ m} + 0.15 \text{ m} = 1.37 \text{ m}$

Activity H2

- 1 $2440 \text{ mm} = 2.44 \text{ m}$
 2 $2120 \text{ mm} = 2.12 \text{ m}$
 3 9.12 m
 4 5.17 m^2
 5 0.025 m
 6 $0.12932 \text{ m}^3 = 0.13 \text{ m}^3$

Activity H3

- 1 9 4 15.75 m^2
 2 7 5 0.04 mm
 3 63 6 0.63 m^3

Activity H4

- 1 a 1.307 m^3
 b 1307 litres
 2 a 0.5193 m^3
 b 519 litres

Activity H5

- 1 side a $= 2.0 \text{ m}$
 2 1.4 m
 3 9.9 m^2
 4 3.5 m^2
 5 13.4 m^2

Extension

Activity E1

1	Scale measurement	Actual measurement
Height	85 mm	850 mm = 0.85 m
Width	90 mm	900 mm = 0.9 m

- 2 $0.9 \times 0.85 = 0.765 \text{ m}^2$
 3 $0.765 \times 60 = 45.9$
 46 bricks needed.

Activity E2

- 1 $1220 \text{ mm} = 1.22 \text{ m}$
 2 3.83 m
 3 1.17 m^2
 4 0.23 m^3

Mini-projects

Activities M1, M2, M3

Check your work with your teacher.

Check it

Activity C1

- 1 1.2 m
 2 1600 mm
 3 1.865 m
 4 2354 mm
 5 2.8 m
 6 915 mm
 7 2440 mm
 8 $6 \text{ ft} = 1830 \text{ mm}$
 9 $3 \text{ in} = 76.2 \text{ mm}$
 10 $6 \text{ ft } 3 \text{ in} = 1906.2 \text{ mm}$

Activity C2

- 1 16.6 m
 2 16.8 m^2

Activity C3

- 1 4.4 m to one decimal place
 2 1.54 m^2 to two decimal places
 3 0.85 m^3 to two decimal places