



Build your skills: Problem solving – Part 3

Try it out

This part of the task gives you the chance to try out your skills and check your progress with some test-type questions.

It also contains the answers to all the activities in Part 1 and Part 3.

Now try out your skills by doing the following two tasks.



Task 1

You are painting fence panels with wood preservative.

Each tin contains 500 ml of the wood preservative paint and this will cover an area of 10 m^2 of fencing.



Each fencing panel is 2 m long and 1.5 m high.

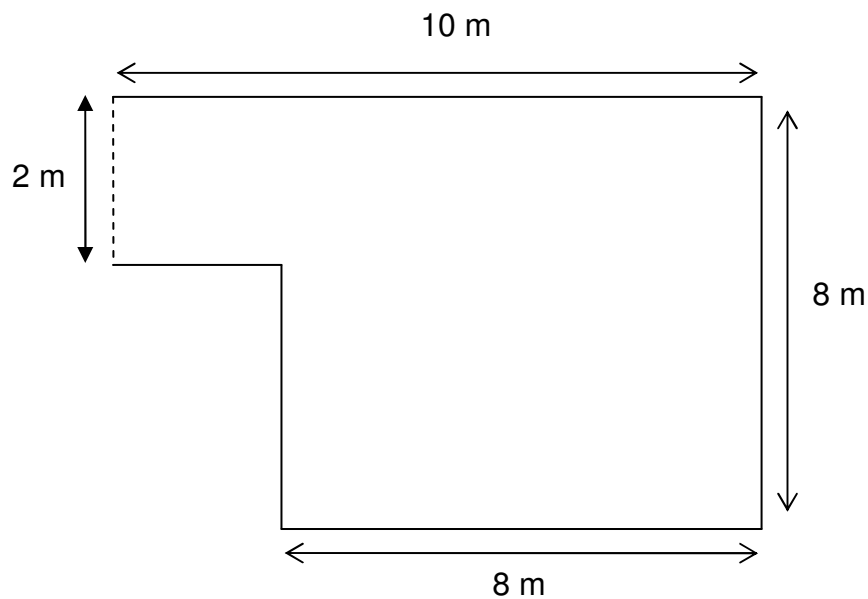
- a Work out the area of *both sides* of each fencing panel.



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- b If you paint all the panels around the perimeter of the garden shown below, how many panels will you need to paint?

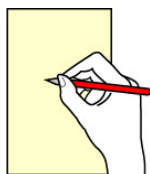
Note: There are no panels in the edge of the garden marked with the dotted line (see the image on following page). (This is where the entrance to the garden is.)



- c How many tins of paint will you need altogether?



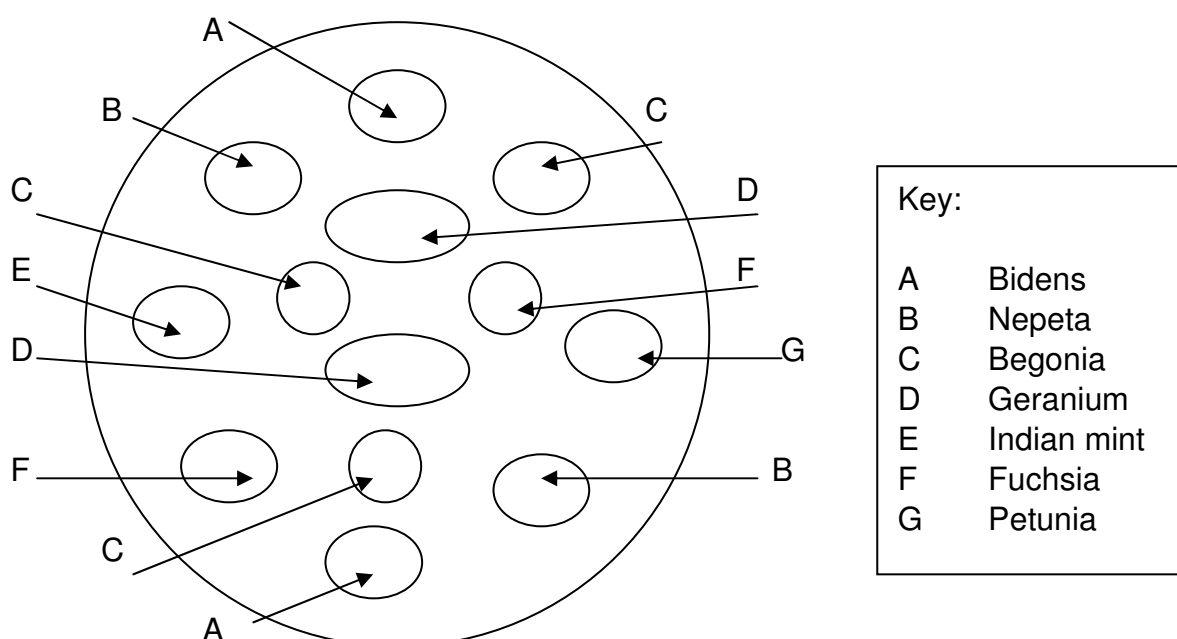
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Task 2

This task is adapted from module 2 of the Horticulture Embedded Materials on the Embedded Learning Portal at <http://rwp.qia.oxi.net/embeddedlearning>.

You have the job of planting out 30 hanging baskets using the below planting plan for each basket.



a Fill in the table below showing how many of each type of plant you will need.

Plant name	Number per basket	Number for 30 baskets	Number of trays
Bidens			
Nepeta			
Begonia			
Geranium			
Indian mint			
Fuchsia			
Petunia			

Tip: You can use the planting plan to work out how many of each type of plant are needed per basket.



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- b** You have to go and get the plants you need from the growing section. Each type of plant comes in a tray containing a different number of plants (depending on the size of the plant etc.).

The table below shows how many of each type of plant comes in one tray.

The second column shows how many rows of the plant and how many plants per row grow in each tray.

Plant name	Plants per tray	Number of plants per tray
Bidens	6×4	
Nepeta	7×5	
Begonia	7×9	
Geranium	2×4	
Indian mint	6×7	
Fuchsia	2×3	
Petunia	8×5	

Work out how many of each type of plant grows in one tray and fill this information in to the third column of the table above.

- c** Look back at the table in (a). In the blank column to the right of the table write in how many trays of each type of plant you need to collect to plant up the 30 baskets.

Tip: You will need to collect whole trays and make sure you have enough of each type of plant for all the 30 baskets.

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Questions to check on your progress

These questions are taken from the Progress checks – confidence-building tests from the Learner Route on the Move On web site.

Progress check H, Q6

A receptionist saves £45 each week towards a holiday.
She needs to save £500.

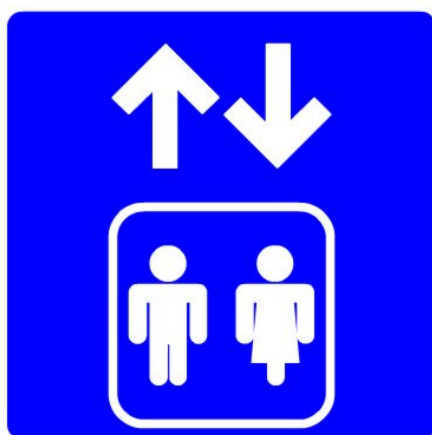
Which of these gives the number of weeks
she needs to save for?

- A. ☐ $45 \div 500$
- B. ☐ $500 \div 45$
- C. ☐ 500×45
- D. ☐ 45×500

Progress check H, Q10

A lift travels from the eleventh floor to the fourth floor.
The distance between each floor is 3.5m.

How far does the lift travel?



- A. ☐ 21.35m
- B. ☐ 24.4m
- C. ☐ 24.5m
- D. ☐ 28m

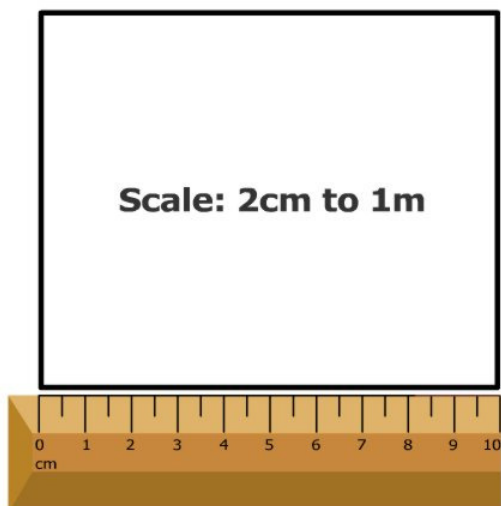


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Progress check H, Q12

A builder is laying some square decking. He uses a scale drawing.

What is the actual length of one side of the decking?



- A. ☐ 2m
- B. ☐ 5m
- C. ☐ 10m
- D. ☐ 20m

Progress check H, Q13

A builder lays a driveway.
He uses square slabs 60cm by 60cm.
The driveway is 4 slabs wide and 7.2m long.

How many slabs does the builder lay?

- A. ☐ 12
- B. ☐ 44
- C. ☐ 48
- D. ☐ 52



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Progress check H, Q22

A driver travels 250 miles and uses 29 litres of petrol.

Which of these calculations shows how many miles the car travels on 1 litre, on average?

- A. ☐ $250 \div 29$
- B. ☐ 250×29
- C. ☐ $29 \div 250$
- D. ☐ 29×250

Progress check H, Q34

You buy a 2-litre bottle of fruit juice.

The label says dilute 1 part juice : 5 parts water.

How much diluted drink would half a bottle of juice make?

- A. ☐ 2.5 litres
- B. ☐ 3 litres
- C. ☐ 5 litres
- D. ☐ 6 litres



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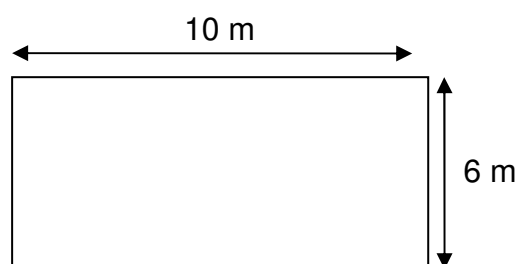
Answers to questions in Part 1



Activity 1

Would a sketch or diagram help you to visualise the problem? If so, what might it look like?

- 1 You might use a sketch something like this to show the client's garden:

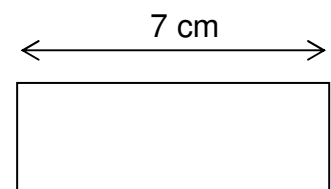


a The total length of fencing will be 32 m $(10 + 6 + 10 + 6)$

b He will need 16 fencing panels altogether $(5 + 3 + 5 + 3)$

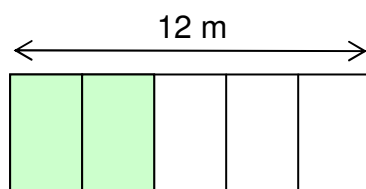
- 2 You might sketch the children's play area:

Each cm on the plan represents 2 metres in the real park.



$2\text{ m} + 2\text{ m} + 2\text{ m} + \dots\text{etc.} = 7 \times 2\text{ m} = 14\text{ metres}$

- 3 You might use a sketch of the garden something like this:



The garden is divided into five equal-sized beds, so each bed will be 2.4 metres long:

$$12\text{ m} \div 5 = 2.4\text{ m}$$

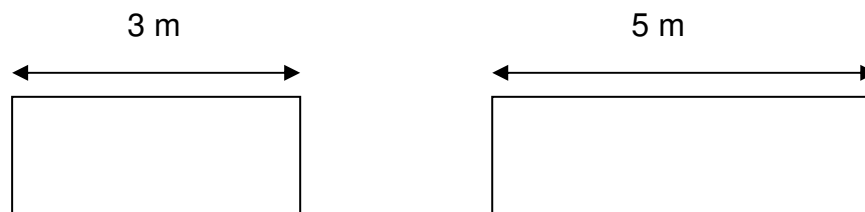
Two of these beds will be 4.8 metres long altogether:

$$2.4\text{ m} \times 2 = 4.8\text{ m}$$



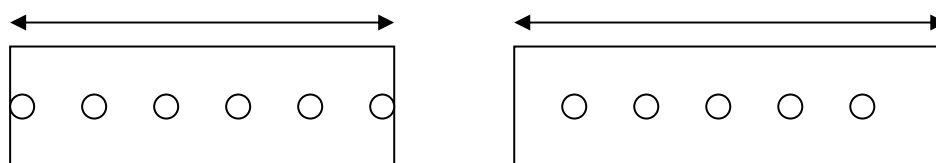
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- 4 You might make a sketch of the two rose beds on the green that looks something like this:



If the roses are planted 1 metre apart from each other:

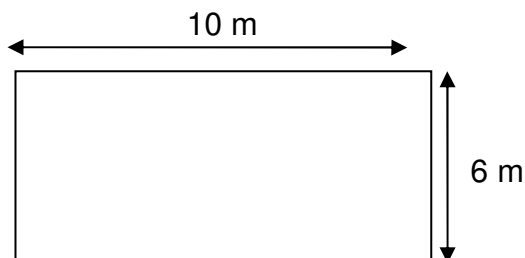
In the 5-metre bed you could fit **5 or 6** (depending on where you plant them in the bed):



Similarly, in the 3-metre bed you could fit **3 or 4** roses.

So your total number of roses should be **between 8 and 10 roses**.

- 5 You might use a sketch something like this to show the garden:



Thinking about the first length of the garden (for the top edge of the garden as shown), the area of fencing for this length would be:

$$10 \text{ metres long} \times 1.5 \text{ metres high} = 15 \text{ m}^2$$

Thinking about each side along the width of the garden (the side edges of the garden as shown), the area of fencing for this side would be:

$$6 \text{ metres long} \times 1.5 \text{ metres high} = 9 \text{ m}^2$$

So the total area of fencing will be: $15 + 9 + 15 + 9 = 48 \text{ m}^2$ area of fencing.



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Activity 2

The details shaded in grey are *not important* for the calculation(s) you need to make.

- 1 Nuah is making some flower beds to go in a garden. She decides to use treated wood that is 2 cm thick and 20 cm deep for the edging to the beds. She wants to make 5 beds, each 2.5 metres long and 1 metre wide.

What length of flower bed will she have altogether in the garden when she has made all the beds?

- 2 A gardener goes shopping for plants for a garden. She spends £42.55 in the first shop. In the next shop she gets some plants that have been reduced from £32.99 to £24.99. How much has she spent in total?

If she set off with £100, how much change will she have after the trip?

- 3 Two allotment holders want to save up to buy seeds for next year's crops. Each year they both sell their produce to local householders and last year they earned £270 and £500 respectively.

They decide to buy the seeds between them as this will save them each wasting seeds they don't want. They contribute £25 and £35 respectively to the joint 'seed fund'.

The seeds they agree to buy cost £53 in total. Have they got enough in the 'fund' to pay for them? If not, how much more do they need to find?

- 4 A landscape gardener is putting a new patio in a client's garden. He agrees to make it 6 patio slabs wide. The client's garden measures 21 m by 16 m and she wants the patio to be 10 metres long.

If the landscape gardener uses slabs that are each 50 cm square, how many will be needed for the 10 m length of patio?



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- 5 Three neighbours live in a historic house which 4 years ago was divided to create 7 separate apartments. The neighbours decide they want to refurbish the area of ground by their flats to create a communal garden area. The cost of the materials they need comes to £522 altogether, including VAT at 15%.

How much will each neighbour contribute to the cost if they share it equally between them?



Activity 3

- 1 She spends £762 ($£135.50 + £254.90 + £144.50 + £112 + £115.10$).

The cost per flower bed is £152.40 ($£762 \div 5$).

- 2 She spent £762, making a cost per bed of £152.40. She estimated it would cost £200 per bed.

So she spent **£47.60 less per bed than her estimate**.

- 3 He has his bonus of £162, so he still needs to save £88 ($£250 - £162$).

At £10 per week, it will take him **another 9 weeks to save up** the full £250:

$$£88 \div 10 = 8.8 \text{ weeks.}$$

But he will need to have 9 weeks' money before he has enough. (After 8 weeks he will only have £80).

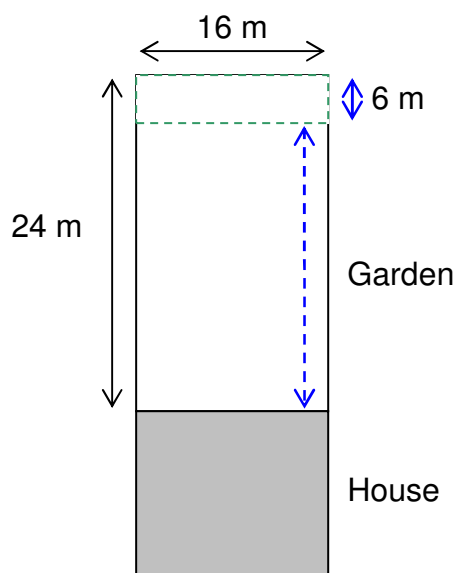
- 4 **Each family will need to contribute £15.**

$$\text{They have } £1\,200 + £645 + £500 = £2\,345.$$

$$\text{So they still need } £150 \quad (£2\,495 - £2\,345)$$

$$\text{This will be } £15 \text{ per family} \quad (£150 \div 10)$$

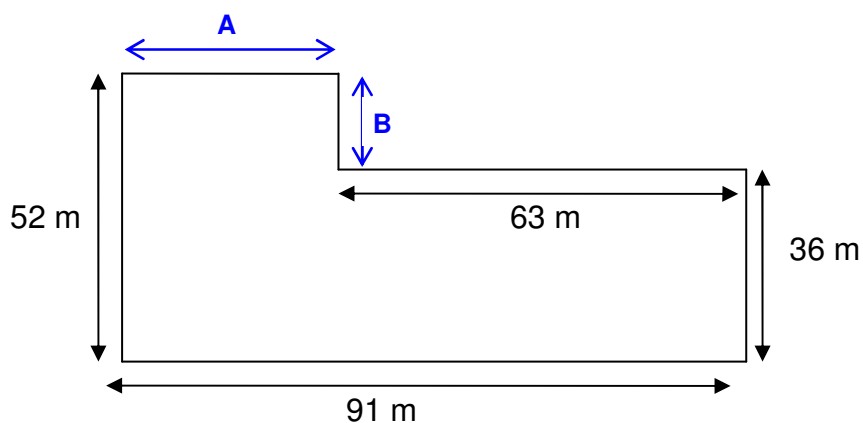
- 5 The distance from the house to the front edge of the vegetable plot will be **18 m**.



The distance we want to find is the one shown by the dotted blue line:

$$24 \text{ m} - 6 \text{ m} = 18 \text{ m}.$$

- 6 The length of fencing is 286 metres.



You could work out the two lengths marked by the blue arrows in the diagram.

$$\text{Length A} = 91 \text{ m} - 63 \text{ m} = 28 \text{ m}$$

$$\text{Length B} = 52 \text{ m} - 36 \text{ m} = 16 \text{ m}$$

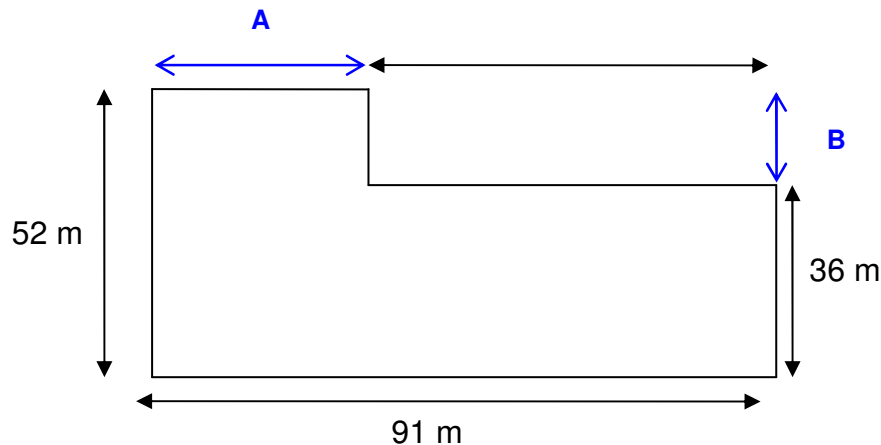
And use this to add up the total length of fencing:

$$28 + 16 + 63 + 36 + 91 + 52 = 286 \text{ m}$$



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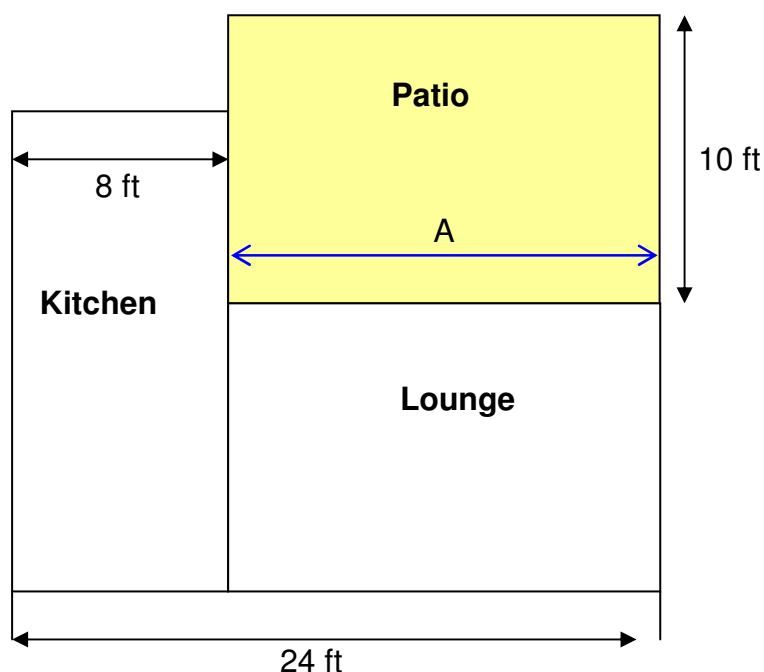
Alternatively, if you think of the lengths of fencing combined as in the diagram below, you won't need to work out the two marked lengths:



You can maybe see from this arrangement that the length of fencing is:

$$\begin{array}{rclclcl} 2 \text{ lengths of } 91 \text{ m} & \text{plus} & 2 \text{ lengths of } 52 \text{ m} & & & \\ (2 \times 91) & + & (2 \times 52) & & & \\ = & 182 & + & 104 & = & 286 \text{ m} \end{array}$$

7 The area of the patio will be 160 sq ft



The distance marked by the blue arrow on the diagram above is $24 \text{ ft} - 8 \text{ ft} = 16 \text{ ft}$.

The area of the patio will be: length of patio \times width of patio

$$10 \times 16 = 160 \text{ square feet.}$$



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Activity 4

1 They would each get £6.66.

$$£20 \div 3 = £6.66666$$

We can't round up to the nearest penny as they only have £20 in total.

So, they get £6.66 and there will be 1p left over, which doesn't divide equally between them.

2 They would each need to contribute £2.45

$$£22 \div 9 = £2.444444$$

We need to round up to the next whole penny to make sure they have the full amount the present costs.

If they only give £2.44 each, there would only be £21.96 between them and they would be 4p short.

3 They would each get 9 plants.

$$29 \div 3 = 9.66666$$

We can't round up as they only have 29 plants in total.

So, they get 9 each and there will be 2 plants left over which don't divide equally between them.

4 He would need 7 tins of paint.

$$65 \text{ sq m} \div 10 \text{ sq m} = 6.5$$

He needs to round up to the next whole tin to make sure he has enough paint for all the fencing.

If he only buys 6 tins, there would only be enough paint for 60 sq metres of fencing.



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5 There would be 8 plants in each bed.

$$25 \div 3 = 8.33333$$

If it is important that each bed has exactly the same number of plants, we only have enough for 8 plants in each bed.

(There would be 2 plants left over, which don't divide equally between the beds.)

A note for interest: Depending on the number of plants involved, having exactly the same number in each bed might at some times be more important than at others.

For example, if there were 65 plants in a tray, the number of plants per bed would be:

$$65 \div 3 = 21.66666.$$

Dividing the plants exactly, you would only have enough for 21 per bed.

With a relatively large number of plants like this, though, it might be difficult to see the difference between 21 and 22 plants, so you could maybe put 22 in two of the beds and 21 in the third bed without them looking unbalanced.

If, on the other hand, there were only 10 plants per tray, the number of plants per bed would be:

$$10 \div 3 = 3.3333.$$

Dividing the plants exactly, you would only have enough for 3 per bed.

With a relatively small number of plants like this, though, it would probably look unbalanced if two beds had three of the plants and one had four plants in it.



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Activity 5

- 1 You could work out the total amount of rain like this:

$$\begin{array}{rcl} 5 \times 20 \text{ mm} & = & 100 \text{ mm} \\ 4 \times 10 \text{ mm} & = & 40 \text{ mm} \\ 2 \times 6 \text{ mm} & = & 12 \text{ mm} \\ 2 \times 5 \text{ mm} & = & 10 \text{ mm} \\ 2 \times 4 \text{ mm} & = & 8 \text{ mm} \\ 2 \times 0 \text{ mm} & = & \underline{0 \text{ mm}} \quad + \\ & & 170 \text{ mm} \end{array}$$

Note: Remember that anything multiplied by zero is zero.

So $2 \times 0 = 0$ (2 lots of nothing is still nothing).

It is important to put these two amounts in the total if we want to count up the number of measurements made to check that they match the number in the gardener's original list.

In this case, the blue numbers above add up to 17, which matches the number of measurements in the original list.

- 2 You could work out the amount of potting compost used like this:

$$\begin{array}{rcl} 5 \text{ pots @ 8 handfuls per pot} & = & 40 \text{ handfuls} \\ 7 \text{ pots @ 5 handfuls per pot} & = & \underline{35 \text{ handfuls}} \\ 12 \text{ pots} & & \mathbf{75 \text{ handfuls}} \end{array}$$

The original bag of compost contained about 100 handfuls, so there will be about 25 handfuls left (100 – 75).

(This is about a quarter of the original bag.)



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3 You could count up the number of sales per day in batches of 2, 6, 12 and 60:

Date	Sales of item	Total sales per day
10/04	5×6 30 2×12 24 2×60 120	174
11/04	2×2 4 3×6 18 2×12 24 1×60 60	106
12/04	4×2 8 2×6 12 1×12 12 1×60 60	92
13/04	1×12 12 3×60 180	192
14/04	2×2 4 3×6 18 1×12 12 2×60 120	154

... and then add up the total number of sales: **718**

Alternatively (if you didn't want to know the sales per day), you could add up the number of batches of 2, 6, 12 and 60 (shown in red in the table above) over the whole period:

8×2 16 13×6 78 7×12 84 9×60 540	718
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Build your skills: Problem solving – Part 3

Try it out (answers)



Task 1

Each fencing panel is 2 m long and 1.5 m high.

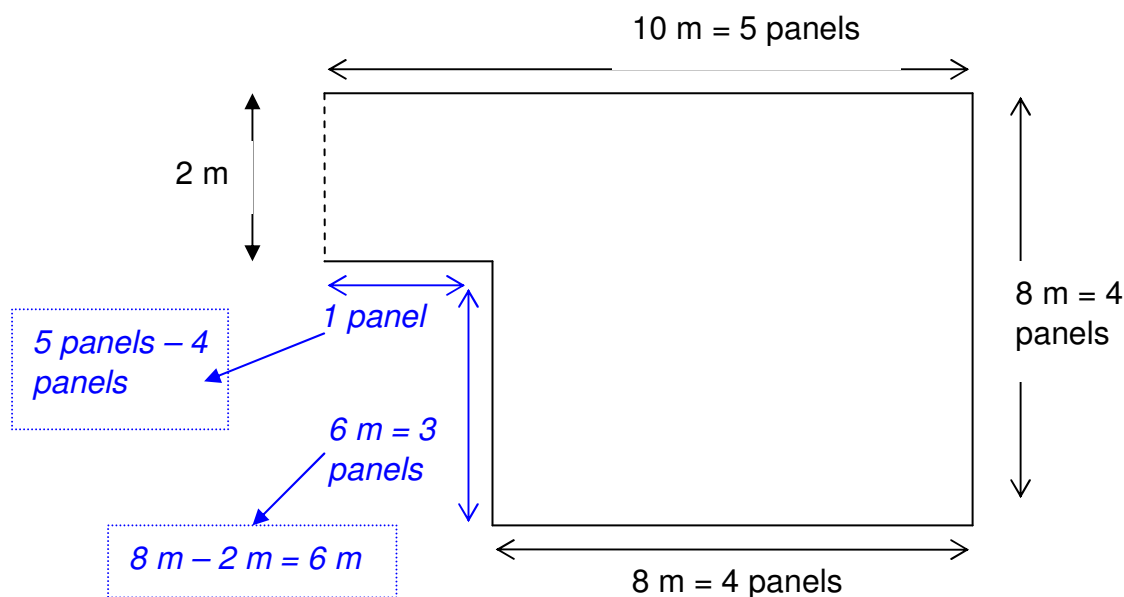
- a** The **area of both sides** of each fencing panel is **6 m²**.

$$\text{Area of one side will be } 2 \text{ m} \times 1.5 \text{ m} = 3 \text{ m}^2$$

$$\text{Area of both sides is therefore } 2 \times 3 \text{ m}^2 = 6 \text{ m}^2$$

- b** You need to paint **17 panels in total**.

$$5 + 4 + 4 + 3 + 1 = 17 \text{ panels (as shown on plan below)}$$



- c** The number of tins of paint needed will be: **11 tins**.

$$\begin{array}{rclcl} \text{Number of panels} & \times & \text{Area per panel (worked out in (a))} & & \\ 17 & \times & 6 \text{ m}^2 & = & 102 \text{ m}^2 \end{array}$$

Each tin (500 ml) of the wood preservative paint will cover 10 m² of fencing.

$$\text{The number of tins needed will be } 102 \div 10 = 10.2 \text{ tins.}$$

You will need 11 tins to make sure you have enough (i.e. you need to round up).



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Task 2

Plant name	No. per basket	No. for 30 baskets	Number per tray	Number of trays
Bidens	2	60	24	3
Nepeta	2	60	35	2
Begonia	3	90	63	2
Geranium	2	60	8	8
Indian mint	1	30	42	1
Fuchsia	2	60	6	10
Petunia	1	30	40	1

Note: If you add up the numbers in the 2nd column, you can check that this is the same as the number of planting 'spots' on the planting plan to make sure you have taken account of all the plants in the plan.

Example of calculations to work out each type of plant:

*Looking at the top row of the table (**Bidens** plants), you can see from the planting plan that you need two Bidens plants per basket.*

So you need 60 Bidens plants altogether (2×30) – this goes in the 3rd column of the table.

Each tray of Bidens contains 24 plants (6×4) – 4th column of table above.

So you will need 3 trays – final column of table:

Two trays ($24 + 24$) would only give you 48 plants, so you need 3 trays to have enough.



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Progress checks (answers)

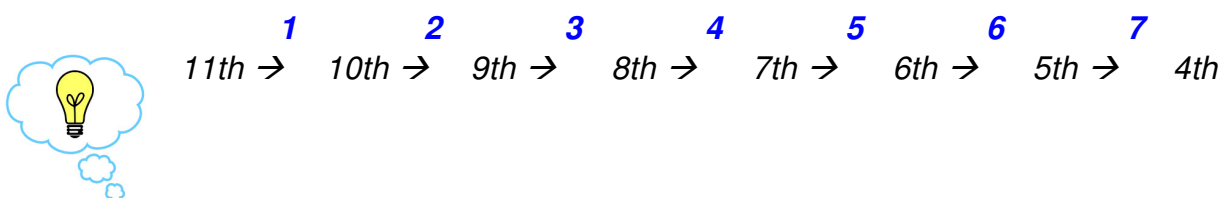
Progress check H, **Q6: B** $500 \div 45$

She needs to work out many lots of £45 will be needed to make £500, so this is a division question.


Progress check H, **Q10: C** 24.5 m

The question tells us that the distance between each floor is 3.5 m. The lift goes from the eleventh (11th) floor to the fourth (4th).

How many spaces between floors is this? You could count up the spaces between floors.



Alternatively, you could think of the situation visually:

11th floor	↓		<i>That's down seven . . .</i>
10th	↓		
9th	↓		
8th	↓		
7th	↓		
6th	↓		
5th	↓		
4th	↓		
3rd			
2nd			
1st floor			
ground			

So, the distance between the 11th and 4th floors is:

$$7 \times 3.5 \text{ metres} = 24.5 \text{ metres.}$$



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Progress check, Q12: **B** 5 metres

The diagram tells us that the scale of the plan is **2cm** (on the plan) = **1 m** (in the actual decking).

The ruler in the diagram shows one side of the decking measuring 10 cm.

$$2 \text{ cm} = 1 \text{ m}$$

$$10 \text{ cm} = ??$$



10 cm is five times as much as 2 cm . . .

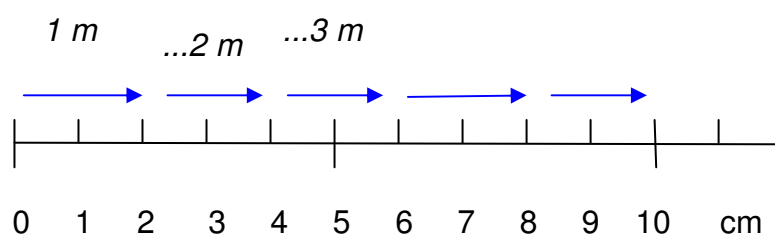
. . . so actual length will be $1 \text{ m} \times 5 = 5 \text{ m}$.

$$\begin{array}{rcl} & 2 \text{ cm} & = 1 \text{ m} \\ \times 5 & \downarrow & \vdots \\ & 10 \text{ cm} & = ?? \end{array}$$

Or, you could again use a visual approach to help you think about the situation:



Each 2 cm on my plan shows 1 metre in real life.





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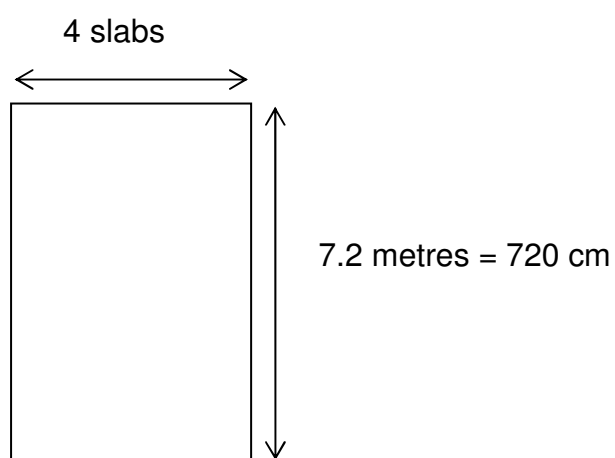
Progress check, Q13: C 48 slabs

The question tells us that the patio will be 4 slabs wide. We need to work out how many slabs long it will be.

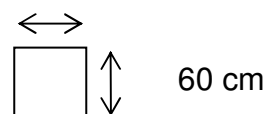


How many 60 cm slabs will fit into 720 cm?

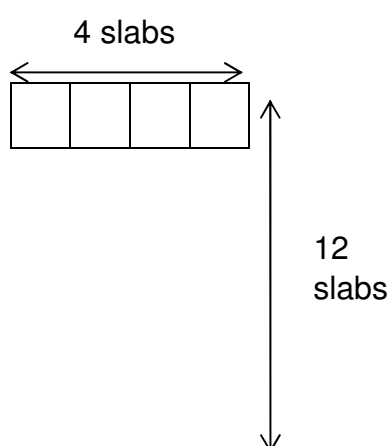
Sketch of patio



Each slab:



$$720 \div 60 = 12 \text{ slabs}$$



So the total number of slabs will be $4 \times 12 = 48$ slabs.



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Progress check, **Q22:** **A** $250 \div 29$

They need to work out the miles per litre, so this will be a division question.

Progress check, **Q34:** **D** 6 litres

The question tells us that the juice should be diluted 1 part juice to 5 parts of water.

Half the bottle of juice will be 1 litre. (Whole bottle is 2 litres.)

1 litre of juice will need 5 litres of water.

Altogether, the amount of drink will be: 1 litre juice + 5 litres water = 6 litres.