2025 Maths Games Senior - Years 7 & 8
Resource Kit 4
Teaching Problem Solving

MATHS GAMES

Problem Solving Strategies

This resource kit focuses on the following problem solving strategies:

1. Divide a Complex Shape

Sometimes you can divide an unusual shape into two or more common shapes that are easier to work with.

2. Convert to a More Convenient Form

There are times when changing some of the conditions of a problem makes a solution clearer or more convenient.

It follows on from strategies introduced in the preparation resource kit and resource kits 1, 2 and 3:

Guess, Check and Refine
Draw a Diagram

Find a Pattern
Build a Table

Work Backwards
Make an Organised List

Solve a Simpler Related Problem
Eliminate All But One Possibility

Resource Kit 4 focuses on:

Divide a Complex Shape

Convert to a More Convenient Form

Set Yellow

Example problems for which full worked solutions are included.

Set Green

Problems that are designed to be similar to Set Yellow, but with fewer difficult elements.

Set Orange

Problems that are similar in mathematical structure to the corresponding Yellow problems.

Further questions and solution methods can be found in the APSMO resource book "Building Confidence in Maths Problem Solving", available from www.apsmo.edu.au.

How to use these problems

At the start of the lesson, present the problem and ask the students to think about it. Encourage students to try to solve it in any way they like. When the students have had enough time to consider their solutions, ask them to describe or present their methods, taking particular note of different ways of arriving at the same solution.

Each question includes at least one solution method that the majority of students should be able to follow. By participating in lessons that demonstrate achievable problem solving techniques, students may gain increased confidence in their own ability to address unfamiliar problems.

Finally, the consideration of different solution methods is fundamental to the students' development as effective and sophisticated problem solvers. Even when students have solved a problem to their own satisfaction, it is important to expose them to other methods and encourage them to judge whether or not the other methods are more efficient.

Preparation Kit

Guess, Check and Refine

This involves making a reasonable guess of the answer, and checking it against the conditions of the problem. An incorrect guess may provide more information that may lead to the answer.

Draw a Diagram

A diagram may reveal information that may not be obvious just by reading the problem.

It is also useful for keeping track of where the student is up to in a multi-step problem.

Resource Kit 1

Find a Pattern

A frequently used problem solving strategy is that of recognising and extending a pattern.

Students can often simplify a difficult problem by identifying a pattern in the problem situation.

Build a Table

A table displays information so that it is easily located and understood.

A table is an excellent way to record data so the student doesn't have to repeat their efforts.

Resource Kit 2

Work Backwards

If a problem describes a procedure and then specifies the final result, this method usually makes the problem much easier to solve.

Make an Organised List

Listing every possibility in an organised way is an important tool.

How students organise the data often reveals additional information.

Resource Kit 3

Solve a Simpler Related Problem

Many hard problems are actually simpler problems that have been extended to larger numbers.

Patterns can sometimes be identified by trying the problem with smaller numbers.

Eliminate All But One Possibility

Deciding what a quantity is not, can narrow the field to a very small number of possibilities.

These can then be tested against the conditions of the original problem.

Resource Kit 4

Convert to a More Convenient Form

There are times when changing some of the conditions of a problem makes a solution clearer or more convenient.

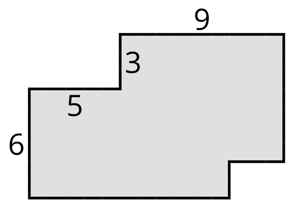
Divide a Complex Shape

Sometimes it is possible to divide an unusual shape into two or more common shapes that are easier to work with.

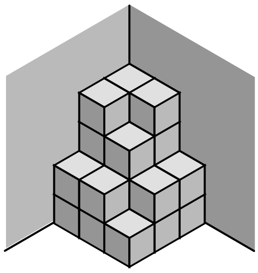
Set Yellow

4.1) What is the value of 846 × 52 + 153 × 52 + 999 × 48?

4.2) The figure at the right is made by placing one rectangle on top of another.
All angles in the figure are right angles.
All lengths are given in centimetres.
What is the perimeter of the figure, in centimetres?



4.3) This tower is in the corner of the room.
It was made by placing identical cubes on top of each other with no gaps.
How many cubes were used to build the tower?



4.4) You are counting aloud by threes, beginning with the number 8.
The first three numbers you say are 8, 11 and 14.
What should be the 20th number you say?

Set Yellow

4.5) What is the value of (74 × 50) – (32 × 50) – (22 × 50)?

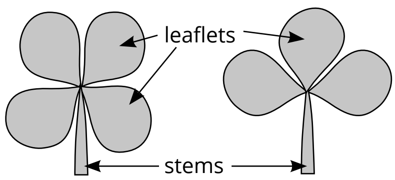
4.6) Sean has a patch of clover growing in his garden.

Some of the stems have 4 leaflets.

All of the other stems have just 3 leaflets.

There are 12 stems and 40 leaflets.

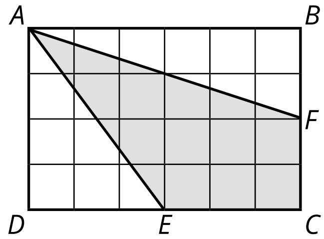
How many of the stems have 4 leaflets?



4.7) The diagram shows a rectangle *ABCD* which is divided into 24 identical squares.

Quadrilateral *AFCE* (shaded) has an area of 48 square centimetres.

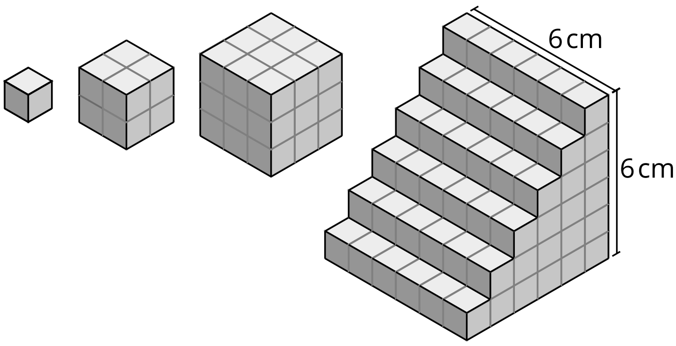
What is the area of *ABCD*, in square centimetres?



4.8) Gary has a lot of wooden cubes, with edges that are 1 cm, 2 cm, or 3 cm long.

He makes the staircase on the right by stacking cubes on a flat surface.

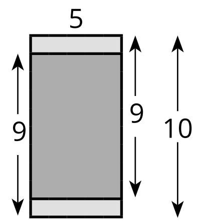
What is the smallest possible number of cubes required to make this staircase?



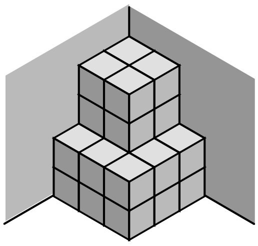
Set Green

4.1) What is the value of $55 \times 6 + 44 \times 6 + 99 \times 4$?

4.2) Two 5 cm × 9 cm rectangles overlap as shown to form a 5 cm × 10 cm rectangle.
What is the perimeter of the overlapping rectangular region, in centimetres?



4.3) This tower is in the corner of the room.
It was made by placing identical cubes on top of each other with no gaps.
How many cubes were used to build the tower?

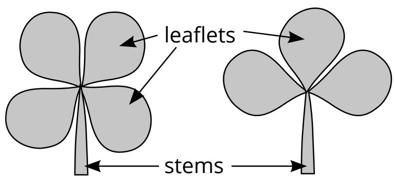


4.4) You are counting aloud by threes, beginning with the number 8.
The first three numbers you say are 8, 11 and 14.
What should be the 10th number you say?

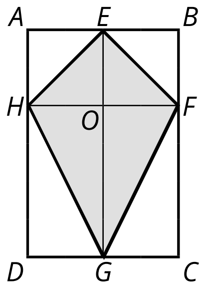
Set Green

4.5) What is the value of (74 × 50) + (16 × 50) + (10 × 50)?

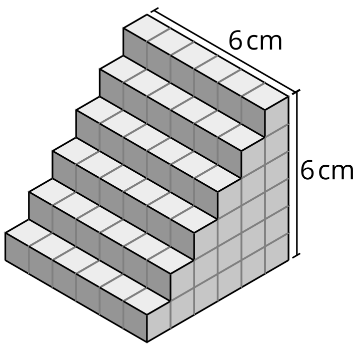
4.6) Sean has a patch of clover growing in his garden.
Some of the stems have 4 leaflets.
All of the other stems have just 3 leaflets.
There are 6 stems and 20 leaflets.
How many of the stems have 4 leaflets?



4.7) *ABCD* is a rectangle with an area of 24 square centimetres.
Points *E* and *G* are midpoints of the sides on which they are located.
The line *HF* is parallel to the line *AB*.
What is the area of the kite *EFGH*?



4.8) Gary has a lot of wooden cubes, with edges that are 1 cm long.
He makes the staircase on the right by stacking cubes on a flat surface.
How many cubes are required to make this staircase?



Set Orange

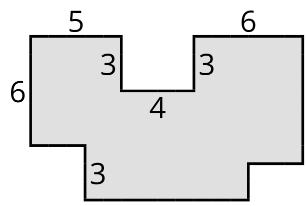
4.1) What is the value of 47 × 55 + 26 × 55 + 55 × 27?

4.2) The figure at the right is made by overlaying three rectangles on top of one another.

All angles in the figure are right angles.

All lengths are given in centimetres.

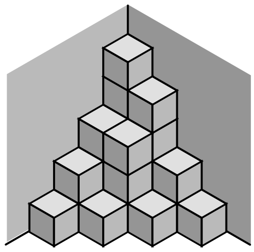
What is the perimeter of the figure, in centimetres?



4.3) This tower is in the corner of the room.

It was made by placing identical cubes on top of each other with no gaps.

How many cubes were used to build the tower?



4.4) You are counting aloud by threes, beginning with the number 8.

The first three numbers you say are 8, 11 and 14.

What should be the 1000th number you say?

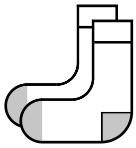
Set Orange

4.5) What is the value of (74 × 50) – (64 × 25) + (40 × 10)?

4.6) Socks are sold in packets containing 3 pairs or 7 pairs.

I bought six packets of socks.

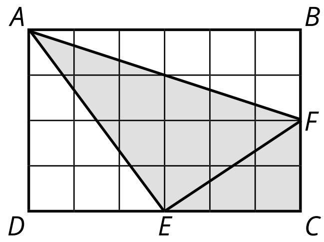
If I ended up with 26 pairs of socks, how many packets contained 3 pairs?



4.7) The diagram shows a rectangle *ABCD* which is divided into 24 identical squares.

Quadrilateral *AFCE* (shaded) has an area of 48 square centimetres.

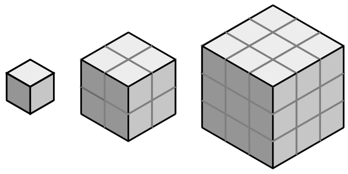
What is the area of triangle *AEF*, in square centimetres?

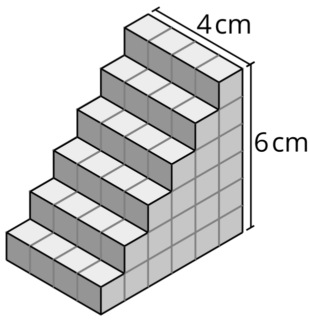


4.8) Gary has a lot of wooden cubes, with edges that are 1 cm, 2 cm, or 3 cm long.

He makes the staircase on the right by stacking cubes on a flat surface.

What is the smallest possible number of cubes required to make this staircase?





Maths Games – Example Problem 4.1

Example Problem 4.1 - Green

What is the value of $55 \times 6 + 44 \times 6 + 99 \times 4$?

Example Problem 4.1 - Yellow

What is the value of $846 \times 52 + 153 \times 52 + 999 \times 48$?

Example Problem 4.1 - Orange

What is the value of $47 \times 55 + 26 \times 55 + 55 \times 27$?

Maths Games Example Solution 4.1 - Yellow

What is the value of 846 × 52 + 153 × 52 + 999 × 48?

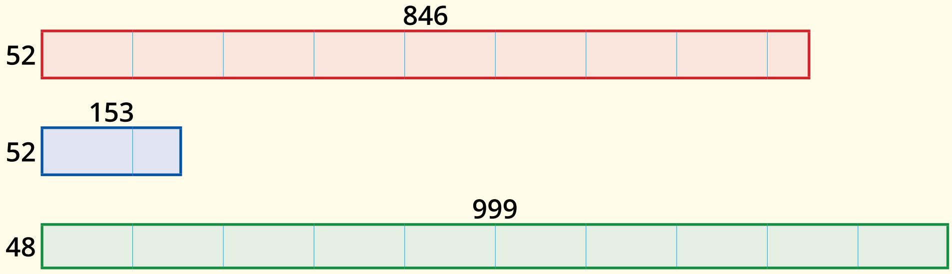
Strategy 1: Convert to a More Convenient Form

We can use area diagrams to represent the value of this expression.

846 × 52

+ 153 × 52

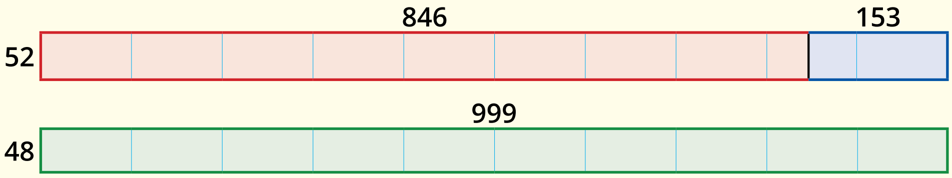
+ 999 × 48



Recognising that two of the diagrams both have a height of **52** units, we can combine those two areas.

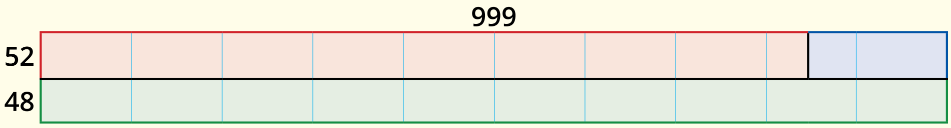
(846 + 153) × 52

+ 999 × 48



Since **846 + 153 = 999**, we can once again combine the areas of two diagrams.

999 × (52 + 48)



From the diagrams, we can see that:

846 × 52 + 153 × 52 + 999 × 48

= (846 + 153) × 52 + 999 × 48

= 999 × 52 + 999 × 48

= 999 × (52 + 48)

= 999 × 100 *(see reasoning at right)*

= **99900**.

To find the value of **999 × 100**, we can take advantage of our decimal place value system.

To multiply a number by **10**, we would move all of the digits up by one place value.

To multiply a number by **100**, we would move all of the digits up by two place values.

	10000s	1000s	100s	10s	1s
999 × 1:			9	9	9
999 × 10:		9	9	9	0
999 × 100:	9	9	9	0	0

Strategy 2: Perform the Calculation

We can use a written algorithm to find that

846 × 52 + 153 × 52 + 999 × 48

= 43992 + 7956 + 47952

= **99900**.

$$\begin{array}{r} 846 \\ \times\ \ 52 \\ \hline 1692 \\ 42300 \\ \hline 43992 \end{array} \qquad \begin{array}{r} 153 \\ \times\ \ 52 \\ \hline 306 \\ 7650 \\ \hline 7956 \end{array} \qquad \begin{array}{r} 999 \\ \times\ \ 48 \\ \hline 7992 \\ 39960 \\ \hline 47952 \end{array} \qquad \begin{array}{r} {}^{1}\ {}^{2}\ {}^{2}\ {}^{1}\ \ \\ 43992 \\ 7956 \\ +\ 47952 \\ \hline \mathbf{99900} \end{array}$$

Answers

4.1 - Green: 990

4.1 - Orange: 5500

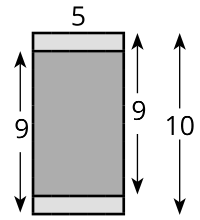
4.1 - Yellow: 99900

Maths Games – Example Problem 4.2

Example Problem 4.2 - Green

Two 5 cm × 9 cm rectangles overlap as shown to form a 5 cm × 10 cm rectangle.

What is the perimeter of the overlapping rectangular region, in centimetres?



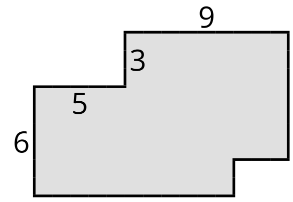
Example Problem 4.2 - Yellow

The figure at the right is made by placing one rectangle on top of another.

All angles in the figure are right angles.

All lengths are given in centimetres.

What is the perimeter of the figure, in centimetres?



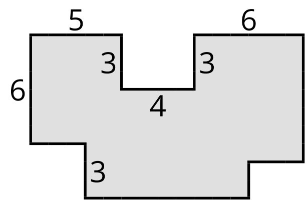
Example Problem 4.2 - Orange

The figure at the right is made by overlaying three rectangles on top of one another.

All angles in the figure are right angles.

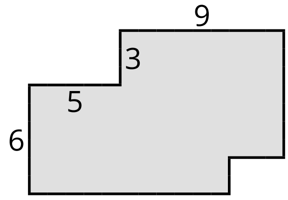
All lengths are given in centimetres.

What is the perimeter of the figure, in centimetres?



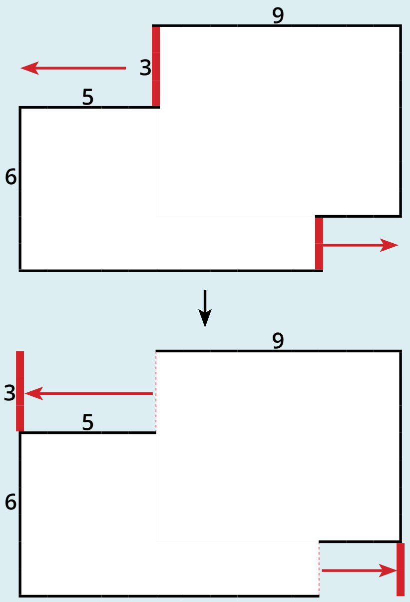
Maths Games Example Solution 4.2 - Yellow

What is the perimeter of the figure, in centimetres?

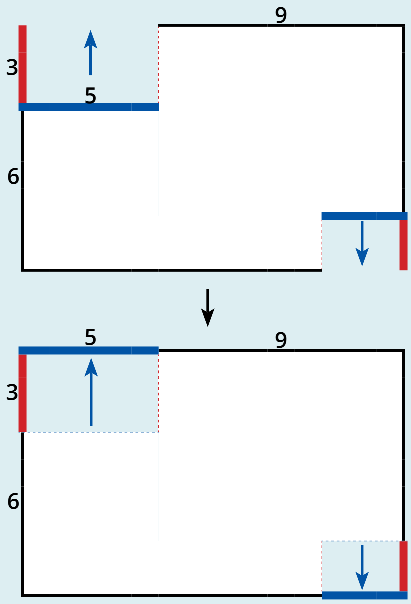


Strategy 1: Convert to a More Convenient Form

We can move the vertical sides of the shape outwards so that they are in a line.



Likewise, we can move the horizontal sides of the shape outwards so that they are in a line.



The sides can be rearranged to form a rectangle with side lengths **5 + 9 = 14 cm**, and **3 + 6 = 9 cm**.

The perimeter of the rectangle is **14 + 9 + 14 + 9 = 46 cm**.

Since the rectangle was constructed using the sides from the original figure, both shapes will have the same perimeter.

Therefore the perimeter of the figure is **46 cm.**

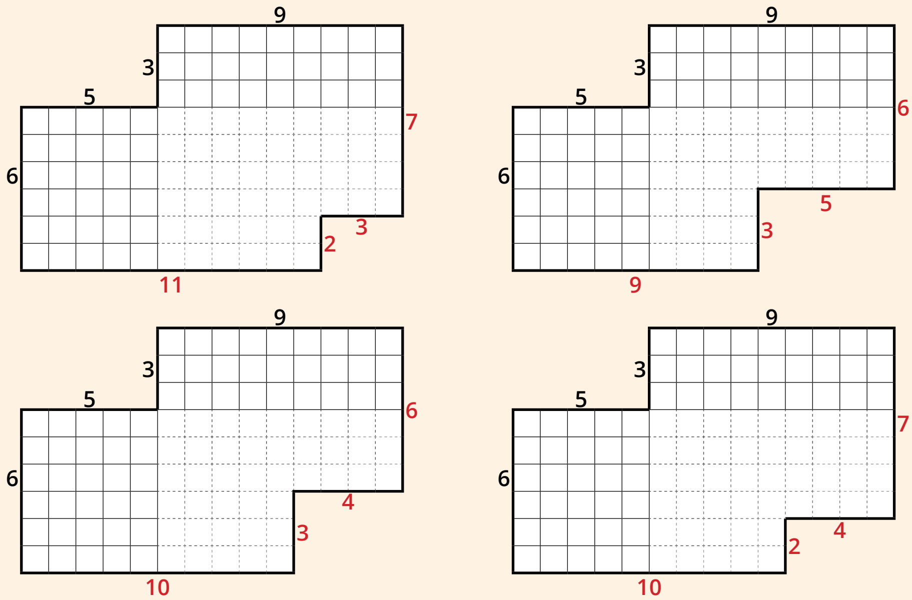
Strategy 2: Divide a Complex Shape, and Guess, Check and Refine

We can begin by sketching in a **1** cm grid pattern to divide the shape, based on the measurements that we know.

By extending the grid pattern to the other side, we can "guess" at the unknown measurements.

Four possible sets of measurements are shown at the right.

In each case, we can add all of the side lengths, and find that the perimeter is **46** centimetres.



Answers

4.2 - Green: 26 (cm)

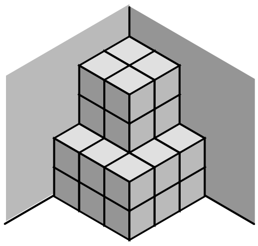
4.2 - Orange: 54 (cm)

4.2 - Yellow: 46 (cm)

Maths Games – Example Problem 4.3

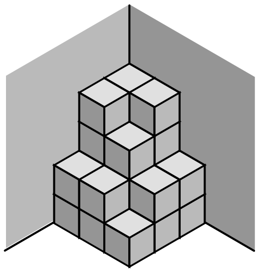
Example Problem 4.3 - Green

This tower is in the corner of the room.
It was made by placing identical cubes on top of each other with no gaps.
How many cubes were used to build the tower?



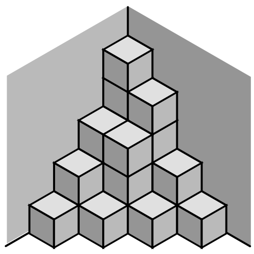
Example Problem 4.3 - Yellow

This tower is in the corner of the room.
It was made by placing identical cubes on top of each other with no gaps.
How many cubes were used to build the tower?



Example Problem 4.3 - Orange

This tower is in the corner of the room.
It was made by placing identical cubes on top of each other with no gaps.
How many cubes were used to build the tower?

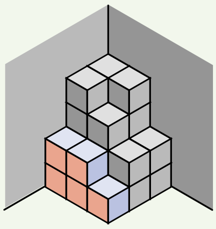


Maths Games Example Solution 4.3 - Yellow

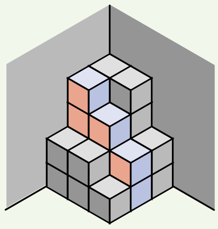
How many cubes are there in the tower?

Strategy 1: Divide a Complex Shape

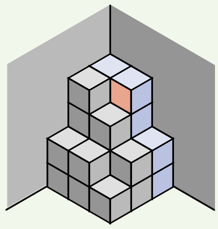
We can count the cubes in layers, going from left to right.



5 at the front.



4 more visible, plus 5 behind the ones in front: 4 + 5 = 9



1 more visible, plus 9 behind the ones in front: 1 + 9 = 10

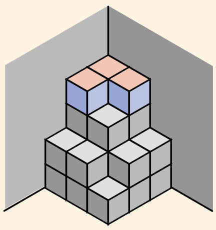
There are

5 + 9 + 10 = **24**

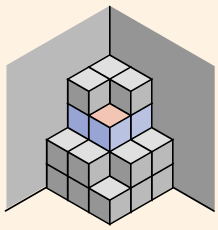
cubes in the tower.

We can get a similar result counting the layers from right to left.

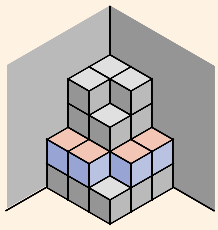
We can also split the tower into horizontal layers.



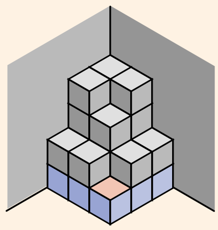
3 on top.



1 more visible, plus 3 under the ones on top: 1 + 3 = 4



4 more visible, plus 4 under the ones on top: 4 + 4 = 8

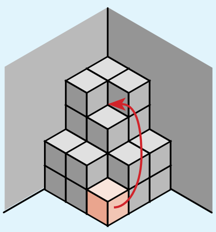


1 more visible, plus 8 under the ones on top: 1 + 8 = 9

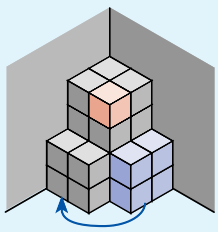
There are 3 + 4 + 8 + 9 = **24** cubes in the tower.

Strategy 2: Divide a Complex Shape (Alternative Approach)

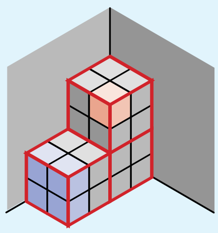
We can rearrange the cubes to make them easier to count.



First we move this cube to the gap in the top layer.



We then move these four cubes to the left side.



As a result, we have three big cubes.

Each big cube is made up of 2 × 2 × 2 = 8 small cubes.

There are 3 × 8 = **24** cubes in the tower.

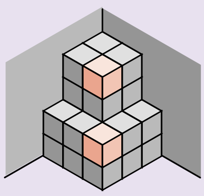
Strategy 3: Divide a Complex Shape (Another Approach)

If we add two more cubes, there will be two large prisms.

The top prism is made up of 2 × 2 × 2 = 8 small cubes.

The lower prism is made up of 2 × 3 × 3 = 18 small cubes.

There are 8 + 18 = 26 cubes in this tower.



After removing the extra two cubes, there are 26 – 2 = **24** cubes that were in the original tower.

Answers

4.3 - Green: 26

4.3 - Orange: 23

4.3 - Yellow: 24

Maths Games – Example Problem 4.4

Example Problem 4.4 - Green

You are counting aloud by threes, beginning with the number 8.

The first three numbers you say are 8, 11 and 14.

What should be the 10th number you say?

Example Problem 4.4 - Yellow

You are counting aloud by threes, beginning with the number 8.

The first three numbers you say are 8, 11 and 14.

What should be the 20th number you say?

Example Problem 4.4 - Orange

You are counting aloud by threes, beginning with the number 8.

The first three numbers you say are 8, 11 and 14.

What should be the 1000th number you say?

Maths Games Example Solution 4.4 - Yellow

What should be the 20th number you say?

Strategy 1: Find a Pattern

We can just keep adding **3** until we have counted 20 numbers.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	
8	11	14	17	20	23	26	29	32	35	38	41	44	47	50	53	56	59	62	65	

The 20th number is **65**.

Strategy 2: Find a Pattern (Alternative Approach)

We are adding **3** each time.

After doing this 10 times, we will be up to our 1st + 10 = 11th number.

For the 11th number, we will have added 10 × 3 = 30.

1st										11th
8										38

For the 21st number, we will have added another 10 × 3 = 30.

1st										11th										21st
8										38										68

The 20th number will be **3** less than the 21st number.

1st										11th									20th	21st
8										38									65	68

The 20th number is 68 – **3** = **65**.

Strategy 3: Convert to a More Convenient Form

It is not easy to count up by 3s starting from 8.

It would be far more convenient to count up by 3s starting from 3.

The numbers in this sequence would just be multiples of 3.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
3	6	9	...																60

The numbers in the sequence starting from 8, are each **5** more than the corresponding multiple of 3.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
3	6	9	...																60
8	11	14	...																65

The 20th number is 60 + **5** = **65**.

Answers

4.4 - Green: 35

4.4 - Orange: 3005

4.4 - Yellow: 65

Maths Games – Example Problem 4.5

Example Problem 4.5 - Green

What is the value of $(74 \times 50) + (16 \times 50) + (10 \times 50)$?

Example Problem 4.5 - Yellow

What is the value of $(74 \times 50) - (32 \times 50) - (22 \times 50)$?

Example Problem 4.5 - Orange

What is the value of $(74 \times 50) - (64 \times 25) + (40 \times 10)$?

Maths Games Example Solution 4.5 - Yellow

What is the value of (74 × 50) – (32 × 50) – (22 × 50)?

Strategy 1: Convert to a More Convenient Form

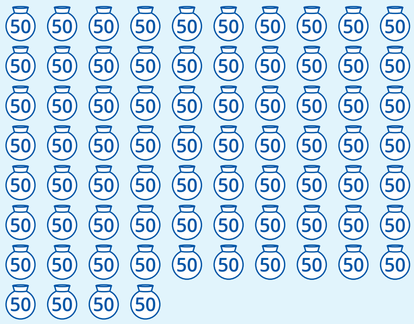
To find the value of **(74 × 50) – (32 × 50) – (22 ×50)**, it may help to think of multiplication as repeated addition.

$74 \times 50 = \underbrace{50 + 50 + 50 + \ldots + 50}_{\text{74 times}}$ $32 \times 50 = \underbrace{50 + 50 + 50 + \ldots + 50}_{\text{32 times}}$ $22 \times 50 = \underbrace{50 + 50 + 50 + \ldots + 50}_{\text{22 times}}$

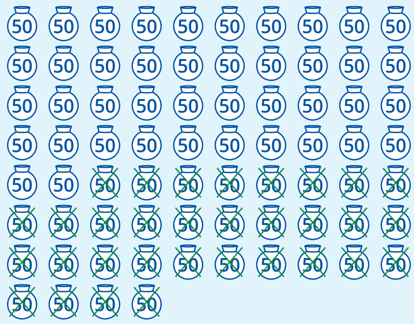
Method 1: Represent the common multiplicand as a unit.

To represent the repeated addition of 50, we can think of bags that each contain 50 marbles.

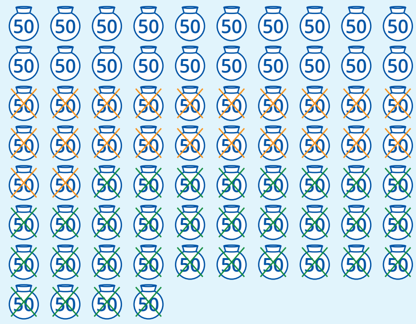
We start off with (74 × 50), or 74 bags of marbles.



Then we take away (32 × 50), or 32 bags of marbles.



Finally we take away (22 × 50), or 22 bags of marbles.

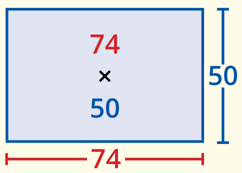


We can see that there are 20 bags remaining, each containing 50 marbles.

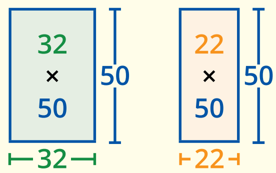
So (74 × 50) – (32 × 50) – (22 × 50) is the same as (20 × 50), and the value of the expression is 20 × 50 = **1000**.

Method 2: Use an area model.

We can represent 74 × 50 as an area model, 74 units wide and 50 units high.



Likewise, 32 × 50 can be represented as being 32 units wide and 50 units high, and 22 × 50 would be 22 units wide and 50 units high.

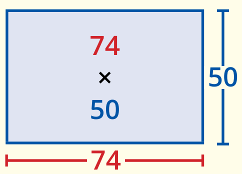


To represent

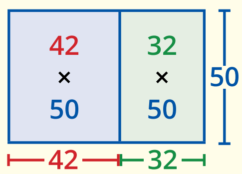
(74 × 50)
– (32 × 50)
– (22 × 50)

using the area model, we would:

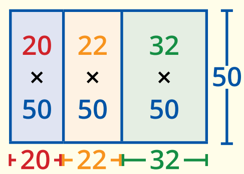
start with (74 × 50),



subtract (32 × 50),



and subtract (22 × 50).



Therefore the value of the expression is 20 × 50 = **1000**.

Strategy 2: Convert to a More Convenient Form (Alternative Approach)

To find the value of 74 × 50, we can change it to 74 × 50 × 10.

	7	4
×		5
3	7	0

Since 74 × 5 = 370,

74 × 50 = 370 × 10

= 3700.

We can use the same method for 32 × 50, but as an alternative we could **halve 32** and **double 50**.

This changes it to the more convenient form of 16 × 100.

So 32 × 50 = 16 × 100 = 1600.

Similarly, 22 × 50 = 11 × 100 = 1100.

Therefore,

(74 × 50) – (32 × 50) – (22 × 50)

= 3700 – 1600 – 1100

= 1000.

Answers

4.5 - Green: 5000

4.5 - Orange: 2500

4.5 - Yellow: 1000

Maths Games – Example Problem 4.6

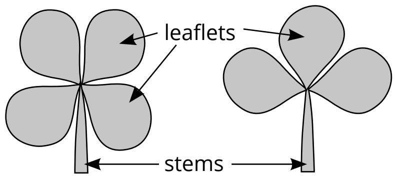
Example Problem 4.6 - Green

Sean has a patch of clover growing in his garden.

Some of the stems have 4 leaflets. All of the other stems have just 3 leaflets.

There are 6 stems and 20 leaflets.

How many of the stems have 4 leaflets?



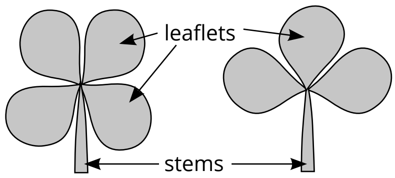
Example Problem 4.6 - Yellow

Sean has a patch of clover growing in his garden.

Some of the stems have 4 leaflets. All of the other stems have just 3 leaflets.

There are 12 stems and 40 leaflets.

How many of the stems have 4 leaflets?

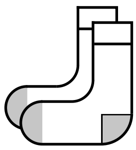


Example Problem 4.6 - Orange

Socks are sold in packets containing 3 pairs or 7 pairs.

I bought six packets of socks.

If I ended up with 26 pairs of socks, how many packets contained 3 pairs?



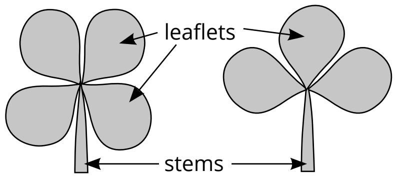
Maths Games Example Solution 4.7 - Yellow

Sean has a patch of clover growing in his garden.

Some of the stems have 4 leaflets. All of the other stems have just 3 leaflets.

There are 12 stems and 40 leaflets.

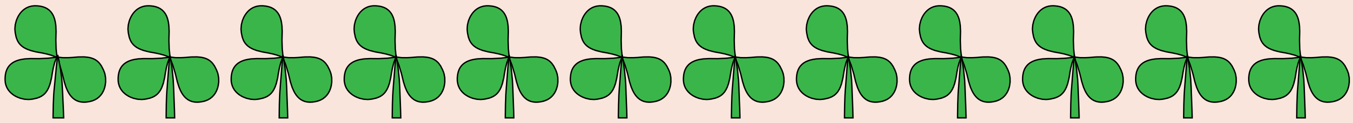
How many of the stems have 4 leaflets?



Strategy 1: Convert to a More Convenient Form

We have **12** stems.

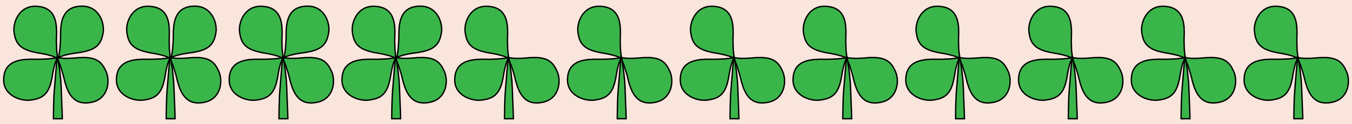
Each stem has at least **3** leaflets.



So far, we have drawn **12 × 3 = 36** leaflets.

There are **40** leaflets in total. So we have **40 – 36 = 4** leaflets remaining.

Let's add the **4** remaining leaflets on to some of the clovers to turn them into four-leaf clovers.



4 of the stems have 4 leaflets.

Strategy 2: Build a Table, and Find a Pattern

We can begin by supposing that all 12 stems have 4 leaflets.

Then, we can begin to replace them with stems that have 3 leaflets.

Stems with 4 leaflets	12	11	10						
Stems with 3 leaflets	0	1	2						
Total leaflets	48	47	46						

Every time we exchange 4 leaflets for 3 leaflets, the number of leaflets decreases by **1**.

To reduce the number of leaflets from **48** down to **40**, we would need to change **48 – 40 = 8** stems to have 3 leaflets each.

Stems with 4 leaflets	12	11	10	9	8	7	6	5	4
Stems with 3 leaflets	0	1	2	3	4	5	6	7	8
Total leaflets	48	47	46	45	44	43	42	41	40

There are **8** stems that have **3** leaflets, and **4** stems that have **4** leaflets.

Answers **4.6 - Green:** 2 **4.6 - Orange:** 4

4.6 - Yellow: 4

Maths Games – Example Problem 4.7

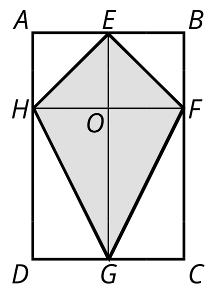
Example Problem 4.7 - Green

ABCD is a rectangle with an area of 24 square centimetres.

Points *E* and *G* are midpoints of the sides on which they are located.

The line *HF* is parallel to the line *AB*.

What is the area of the kite *EFGH*?

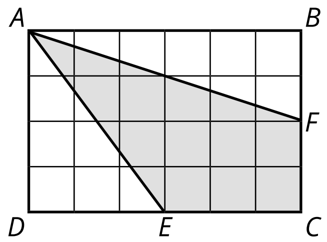


Example Problem 4.7 - Yellow

The diagram shows a rectangle *ABCD* which is divided into 24 identical squares.

Quadrilateral *AFCE* (shaded) has an area of 48 square centimetres.

What is the area of *ABCD*, in square centimetres?

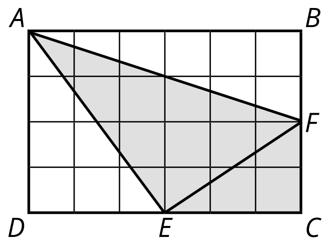


Example Problem 4.7 - Orange

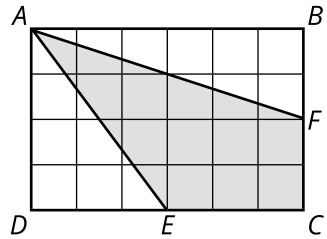
The diagram shows a rectangle *ABCD* which is divided into 24 identical squares.

Quadrilateral *AFCE* (shaded) has an area of 48 square centimetres.

What is the area of triangle *AEF*, in square centimetres?



Maths Games Example Solution 4.7 - Yellow



Quadrilateral *AFCE* (shaded) has an area of 48 square centimetres.

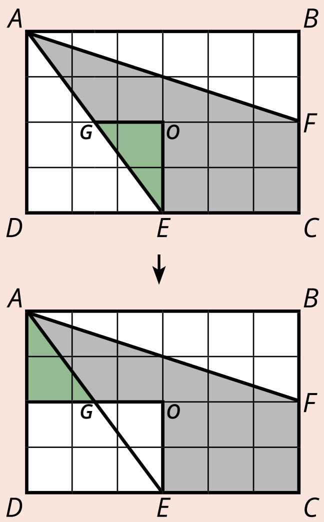
What is the area of *ABCD*, in square centimetres?

Strategy 1: Convert to a More Convenient Form

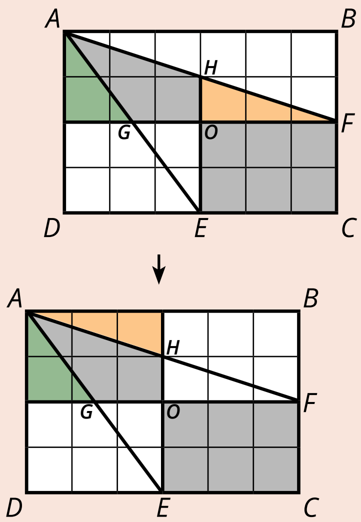
We know that the area of *AFCE* is **48** square centimetres.

By rearranging parts of *AFCE*, we can work out how much of *ABCD* it occupies.

We can begin by defining and cutting out $\triangle GOE$, and rotating this area around *G* to complete some grid squares above.



We can cut out $\triangle HOF$, rotating it around *H* to complete some grid squares to the left.

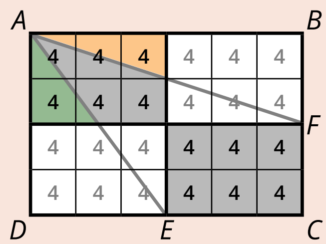


AFCE can be rearranged to fill 12 grid squares.

Since the area of *AFCE* is 48 square centimetres, the area of one grid square is **48 ÷ 12 = 4** square centimetres.

ABCD comprises **24** grid squares.

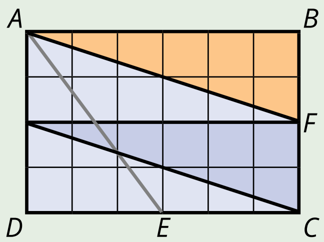
Therefore the area of *ABCD* is **24 × 4 = 96** square centimetres.



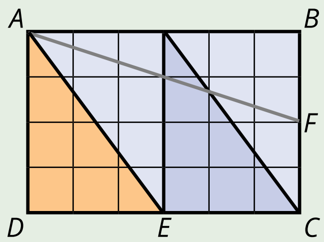
Strategy 2: Divide a Complex Shape

We can begin by working out the fraction of *ABCD* that is covered by *AFCE*.

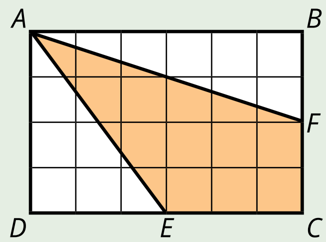
$\triangle ABF$ is $\frac{1}{4}$ of the area of *ABCD*.



$\triangle AED$ is $\frac{1}{4}$ of the area of *ABCD*.



AFCE is $1 - \frac{1}{4} - \frac{1}{4} = \frac{1}{2}$ of the area of *ABCD*.



Since the area of *AFCE* is **48** square centimetres, $\frac{1}{2}$ of the area of *ABCD* is **48** square centimetres.

Therefore the area of *ABCD* is **2 × 48 = 96** square centimetres.

Answers

4.7 - Green: 12 (cm^2)

4.7 - Orange: 36 (cm^2)

4.7 - Yellow: 96 (cm^2)

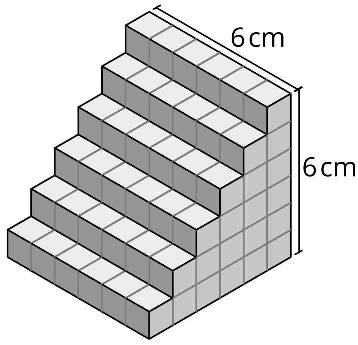
Maths Games – Example Problem 4.8

Example Problem 4.8 - Green

Gary has a lot of wooden cubes, with edges that are 1 cm long.

He makes the staircase on the right by stacking cubes on a flat surface.

How many cubes are required to make this staircase?

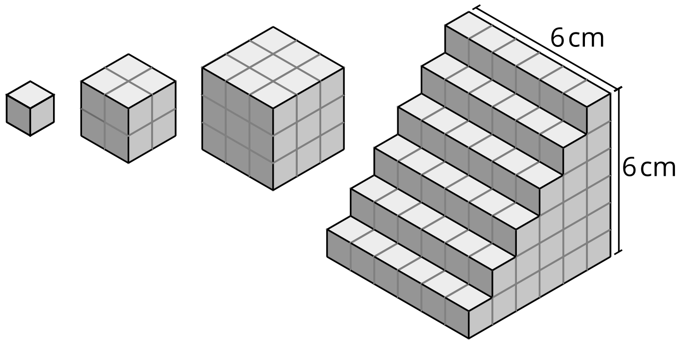


Example Problem 4.8 - Yellow

Gary has a lot of wooden cubes, with edges that are 1 cm, 2 cm, or 3 cm long.

He makes the staircase on the right by stacking cubes on a flat surface.

What is the smallest possible number of cubes required to make this staircase?

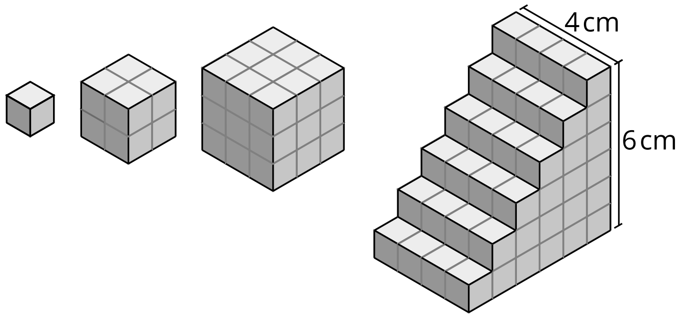


Example Problem 4.8 - Orange

Gary has a lot of wooden cubes, with edges that are 1 cm, 2 cm, or 3 cm long.

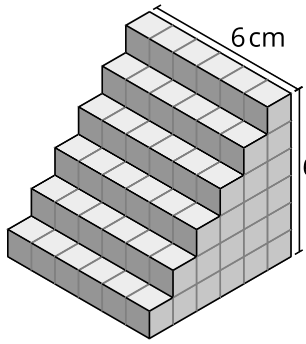
He makes the staircase on the right by stacking cubes on a flat surface.

What is the smallest possible number of cubes required to make this staircase?

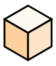


Maths Games Example Solution 4.8 - Yellow

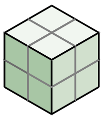
What is the smallest possible number of cubes required to make this staircase?



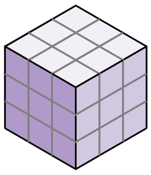
Gary's wooden cubes come in three different sizes:



1 cm × 1 cm × 1 cm,



2 cm × 2 cm × 2 cm,



and 3 cm × 3 cm × 3 cm.

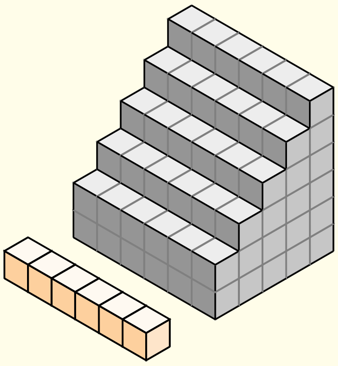
Strategy: Divide a Complex Shape

Since we want the smallest number of cubes, we will aim to use the largest cubes in each circumstance.

The bottom "step" on this staircase is only 1 cm high.

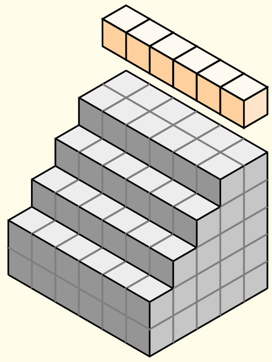
To construct this step, it is not possible to use cubes that are larger than 1 cm × 1 cm × 1 cm.

So far, the staircase requires six cubes.



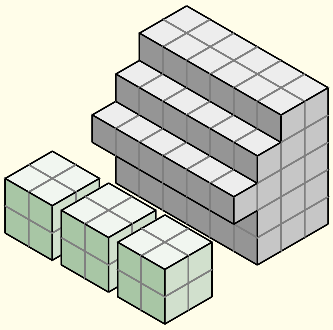
Since the top "step" on this staircase is only 1 cm wide, it is likewise not possible to use cubes that are larger than 1 cm × 1 cm × 1 cm.

To construct the top step, the staircase requires another six cubes.



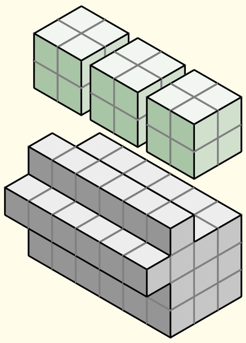
The second "step" on this staircase is 2 cm high.

To construct this step, we can use three cubes that are each 2 cm × 2 cm × 2 cm.

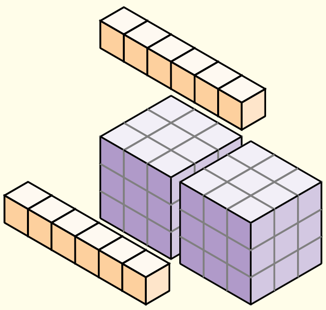


Likewise, the second "step" from the top is 2 cm deep.

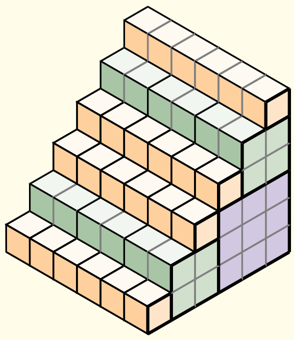
Three 2 cm × 2 cm × 2 cm cubes can also be used to construct this step.



The remaining cubes can be divided into two 3 cm × 3 cm × 3 cm cubes, and two strips each containing six 1 cm × 1 cm × 1 cm cubes.



We can see, from the side of the staircase, the largest cubes that could have been used in its construction.



The smallest possible number of cubes is **6 + 6 + 3 + 3 + 2 + (2 × 6) = 32**.

Answers

4.8 - Green: 126

4.8 - Orange: 30

4.8 - Yellow: 32

Answers

Set Green		Set Yellow		Set Orange	
4.1	990	**4.1**	99900	**4.1**	5500
4.2	26 (cm)	**4.2**	46 (cm)	**4.2**	54 (cm)
4.3	26	**4.3**	24	**4.3**	23
4.4	35	**4.4**	65	**4.4**	3005
4.5	5000	**4.5**	1000	**4.5**	2500
4.6	2	**4.6**	4	**4.6**	4
4.7	12 (cm^2)	**4.7**	96 (cm^2)	**4.7**	36 (cm^2)
4.8	126	**4.8**	32	**4.8**	30