2023 Maths Games Junior - Years 5 & 6
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
Build a Table

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

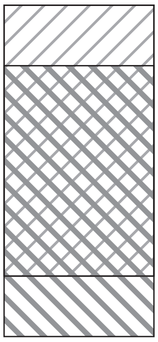
Sometimes it is possible to divide an unusual shape into two or more common shapes that are easier to work with.

Set Yellow

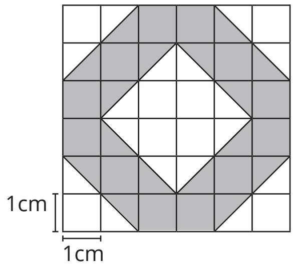
4.1) What is the value of the following?

$268 + 1375 + 6179 - 168 - 1275 - 6079$

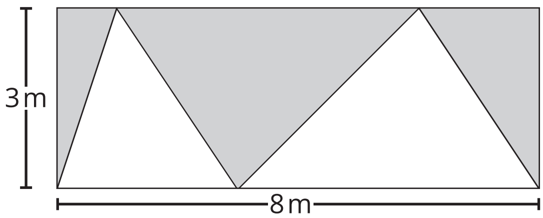
4.2) Two 5 cm × 9 cm rectangles overlap as shown to form a 5 cm × 10 cm rectangle. What is the area of the overlapping rectangular region, in square cm? (Diagram may not be drawn to scale.)



4.3) The diagram shows a grid pattern with an area of 36 square centimetres. What is the area, in square centimetres, of the shaded region?



4.4) What is the area, in square metres, of the shaded part of the rectangle?

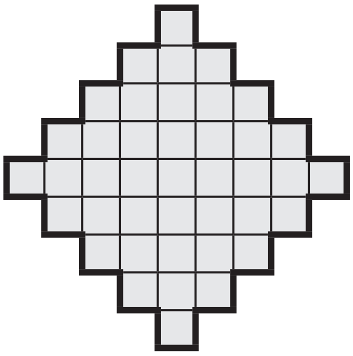


Set Yellow

4.5) In Sophie's diagram, each of the small squares measures 1 cm × 1 cm.

She wants to paint the perimeter of the whole shape with a thick line.

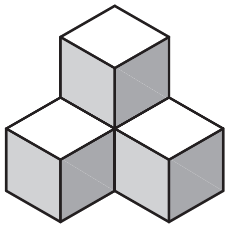
How long, in centimetres, will the thick line be?



4.6) Four 1 cm × 1 cm × 1 cm cubes are glued together, face to face.

The whole object is then dipped into a bucket of red paint, so that every face is covered.

What is the total area, in square centimetres, of all of the red painted faces?



4.7) The Funny Book has its pages numbered the following way: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5 … .

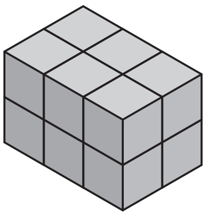
That is, there is one 1, two 2s, three 3s, four 4s, five 5s, and so on.

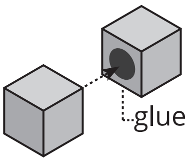
The last page is numbered "10". There are ten pages numbered "10".

How many pages are there in the Funny Book?

4.8) Chloe is using 12 small cubes to make this rectangular prism, as shown at the right.

The prism is 2 cubes high, 2 cubes wide and 3 cubes long.





Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

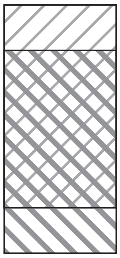
How many dots of glue does she need to construct the rectangular prism?

Set Green

4.1) What is the value of the following?

$$26 + 137 + 617 - 16 - 127 - 607$$

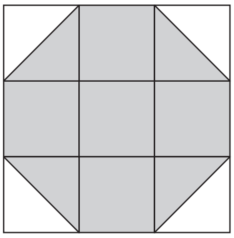
4.2) Two 2 cm × 4 cm rectangles overlap as shown to form a 2 cm × 5 cm rectangle.
What is the area of the overlapping rectangular region, in square cm?
(Diagram may not be drawn to scale.)



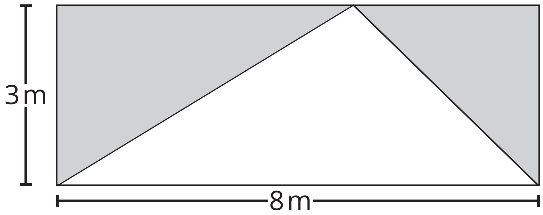
4.3) There are nine squares on this board.

The area of the whole board is 9 square centimetres.

What is the area of the shaded region, in square centimetres?



4.4) What is the area, in square metres, of the shaded part of the rectangle?



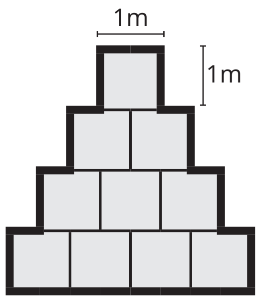
Set Green

4.5) Jason has designed a new handball court.

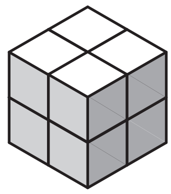
It is made up of ten squares which all have a side length of one metre, as shown in the diagram.

He wants to paint the perimeter of the whole court with a thick line.

How long, in metres, will the thick line be?



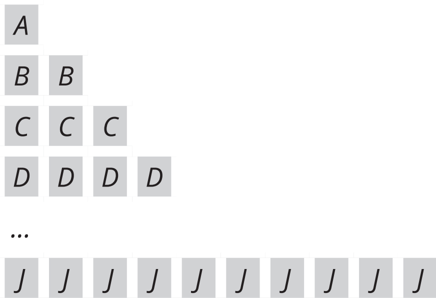
4.6) What is the surface area of a 2 cm × 2 cm × 2 cm cube, in square centimetres?



4.7) I have a set of letter cards.

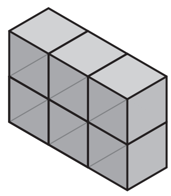
There is one *A*, two *B*s, three *C*s, four *D*s, and so on, up to ten *J*s.

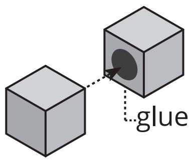
How many letter cards are there in the set?



4.8) Chloe is using 6 small cubes to make this rectangular prism, as shown at the right.

The prism is 2 cubes high, 1 cube wide and 3 cubes long.





Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

How many dots of glue does she need to construct the rectangular prism?

Set Orange

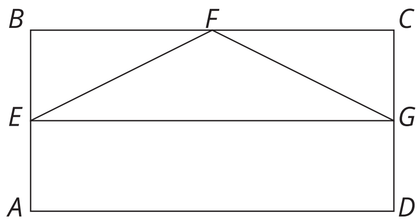
4.1) What is the value of the following?

682 + 1735 + 7619 + 50 – 582 – 1635 – 6619

4.2) *ABCD* is a rectangle with area equal to 36 square units.

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

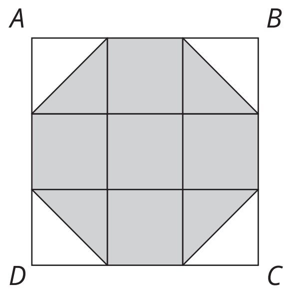
How many square units are there in the area of triangle *EFG*?



4.3) Square *ABCD* is composed of nine identical squares as shown.

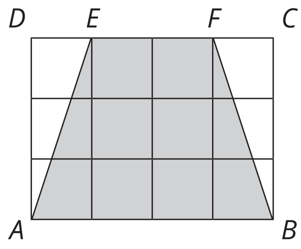
The area of the shaded region is 14 square centimetres.

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



4.4) *ABCD* is a rectangle whose area is 12 square units.

How many square units are contained in the area of trapezium *EFBA*?

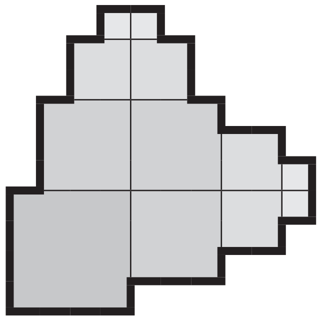


Set Orange

4.5) The figure shown is built from:

- Four 1 cm × 1 cm squares
- Four 2 cm × 2 cm squares
- Three 3 cm × 3 cm squares, and
- One 4 cm × 4 cm square.

What is the perimeter of the figure, in cm?

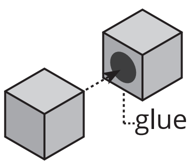


4.6) A rectangular solid wooden block is 4 cm × 4 cm × 5 cm.
The block is painted on all faces.
Then the block is cut into eighty 1 cm × 1 cm × 1 cm cubes.
How many of these cubes have no paint on any face?

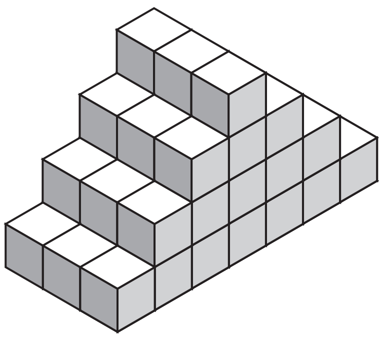
4.7) Each row of *s has two more *s than the row immediately above it, as shown.
Altogether, how many *s are contained in the first ten rows?

*
* * *
* * * * *
* * * * * * *
and so on.

4.8) Chloe is using 48 small cubes to make this object, as shown at the right.



Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.



How many dots of glue does she need to construct this object?

Maths Games – Example Problem 4.1

Example Problem 4.1 - Green

What is the value of the following?

26 + 137 + 617 – 16 – 127 – 607

Example Problem 4.1 - Yellow

What is the value of the following?

268 + 1375 + 6179 − 168 −1275 − 6079

Example Problem 4.1 - Orange

What is the value of the following?

682 + 1735 + 7619 + 50 – 582 – 1635 – 6619

Maths Games Example Solution 4.1 - Yellow

What is the value of the following?

268 + 1375 + 6179 − 168 −1275 − 6079

Strategy 1: Convert to a More Convenient Form

To make this problem easier to think about, we can pretend that we are counting items - for example, beans.

To begin with, we have the following:	268	+	1375	+	6179	The next thing we need to do is take away 168 beans. If we take the 168 beans out of the bag that currently has 268 beans, then the subtraction is much simpler.
We now have the following:	268 – 168 = 100	+	1375	+	6179	and we need to take away 1275 beans. This time, it might be simpler if we take the 1275 beans out of the bag that currently has 1375 beans.
Finally, we have:	268 – 168 = 100	+	1375 – 1275 = 100	+	6179	and we need to take away 6079 beans. We can take the 6079 beans out of the bag that currently has 6179 beans.
We are left with this many beans.	268 – 168 = 100	+	1375 – 1275 = 100	+	6179 – 6079 = 100	Each bag now holds 100 beans. Therefore, the result is **100 + 100 + 100 = 300**.

Strategy 2: Split Strategy

We can split all of the numbers into their place value components, resulting in the following:

268 + 1375 + 6179 – 168 – 1275 – 6079

= 200 + 60 + 8 + 1000 + 300 + 70 + 5 + 6000 + 100 + 70 + 9 – 100 – 60 – 8 – 1000 – 200 – 70 – 5 – 6000 – 70 – 9

Grouping by place value, we have:

= 1000 + 6000 – 1000 – 6000 + 200 + 300 + 100 – 100 – 200 + 60 + 70 + 70 – 60 – 70 – 70 + 8 + 5 + 9 – 8 – 5 – 9

= 0 + 300 + 0 + 0

Therefore the value of the expression is 0 + 300 + 0 + 0 = **300**.

Answers

4.1 - Green: 30

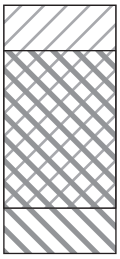
4.1 - Orange: 1250

4.1 - Yellow: 300

Maths Games – Example Problem 4.2

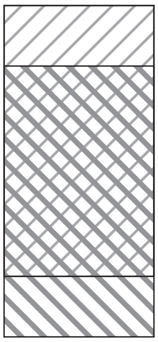
Example Problem 4.2 - Green

Two 2 cm × 4 cm rectangles overlap as shown to form a 2 cm × 5 cm rectangle.
What is the area of the overlapping rectangular region, in square cm?
(Diagram may not be drawn to scale.)



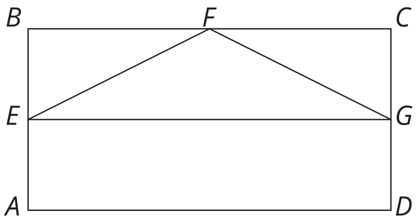
Example Problem 4.2 - Yellow

Two 5 cm × 9 cm rectangles overlap as shown to form a 5 cm × 10 cm rectangle.
What is the area of the overlapping rectangular region, in square cm?
(Diagram may not be drawn to scale.)

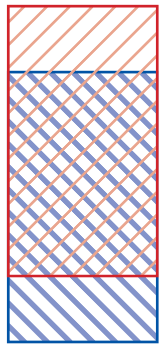


Example Problem 4.2 - Orange

ABCD is a rectangle with area equal to 36 square centimetres.
Points *E*, *F* and *G* are midpoints of the sides on which they are located.
How many square centimetres are there in the area of triangle *EFG*?



Maths Games Example Solution 4.2 - Yellow



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

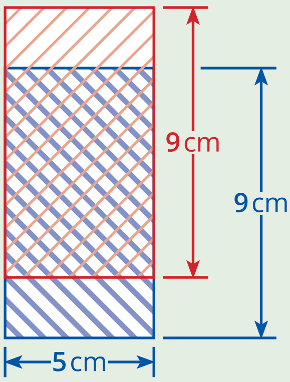
What is the area of the overlapping rectangular region, in square cm?

(Diagram may not be drawn to scale.)

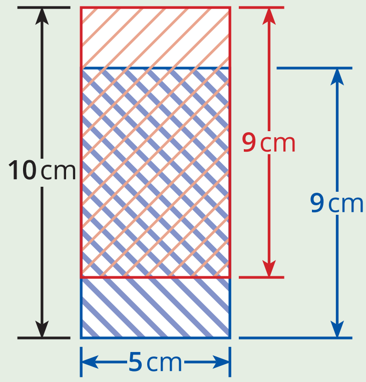
Strategy: Divide a Complex Shape, and Convert to a More Convenient Form

We can start by drawing an accurate diagram of the overlapping rectangles, and labelling it with all of the information we have.

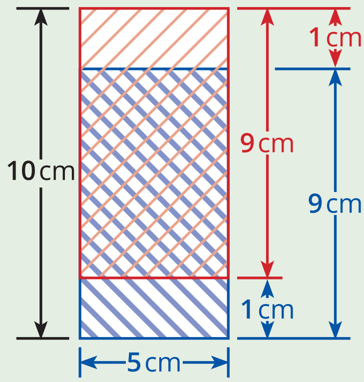
Each of the overlapping rectangles is 5 cm × 9 cm.



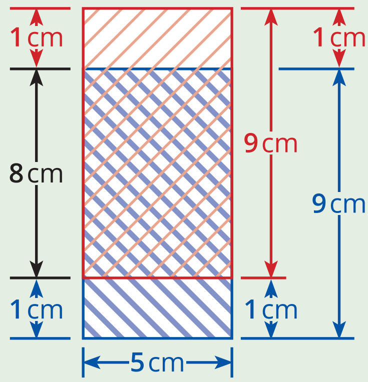
Together, these two overlapping rectangles form a 5 cm × 10 cm rectangle.



We can see that the parts outside the overlap region are 1 cm high.

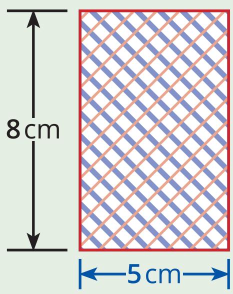


If there are two 1 cm-long rectangles outside of the overlapping region, then the overlapping region must be 10 – 1 – 1 = 8 cm high.



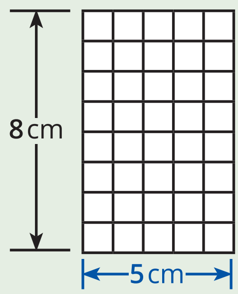
The overlapping region is

- 8 cm high, and
- 5 cm wide.



We can fill this area with square centimetres:

- 8 rows of squares, with
- 5 squares in each row.



There are **8 × 5 = 40** square centimetres in the overlapping rectangular region.

Answers

4.2 - Green: 6 (cm²)

4.2 - Orange: 9 (cm²)

4.2 - Yellow: 40 (cm²)

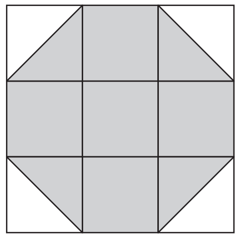
Maths Games – Example Problem 4.3

Example Problem 4.3 - Green

There are nine squares on this board.

The area of the whole board is 9 square centimetres.

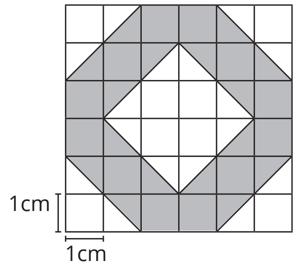
What is the area of the shaded region, in square centimetres?



Example Problem 4.3 - Yellow

The diagram shows a grid pattern with an area of 36 square centimetres.

What is the area, in square centimetres, of the shaded region?

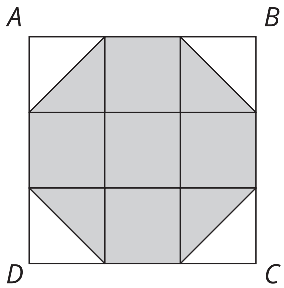


Example Problem 4.3 - Orange

Square *ABCD* is composed of nine identical squares as shown.

The area of the shaded region is 14 square centimetres.

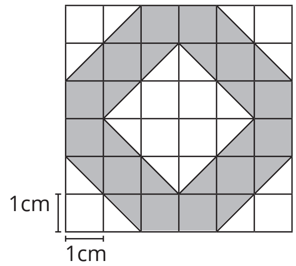
What is the area of square *ABCD*, in square centimetres?



Maths Games Example Solution 4.3 - Yellow

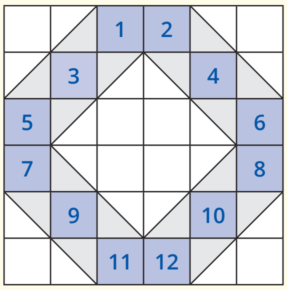
The diagram shows a grid pattern with an area of 36 square centimetres.

What is the area, in square centimetres, of the shaded region?

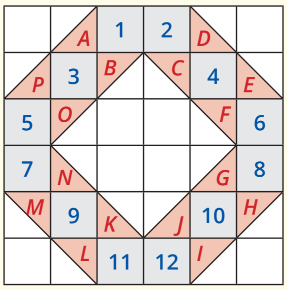


Strategy 1: Divide a Complex Shape (1)

We can see that the shaded area is made up of squares and triangles.



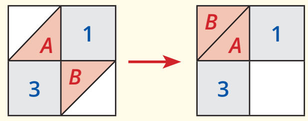
There are 12 squares in the shaded region.



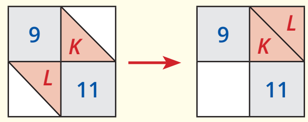
There are 16 triangles in the shaded region.

If we combine two triangles, together they will have the same area as one square.

For example, we could move triangle *B* so that it forms a square with triangle *A*.



Likewise, we could move triangle *L* so that it forms a square with triangle *K*.



The 16 shaded triangles will have the same area as 16 ÷ 2 = 8 squares.

In total, the area of the shaded region is 12 + 8 = 20 squares.

Each shaded square is **1** cm × **1** cm = **1** cm^2.

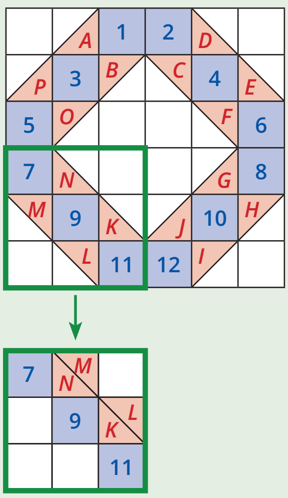
The area of the shaded region is **20** × **1** cm^2 = **20** cm^2.

Strategy 2: Divide a Complex Shape (2)

Since there is symmetry in this shape, we can find the shaded area in one quarter of it, and multiply this area by **4**.

By rearranging the triangular shaded regions, we can see that the shaded area in one-quarter of the shape is **5** cm^2.

The area of the shaded region is **4** × **5** cm^2 = **20** cm^2.

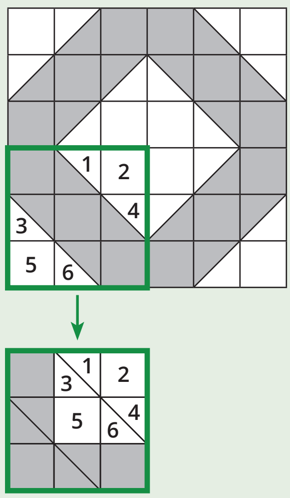


Another way to find the shaded area is to subtract the unshaded area.

In one quarter of the grid pattern, there is:

- **9** cm^2 in total, of which
- **4** cm^2 is unshaded, and
- **9** – **4** = **5** cm^2 is shaded.

The area of the shaded region is **4** × **5** cm^2 = **20** cm^2.



Answers

4.3 - Green: 7 (cm^2)

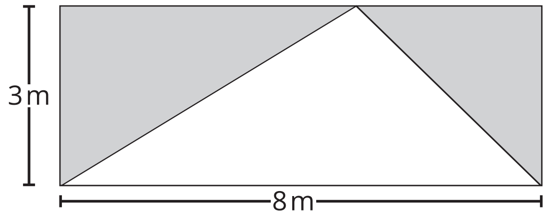
4.3 - Orange: 18 (cm^2)

4.3 - Yellow: 20 (cm^2)

Maths Games – Example Problem 4.4

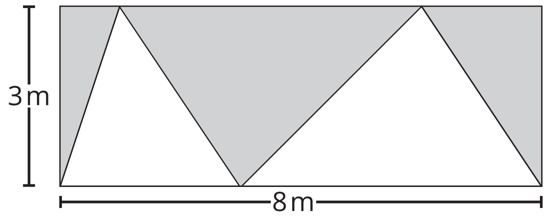
Example Problem 4.4 - Green

What is the area, in square metres, of the shaded part of the rectangle?



Example Problem 4.4 - Yellow

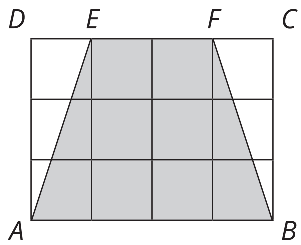
What is the area, in square metres, of the shaded part of the rectangle?



Example Problem 4.4 - Orange

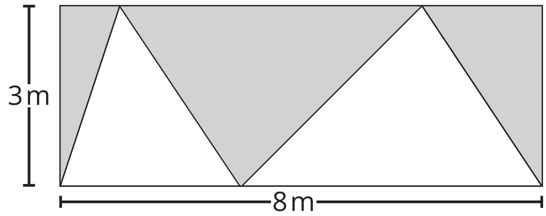
ABCD is a rectangle whose area is 12 square units.

How many square units are contained in the area of trapezium *EFBA*?



Maths Games Example Problem 4.4 - Solution

What is the area, in square metres, of the shaded part of the rectangle?

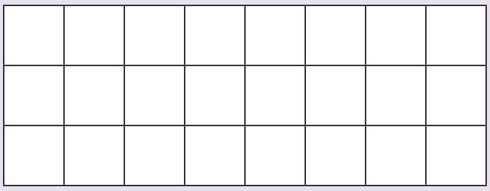


Strategy 1: Divide a Complex Shape, and Convert to a More Convenient Form

The rectangle is **8** m long and **3** m wide.

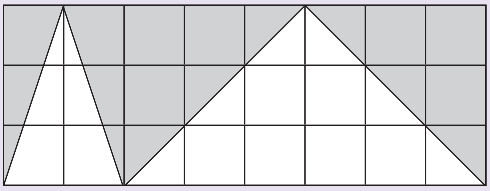
If we cut the rectangle into square metres, we would have **3** rows with **8** squares in each row.

The area of the rectangle is **3 × 8 = 24** square metres.

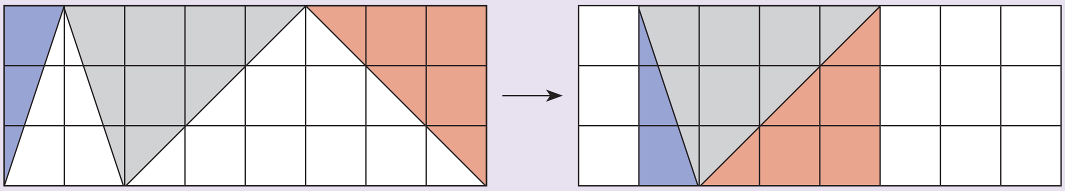


Since the question doesn't really specify the sizes of the triangles, we can draw them in a way that is convenient for us.

Let's position them to make it easier to work out the areas.



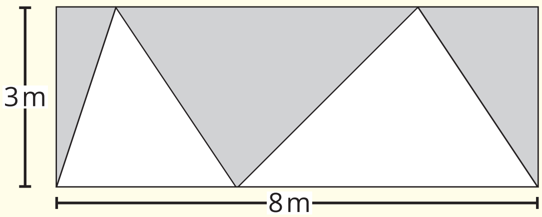
By rearranging the triangles, we can make an area that is much easier to measure.



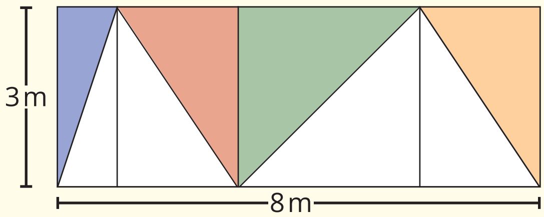
We can see that, in total, the shaded area is **3 × 4 = 12** square metres.

Strategy 2: Divide a Complex Shape

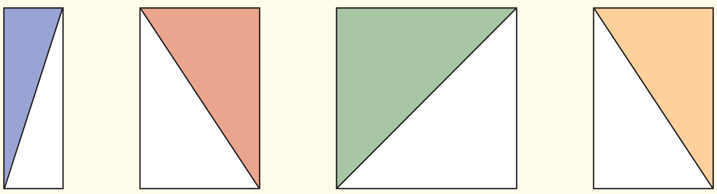
We know that the area of the whole rectangle is **3 × 8 = 24** square metres.



To find the shaded area, we can begin by dividing the rectangle into four smaller rectangular sections.



Half of each of these rectangular sections is shaded, and the other half is not.



In total, half of the large rectangle is shaded.

Since the area of the large rectangle is **24** square metres, the shaded area is **24 ÷ 2 = 12** square metres.

Answers

4.4 - Green: 12 (m^2)

4.4 - Orange: 9 (square units)

4.4 - Yellow: 12 (m^2)

Maths Games – Example Problem 4.5

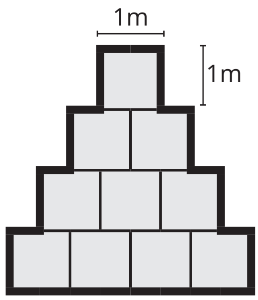
Example Problem 4.5 - Green

Jason has designed a new handball court.

It is made up of ten squares which all have a side length of one metre, as shown in the diagram.

He wants to paint the perimeter of the whole court with a thick line.

How long, in metres, will the thick line be?

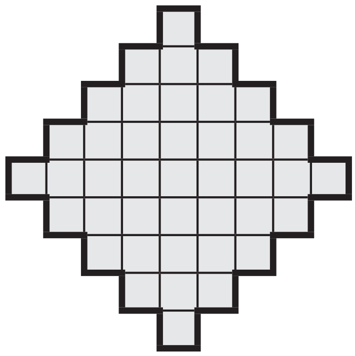


Example Problem 4.5 - Yellow

In Sophie's diagram, each of the small squares measures 1 cm × 1 cm.

She wants to paint the perimeter of the whole shape with a thick line.

How long, in centimetres, will the thick line be?

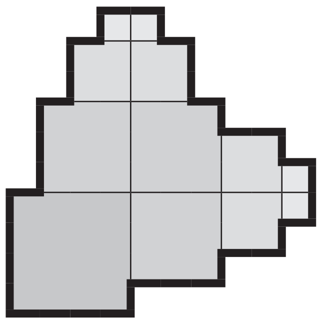


Example Problem 4.5 - Orange

The figure shown is built from:

- Four 1 cm × 1 cm squares
- Four 2 cm × 2 cm squares
- Three 3 cm × 3 cm squares, and
- One 4 cm × 4 cm square.

What is the perimeter of the figure, in cm?

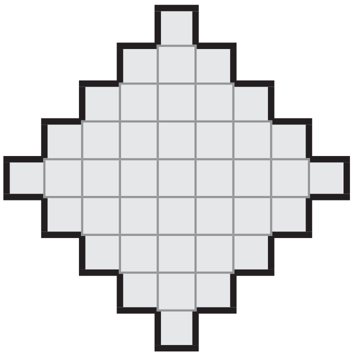


Maths Games Example Solution 4.5 - Yellow

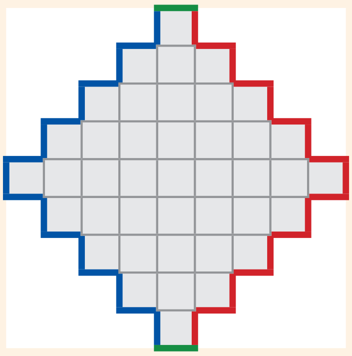
In Sophie's diagram, each of the small squares measures 1 cm × 1 cm.

She wants to paint the perimeter of the whole shape with a thick line.

How long, in centimetres, will the thick line be?



Strategy 1: Divide a Complex Shape (1)



Since the shape is symmetrical, we can divide it into two large sections connected by two **1** cm lines, one at the top and one at the bottom.

Counting the number of sides that make up one of the halves shows us that they are both **17** cm in length.

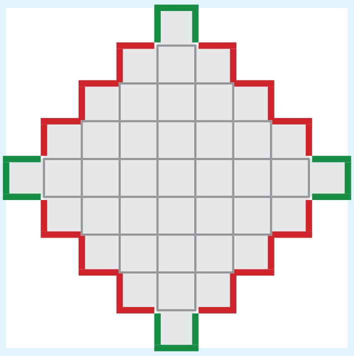
The total length of the thick line

= the right-hand side + left-hand side + top + bottom

= **17** cm + **17** cm + **1** cm + **1** cm

= **36** cm.

Strategy 2: Divide a Complex Shape (2)



The shape has four sections of the same length, with four connecting end pieces, one on each 'corner'.

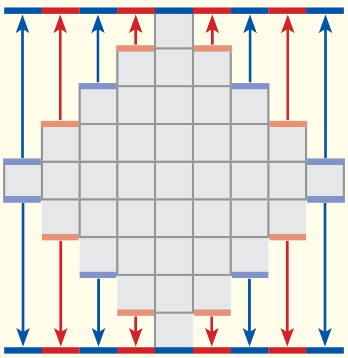
Each of the four sections is **6** cm long.

Each of the connecting pieces is **3** cm long.

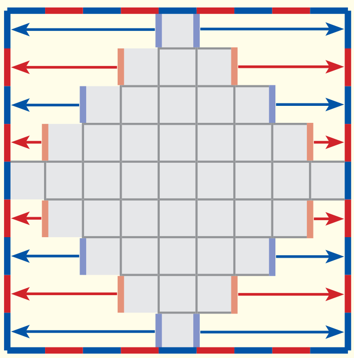
Method 1: 4 × 3 cm + 4 × 6 cm = **12** cm + **24** cm = **36** cm.

Method 2: 4 × (3 cm + 6 cm) = 4 × **9** cm = **36** cm.

Strategy 3: Convert to a More Convenient Form



Suppose we take all of the horizontal **1** cm sides, and push them to be in line with the top and bottom of the shape.



We can do the same thing with the vertical **1** cm sides, pushing them out to be in line with the left-most side and the right-most side of the shape.

In this way, the perimeter can be rearranged to become a square with **9** cm long sides.

The length of the thick line is 4 × **9** cm = **36** cm.

Answers

4.5 - Green: 16 (m)

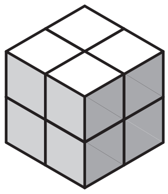
4.5 - Orange: 40 (cm)

4.5 - Yellow: 36 (cm)

Maths Games – Example Problem 4.6

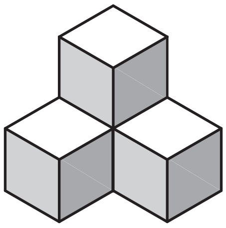
Example Problem 4.6 - Green

What is the surface area of a 2 cm × 2 cm × 2 cm cube, in square centimetres?



Example Problem 4.6 - Yellow

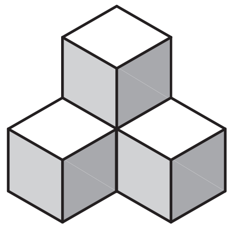
Four 1 cm × 1 cm × 1 cm cubes are glued together, face to face.
The whole object is then dipped into a bucket of red paint, so that every face is covered.
What is the total area, in square centimetres, of all of the red painted faces?



Example Problem 4.6 - Orange

A rectangular solid wooden block is 4 cm × 4 cm × 5 cm.
The block is painted on all faces.
Then the block is cut into eighty 1 cm × 1 cm × 1 cm cubes.
How many of these cubes have no paint on any face?

Maths Games Example Solution 4.6 - Yellow



Four 1 cm × 1 cm × 1 cm cubes are glued together, face to face.

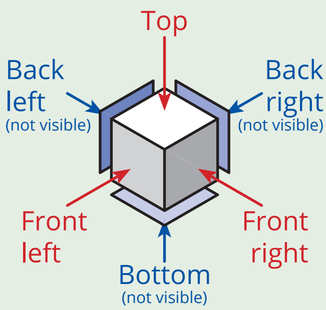
The whole object is then dipped into a bucket of red paint, so that every face is covered.

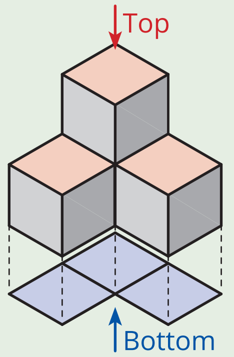
What is the total area, in square centimetres, of all of the red painted faces?

Strategy 1: Divide a Complex Shape (1)

A cube has six faces.

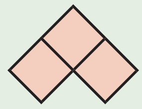
Since the object is made up of cubes joined by their faces, there are six directions from which we can look at faces directly.

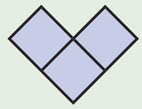




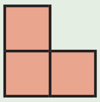
Looking down on to the top of the object, we can see **3** faces.

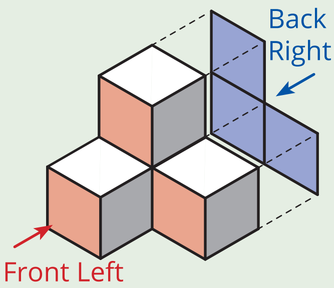
If we tilt the object slightly upwards and look up from the bottom, we can once again see **3** faces.

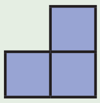




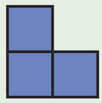
Looking from the front left corner, we can see **3** faces.



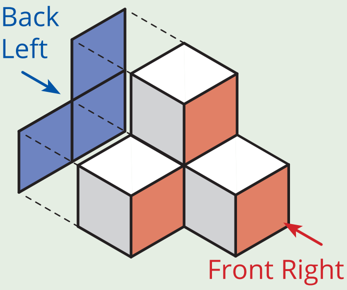




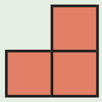
If we rotate the object towards the left and look at the back on the right side, we can once again see **3** faces.



If we rotate the object towards the right and look at the back on the left side, we can see **3** faces.



Looking from the front right corner, we can see **3** faces.



Since each exposed face has an area of **1** square cm, **3** + **3** + **3** + **3** + **3** + **3** = **18** square cm would be covered in red paint.

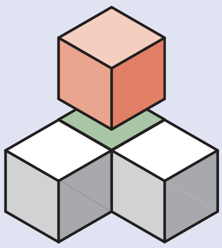
Strategy 2: Divide a Complex Shape (2)

The object is made up of four cubes.

On each cube, each face has an area of **1** square cm.

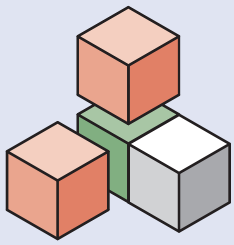
The topmost cube is attached to the rest of the object by its bottom face only,

so it has **5** exposed faces.



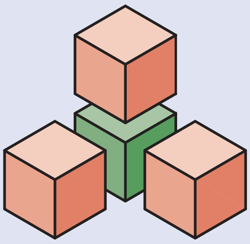
The left-side cube is attached to the rest of the object by the back-right face,

so it, too, has **5** exposed faces.



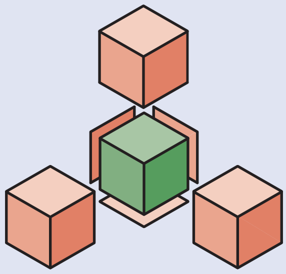
The right-side cube is attached to the rest of the object by the back-left face,

so it has **5** exposed faces as well.



Finally, the fourth cube is connected to each of the other three,

so it only has **6 – 3 = 3** faces exposed.



The object has **5 + 5 + 5 + 3 = 18** square centimetres of surface area.

Answers

4.6 - Green: 24 (cm^2)

4.6 - Orange: 12

4.6 - Yellow: 18 (cm^2)

Maths Games – Example Problem 4.7

Example Problem 4.7 - Green

I have a set of letter cards.

There is one *A*, two *B*s, three *C*s, four *D*s, and so on, up to ten *J*s.

How many letter cards are there in the set?

A
B B
C C C
D D D D
...
J J J J J J J J J J

Example Problem 4.7 - Yellow

The Funny Book has its pages numbered the following way: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5 ... .

That is, there is one 1, two 2s, three 3s, four 4s, five 5s, and so on.

The last page is numbered "10". There are ten pages numbered "10".

How many pages are there in the Funny Book?

Example Problem 4.7 - Orange

Each row of *s has two more *s than the row immediately above it, as shown.

Altogether, how many *s are contained in the first ten rows?

```
*
* * *
* * * * *
* * * * * * *
```
and so on.

Maths Games Example Solution 4.7 - Yellow

The Funny Book has its pages numbered the following way: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5 ... .

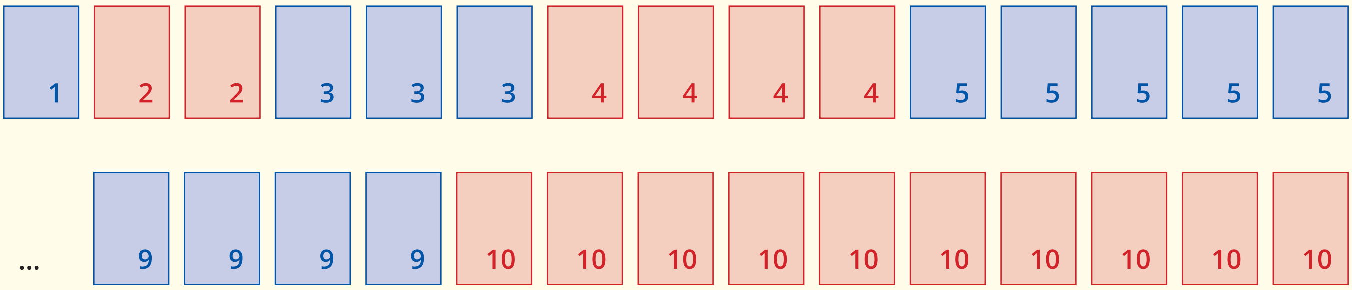
That is, there is one 1, two 2s, three 3s, four 4s, five 5s, and so on.

The last page is numbered "10". There are ten pages numbered "10".

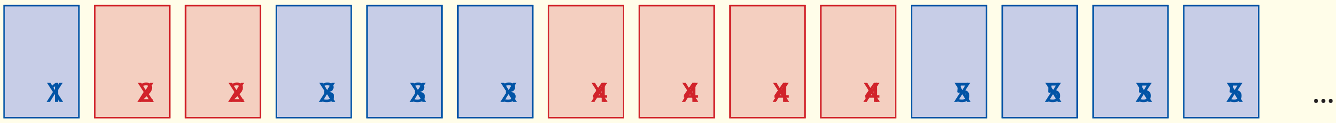
How many pages are there in the Funny Book?

Strategy: Convert to a More Convenient Form

To make sure we understand what the numbering actually looks like, we can start by drawing some of the pages.



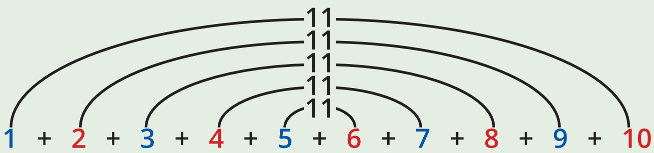
Since the page numbers don't actually help to work out how many pages there are, we can make it less confusing by crossing out all of the numbers.



Then, to count the pages, we can just count the number of crosses: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10.

Method 1: Group the numbers.

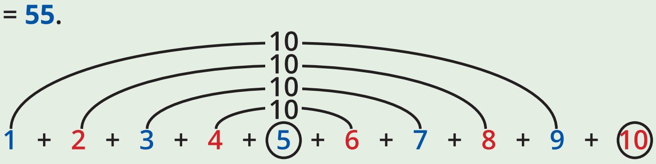
The numbers can be grouped to make it easier to add.



(1 + 10) + (2 + 9) + (3 + 8) + (4 + 7) + (5 + 6)

= 11 + 11 + 11 + 11 + 11

= **55**.



(1 + 9) + (2 + 8) + (3 + 7) + (4 + 6) + (5) + (10)

= 10 + 10 + 10 + 10 + 5 + 10

= **55**.

The Funny Book has **55** pages.

Method 2: Duplicate the book.

To find the number of pages in the Funny Book, we can make a copy of the book and reverse the order of the pages, like this:

Copy 1: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10

Copy 2: 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1

All together, the two books have **10 × 11 = 110** pages.

Copy 1:	1 +	2 +	3 +	4 +	5 +	6 +	7 +	8 +	9 +	10
Copy 2:	10 +	9 +	8 +	7 +	6 +	5 +	4 +	3 +	2 +	1
Together:	11 +	11 +	11 +	11 +	11 +	11 +	11 +	11 +	11 +	11

Since two copies of the Funny Book would have **110** pages, one copy of the Funny Book would have **110 ÷ 2 = 55** pages.

Answers

4.7 - Green: 55

4.7 - Orange: 100

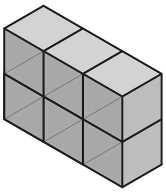
4.7 - Yellow: 55

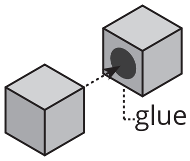
Maths Games – Example Problem 4.8

Example Problem 4.8 - Green

Chloe is using 6 small cubes to make this rectangular prism, as shown at the right.

The prism is 2 cubes high, 1 cube wide and 3 cubes long.





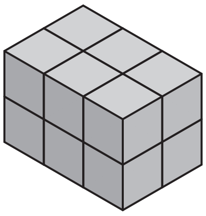
Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

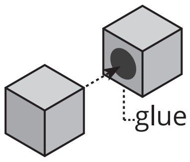
How many dots of glue does she need to construct the rectangular prism?

Example Problem 4.8 - Yellow

Chloe is using 12 small cubes to make this rectangular prism, as shown at the right.

The prism is 2 cubes high, 2 cubes wide and 3 cubes long.



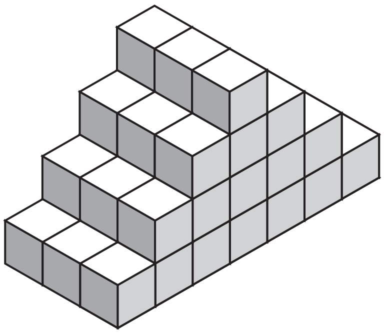


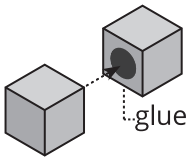
Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

How many dots of glue does she need to construct the rectangular prism?

Example Problem 4.8 - Orange

Chloe is using 48 small cubes to make this object, as shown at the right.



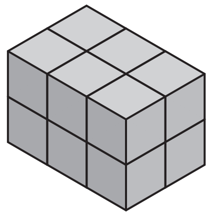


Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

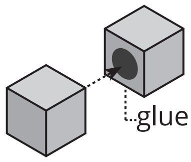
How many dots of glue does she need to construct this object?

Maths Games Example Solution 4.8 - Yellow

Chloe is using 12 small cubes to make this rectangular prism, as shown at the right.



The prism is 2 cubes high, 2 cubes wide and 3 cubes long.



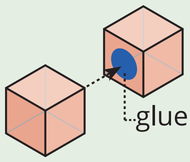
Wherever the faces of two cubes meet, she adds one dot of glue between them to stick them together, as shown in the diagram on the left.

How many dots of glue does she need to construct the rectangular prism?

Strategy: Divide a Complex Shape

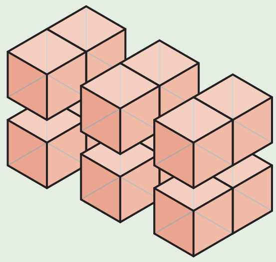
We can start by constructing two-cube pieces.

Each two-cube piece would be put together with a single dot of glue.



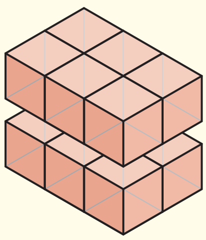
The prism has **12** cubes, and so there are **12** ÷ **2** = **6** two-cube pieces.

To make six two-cube pieces, Chloe will need **6** dots of glue.

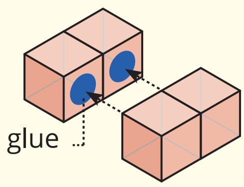


So far, Chloe has used **6** dots of glue.

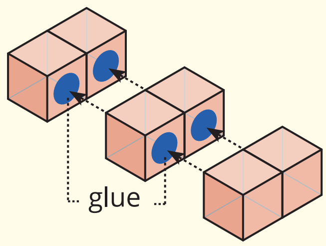
Next, Chloe can stick the two-cube pieces together to make one-cube-thick slices.



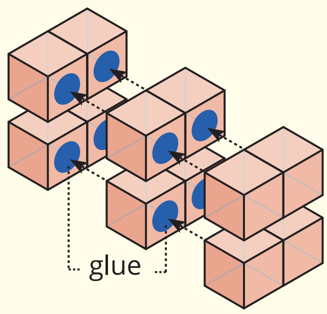
To join two 2-cube pieces together, Chloe needs **2** dots of glue.



She would need **2 + 2 = 4** dots of glue to complete one slice.



To make two slices, she would need **2 × 4 = 8** dots of glue.

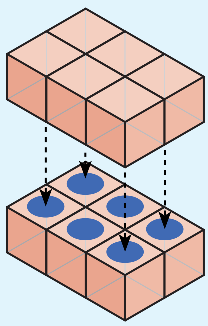


So far, Chloe has used **6 + 8** dots of glue.

Finally, to join two 6-cube slices together, Chloe needs another **6** dots of glue.

After doing so, the rectangular prism is complete.

Chloe needs **6 + 8 + 6 = 20** dots of glue to construct the rectangular prism.



Answers

4.8 - Green: 7

4.8 - Orange: 95

4.8 - Yellow: 20

Answers

Set Green

4.1	30
4.2	6 (cm^2)
4.3	7 (cm^2)
4.4	12 (m^2)
4.5	16 (m)
4.6	24 (cm^2)
4.7	55
4.8	7

Set Yellow

4.1	300
4.2	40 (cm^2)
4.3	20 (cm^2)
4.4	12 (m^2)
4.5	36 (cm)
4.6	18 (cm^2)
4.7	55
4.8	20

Set Orange

4.1	1250
4.2	9 (cm^2)
4.3	18 (cm^2)
4.4	9 (square units)
4.5	40 (cm)
4.6	12
4.7	100
4.8	95