USING MATHEMATICS 3 (ACC 3)
Outcome 3

Exercise 1

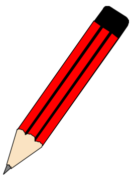
Reminders

In this exercise we are going to look at shapes.

You will use worksheets, and you will need a pencil and a ruler to complete the work.

If you are not sure about the question - ask your teacher

If you get stuck - look up the Wordbank to help you.



You need scissors, glue and Symmetry Worksheet 1

1. **Shape A** is called a **trapezium**.

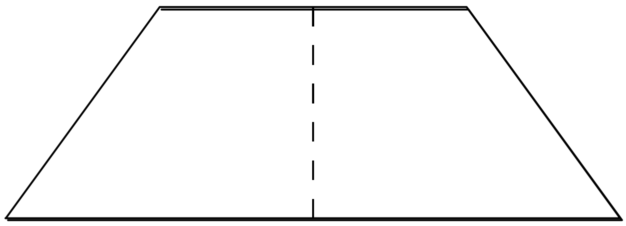
   Cut out **shape A**.

   a) How many ways you can fold **shape A** so that one half fits on top of the other?

   You should only be able to find **one** way.

   b) Use a ruler to draw a dotted line down the fold.

   Your shape should look like this:



The dotted line is called a **line of symmetry**.

Stick the shape into your jotter.

2. **Shape B** is called a **rectangle**.

   Cut out **shape B**.

   a) How many ways you can fold **shape B** so that one half fits on top of the other?

   You should be able to find **two** ways.

   b) Use a ruler and draw dotted lines to show the two lines of symmetry. Stick the rectangle into your jotter.

3. Cut out **shape C**.

   a) Find the lines of symmetry.

   There should be 4.

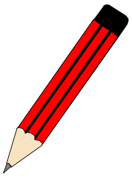
   b) Draw dotted lines to show the lines of symmetry.

4. Cut out **shape D**.

   a) Find the lines of symmetry.

   There should be 2.

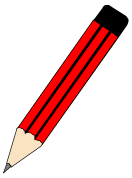
   b) Draw dotted lines to show the lines of symmetry.



You need Symmetry Worksheet 2

5. The number beside each shape tells you how many lines of symmetry that shape has. Use a ruler to draw dotted lines on each shape to show the lines of symmetry.

You can use a mirror or tracing paper to help you.



You need Symmetry Worksheet 3

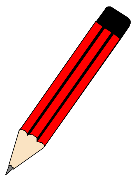
6. Follow the instructions on Symmetry Worksheet 3 to mark the lines of symmetry on each letter.

Exercise 2

Reminders

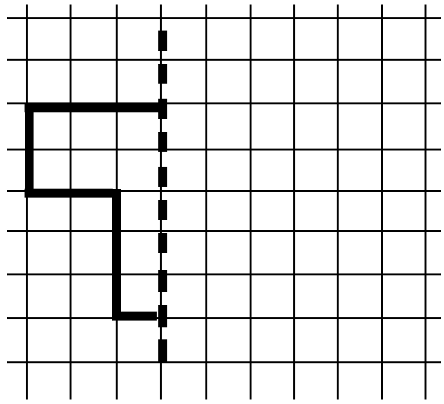
In this exercise we are going to draw shapes which have line symmetry.

If you are not sure about what to do - ask your teacher

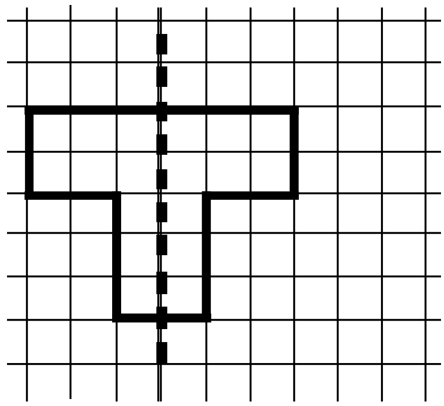


You need Symmetry Worksheet 4

The first shape on Symmetry Worksheet 4 looks like this:



Complete the shape so that the dotted line is a **line of symmetry**.



1. Complete the first shape on Symmetry Worksheet 4 in the same way as the example on page 5.

2. Now, complete the rest of the shapes so that the dotted lines are lines of symmetry.

You can use a mirror to check your answers.

You need a sheet of 1 cm squared paper.

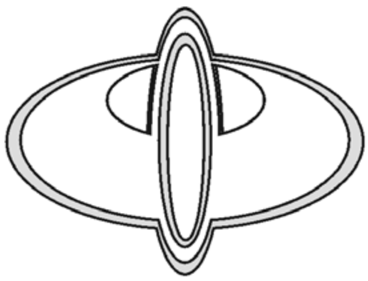
3a) Draw **three** different symmetrical shapes of your own on the squared paper.

b) Draw the line(s) of symmetry on each shape.

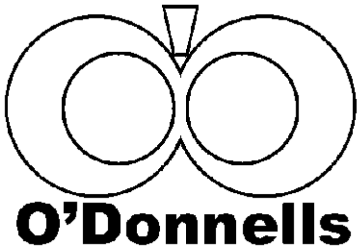
Practical Work - Work with a partner or in a small group.

Some companies use symmetrical shapes for their logos :

e.g. O’Donnells Restaurants



Toyota Cars



4. Your teacher will give you some newspapers and magazines. Look through these and see how many different symmetrical logos you can find. You may want to cut some of them out and use them to make a small poster.

5. On 1 cm squared paper, design your own logo. You may want to use your initials, or a shape, or a combination of the two. When you have drawn your logo, colour it to make it look as ‘eye-catching’ as possible. Remember - sometimes the most simple designs are the most effective.

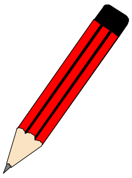
   Check with your teacher - you may be able to use a computer package (like Draw in Clarisworks) to design and print out your logo.

Exercise 3

Reminders

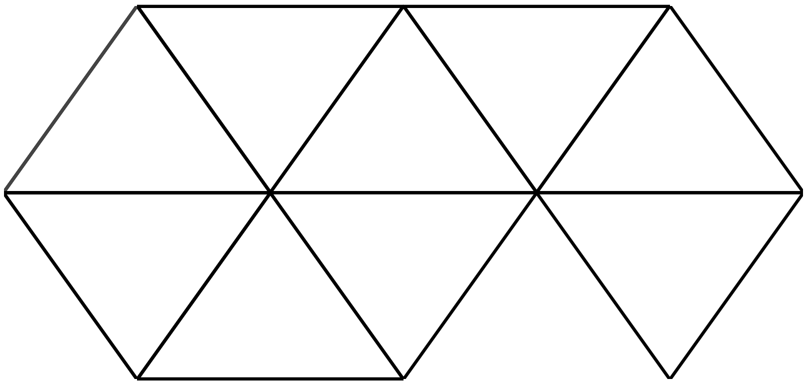
A **tiling** is a set of shapes that fit together in a **regular pattern**, with no gaps and no overlaps.

If you are not sure what to do - ask your teacher



You will need a shape template, plain paper and coloured pencils.

1. The diagram below shows part of a tiling using triangles.



Use the triangle on the shape template to make a tiling picture like this one.

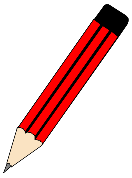
You need the shape template

2. From the shape template choose 4 shapes which tile.

   Make tilings of each of the shapes you choose.

   Show at least 8 tiles in each of your patterns.

   Colour in the tilings



You need Tiling Worksheet 1

3. Four tilings have been started for you on Tiling Worksheet 1.

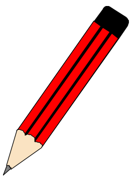
   Use a pencil and ruler to add at least 10 more tiles.

   Colour in your tilings.

Reminders

More than one shape can be used in a tiling.

The shapes must always fit together with no gaps and no overlaps.

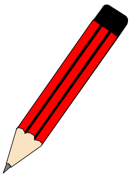


You need Tiling Worksheet 2

4. Three **2-shape tilings** have been started for you on Tiling Worksheet 2.

   Use a pencil and ruler to add more tiles to each tiling.

   Colour in your tilings.



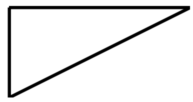
You need Tiling Worksheet 3

Alice and Jim want to tile their kitchen floor.

The diagram on Tiling Worksheet 3, shows two plans of their kitchen floor.

Alice would like to tile the floor using one shape of tile, but Jim thinks it would look better if they used two different shapes of tile.

5. **Plan A** shows the tiles which Alice would like.



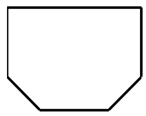
Complete the pattern using this shape of tile.

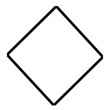
One tile has been drawn for you on **Plan A**.

Plan B shows the tiles which Jim would like.

Complete the tiling using the two different shapes of tiles.

One of each tile has been drawn for you on **Plan B**.





Reminders

You may have to use a part of a tile around the edge of the room to make sure that the floor is completely covered.

Part tiles can be used only around the edge of the room.

They may not be used in the middle of the floor.

Exercise 4

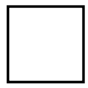
Reminders

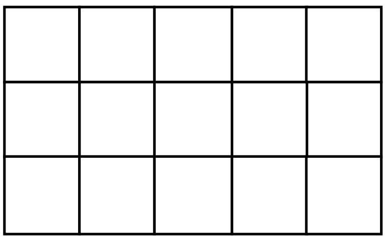
The **area** of a shape is how much surface it covers.

The surface can be any flat space e.g. the floor or a wall.

The area of this square is **1 square centimetre**.

This can be shortened to 1 sq. cm. or 1 cm^2

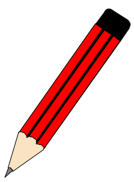




This rectangle covers
15 centimetre squares.

The **area** of the rectangle is
15 square centimetres.

Area = 15cm^2



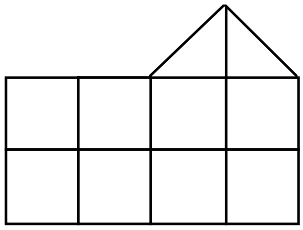
You need Area worksheet 1

1. On Area Worksheet 1 count the number of squares to find the area of each shape and write your answers in the spaces provided.

Reminders

Sometimes shapes cover parts of squares.

These must be counted too.

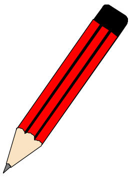


This shape covers 8 whole squares and

2 half squares.

The 2 half squares make 1 whole square.

So, the area is 9 cm^2



You need Area Worksheet 2

2. Use Area Worksheet 2 and count the number of squares in each shape.

   Write down the area of each shape in the spaces provided.

Remember two half squares make 1 cm^2

3. On 1 cm squared paper, draw :

   a) 1 shape with an area of 4 cm^2

   b) 2 shapes with an area of 6 cm^2

   c) 3 shapes with an area of 8 cm^2

   d) 4 shapes with an area of 10 cm^2

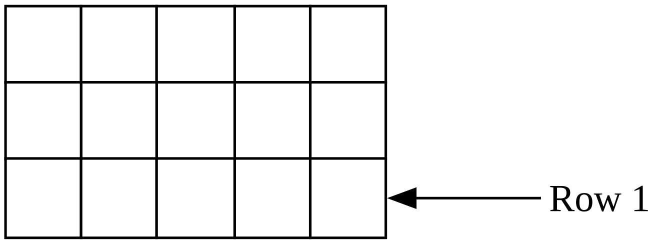
Remember, you can use half squares to make your diagrams more interesting

Exercise 5

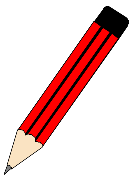
The rectangle shown has an area of 15 cm^2.

There are 5 tiles in Row 1

There are 3 rows



area = number of tiles in <u>row 1</u> x number of rows



You need Area Worksheet 3

Do questions 1 - 5 in your jotter.

Set your working out like this:

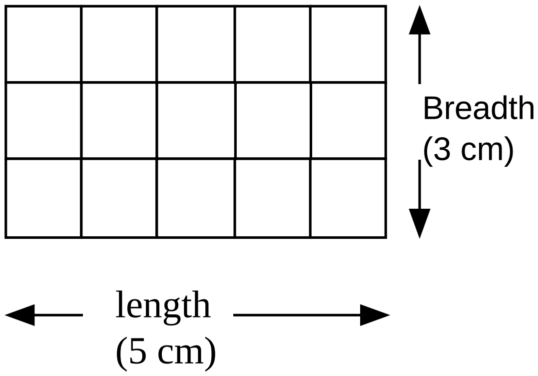
Number of tiles in row 1 = 5

Number of rows = 3

Area = 5 x 3

= 15

We call the distance across the rectangle the **length** and the distance up the way is the **breadth**.



then

area = length x breadth

area = 5 x 3

= 15 cm^2

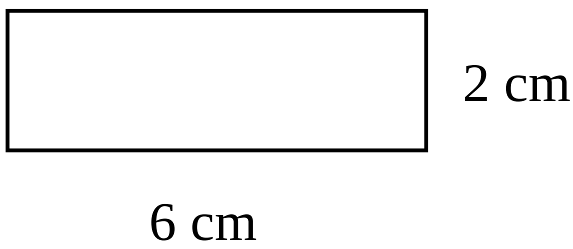
This means the diagram does not need to be split up into small squares.

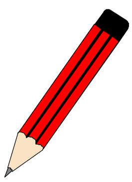
Example

Area = length x breadth

= 6 x 2

= 12 cm^2





You need Area Worksheet 3

Do questions 6 - 10 in your jotter.

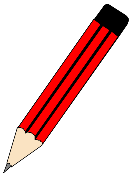
Set your working out like the example shown above.

Exercise 6

Reminders

In this exercise we are going to look at solid shapes.

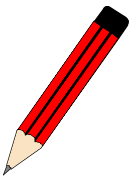
If you get stuck - look up the Wordbank to help you.



You need Solids Worksheet 1

1. Solids Worksheet 1 shows pictures of different solids.
   On the line beneath each shape write in the name of the solid.
   Choose from the list given.

If you are not sure - ask your teacher

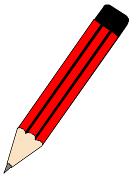


You need Solids Worksheet 2

2. Solids Worksheet 2 shows a diagram of a maths factory building.
   Follow the instructions given to complete the table on the worksheet.

Reminders

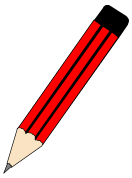
A **net** is a flat shape which can be folded to make a solid shape, like a cube or a cuboid.



You need Solids Worksheet 3 and scissors

3. Solids Worksheet 3 has a **net** of a cube.

   Cut the net out and then fold it up to make a cube.



You need Solids Worksheet 4 and scissors

4. There are lots of patterns of six squares on Solids Worksheet 4.

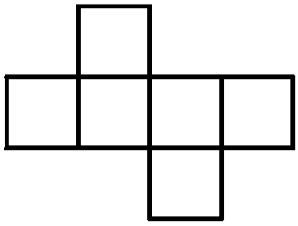
   Are they all nets of cubes?

   Cut them out and then try to fold each one into a cube.

   Stick all the examples which can make a cube into your jotter.

Reminders

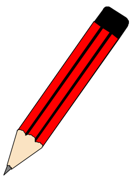
All solid shapes have a **net** .



The net of a cube is made up of **six squares**

because a cube has **six** faces,

and each face is **square**.

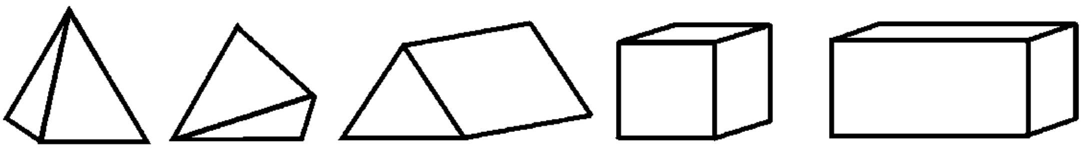


You need Solids Worksheets 5 and 6

5. There are nets of three different solids drawn on Solids Worksheet 5 and another two drawn on Solids Worksheet 6.

   Decide which solid each net can make.

   Choose from :



Square-based pyramid	***tetrahedron***	***triangular prism***	***cube***	***cuboid***

   Write your answers into your jotter.

6. Cut out each of the nets from Solids Worksheets 5 and 6.

   Fold each one to check your answers to question 5.

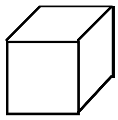
Exercise 7

Reminders

Volume is the space taken up by a solid shape.

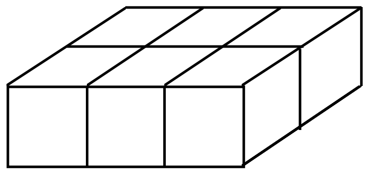
This is 1 centimetre cube

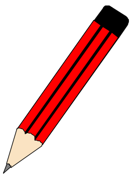
We write 1 cm^3.



This shape is made up of 6 of these cubes.

So, we say the volume of the shape is 6 cm^3.





You need a set of 1 centimetre cubes and Volume Worksheet 1.

If you get stuck - look up the Wordbank to help you.

1. Use the cubes to build each of the shapes shown on Volume Worksheet 1.

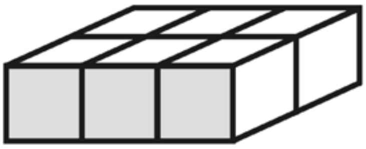
   For each shape count the cubes to find the volume.

   Write your answers into the table on the back of the worksheet.

   Remember to include units (cm^3) in your answers.

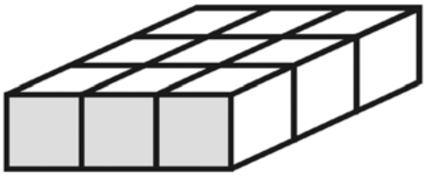
You will need 18 centimetre cubes.

2. Use all the cubes to build a cuboid with a bottom layer like this:



   a) How many cubes are in the bottom layer?
   b) How many layers does the cuboid have?
   c) What is the volume of the cuboid?

3. Use the 18 cubes to build a cuboid with a bottom layer like this:

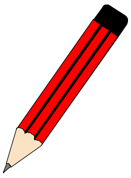


   a) How many cubes are in the bottom layer?
   b) How many layers does the cuboid have?
   c) What is the volume of the cuboid?

Reminders

Volume of a cuboid

= number of cubes in one layer x number of layers



Exercise 8

Find the volume of the cuboids in questions 1 to 6.

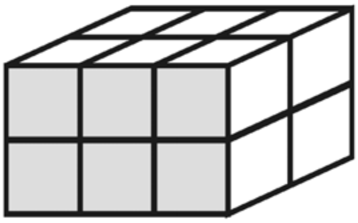
Do this work in your jotter - set your working out like this :

1. Number of cubes in one layer = 6

   Number of layers = 2

   Volume = 6 x 2

   = 12 cm^3



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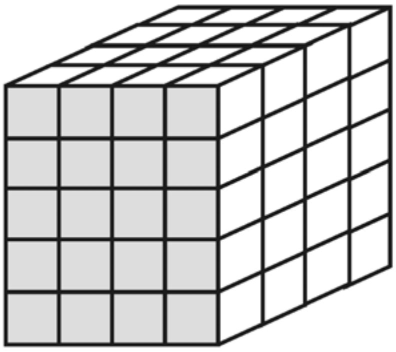

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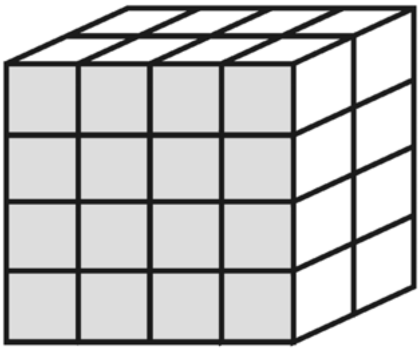

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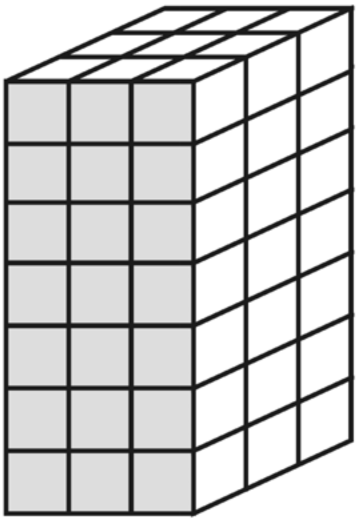
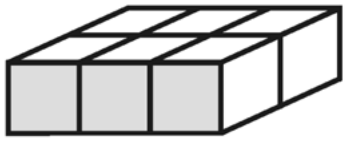


5.



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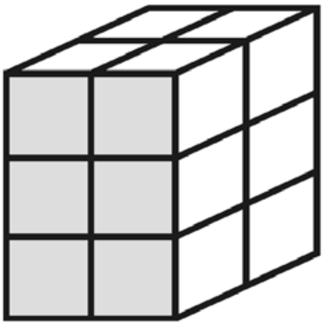


This method will work for any solid shape as long as all the layers in the shape are the same. We call a solid shape like this a prism.

Work out the volume of the prisms in questions 7 to 12.

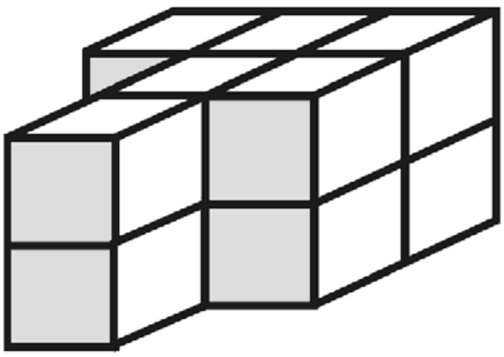
Do this work in your jotter - set your working out like this :

7. Number of cubes in one layer = 6

Number of layers = 2

Volume = 6 x 2

= 12 cm^3



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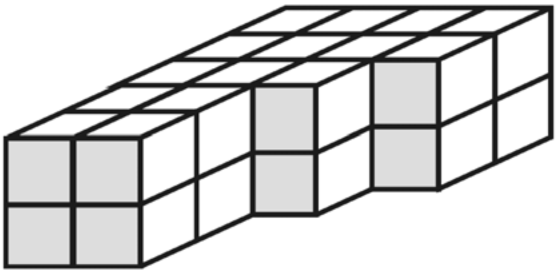

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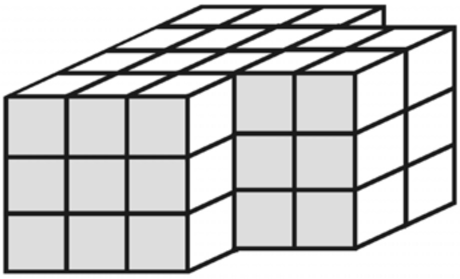
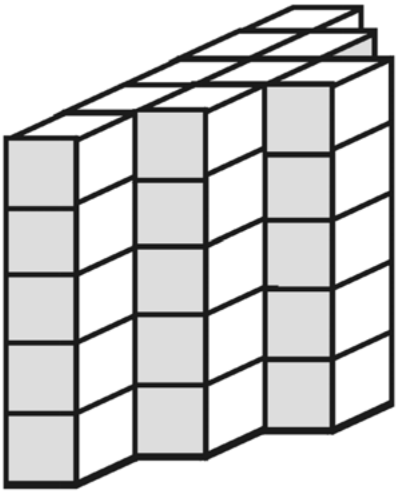
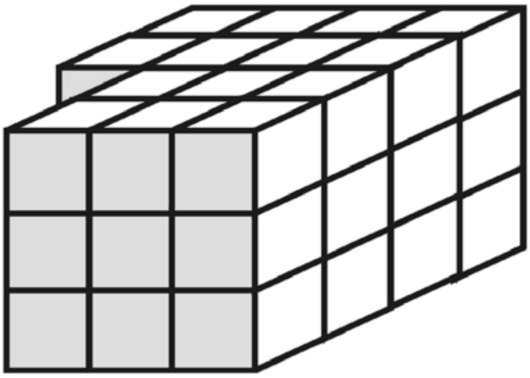


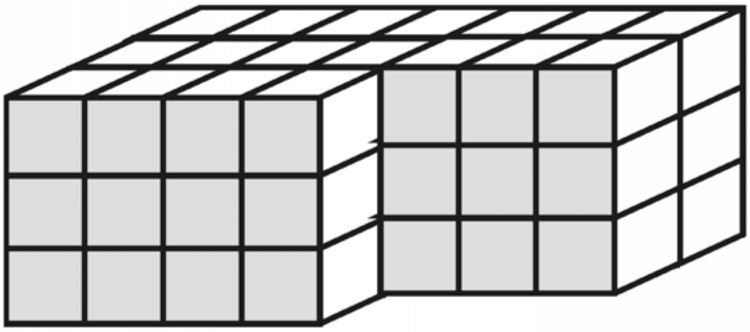
10.



11.



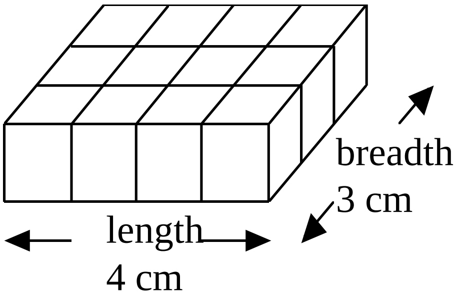
12.



Exercise 9

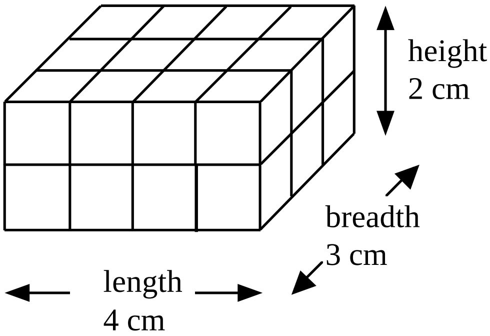
When we cannot see the cubes, we can work out the number of cubes there are in one layer

by **multiplying the length by the breadth**.



We then find the **total volume**

by **multiplying by the height** (the number of layers)



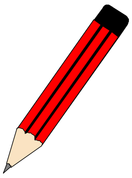
The formula for the volume of a cuboid is

Volume of a cuboid = length x breadth x height

Volume = length x breadth x height

= 4 x 3 x 2

= 24 cm^3



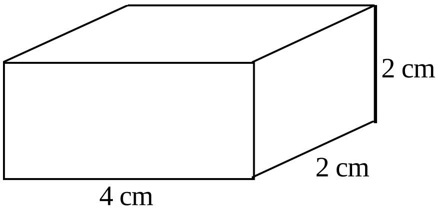
Use the formula

Volume of a cuboid = length x breadth x height

to work out the volumes of each of the cuboids below.

Do this work in your jotter - set your working out like this

1.

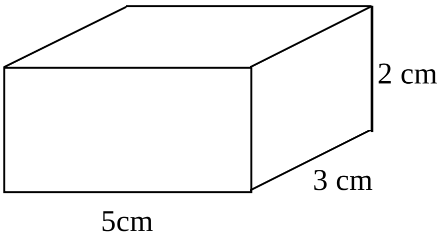


Volume = length x breadth x height

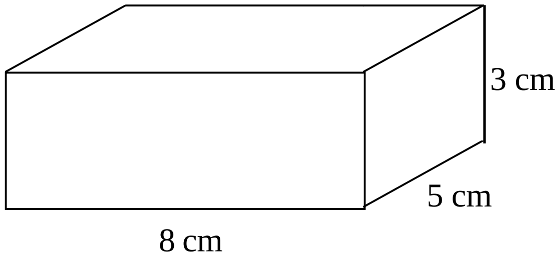
= 4 x 2 x 2

= 16 cm^3

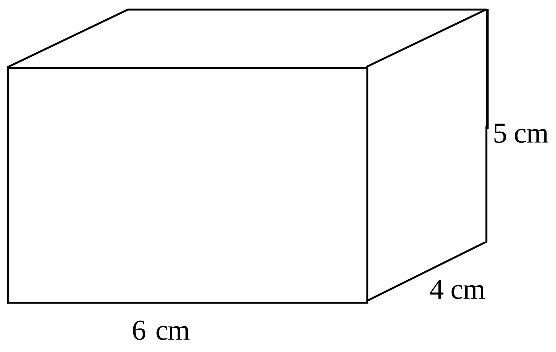
2.



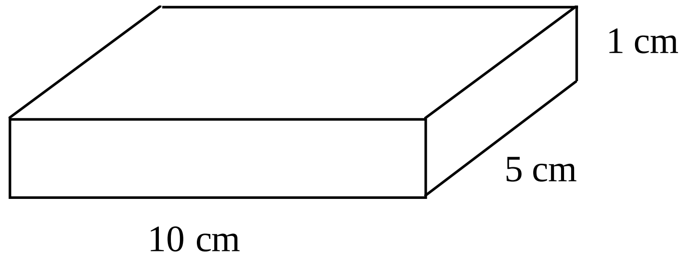
3.



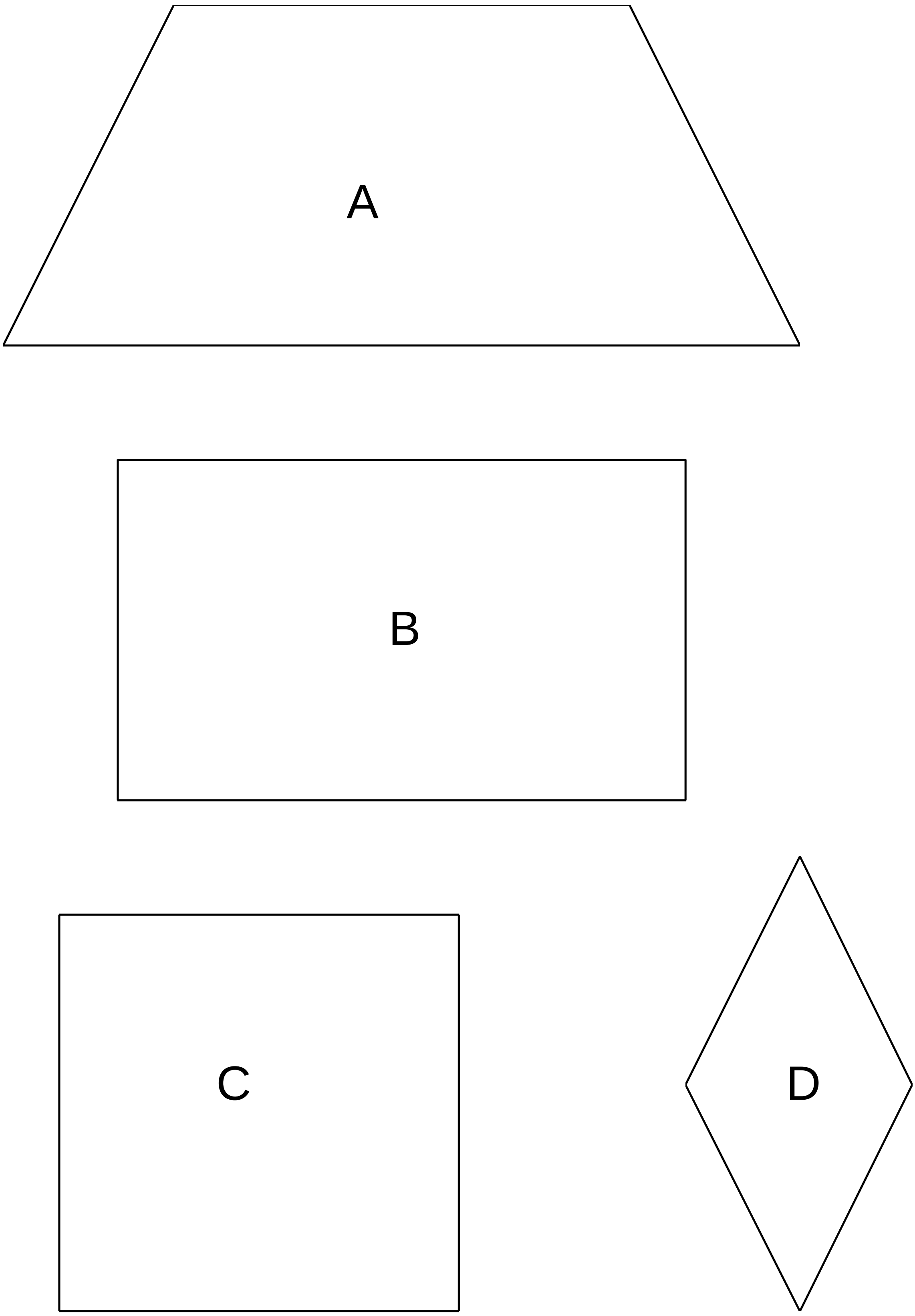
4.



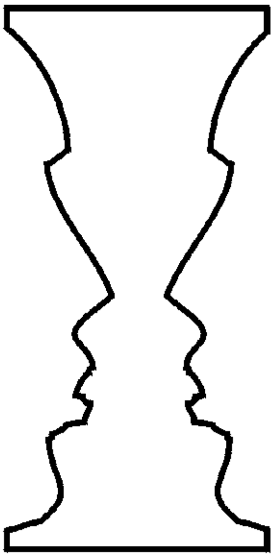
5.



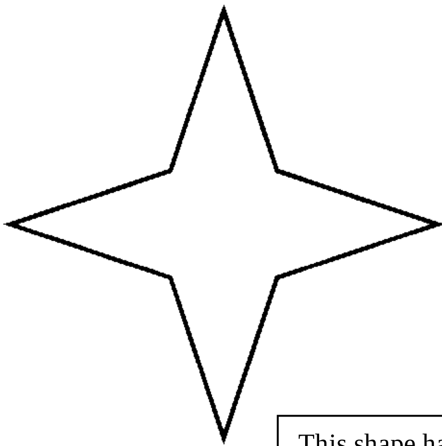
Symmetry Worksheet 1



Symmetry Worksheet 2

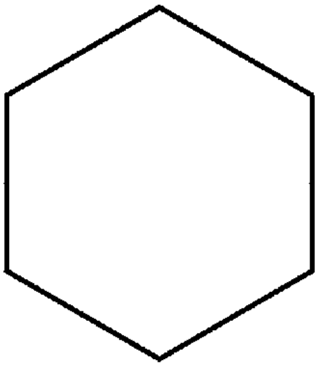


(1)

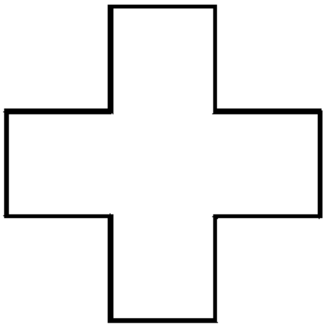


(4)

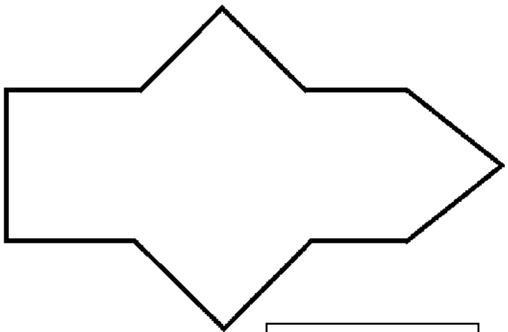
This shape has 4 axes of symmetry.



(6)

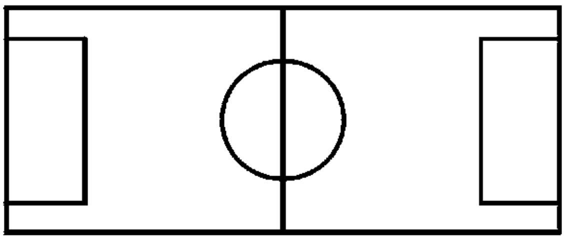


(4)

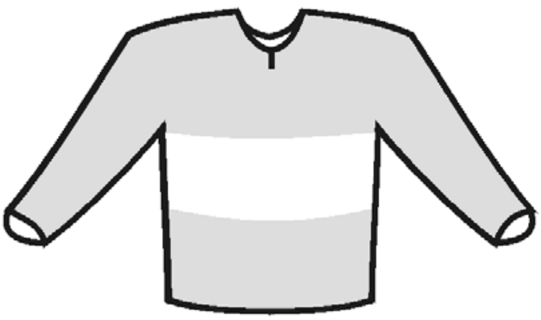


(1)

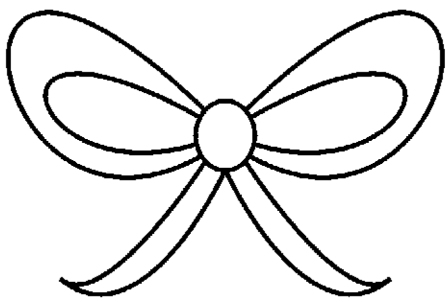
This shape has 1 axis of symmetry.



(2)



(1)



(1)

Symmetry Worksheet 3

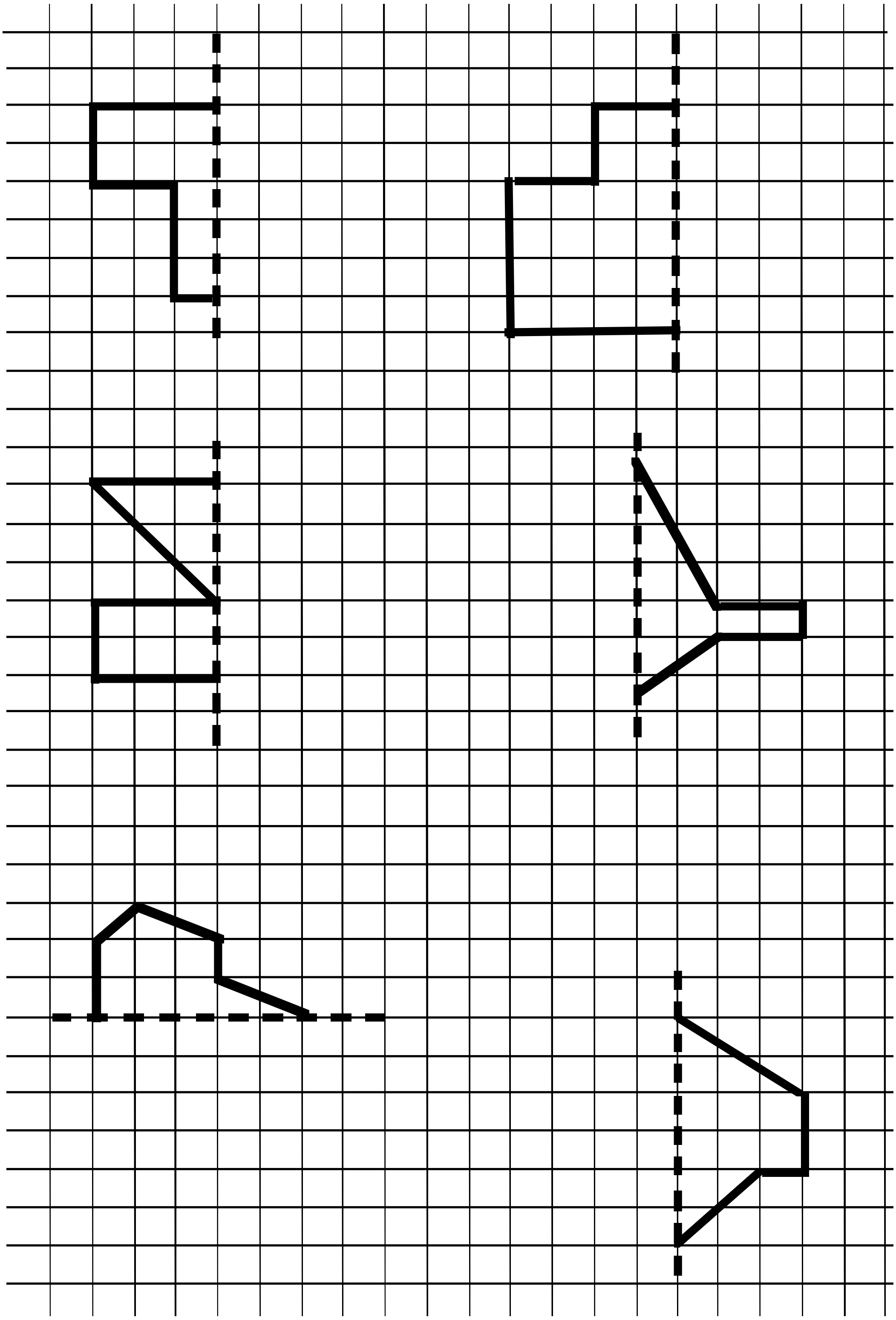
Here are some of the letters of the alphabet.

On each letter use a dotted to line to mark in any axes of symmetry you can find.

You can use a mirror or tracing paper to help you.

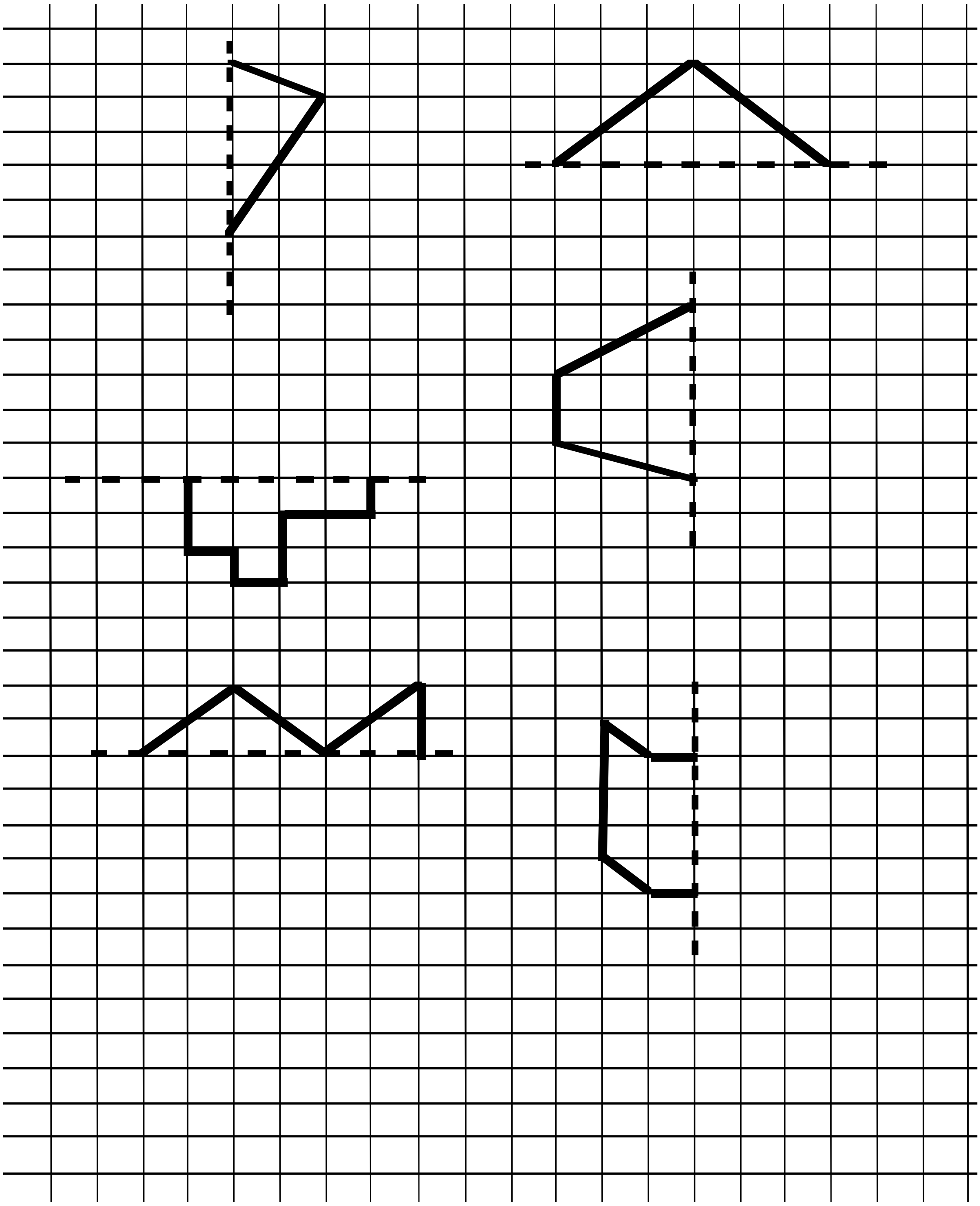
A	C	E
F	H	J
N	O	R
S	T	X

Symmetry Worksheet 4 (Front)



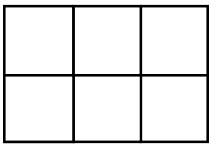
Turn over

Symmetry Worksheet 4 (Back)

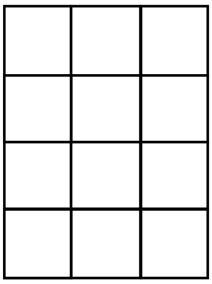


Go back to page 6 of workbook

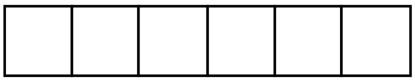
Area Worksheet 1



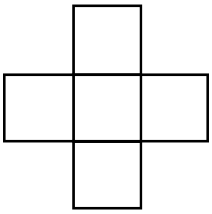
Area = _____cm^2



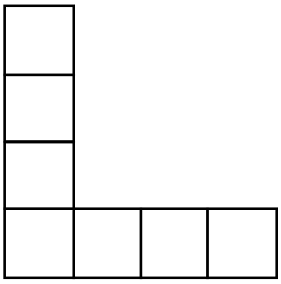
Area = _____cm^2



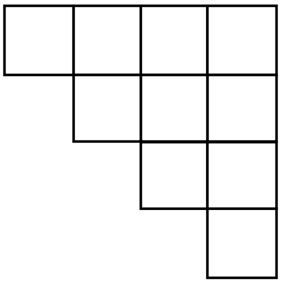
Area = _____cm^2



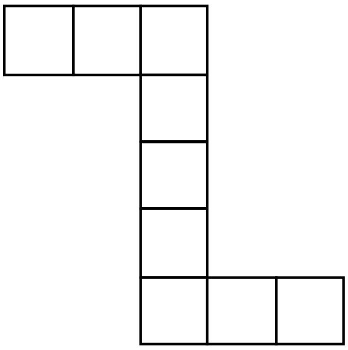
Area = _____cm^2



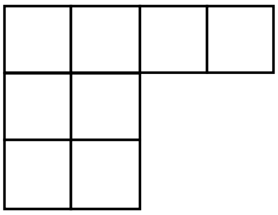
Area = _____cm^2



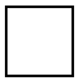
Area = _____cm^2



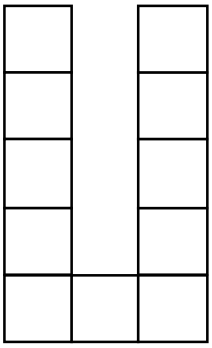
Area = _____cm^2



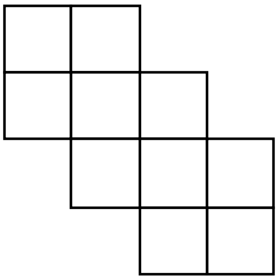
Area = _____cm^2



represents $1cm^2$

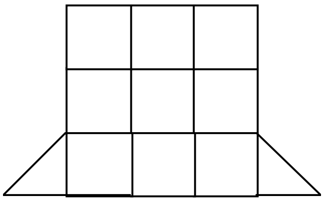


Area = _____cm^2

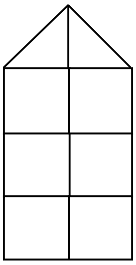


Area = _____cm^2

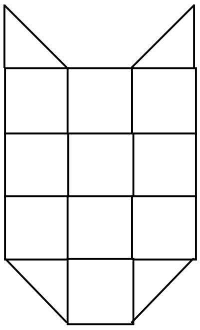
Area Worksheet 2



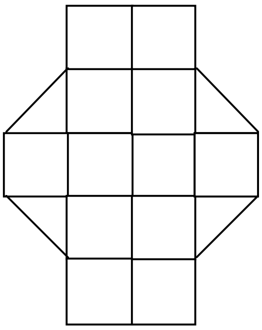
Area = ______cm^2



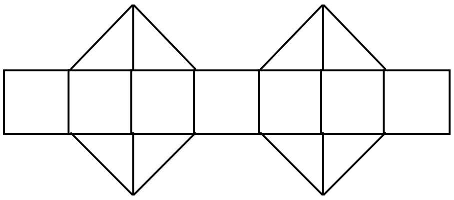
Area = ______cm^2



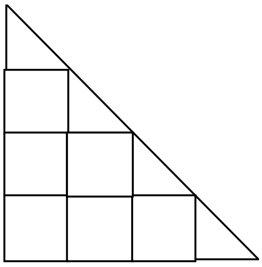
Area = ______cm^2



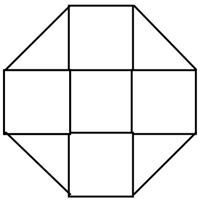
Area = ______cm^2



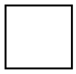
Area = ______cm^2



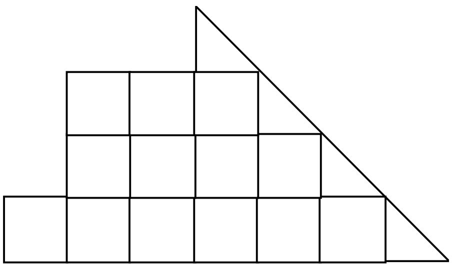
Area = ______cm^2



Area = ______cm^2

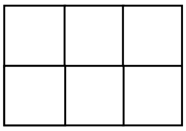


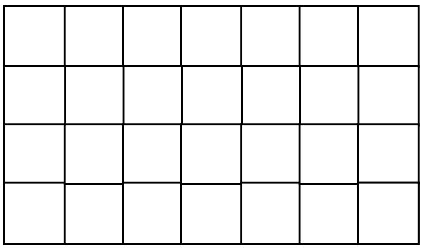
represents 1cm^2

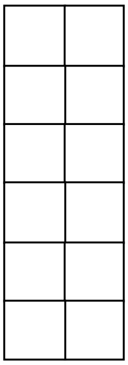


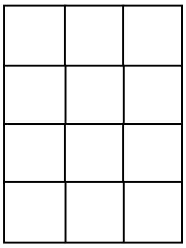
Area = ______cm^2

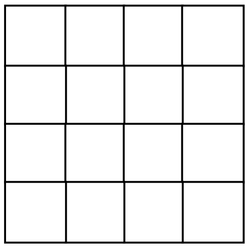
Area Worksheet 3

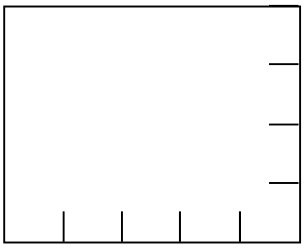
1. 

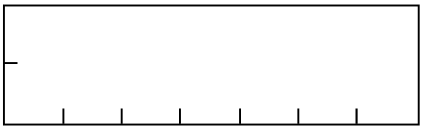
2. 

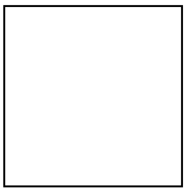
3. 

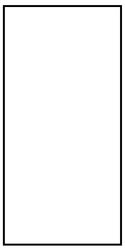
4. 

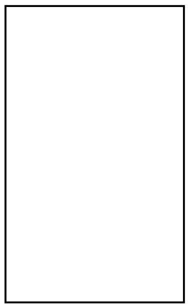
5. 

6. 

7. 

8. 

9. 

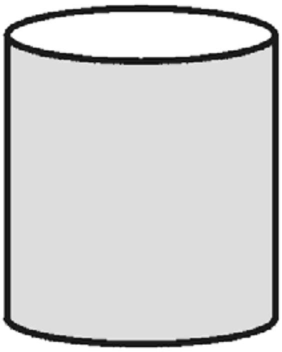
10. 

Solids Worksheet 1 (Front)

Below are pictures of different solid shapes.

Write the name of each solid in the spaces provided.

Choose from : ***cube ; cuboid ; sphere ; triangular prism ; pyramid ; cylinder***



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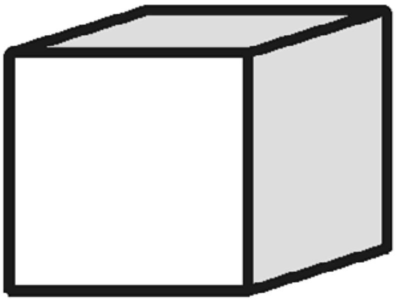

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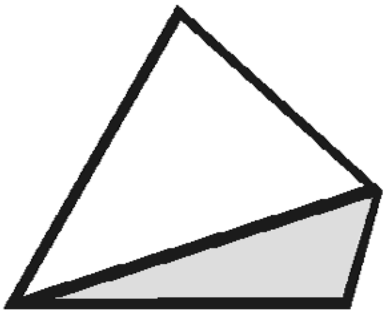

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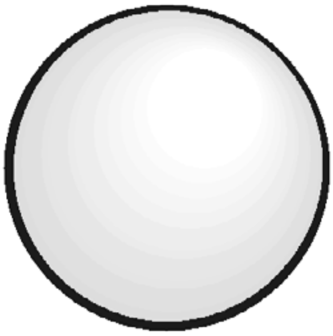

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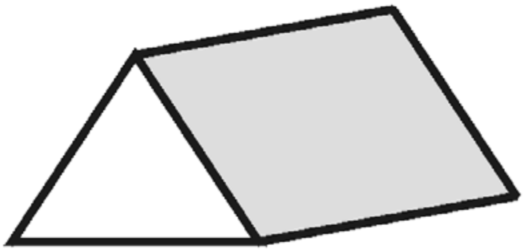


____

____

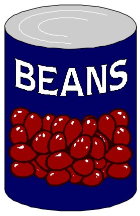
Turn over

Solids Worksheet 1 (Back)

Below are pictures of everyday objects.

Write the name of the solid in the space provided.

Choose from : ***cube ; cuboid ; sphere ; triangular prism ; cylinder***



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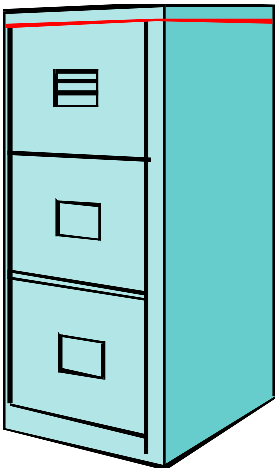

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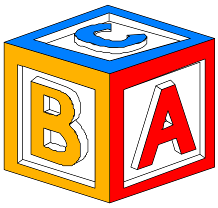
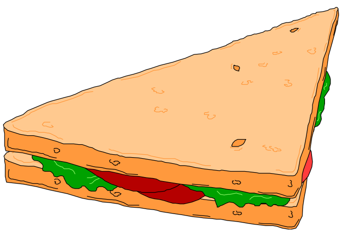


____

____



____

Go back to page 15 of the workbook

Solids Worksheet 2

The diagram below shows a maths factory building made out of solid shapes.

For each of the shapes B - I write in the name of the solid .

The first one has been done for you.

A = Cuboid

B = ________________

C = ________________

D = ________________

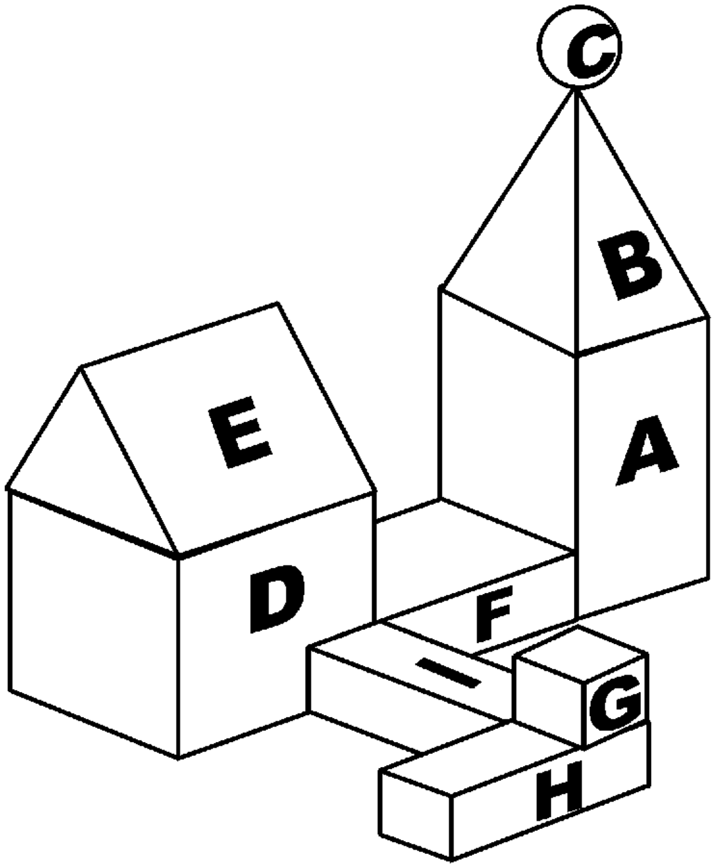
E = ________________

F = ________________

G = ________________

H = ________________

I = ________________

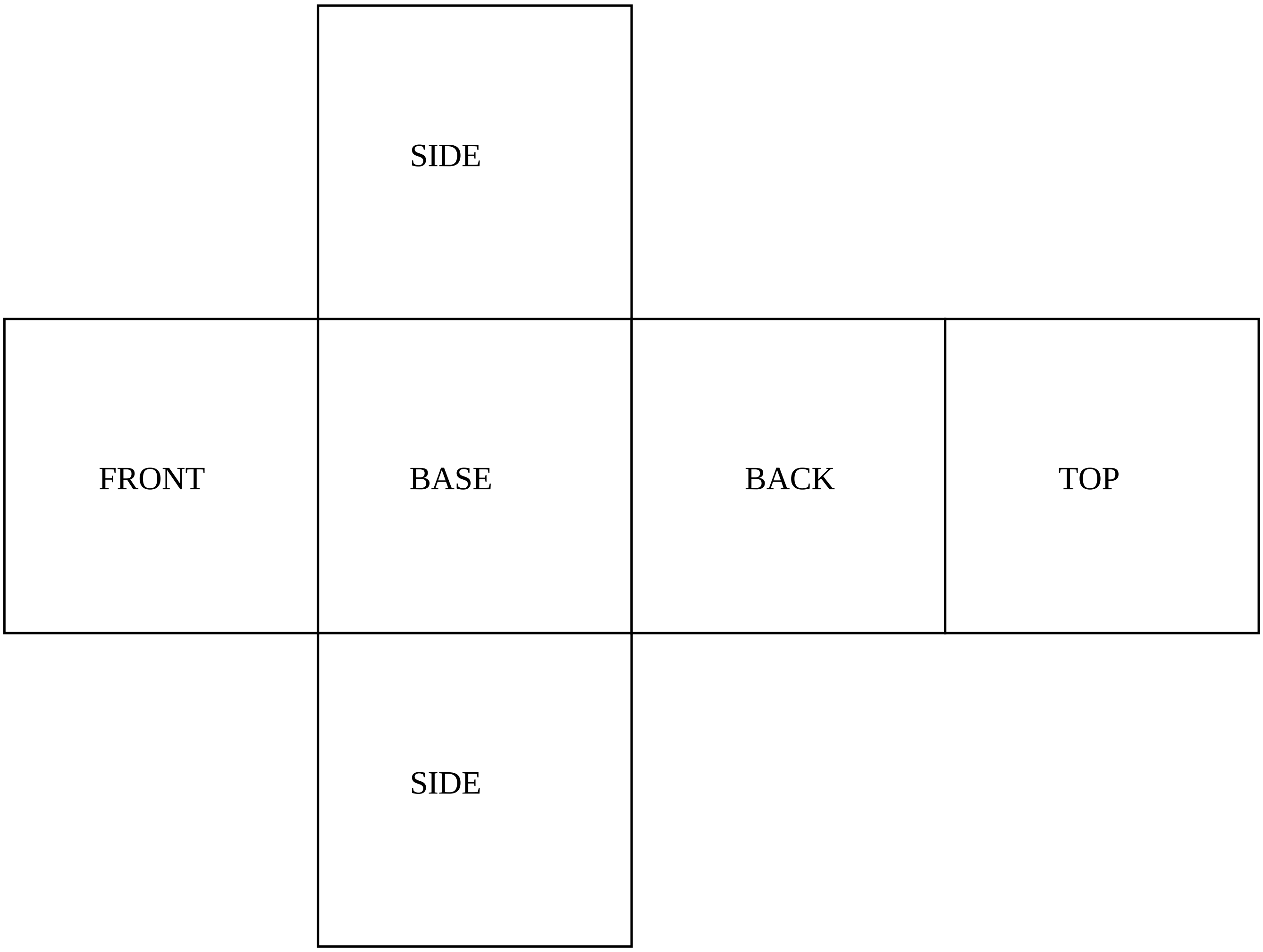


Go back to page 16 of the workbook

Solids Worksheet 3

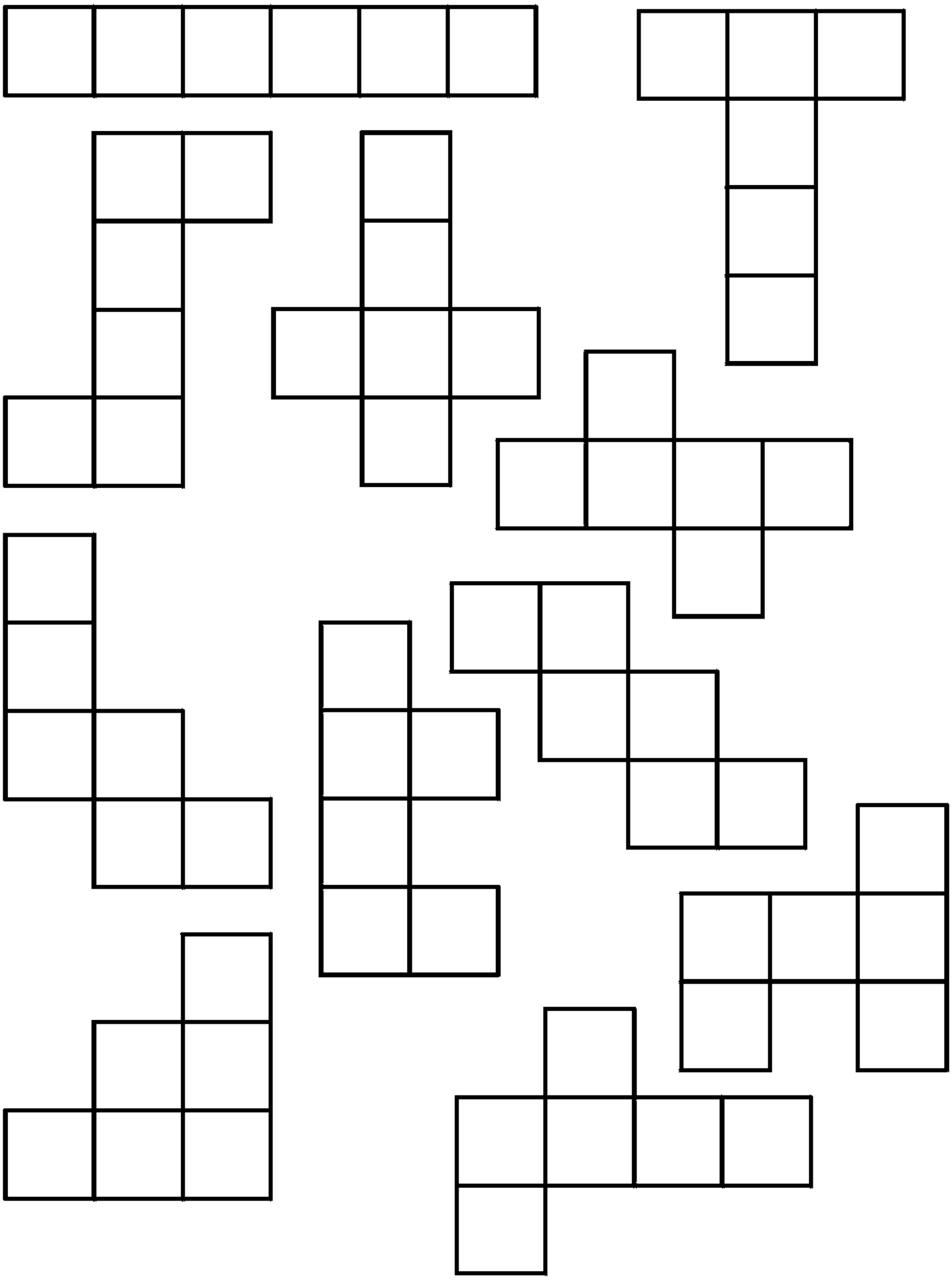
Here is the net of a cube.

Cut the net out and then fold it to make a cube.

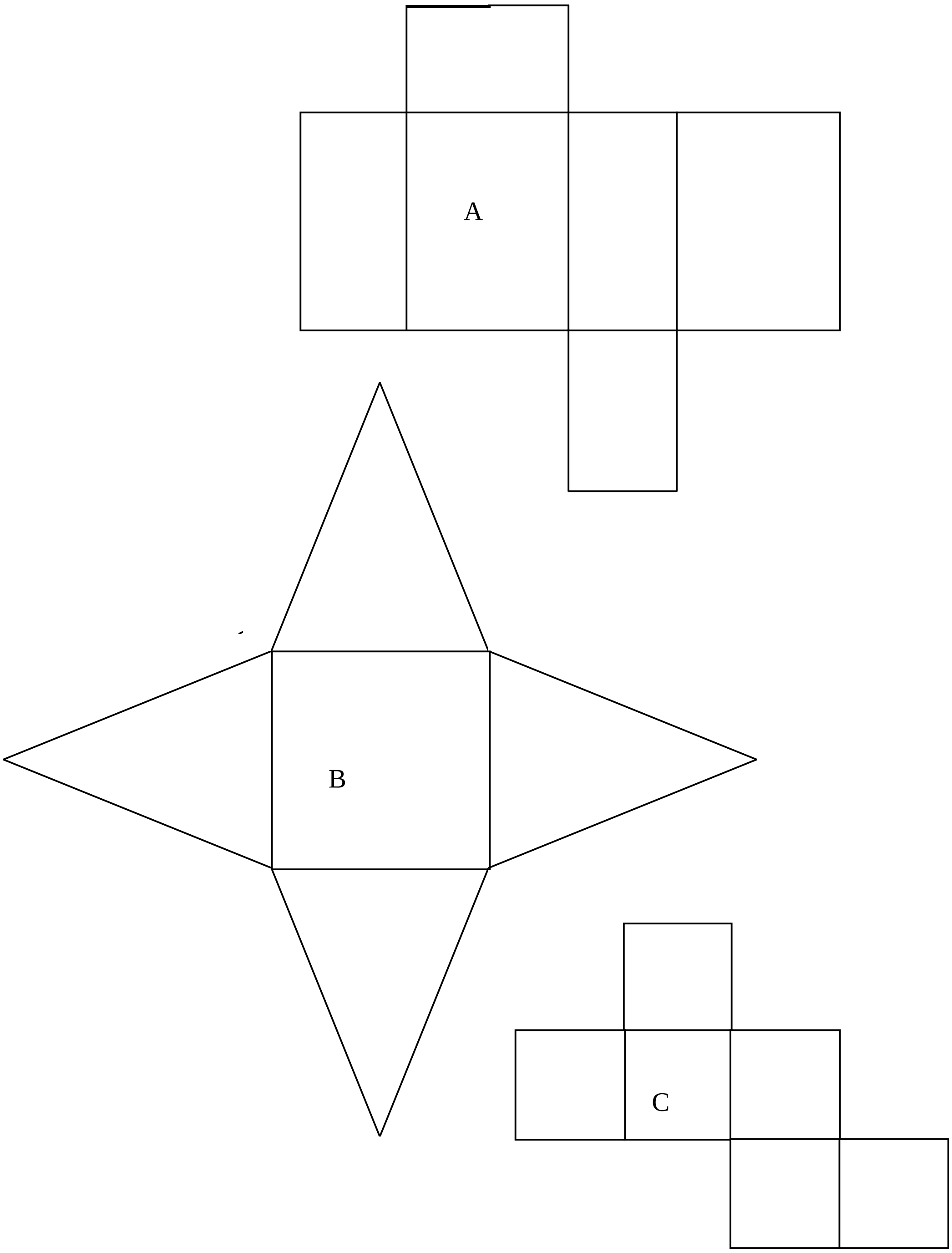


Go back to page 16 of the workbook

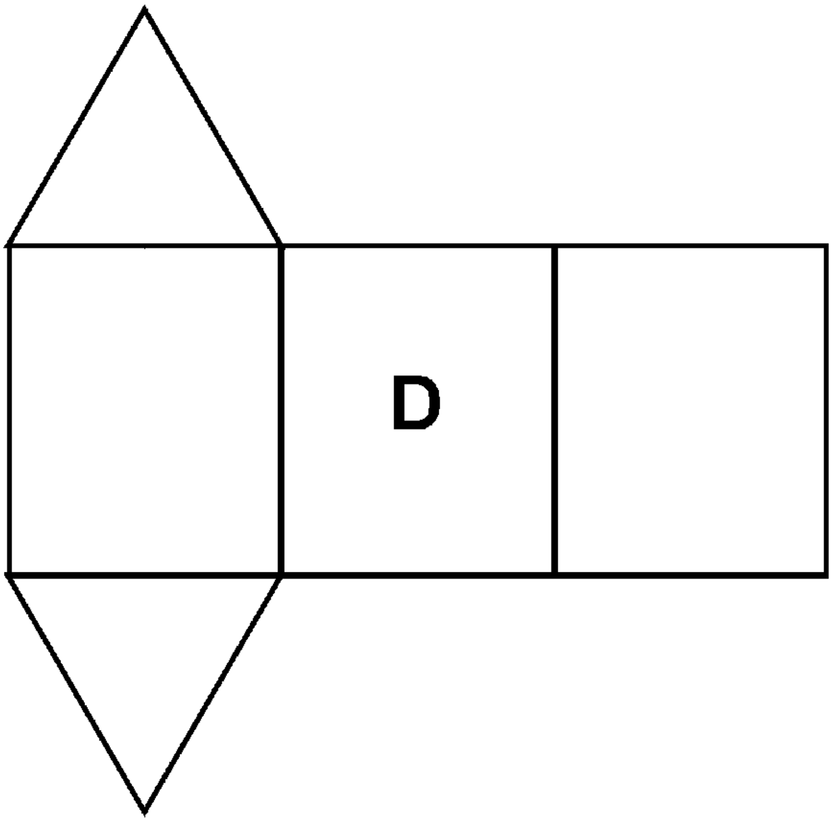
Solids Worksheet 4

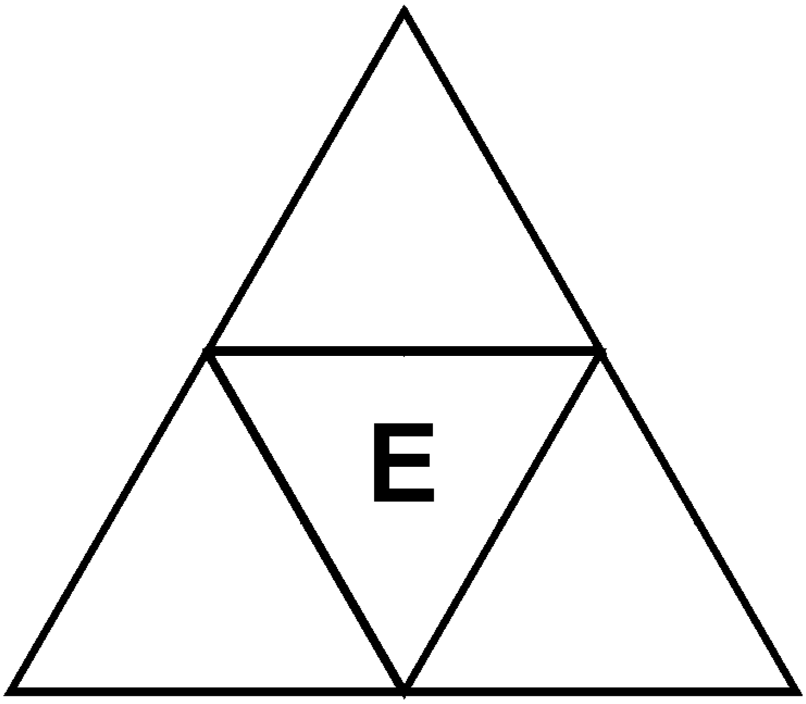


Solids Worksheet 5



Solids Worksheet 6



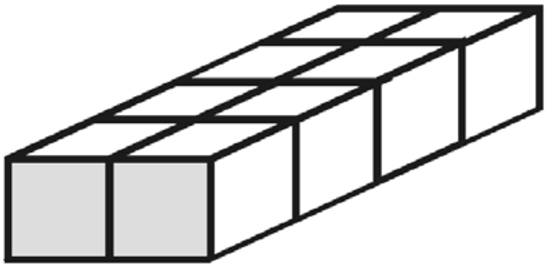


Volume Worksheet 1 (Front)

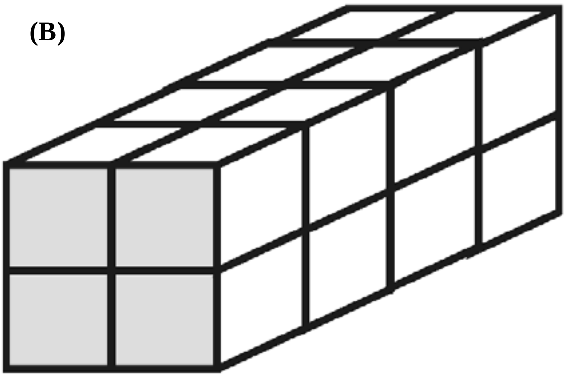
Build each of the solids shown on this worksheet.

For each one count the number of cubes used to build it and write your answers into the table on the back of this sheet.

(A)



(B)



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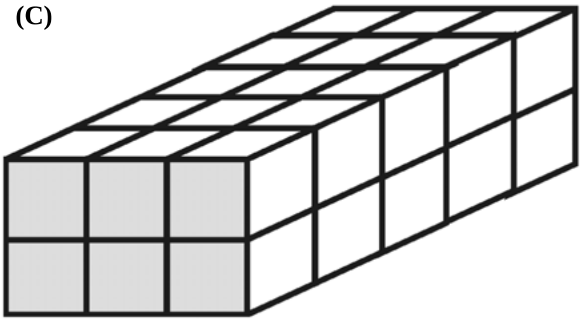

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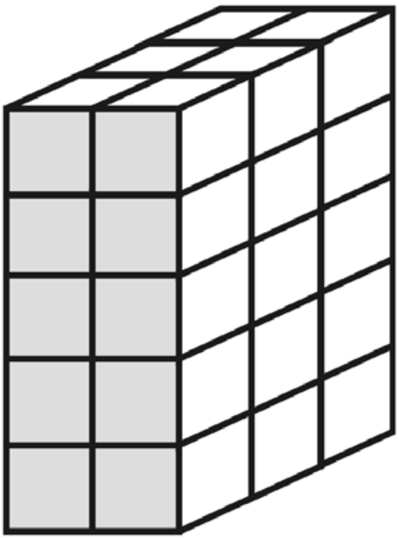

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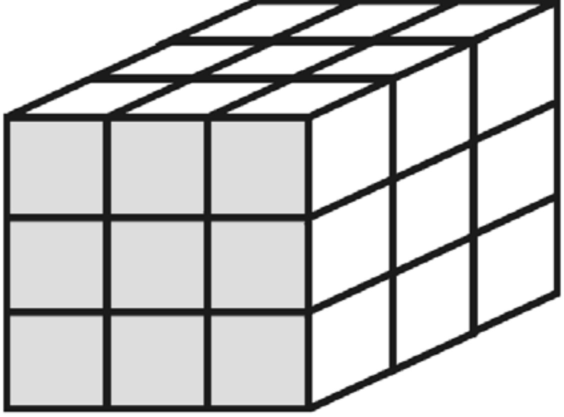

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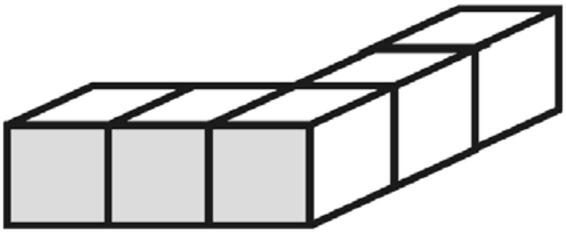
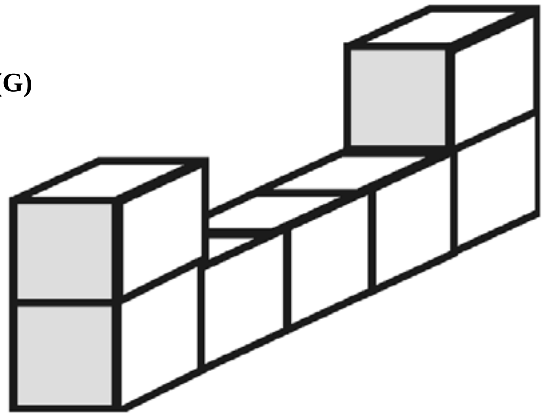
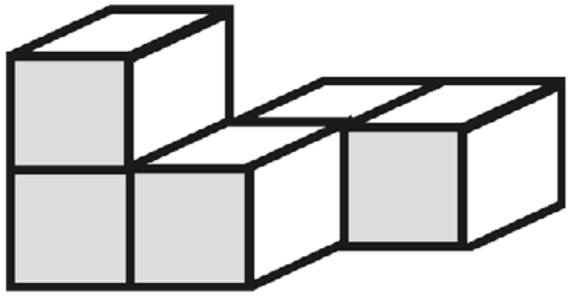


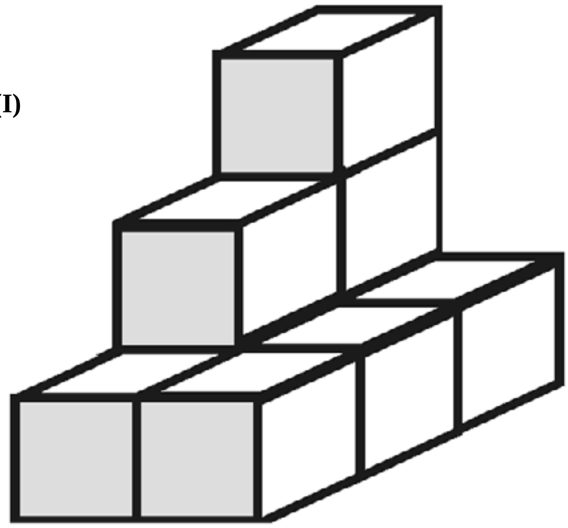
(G)



(H)



(I)



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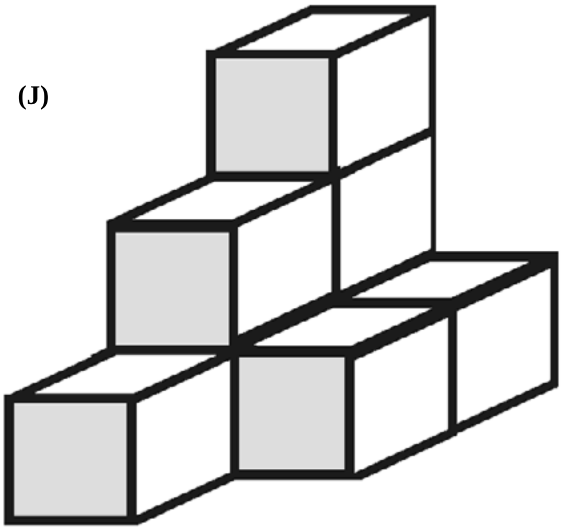
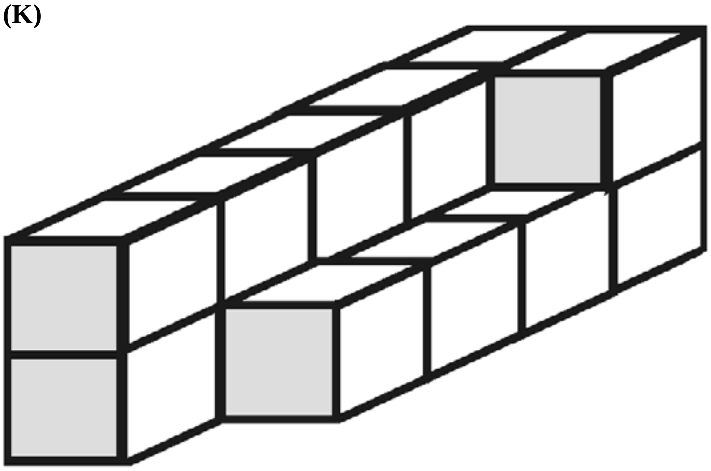
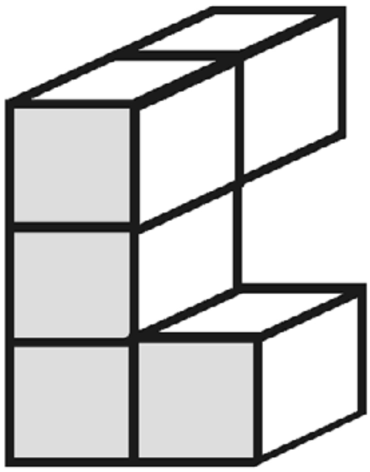


(K)



(L)



Solid	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Volume cm^3												

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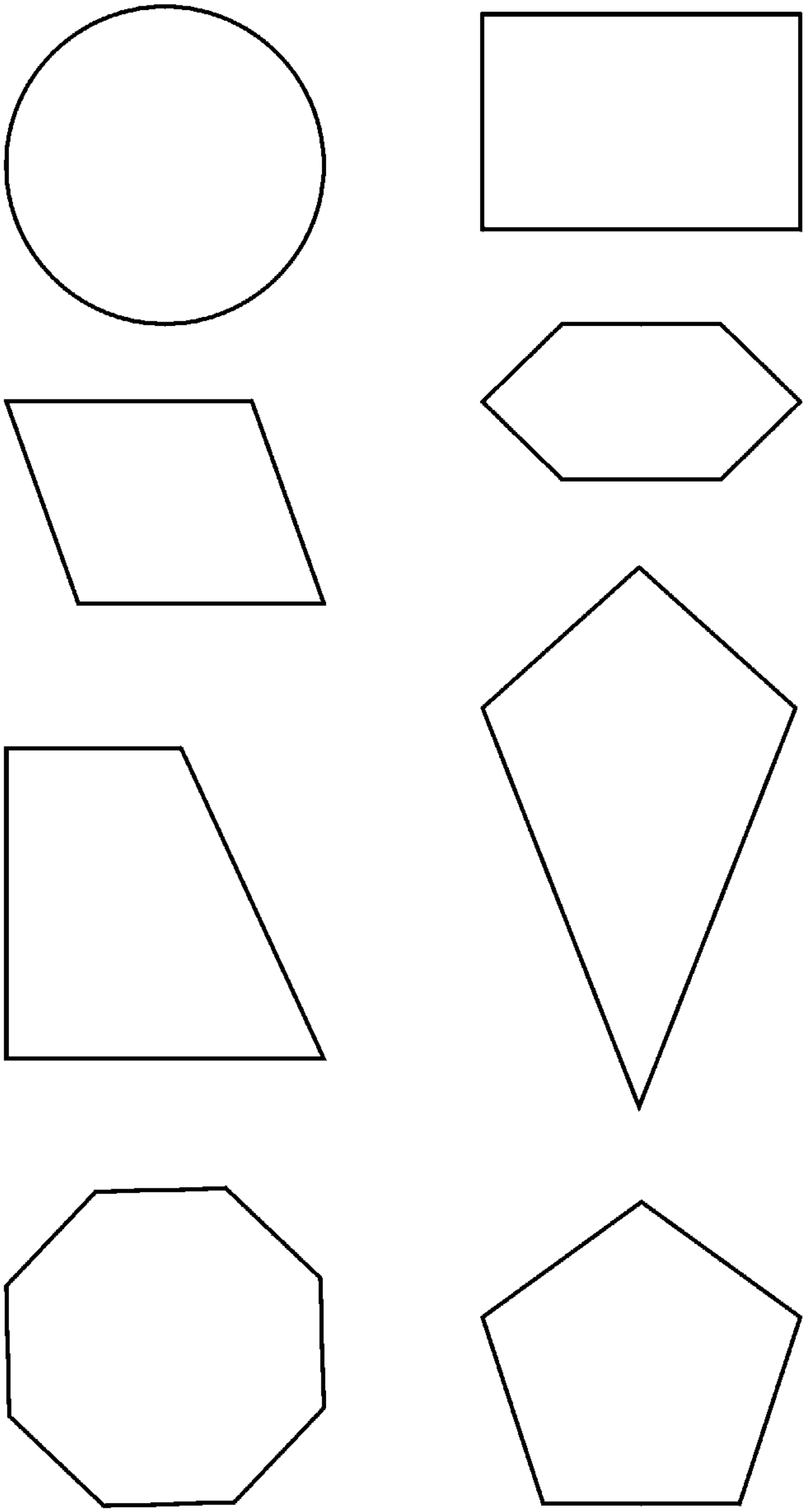
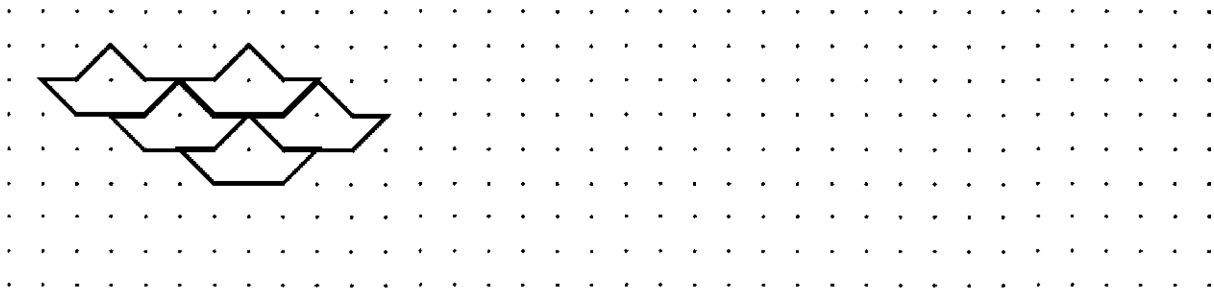
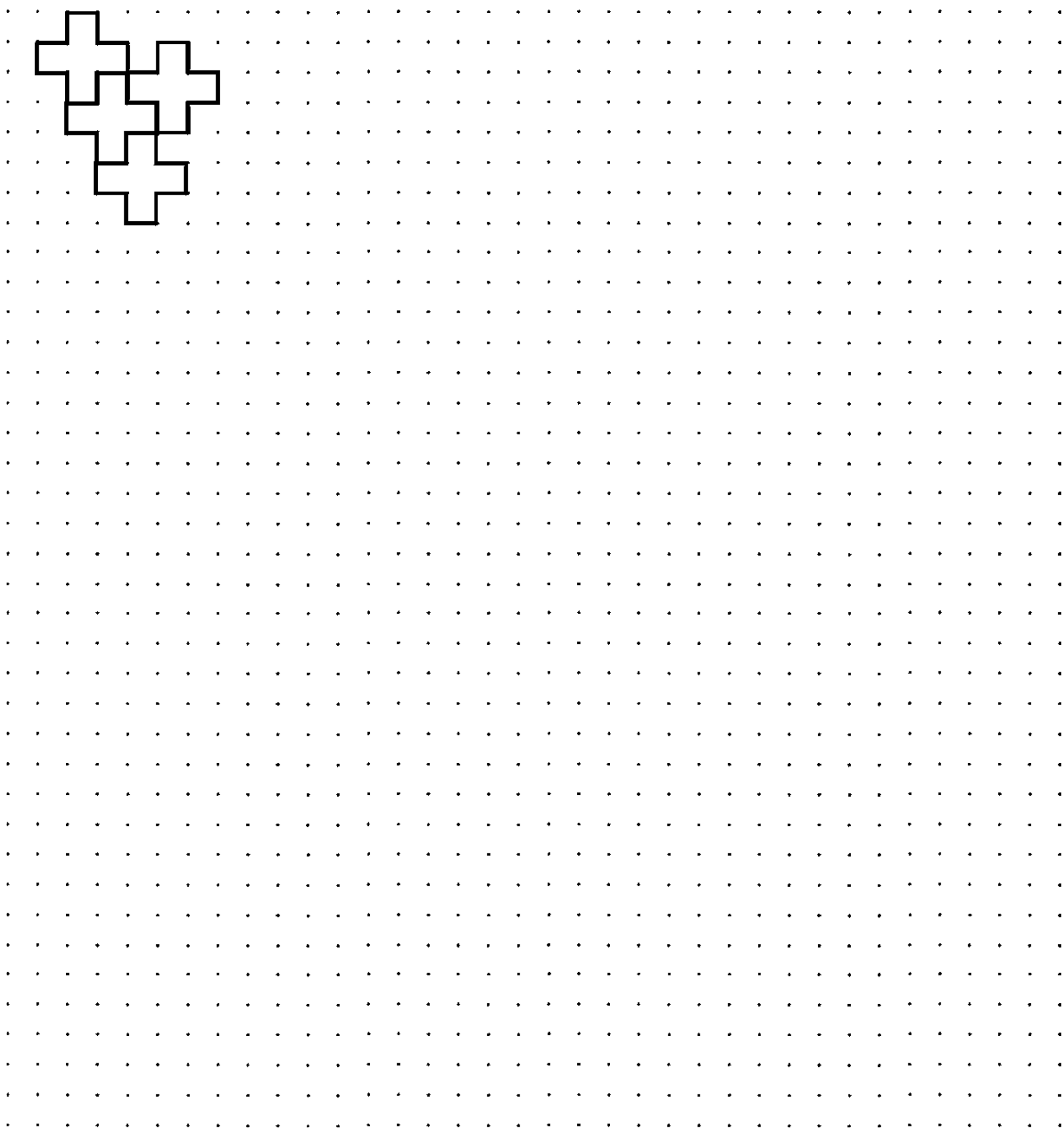
Tiling – Shape Templates

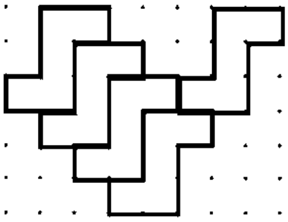


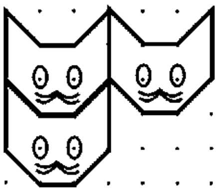
Tiling Worksheet 1 – Front



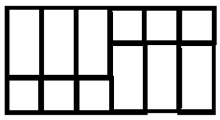


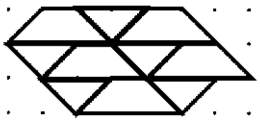
Tiling Worksheet 1 – Back

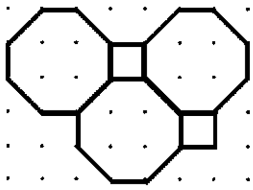




Tiling Worksheet 2







Tiling Worksheet 3