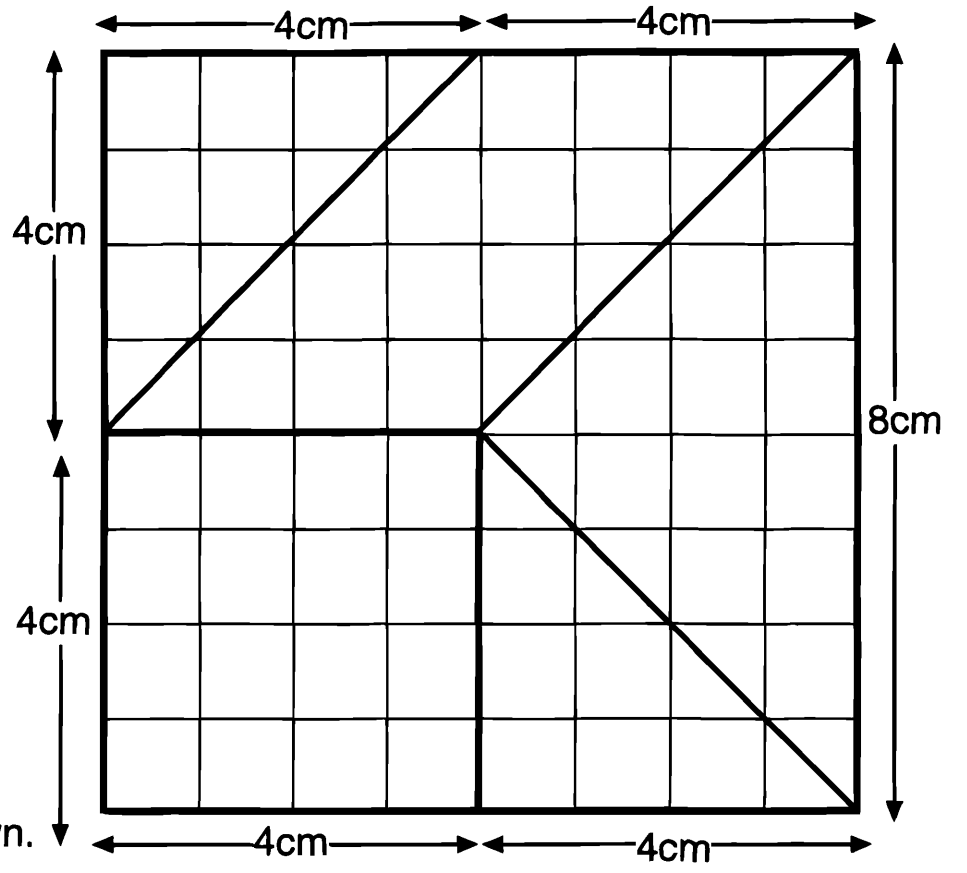
Tangram 1

Smile 0005

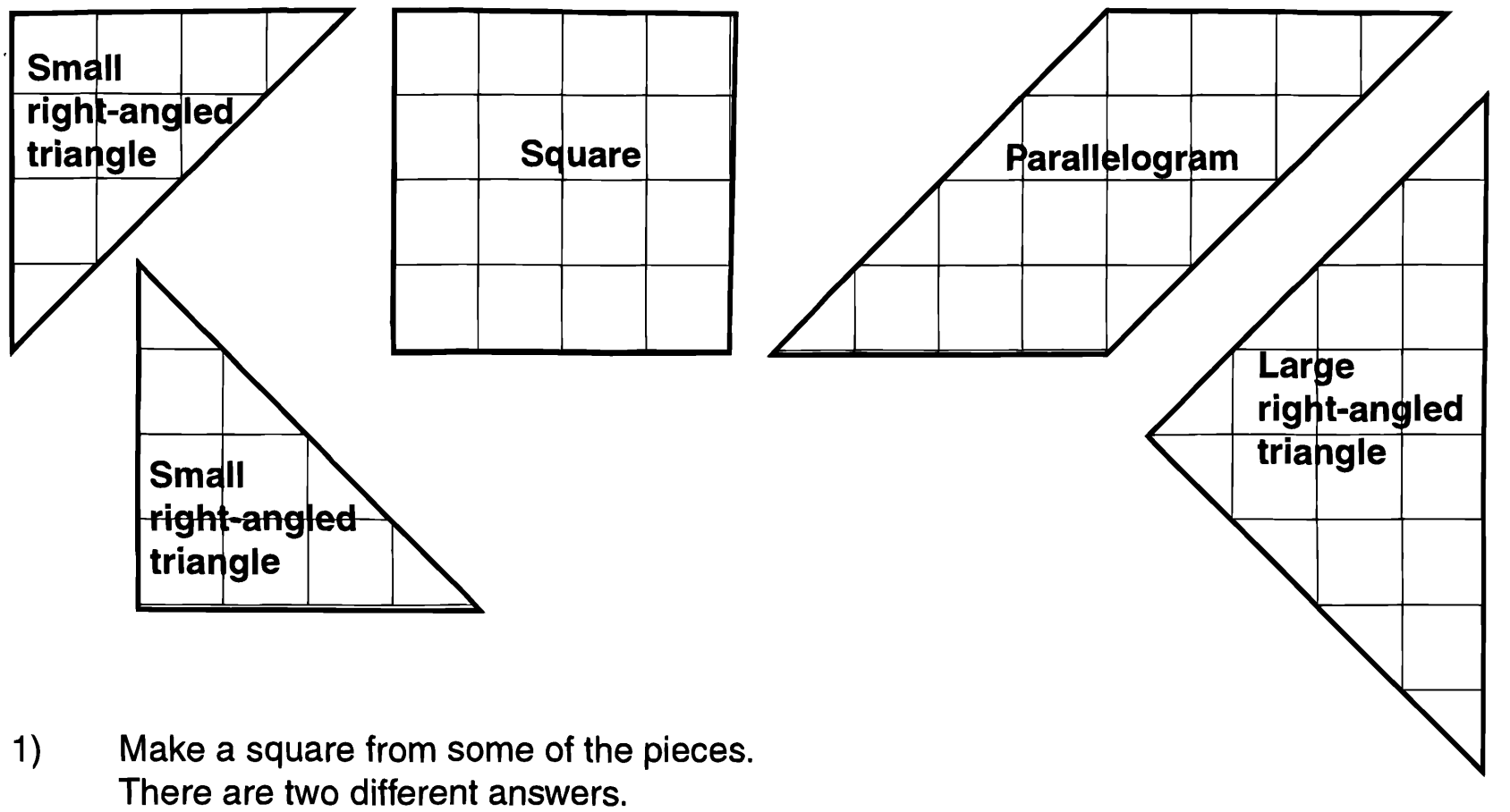
You will need centimetre squared paper and scissors.

Draw this on centimetre squared paper.

Cut out the pieces.



Here are the pieces you should have drawn.



1) Make a square from some of the pieces.
There are two different answers.

2) Make a rectangle from some or all of the pieces.
There are eight different answers.

3) What do you notice about the square and the 2 small right-angled triangles?
What do you notice about the large right-angled triangle?
What do you notice about the parallelogram and the 2 small right-angled triangles?
What is the same about the square, the large right-angled triangle and the parallogram?

Keep your pieces. You will need them again.

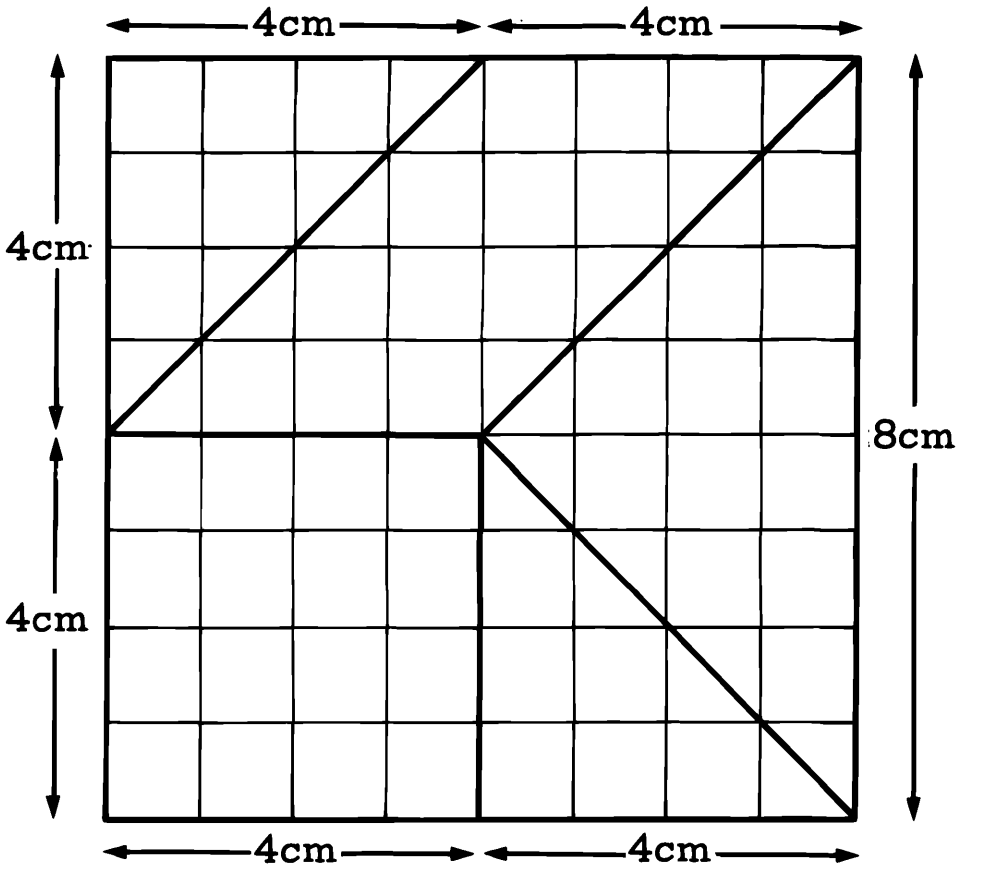
You will need cm squared paper and scissors

Smile **0005**

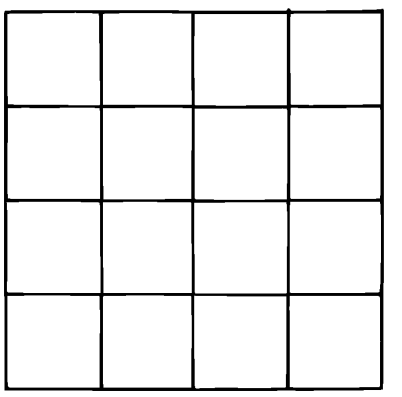
Tangram 1

Draw this on cm squared paper.

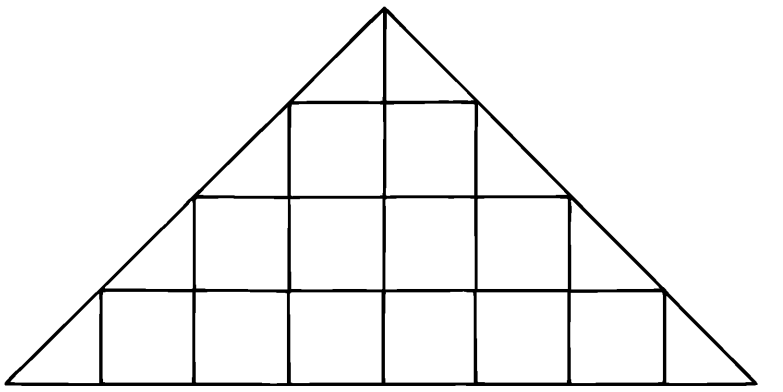
Cut out the pieces.



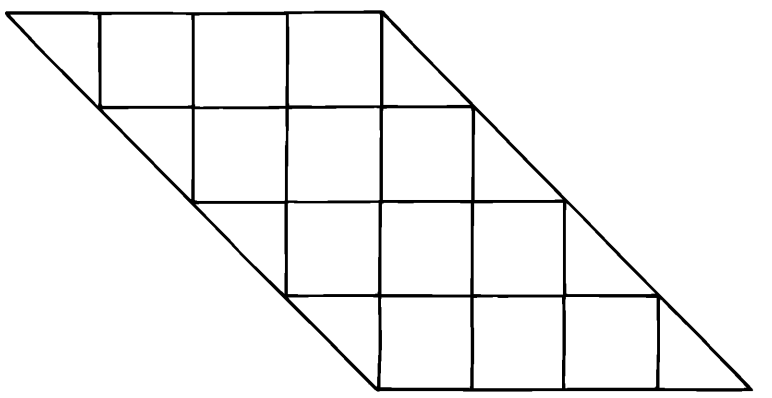
Here are the pieces you should have.



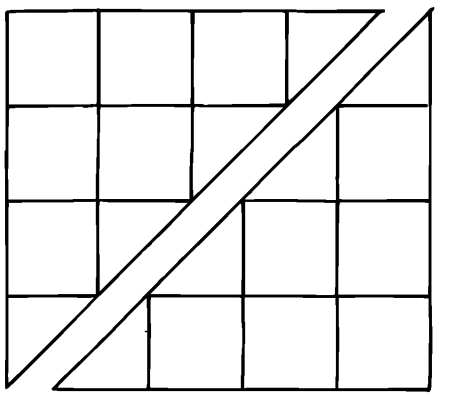
Square



Triangle



Parallelogram



2 small triangles

1) Make a square from some of the pieces. *There are two different answers.*

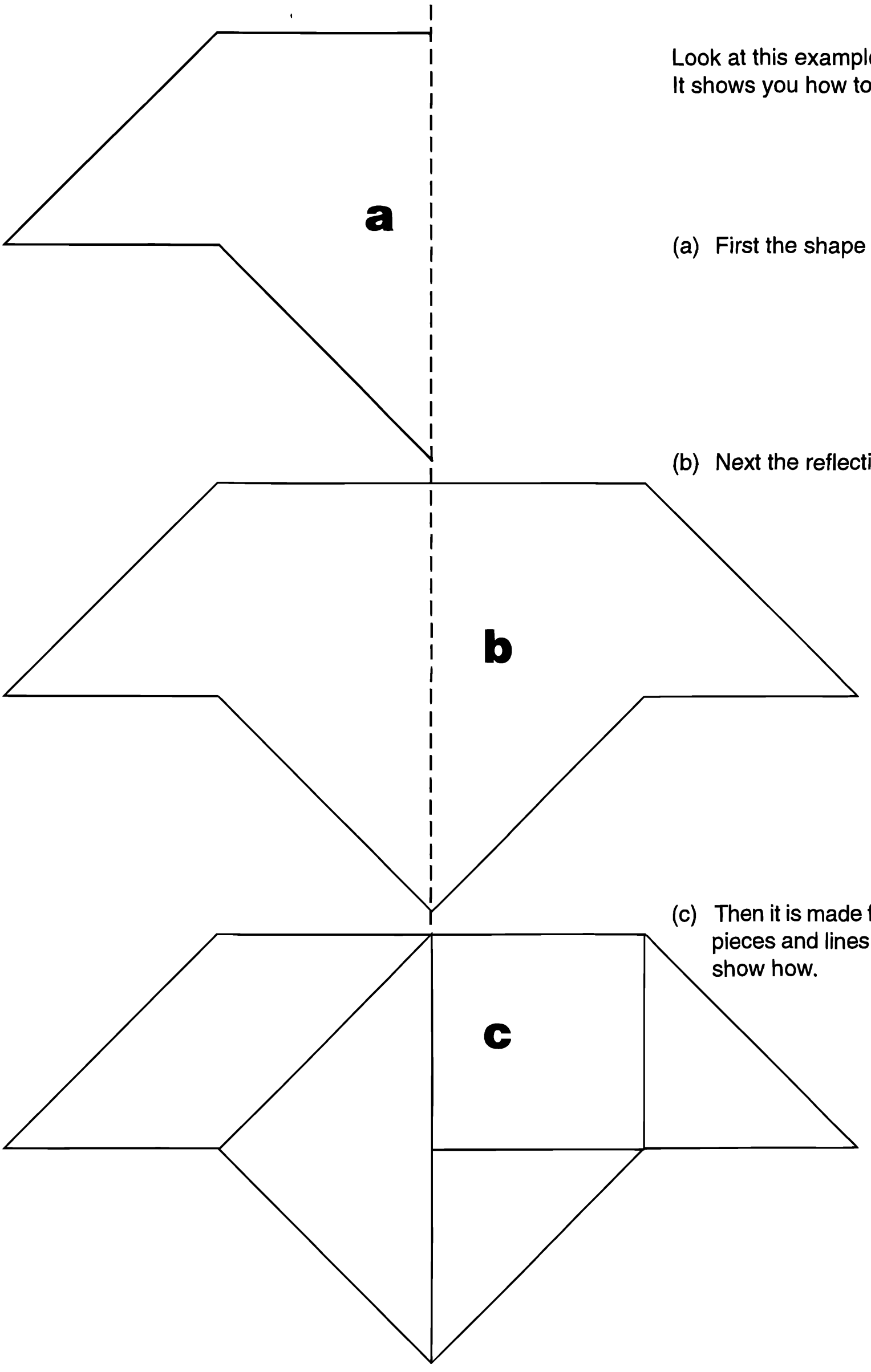
2) Make a rectangle from some or all of the pieces. *There are eight answers.*
Can you find them all?

3) What do you notice about the square and the 2 small triangles?
What do you notice about the large triangle and the 2 small triangles?
What do you notice about the parallelogram and the 2 small triangles?
What is the same about the square, large triangle and parallelogram?

KEEP YOUR PIECES! You will need them again.

Tangram 3

You will need tangram pieces from SMILE 0005 Tangram 1.

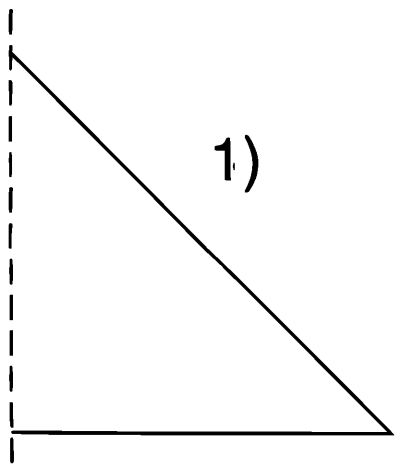


Look at this example.
It shows you how to do the work.

(a) First the shape is traced.

(b) Next the reflection is added.

(c) Then it is made from tangram pieces and lines are drawn to show how.

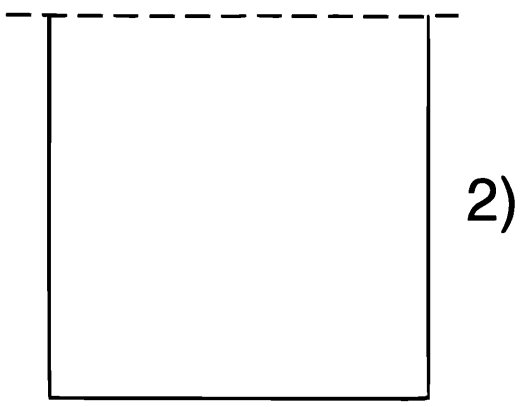


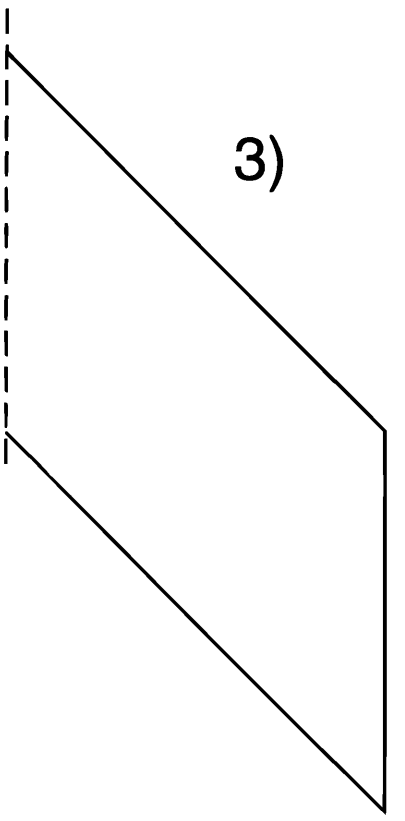
For each question:

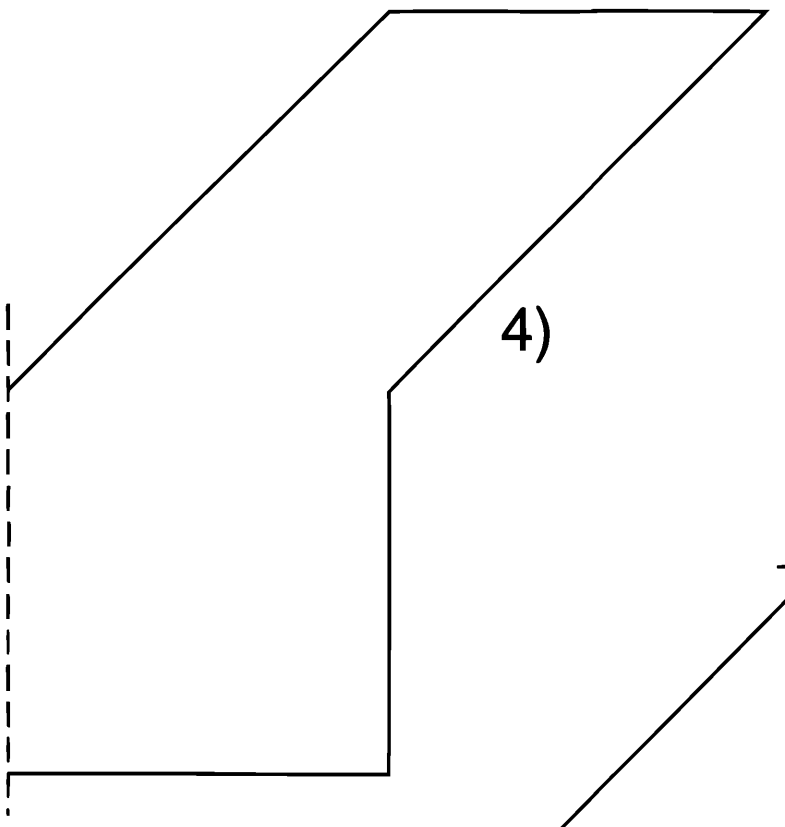
(a) trace the shape

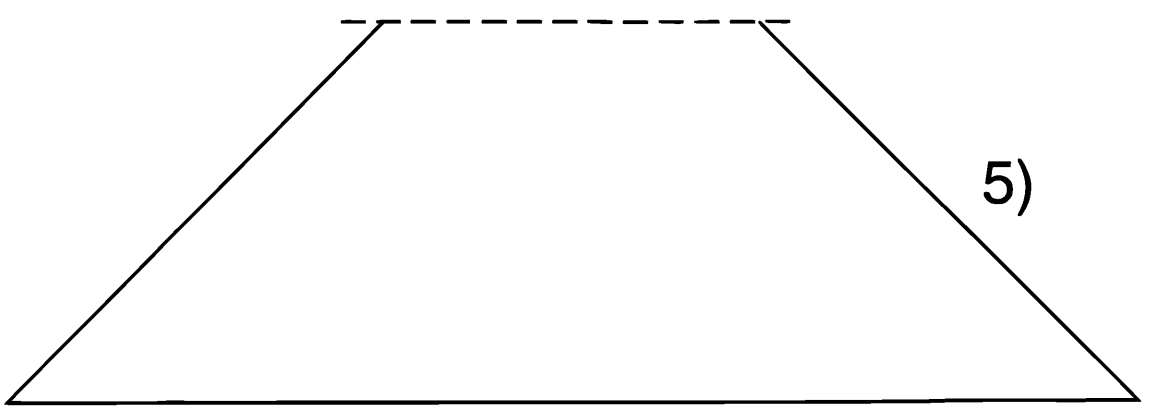
(b) draw the reflection about the mirror line

(c) fit the tangram pieces – draw lines to show how.





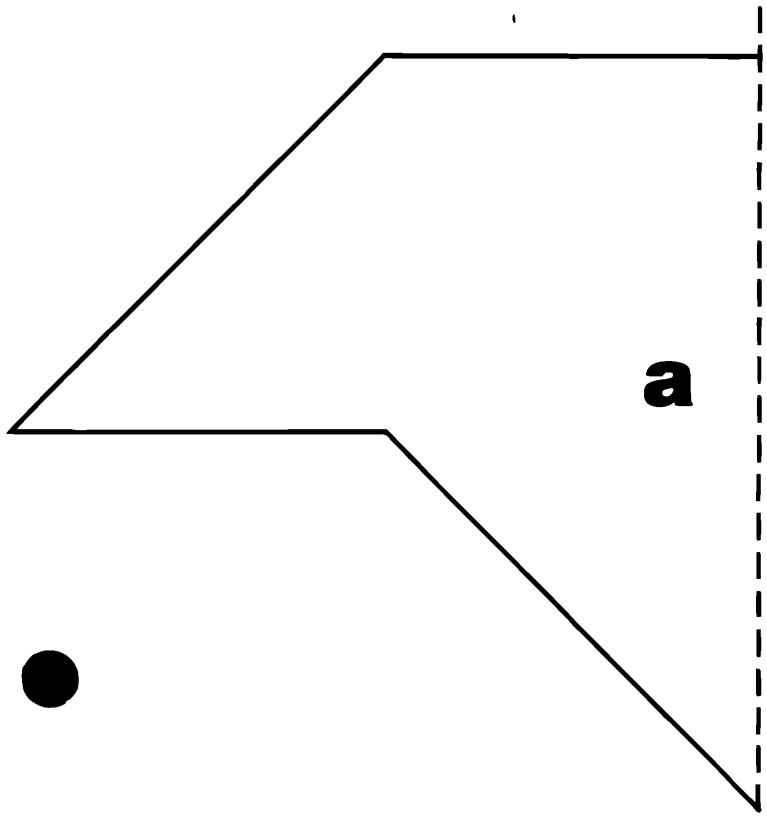




Tangram 3

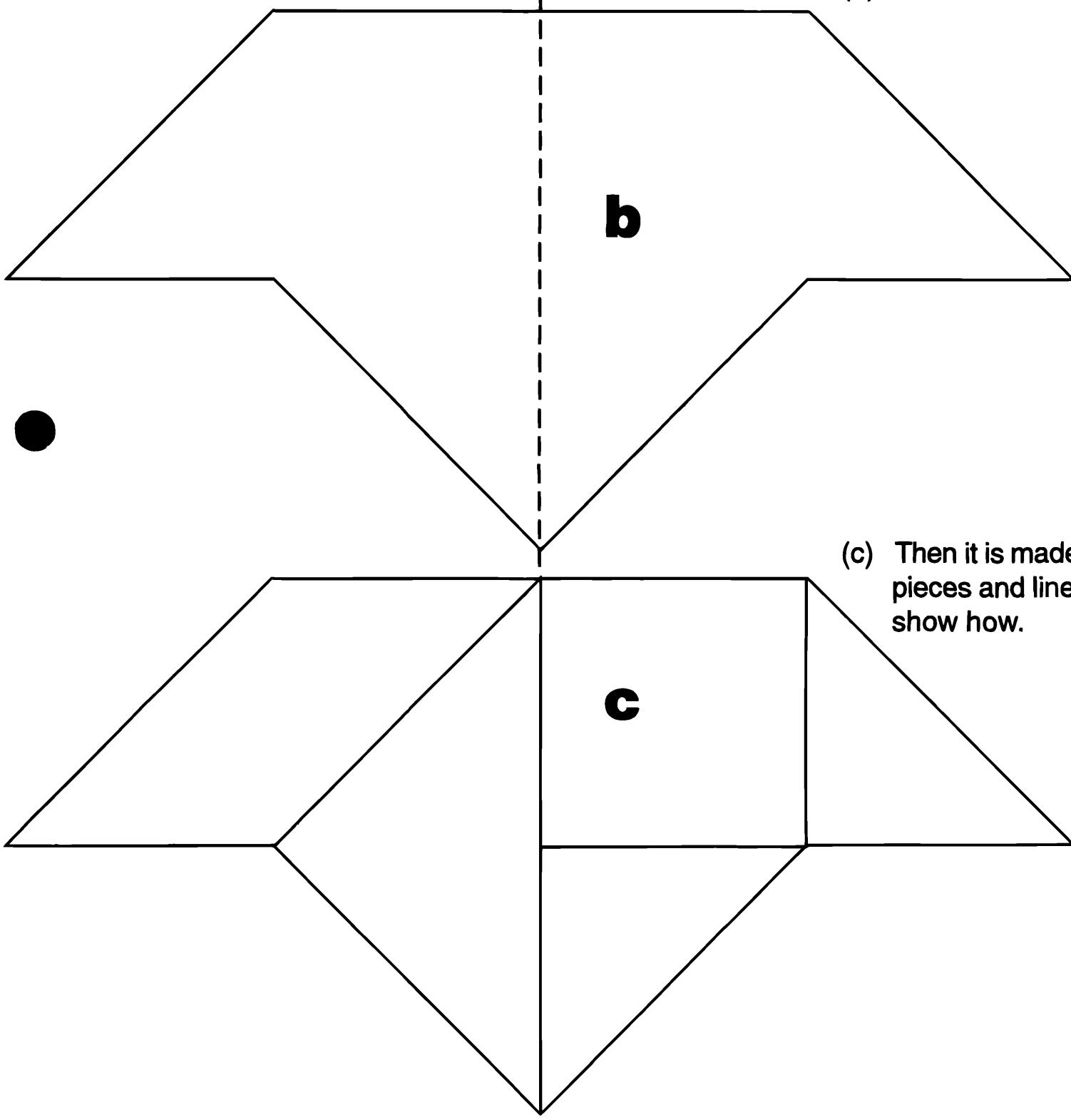
Smile **0007**

You will need tangram pieces from SMILE 0005 Tangram 1.



Look at this example.
It shows you how to do the work.

(a) First the shape is traced.



(b) Next the reflection is added.

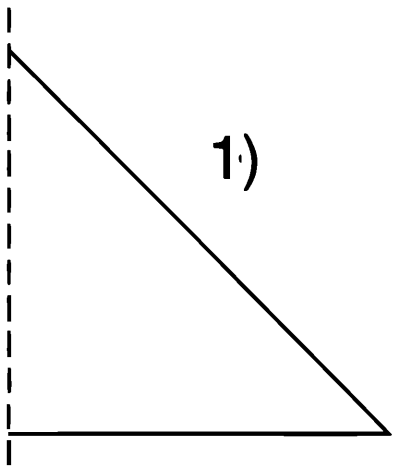
(c) Then it is made from tangram pieces and lines are drawn to show how.

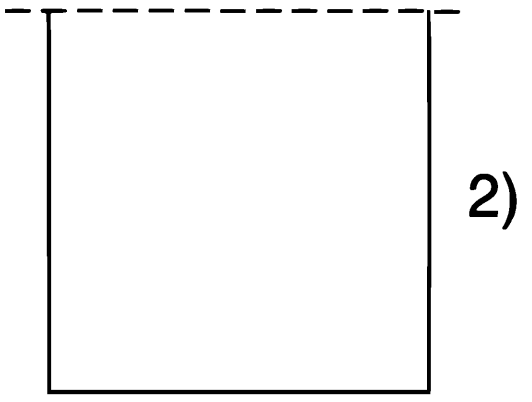
For each question:

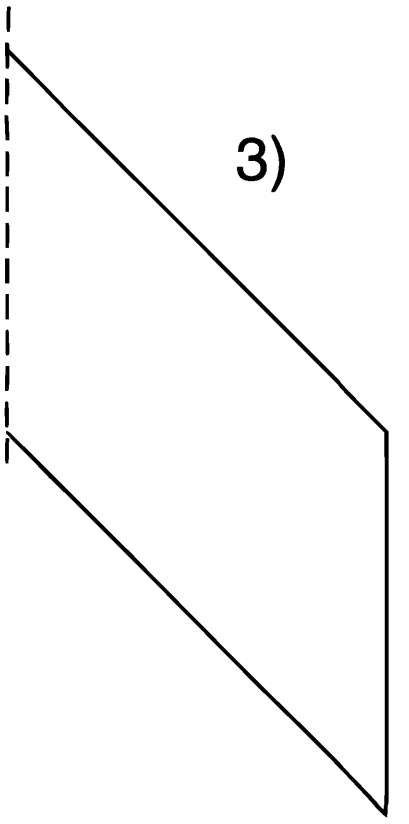
(a) trace the shape

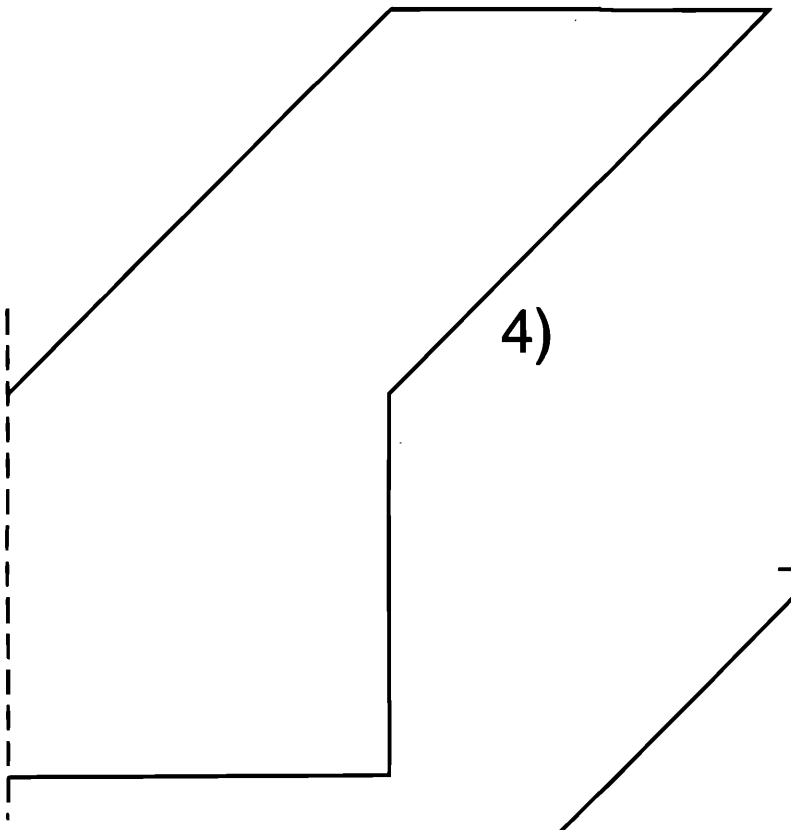
(b) draw the reflection about the mirror line

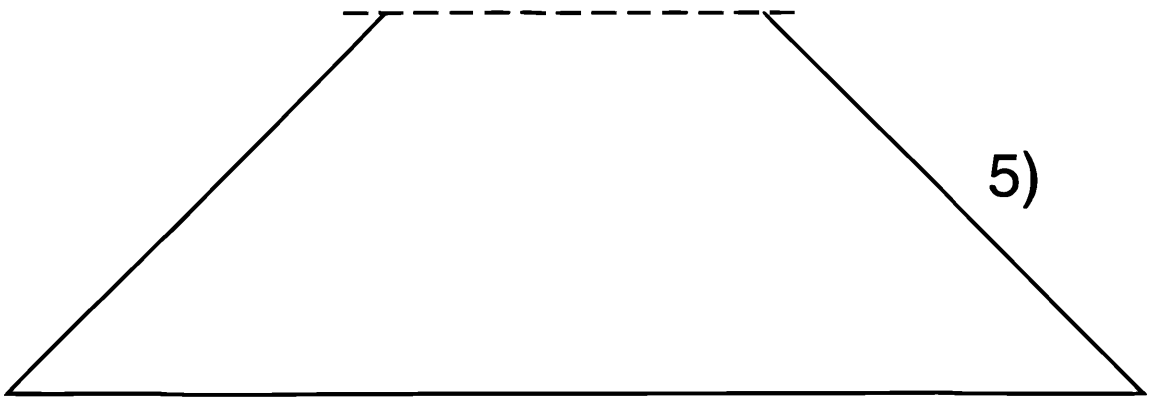
(c) fit the tangram pieces – draw lines to show how.





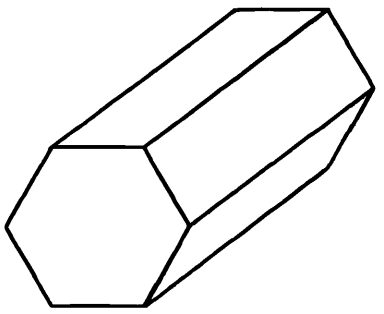




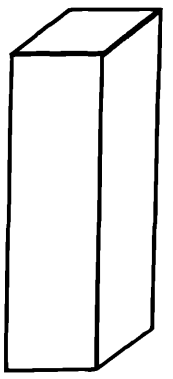


You will need a box of solids and a large sheet of paper.

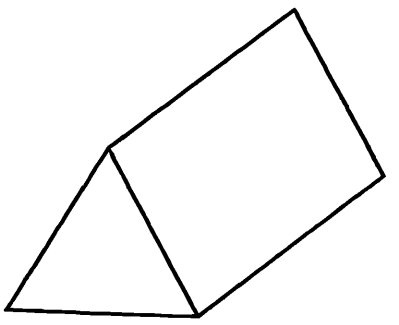
Here are some prisms.



Hexagonal Prism

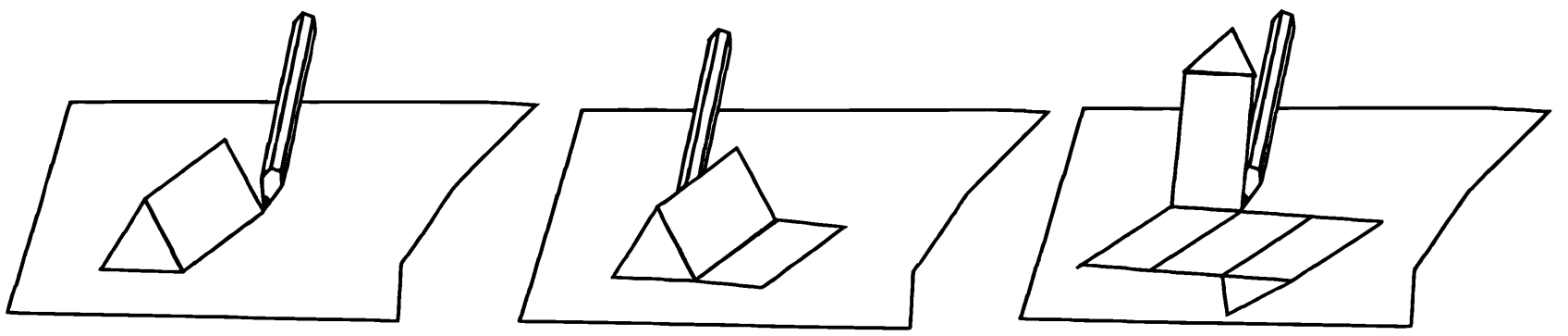


Square Prism



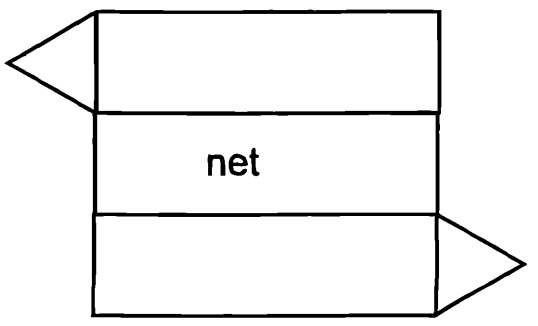
Triangular Prism

Choose a prism from you box of solids.
On a large sheet of paper draw round one of its faces.
Roll the prism over and draw round the next face.
Roll again, until you have drawn all the faces.

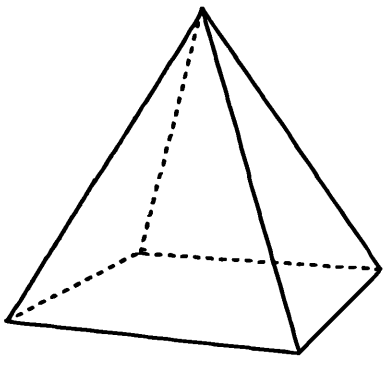


Your finished shape is called a net.
Cut out your net.
If you fold it up it will make a prism.

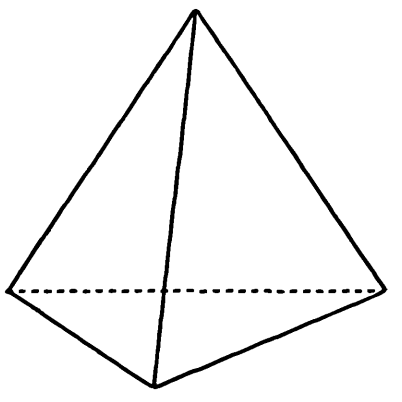
Stick the net in your book.



Make nets for other prisms and for some pyramids.



Square based pyramid



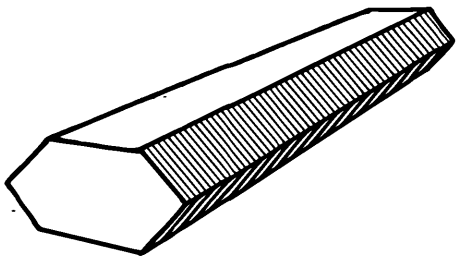
Triangular based pyramid

You will need a box of solids and a large sheet of paper

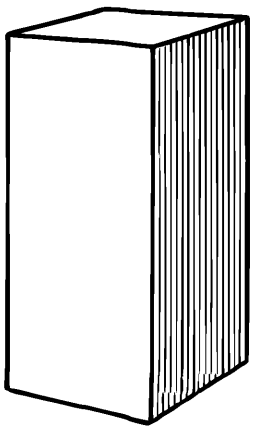
Smile **0008**

PRISMS AND PYRAMIDS

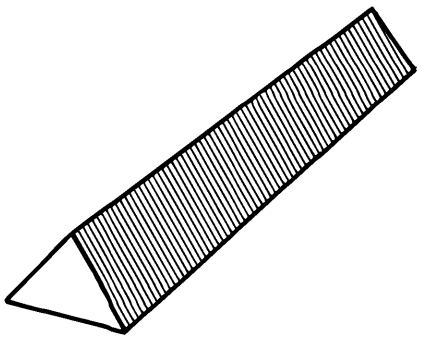
*Here are some **prisms:***



Hexagonal Prism

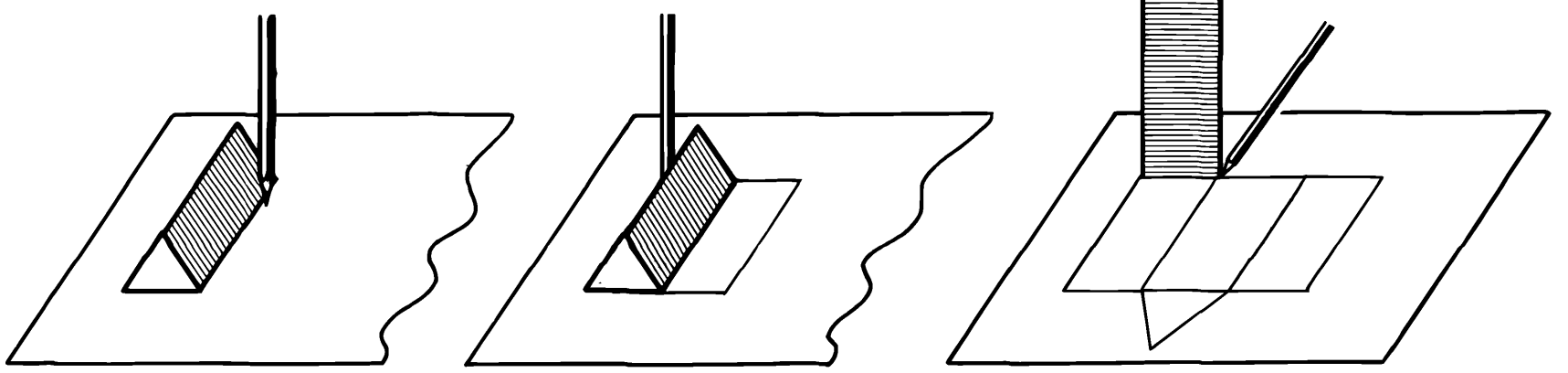


Square Prism

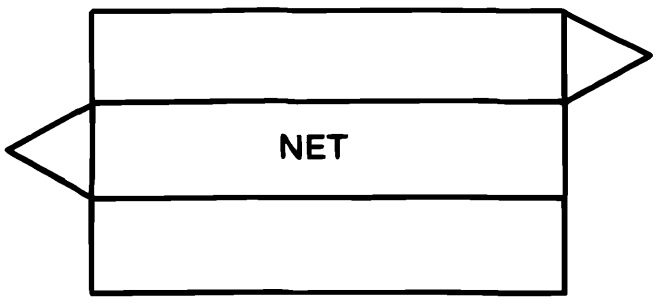


Triangular Prism

Choose a prism from your box of solids.
On a large sheet of paper draw round one of its faces.
Roll the prism over and draw round the next face.
Roll again, until you have drawn all the faces.

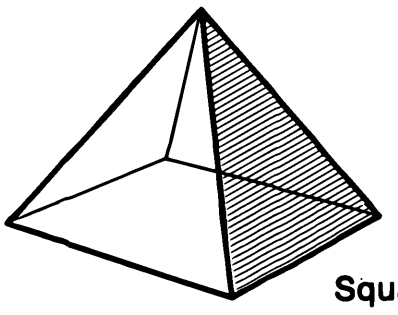


Your finished shape is called a net.
Cut out your net.
If you fold it up it will make the prism.

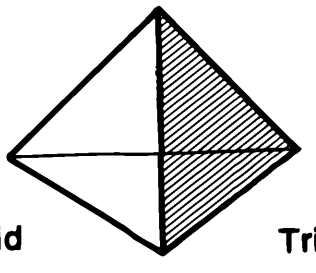


Stick the net in your book.

Make nets for other prisms and for some pyramids.



Square Pyramid



Triangular Pyramid

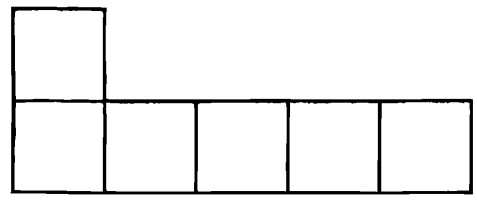
You will need: cm squared paper

Area 1

The area of this shape is

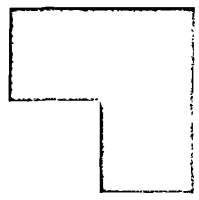
6 sq cm or 6 cm^2

(Read this ' six square centimetres'.)

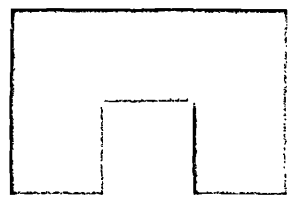


Draw each shape below, on a cm squared paper and write the area.

1.

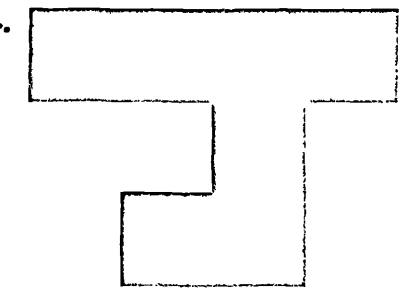


2.

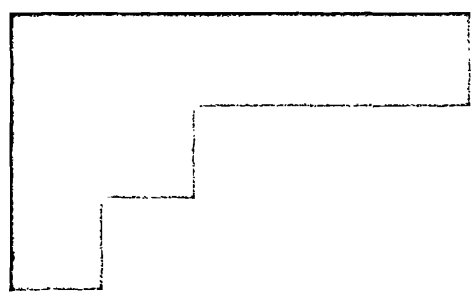


3.

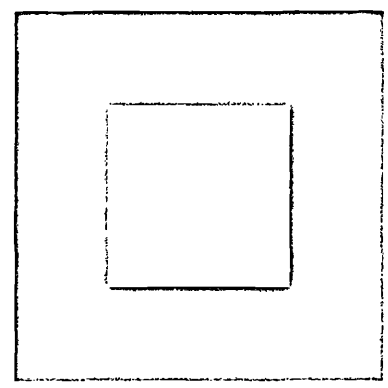
4.



5.



6.



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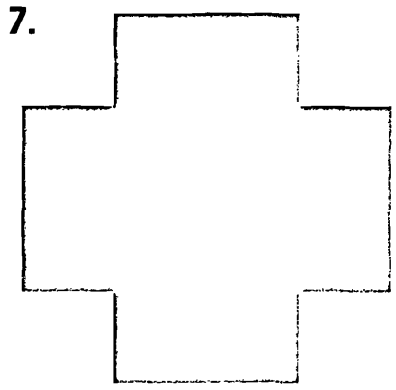
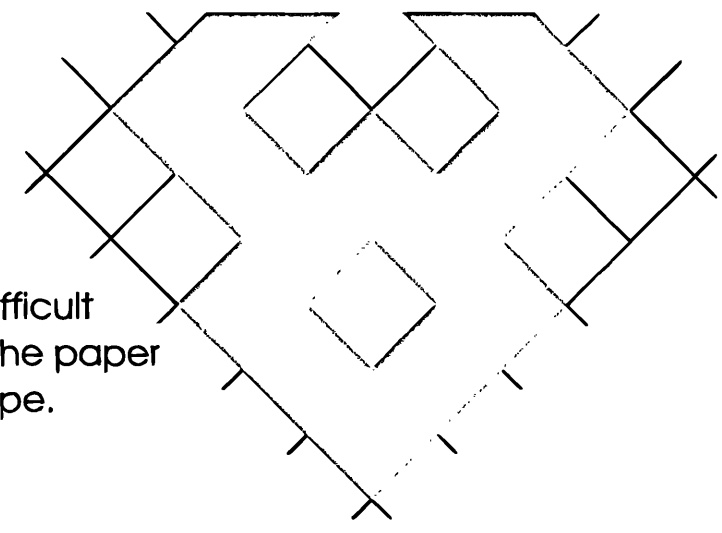
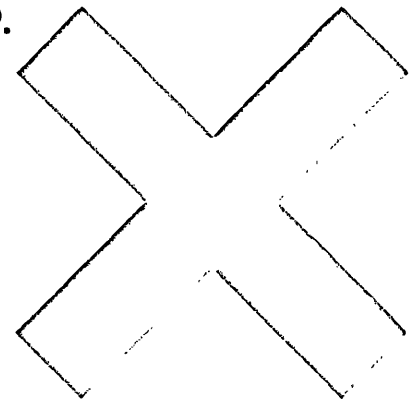


8.



Question **8.** looks difficult to draw . . . so turn the paper first or trace the shape.

9.



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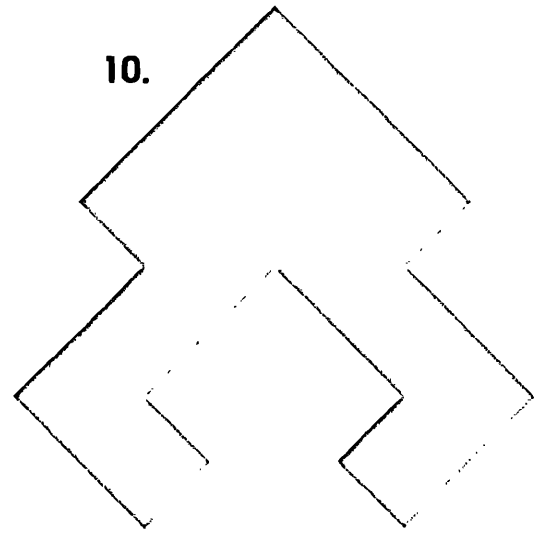
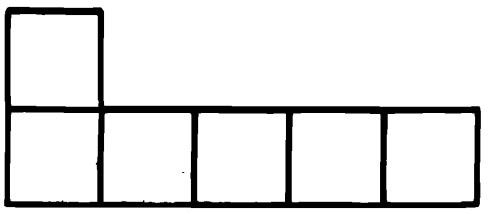


You will need cm squared paper

Smile **0022**

Area 1

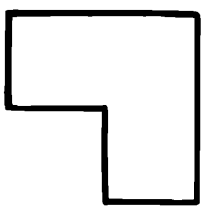


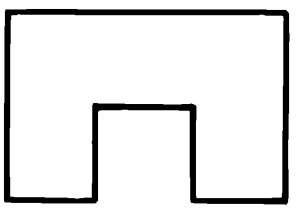
The area of this shape is

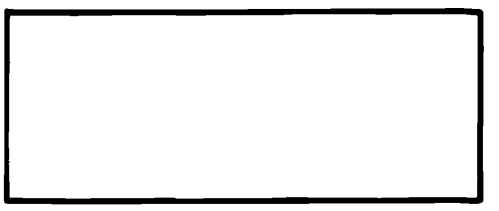
6 sq cm or 6 cm^2

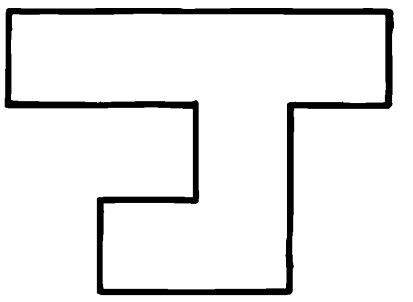
(Read this 'six square centimetres'.)

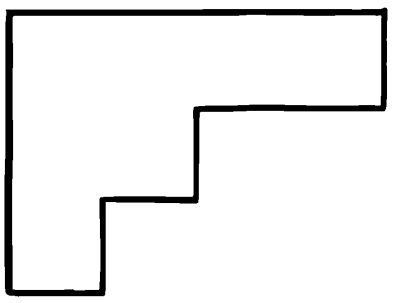
Draw each shape below, on cm squared paper and write the area.

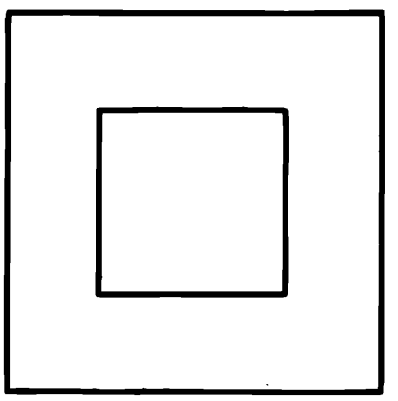
1) 

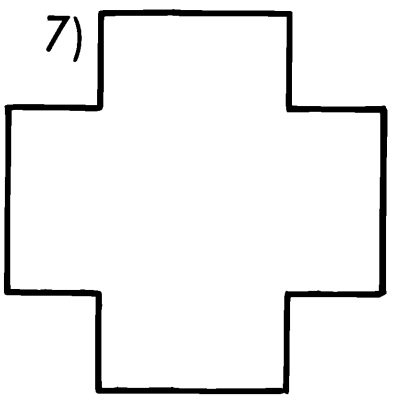
2) 

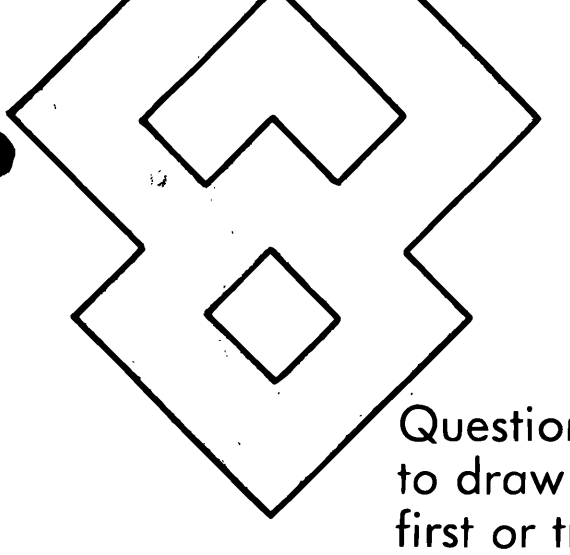
3) 

4) 

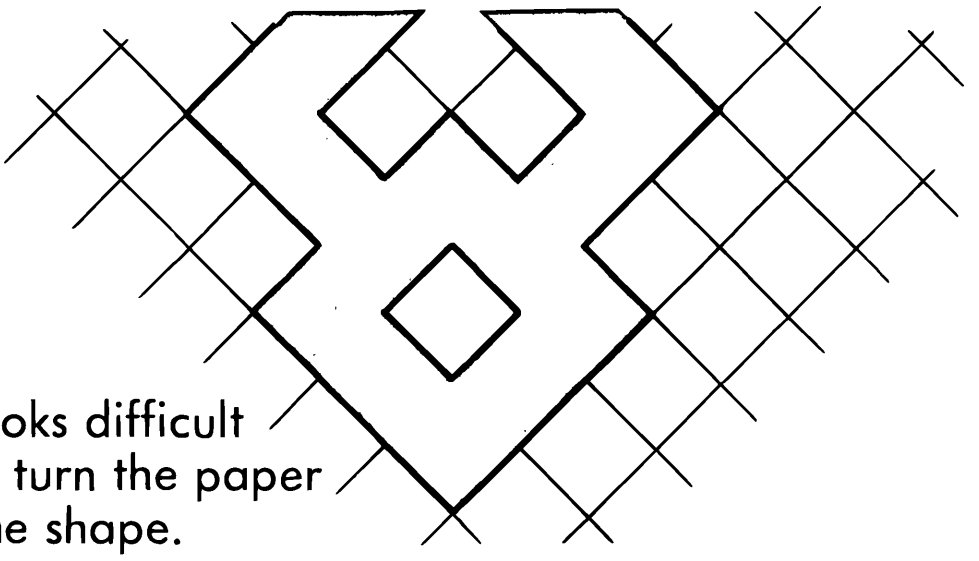
5) 

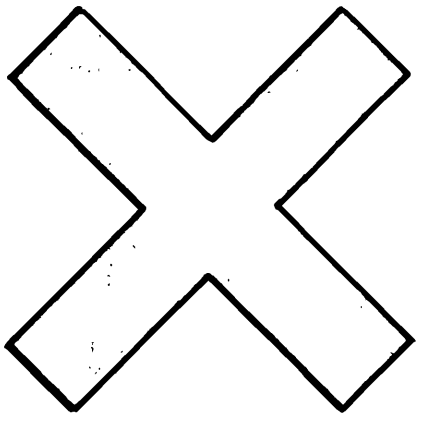
6) 

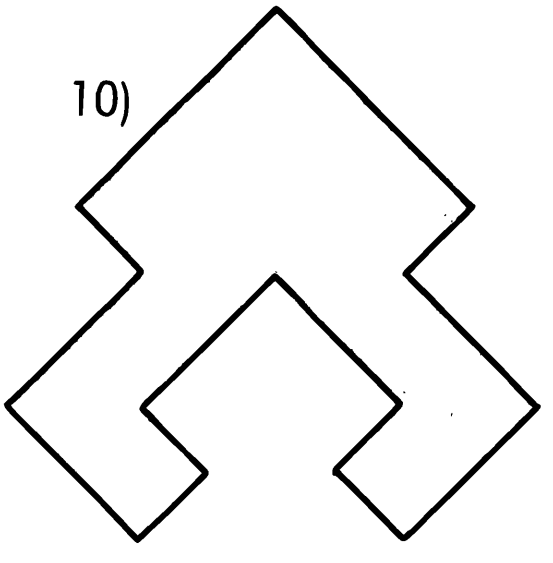
7) 

8) 

Question (8) looks difficult to draw . . . so turn the paper first or trace the shape.



9) 

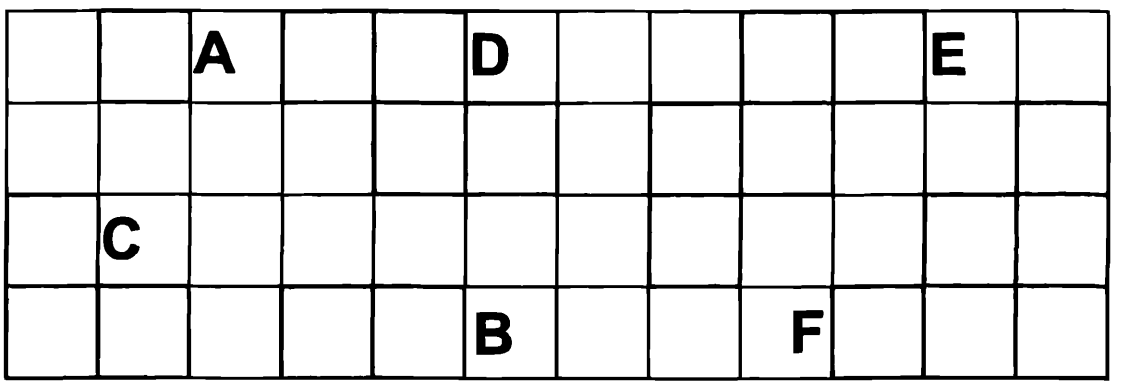
10) 

Area 2

You will need centimetre square paper.

1) List the areas of these shapes:

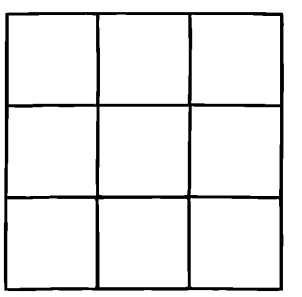
A is 1cm^2
B is [redacted]
C is [redacted]
D is [redacted]
E is [redacted]
F is [redacted]



2) Draw the shapes and cut them out.

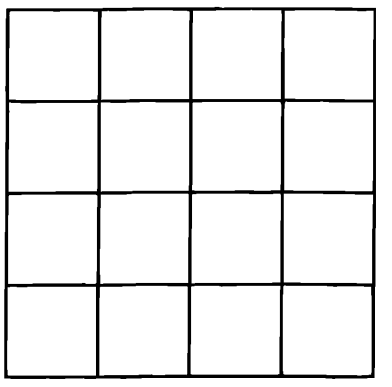
3) Use some of your shapes to fill the 3cm x 3cm square and sketch your answer.

What is the area of the square?



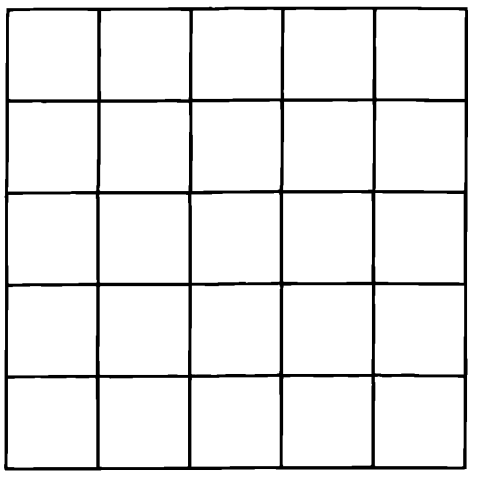
4) Use some of your shapes to fill the 4cm x 4cm square and sketch your answer.

What is the area of the square?



5) It is impossible to make a 5cm x 5cm square using the pieces above.

Why?



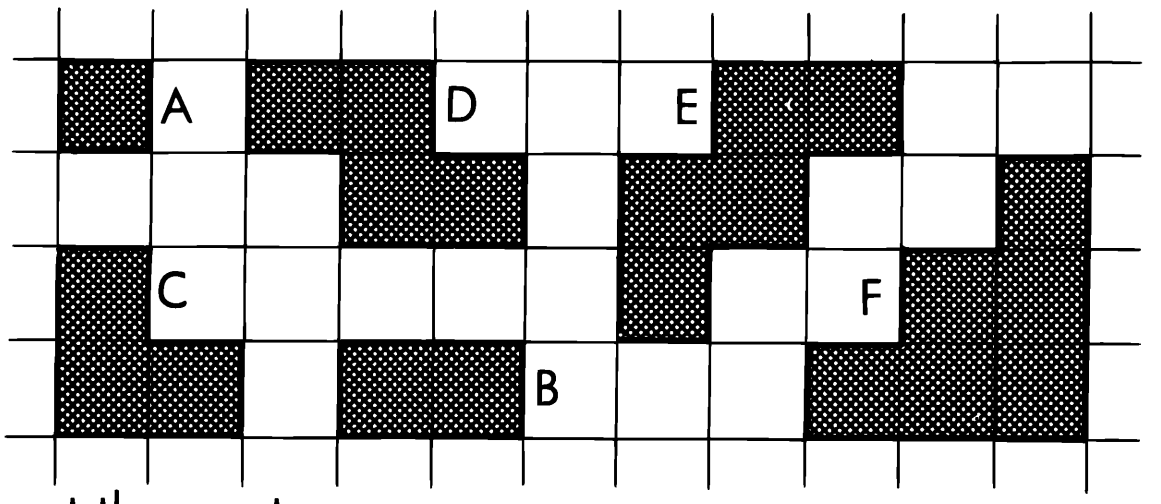
Keep your shapes. You will need them for the test.

You will need cm squared paper

Smile **0023**

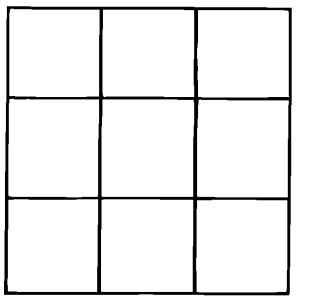
Area 2

1) List the areas of these shapes:
A is 1cm²
B is
C is
D is
E is
F is

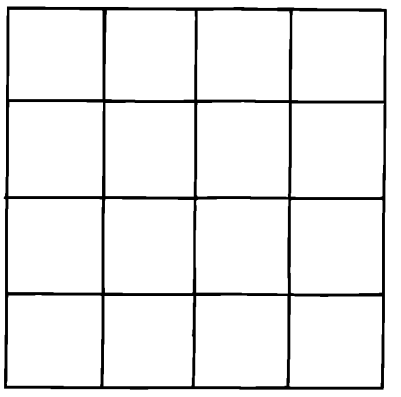


2) Draw the shapes and cut them out.

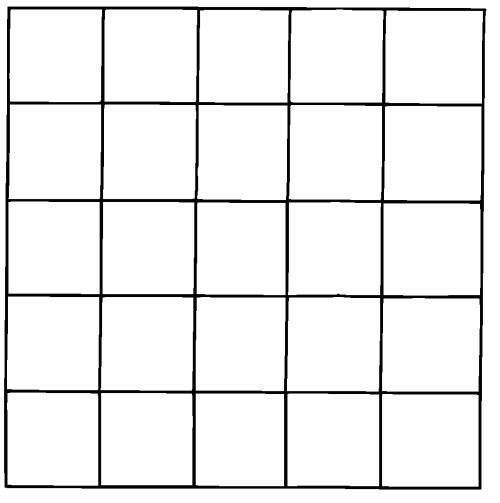
3) Use some of your shapes to fill the 3cm x 3cm square and sketch your answer.
What is the area of the square?



4) Do the same for this 4cm x 4cm square and write down the area.



5) It is impossible to make a 5cm x 5cm square using the pieces above.
Why?

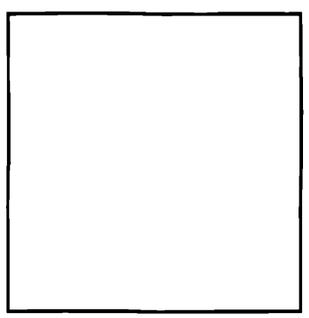


Keep your shapes - You will need them for the test

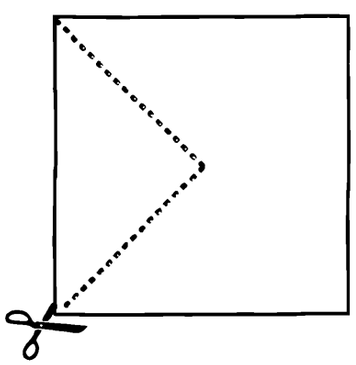
Area 3

You will need paper and scissors.

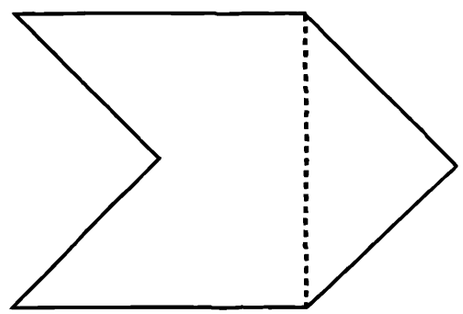
Start with a square …



… cut it along the dotted line …



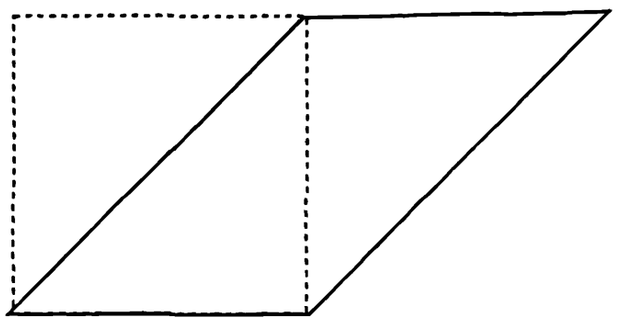
… change the square into this shape.

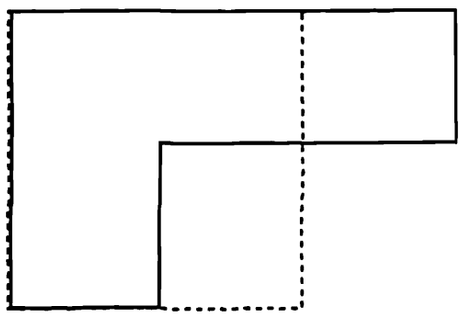


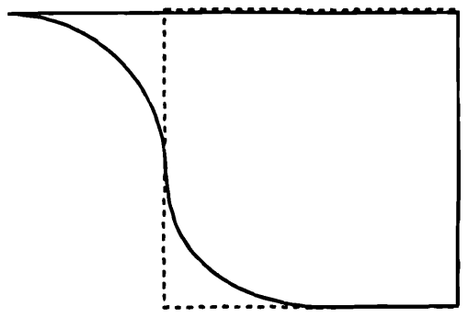
The area of the shape is the same because nothing has been taken away or added.

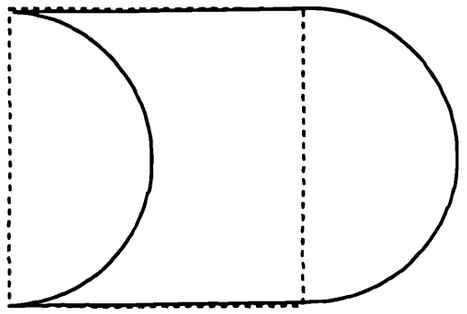
1) Cut out 6 squares, all the same area.

2) Make these shapes using 4 of them.
Stick them into your book.







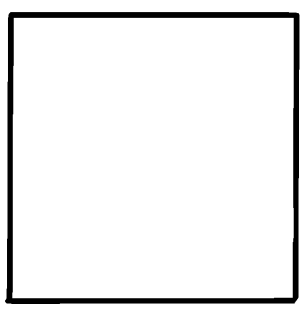


3) Make up your own shapes with the last 2 squares and put them in your book.

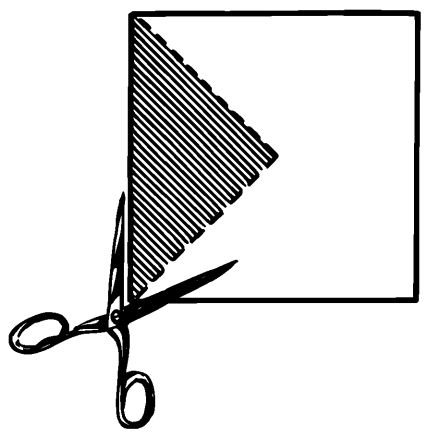
4) Why are the areas of the shapes all the same?

Area 3

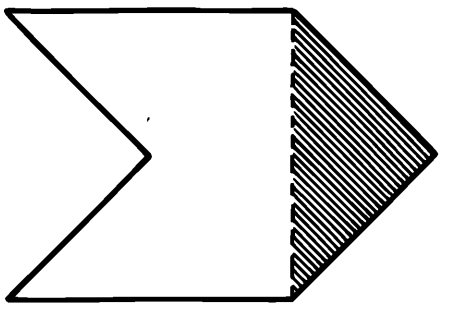
Start with
a square . . .



. . . cut it along
the dotted line . . .

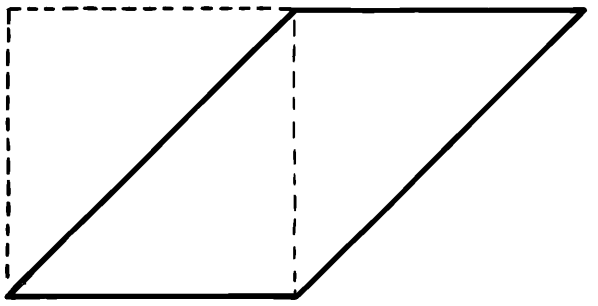


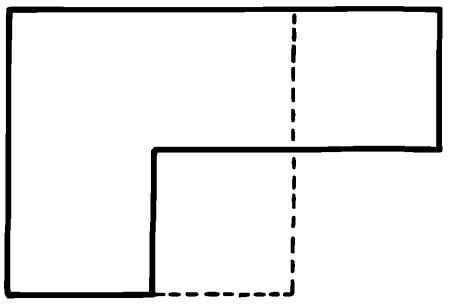
. . . change the square
into this shape.

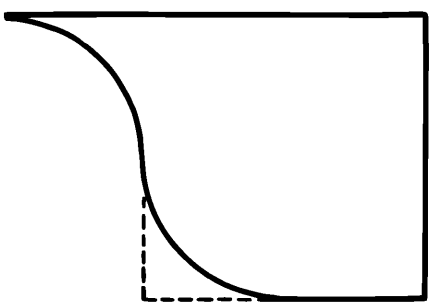


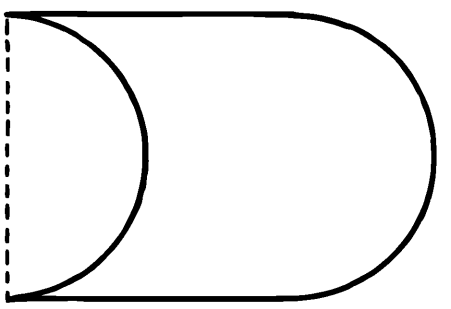
The area of the shapes is the same
because nothing has been taken away or added.

1. Cut out 6 squares, all the same area.
2. Make these shapes using 4 of them.
   Stick them into your book.





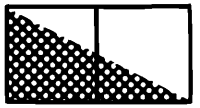




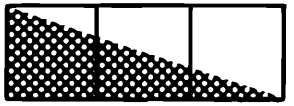
3. Make up your own shapes with the last 2 squares
   and put them in your book.
4. Why are the areas of the shapes all the same?

Area 4

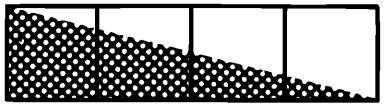
The shaded area is $\frac{1}{2}$ cm ^{2}



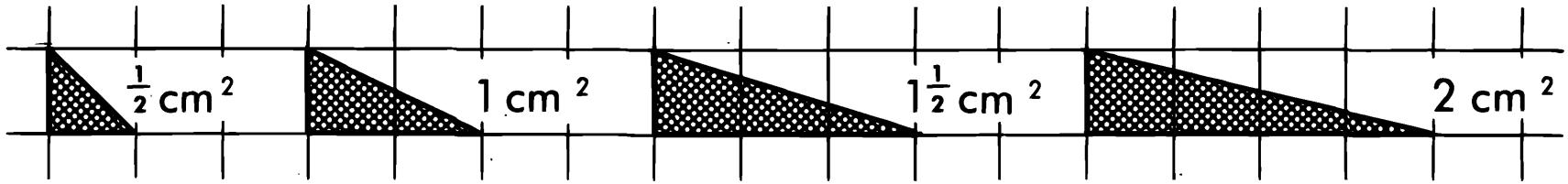
The shaded area is half of two squares — which is 1 cm ^{2}



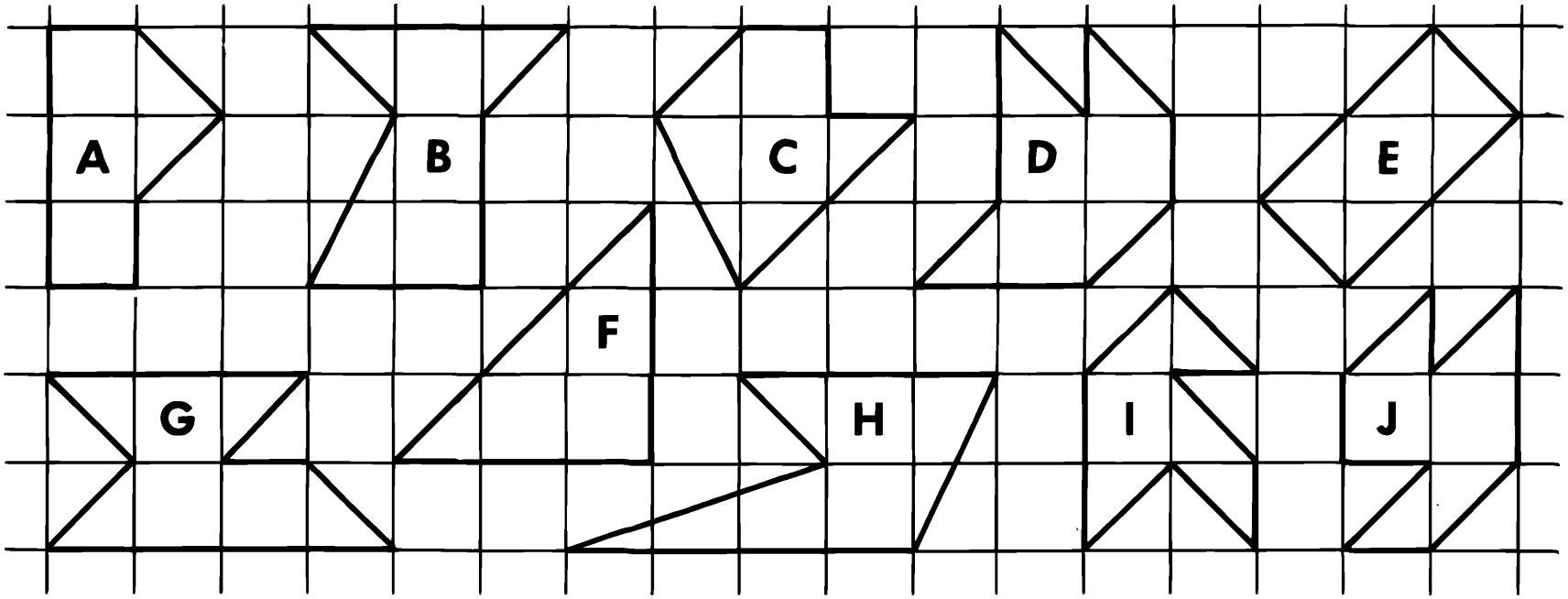
The shaded area is half of three squares.
How much is this?



What area is shaded?



Draw these shapes:

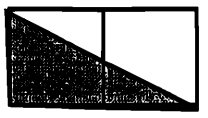


(1) Find the area of each shape.

(2) Draw as many shapes as you can, each with an area of 5cm^2.
It will help to make them on a pinboard first.

Area 4

The shaded area is $\frac{1}{2}$cm^2.

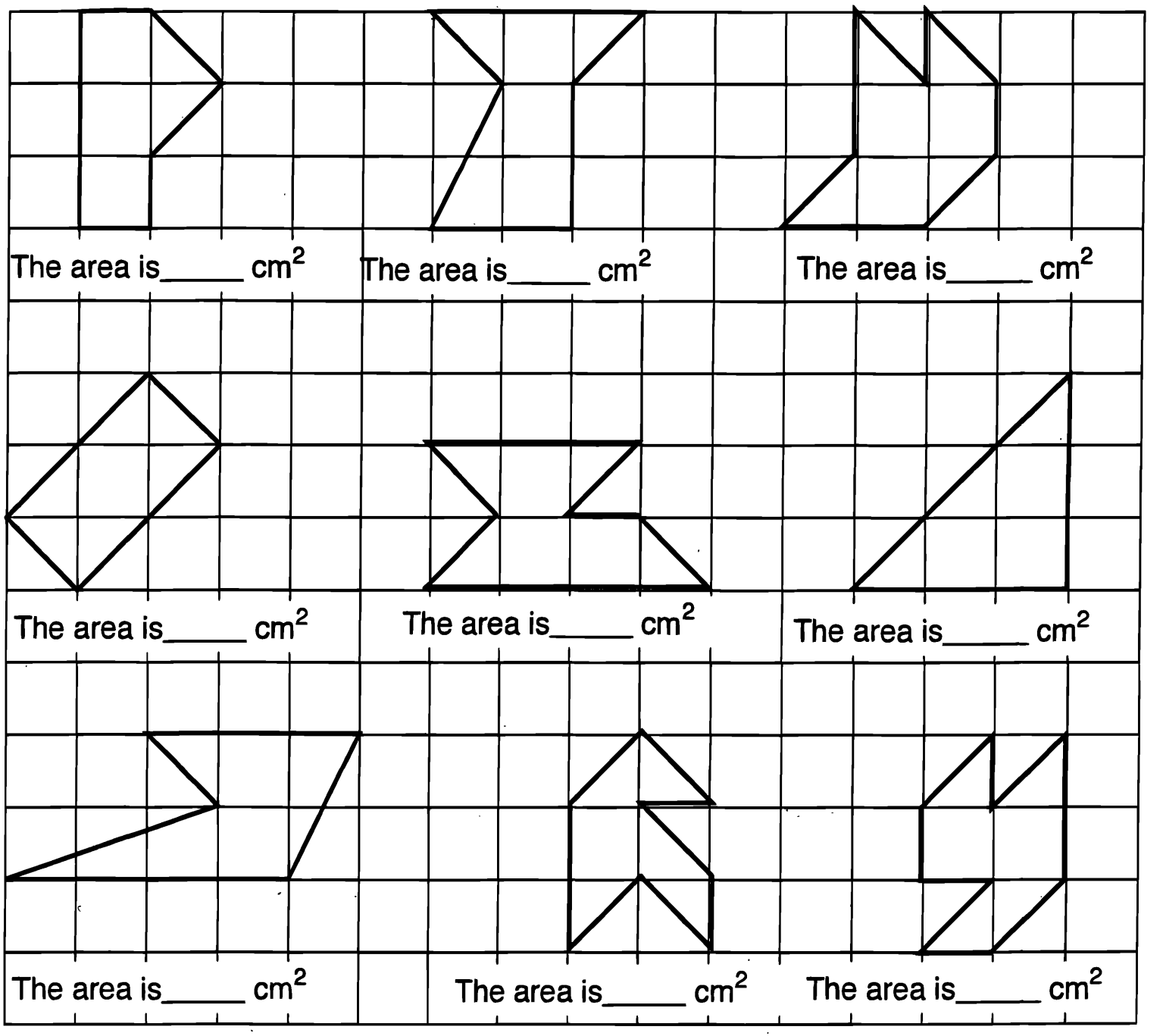


The shaded area is half of two squares.
The shaded area is 1cm^2.

The shaded area is half of three squares.
The shaded area is $1\frac{1}{2}$ cm^2.

The shaded area is half of four squares.
The shaded area is 2cm^2.

Find the area of each shape.



The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

The area is_____ cm^2

Number Squares 1

Can you see which numbers have been added together to complete this number square?

1	7	
5	9	

→

1	7	**8**
5	9	**14**
6	**16**	

→

1	7	8
5	9	14
6	16	**22**

Complete these in the same way:

1)

1	2	
3	4	

2)

5	6	
7	8	

3)

2	5	
7	9	

4)

4	9	
4	7	

5)

8	8	
3	5	

6)

5	5	
9	9	

7)

7	9	
6	8	

8)

8	4	
2	9	

9)

7	7	
3	5	

10)

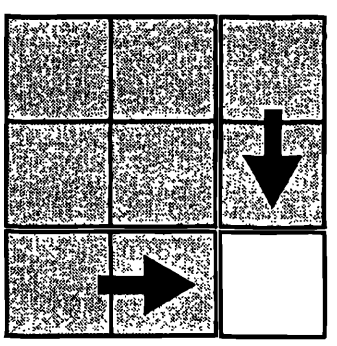
6	6	
3	7	

11)

7	5	
5	7	

12)

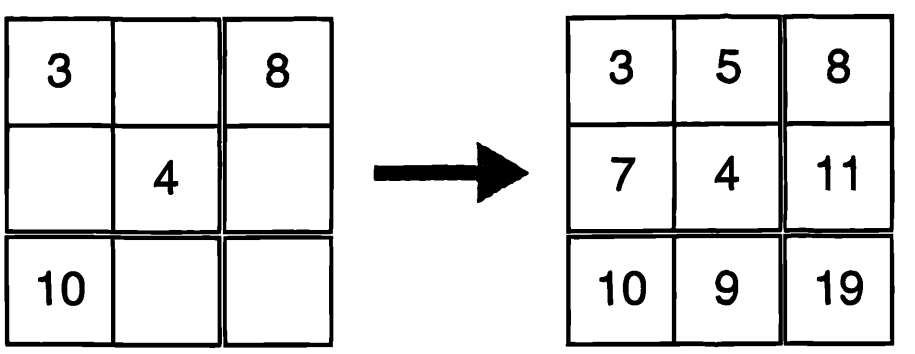
7	8	
9	10	



Check that the final answers are correct by adding across **and** down.

Number Squares 2

Here is one example done for you. Look carefully at it.
The left hand square is the question, the right hand square is the answer.



3		8
	4	
10		

3	5	8
7	4	11
10	9	19

Complete the squares below in the same way.

1)

5	1	
7	8	

2)

	2	8
	3	5

3)

6		11
		9
10		

4)

8	5	
	6	9
		22

5)

	4	10
6		13

6)

5	7	
		12
14		

7)

	10	16
9		11

8)

14		14
	5	18

9)

		15
3		
	12	20

10)

4		13
8		
		28

11)

9		13
17		30

12)

7		21
	4	
		31

Number Squares 4

In each row and in each column the first 3 numbers must be added up to make the 4th number.

Complete these squares.

1)

8	3	7	
4	6	2	
5	9	1	

2)

5	9	4	
6	3	5	
5	7	8	

3)

7	6	3	
6	3	7	
3	7	6	

4)

4	2	8	
3	9	2	
5	4	3	

5)

8	6	5	
6	5	8	
5	8	6	

6)

9	12	15	
9	12	15	
9	12	15	

7)

5	6		14
	3	1	8
5		5	
	10		

8)

	1	2	10
	4	3	8
5			
	6	7	

9)

	4	1	5
	0	2	3
	6	8	20

Find the Number 1

Find the missing number for the following equations to be correct.

Examples:

5 + ☐ = 9	The missing number is **4**, because 5 + **4** = 9
12 – ☐ = 7	The missing number is **5**, because 12 – **5** = 7
☐ – 6 = 8	The missing number is **14**, because **14** – 6 = 8

1) 4 + ☐ = 8

2) 6 + ☐ = 14

3) 4 + ☐ = 12

4) ☐ + 8 = 15

5) ☐ + 9 = 17

6) ☐ + 6 = 19

7) ☐ – 3 = 2

8) ☐ – 6 = 9

9) ☐ – 5 = 7

10) ☐ – 9 = 6

11) 13 – ☐ = 4

12) 17 – ☐ = 9

13) ☐ + 13 = 20

14) ☐ – 13 = 20

15) 20 – ☐ = 13

16) 18 + ☐ = 25

17) 24 – ☐ = 14

18) ☐ – 15 = 17

19) 43 + ☐ = 60

20) ☐ – 19 = 29

Smile Worksheet **0031**

Find the Number 1

Find the missing number for the following equations to be correct.

Examples:

5 + ☐ = 9	The missing number is **4**, because 5 + **4** = 9
12 – ☐ = 7	The missing number is **5**, because 12 – **5** = 7
☐ – 6 = 8	The missing number is **14**, because **14** – 6 = 8

1) 4 + ☐ = 8

2) 6 + ☐ = 14

3) 4 + ☐ = 12

4) ☐ + 8 = 15

5) ☐ + 9 = 17

6) ☐ + 6 = 19

7) ☐ – 3 = 2

8) ☐ – 6 = 9

9) ☐ – 5 = 7

10) ☐ – 9 = 6

11) 13 – ☐ = 4

12) 17 – ☐ = 9

13) ☐ + 13 = 20

14) ☐ – 13 = 20

15) 20 – ☐ = 13

16) 18 + ☐ = 25

17) 24 – ☐ = 14

18) ☐ – 15 = 17

19) 43 + ☐ = 60

20) ☐ – 19 = 29

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Find the Number 3

Smile Worksheet **0033**

Find the missing number for the following equations to be correct.

Examples:

5 x ☐ = 45 The missing number is **9**, because 5 x **9** = 45

24 ÷ ☐ = 6 The missing number is **4**, because 24 ÷ **4** = 6

☐ ÷ 6 = 8 The missing number is **48**, because **48** ÷ 6 = 8

1) 4 x ☐ = 24

2) 7 x ☐ = 35

3) ☐ x 8 = 32

4) ☐ x 5 = 25

5) 9 x ☐ = 72

6) ☐ x 11 = 44

7) 36 ÷ ☐ = 9

8) ☐ ÷ 6 = 7

9) 90 ÷ ☐ = 10

10) ☐ ÷ 7 = 8

11) ☐ ÷ 8 = 5

12) 49 ÷ ☐ = 7

13) 6 x ☐ = 54

14) ☐ x 5 = 60

15) 121 ÷ ☐ = 11

16) ☐ x 6 = 48

17) 63 ÷ ☐ = 9

18) 96 ÷ ☐ = 8

19) ☐ ÷ 11 = 12

20) ☐ x 22 = 88

Find the Number 3

Smile Worksheet **0033**

Find the missing number for the following equations to be correct.

Examples:

5 x ☐ = 45 The missing number is **9**, because 5 x **9** = 45

24 ÷ ☐ = 6 The missing number is **4**, because 24 ÷ **4** = 6

☐ ÷ 6 = 8 The missing number is **48**, because **48** ÷ 6 = 8

1) 4 x ☐ = 24

2) 7 x ☐ = 35

3) ☐ x 8 = 32

4) ☐ x 5 = 25

5) 9 x ☐ = 72

6) ☐ x 11 = 44

7) 36 ÷ ☐ = 9

8) ☐ ÷ 6 = 7

9) 90 ÷ ☐ = 10

10) ☐ ÷ 7 = 8

11) ☐ ÷ 8 = 5

12) 49 ÷ ☐ = 7

13) 6 x ☐ = 54

14) ☐ x 5 = 60

15) 121 ÷ ☐ = 11

16) ☐ x 6 = 48

17) 63 ÷ ☐ = 9

18) 96 ÷ ☐ = 8

19) ☐ ÷ 11 = 12

20) ☐ x 22 = 88

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Find the Number 4

Smile Worksheet **0034**

State whether the following equations are **true** or **false**.

Examples:

5 + 12 = 17 true The statement is **true.**

16 ÷ 4 = 5 false The statement is **false.**

1) 9 + 6 = 13 ____
2) 12 + 7 = 19 ____
3) 18 + 9 = 27 ____
4) 36 ÷ 4 = 9 ____
5) 24 − 18 = 5 ____
6) 8 x 9 = 72 ____
7) 63 ÷ 7 = 9 ____
8) 48 ÷ 8 = 8 ____
9) $\frac{1}{2}$ of 5 = 10 ____
10) $\frac{1}{2}$ of 98 = 49 ____
11) 2 ÷ 4 = $\frac{1}{2}$ ____
12) $\frac{1}{2}$ of 4 = 2 ____

Find the missing number for the following equations to be true.

Examples:

□ + 11 = 35 The missing number is **24**, because **24** + 11 = 35.

$\frac{1}{2}$ of □ = 18 The missing number is **36**, because $\frac{1}{2}$ of **36** = 18.

13) □ + 12 = 25
14) □ − 12 = 19
15) 76 ÷ □ = 1
16) 9 x □ = 99
17) $\frac{1}{2}$ of □ = 3
18) $\frac{1}{2}$ of □ = 15
19) □ ÷ 5 = $\frac{1}{2}$
20) 12 ÷ □ = $\frac{1}{2}$

Find the Number 4

Smile Worksheet **0034**

State whether the following equations are **true** or **false**.

Examples:

5 + 12 = 17 true The statement is **true.**

16 ÷ 4 = 5 false The statement is **false.**

1) 9 + 6 = 13 ____
2) 12 + 7 = 19 ____
3) 18 + 9 = 27 ____
4) 36 ÷ 4 = 9 ____
5) 24 − 18 = 5 ____
6) 8 x 9 = 72 ____
7) 63 ÷ 7 = 9 ____
8) 48 ÷ 8 = 8 ____
9) $\frac{1}{2}$ of 5 = 10 ____
10) $\frac{1}{2}$ of 98 = 49 ____
11) 2 ÷ 4 = $\frac{1}{2}$ ____
12) $\frac{1}{2}$ of 4 = 2 ____

Find the missing number for the following equations to be true.

Examples:

□ + 11 = 35 The missing number is **24**, because **24** + 11 = 35.

$\frac{1}{2}$ of □ = 18 The missing number is **36**, because $\frac{1}{2}$ of **36** = 18.

13) □ + 12 = 25
14) □ − 12 = 19
15) 76 ÷ □ = 1
16) 9 x □ = 99
17) $\frac{1}{2}$ of □ = 3
18) $\frac{1}{2}$ of □ = 15
19) □ ÷ 5 = $\frac{1}{2}$
20) 12 ÷ □ = $\frac{1}{2}$

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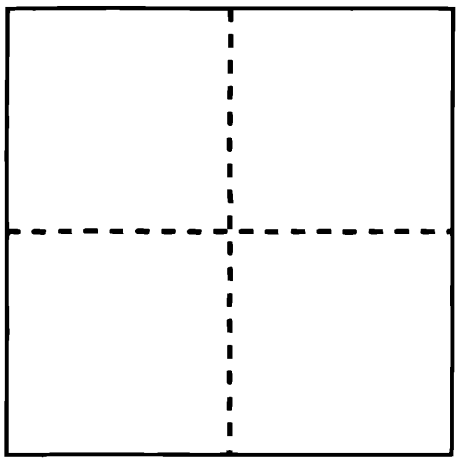
Smile **0035**

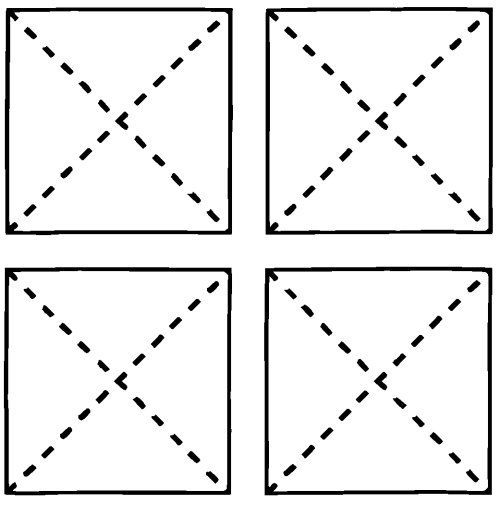
Squares and Triangles

You will need: a coloured gummed square and scissors.

1. Fold the gummed paper into 4 smaller squares.

   • Cut along the fold lines.





2. Fold each small square into four triangles.

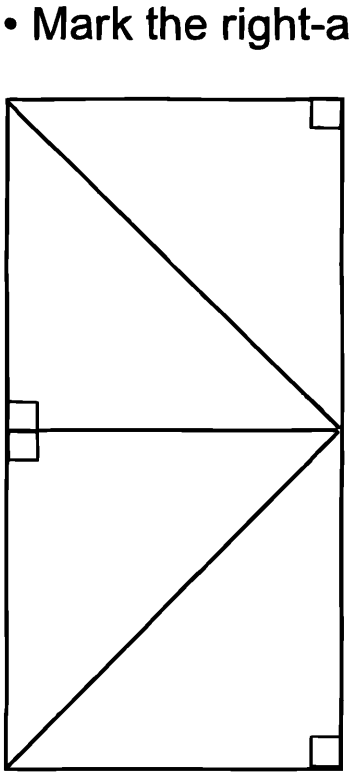
   • Cut along the fold lines.

   • You will now have 16 right-angled triangles.

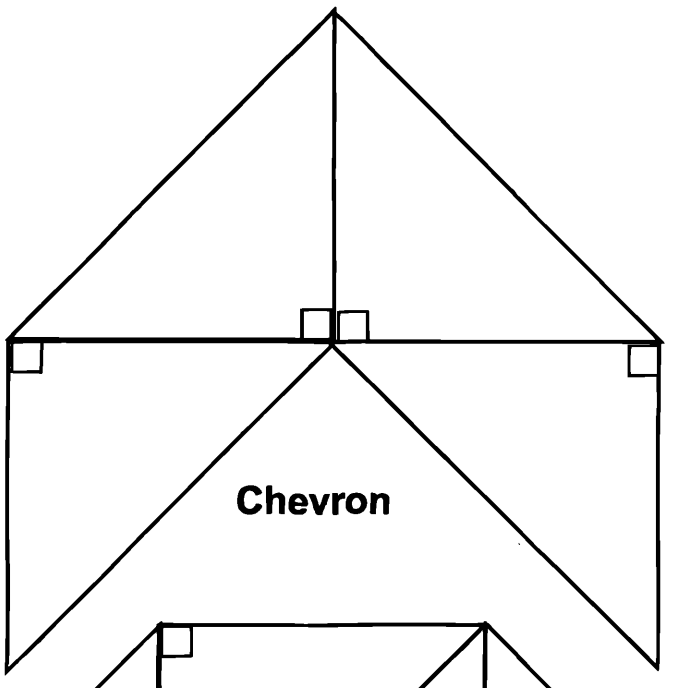
3. Use the 16 right-angled triangles to make the following shapes.

   • Stick them in your book.

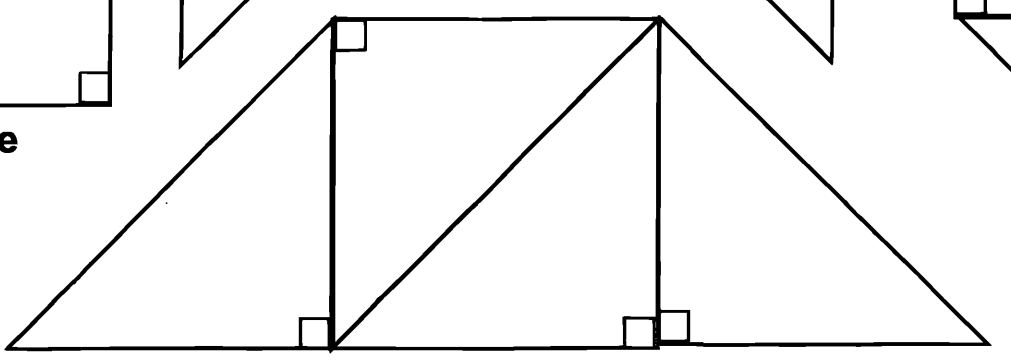
   • Mark the right-angles and name the shape.



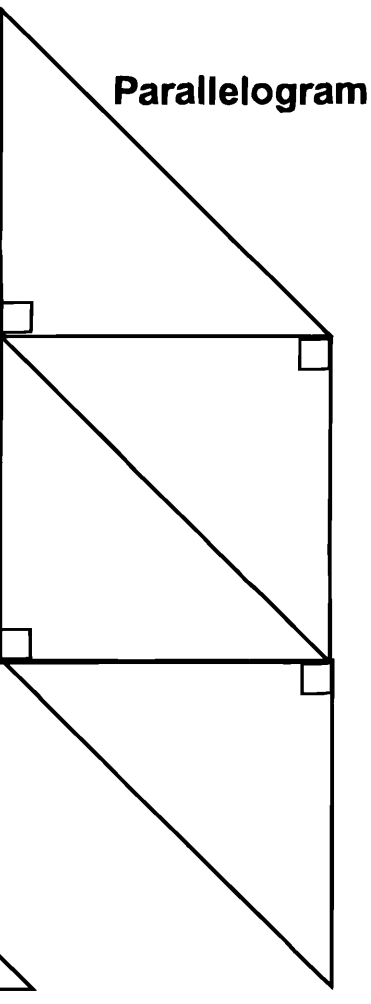
Rectangle



Chevron



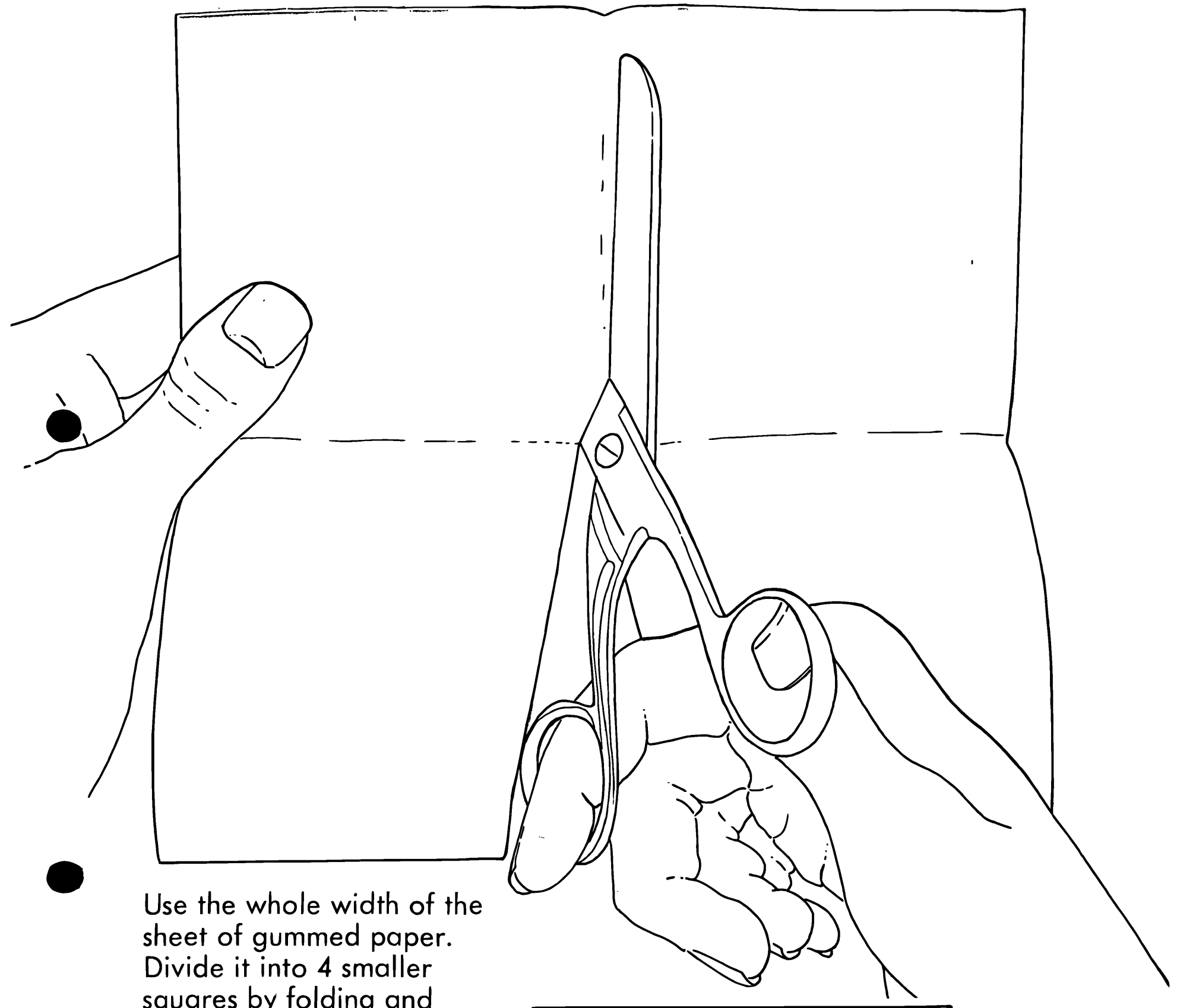
Trapezium



Parallelogram

Squares and Triangles

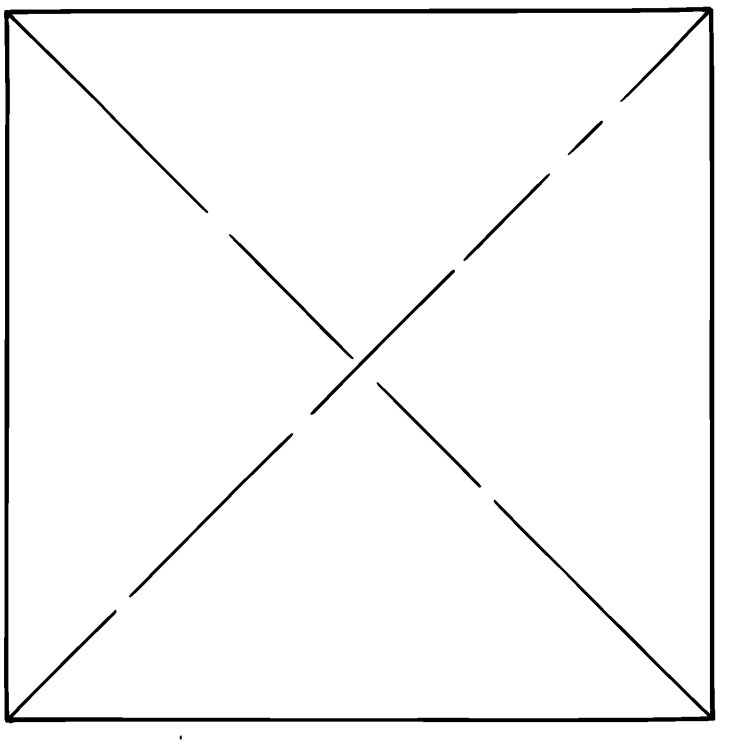
You will need a coloured gummed square and scissors.



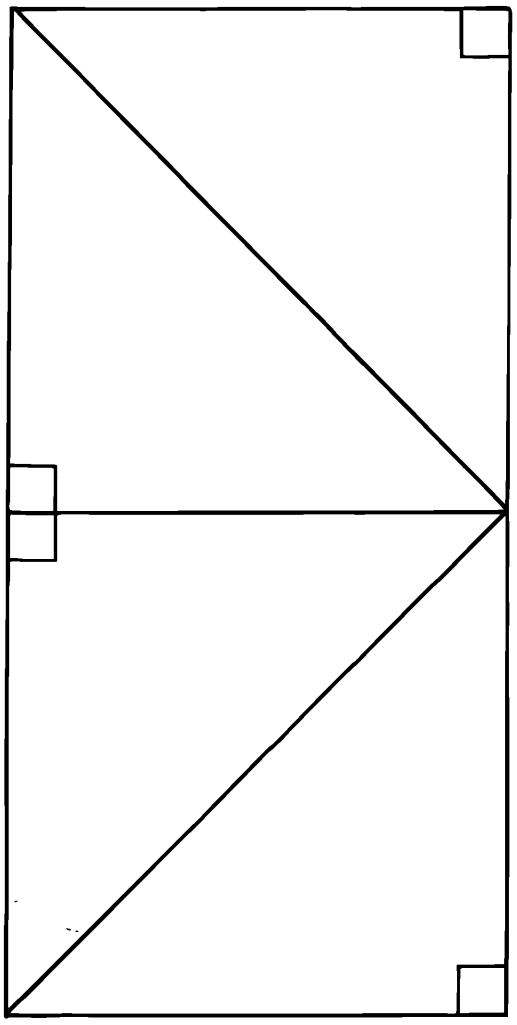
Use the whole width of the sheet of gummed paper. Divide it into 4 smaller squares by folding and cutting.

Divide each small square into four triangles by folding and cutting.

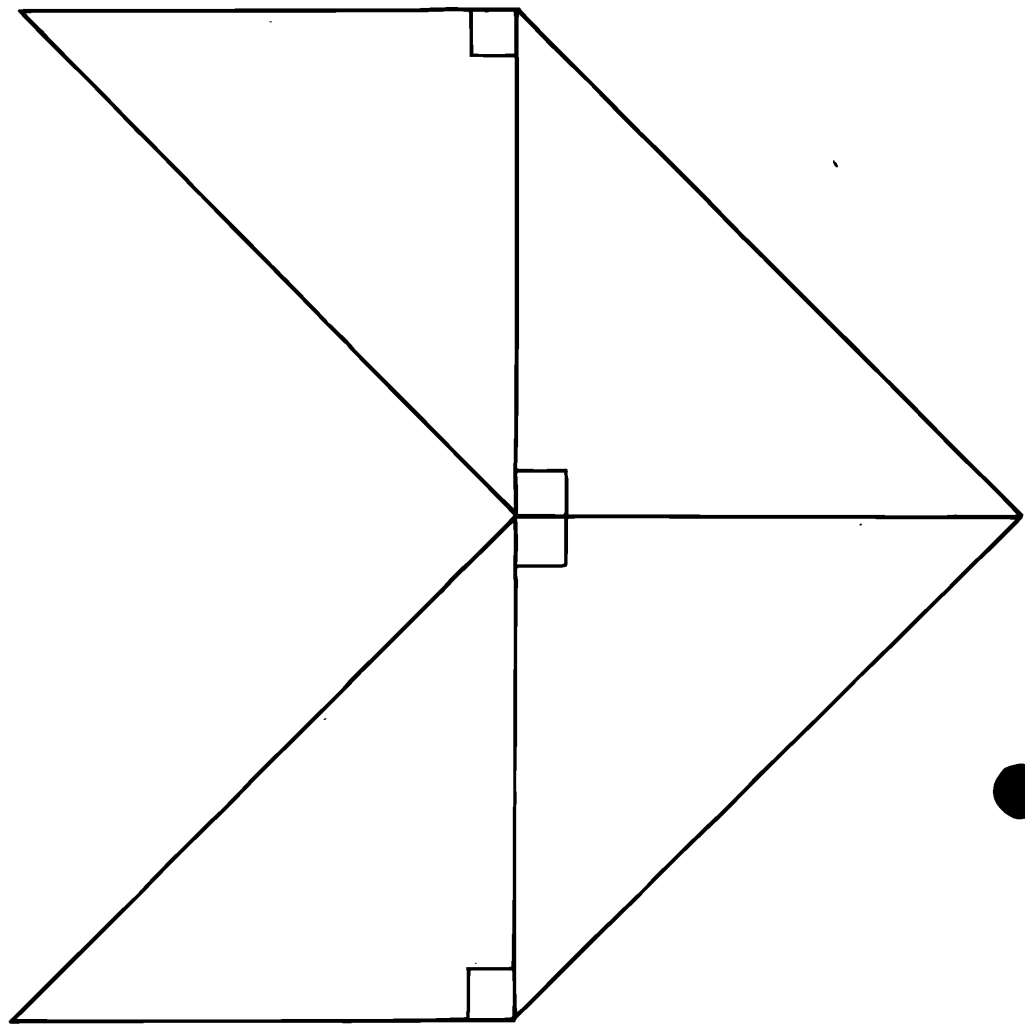
On each of these triangles one corner is a right angle. You should have 16 right-angled triangles, all the same size and shape.



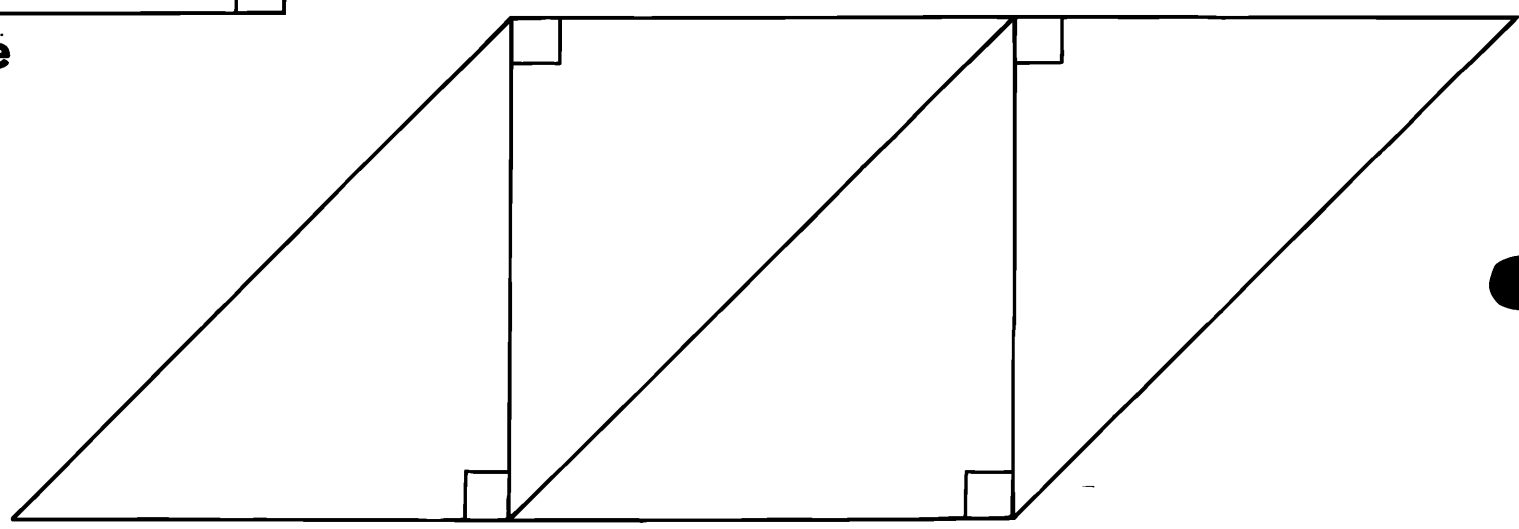
Use the right-angled triangles to make the following shapes. Stick them in your book. *Mark the right angles (as shown) and name the shapes.*



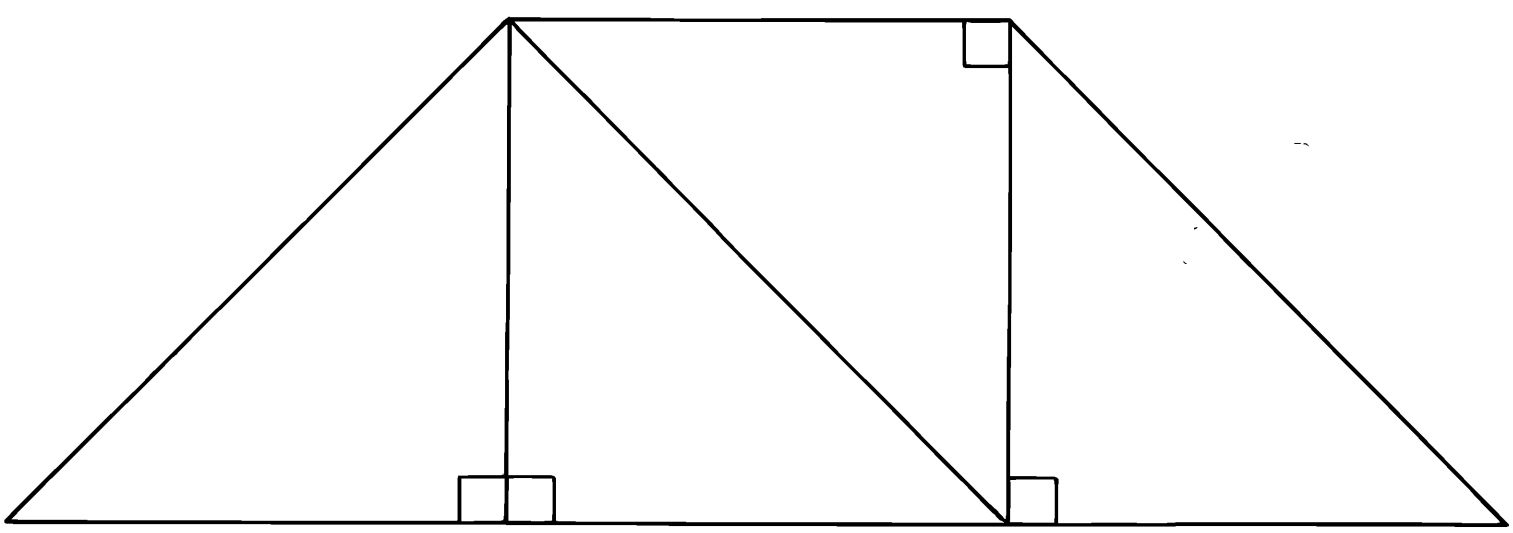
Rectangle



Chevron



Parallelogram

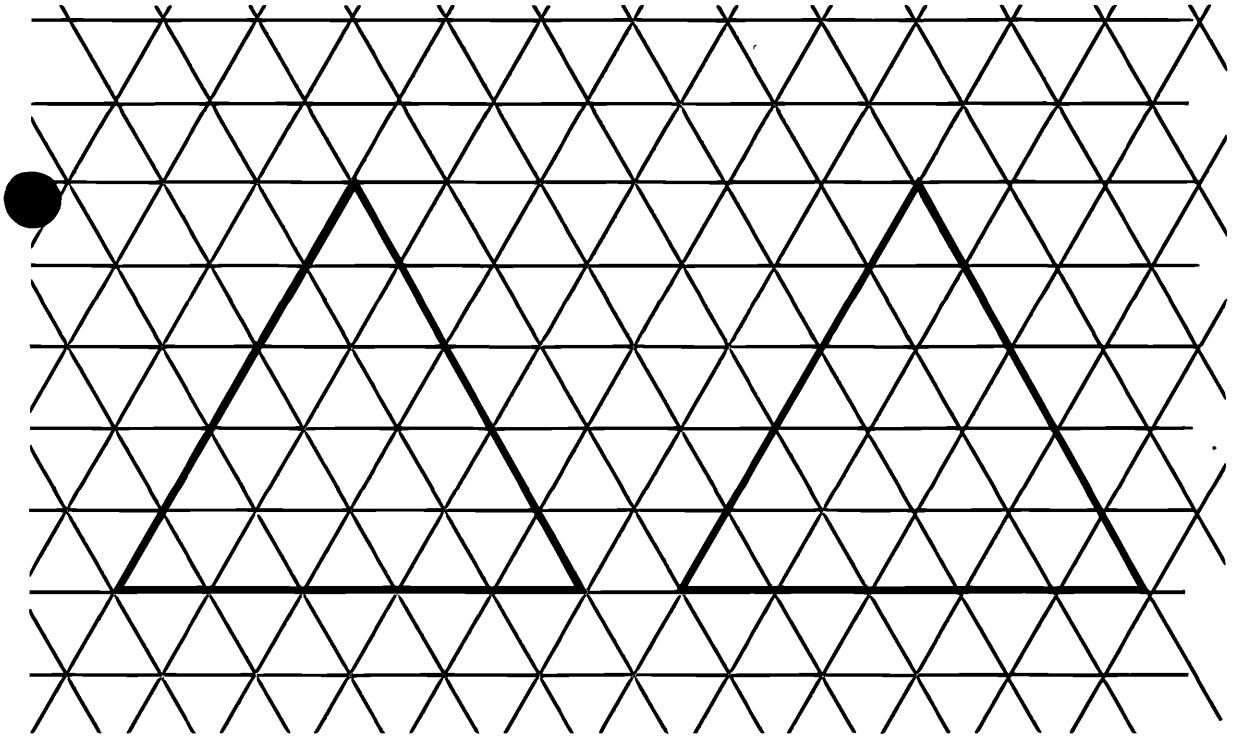


Trapezium

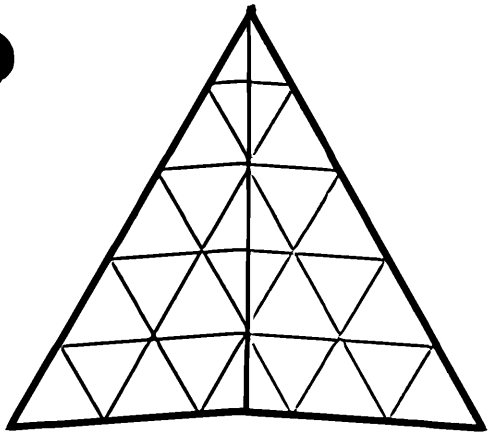
SMILE 0039

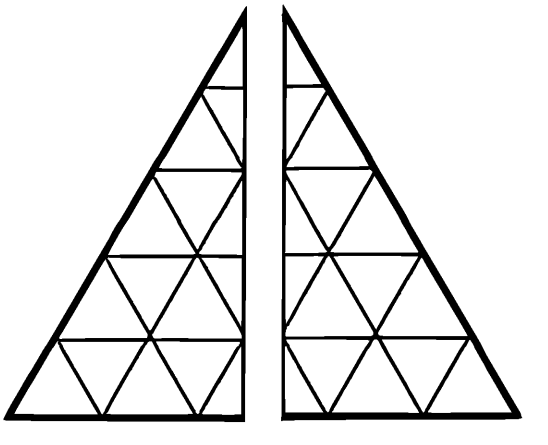
About Angles

You will need isometric paper, scissors and tracing



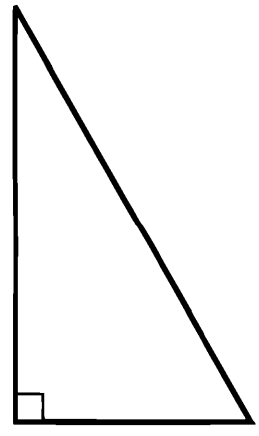
Draw 2 equilateral triangles and cut them out.
Fold each triangle in **half** and cut along the **fold**.



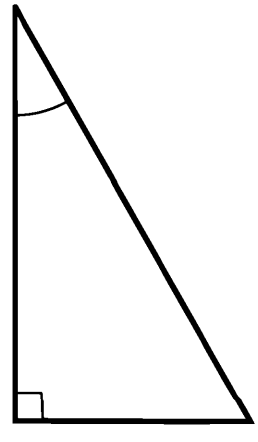


1) On each small triangle mark the right angle.
Mark it on both sides.

How many degrees
in a right angle?

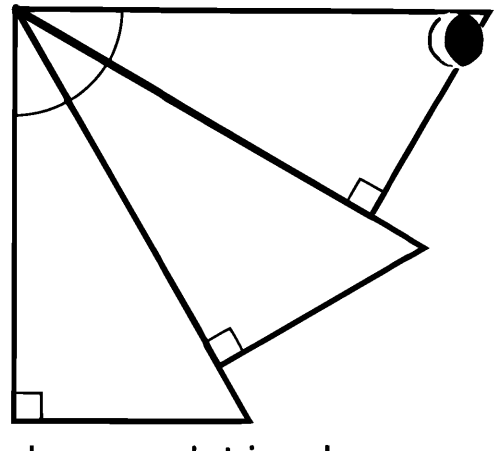


2) On each small triangle mark the smallest angle.
Mark it on both sides.



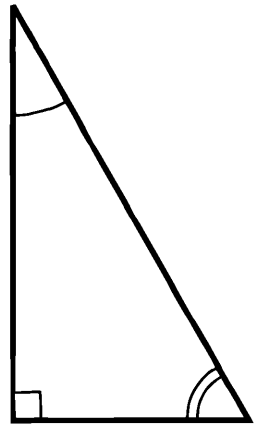
3) Place 3 of the smallest angles together.
What is the size of the
angle they make?

So each of the smallest
angles must be ■ degrees.

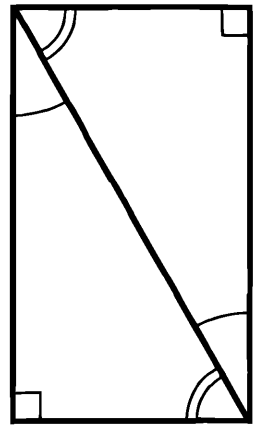


Write the size of the smallest angle on each triangle.

4) On each small triangle mark the third angle.



5) Make this shape.



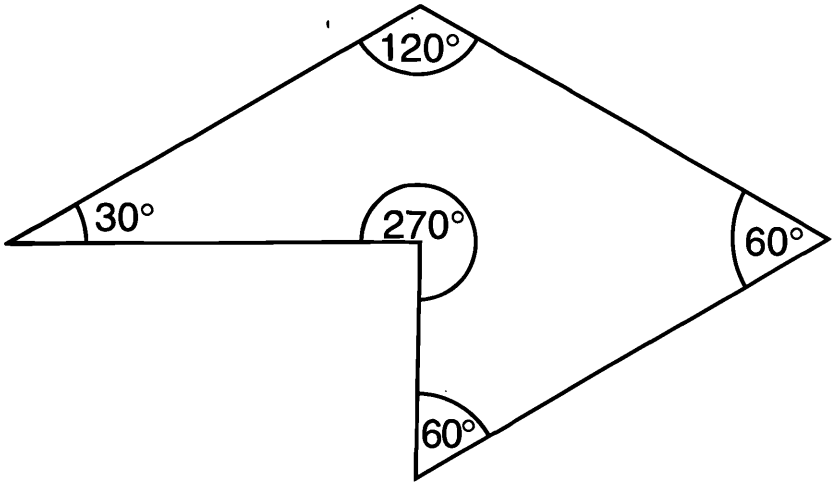
What is the name of the shape?

What is the size of each corner?

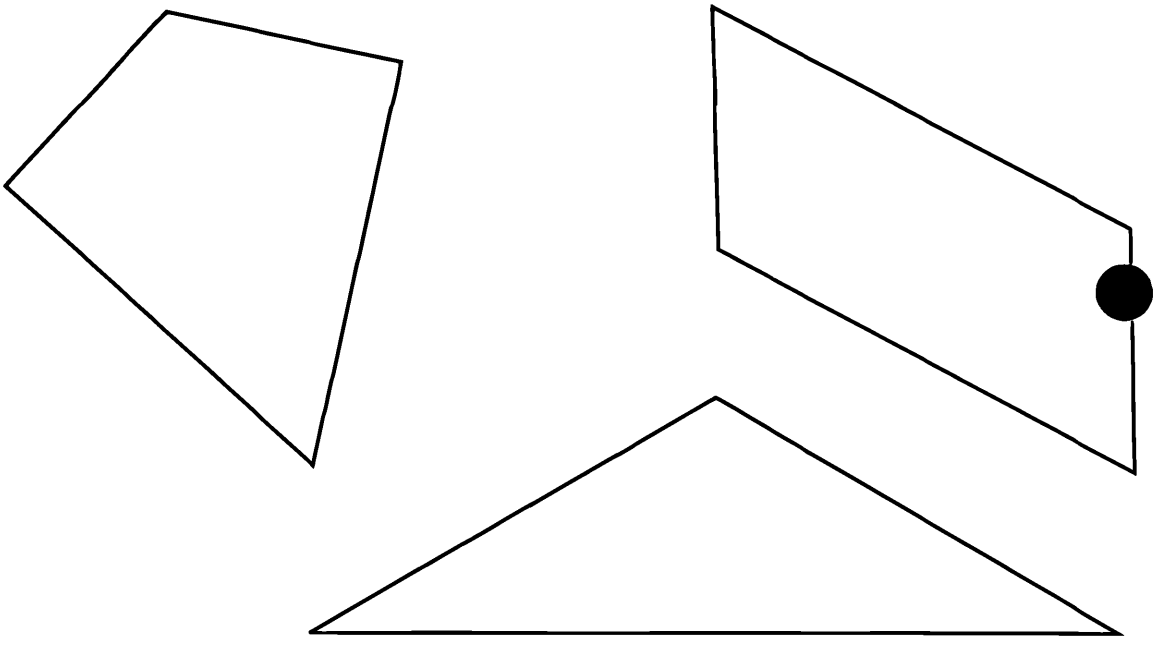
So the third angle of the triangle must be ■ degrees.

Write the size of the third angle on each triangle.

Three small triangles were used to make this shape and to work out its angles.



6) Trace these shapes into your book and use the small triangles to work out their angles.



Smile **0040**

Equilateral Triangle

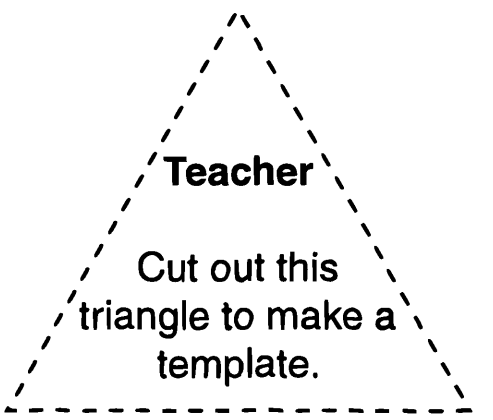
You will need gummed paper and scissors.

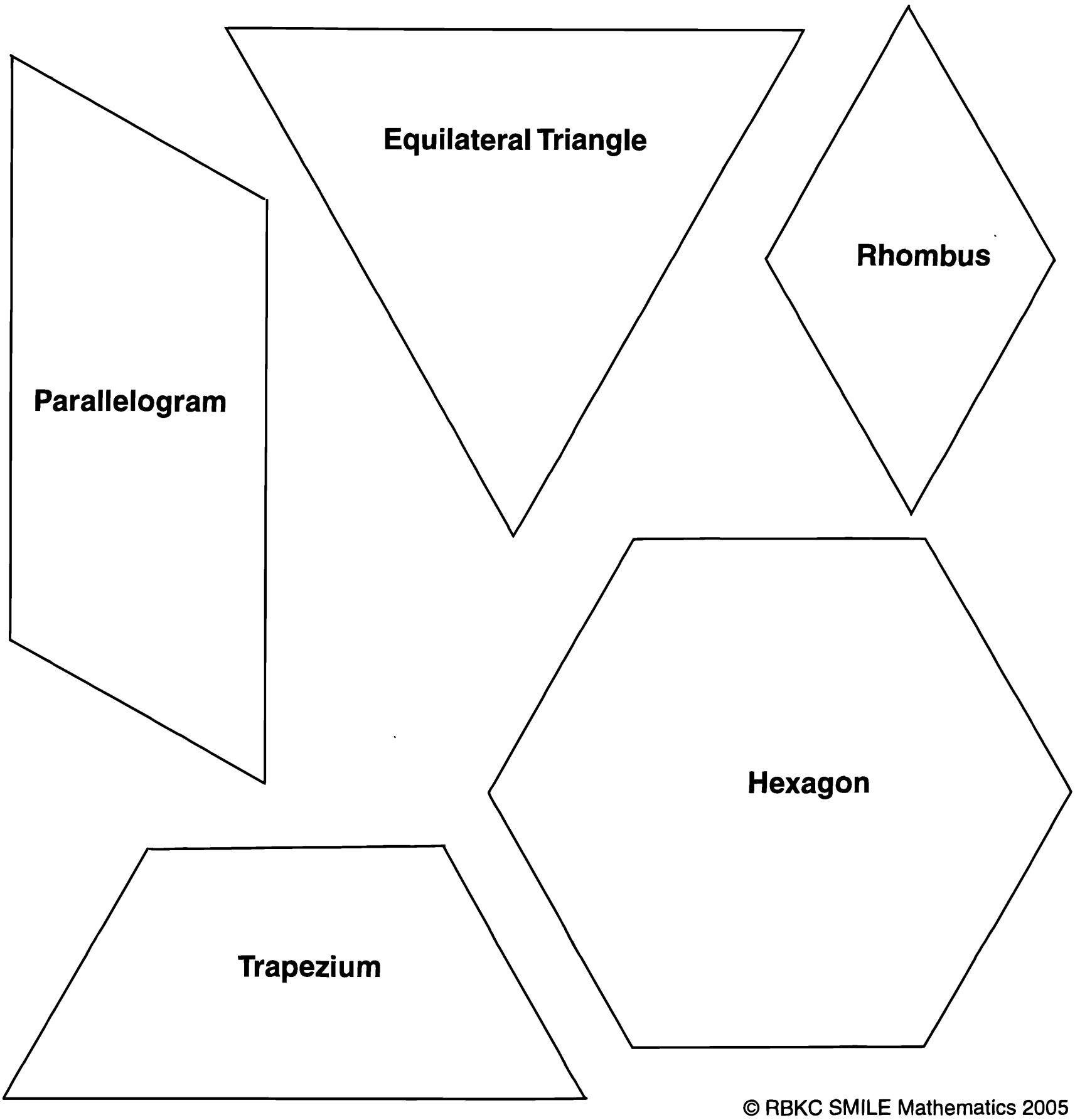
Draw some **equilateral triangles** on gummed paper.
- Use the cut out to help you.

Cut out your **equilateral triangles**.

- Use them to make these shapes.

- Stick the shapes in your book.





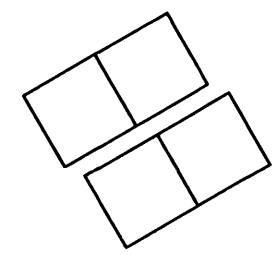
Domino 2

You will need: 2 centimetre squared paper.

A domino is the shape made by joining 2 squares, edge to edge.

A domino is a special sort of rectangle. Make some dominoes.

1. Fit 2 dominoes together to make a 2 x 2 square.



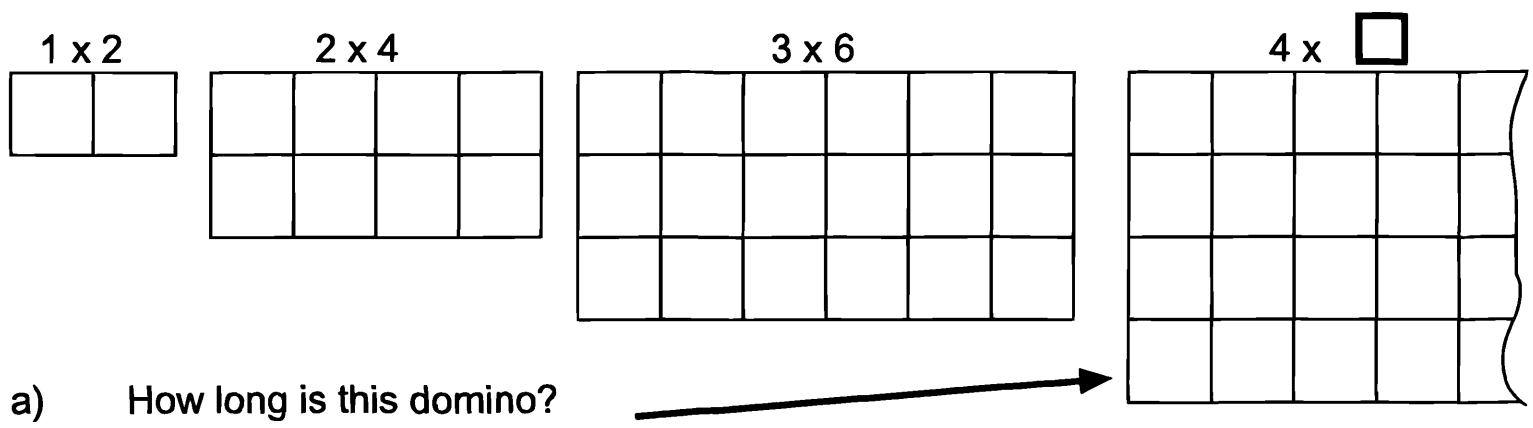
   • Draw the square in your book.

2. Fit dominoes together to amke some larger squares.

   • Which squares can you make? Draw them.

   • Which squares can't you make? Why not.

3. Dominoes are always twice as long as they are wide.
   Things which are the same shape but a different size are called **similar**.



   a) How long is this domino?

   b) If a domino is 10cm wide, how long is it?

4. How many small dominoes do you need to make the similar larger ones, which are drawn above?

   • Draw sketches to show your answers.

5. How many small dominoes would you need to make:

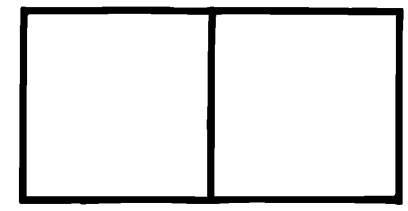
   • a similar 5 x 10 domino?

   • a similar 6 x 12 domino?

   • a similar . . .

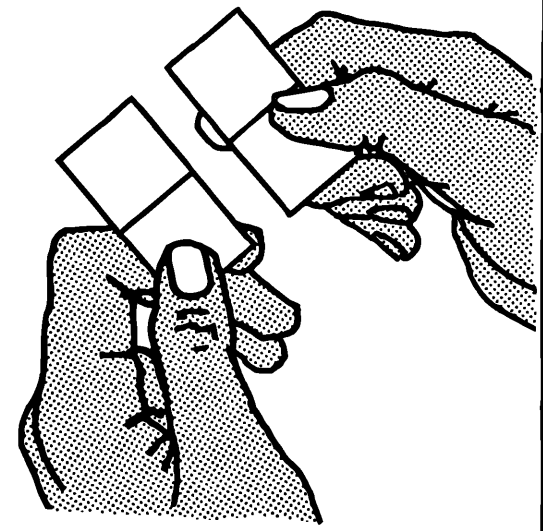
You will need 2cm squared paper.

DOMINO



A domino is the shape made by joining 2 squares, edge to edge.

A domino is a special sort of rectangle. Make some dominoes.

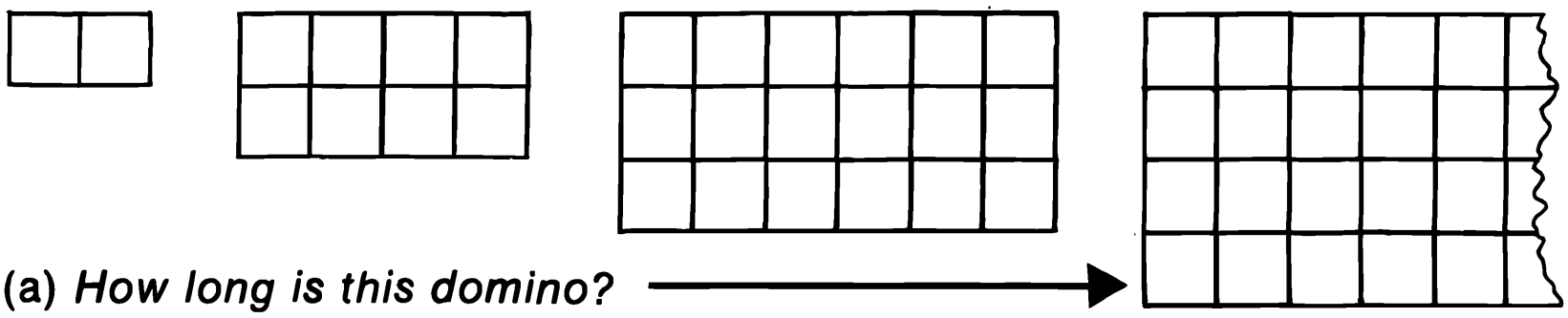


1) Fit 2 dominoes together to make a 2 × 2 square.
Draw this square in your book.

2) Fit dominoes together to make some larger squares.
Which squares can you make? *Draw them.*
Which squares can't you make? *Why not?*

3) Dominoes are always twice as long as they are wide.
Things which are the same shape but a different size are called ***similar.***

1 × 2 2 × 4 3 × 6 4 × ■



(a) *How long is this domino?*

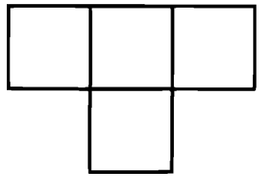
(b) If a domino is 10cm wide, how long is it?

4) How many small dominoes do you need to make the similar larger ones, which are drawn above?
Draw sketches to show your answers.

How many small dominoes would you need to make a similar 5 × 10 domino? A similar 6 × 12 domino?

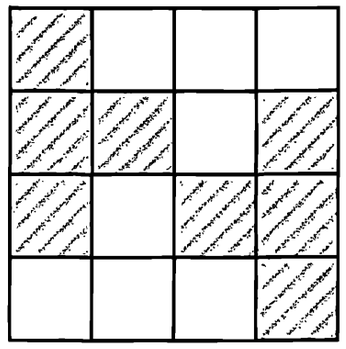
You will need centimetre squared paper, scissors and glue.

A tetromino is made by joining 4 squares edge to edge.

This is a T-tetromino. 

Draw all the different tetrominoes.

Four T-tetrominoes make a square.

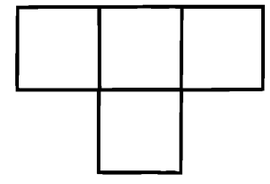


Show how to make squares from the other tetrominoes?

SMILE 0048

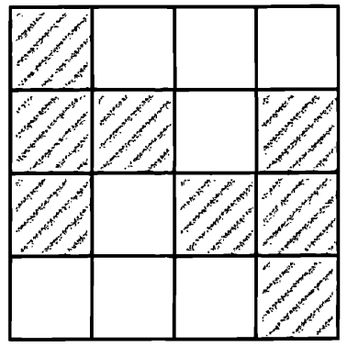
You will need centimetre squared paper, scissors and glue.

A tetromino is made by joining 4 squares edge to edge.

This is a T-tetromino. 

Draw all the different tetrominoes.

Four T-tetrominoes make a square.



Show how to make squares from the other tetrominoes?

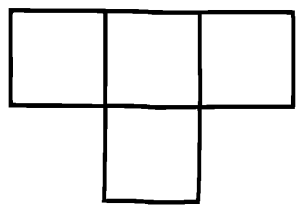
© RBKC SMILE 2005

Tetromino

You will need centimetre squared paper, scissors and glue.

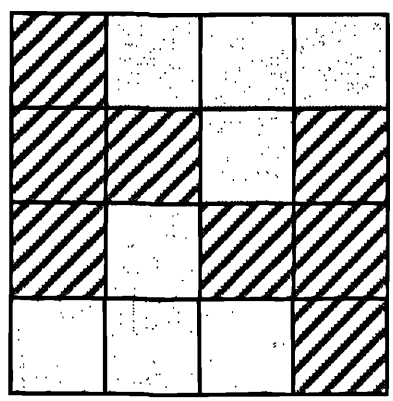
A tetromino is made by joining 4 squares edge to edge.

This is a T-tetromino.



Draw all the different tetrominoes.

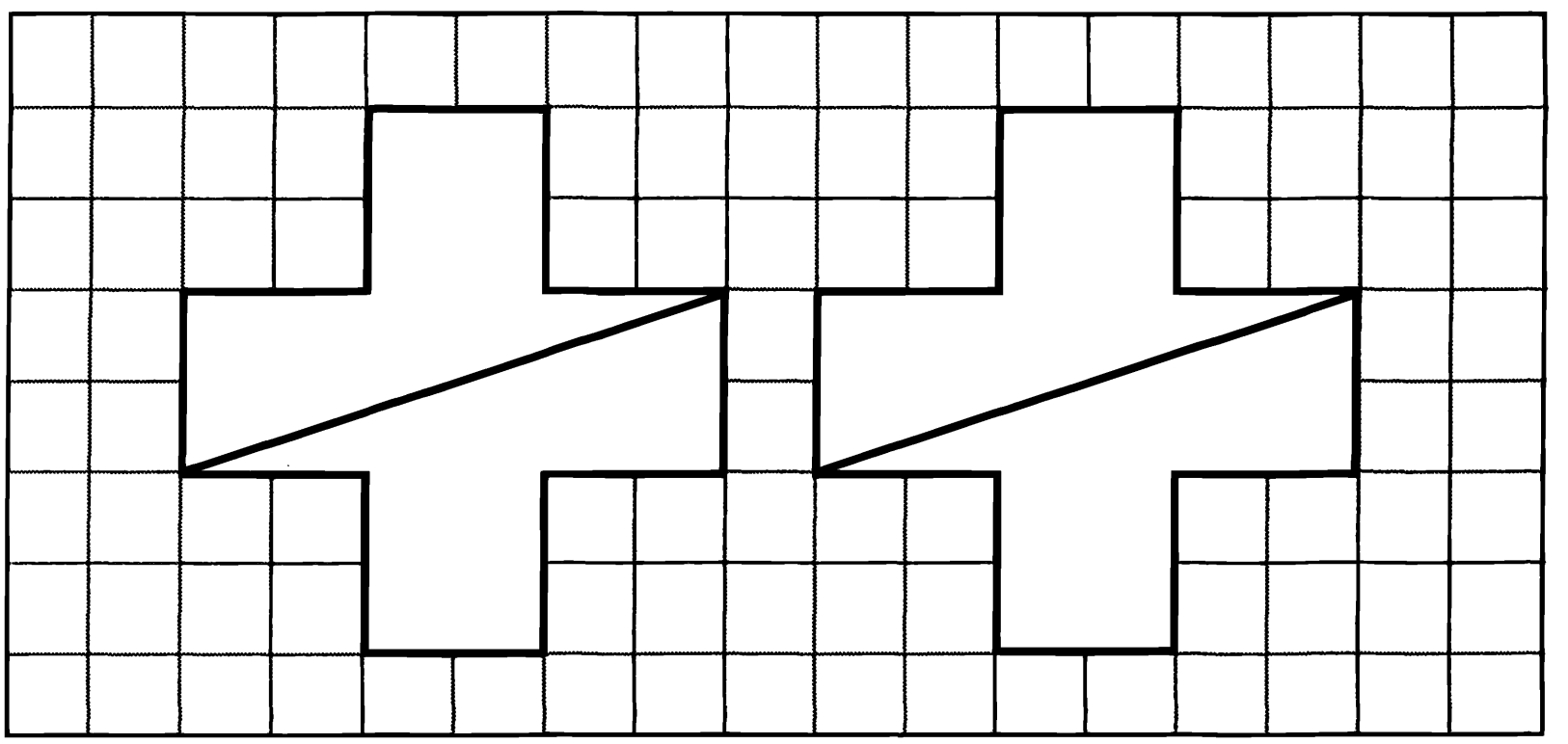
Four T-tetrominoes make a square.



Show how to make squares from the other tetrominoes?

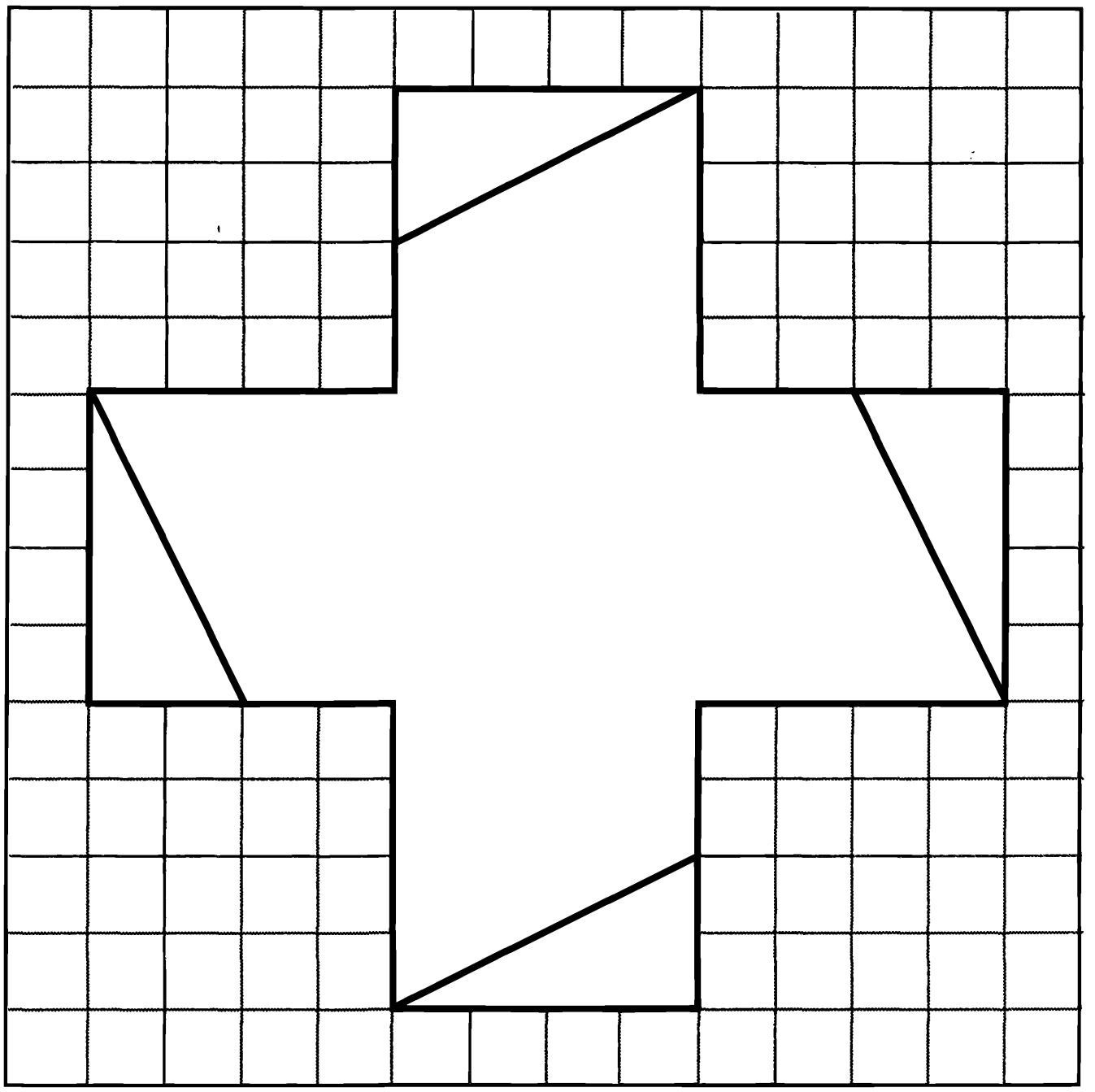
Dissection 1

You will need: centimetre squared paper, colours, scissors, glue.

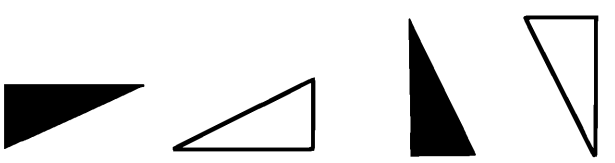


- Draw these **2** crosses on squared paper.
- Draw a line from corner to corner.
- Colour the **2** parts of each cross.
- Cut out the **4** coloured pieces.

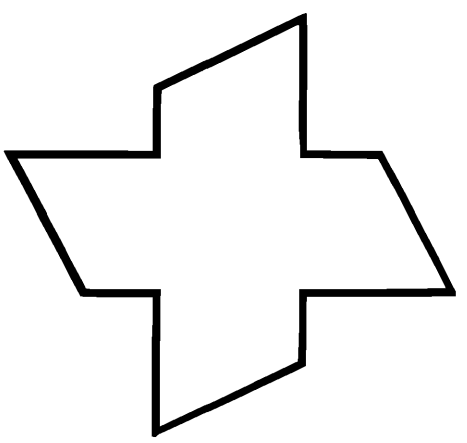
- Fit the **4** pieces together to make a **square**.
- Stick them in your book.



- Draw this cross on squared paper.
- Colour the triangle pieces.
- Cut out the cross.
- Cut off the triangle pieces:



- Stick the large piece in your book.

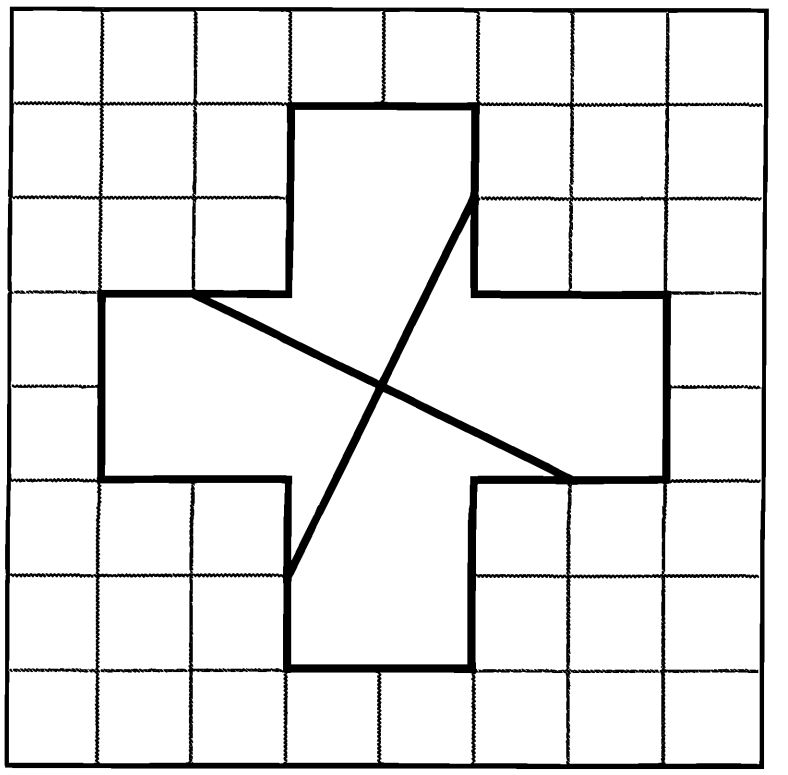


- Fit the triangle pieces around the large piece to make a **square.**

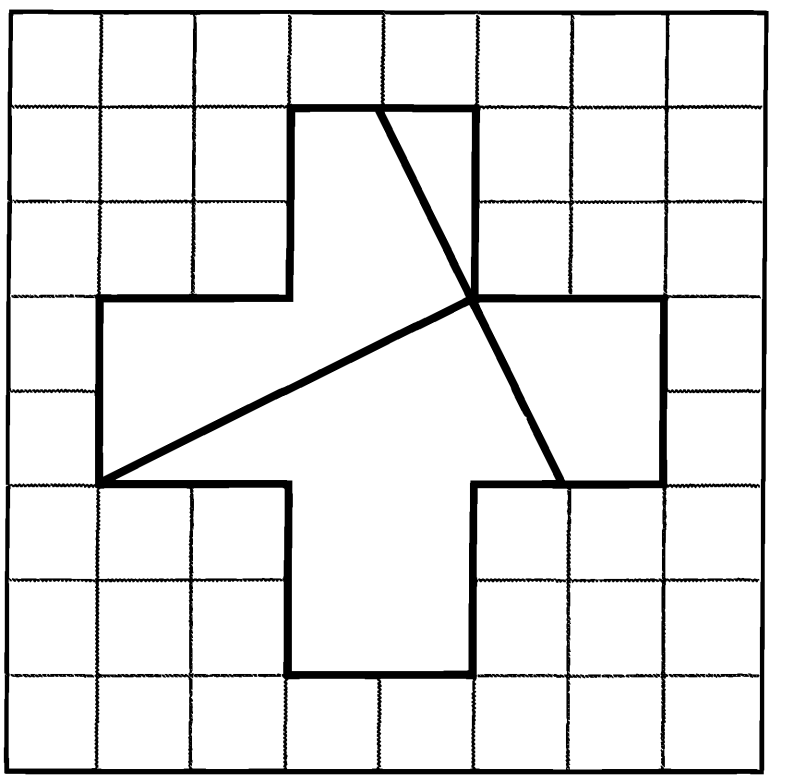
Dissection 2

You will need: centimetre squared paper, scissors, glue.

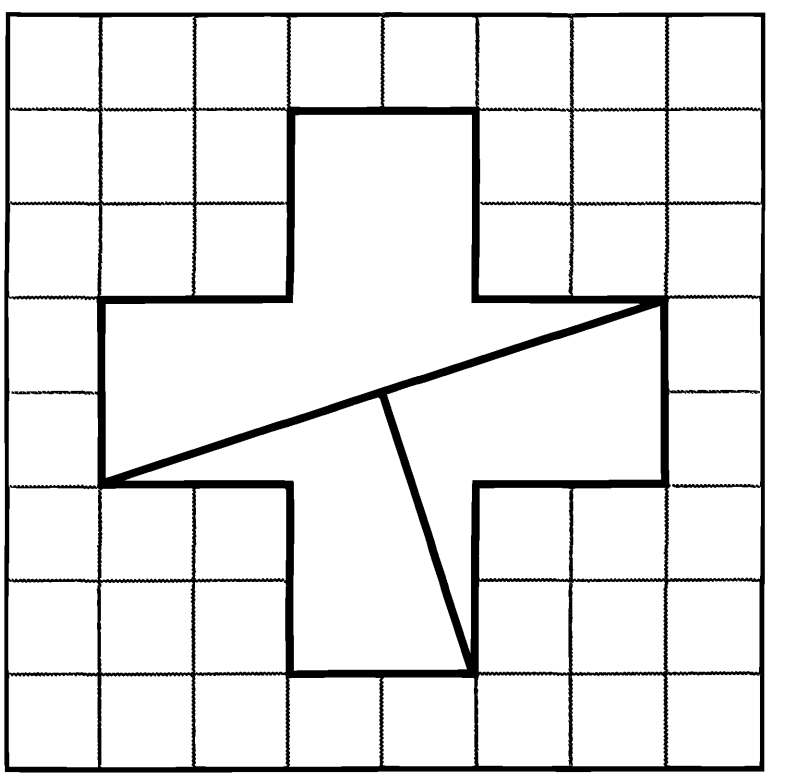
- Draw this cross.
- Draw the two lines shown.
- Colour the cross.
- Cut out the **4** pieces.
- Fit the **4** pieces into a **square** and stick them in your book.



- These **4** pieces will also make a **square.**
- Draw them, cut them out, fit the pieces into a **square** and stick them in your book.



- Use these **3** pieces to make a **rectangle**.

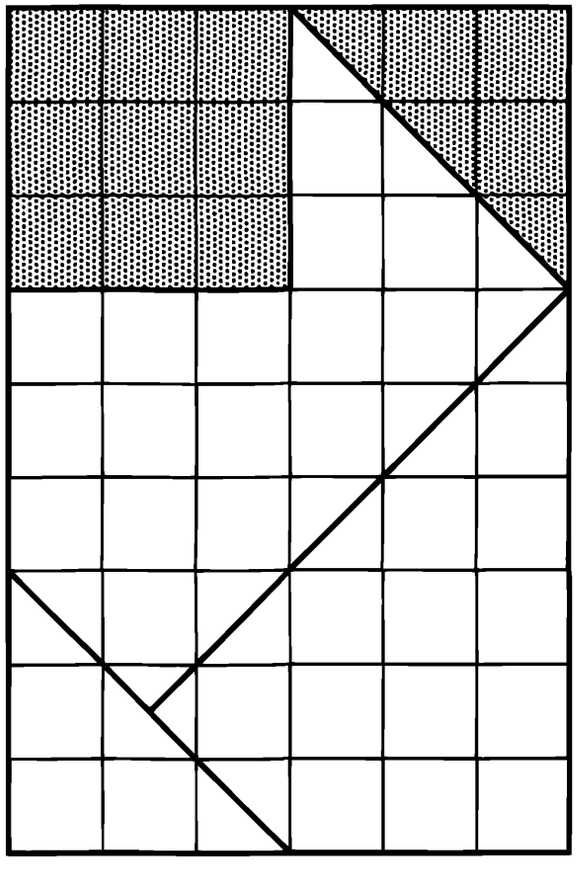


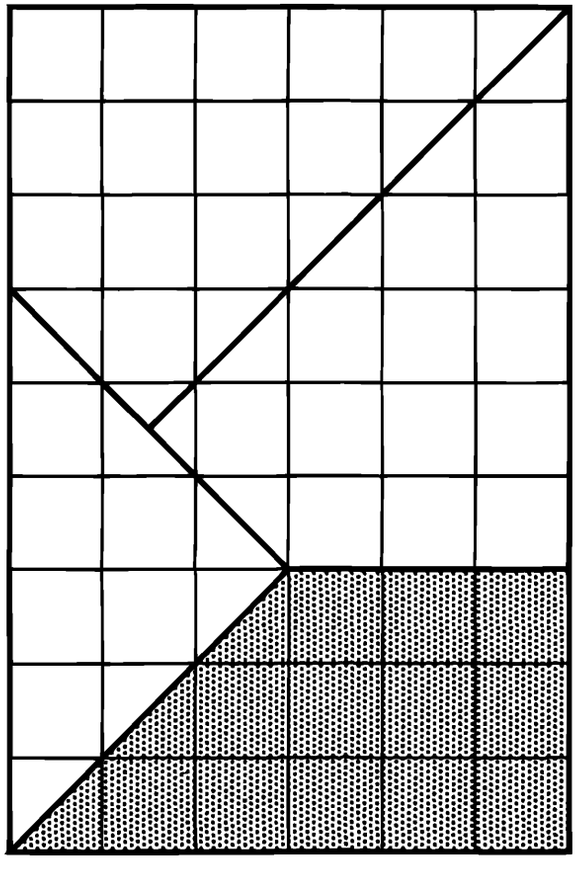
Dissection 3

Smile **0052**

You will need: centimetre squared paper, scissors, glue.

- Copy these two rectangles.





In each rectangle, the 3 **unshaded** pieces will make a square.

For each rectangle:

- Cut out the 3 **unshaded** pieces.
- Fit the 3 pieces into a square and stick them in your book.

The 3 **shaded** pieces will make a rectangle.

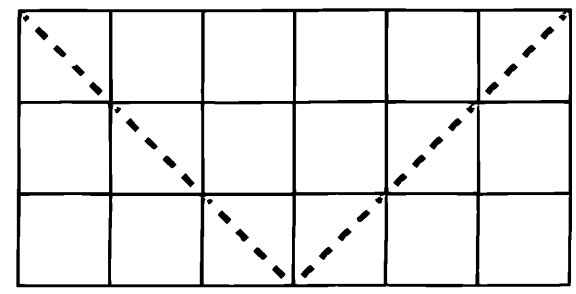
- Fit the 3 **shaded** pieces into a rectangle and stick them in your book.

Dissection 4

Smile **0053**

You will need: centimetre squared paper, scissors and glue.

1. Draw this rectangle.

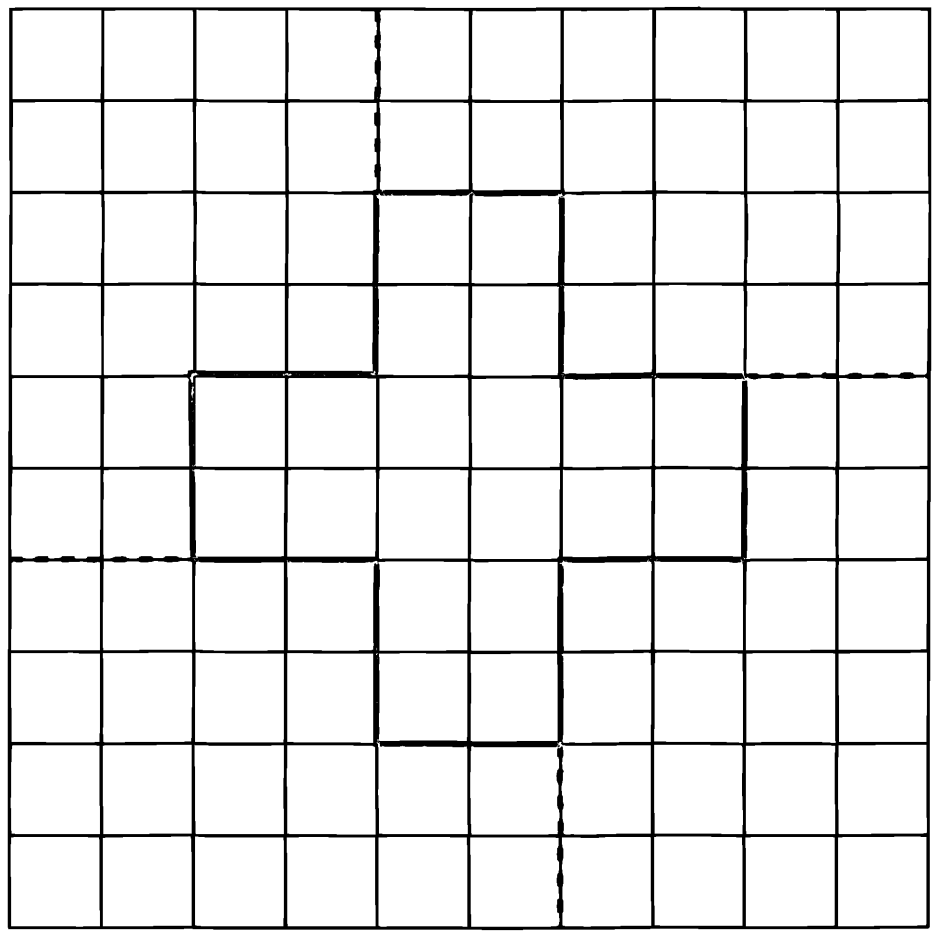


   - Cut along the dotted line.
   - Rearrange the pieces to make a square.
   - Stick the square in your book.

2. Draw some different rectangles.

   - Can you always make a square?

3. Draw this and cut it out.



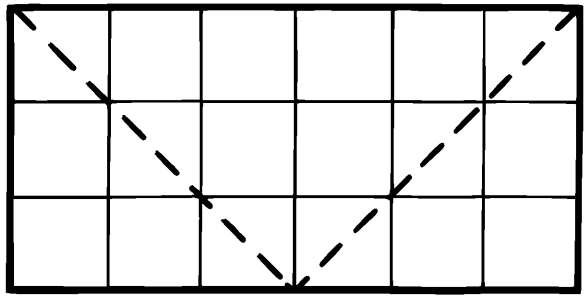
- Look at the centre piece. It is a cross.
- Use the four corners pieces to make a larger cross.
- Stick the square in your book.

You will need squared paper,
scissors and glue

Smile **0053**

Dissection 4

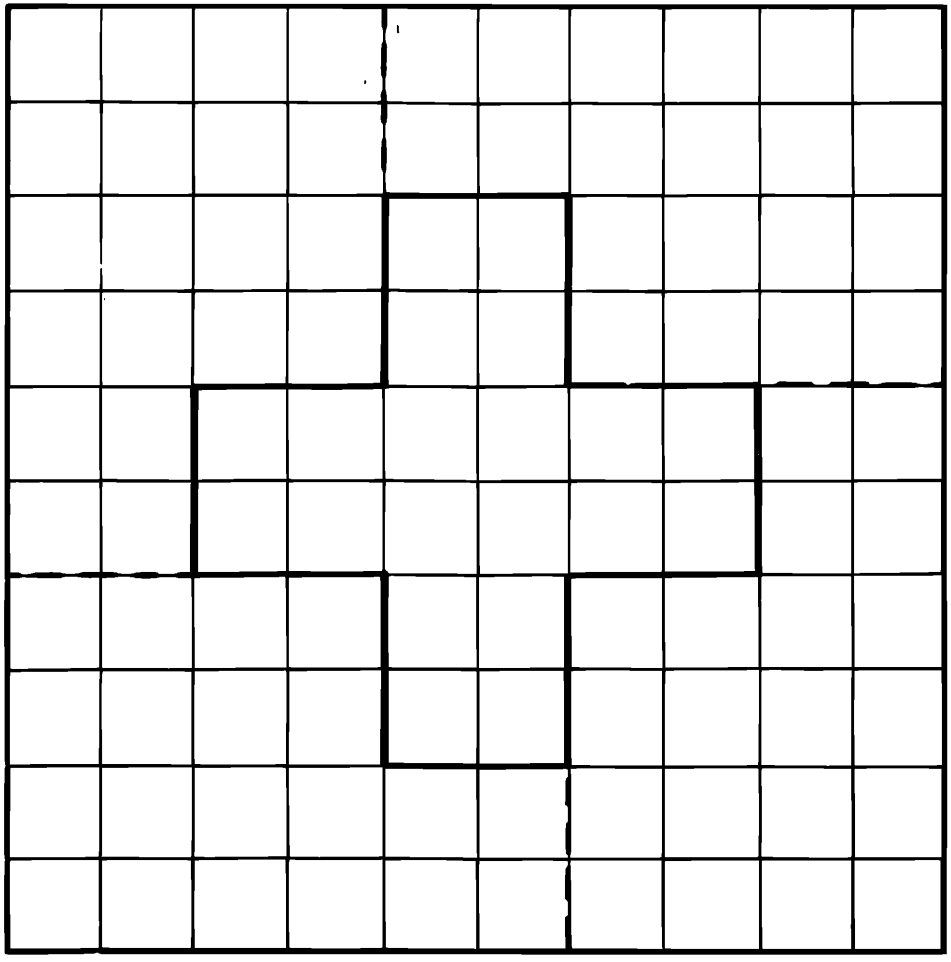
1) Draw the rectangle. Cut along the dotted line.
Rearrange the pieces to make a square.
Stick the square in your book.



2) Draw some different rectangles.
Can you always make a square?

Turn over

3) Draw this and cut it out. Look at the centre piece. It is a cross. *Use the four corner pieces to make a larger cross.*



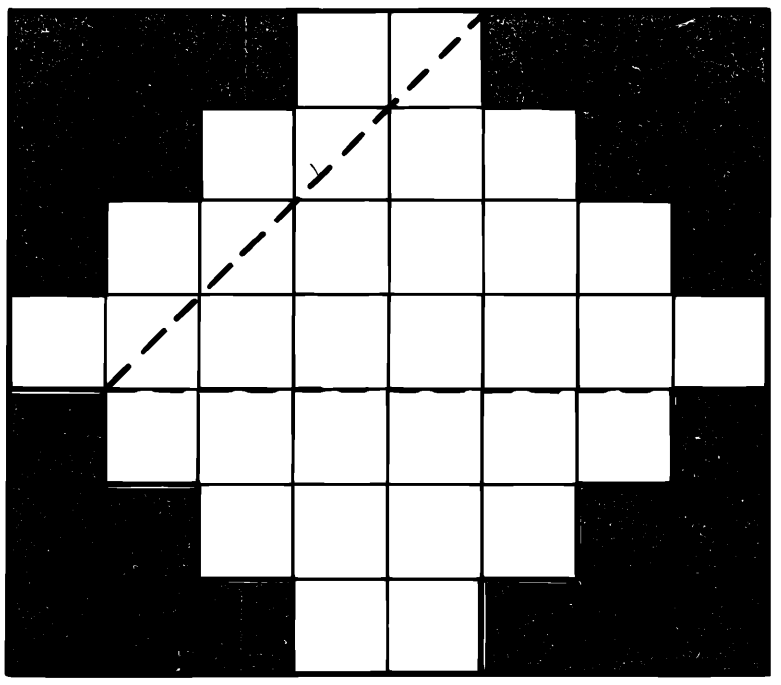
You will need squared paper, scissors and glue.

Smile **0054**

Dissection 5

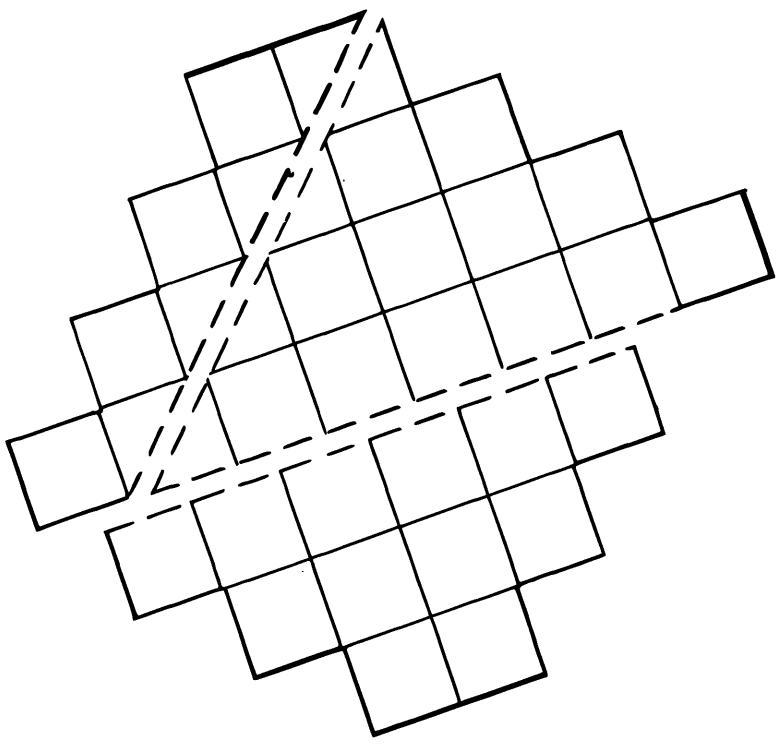
Copy this diagram.

Cut off the blue pieces carefully.
(You will need them for question 2)



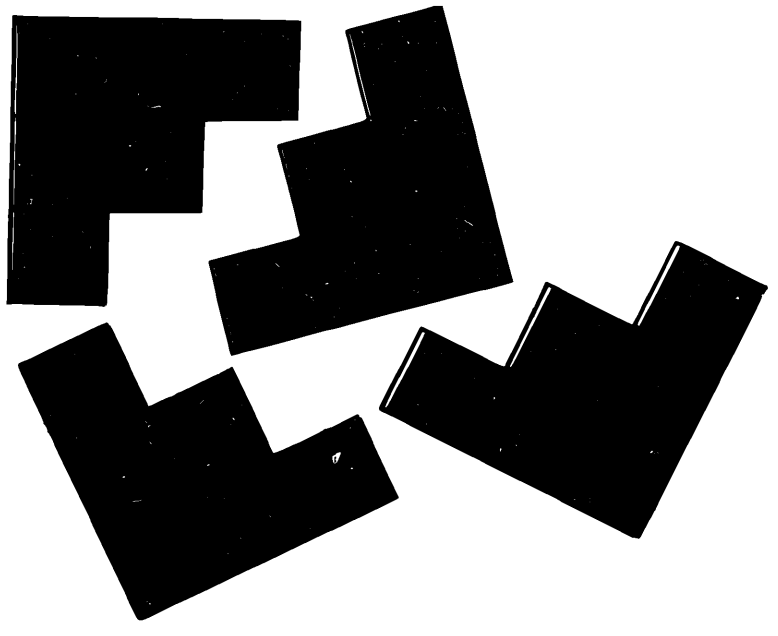
1) **With the yellow pieces:**
Cut along the dotted lines.
Use the 3 pieces to make a triangle.
You will have to turn one piece over.

Stick the triangle in your book.



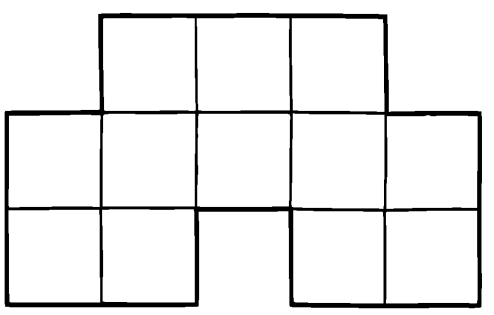
2. **With the blue pieces:**
Fit them together to make a shape with 4 lines of symmetry.

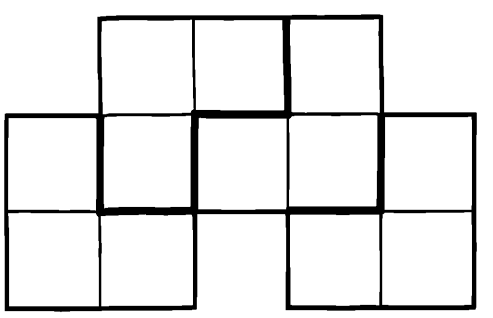
Stick the shape in your book and draw on it the lines of symmetry.



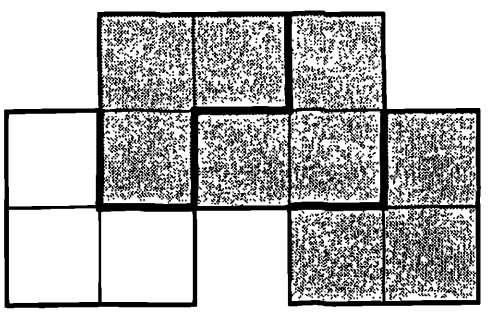
Fractions 3

This shape is divided into $\frac{1}{4}$'s



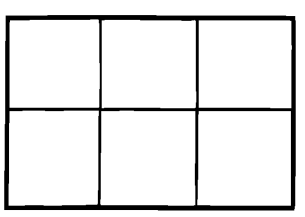


$\frac{3}{4}$ are shaded.

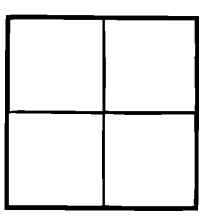


Shade in the given fraction of the following shapes.

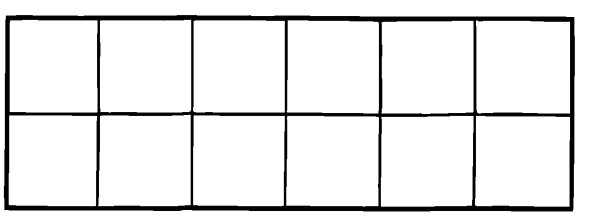
$\frac{1}{6}$



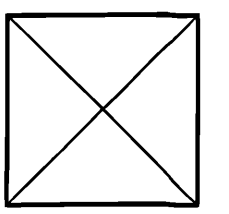
$\frac{1}{4}$



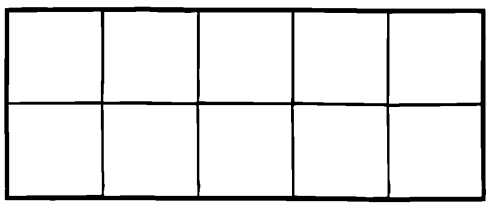
$\frac{5}{6}$



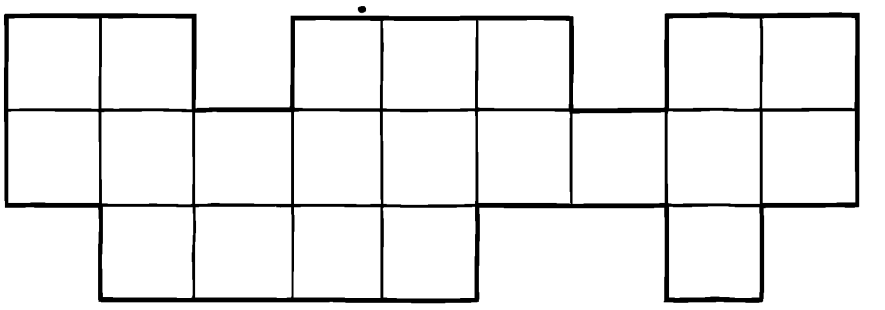
$\frac{3}{4}$



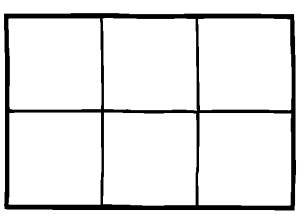
$\frac{2}{5}$



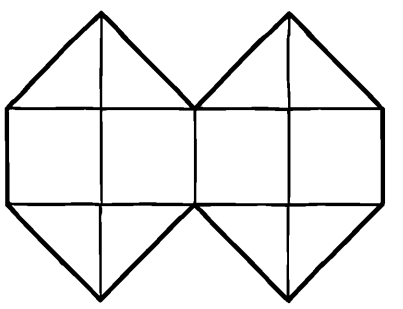
$\frac{3}{7}$



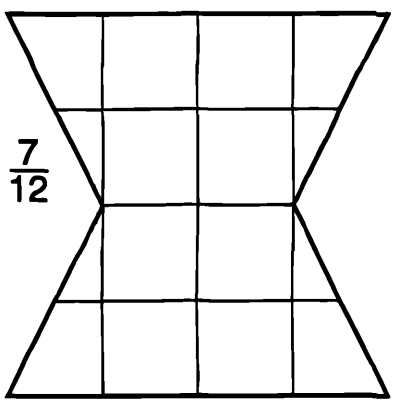
$\frac{1}{3}$



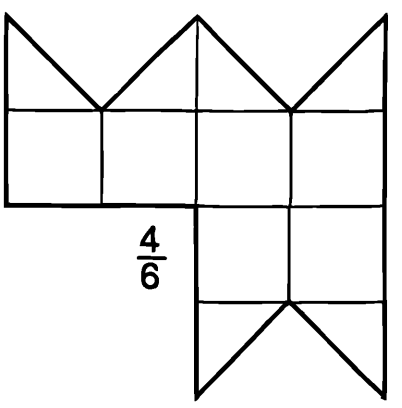
$\frac{9}{16}$



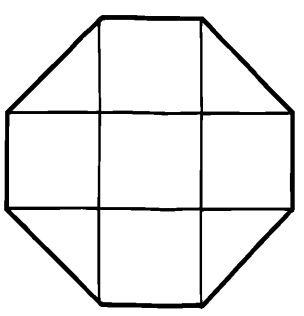
$\frac{7}{12}$



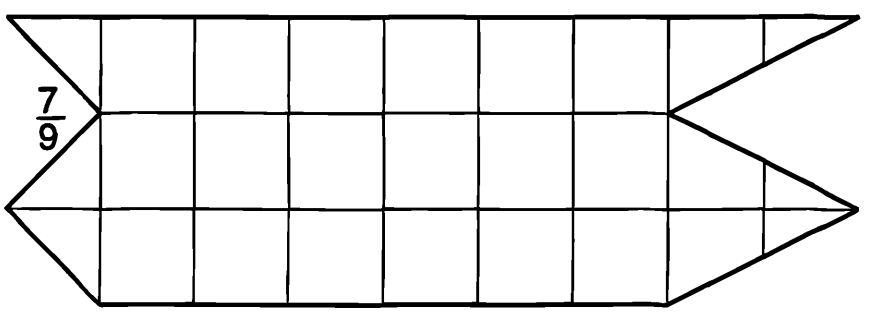
$\frac{4}{6}$



$\frac{11}{14}$

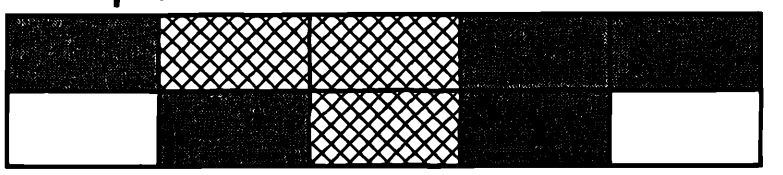


$\frac{7}{9}$



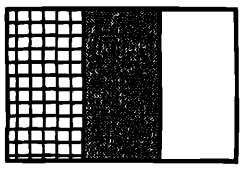
Fractions 4

Example

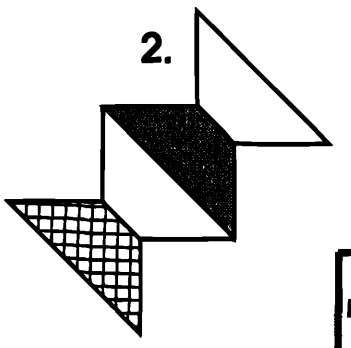


Complete the table using the diagrams below.

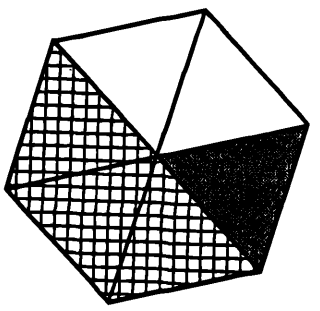
1.



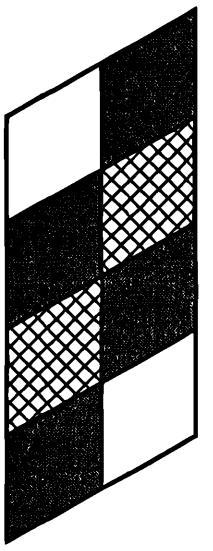
2.



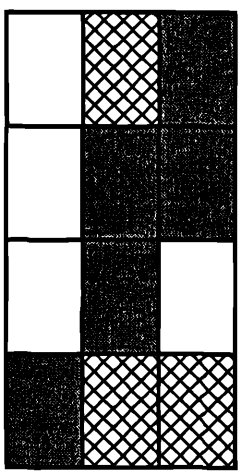
3.



4.



5.



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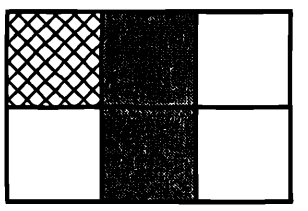

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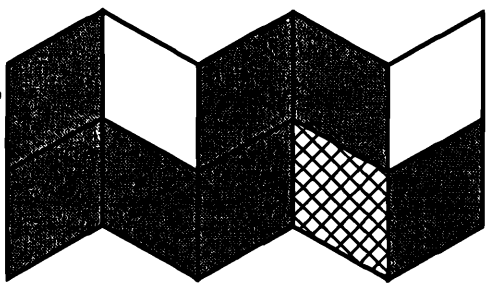
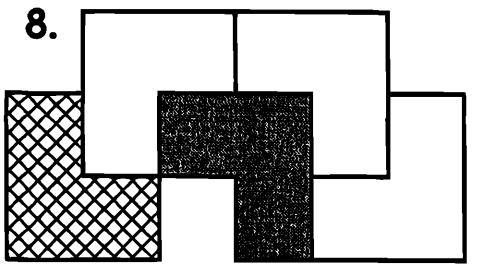
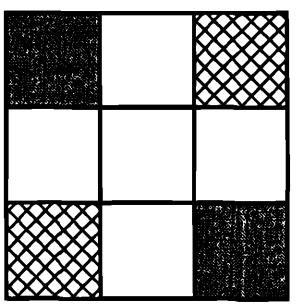


8.



9.



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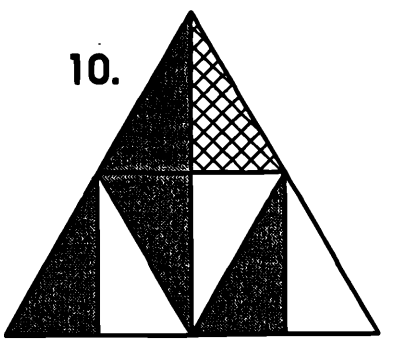


	Number of equal parts	Fraction shaded with lines	Fraction shaded grey	Fraction shaded altogether	Fraction unshaded
Example	10	$\frac{3}{10}$	$\frac{5}{10}$	$\frac{8}{10}$	$\frac{2}{10}$
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

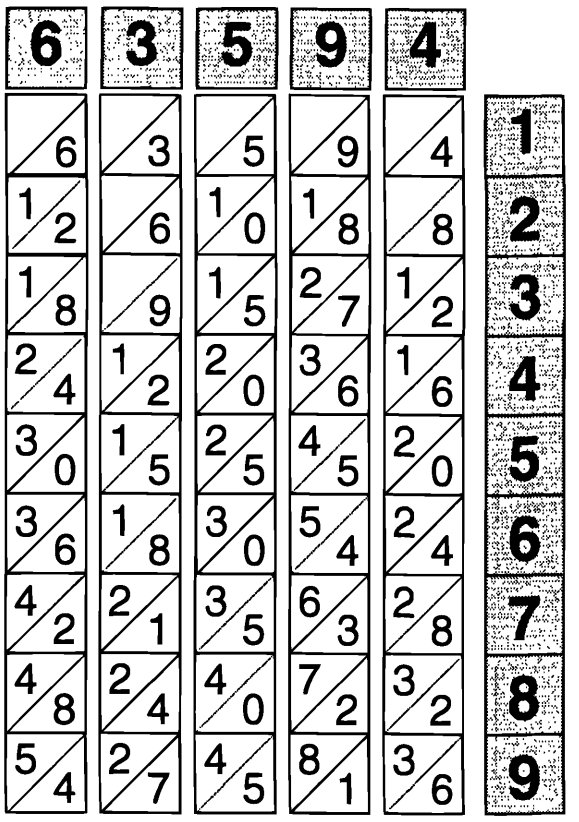
Napier's Rods

You will need a set of Napier's Rods, or a copy of Smile worksheet 0066a Napier's Rods and scissors.

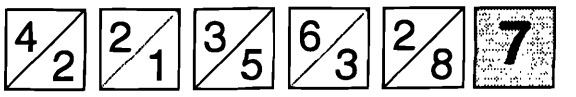
Three hundred years ago peole use a set of Napier's Rods to do simple multiplication problems. Follow the steps to find out how they worked.

To multiply **63594** by **7**:

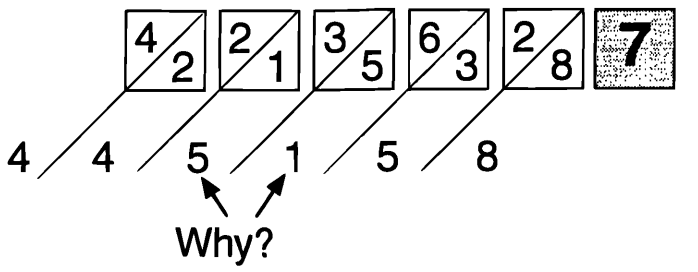
Step 1 Place the rods in the correct order with the index rod at one end.



Step 2 Write down row **7**.



Step 3 Add diagonally.



So **63594** x **7** = **445158**

Use rods 3 and 6 and the index rod to calculate:

1. 36 x 2
2. 36 x 4
3. 36 x 8

Use the correct rods to calculate:

4. 65 x 8
5. 38 x 7
6. 365 x 6
7. 1760 x 7
8. 865 x 8
9. 8375 x 9
10. 9748 x 7
11. 1809 x 6
12. 18392 x 6
13. Have you noticed how the rods are designed?
14. Can you think of any multiplication problem which would be difficult wto do with Napier's Rods?
    Write down the problems and explain why they are difficult.

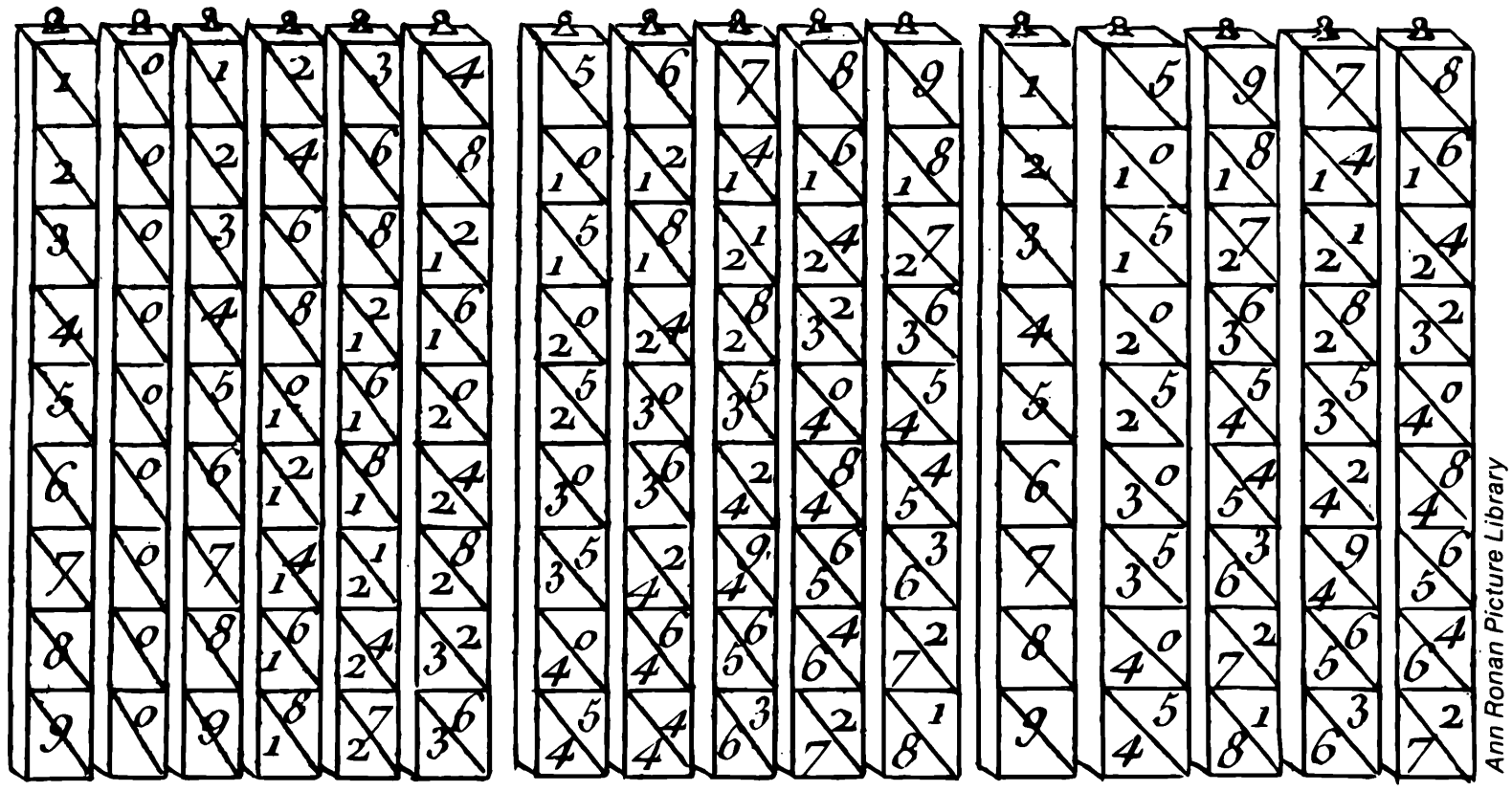
Smile **0066**

You will need a set of Napier's Rods.

Napier's Rods

300 years ago people used a set of Napier's Rods to do simple multiplication problems.

Follow the steps on the next page to to find out how they worked.



Ann Ronan Picture Library

To multiply **63594** by **7:**

Place the rods in the correct order with the index rod at one end.

6	3	5	9	4	1
12	6	10	18	8	2
18	9	15	27	12	3
24	12	20	36	16	4
30	15	25	45	20	5
36	18	30	54	24	6
42	21	35	63	28	7
48	24	40	72	32	8
54	27	45	81	36	9

Write down row **7**

4	2	3	6	2	7
2	1	5	3	8	

Add diagonally

	4	2	3	6	2
	2	1	5	3	8
4	4	5	1	5	8

Why?

So **63594 × 7 = 445158**

Use rods **3** and **6** and the index rod to calculate:

1. 36 × 2 *2.* 36 × 4 *3.* 36 × 8

Use the correct rods to calculate:

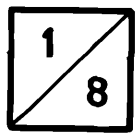
4. 65 × 8 *7.* 1760 × 7 *10.* 9748 × 7

5. 38 × 7 *8.* 865 × 8 *11.* 1809 × 6

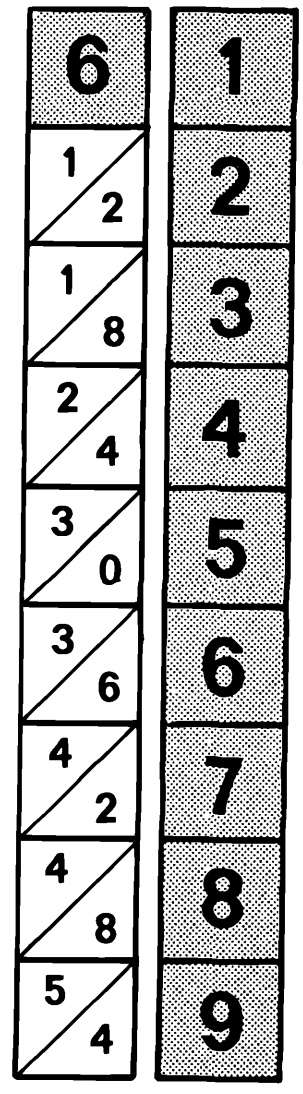
6. 365 × 6 *9.* 8375 × 9 *12.* 18392 × 6

13. Have you noticed how the rods are designed?

The third square down on rod 6 is



Why?



14. Can you think of any multiplication problems which would be difficult to do with Napier's Rods?

Write down the problems and explain why they are difficult.

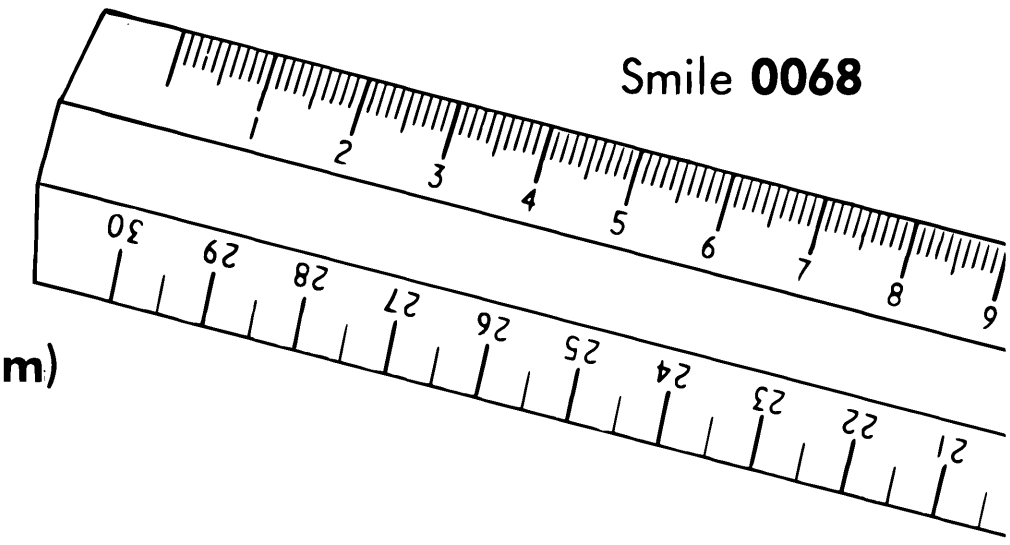
Napier's Rods

Cut out each of these ten strips.

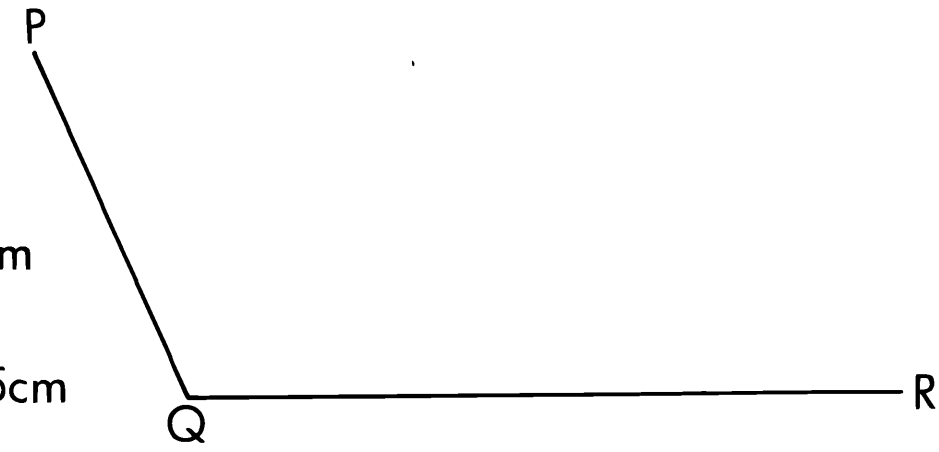
0	1	2	3	4	5	6	7	8	9
0	2	4	6	8	10	12	14	16	18
0	3	6	9	12	15	18	21	24	27
0	4	8	12	16	20	24	28	32	36
0	5	10	15	20	25	30	35	40	45
0	6	12	18	24	30	36	42	48	54
0	7	14	21	28	35	42	49	56	63
0	8	16	24	32	40	48	56	64	72
0	9	18	27	36	45	54	63	72	81
0	10	20	30	40	50	60	70	80	90

Accurate Measuring

Smile **0068**



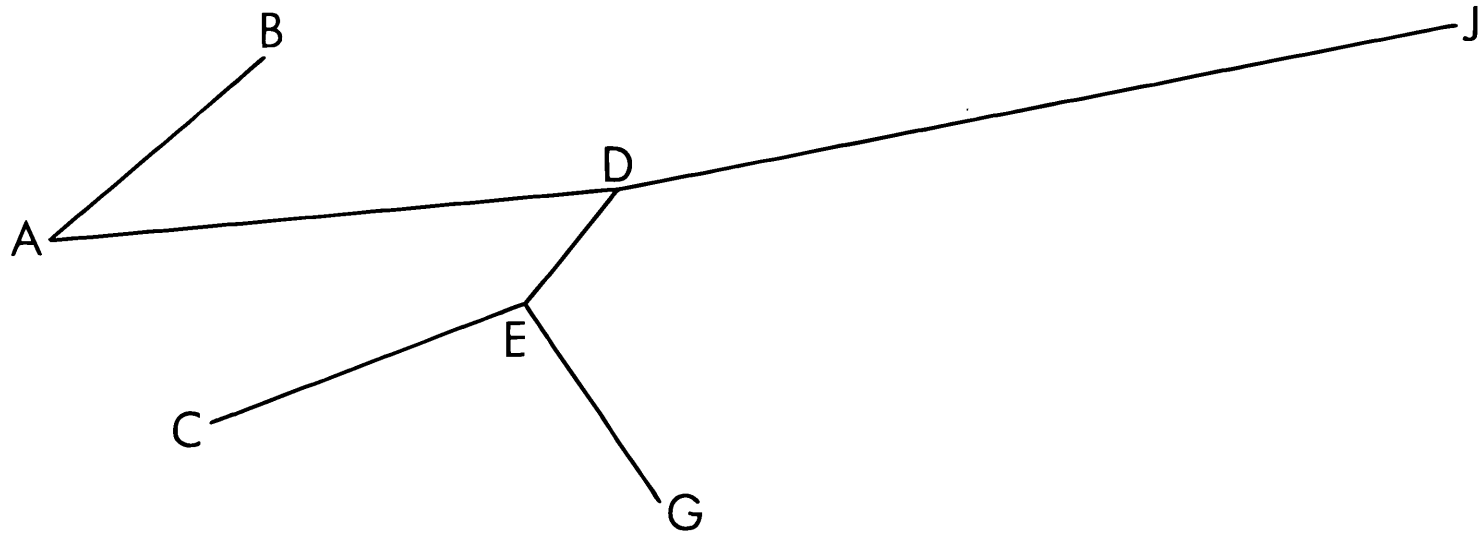
For these measurements you will need a ruler with each centimetre (**cm**) marked into 10 millimetres (**mm**).



(a) Measure the line PQ.
PQ = 40mm PQ = 4 cm

(b) Measure the line QR.
QR = 75mm QR = 7.5cm

Measure these lines.
For each line write its length in **cm** and **mm**.



1) DE = 1.5 ☐
2) DE = 15 ☐

3) AB = 3.0 ☐
4) AB = 30 ☐

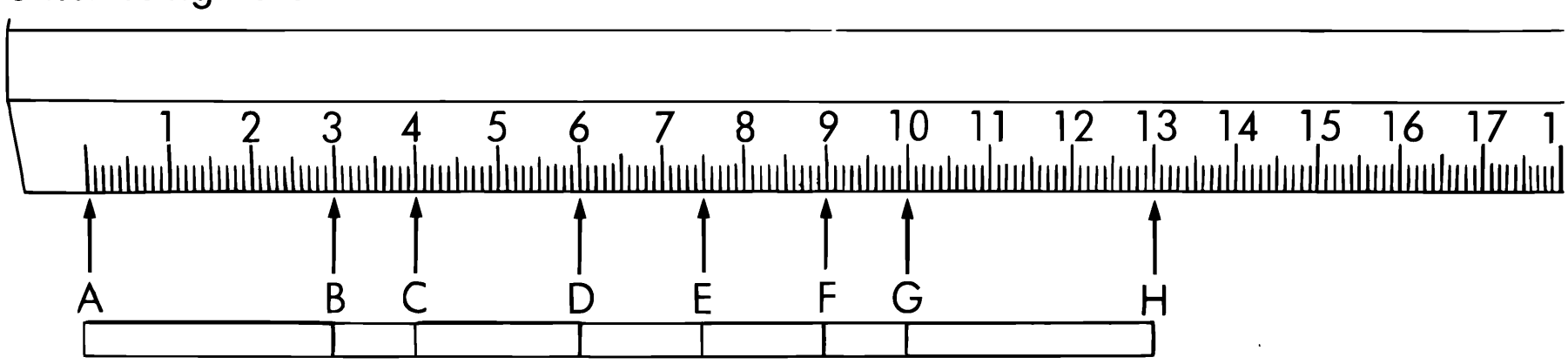
5) AD = ☐ cm
6) AD = ☐ mm

7) CE = ☐ cm
8) CE = ☐ mm

9) GE = ☐ cm
10) GE = ☐ mm

11) JD = ☐ cm
12) JD = ☐ mm

For each of these measurements write two answers, one using **cm** and the other using **mm**.



13) CA
14) DH

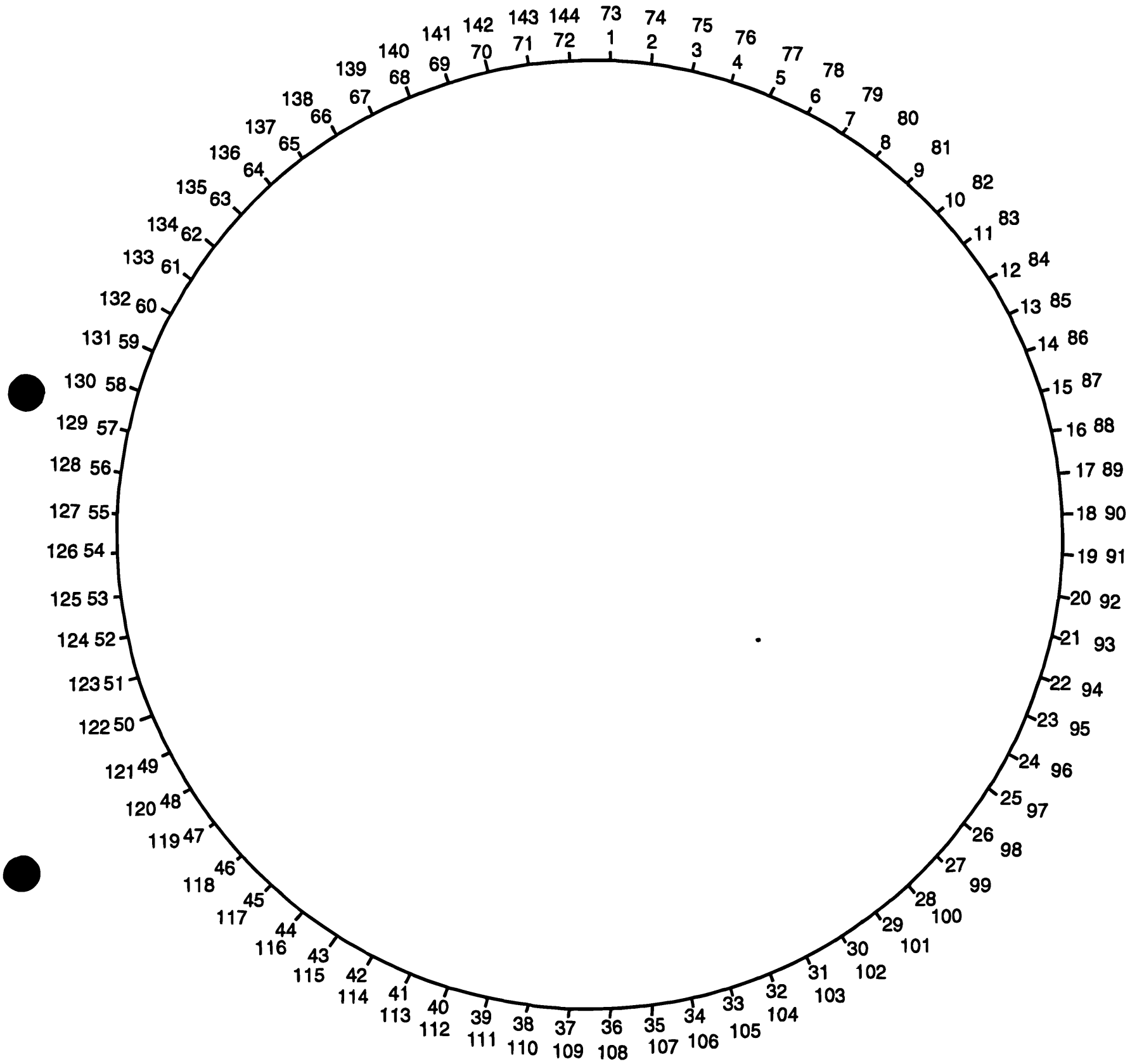
15) CF
16) EB

17) BG
18) EH

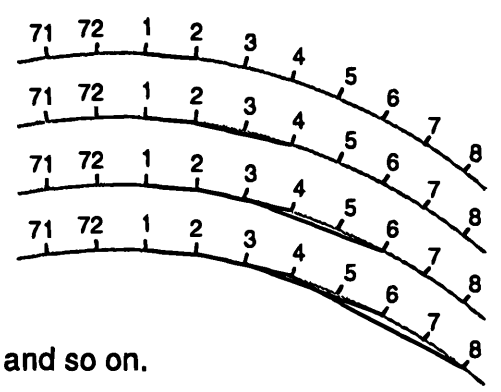
19) GF
20) GC

Cardioid

Use a ruler and a sharp pencil to join each number to its double.



Hints



Question

In medicine, heart treatment is called 'cardiac' treatment.

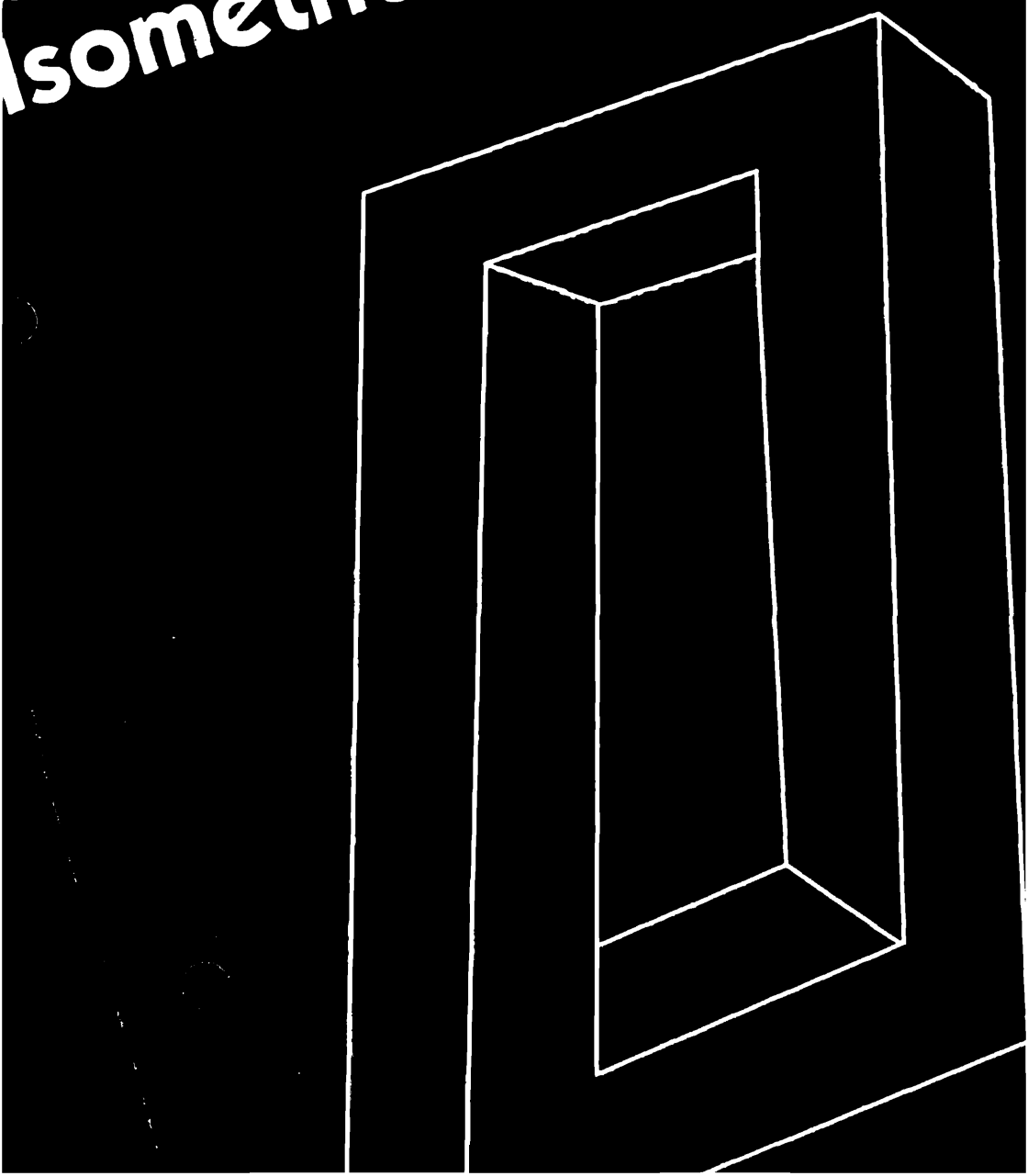
What is the connection?

Use a dictionary to help you explain.

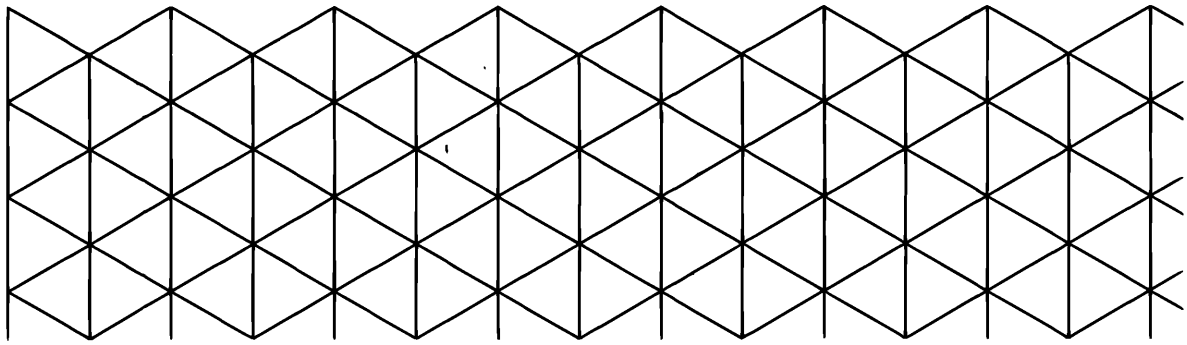
Smile 0070

u will need isometric paper and centicubes.

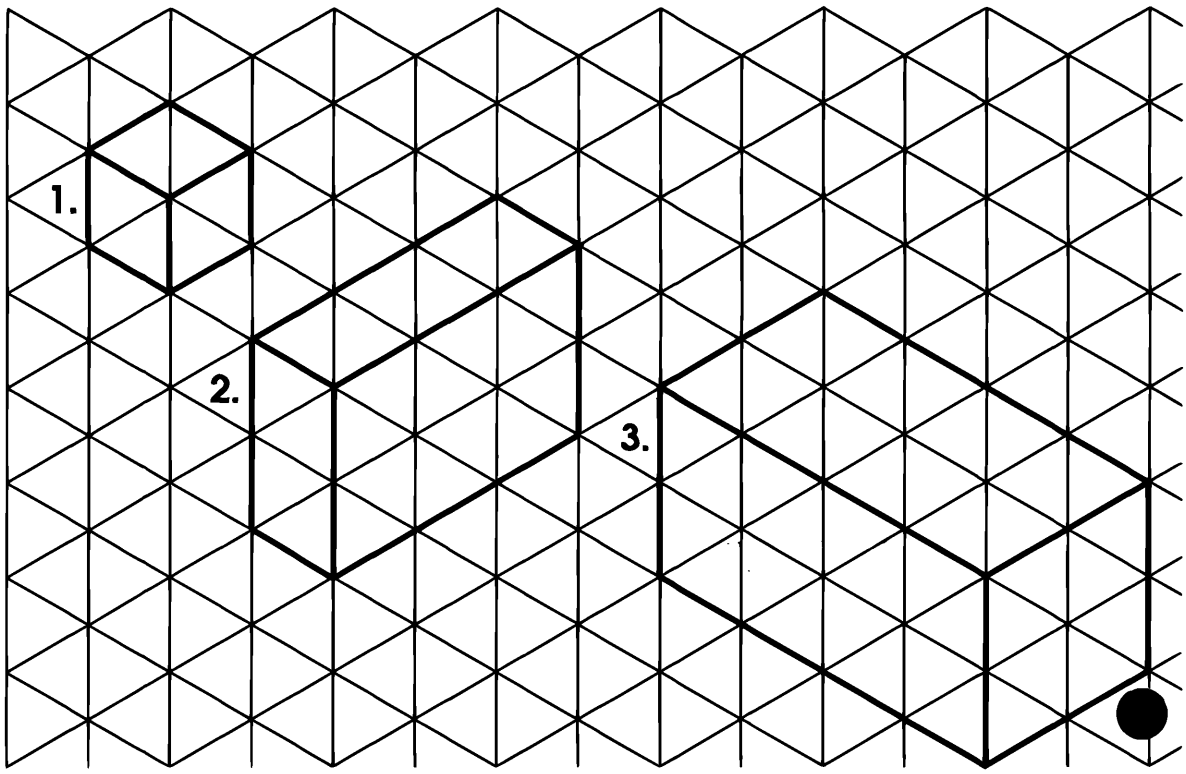
Isometric Drawing



Use your paper this way up...



and draw these:



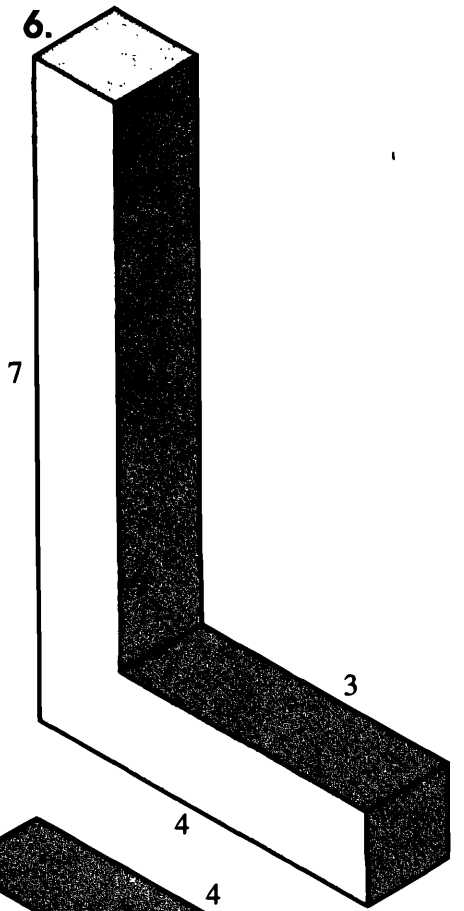
Make and draw these.

4. A shape using 8 centicubes.

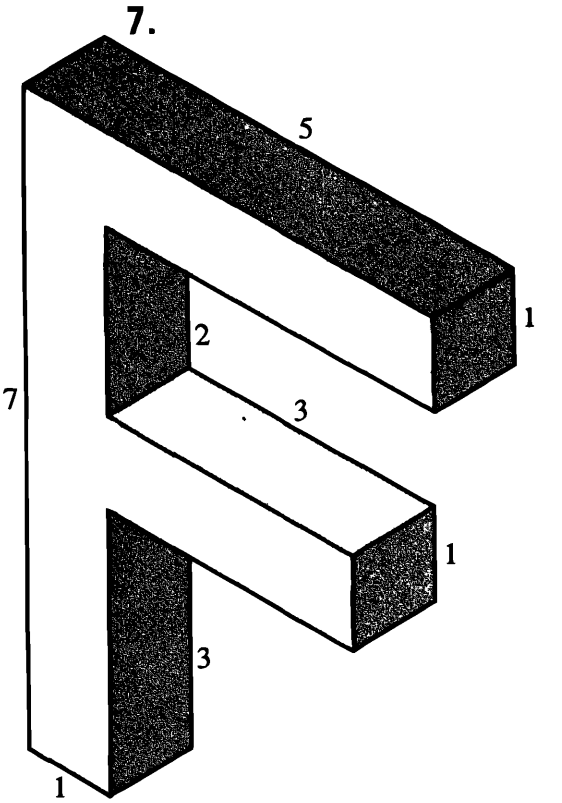
5. A shape using 10 centicubes.

Make these shapes with centicubes. Then draw them.

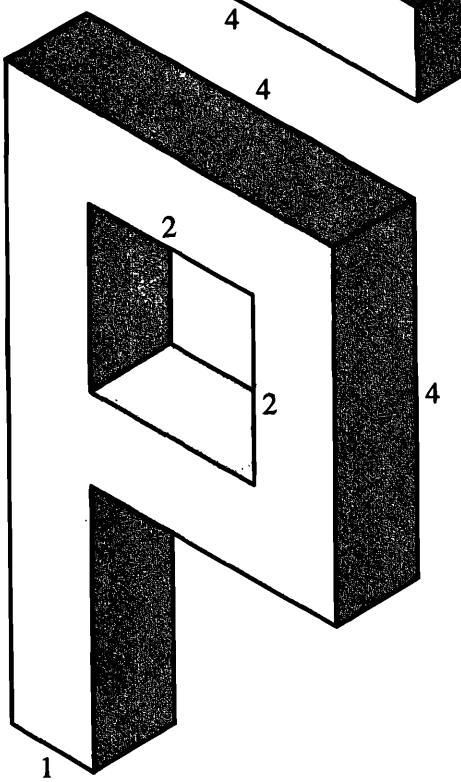
6.



7.

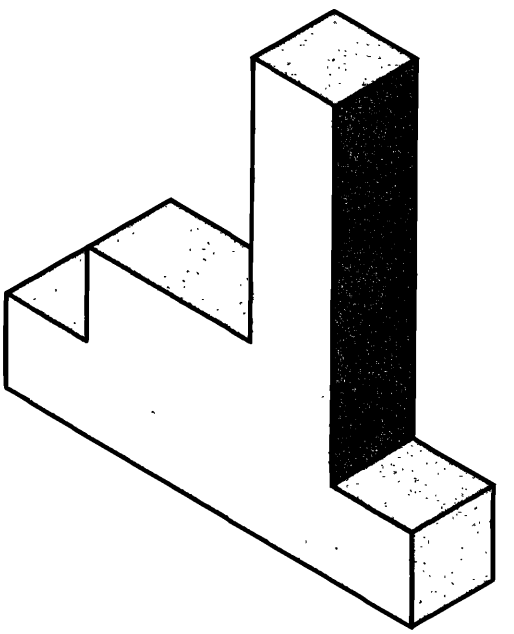


8.



turn over

9. Make and draw some solid shapes of your own. Use three colours to shade each drawing with parallel planes in the same colour like the example below.

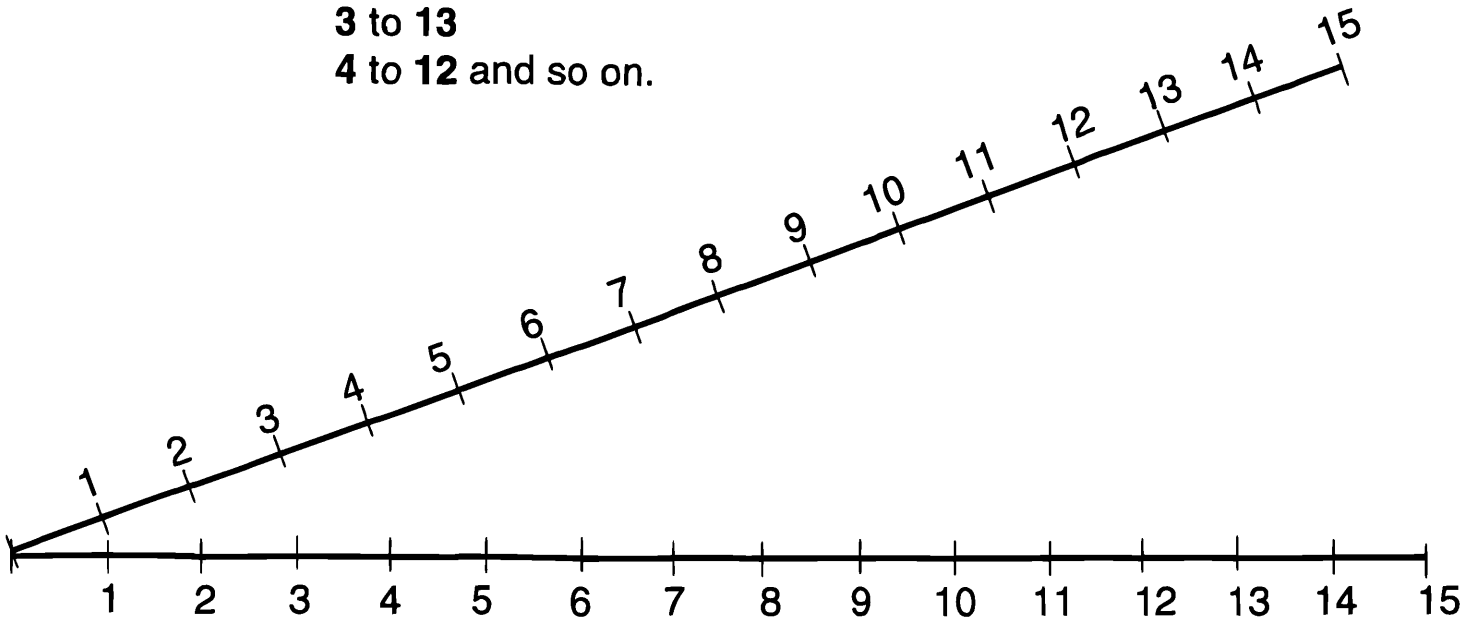


Smile **0071**

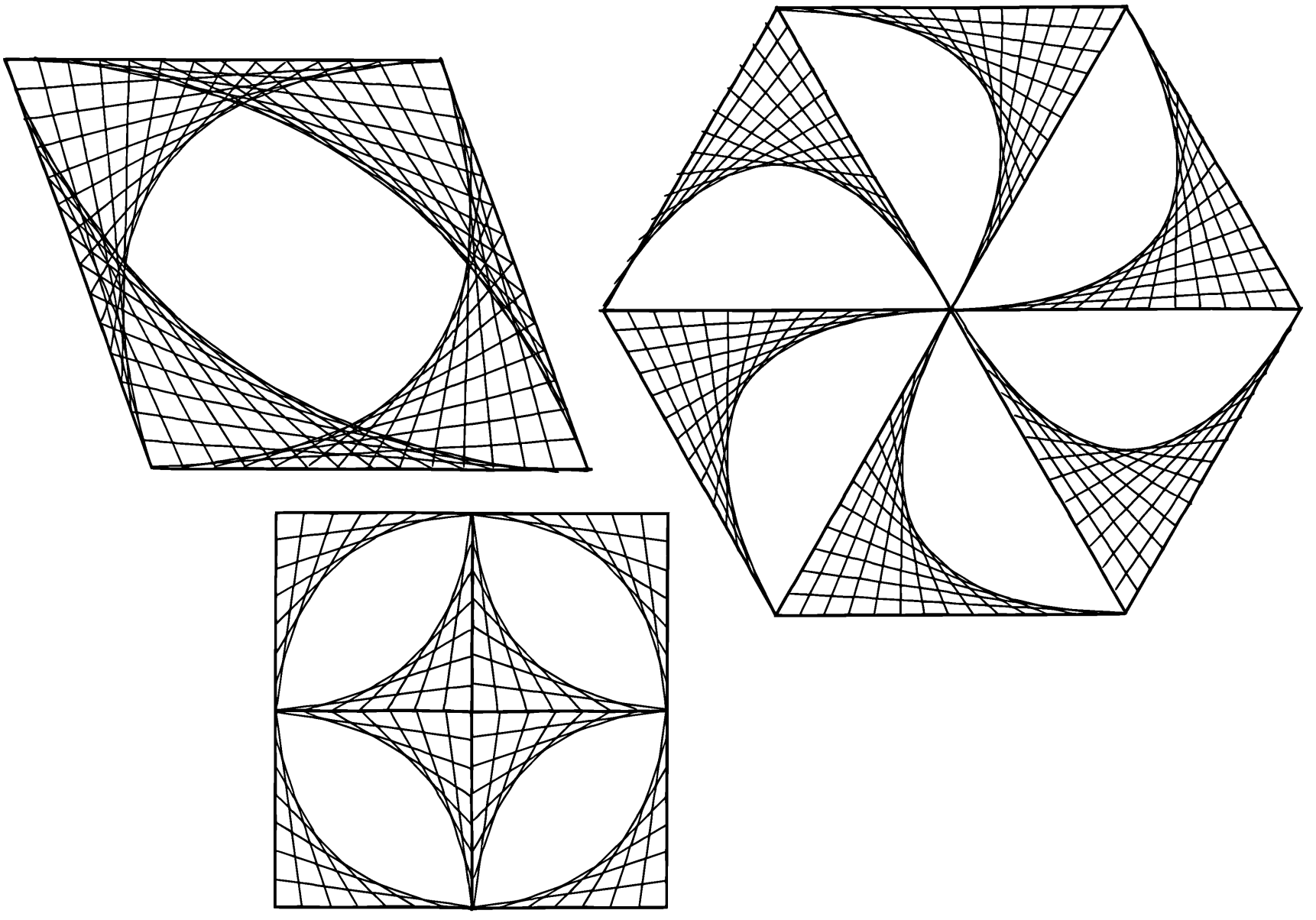
Envelopes

Draw 2 straight lines to make an angle.
Number the lines from **1** to **15** at 1 centimetre intervals.

Use a ruler to join **1** to **15**
2 to **14**
3 to **13**
4 to **12** and so on.



You can use this idea to make many different patterns.



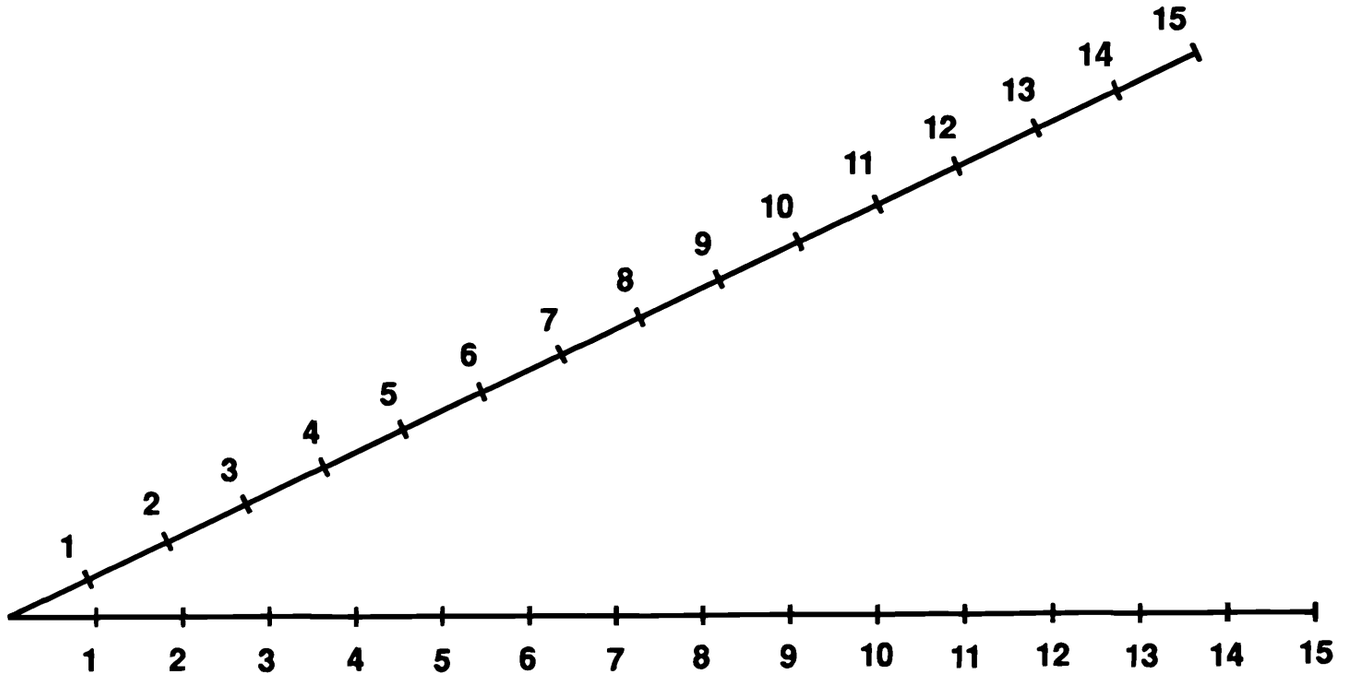
Try some of your own.

ENVELOPES

Draw 2 straight lines to make an angle.

Number the lines from **1** to **15**
at 1 cm. intervals.

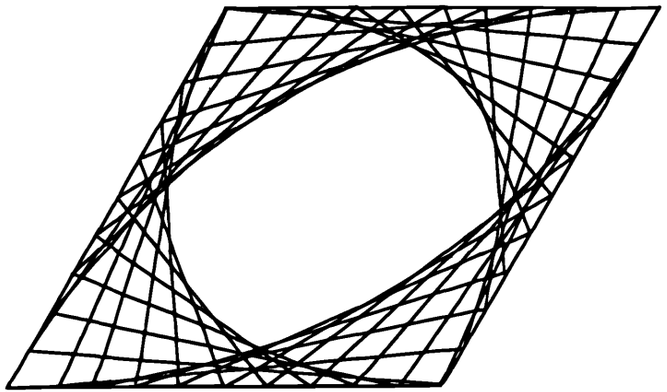
Use a ruler to join **1** to **15**
2 to **14**
3 to **13**
4 to **12** and so on. . .

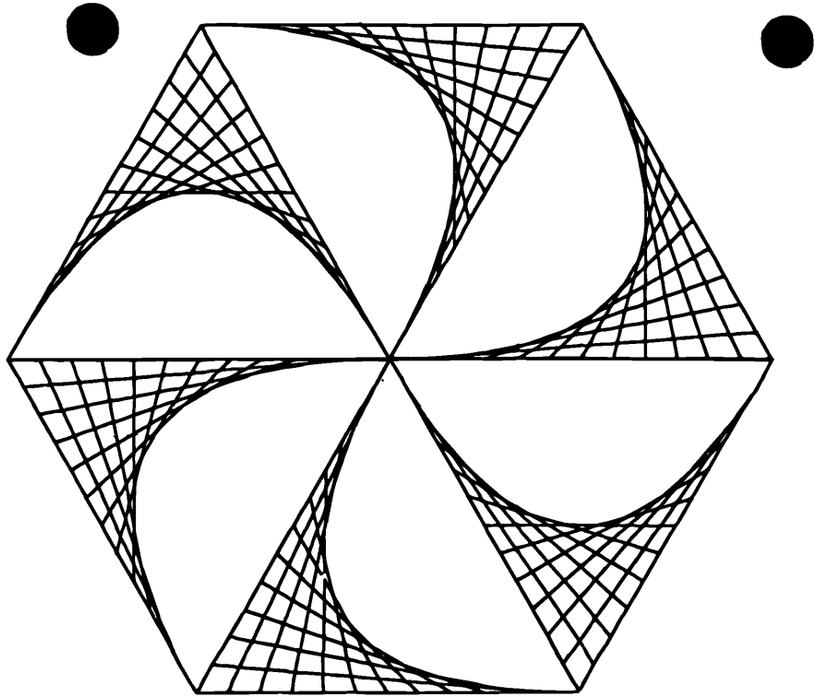


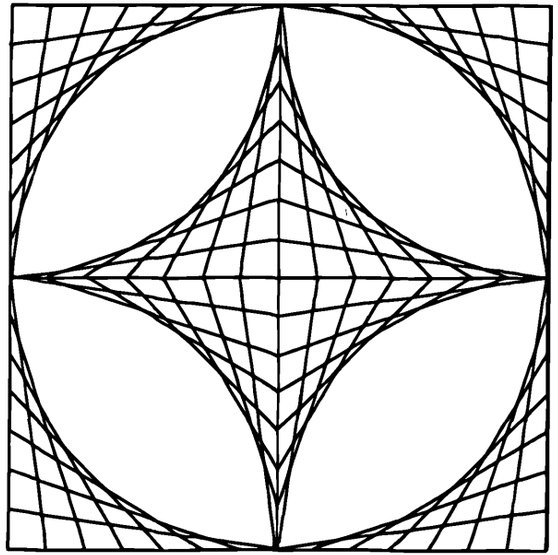
Turn over

You can use this idea to make many different patterns.

Try some of your own.



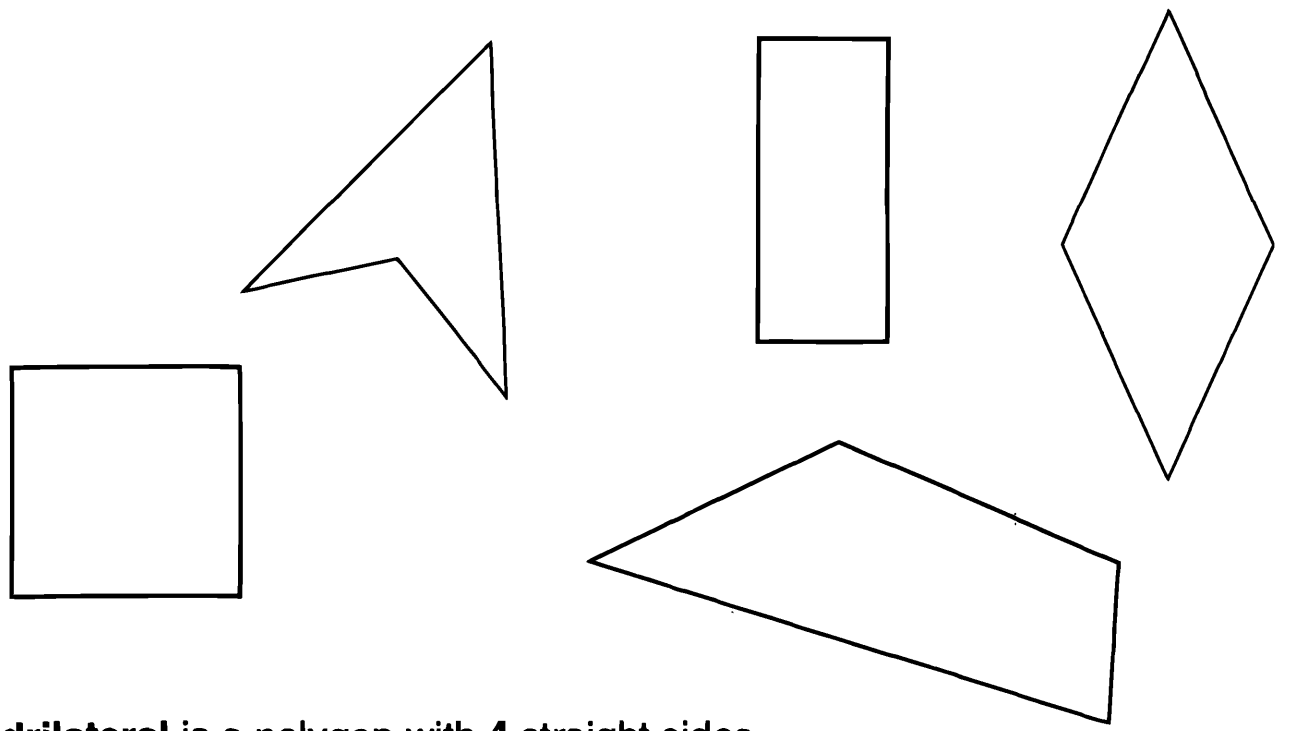




Angles of a Quadrilateral

You will need gummed paper.

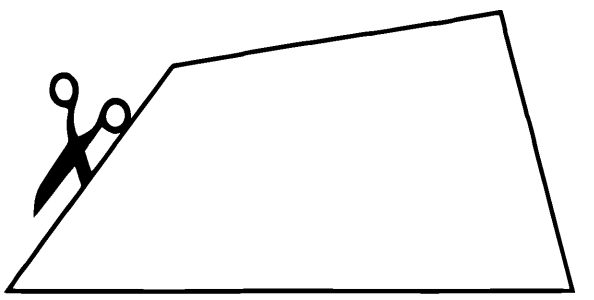
These are all **quadrilaterals.**



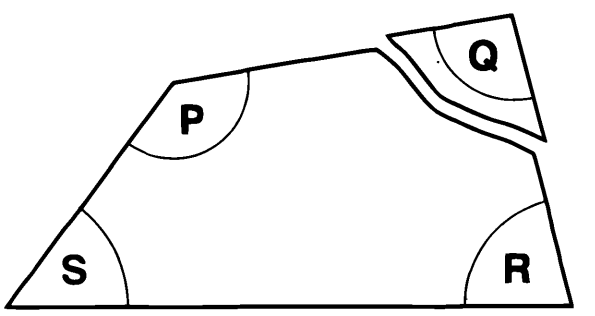
A **quadrilateral** is a polygon with **4** straight sides.

Draw a large quadrilateral on gummed paper.

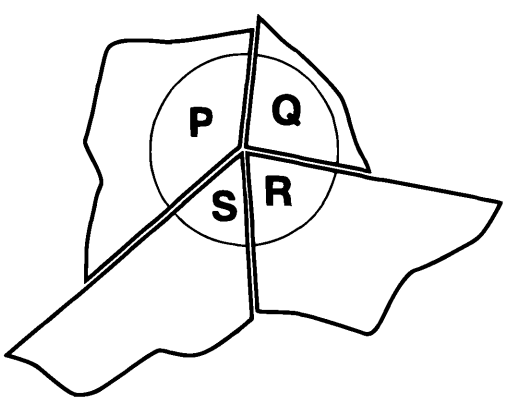
Cut it out.



Mark the angles clearly and tear them off.



Stick the angles together like this.



What do you notice about these angles?

Turn over.

Draw some other quadrilaterals.

Cut them out, mark and tear off the angles as before and then stick them together.
What do you notice about the angles for each quadrilateral?

Copy and complete:

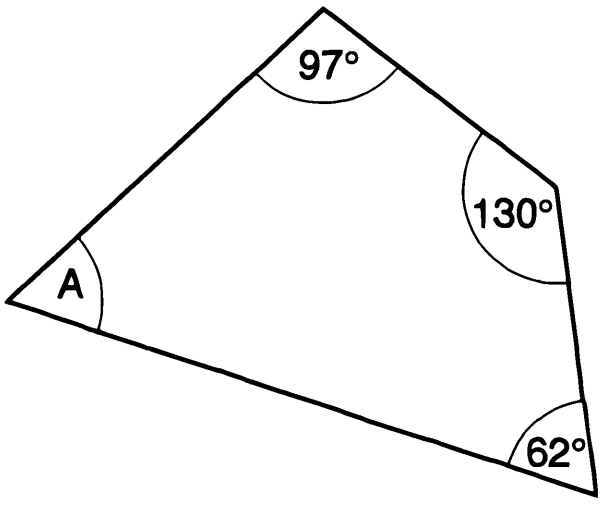
1. The angles of a quadrilateral add up to [redacted] right-angles.

2. The angles of a quadrilateral add up to [redacted] degrees.

Work out the missing angles in these quadrilaterals.

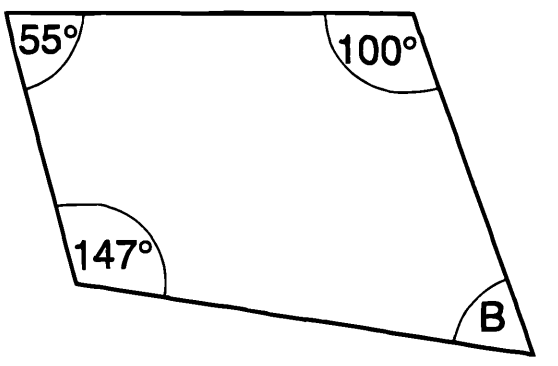
The angles are not drawn accurately.

3.



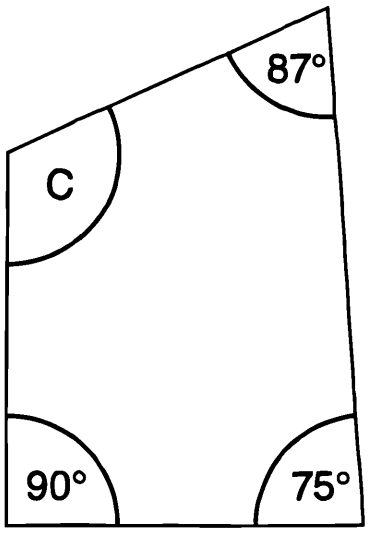
A = ?

4.



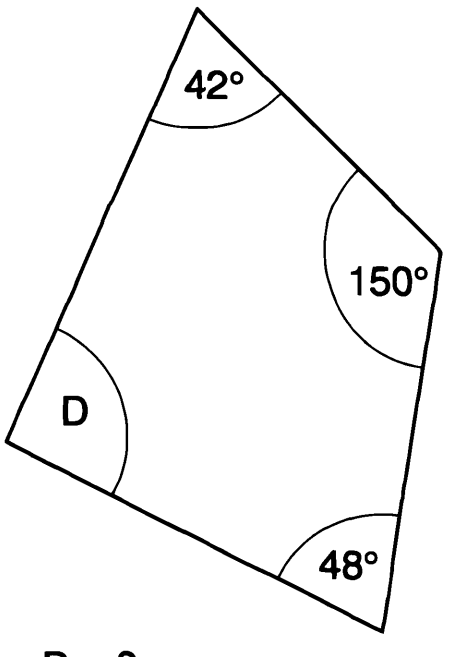
B = ?

5.



C = ?

6.



D = ?

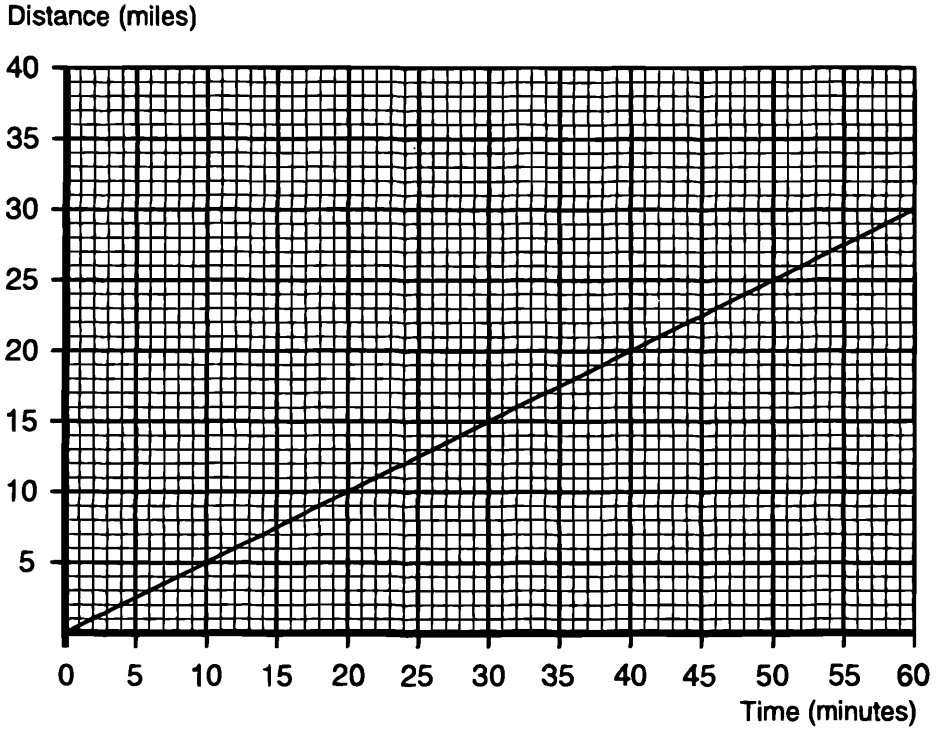
Time/Distance Graph

A car is travelling at 30 m.p.h.

In 1 hour it will travel 30 miles.

In $\frac{1}{2}$ hour it will travel 15 miles.

This graph shows the relationship between distance and time.



1) Use the graph to find the distance travelled in:
   (a) 10 mins
   (b) 50 mins
   (c) $\frac{1}{4}$ hour
   (d) 30 mins
   (e) $\frac{3}{4}$ hour

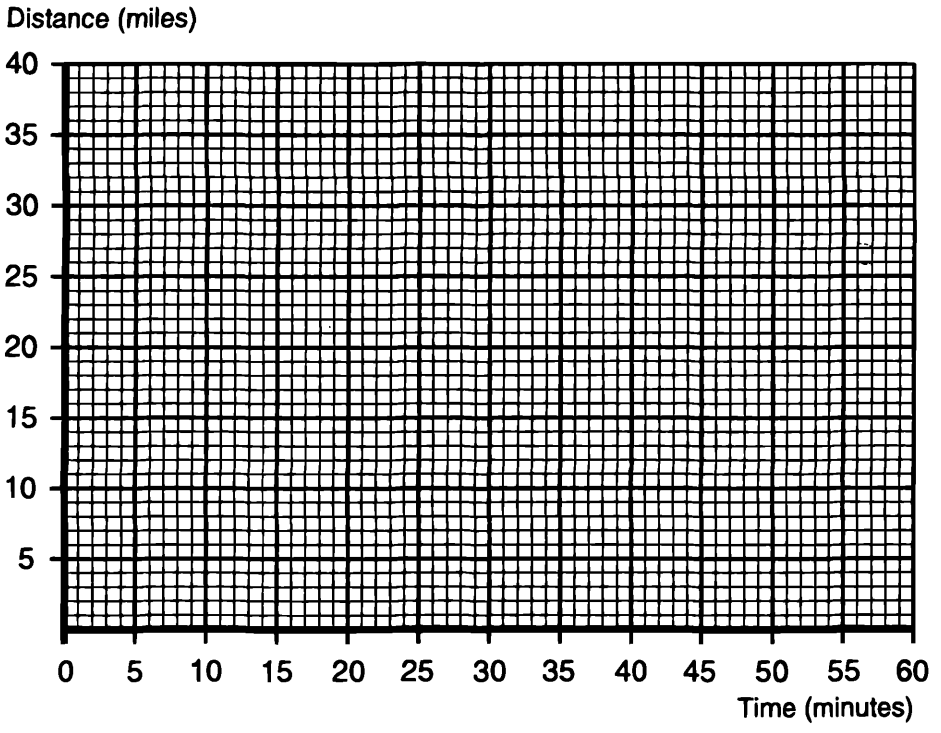
2) Use the graph to find th time taken to travel:
   (a) 10 miles
   (b) 20 miles
   (c) 25 miles
   (d) 2.5 miles
   (e) 17.5 miles

A cyclist travels at a steady speed.

After 40 minutes she has gone 10 miles.

Can you draw a time distance graph?

Hint:
How far has the cyclist travelled after 40 minutes?
How far has she travelled after 20 minutes?



3) What distance has been covered in these times?
   (a) 60 mins
   (b) 50 mins
   (c) 30 mins
   (d) 25 mins

4) What is the cyclist's speed in m.p.h.?

5) Find the time taken to travel:
   (a) 15 miles
   (b) 7.5 miles
   (c) 2.5 miles
   (d) 6.25 miles

6) How far will she travel in $1\frac{1}{2}$ hours?

Sum and Product

To find the **sum** we add e.g. 2 + 5 =7
To find the **product** we multiply e.g. 2 x 5 = 10

		sum	product
6	5	**11**	**30**
7	3		
2	9		
4	8		
5	6		
3	7		
8	8		
10	11		
9	4		
4	11		
6	8		
9	7		
12	12		
8	9		
11	12		

Smile Worksheet **0074**

Sum and Product

To find the **sum** we add e.g. 2 + 5 =7
To find the **product** we multiply e.g. 2 x 5 = 10

		sum	product
6	5	**11**	**30**
7	3		
2	9		
4	8		
5	6		
3	7		
8	8		
10	11		
9	4		
4	11		
6	8		
9	7		
12	12		
8	9		
11	12		

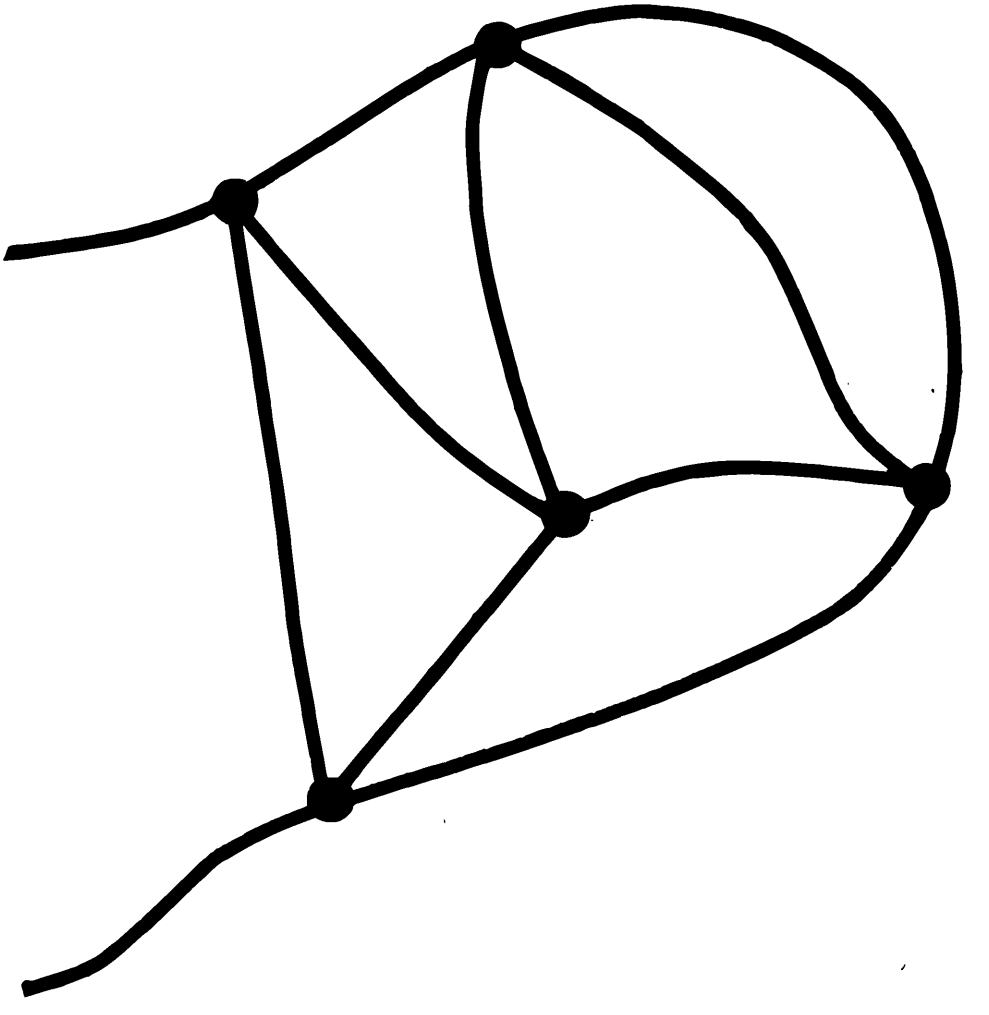
You will need tracing paper. Smile **0075**

Networks

A network is **traversable** if you can draw it:

. . . in one stroke without taking your pencil off the paper

. . . without going over any line twice

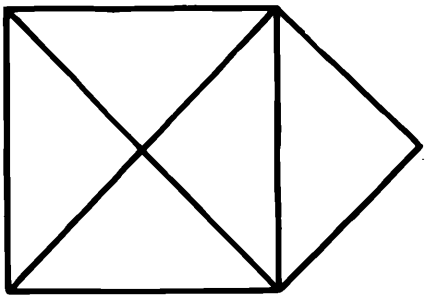


Use tracing paper to check that this network **is** traversable.

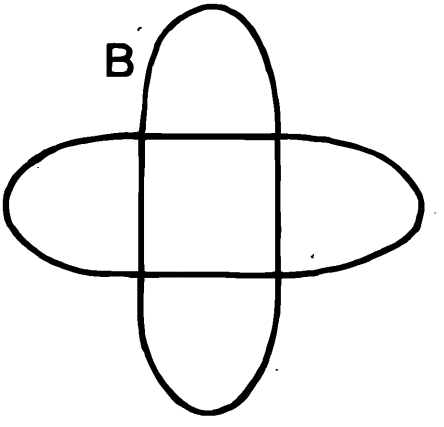
Turn over

Are these networks traversable? Use tracing paper to find out.

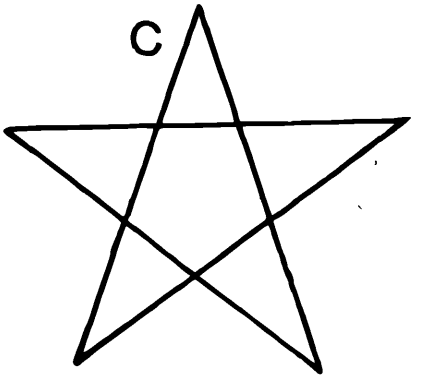
A



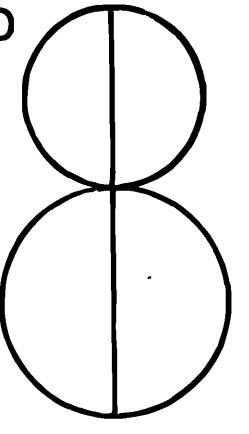
B



C



D



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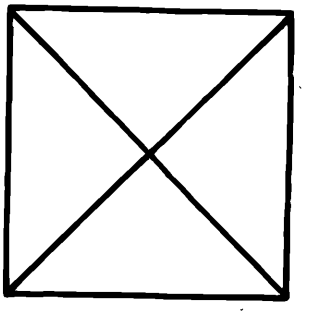
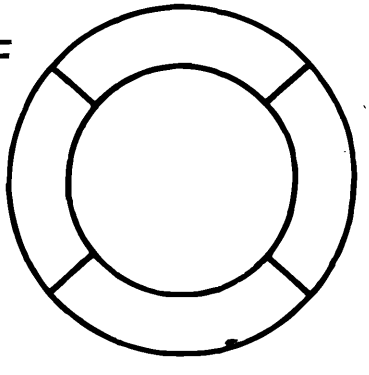
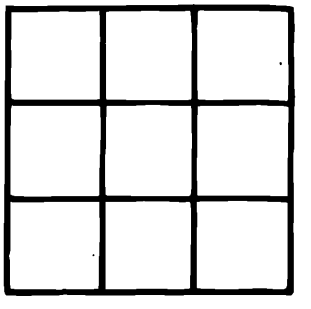


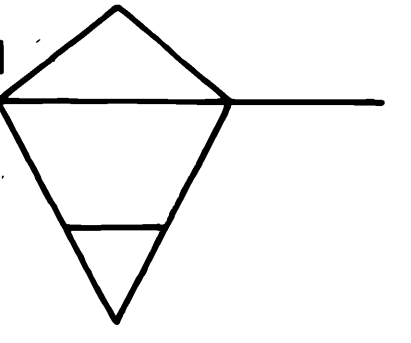
F



G



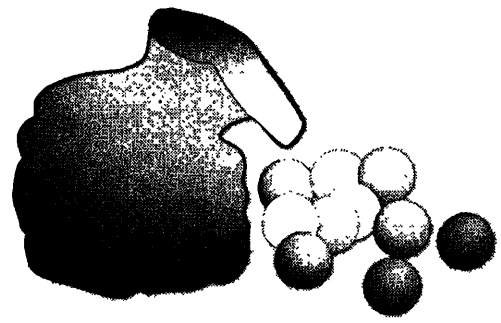
H



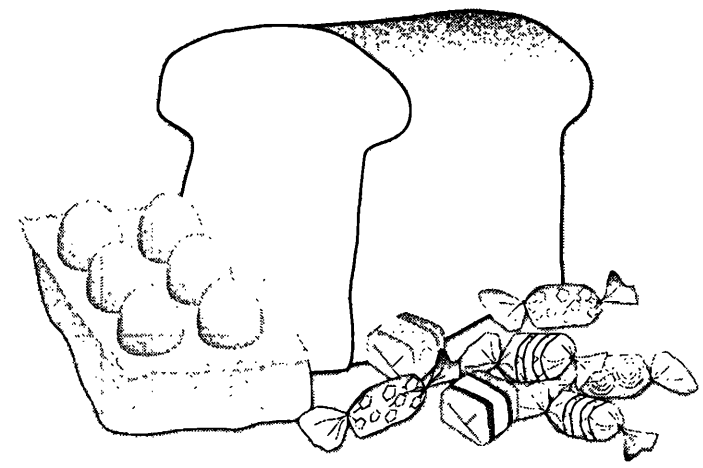
Calculator Problems

Smile **0085**

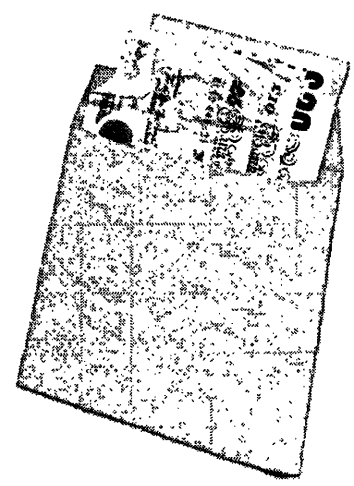
(1) A bag contains 23 red marbles, 62 yellow marbles, 49 green marbles, 87 black marbles and 65 purple marbles.
How many marbles are there?
How many are **not** green?
How many are **not** black?



(2) I spent 5p on sweets, 23p on eggs and 17p on bread.
How much did I spend?
How much change did I get from 50p?

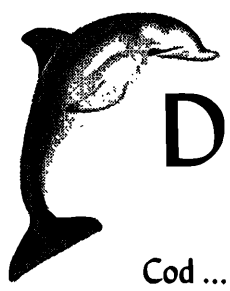


(3) In a month I earned £26 in the first week, £19 in the second week, £21 in the third week and only £15 in the fourth week.
How much did I earn?
If I need £100, how much more must I earn?



(4) In a shop I spent 6p, 3p, 1p, 7p, 11p, 18p and 17p.
How much change did I get from £1.

(5) This is the menu in a fish and chip shop. What is the cost of:



Dolphin
Fish Bar

Cod	19p
Plaice	23p
Rock	20p
Haddock	24p
Steak Pie	16p
Chips	6p
Gherkin	4p
Onions	3p
Saveloy	10p

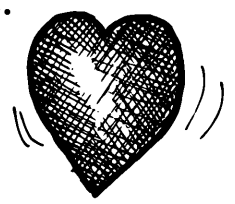
(a) Cod and 2 portions of chips.
(b) Steak pie and chips with a gherkin.
(c) Three meals of Rock, chips and an onion.
(d) Saveloy and 3 portions of chips.
(e) Two meals of Haddock, chips and a gherkin.

What change do you get from £1 each time?

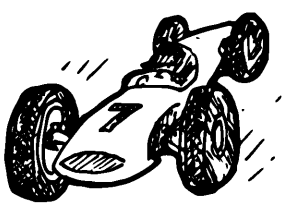
(6) How can you tell this card was written in 1972?

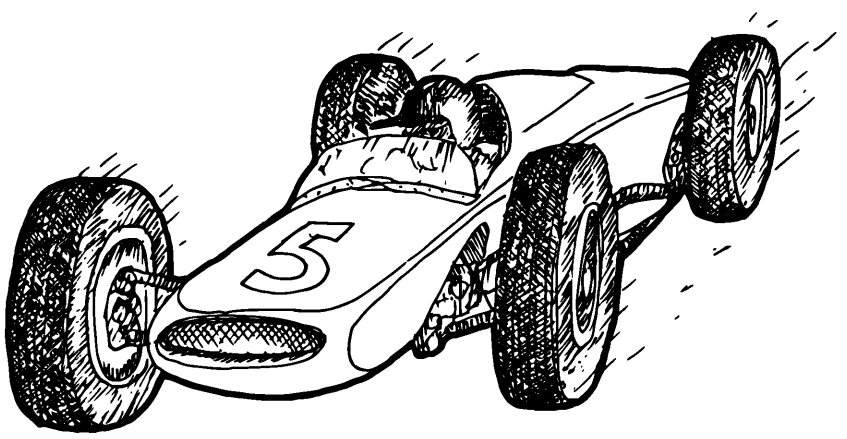
More Calculator Problems

(1) Your heart beats an average of 79 beats per minute. How many beats per hour?

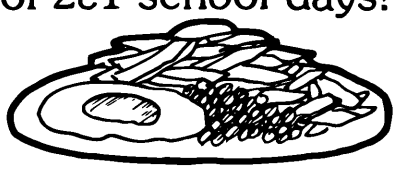


(2) The 'Le Mans' is a 24 hour race. If a car averages 179 km per hour, how far does it travel?



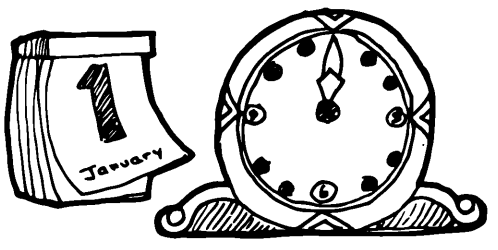


(3) A school serves an average of 134 dinners per day. How many dinners does it serve in a year of 281 school days?

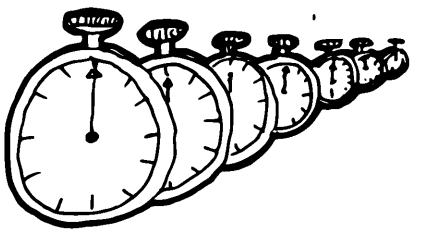


(4) A woman earns £28 per hour as a computer consultant. She works seven hours a day for seven days. How much does she earn?

(5) How many hours in a year?

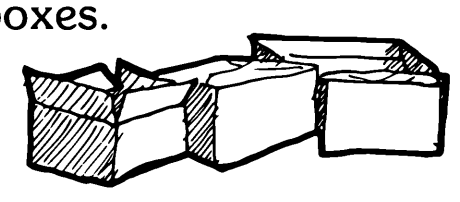


(6) How many minutes in a year?

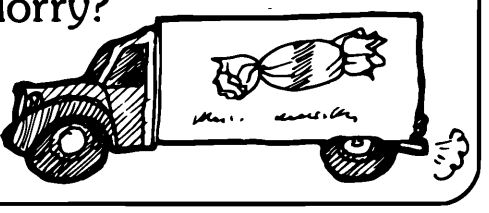


(7) There are 31 sweets in a packet and 112 packets in a box.

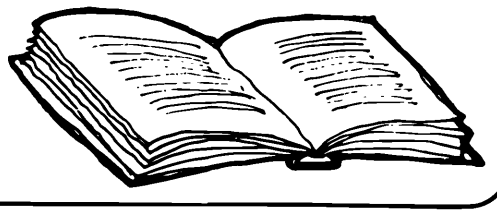
A lorry carries 53 boxes.



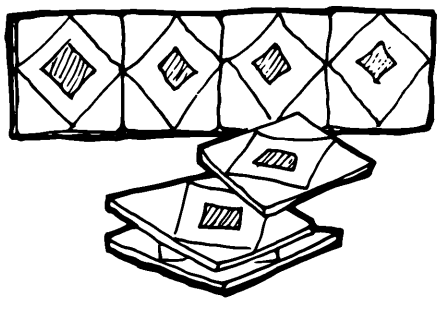
How many sweets on the lorry?



(8) A book has an average of 13 words per line and 49 lines per page. It has 267 pages. How many words are in the book?



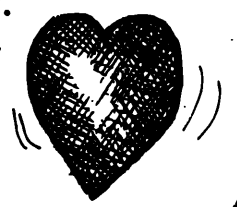
(9) Tiles cost 19p each. How much do 157 tiles cost?



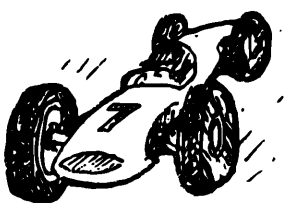
(10) How many hours have you been alive? (You do not have to give an exact answer — but the closer the better)

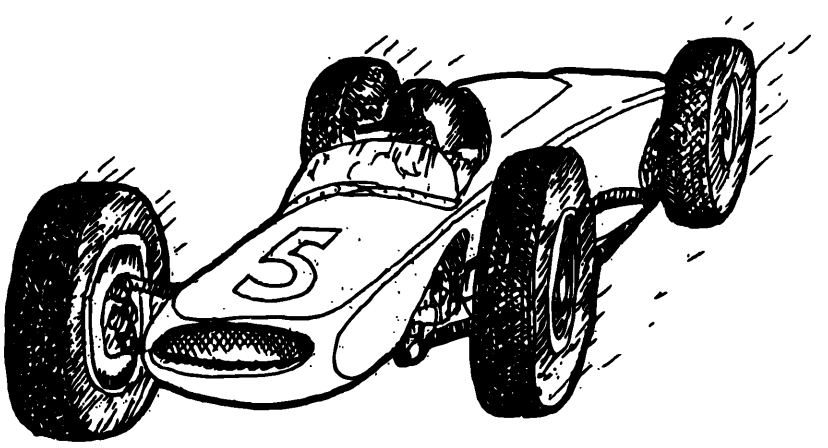
More Calculator Problems

(1) Your heart beats an average of 79 beats per minute. How many beats per hour?

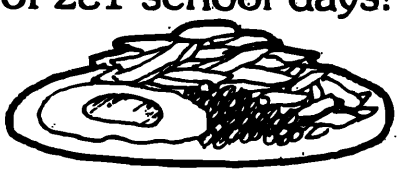


(2) The 'Le Mans' is a 24 hour race. If a car averages 179 km per hour, how far does it travel?



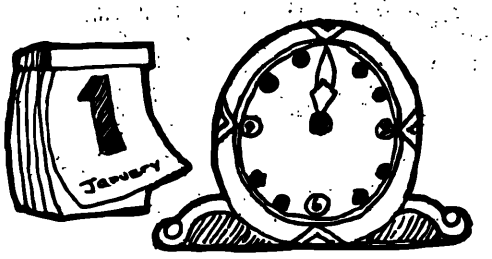


(3) A school serves an average of 134 dinners per day. How many dinners does it serve in a year of 281 school days?

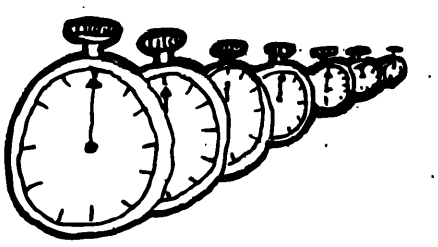


(4) A woman earns £28 per hour as a computer consultant. She works seven hours a day for seven days. How much does she earn?

(5) How many hours in a year?

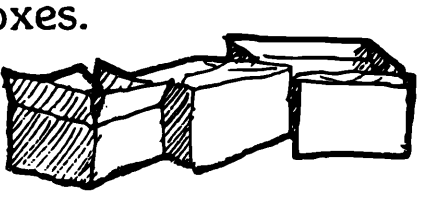


(6) How many minutes in a year?

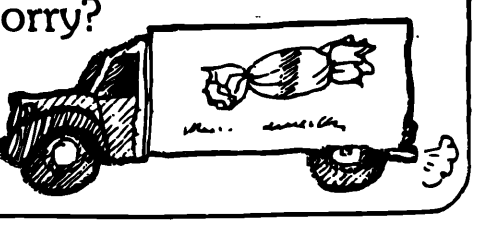


(7) There are 31 sweets in a packet and 112 packets in a box.

A lorry carries 53 boxes.



How many sweets on the lorry?



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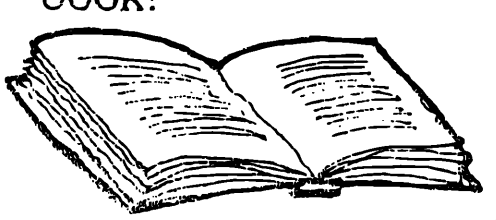

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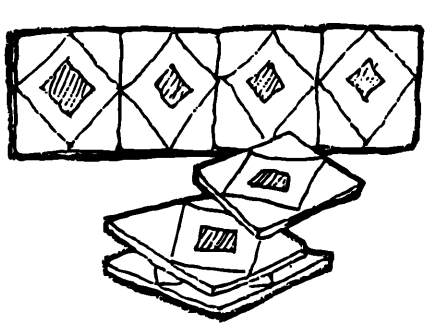
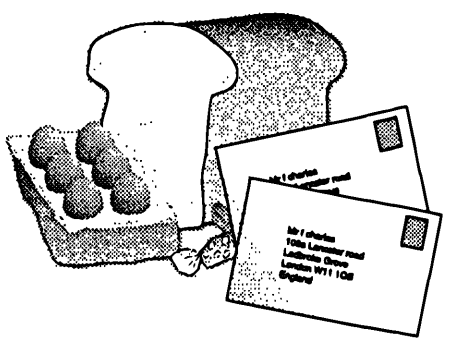


(10) How many hours have you been alive? (You do not have to give an exact answer — but the closer the better)

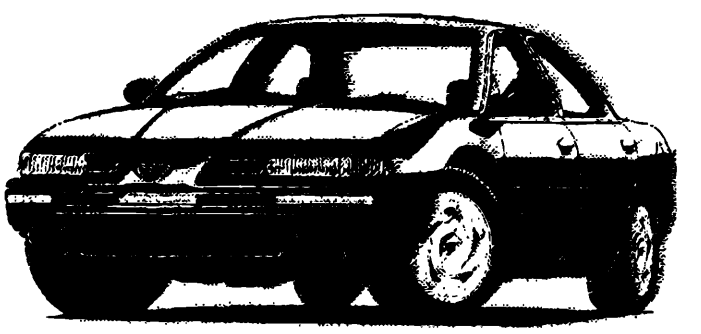
Smile **0092**

Harder Calulator Problems

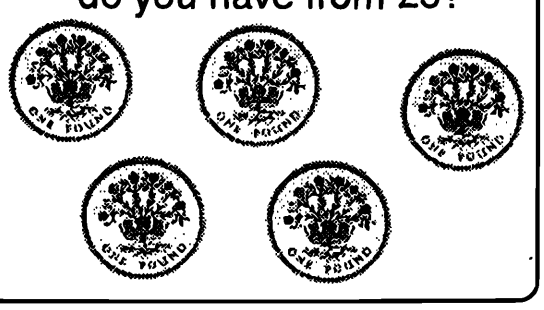
1) You spend £2.31 on food, £1.39 at the Post Office and £2.94 on petrol. How much have you spent?



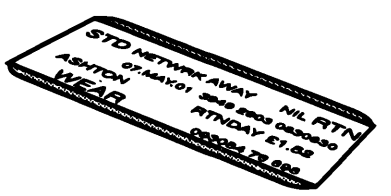
2) A car goes forward 3.69km, then reverses 0.12km. How far has the car moved forwards?



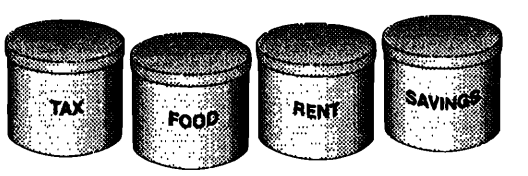
3) You spend £1.27 on groceries and £2.96 on meat. How much change do you have from £5?

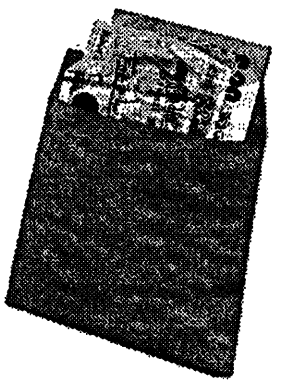


4) You have £3 but you need to keep £1.52 for your train fare. How much can you afford to spend?



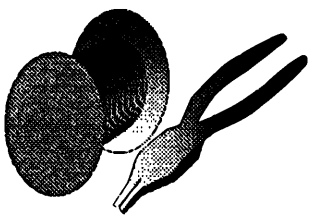
5) In a week you earn £68.70, but you pay £15.69 tax, £24.73 on food, and £15.50 rent. How much could you save in 3 weeks?



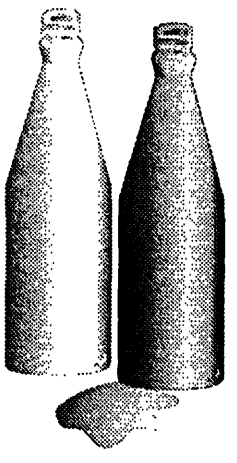


6) Leila has £55.80. She owes Kate half of it and Jenny a third of what's left. How much money does Leila have after she's paid her debts?

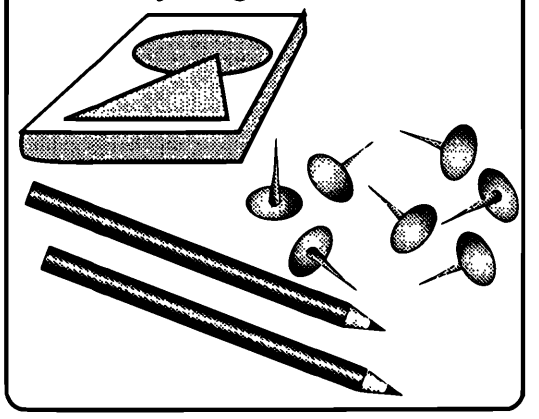
7) A wire is 38.7cm long. A piece 198mm long is cut off. Find the length left.



8) An empty bottle weighs 83.9g but full of water it weighs 1.217kg. Find the weight of the water.



9) You buy 9 books at £1.63 each, 13 pencils at 4p each and 850 drawing pins at 3p for 50. How much change do you get from £16?



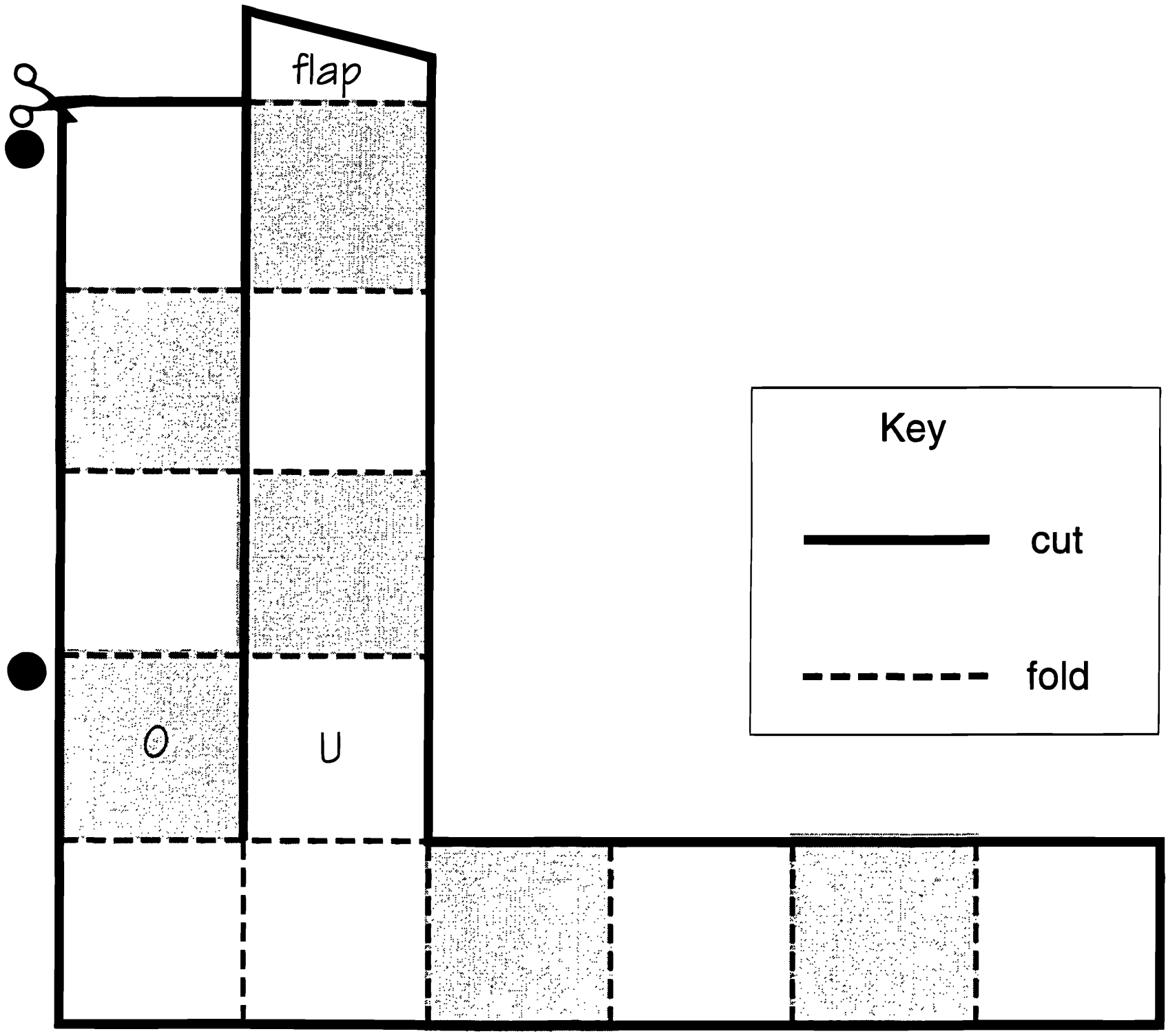
10) Add these lengths. 6.2km, 3m, 4.29m, 98cm, 981mm, 0.487km, 216.4cm.

10mm	=	1cm
100cm	=	1m
1000m	=	1km
1000g	=	1kg

Plaited Cube

SMILE Worksheet 0098

1. Cut out the net.
2. Fold along the dotted lines
3. Make a cube by plaiting.
   - Start by placing the square marked 'O', over the square marked 'U'.
   - Continue plaiting so that the shaded squares form the outside of the cube.
   - Finish by tucking in the flap.



4. Unplait the cube and stick the net into your book.

Challenge: Design a net for a plaited cuboid.

Sum and Product Again

To find the **sum** we add e.g. 5 + 3 = 8
To find the **product** we multiply e.g. 5 x 3 = 15

		sum	product
3	4	**7**	**12**
4	5		
5	6		
6	7		
7	6		
8	5		
9	4		
10	3		
11	2		
12	5		
10	11		
9	8		
8	8		
7	12		
11	11		

Smile Worksheet **0099**

Sum and Product Again

To find the **sum** we add e.g. 5 + 3 = 8
To find the **product** we multiply e.g. 5 x 3 = 15

		sum	product
3	4	**7**	**12**
4	5		
5	6		
6	7		
7	6		
8	5		
9	4		
10	3		
11	2		
12	5		
10	11		
9	8		
8	8		
7	12		
11	11		

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