

# SMILE WORKCARDS

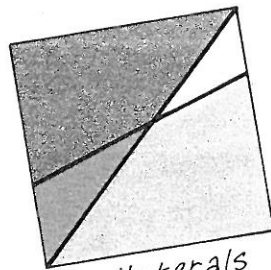
## Properties of Shapes Pack Two

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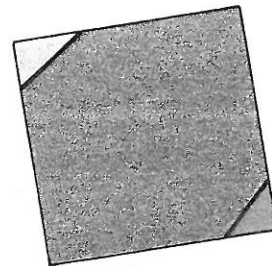
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You will need some copies of worksheet 1592A

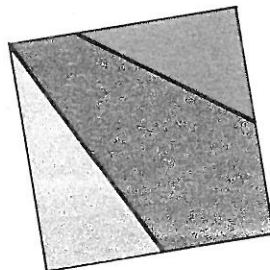
## Two Cuts Investigation



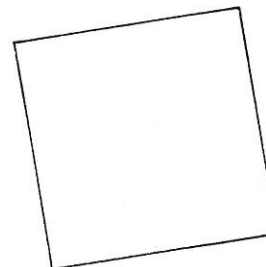
2 quadrilaterals  
2 triangles



1 hexagon  
2 triangles



2 triangles  
1 pentagon

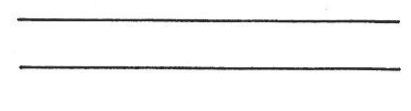
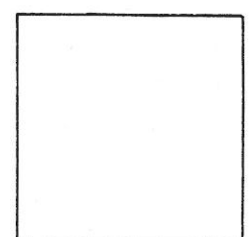
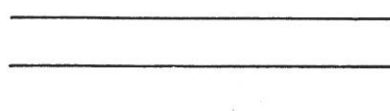
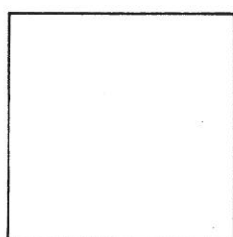
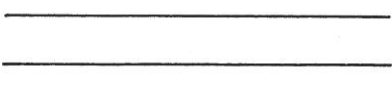
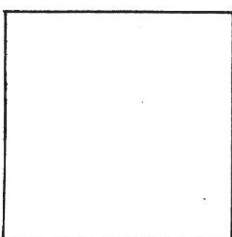
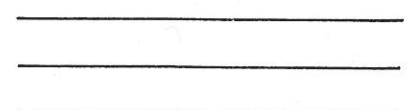
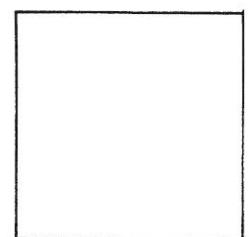
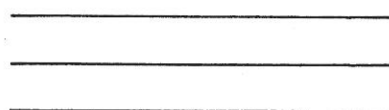
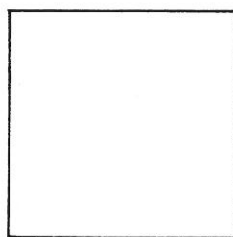
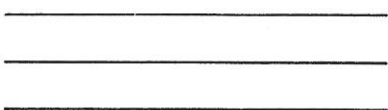
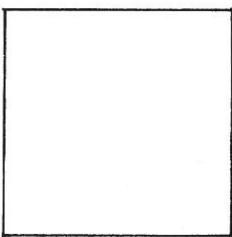
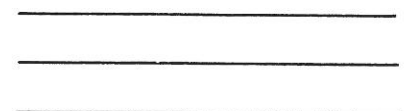
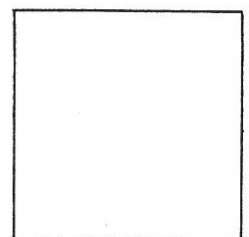
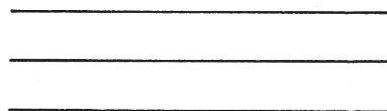
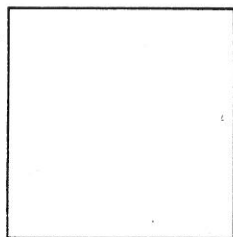
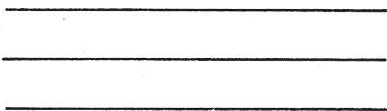
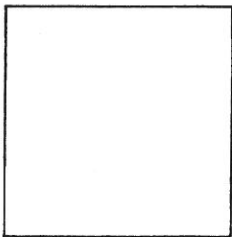
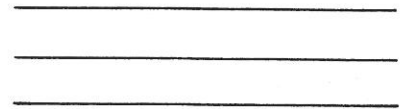
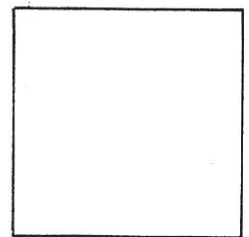
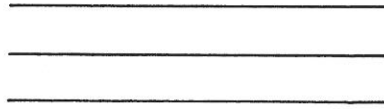
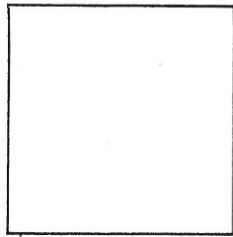
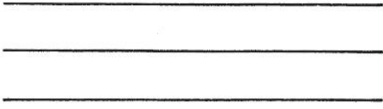
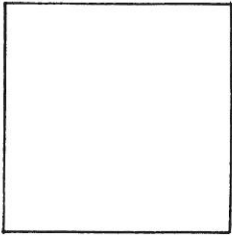


Using 2 cuts on a square, what shapes can you make?

Record your work on copies of the worksheet.

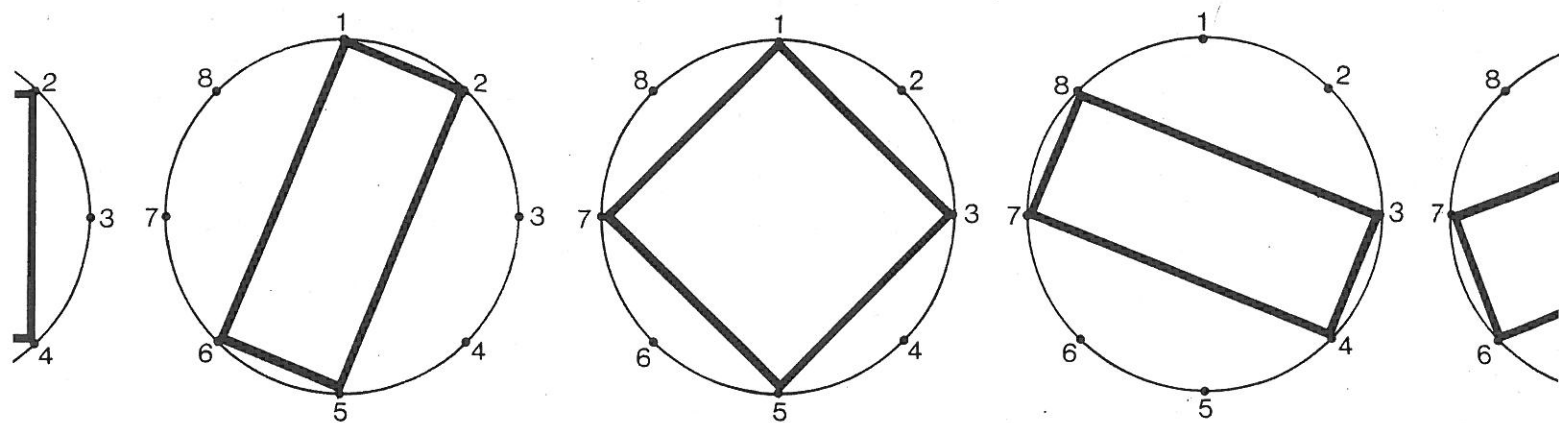
# Two Cuts Investigation

Smile worksheet 1592 A

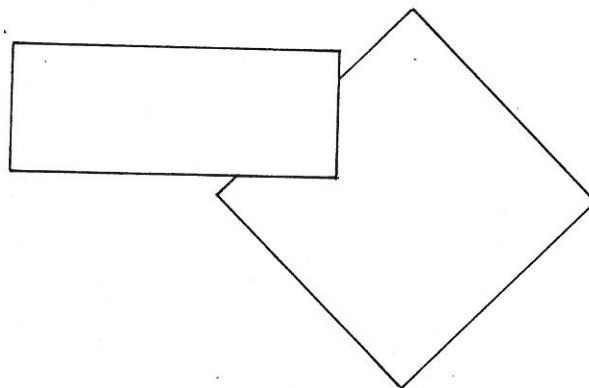


# Rectangles in Circles

In an 8-point circle it is possible to draw several rectangles by joining dots . . .



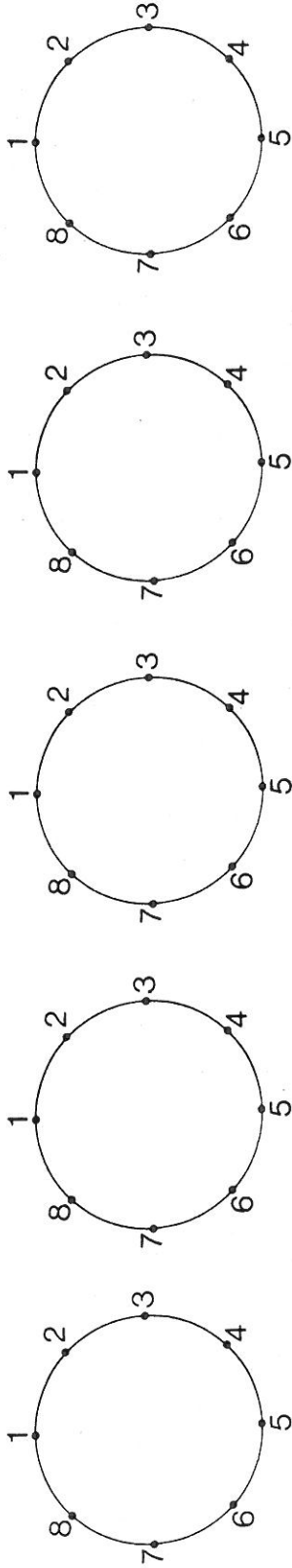
. . . but there are only 2 different ones! Try it yourself.



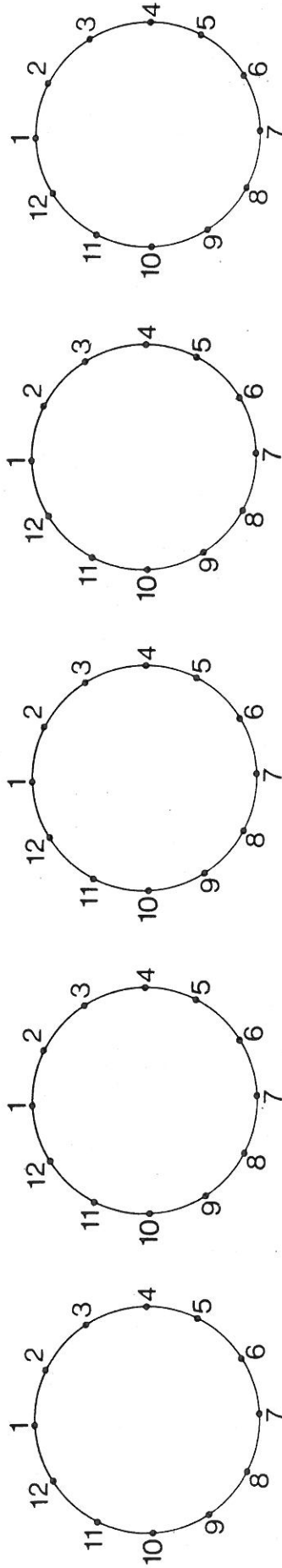
How many *different* rectangles can you make in a 12-point circle?

How many different rectangles can you draw in a 16-point circle?

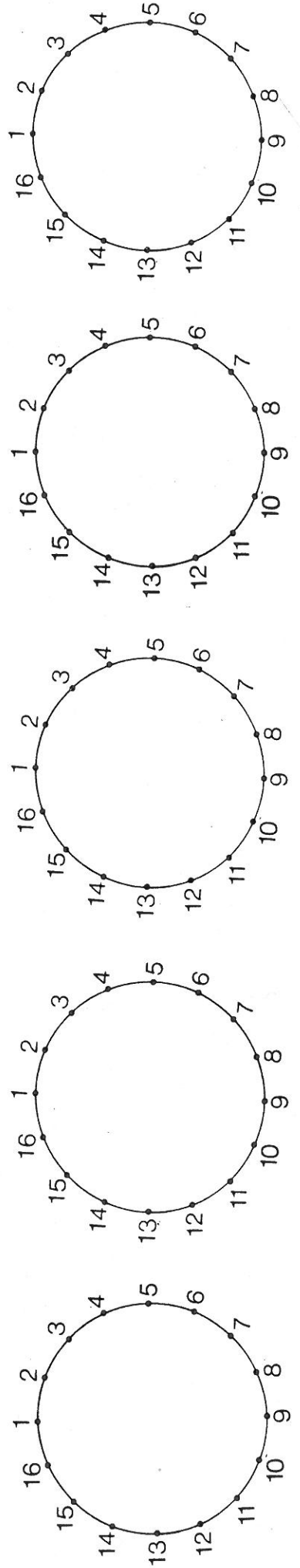
**8-point circles**



**12-point circles**

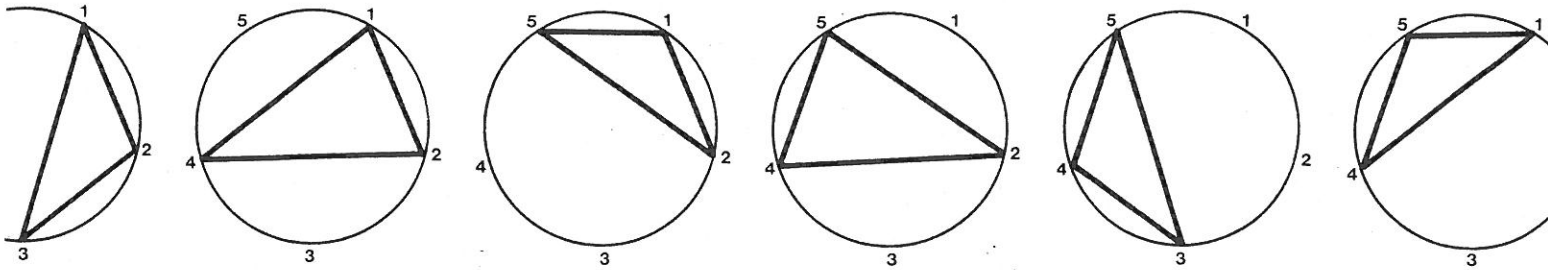


**16-point circles**

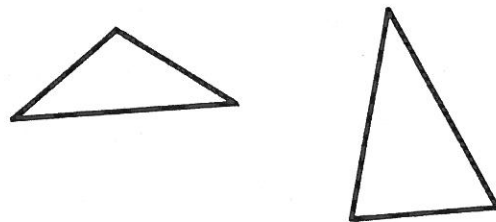


# Triangles in Circles

In a 5-point circle it is possible to draw many triangles by joining various dots ....

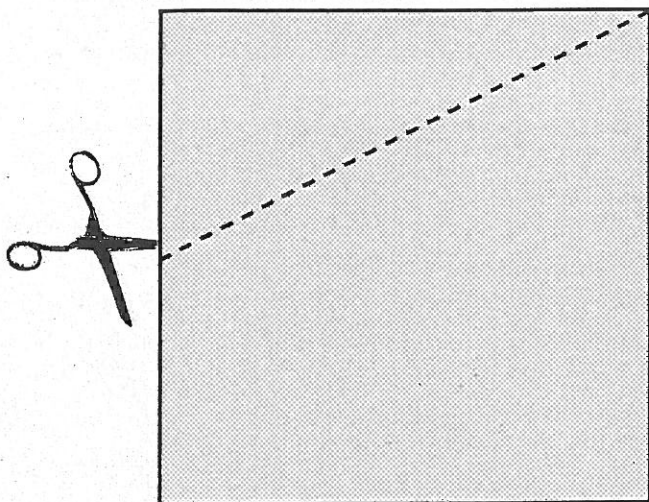


....but there are only 2 *different* triangles!



Investigate how many *different* triangles can be drawn in a  
3-point circle  
4-point circle  
6-point circle  
7-point circle ....

# 2 piece square

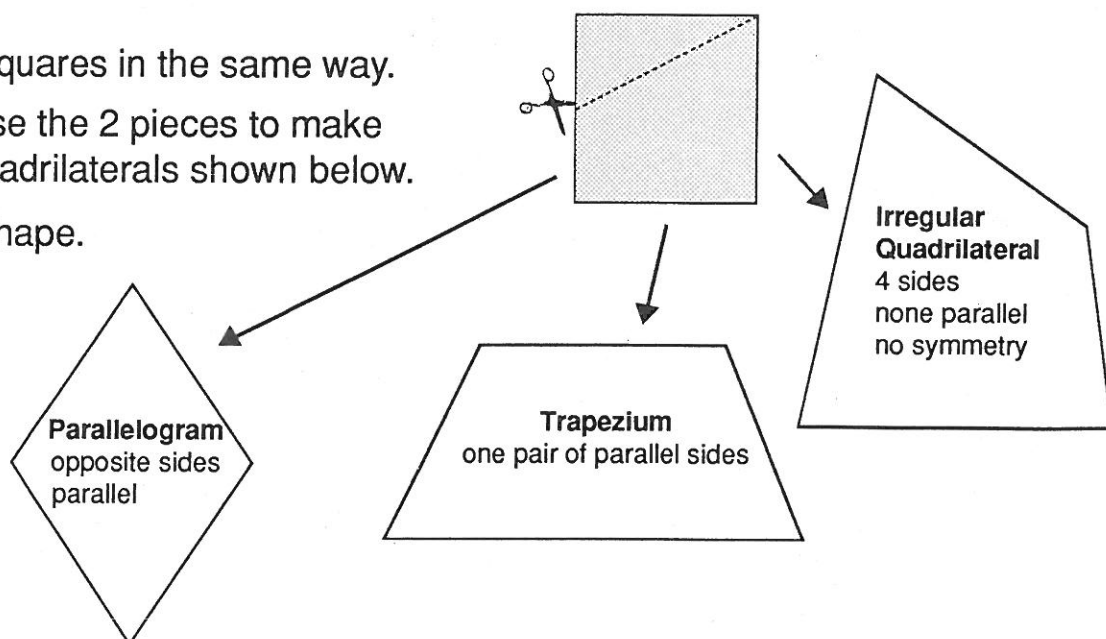


- Take a square, or cut one out.
- Draw a line from one corner to the middle of a side.
- Cut along the line.
- Use the 2 pieces to make a **TRIANGLE**.
- Stick it in your book.

Turn over

A **QUADRILATERAL** has 4 sides.

- Cut 3 other squares in the same way.
- Each time, use the 2 pieces to make one of the quadrilaterals shown below.
- Label each shape.



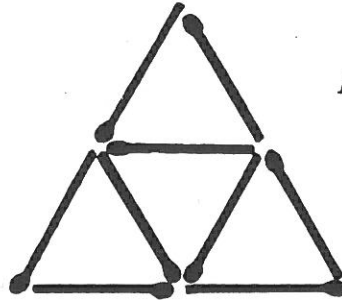
A **PENTAGON** has 5 sides.

Cut another square into 2 pieces and see how many pentagons you can make.

You will need: 15 matches

MATCHSTICK PUZZLES

Puzzle 1



Arrange 9 matches like this.

Remove 4 matches to leave 2 equilateral triangles.

Puzzle 2

Start with the same pattern.

Remove 3 matches to leave 2 equilateral triangles.

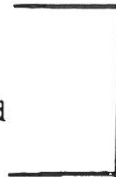
Puzzle 3

Start with the same pattern again.

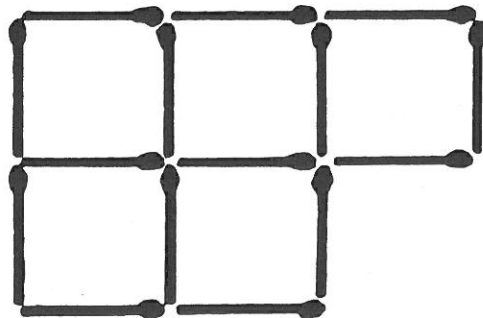
Remove 2 matches to leave 2 equilateral triangles.



Loose ends  
NOT allowed



Puzzle 4



Arrange 15 matches like this.

Remove 3 matches to leave 3 squares (no loose ends!).

Draw all your answers.



# Shape names

- Match each shape with its correct mathematical name and its description.
- Use a Mathematical Dictionary to check your answers.
- Draw a different shape, give its correct mathematical name and write a description.

## Descriptions

This shape has three sides. It has one right angle.

This shape has three sides. None of the angles are equal. It has no right angle.

This shape has two equal sides. Two of the three angles are equal.

All the angles of this shape are right-angles. Not all the sides are equal.

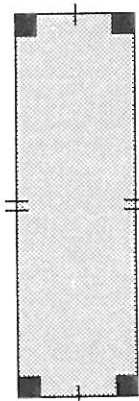
This shape has four sides. Two sides are parallel. It has two right-angles.

This shape has three sides. The angles are all equal.

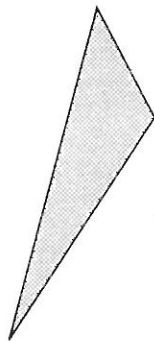
All the sides of this shape are equal. All the angles are right-angles.

## Shapes

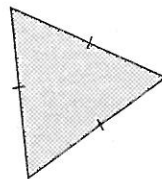
A



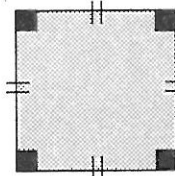
B



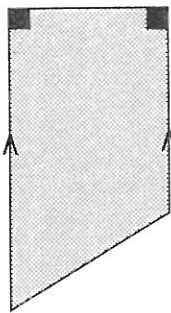
C



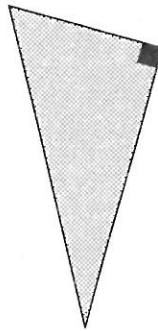
D



E



F



G



## Mathematical Names

right-angled trapezium

right-angled triangle

isosceles triangle

equilateral triangle

square

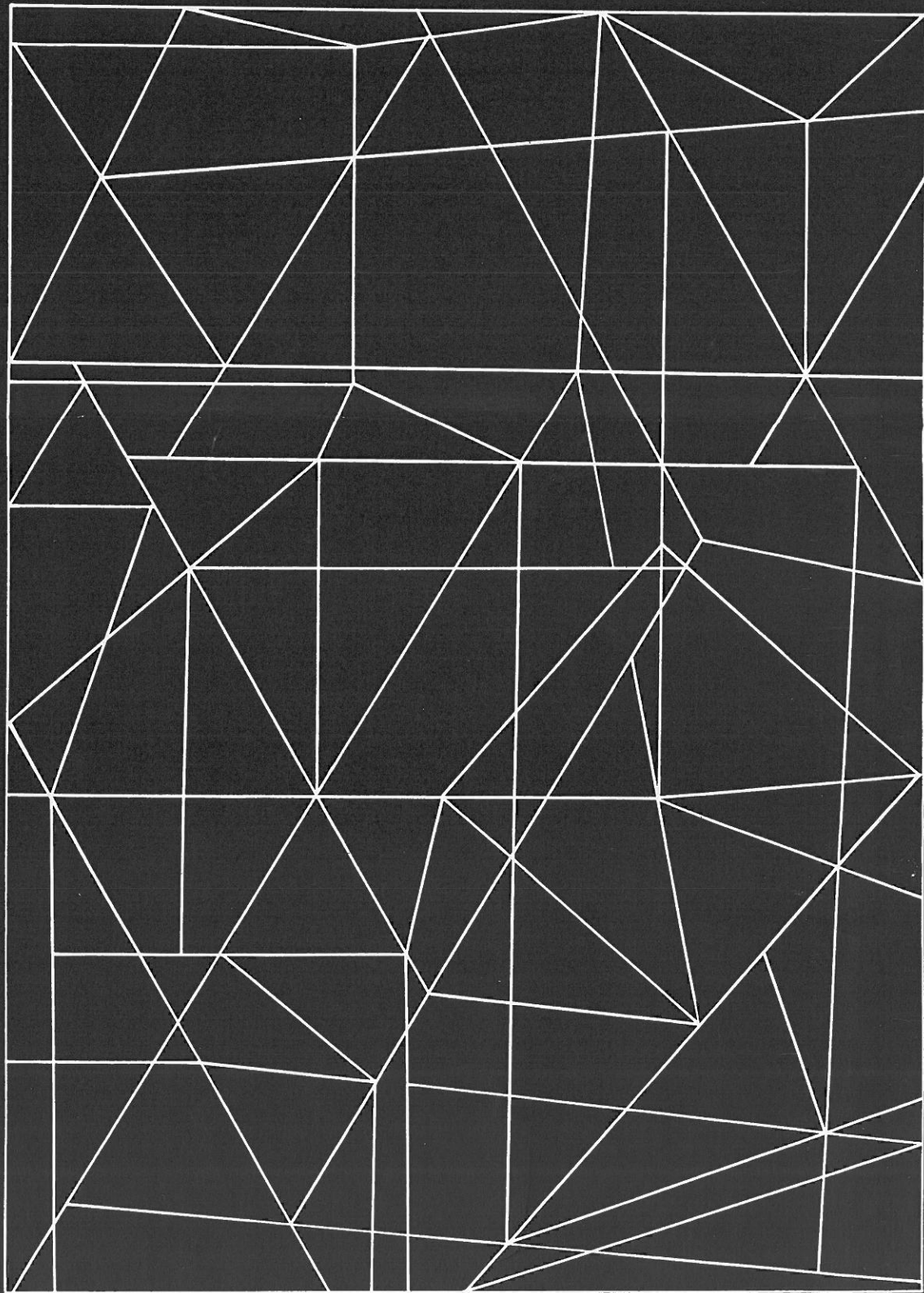
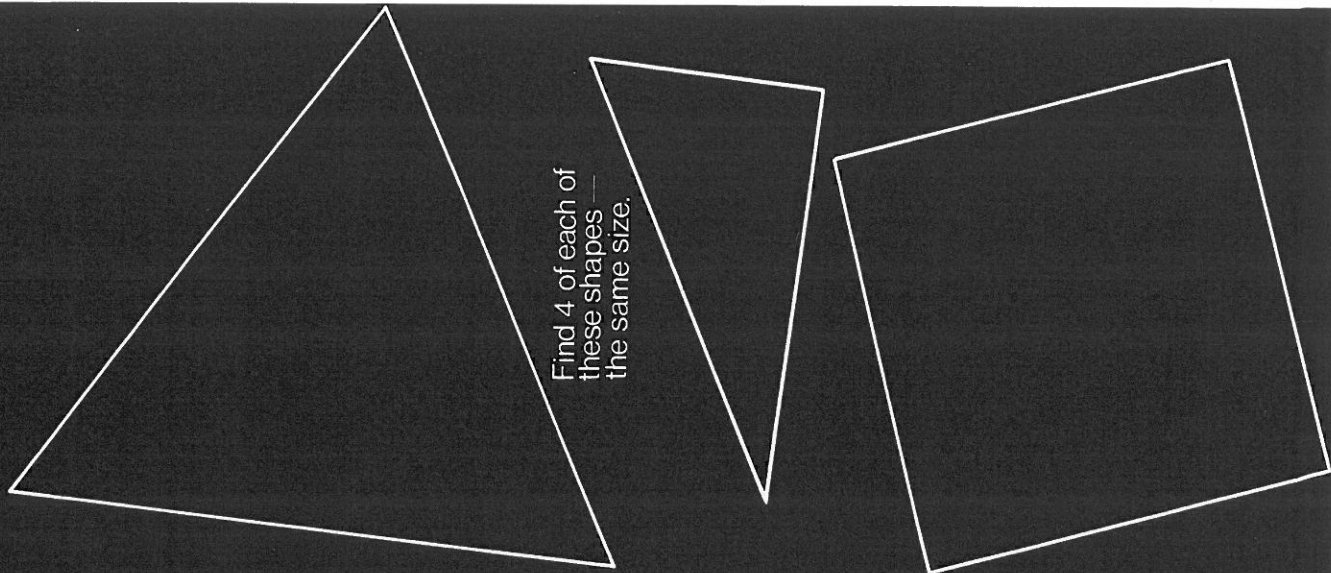
scalene triangle

rectangle

# HIDDEN SHAPES

Smile 0697

Find 4 of each of  
these shapes —  
the same size.

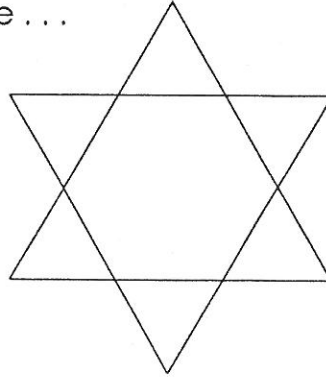


# Visualising

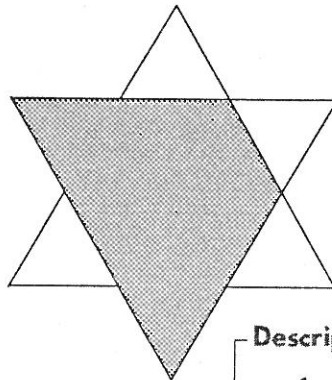
– a group activity

You will need several copies of Worksheet 2155a.

This shape . . .



can be seen as **one trapezium**  
and  
**four triangles.**



**Description**

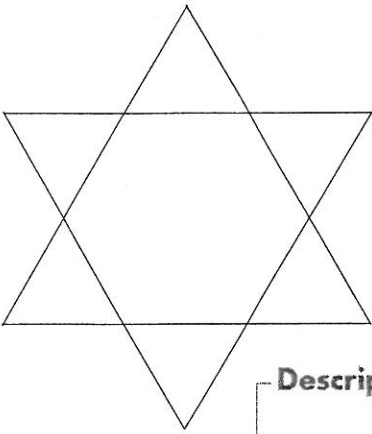
*1 trapezium  
and  
4 triangles.*

But there are many other ways!

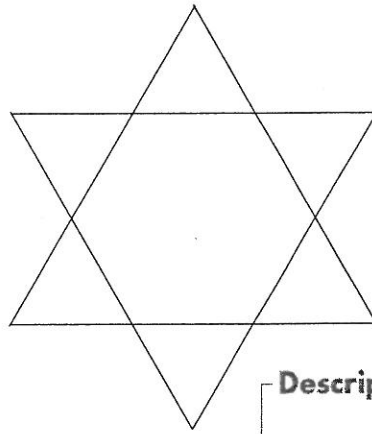
- Find a new way of seeing the shape.
- Describe the way you see it to the group.  
Wait for them to see it that way.
- Use the worksheet to record the way you see it and write the description.

How many ways can your group find?

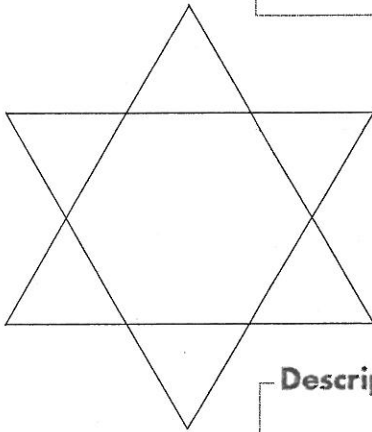
# Visualising Worksheet



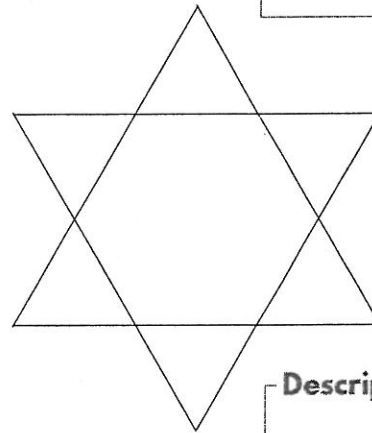
**Description**



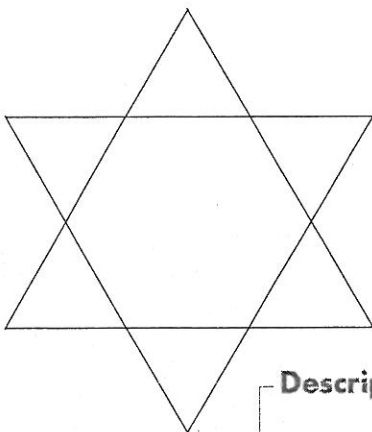
**Description**



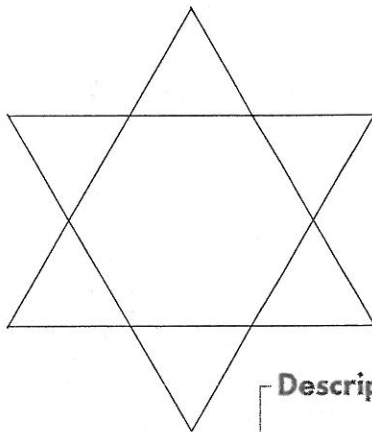
**Description**



**Description**



**Description**



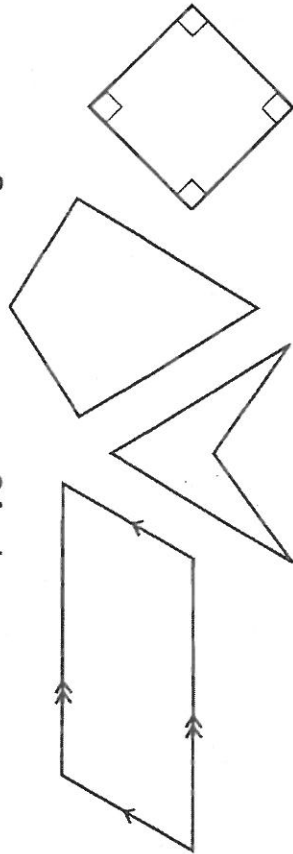
**Description**

# Sixteen Quadrilaterals

Smile 2367

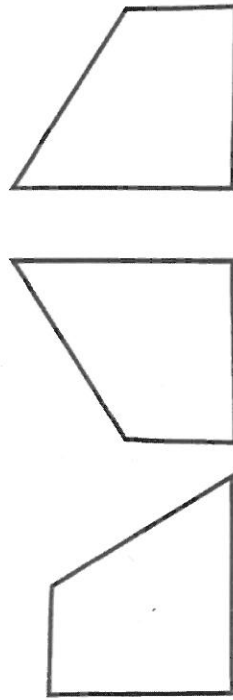
## Definition: Quadrilateral

Quadrilaterals are polygons with four straight sides.



## Definition: Congruent

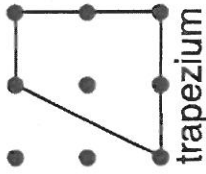
Congruent shapes have the same shape and size.  
e.g. These quadrilaterals are congruent.



You can make 16 different quadrilaterals on a 9 point grid.



1. Find all 16 quadrilaterals.  
(Remember none of your quadrilaterals can be congruent.)



e.g.

- draw them
- label each quadrilateral with the correct mathematical name

trapezium

(You may like to use Smile 2163 Geometry Facts to find all the names of your quadrilaterals.)

2. You may like to investigate ...
  - triangles on a 9 point grid
  - other polygons on a 9 point grid.

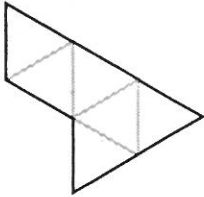
# Hexiamonds

Smile 2231

An activity for a group of 3 or 4.

1

This is a hexiamond.

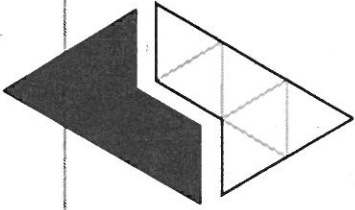


It is made from 6 equilateral triangles.

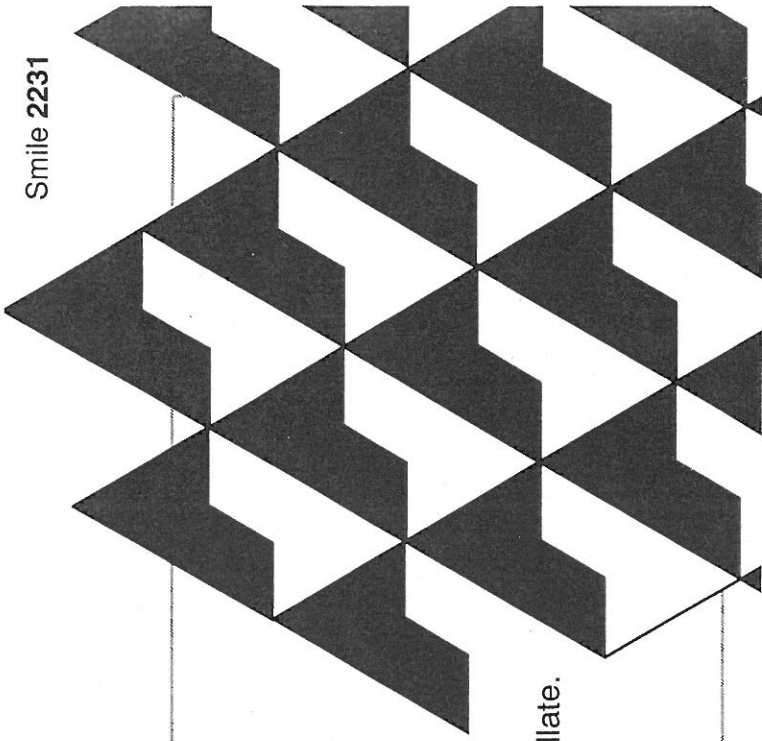
- In your group find all the hexiamonds.  
How many different ones did you find?

2

This hexiamond tessellates.



- Each choose a different hexiamond to tessellate.
- In your group decide whether all hexiamonds tessellate.  
Explain your answers.
- Make a poster of all your tessellations.



# Identikit

You might find it  
helpful to work with  
a partner.

## 1

Describe a circle without using the words  
*circle* or *round*.  
When you are satisfied with your  
description, write it down.

## 2

Choose at least 3 other items from the list  
below. Write out a description for each item  
on a separate piece of paper.

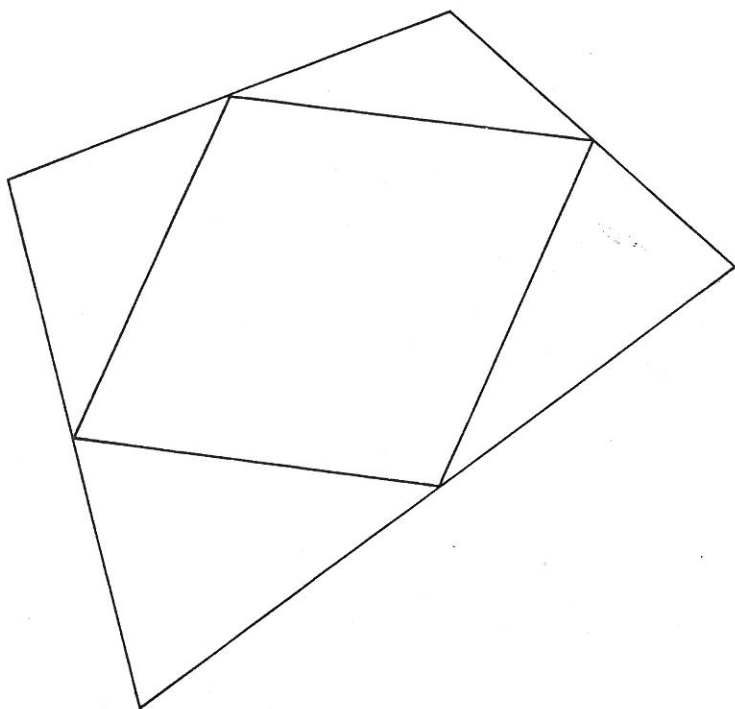
- (a) cube
- (b) square
- (c) sphere
- (d) parallel
- (e) tessellation

## 3

Give your descriptions to someone else.  
Can she identify what you have described?

You will need scissors

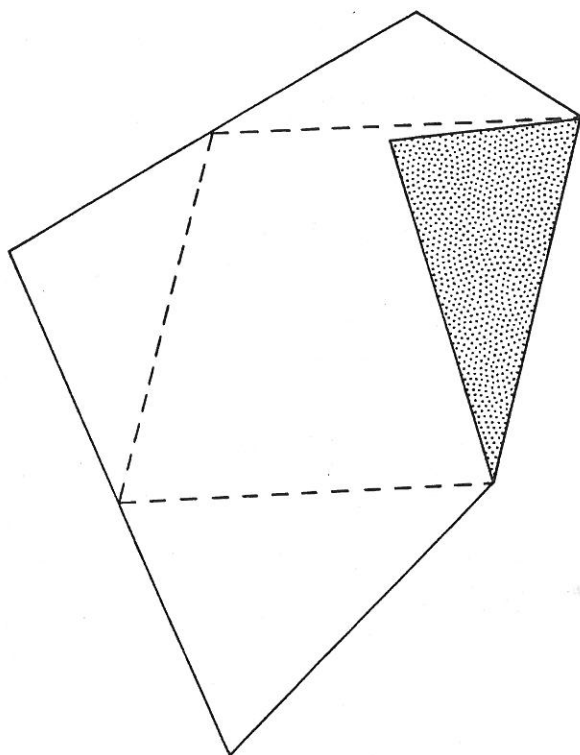
## MID-POINTS



- 1) Draw a large quadrilateral with all the sides different lengths.
- 2) Join the mid-points of the sides as shown.
- 3) What shape is the new quadrilateral?

*Investigate different starting quadrilaterals: squares, rectangles, kites, . . .*

### Cut out the original quadrilateral



- 4) If you fold over the 4 triangles will you cover the central shape?
- 5) If you cut off the 4 triangles can you fit them into the central shape?  
*(Make sure you label all the pieces carefully so you know how they fitted together.)*
- 6) Repeat this with other quadrilaterals — *are there any special cases?*
- 7) Make a wall display to show your work.