

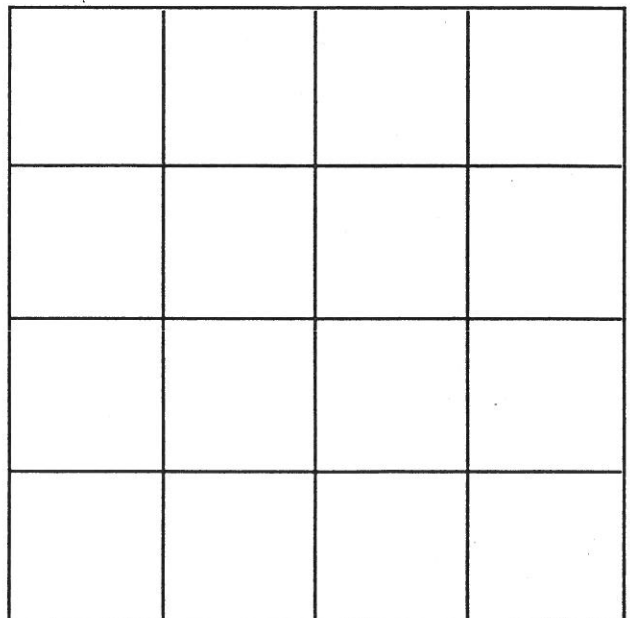
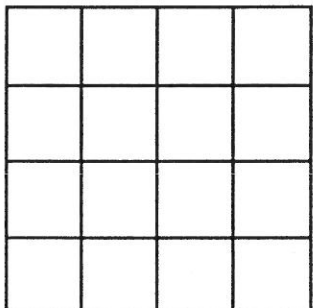
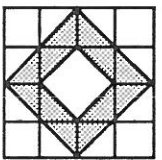
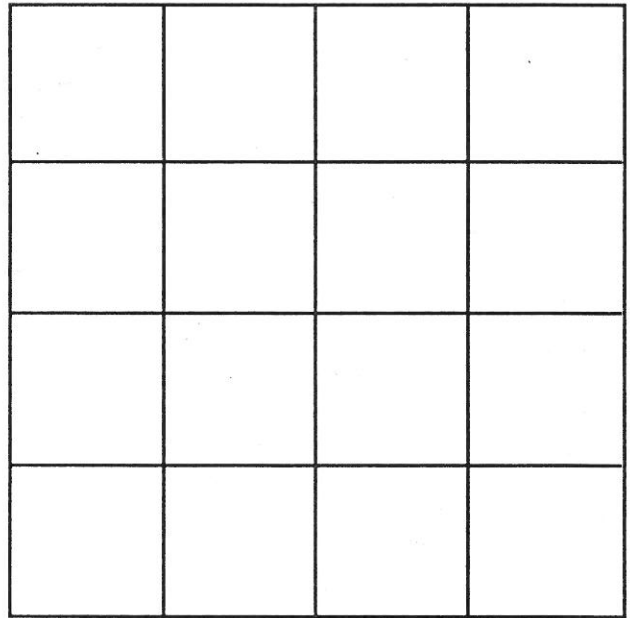
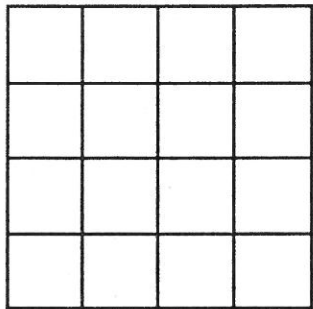
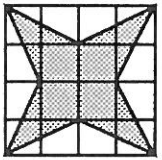
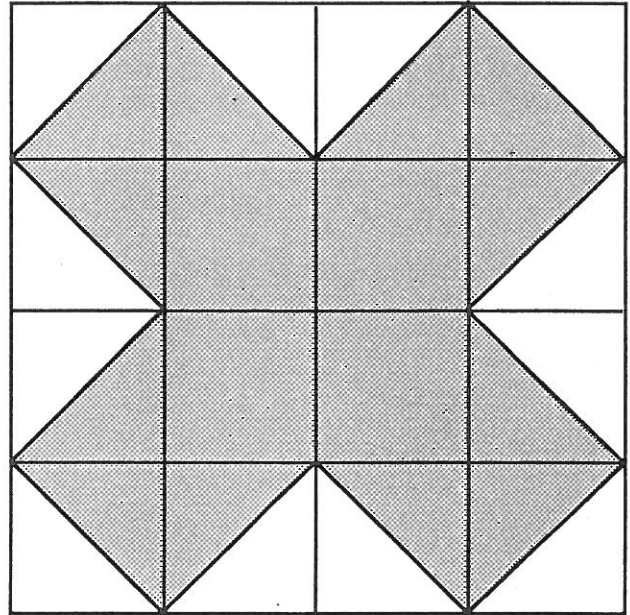
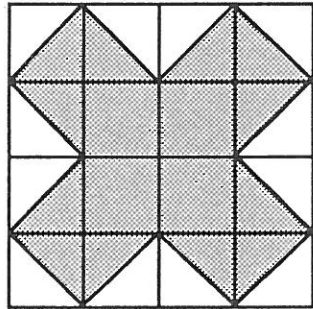
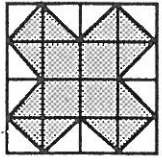
# SMILE WORKCARDS

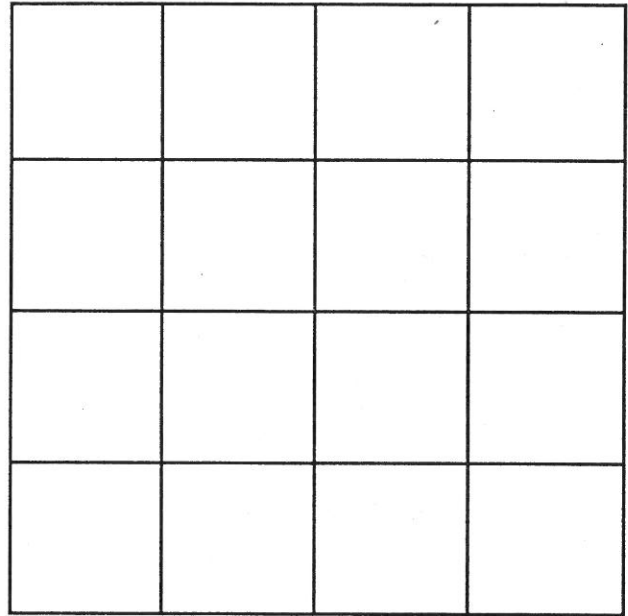
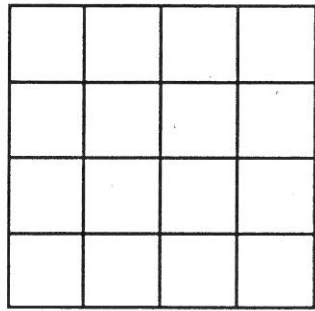
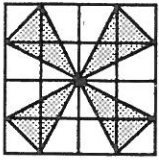
## Drawing Pack One

### Contents

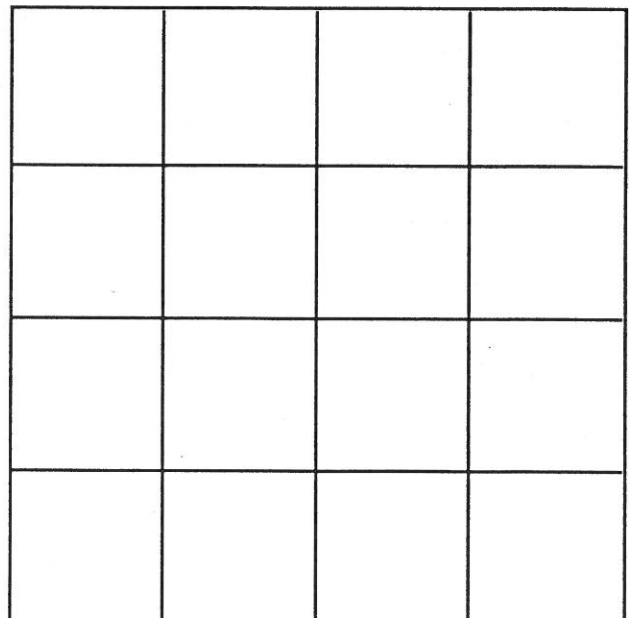
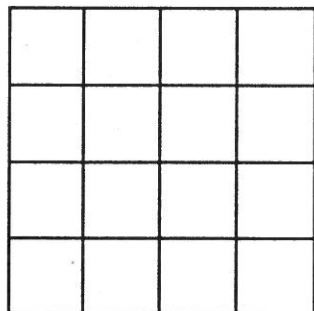
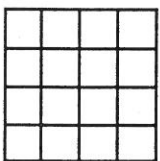
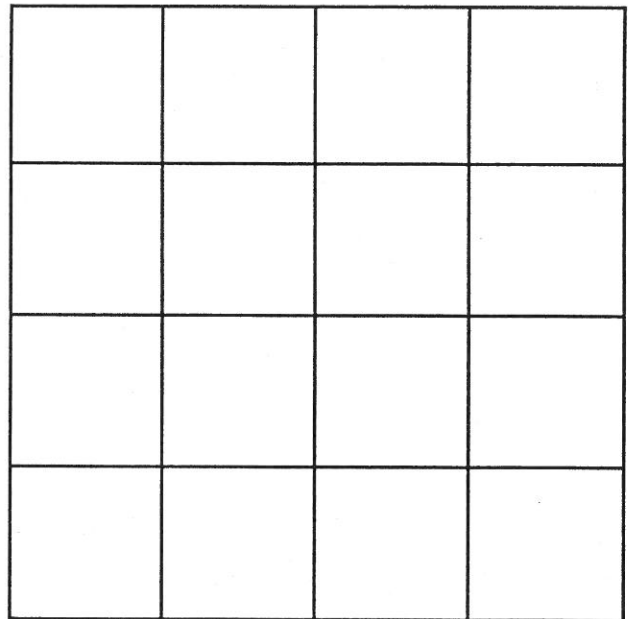
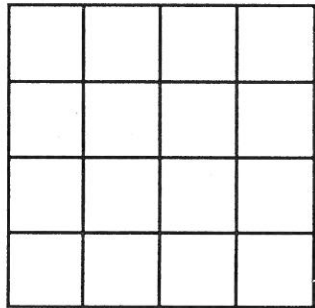
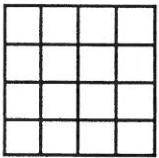
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# Growing Patterns

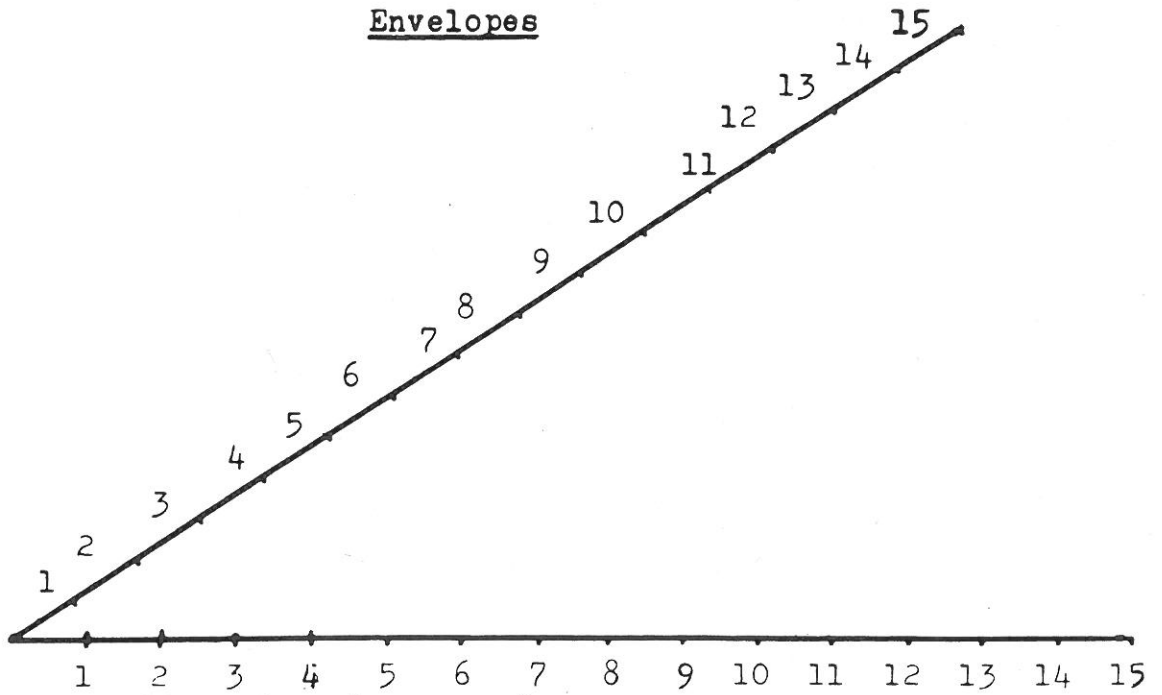




Now try with your own shapes.



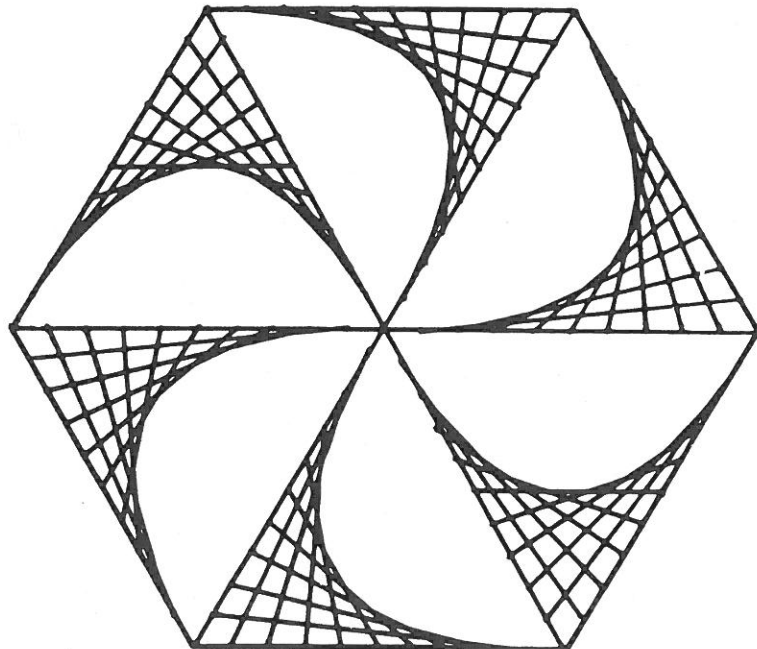
Envelopes



- (1) Draw 2 straight lines to make an angle.
- (2) Number the lines from 1 to 15 at 1 cm. intervals.
- (3) Use a ruler to join 1 to 15.  
2 to 14  
3 to 13  
4 to 12 and so on.

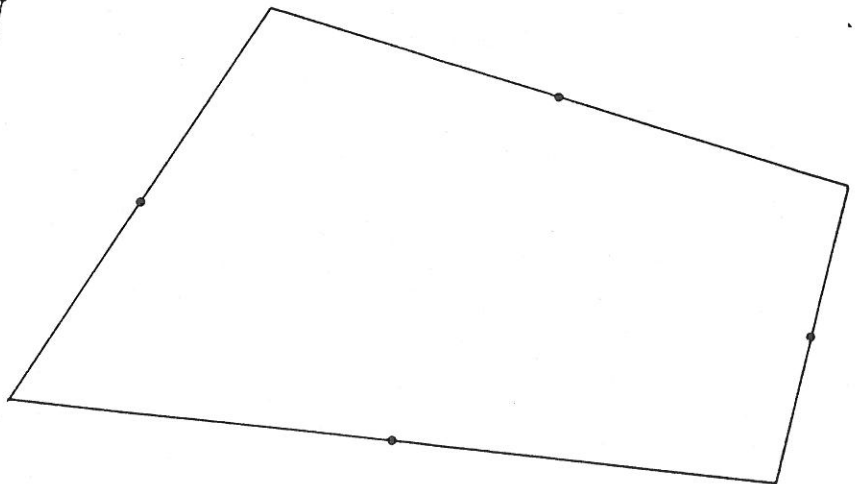
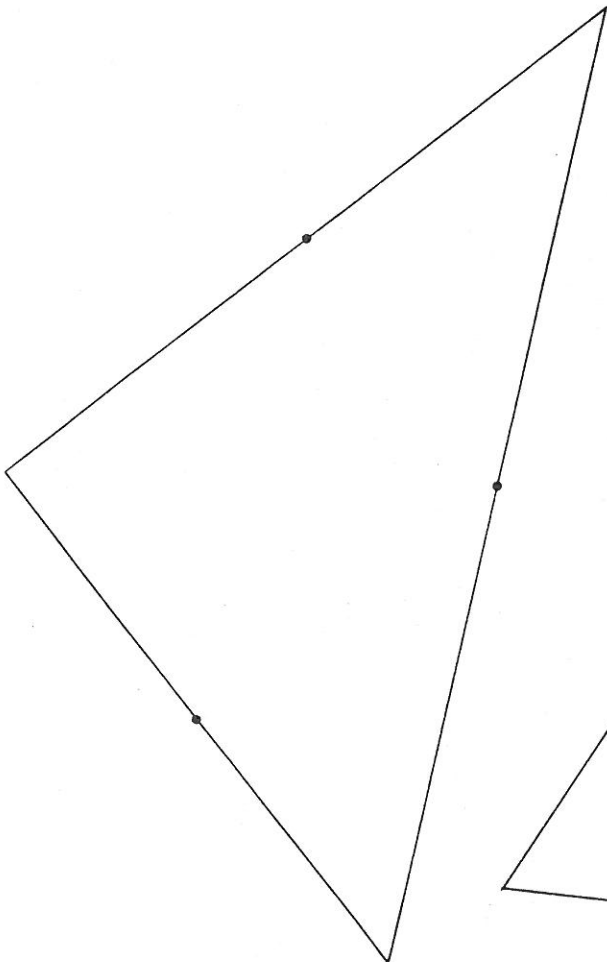
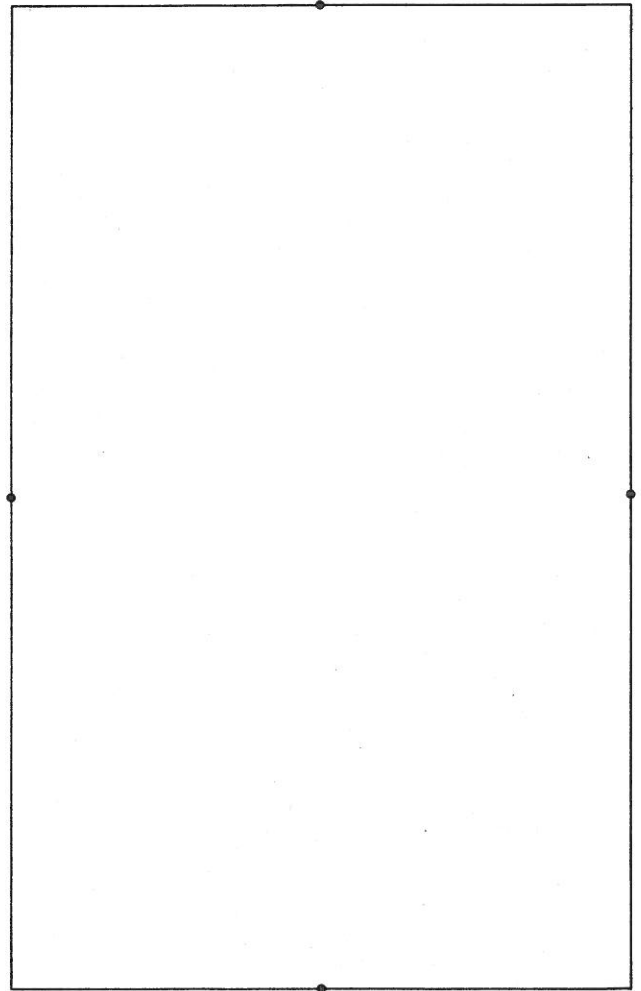
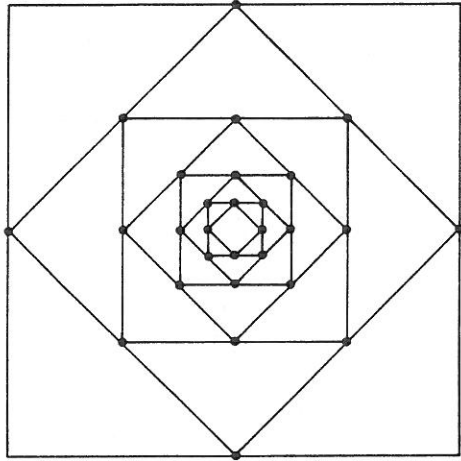
You can use this idea  
to make many different  
patterns.

Try some of your own.

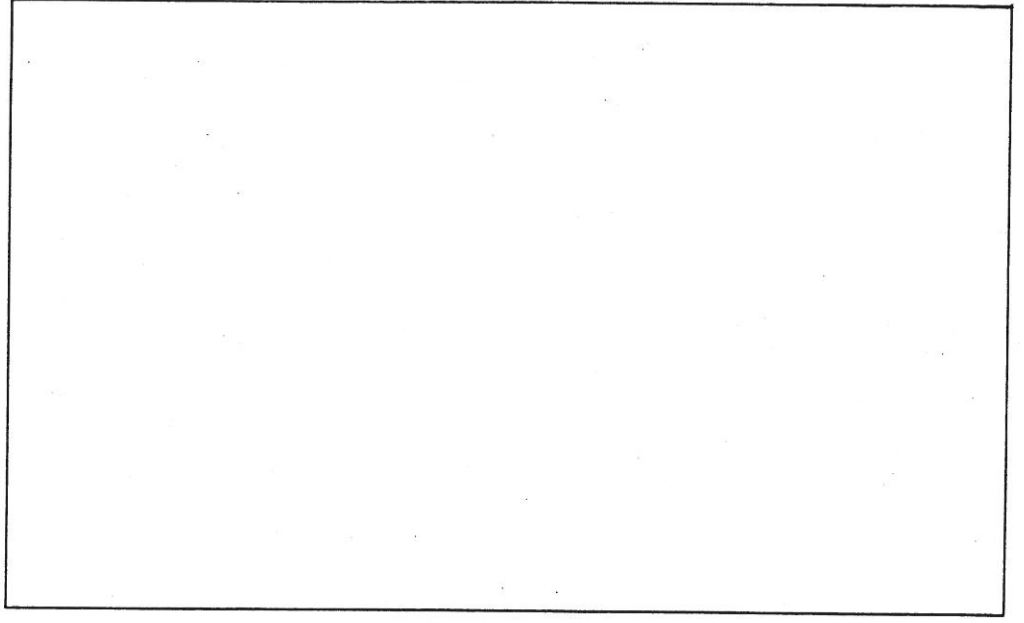
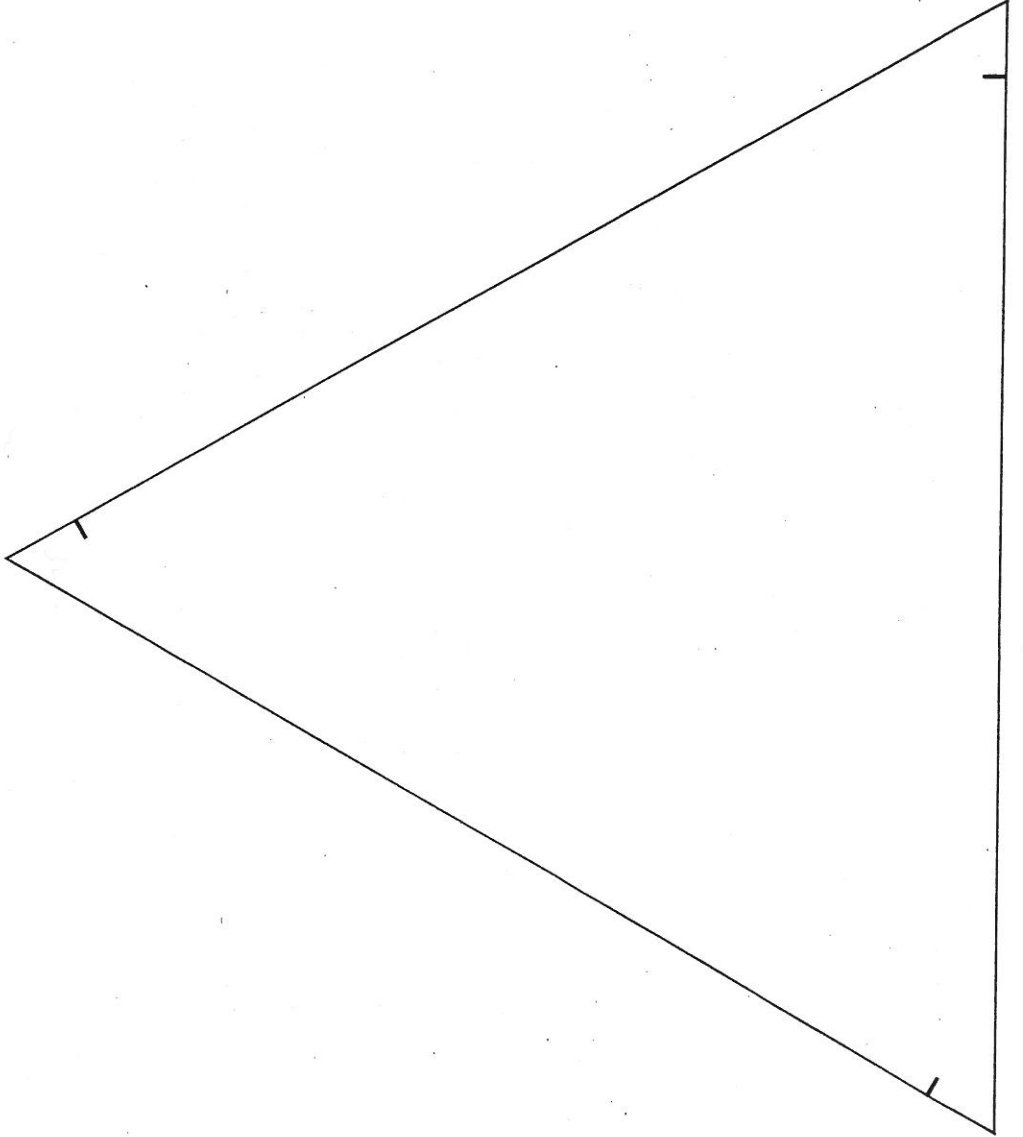
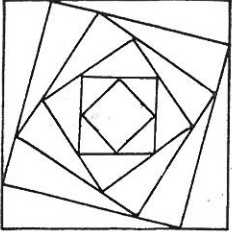
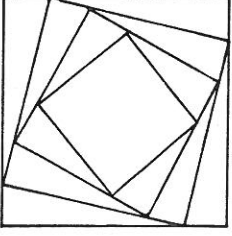
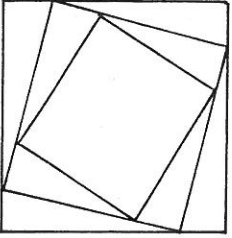
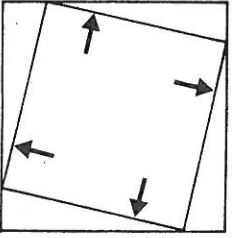
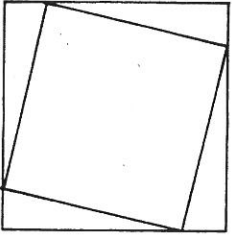
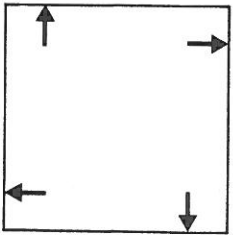


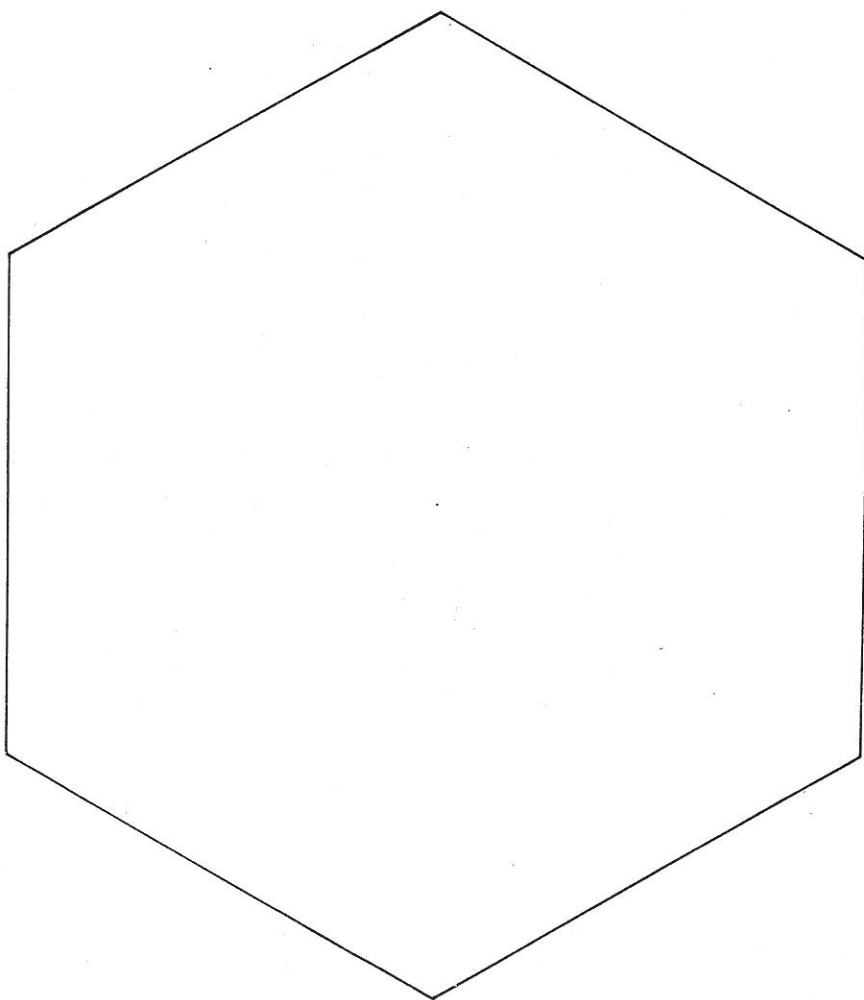
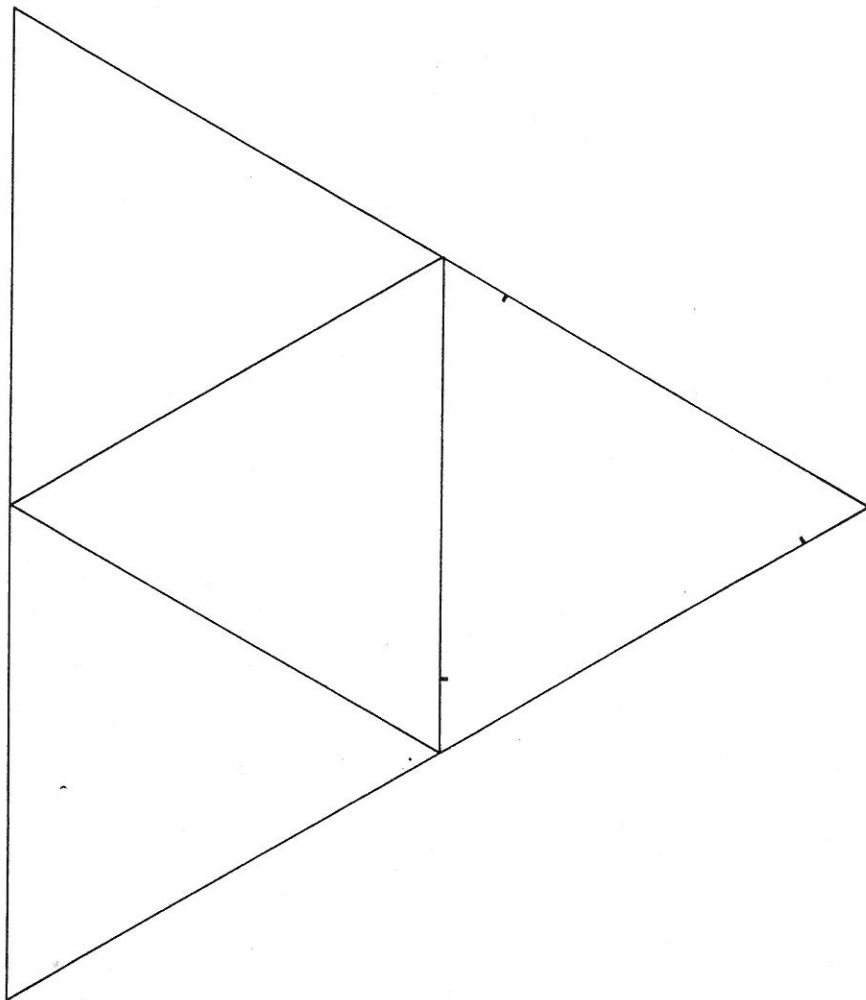
# Midpoint

- 1) Join up the dots.
- 2) Mark the mid-points of your lines with dots.
- 3) Try to 'finish' the patterns.



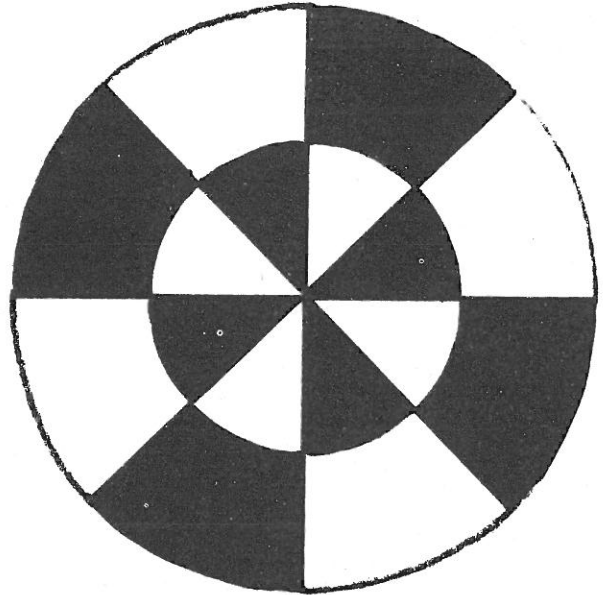
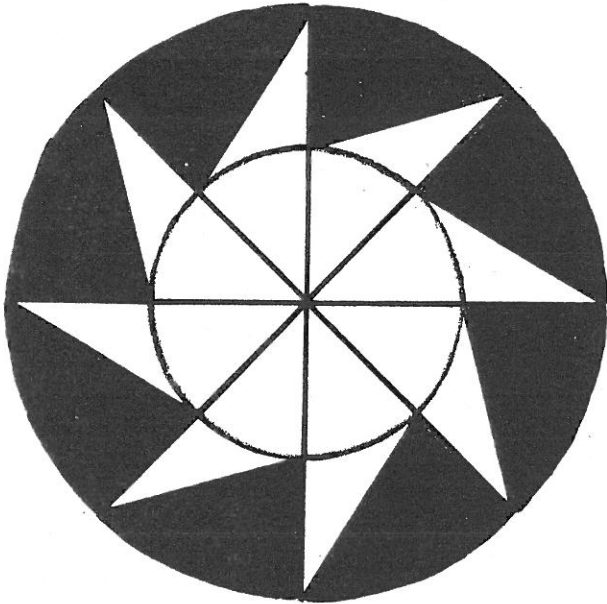
# Spirals



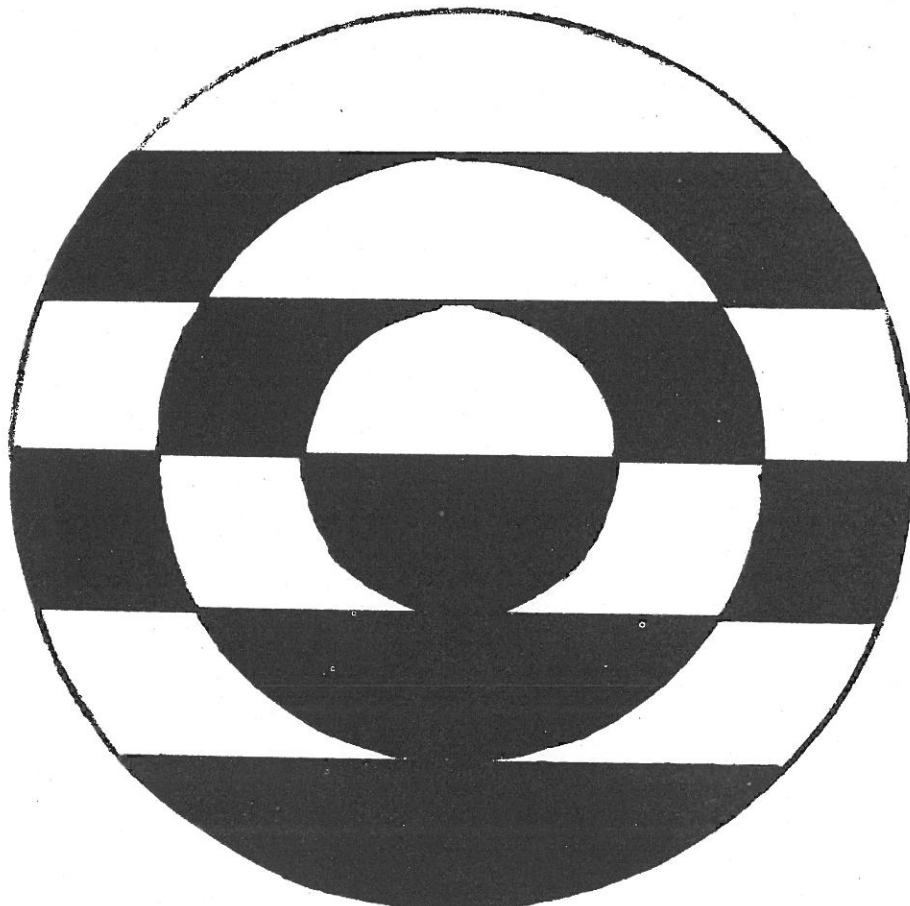


You will need: compasses, coloured pencils

Concentric Circles



Each pattern uses circles which are concentric (have the same centre).  
Copy these or make up some of your own.

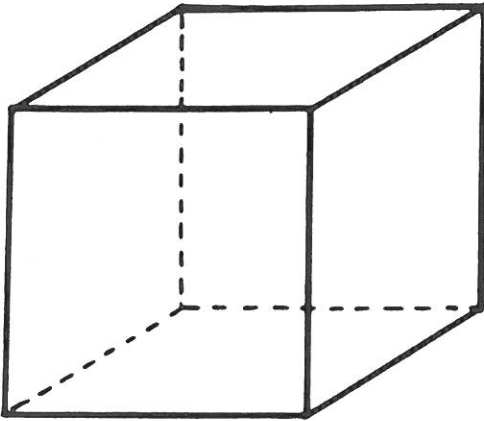




You will need: cm. squared paper, scissors

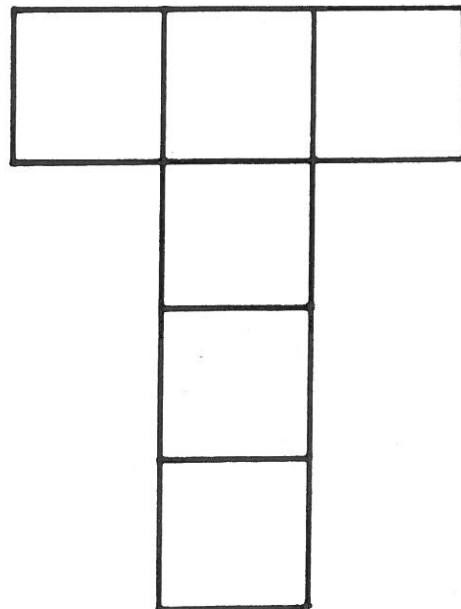
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Nets of a Cube



A cube has 6 faces.

This diagram has 6 squares.

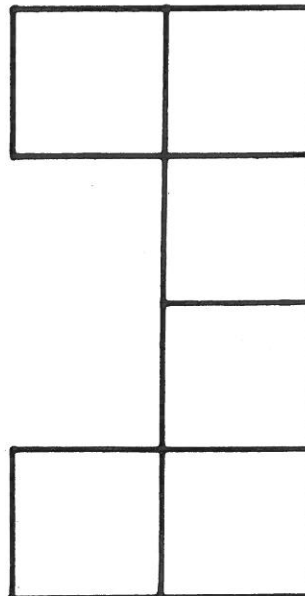
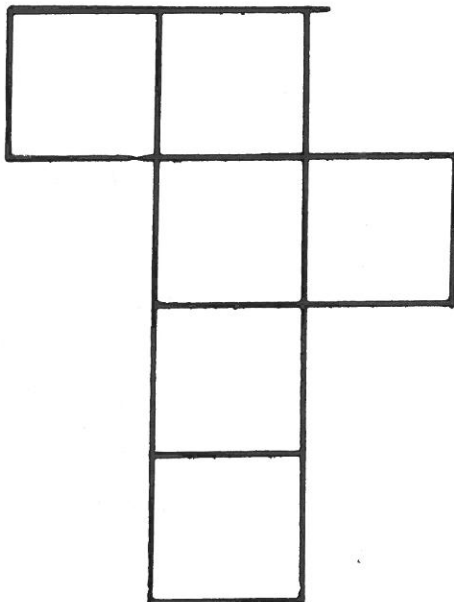


- (1) Copy it onto squared paper.
- (2) Cut it out.
- (3) Fold along the lines.
- (4) Make a cube from it.
- (5) This diagram is a net of a cube.  
Draw it in your book.

Turn over

---

Now try to make cubes from these shapes.



---

Draw another diagram like these with 6 squares.  
See if you can fold it into a cube.  
If it does make a cube, draw the net in your book.

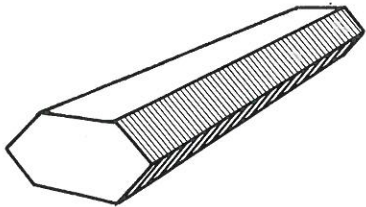
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The cube has many nets.  
Try to find more. Draw them.

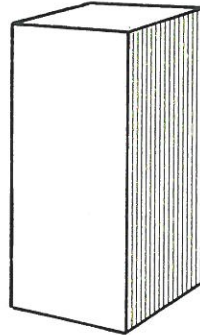
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# PRISMS AND PYRAMIDS

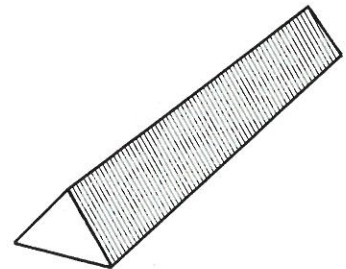
Here are some **prisms**:



Hexagonal Prism

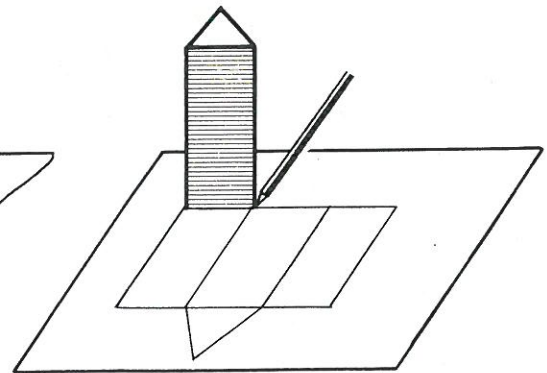
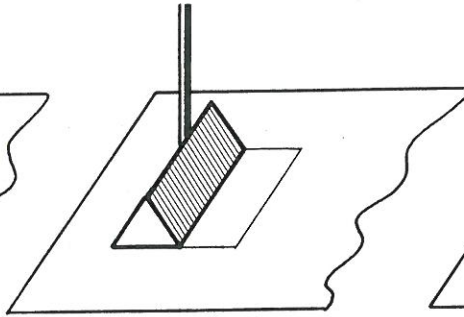
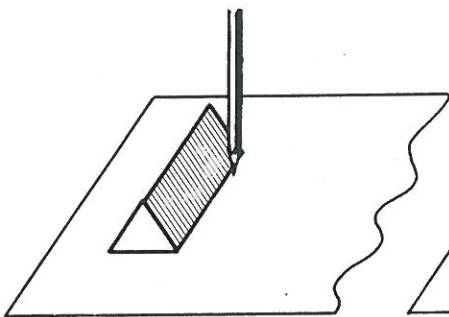


Square Prism

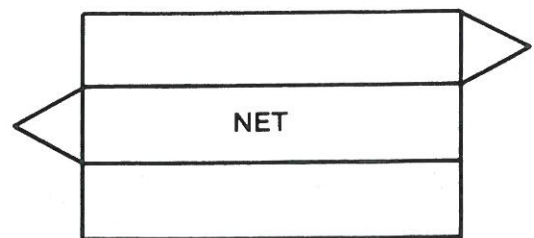


Triangular Prism

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.

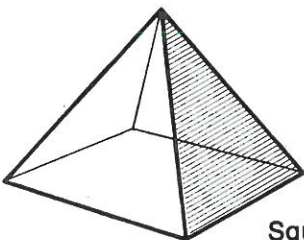


Your finished shape is called a net.  
Cut out your net.  
If you fold it up it will make the prism.

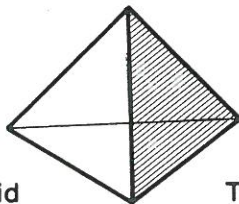


Stick the net in your book.

Make nets for other prisms and for some pyramids.



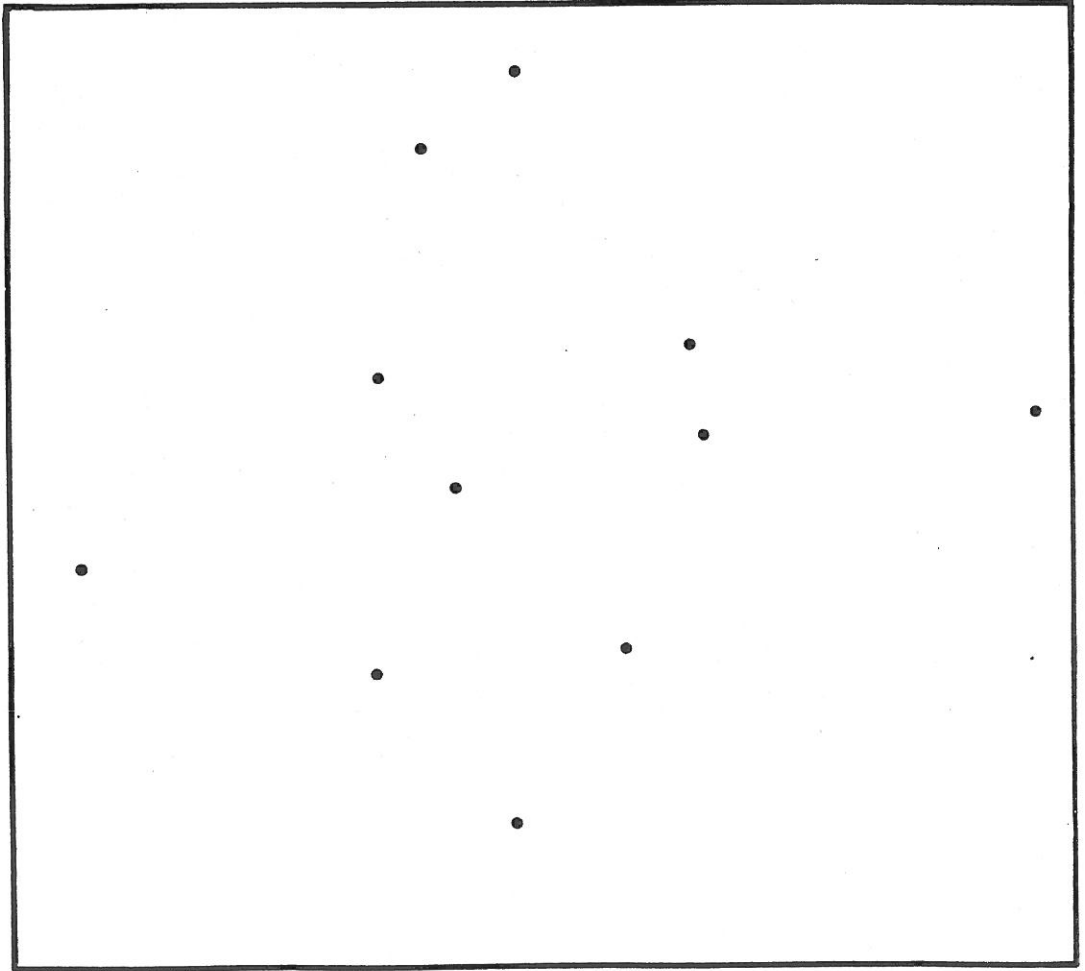
Square Pyramid



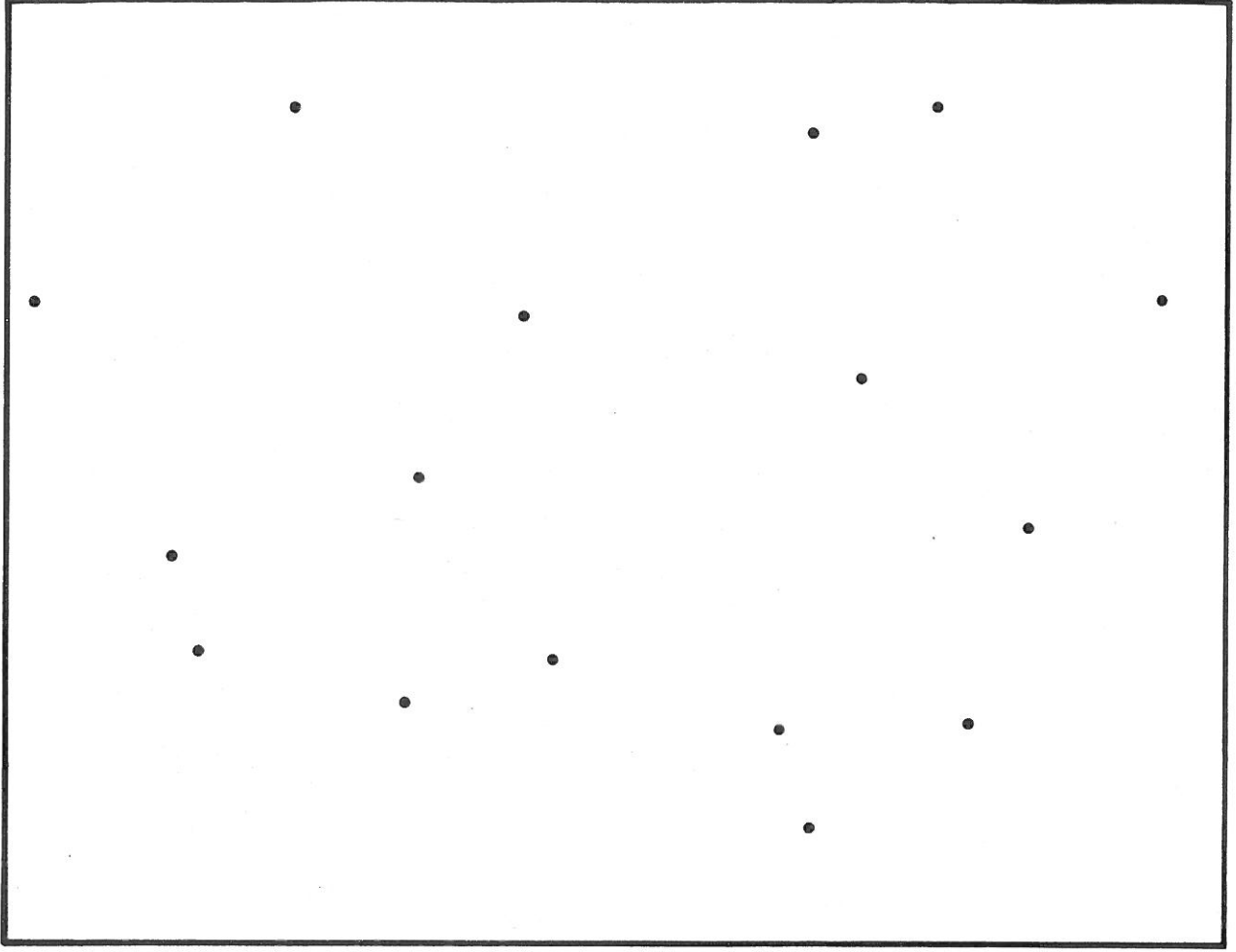
Triangular Pyramid

# Straight Lines

1. Find 3 points in a straight line ... they must be exactly in line.



2. How many straight lines can you find with exactly 3 points?

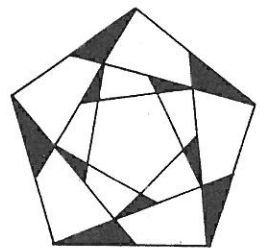
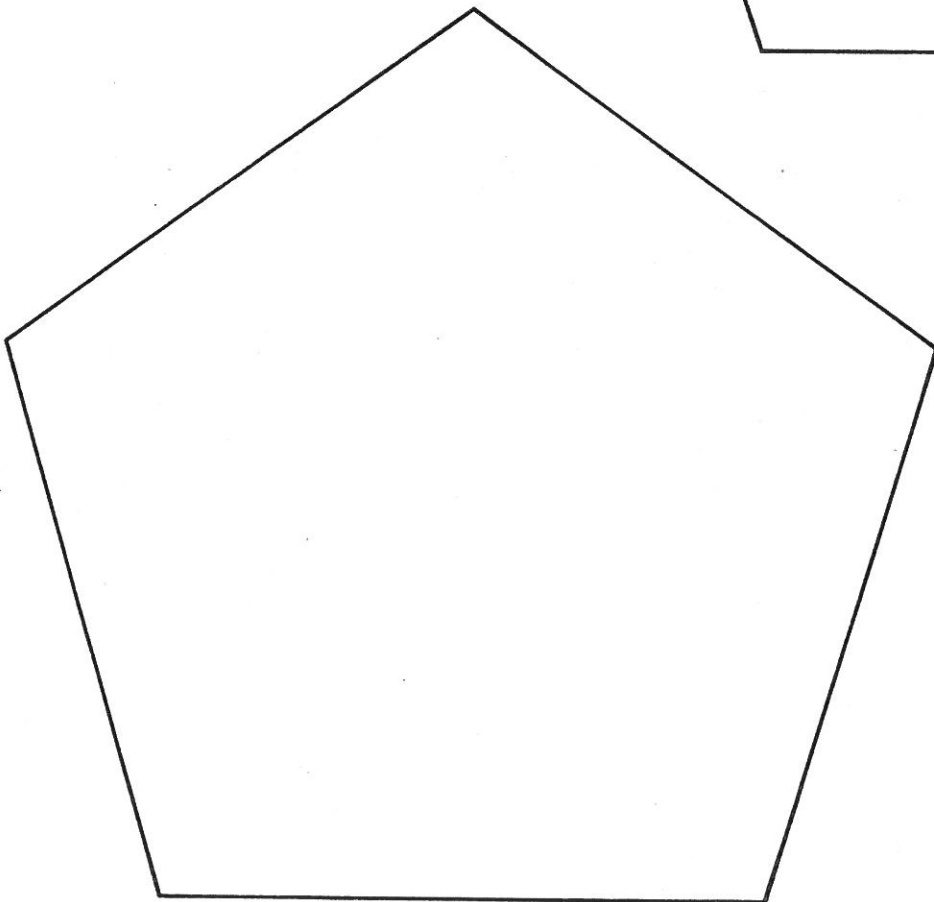
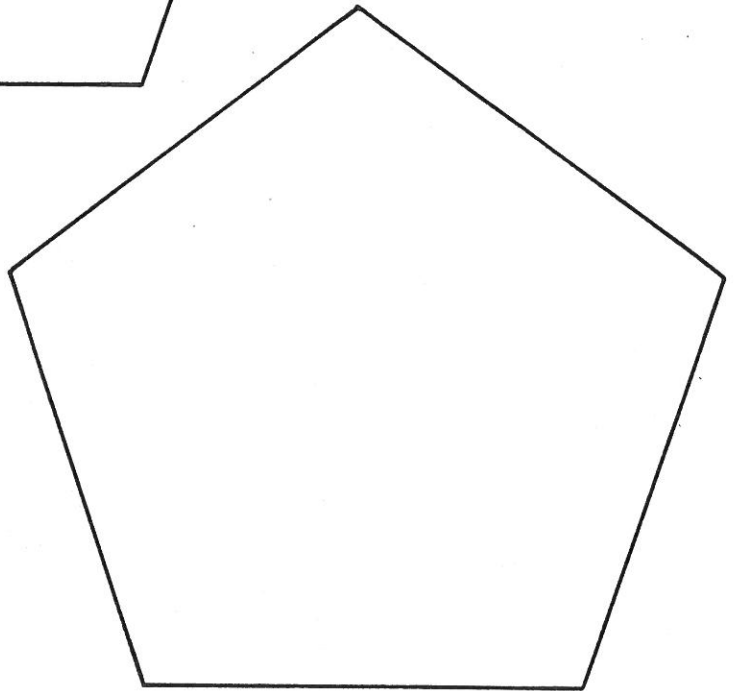
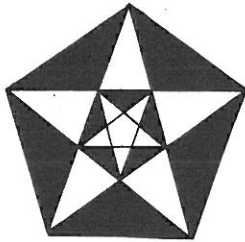
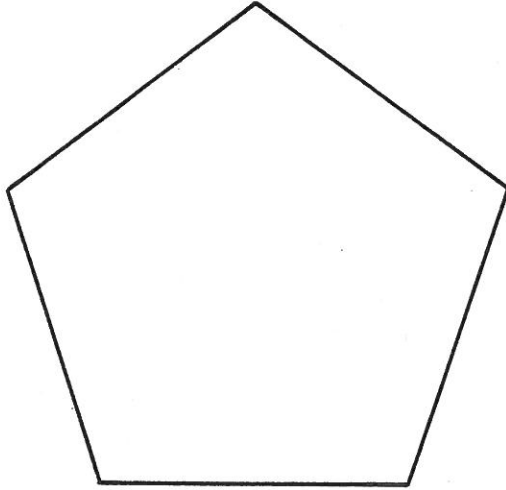
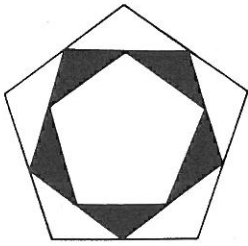


3. Make a similar puzzle for a friend.



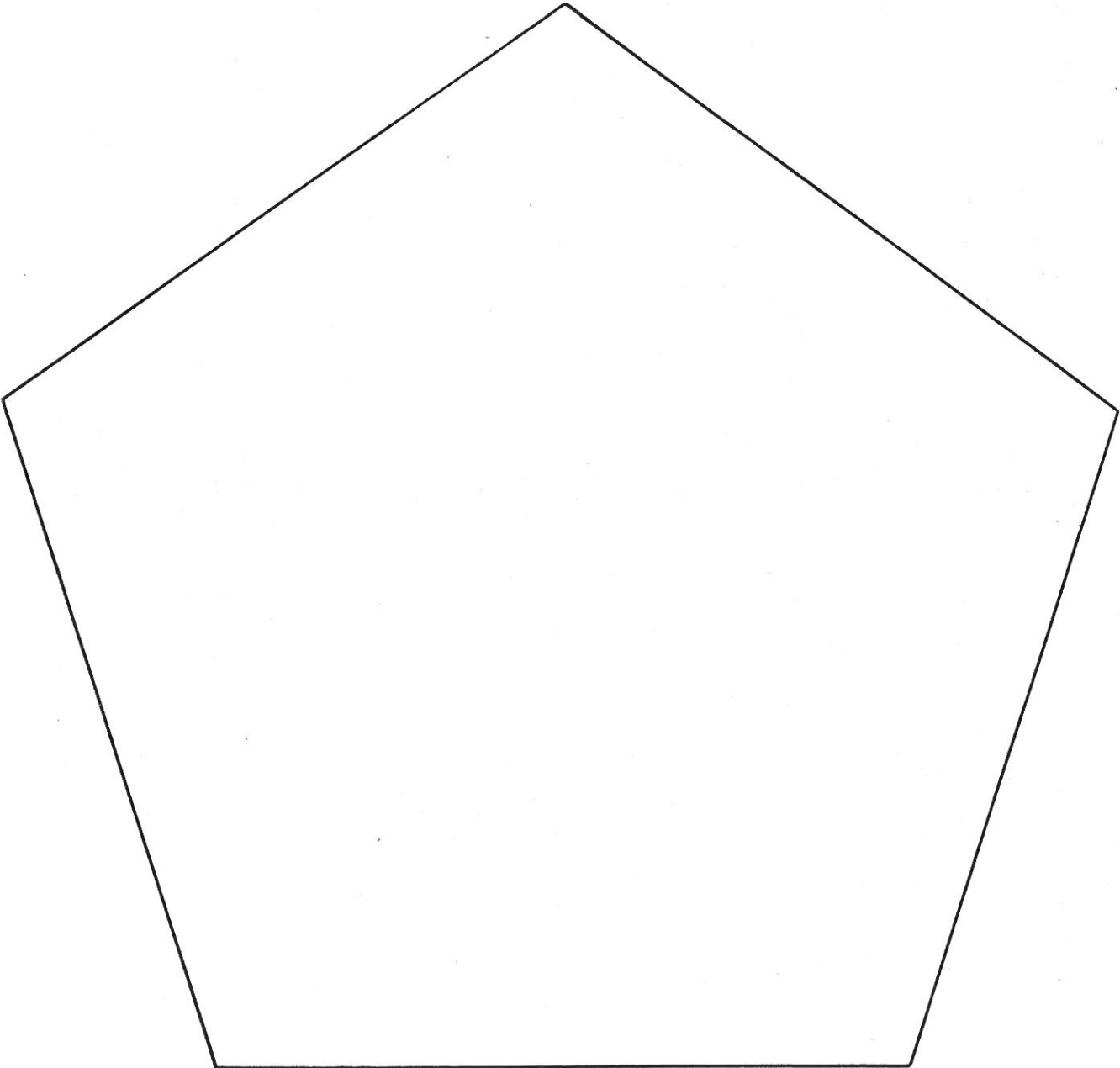
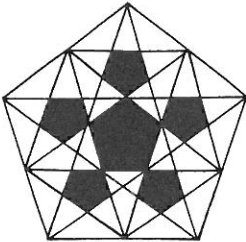
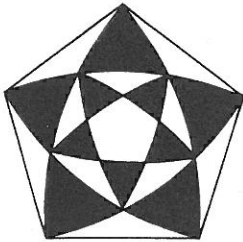
# Pentagons

Copy the patterns and continue them.



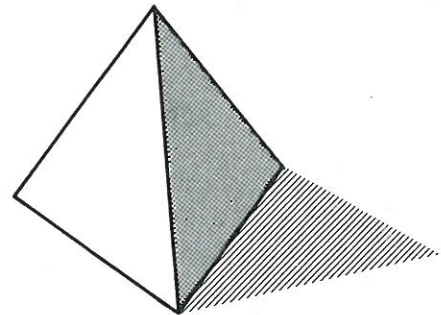
Turn over

Make a design of your own or copy one of these.

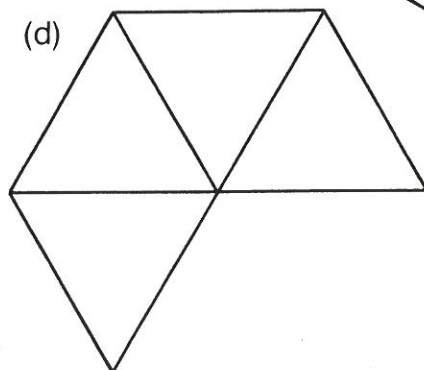
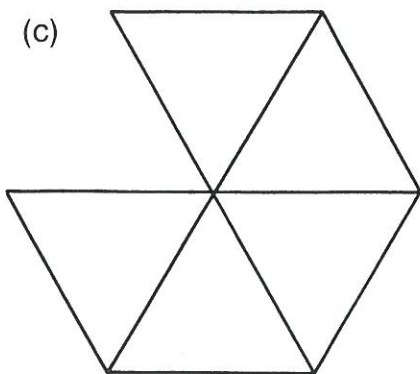
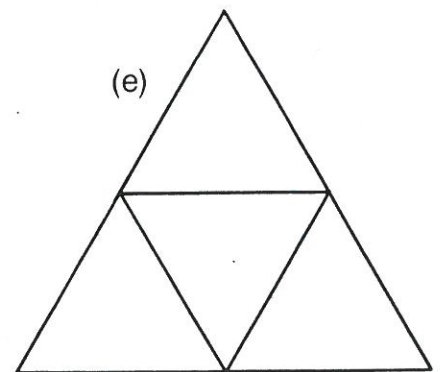
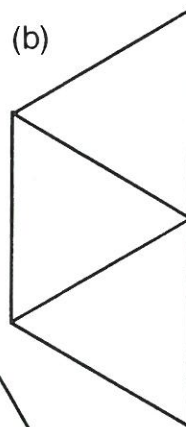
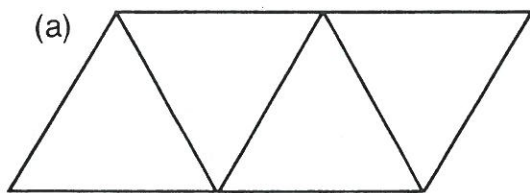


# TETRAHEDRON NETS

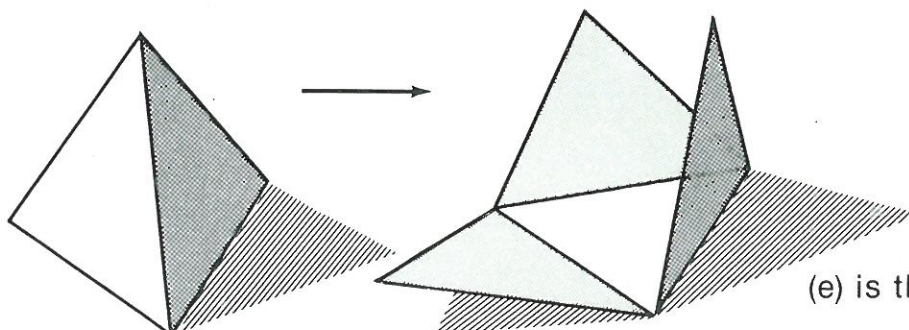
Get a tetrahedron from the box of solids.



1. How many FACES has it?
2. What shape is each face?
3. How many triangles are there in the shapes below?



4.

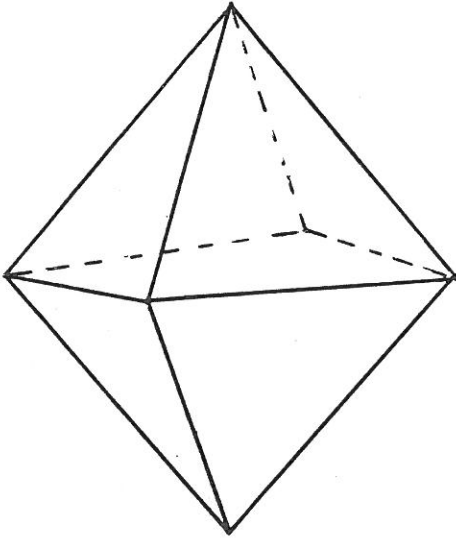


(e) is the net of a tetrahedron.

Find which of the other drawings are nets of tetrahedrons.

You will need: isometric paper or compasses, sellotape

## OCTAHEDRON NETS

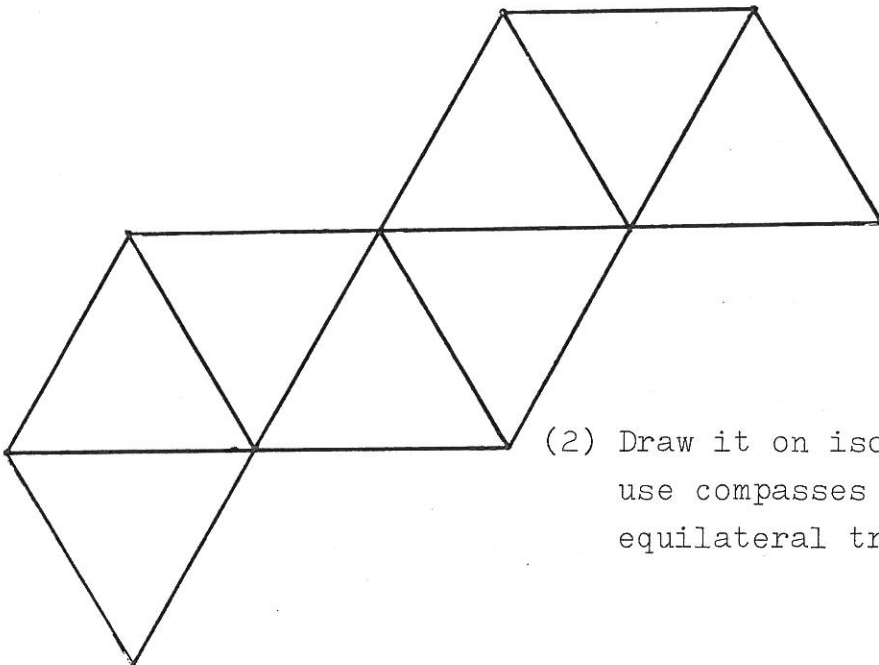


This is a regular octahedron.  
It is an OCTAHEDRON because it has  
8 faces - all triangles.  
It is REGULAR because .....

(1) Can you finish this sentence?

---

Here is a net for the regular octahedron:



(2) Draw it on isometric paper or  
use compasses to construct the  
equilateral triangles.

- (3) Cut it out.  
(4) Fold along the lines.  
(5) Use sellotape to make the octahedron.

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(6) There are other nets for a regular octahedron.

See how many you can find.

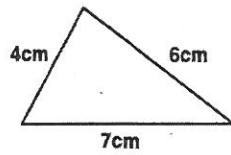


# Ruler, Pencil, Compass

These drawings are not to scale.

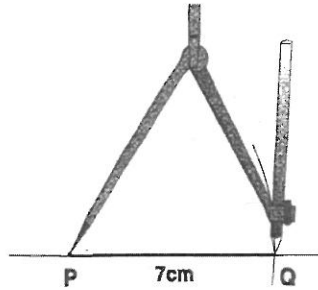
Can you draw this triangle accurately using only:

- a ruler
- a sharp pencil and
- a compass?

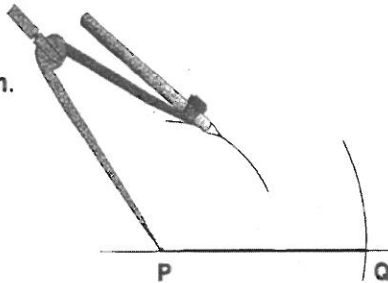


Here's how!

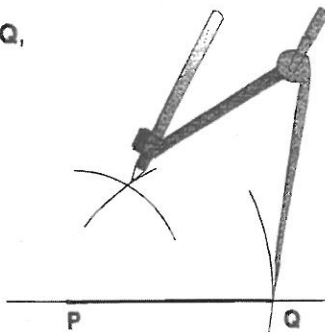
- Mark off 7cm on a line.



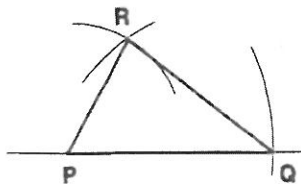
- Draw an arc centre P, radius 4cm.



- Draw another arc; centre Q, radius 6cm.



- Draw the triangle PQR.

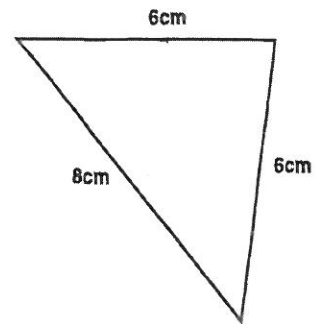


- Check the measurements.

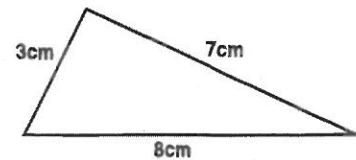
Turn over

Draw these triangles accurately, using only a ruler, a sharp pencil and a compass.

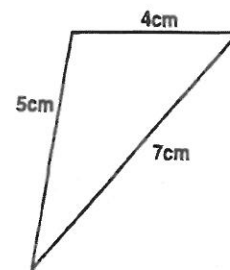
1)



2)



3)



Try to draw these triangles accurately, some are impossible.

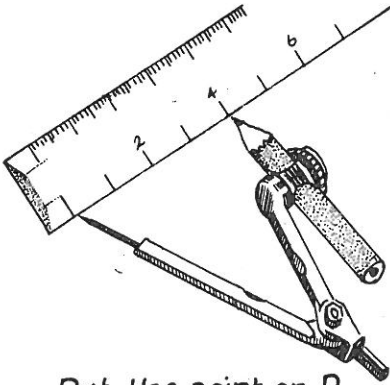
- 4) 5cm, 5cm, 9cm.
- 5) 15cm, 8cm, 7cm.
- 6) 8cm, 8cm, 8cm.
- 7) 4cm, 7cm, 11cm
- 8) Which triangles are impossible to draw? Explain why.
- 9) Look at the triangles you have drawn.
  - Which ones are isosceles?
  - Which one is equilateral?

# EQUILATERAL CONSTRUCTION

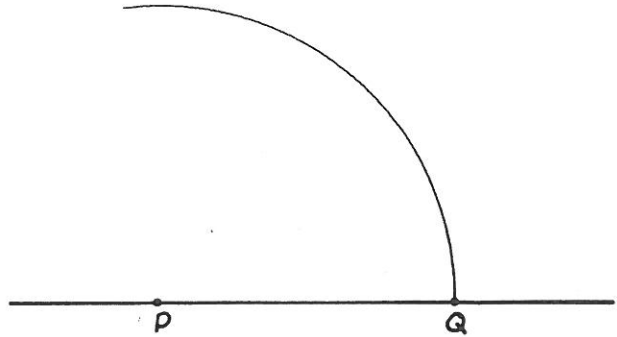
- 1) Draw a line. Mark off 4 cm. Label this PQ.



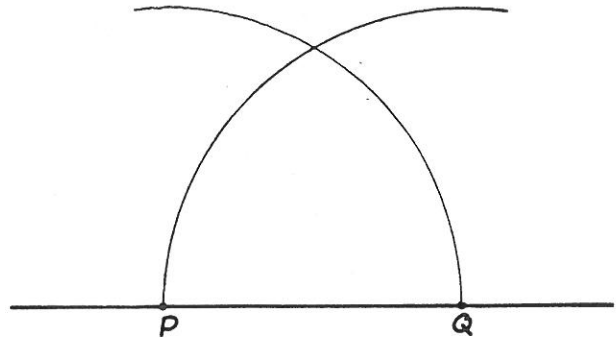
Open the compasses 4 cm.



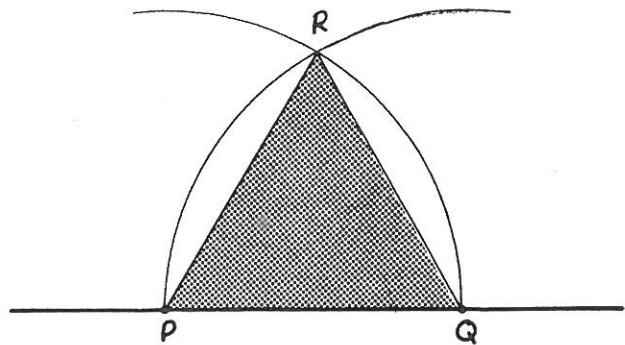
Put the point on P. Draw an arc from Q.



Put the compasses' point on Q. Draw an arc from P to cut the other arc.

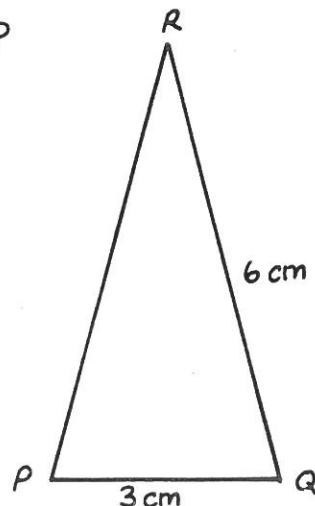


Draw the lines PR and QR to make an equilateral triangle.



- 2) Use the same method to construct an equilateral triangle with sides 5.3 cm
- 3) Can you see **why** the triangles are equilateral ?

- 4) If you understood the method of construction, you might be able to adapt it slightly .....  
.....construct this isosceles triangle.

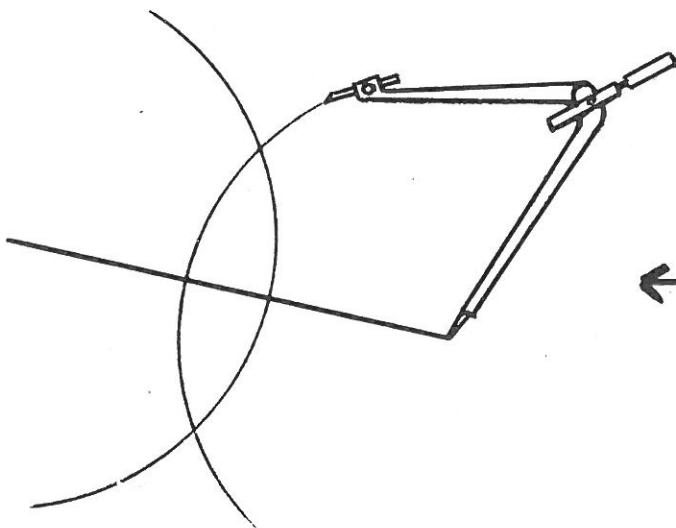


You will need: protractor compasses, sharp pencil.

## Perpendicular Bisectors

Over 2,000 years ago Greek mathematicians prided themselves that they could do geometry with only 3 instruments;

- a) a pair of compasses
- b) a very sharp pencil
- c) a straight edge (a ruler without markings).

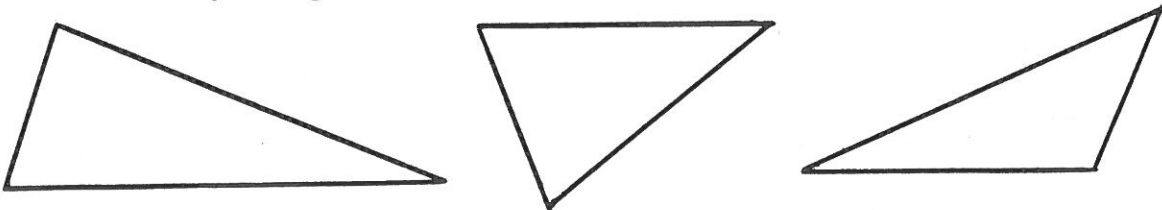


- (1) Draw a straight line.
- (2) Put the compass point at one end and draw an arc.
- (3) DON'T ALTER THE COMPASSES. Draw another arc with the compass point at the other end.
- (4) Join the points where the arcs meet. This is the bisector.

- (5) Use a ruler to CHECK that the bisector meets the first line at its middle point.
- (6) Use a protractor to CHECK that the bisector is perpendicular (at  $90^\circ$ ) to the first line.
- (7) Draw the perpendicular bisectors of 5 more straight lines, and check that your work is accurate. (ruler and protractor)
- (8) Draw any triangle. Draw the perpendicular bisectors of all 3 sides.

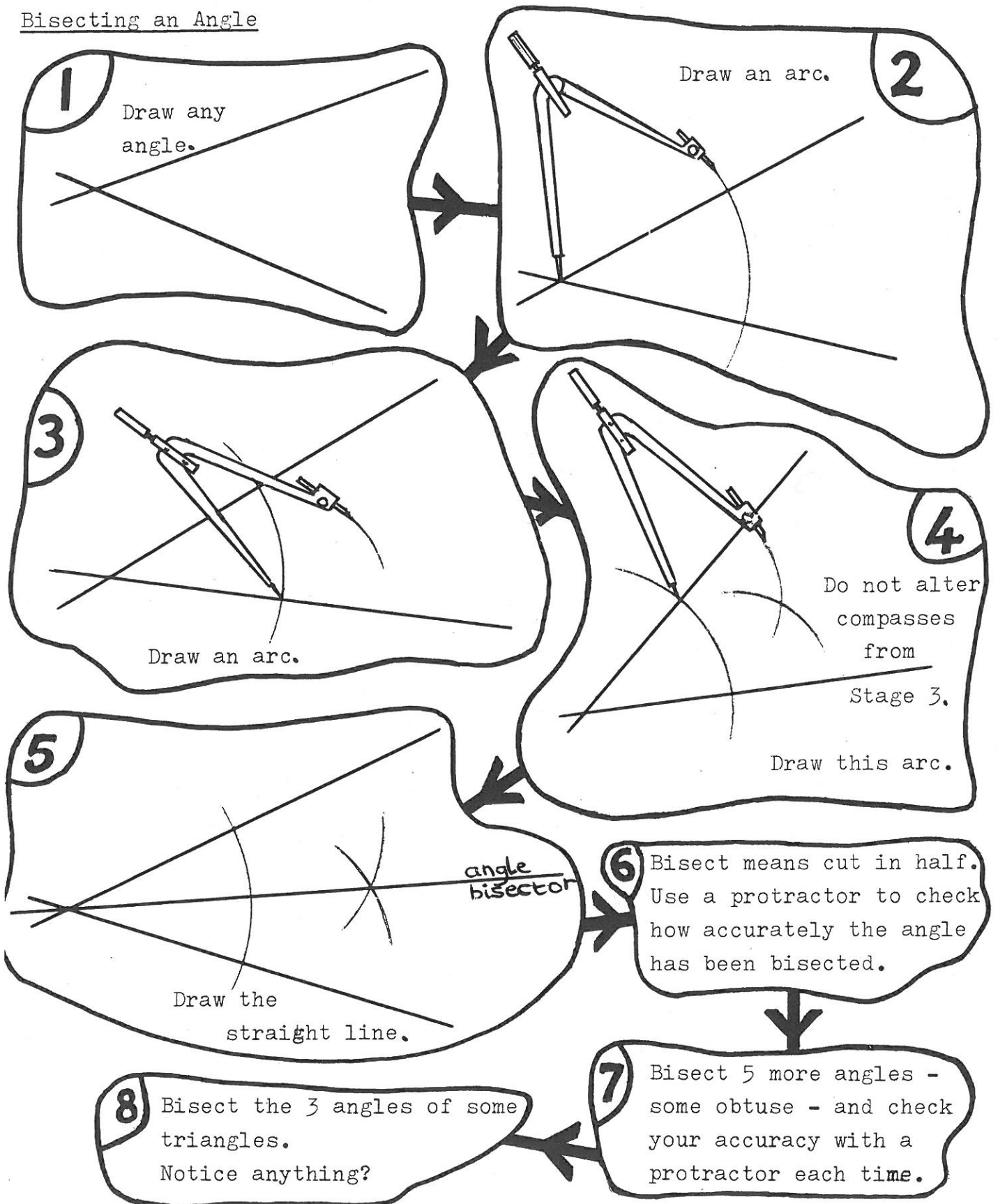
Repeat this for some other triangles.

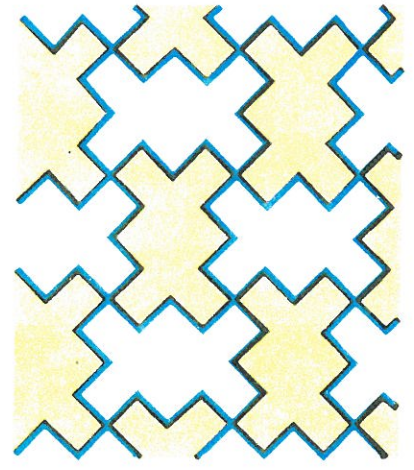
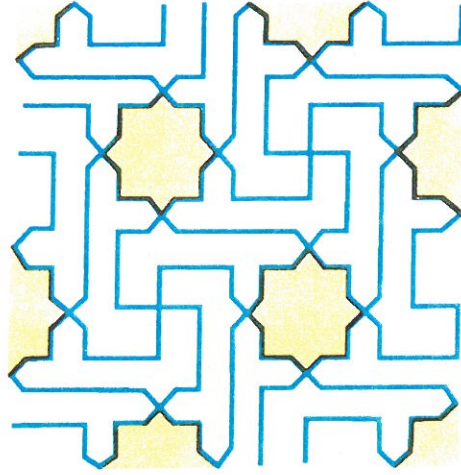
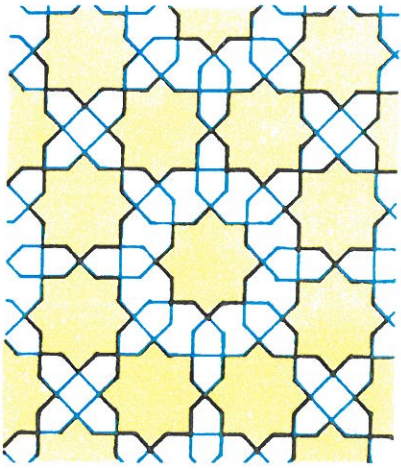
Notice anything?



You will need: protractor, ruler, compasses, sharp pencil

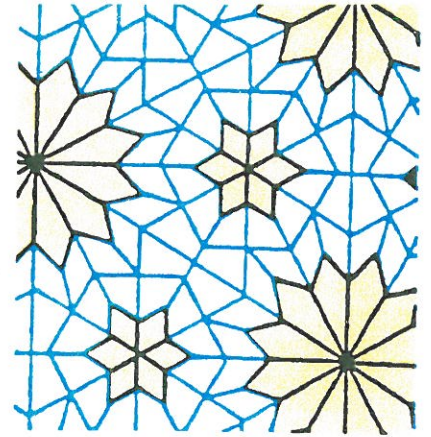
Bisecting an Angle





Intricate geometric designs like these can be found decorating the walls, floors and windows of many buildings in Islamic countries.

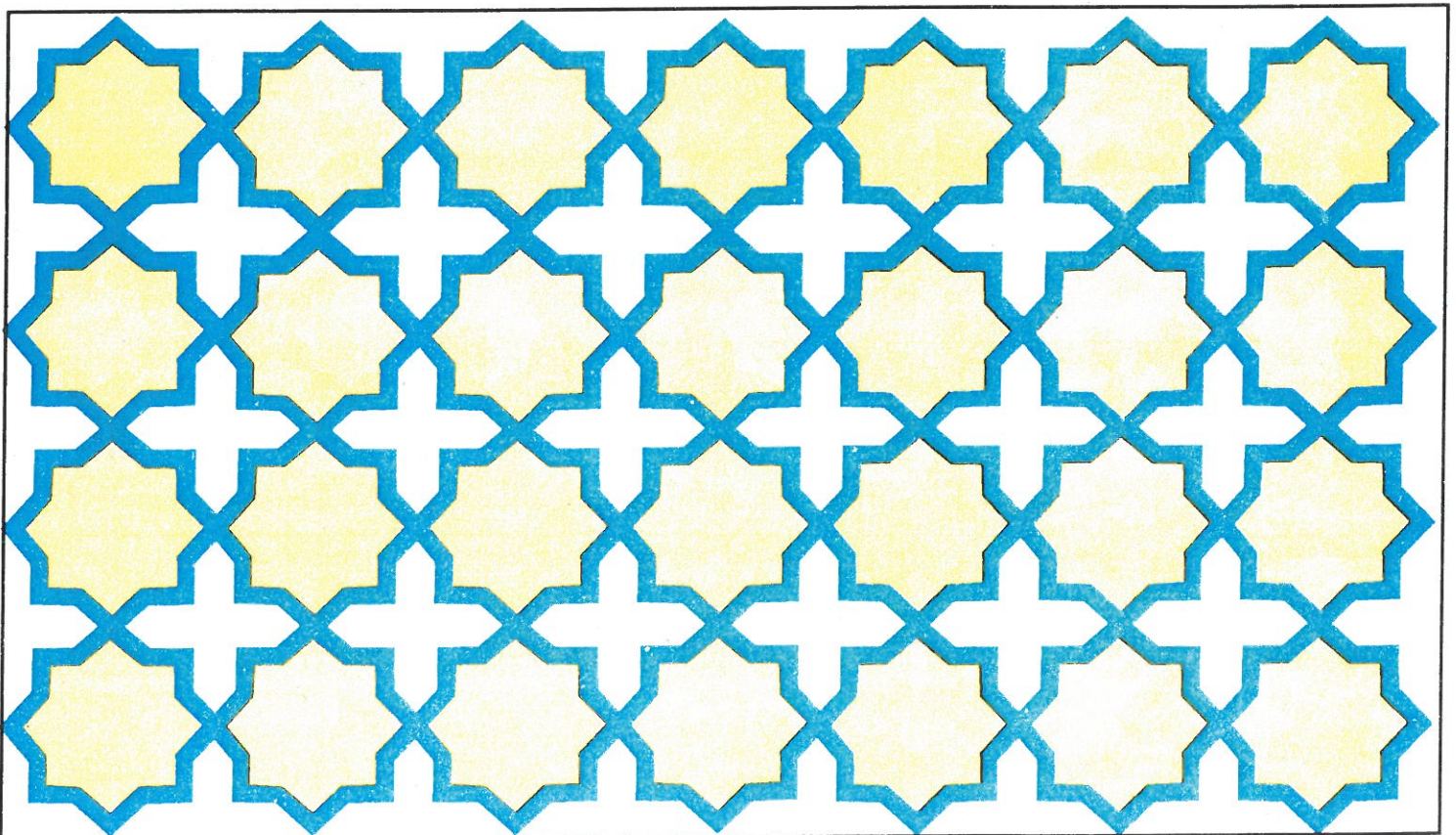
These designs were developed because the Islamic religion discourages the making of images of lifelike figures. The use of geometric patterning first began in Iran and Iraq in the early 11th century but its use spread elsewhere and can still be seen today in many countries from Spain to India.



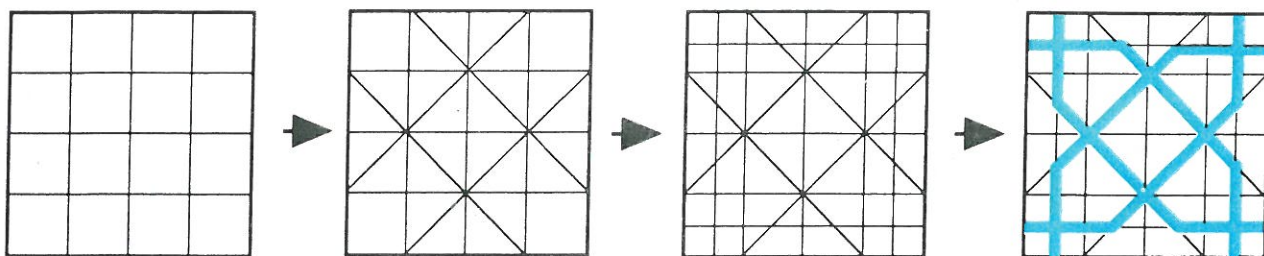
© 1993 RBKC SMILE

# ISLAMIC DESIGNS

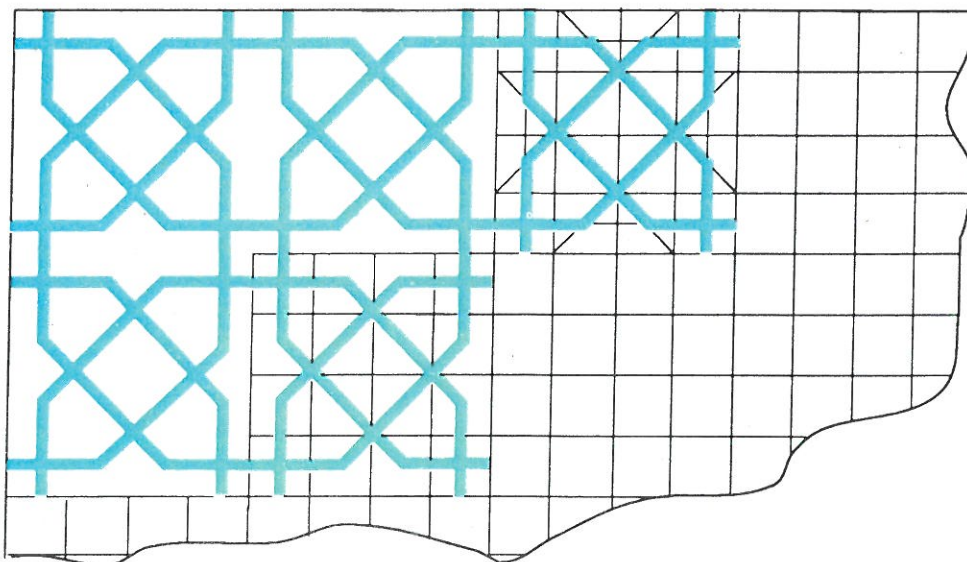
Smile 2063



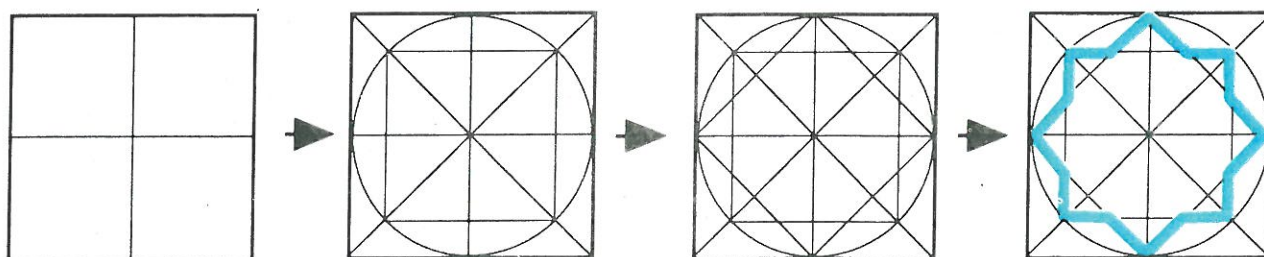
1. Draw the construction lines faintly.



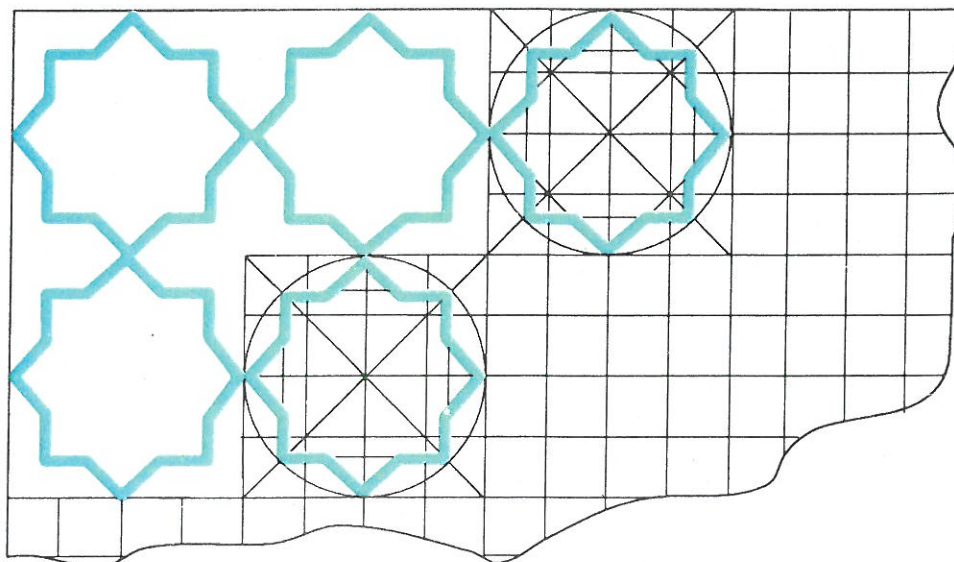
Rub out the pencil lines.  
Repeat your design.



2.



Rub out the pencil lines.  
Repeat your design.



Now try some of your own designs.