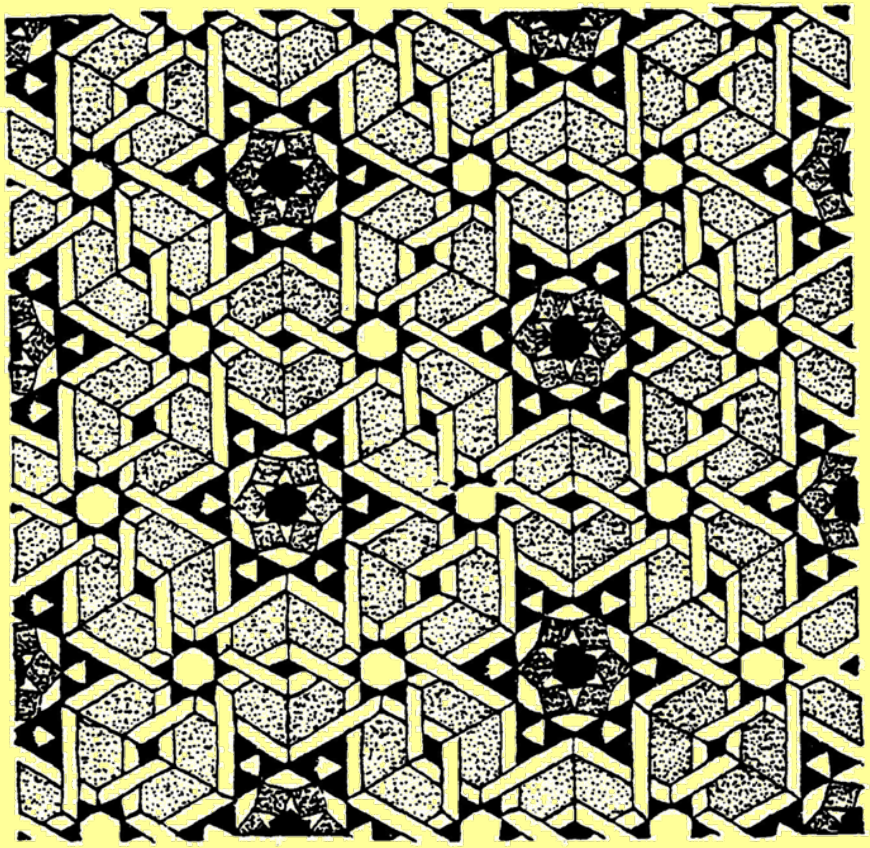
WALSALL
LOGO
PROJECT

CURRICULUM SUPPORT TEAM

WALSALL 409383 / 495221



ISLAMIC PATTERNS

Text and Illustrations

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MICROELECTRONICS EDUCATION SUPPORT UNIT

Islamic Pattern

In the context of the Multi-cultural society we live in and the L.E.A policy on Equal Opportunity and Anti-Racism, this resource is a timely one.

The majority of our ethnic minority children in Walsall Schools are of Asian origin, of which the Moslems are the largest group. Islam, which is their religion, discourages the drawing of the human form, so as to direct attention away from idol worshipping. Instead of ikons, the facades of Mosques are adorned with intricate geometric patterns, uniquely developed, as if they are meant to match the intensity of moslem worship of Allah.

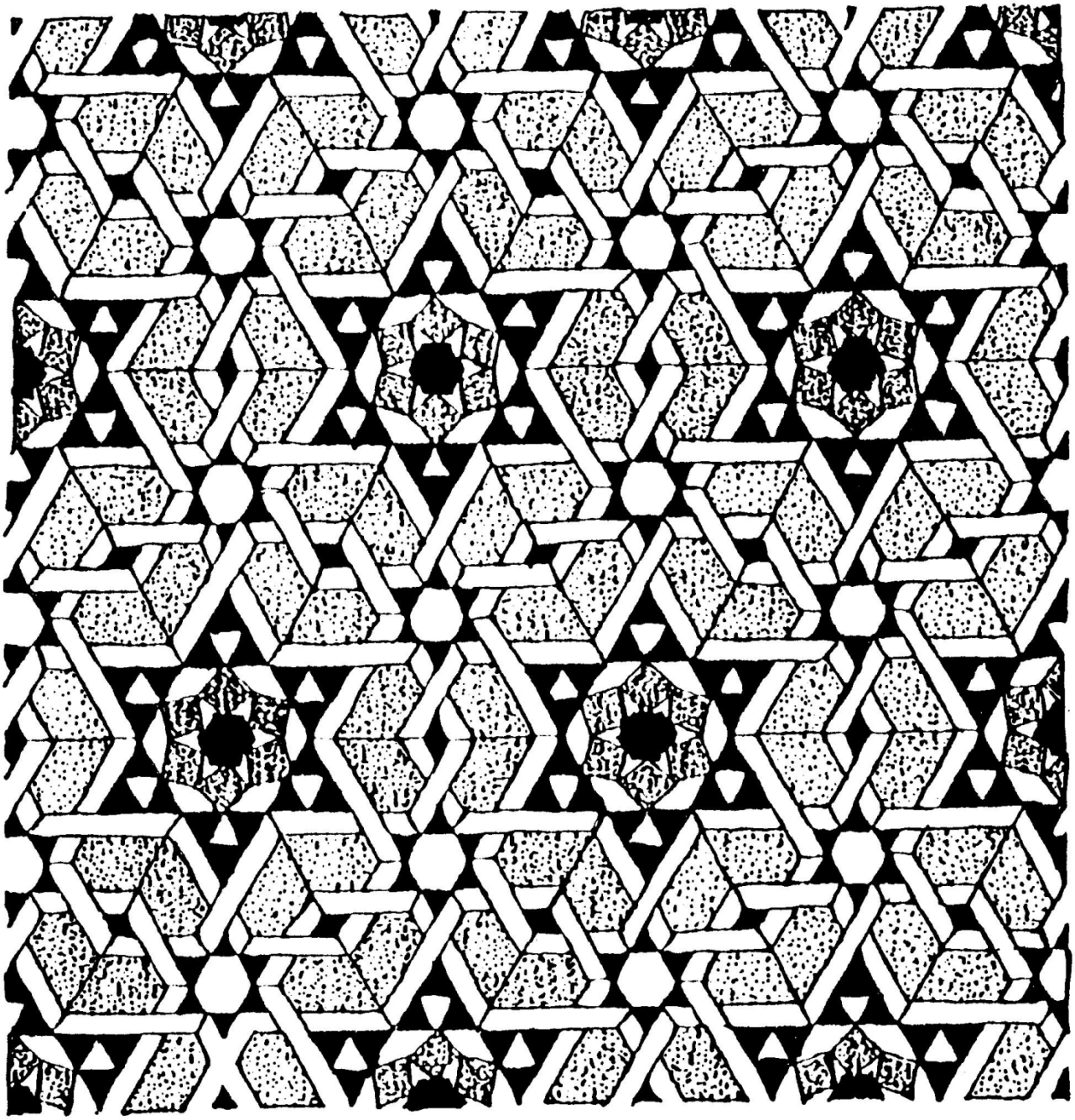
Moslem children in Walsall may have their family origins in rural settings of Punjab and Bangladesh, but one of their points of reference for high culture is certainly the architectural heritage of Islam. This booklet, therefore, is not only a valuable resource for activities connected to Mathematics and Computing, but it also gives teachers an opportunity to highlight through their work one of the many positive sides of Islamic culture - geometric patterns.

Nash Mejghi
Inter Cultural Curriculum Support,
Walsall

He hath created man
He hath taught him power of expression
The sun and the moon are made punctual

And the sky He hath uplifted
And He hath uplifted
And He hath set the balance
That ye exceed not the balance
But observe it strictly
Nor fall short thereof

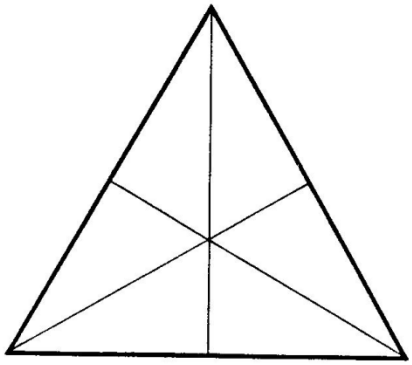
SURA LV, KORAN



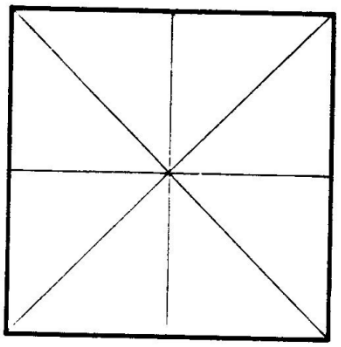
Making complex and beautiful patterns using the regular polygons of geometry, which the Greeks understood as an attempt by the artist to express the Essence, the Ideal of absolute beauty and order that is the unity of God, can be exciting and rewarding to anyone who wishes to produce them.

The multi-layered designs perceived here as many simultaneously existing patterns, suggests the concept of "kismit" or Destiny, which grows out of the notion that as God is omnipresent He experiences past, present and future at the same time and by His Will alone allows whatever exists to continue or to cease - thus at any moment there are no forms, no figures, but only an assemblage of atoms held in one pattern by the Will of Allah.

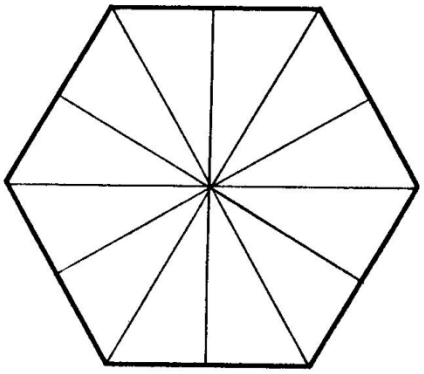
Many of the Islamic designs can be derived from three basic shapes, the equilateral triangle, the square and the regular hexagon. By using the natural lines of symmetry in each shape as guidelines, numerous designs can be developed. For example:-



3 lines of symmetry



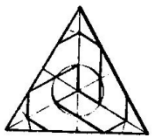
4 lines

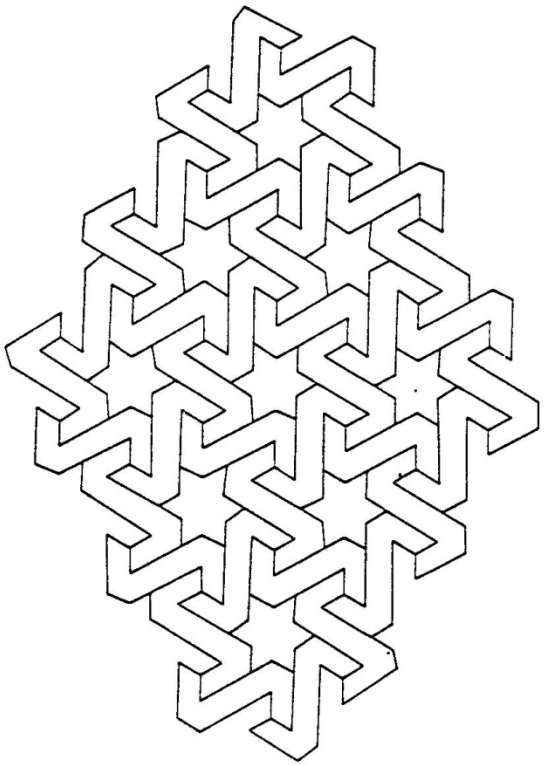


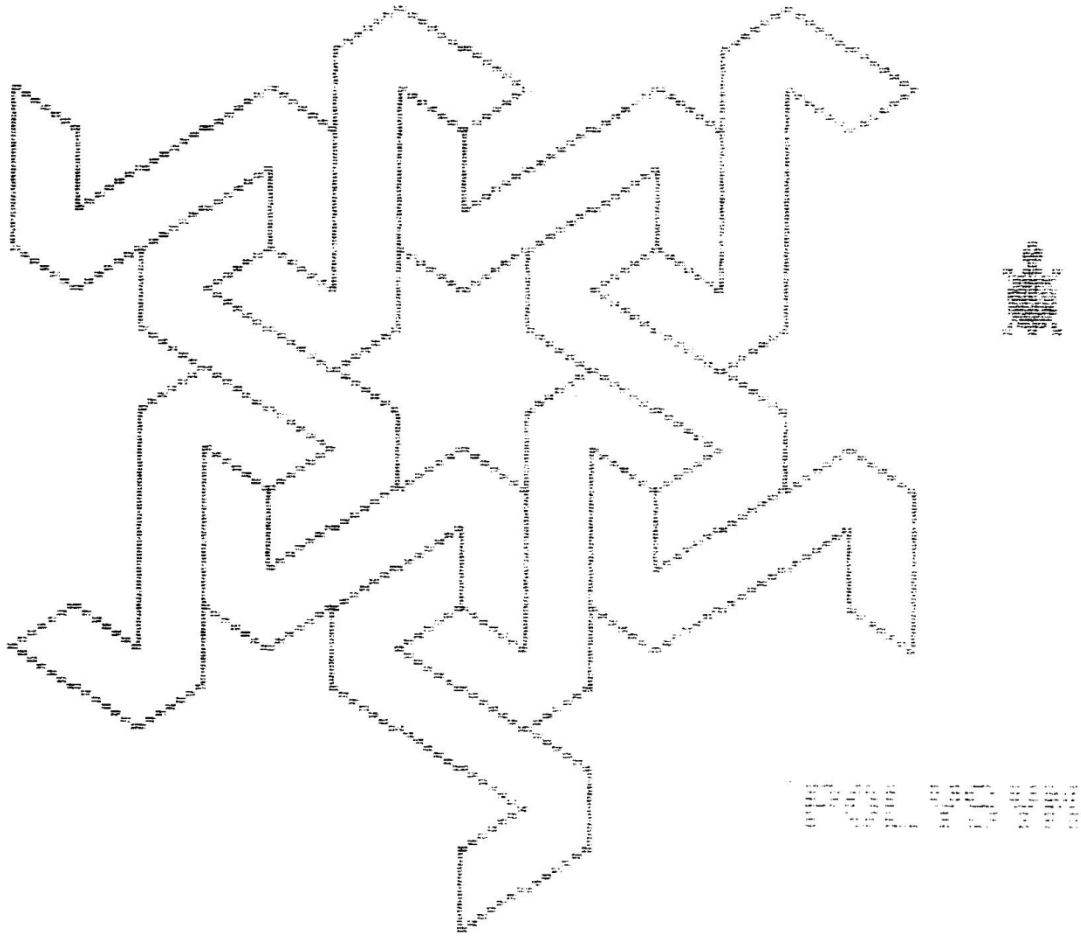
6 lines

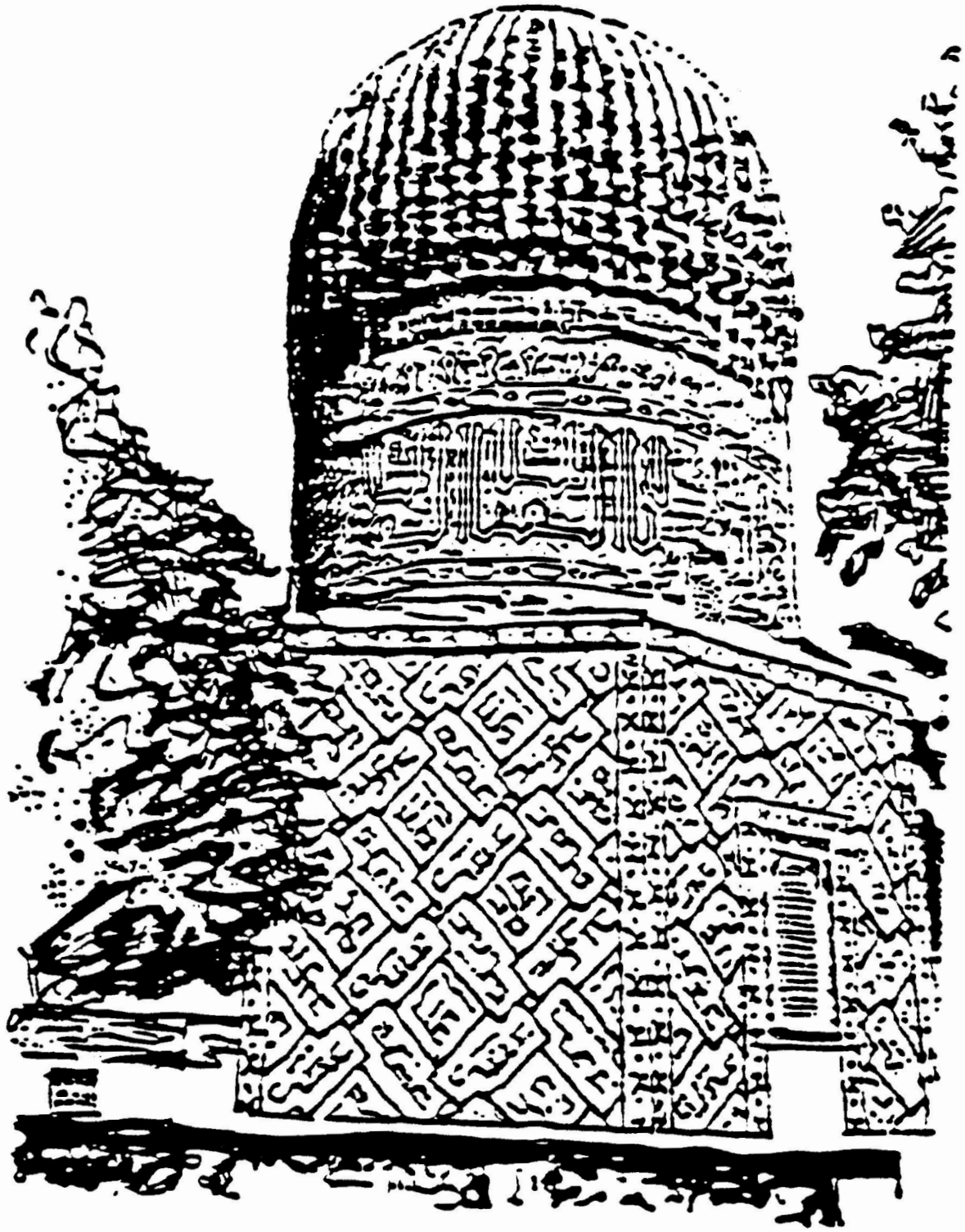
Once a satisfactory motif has been produced it can then be traced onto a grid of the same basic shape as the motif. Tessellating or rotating the motif can produce a much larger and often unexpectedly beautiful pattern. Another method is to cut out the motif and trace around it in a variety of ways.

For example in a rotational fashion:-



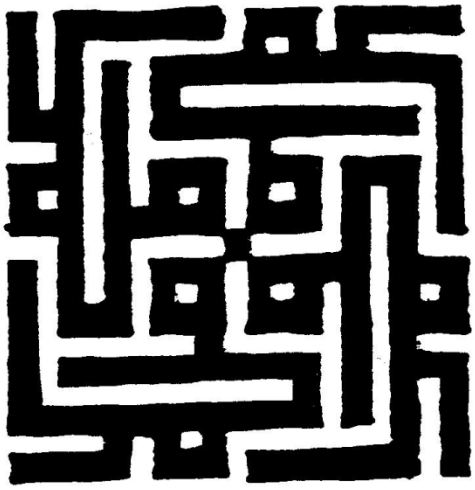


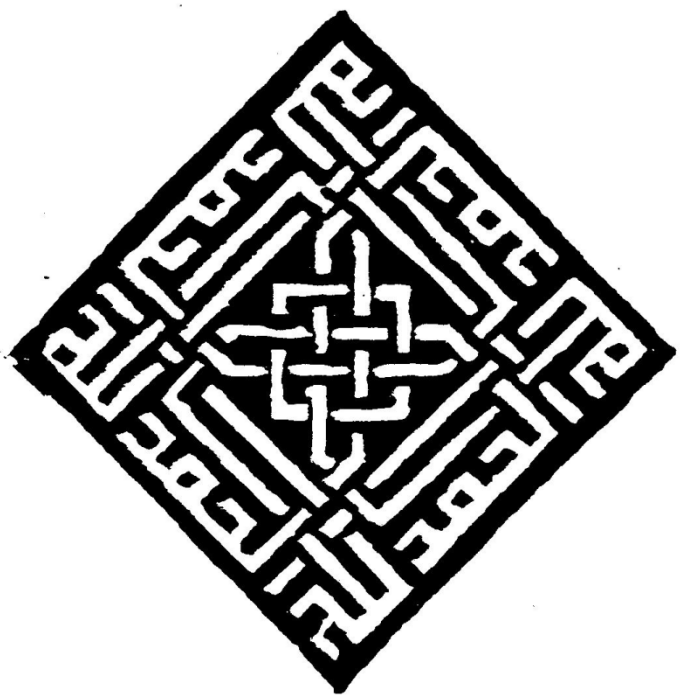


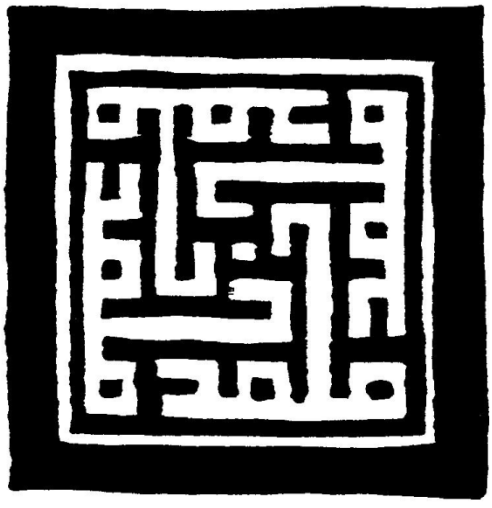


A view of the Gur-i-Mir, the Mausoleum of Tamurlaine. Samarkand, completed in 1434. The building shows the use of calligraphy as architectural decoration.

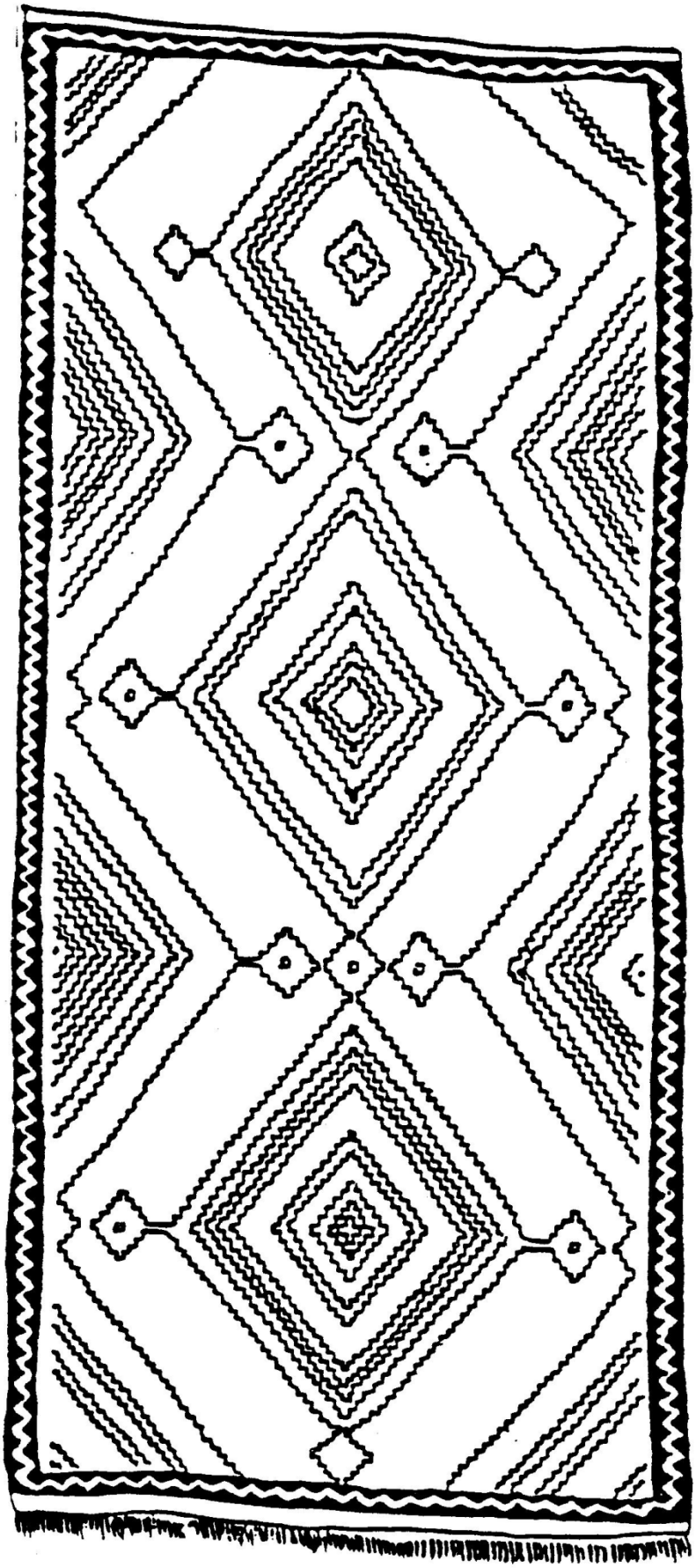
Islamic Sources



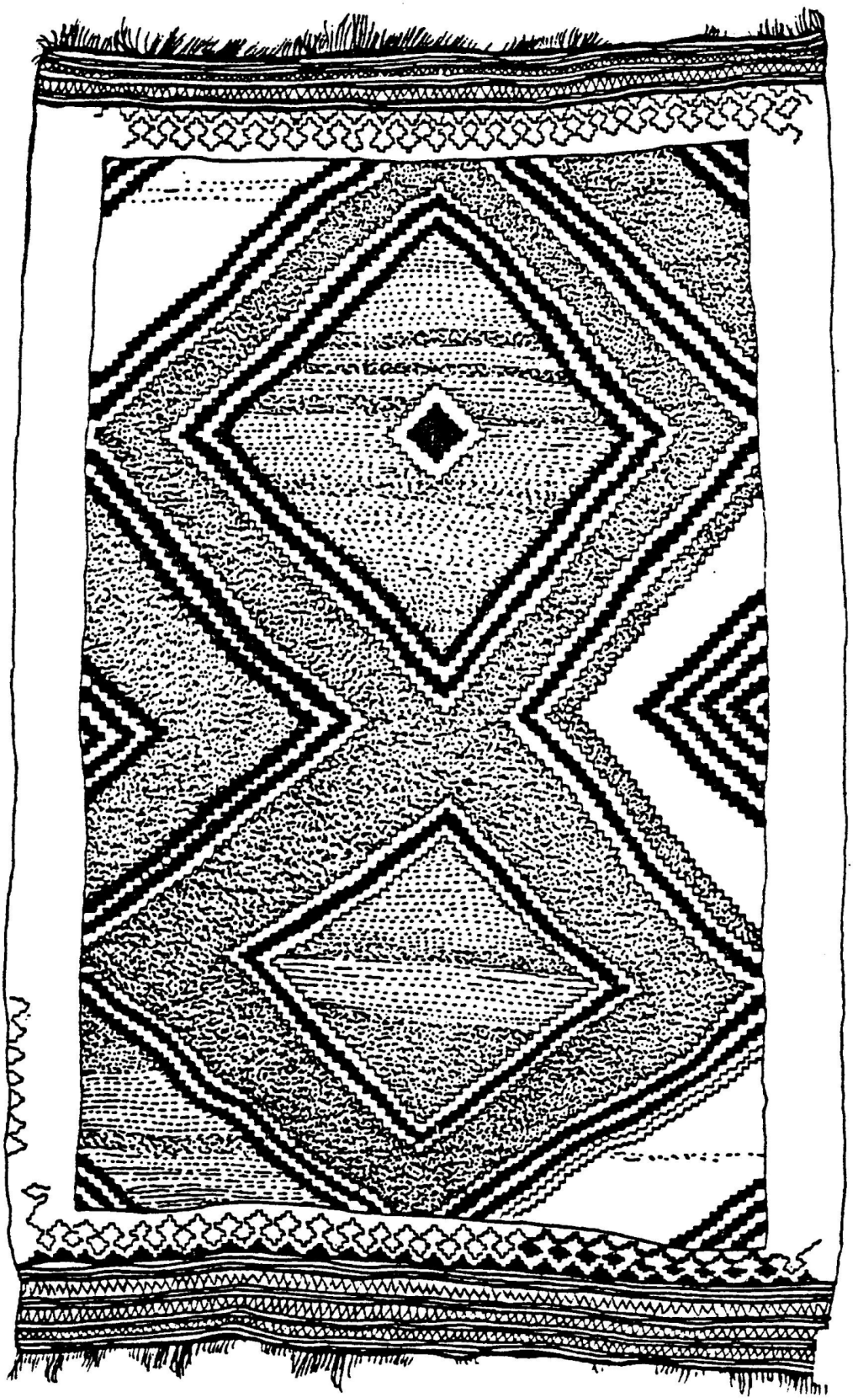




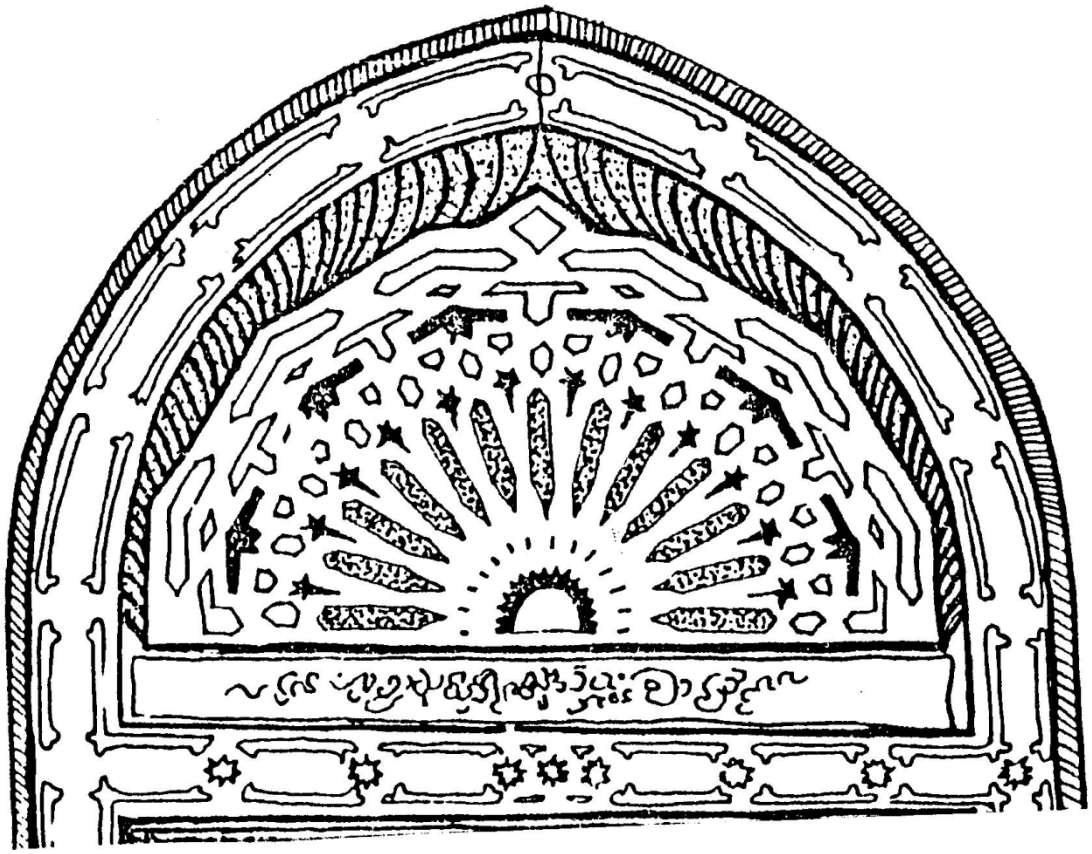
Three panels of Kufic inscription. Top: names of Mohammed and Ali. Centre: "Praise be to Allah". Below: "Mohammed" repeated four times.

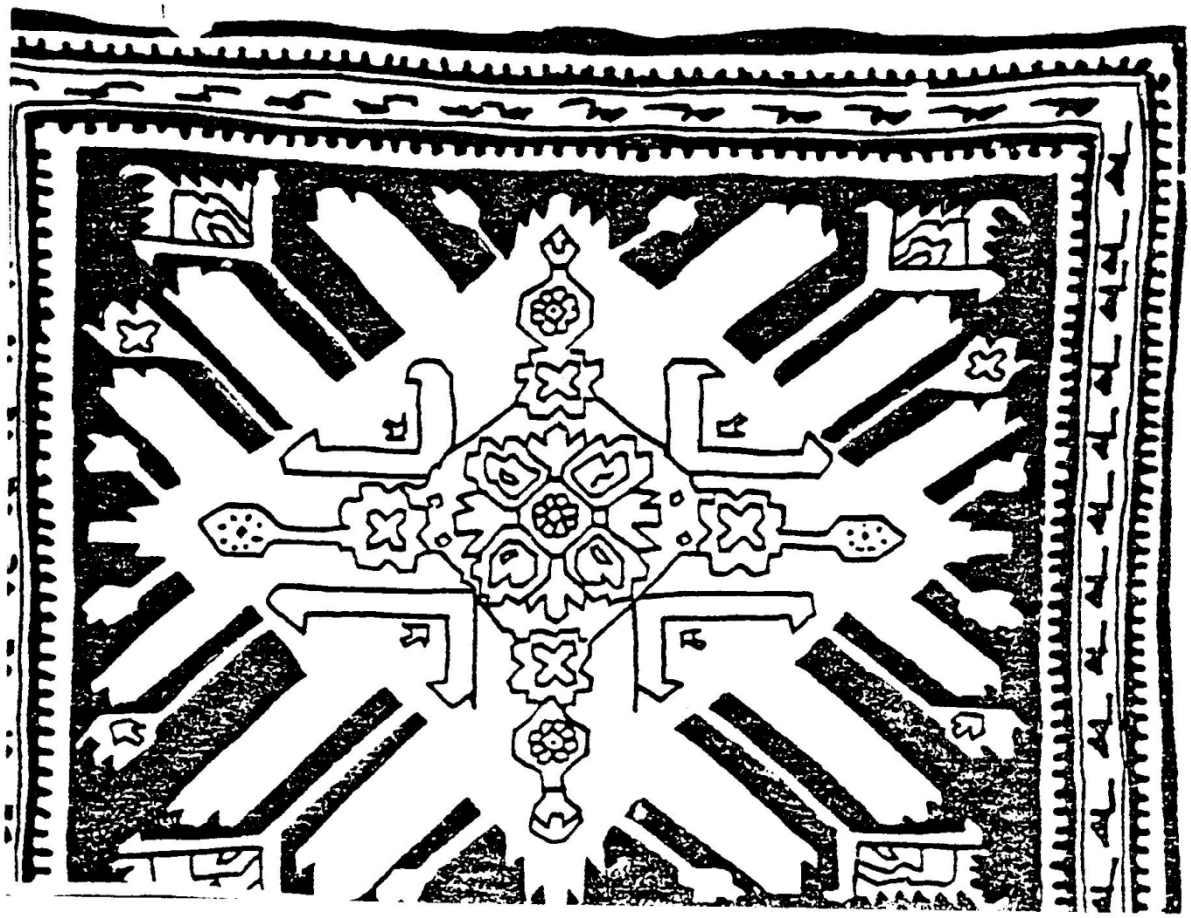


Pattern generation is the systematic connection of a central point to points placed regularly around it. In weaving this process is elemental as coloured threads and knots are "staggered" to create diamond stepping designs; row upon row gives rise to the zig-zag lattice. This basic principle has lead to the systematic development of diagonal motifs as seen in the Kelim from South Iran. Here there is no particular motif to be seized upon, rather a system of diagonals woven in stepping stones which enclose and simultaneously lie inside other parallel diamonds.

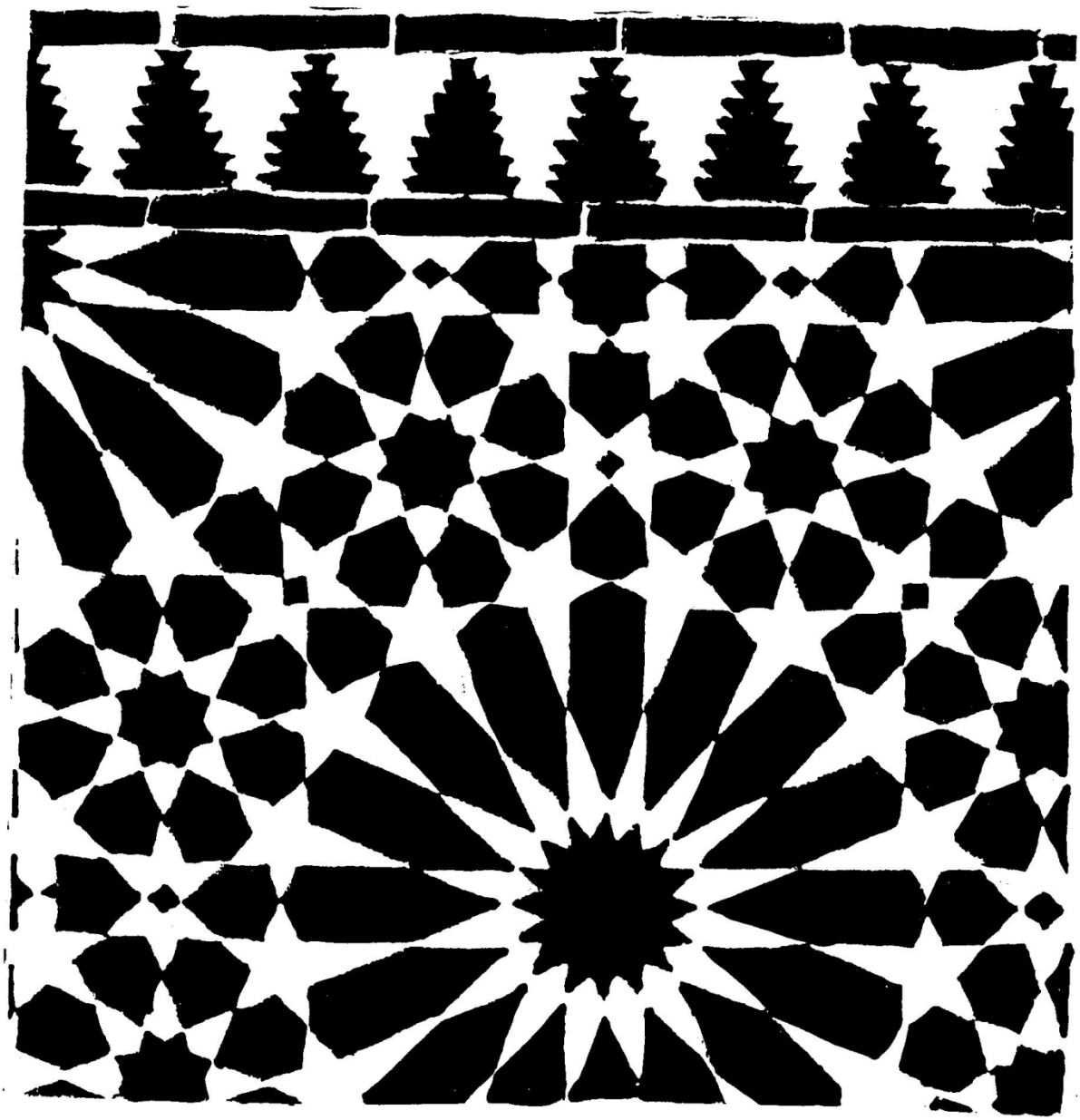


Another example of a Kelin from South Iran, probably woven by the Lurs tribe from the district of Fars. The design is much simpler and less cluttered than that preferred by the Qashqai tribe. Persian book covers influenced tribal as well as court carpet patterns.

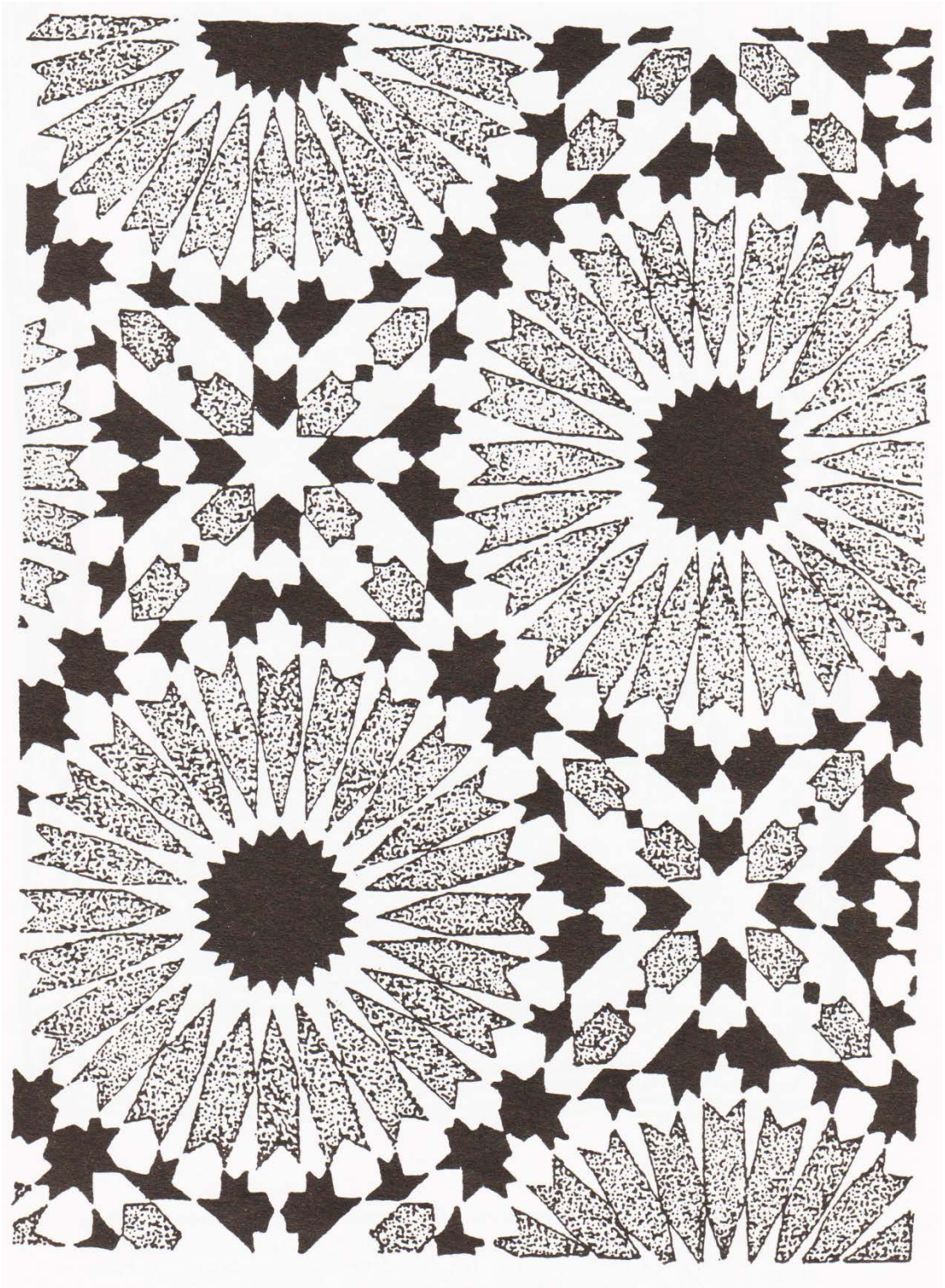


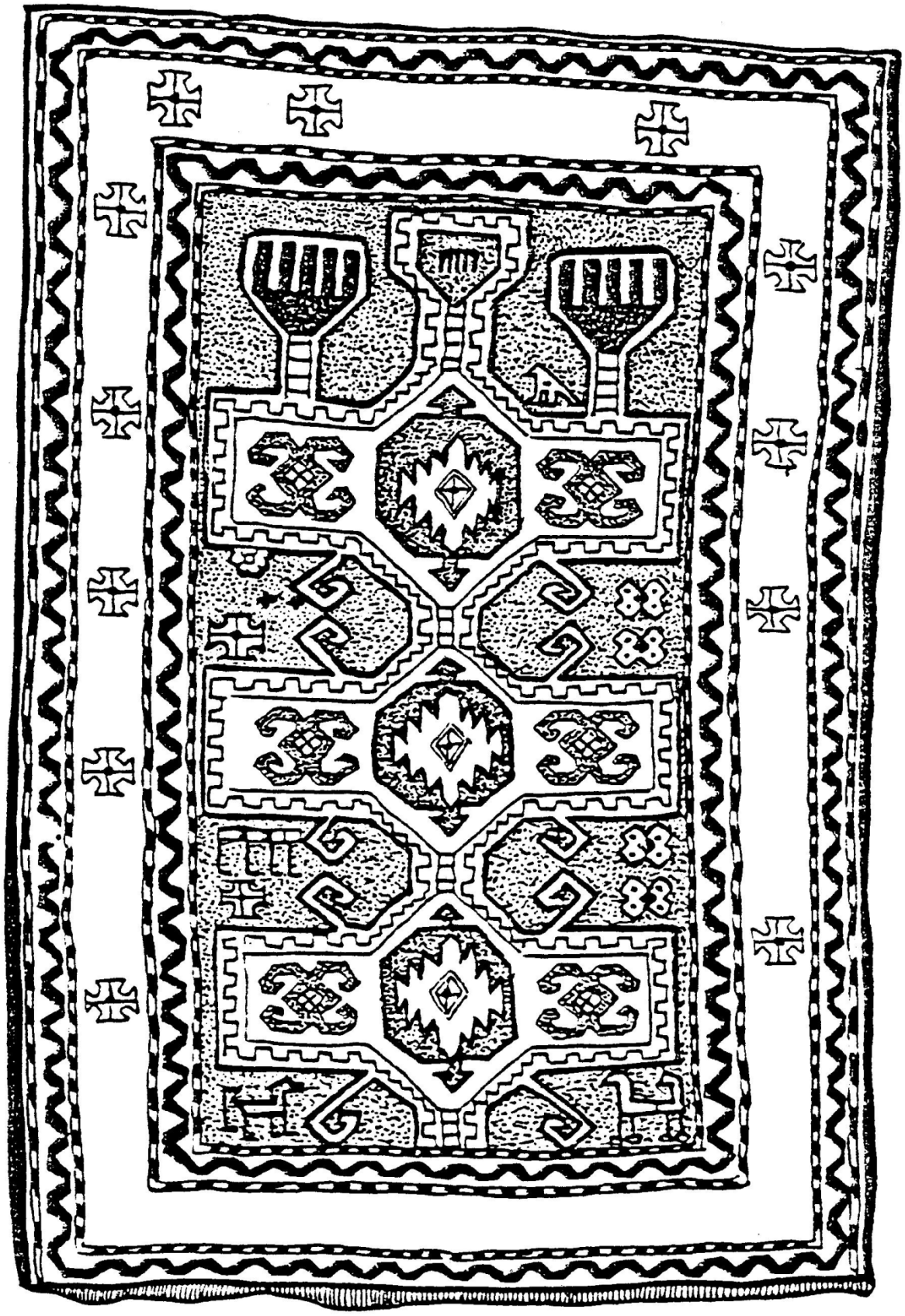


The sunburst design is found in Kazak rugs: the latter have tribal Turkic patterns, but the rug illustrated uses a Persian geometric flower motif and develops this into the sunburst: dramatic radiating medallions in bold colours.

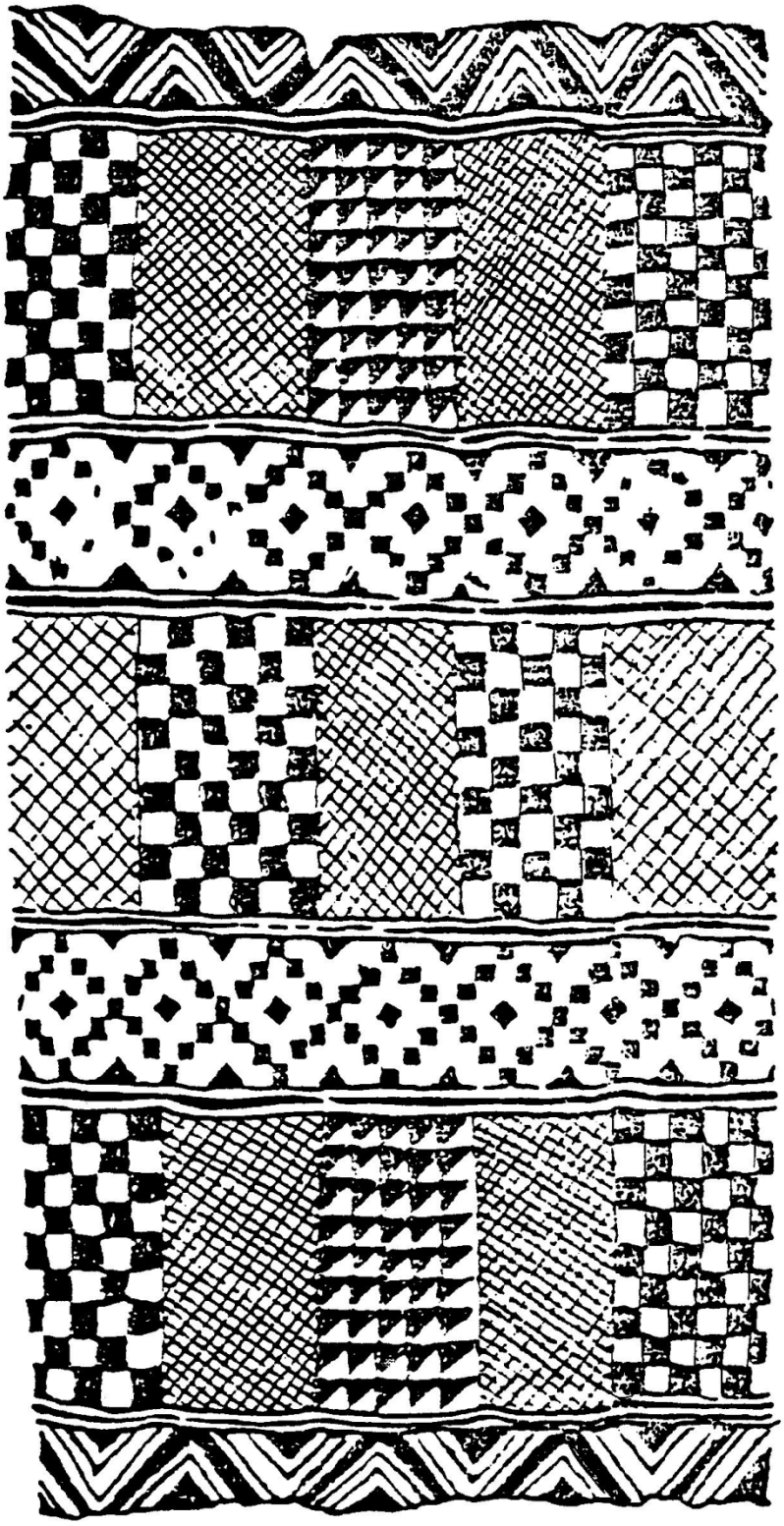


A characteristic pattern type of Spain and North Africa, the starburst.

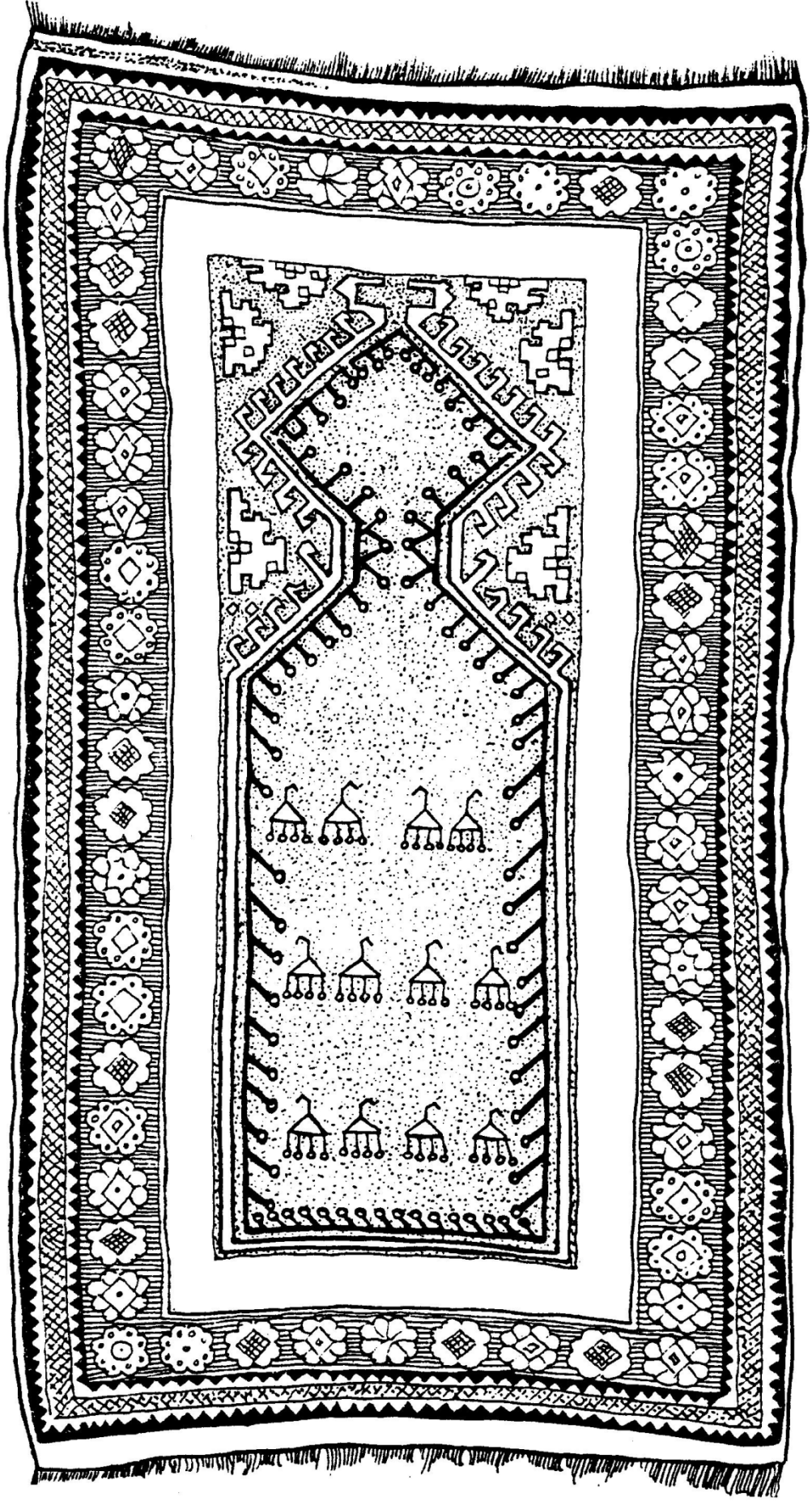




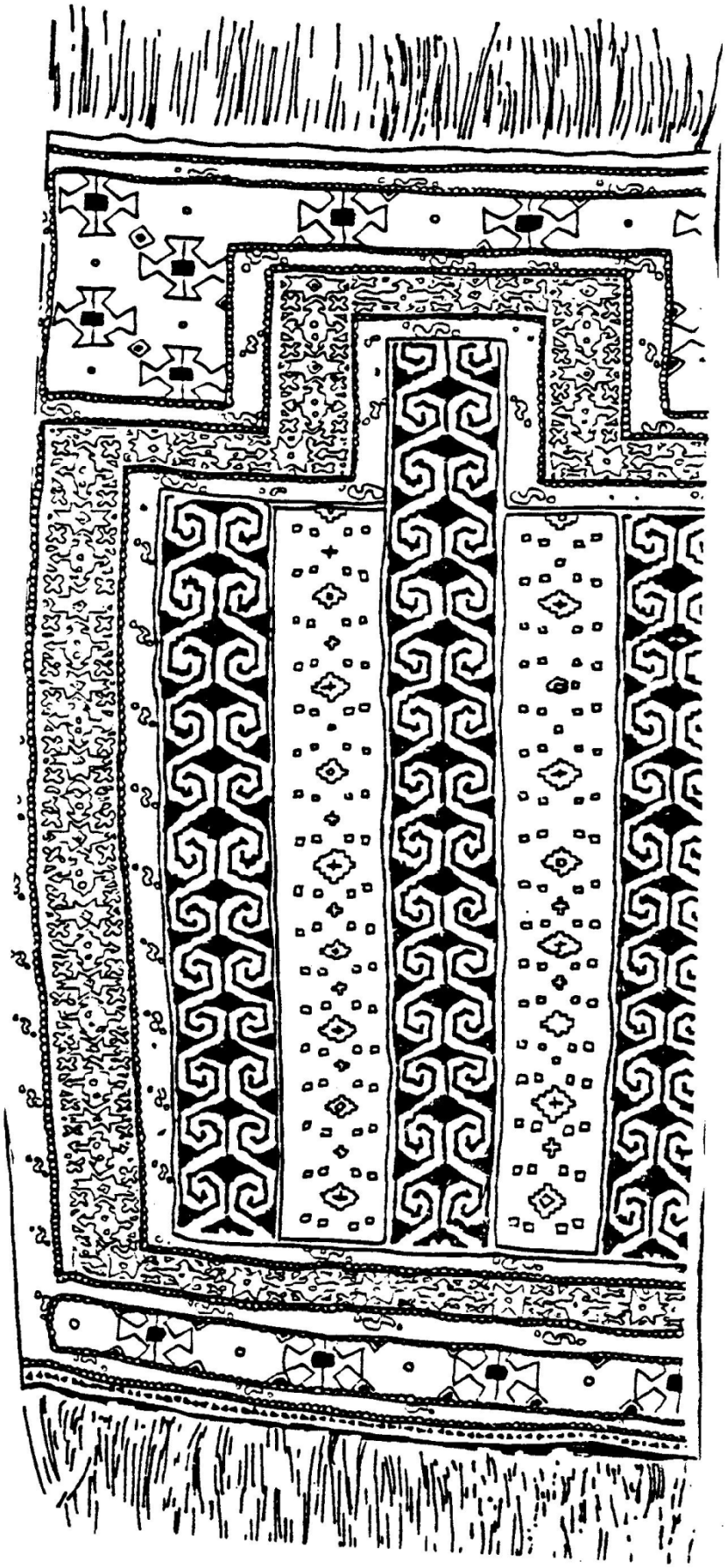
Tribal prayer rugs from the Caucasus and Turkey often feature stylized hands on each side of the prayer arch, sometimes accompanied by the five-toothed comb as here - the comb carries the same meaning as well as referring to the weaver's comb, used to pull the weft threads tight. The hand is an ancient pictorial device, found in the positive and negative handprints of Paleolithic caves. This example is a Gendje rug although that town is now known as Kirovabad.



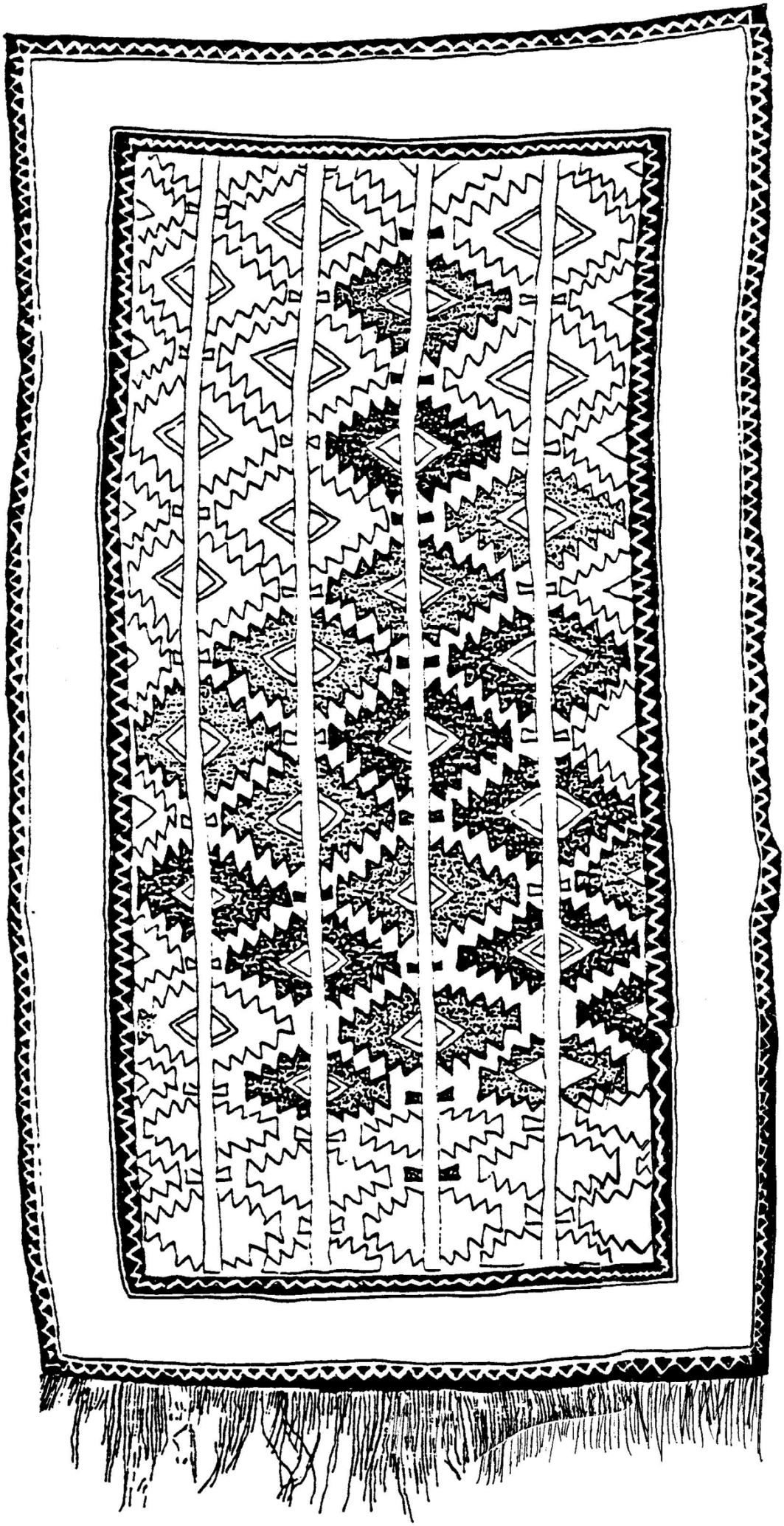
Chequer-board, criss-cross, zig-zag and stepped diamond designs painted on a wooden door in Libya: these applied patterns were derived from woven textiles.



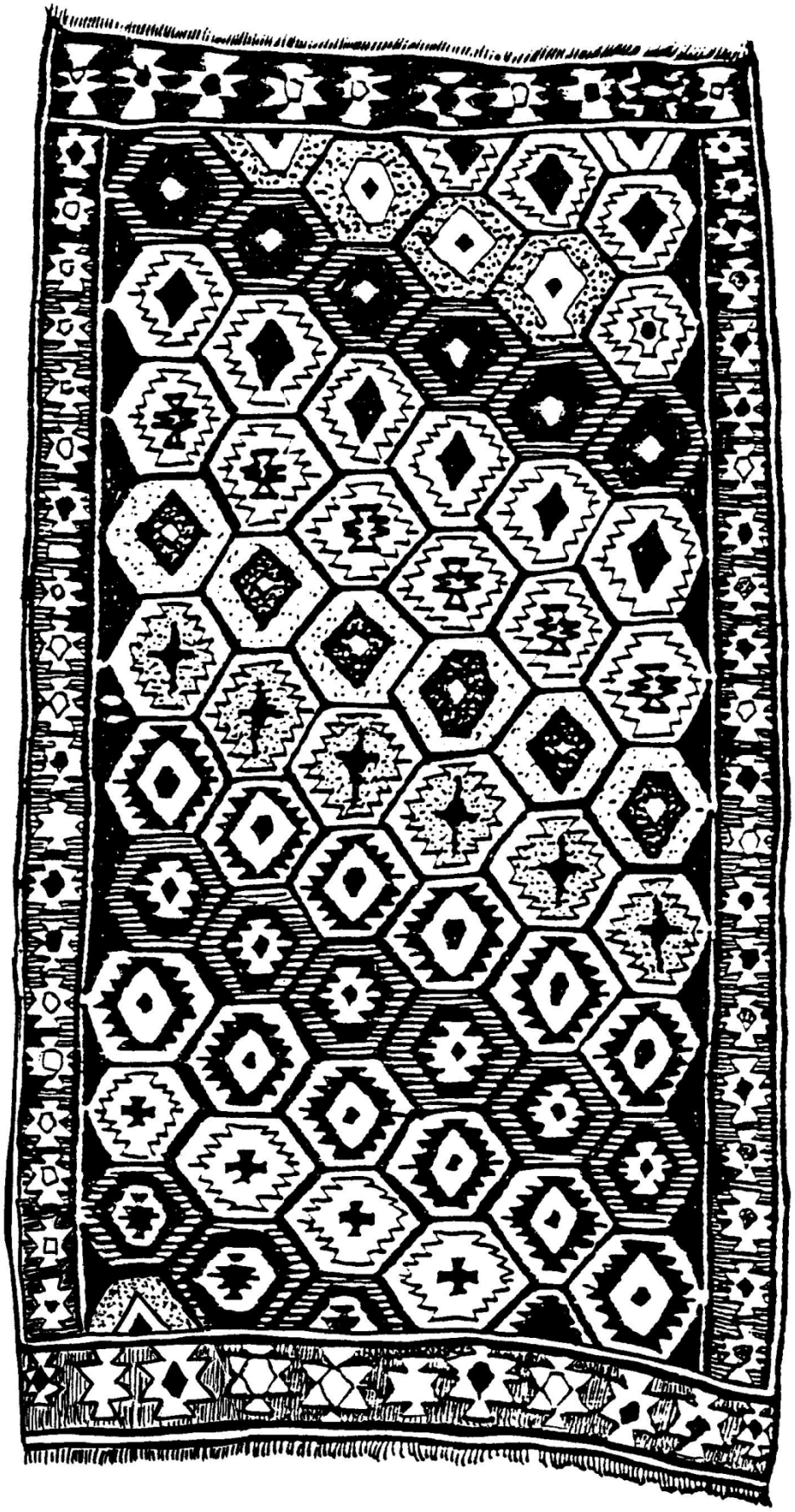
Milas prayer rug from south-west Turkey, on the shores of the Aegean Sea, about 1860. Milas mihrabs often have a diamond-shaped arch with a geometric branching design inside the arch and the central field. The colours are bright, and stylized animals and flower motifs feature in the central field and run around the borders.



Yamout Bokhara prayer rug: there are many kinds of Bokhara weave common to Northern Iran and Afghanistan. Some tribal rugs have a very small prayer arch, making their nature as mihrabs difficult to identify. But this rug is bold and geometrically clear in design.

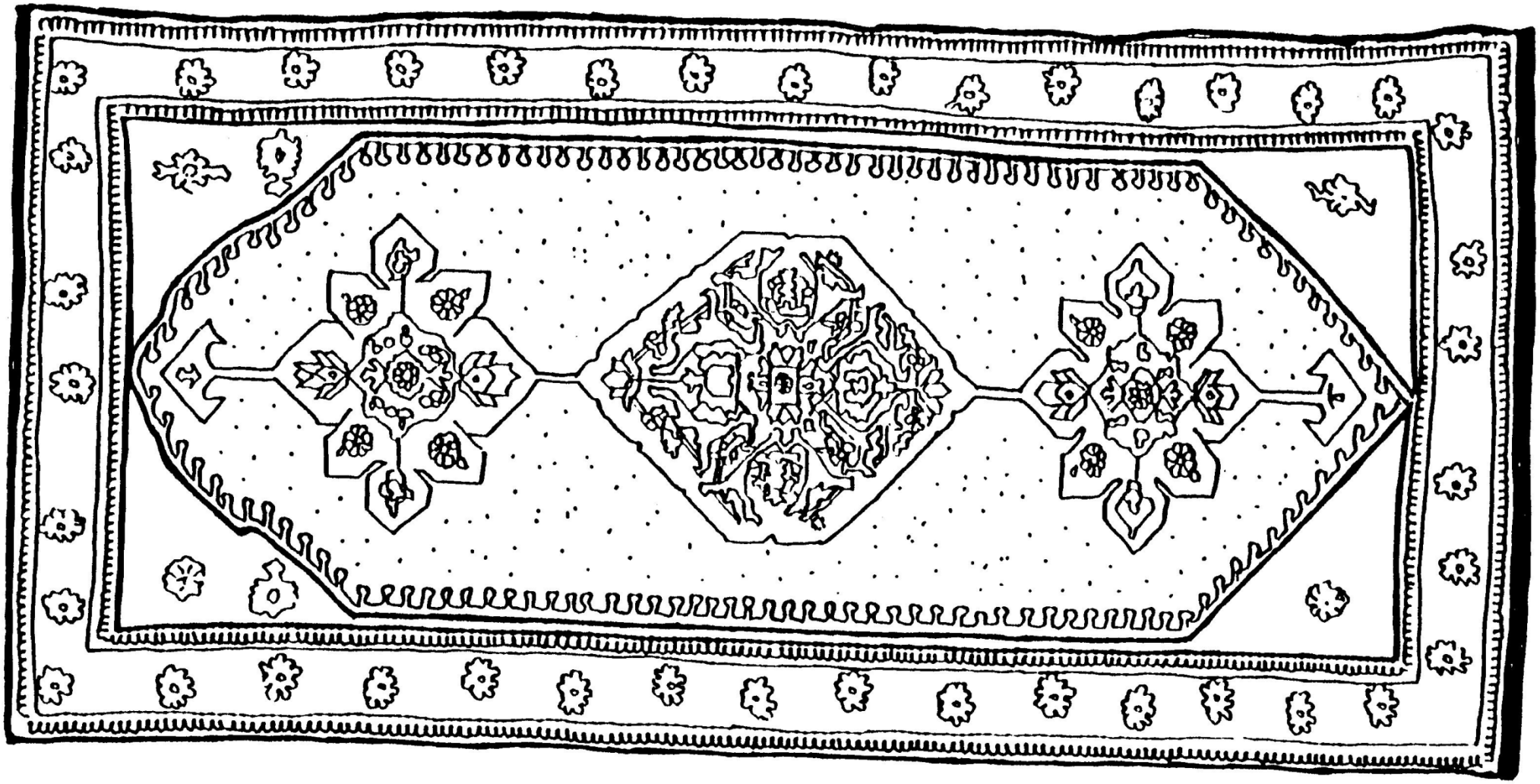


A stepped lattice with running vertical bands. The zig-zag border patterns echo the essential design. The colours run in diagonal rows, although this is varied which creates a "flickering" effect: improvised notes within a system.

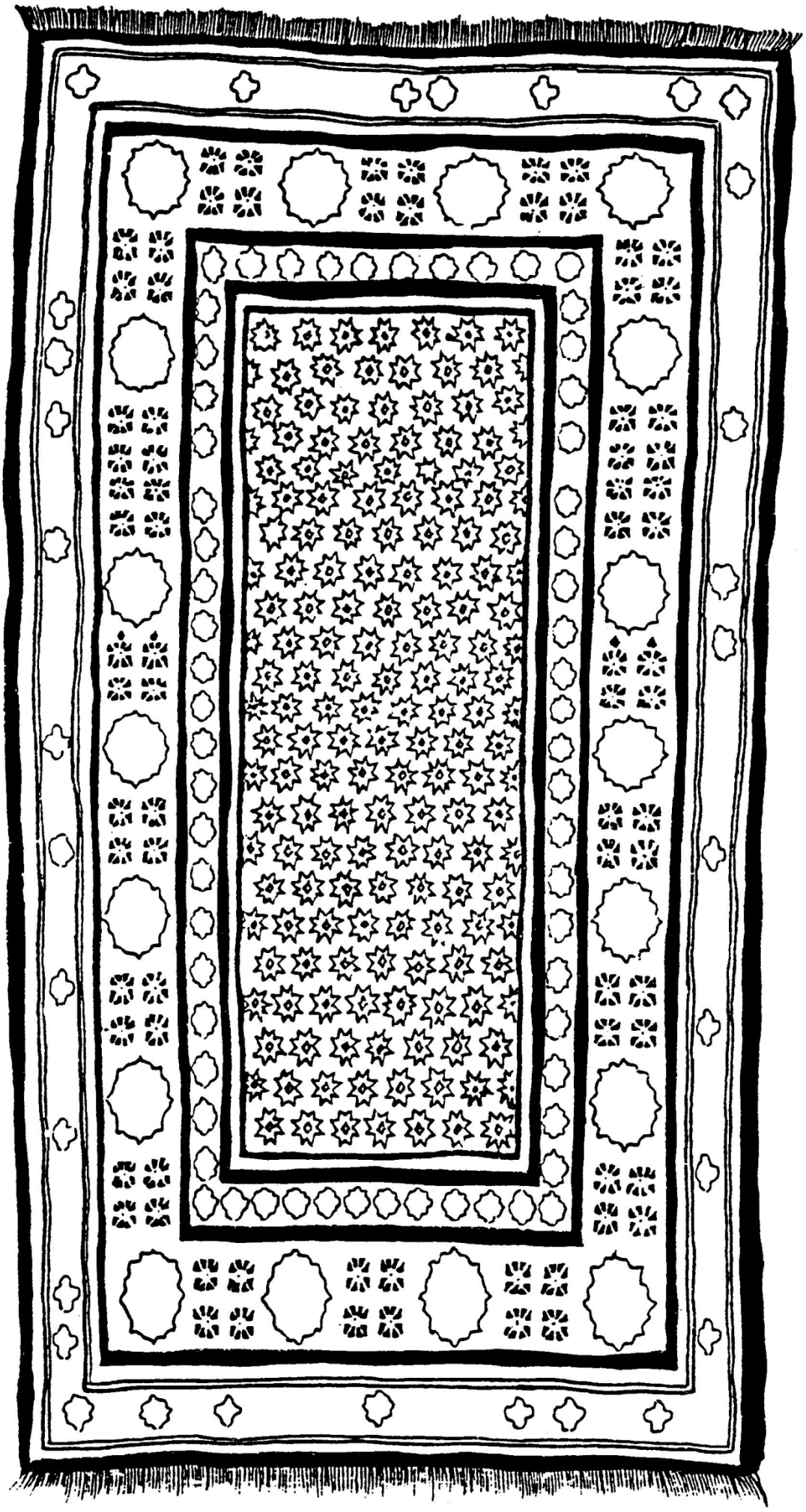


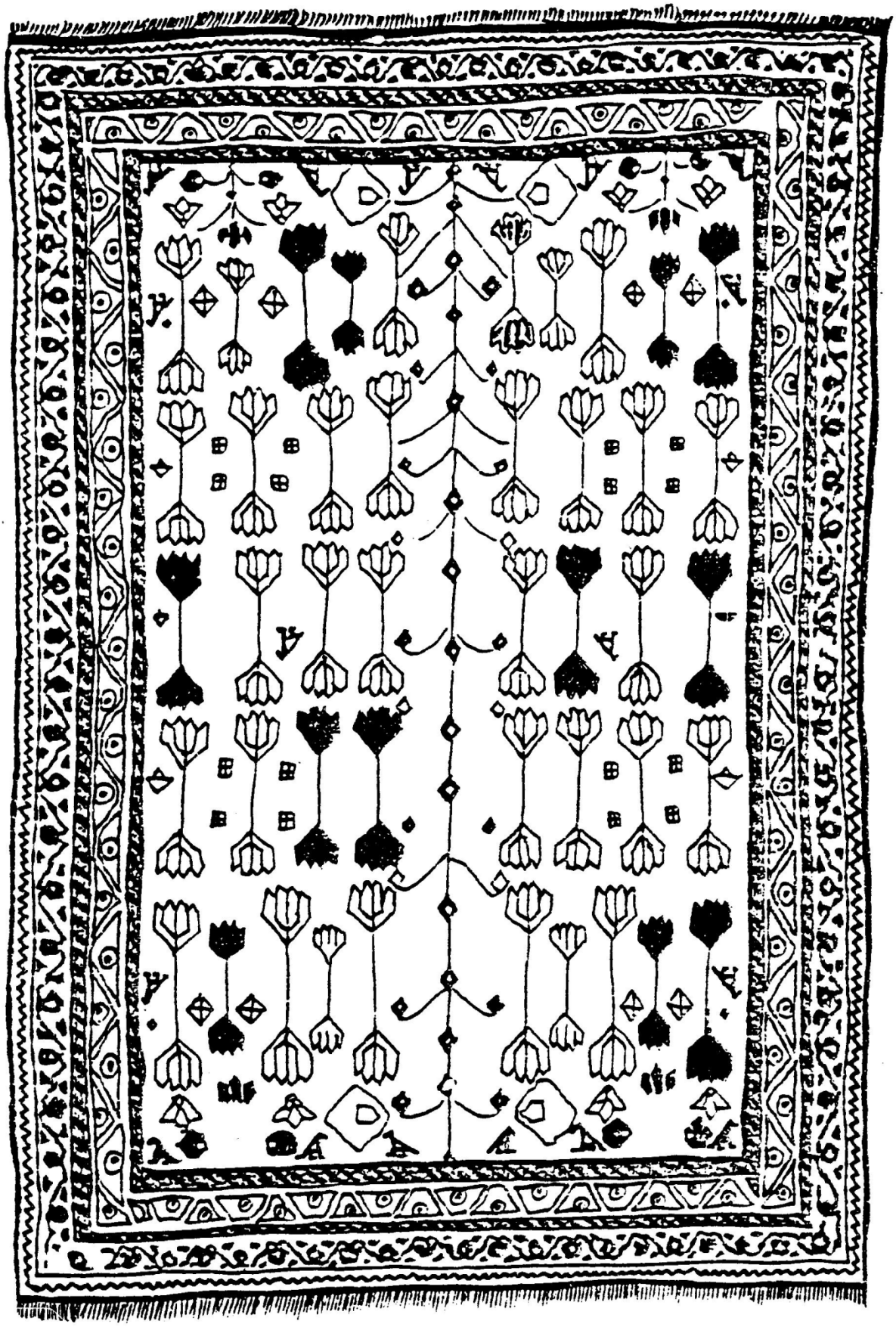
Diagonal rows of hexagons in alternating ivory, red and rust colours on a dark blue and brown-black ground. This is a Kelim from Garmsar, North Iran. The border is of stepped polygons.

A 19th century Karabagh carpet from the Caucasus. Karabagh is the southernmost province of the Caucasus and consequently its carpets have been strongly influenced by Persian designs. It is clearly a more sophisticated work than the Luri rug and in fact is the product of a workshop rather than a tribal weave. Rather than a bold, stepped design, this Karabagh features a central medallion attached by slender lines to two pendants on the inner field. In the 18th century, carpet makers from Karabagh were invited to France where they made Savonnerie carpets which reflect western floral designs but in a purely geometric manner. Savonnerie designs have become extremely stylized.



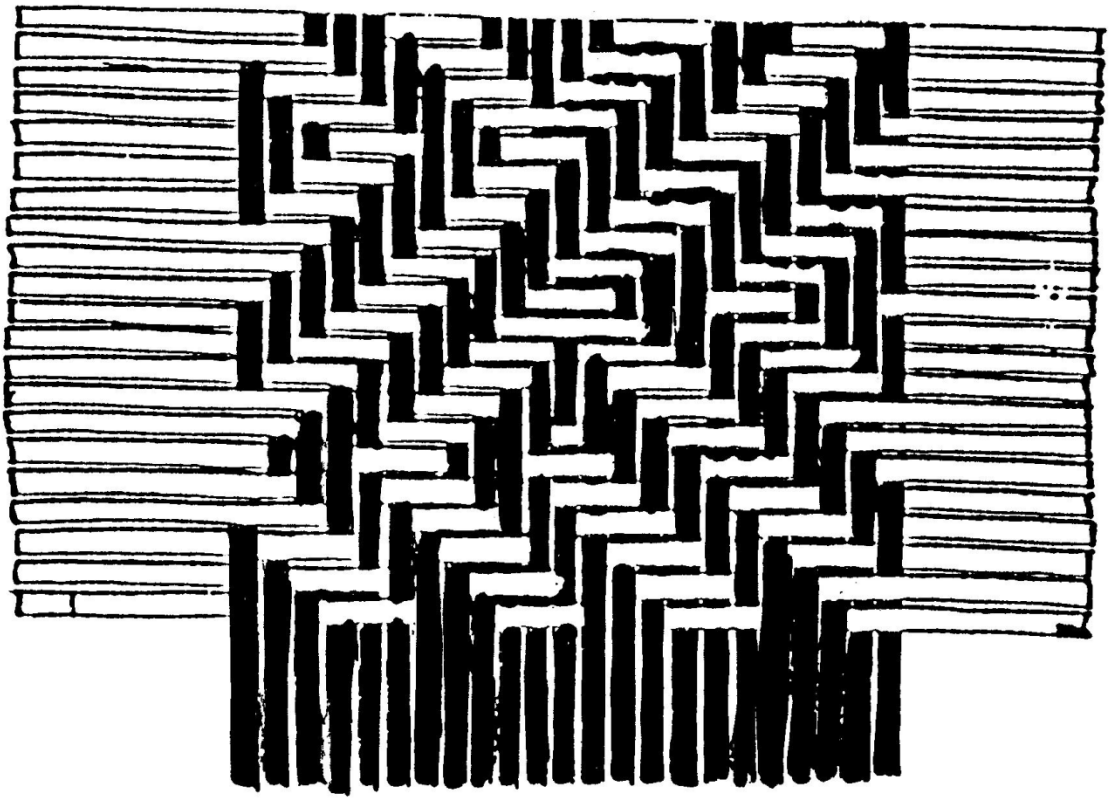
19th century Shirvan Talish carpet from the Caucasus. The central field is filled with eight-pointed stars, a design common to Talish works. The main borders of these carpets often feature Mongolian ornaments, and in fact they are the product of intermarriage between tribes: it was in this way that certain designs were exchanged and new variations and hybrids created. Tribal pattern should therefore be seen as visually embodying the social relations of different groups.





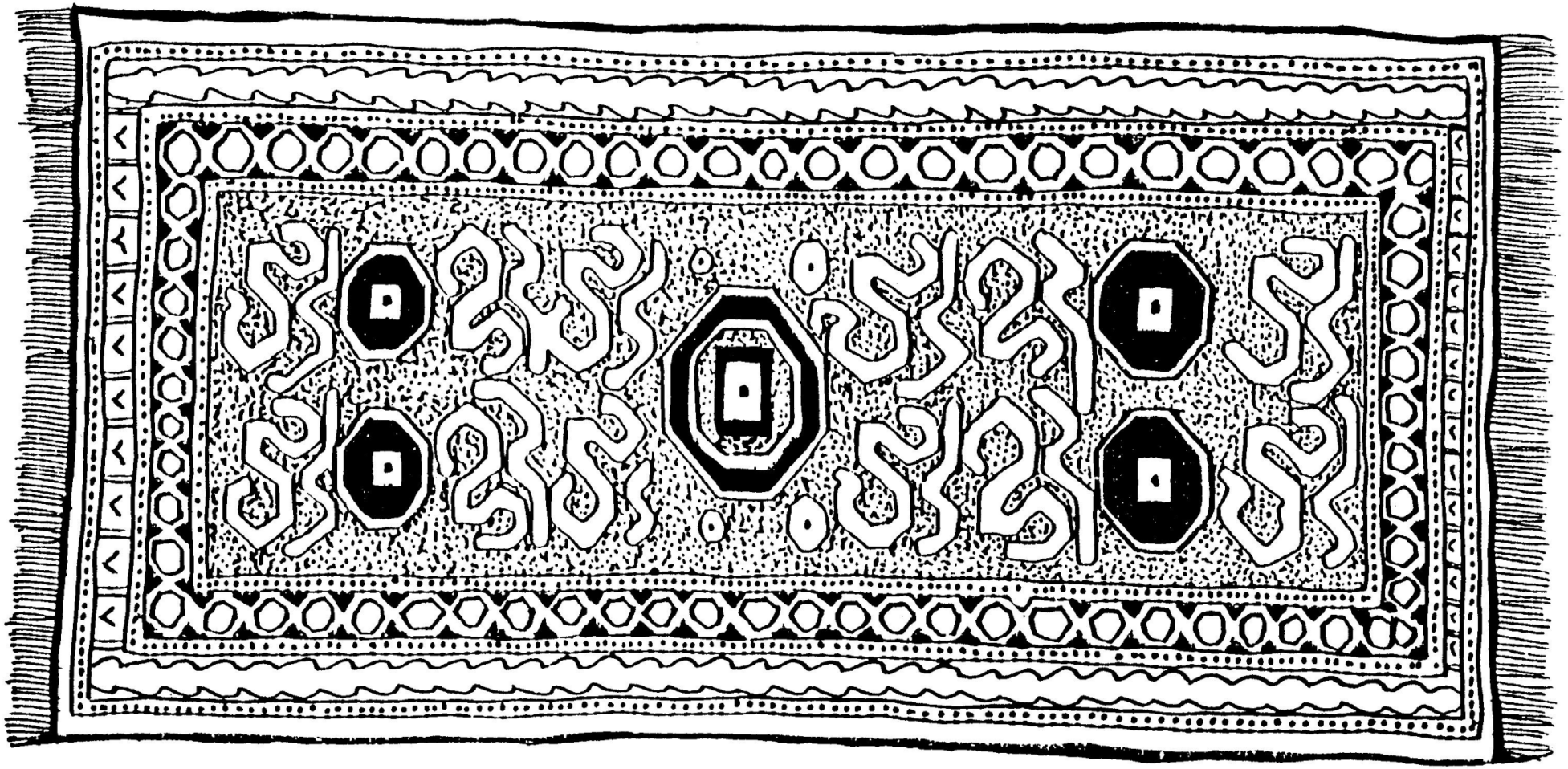
Flower carpet by the Bakhkiari tribe woven in the 19th century. The flowers are stylized, even geometrical motifs which are reflected upon themselves so that like many carpets there is no single determined viewpoint.

This work captures something of the Persian taste for formal gardens where each flower has its place in a balanced scheme: this preference is to be found in tribal as well as court carpets.

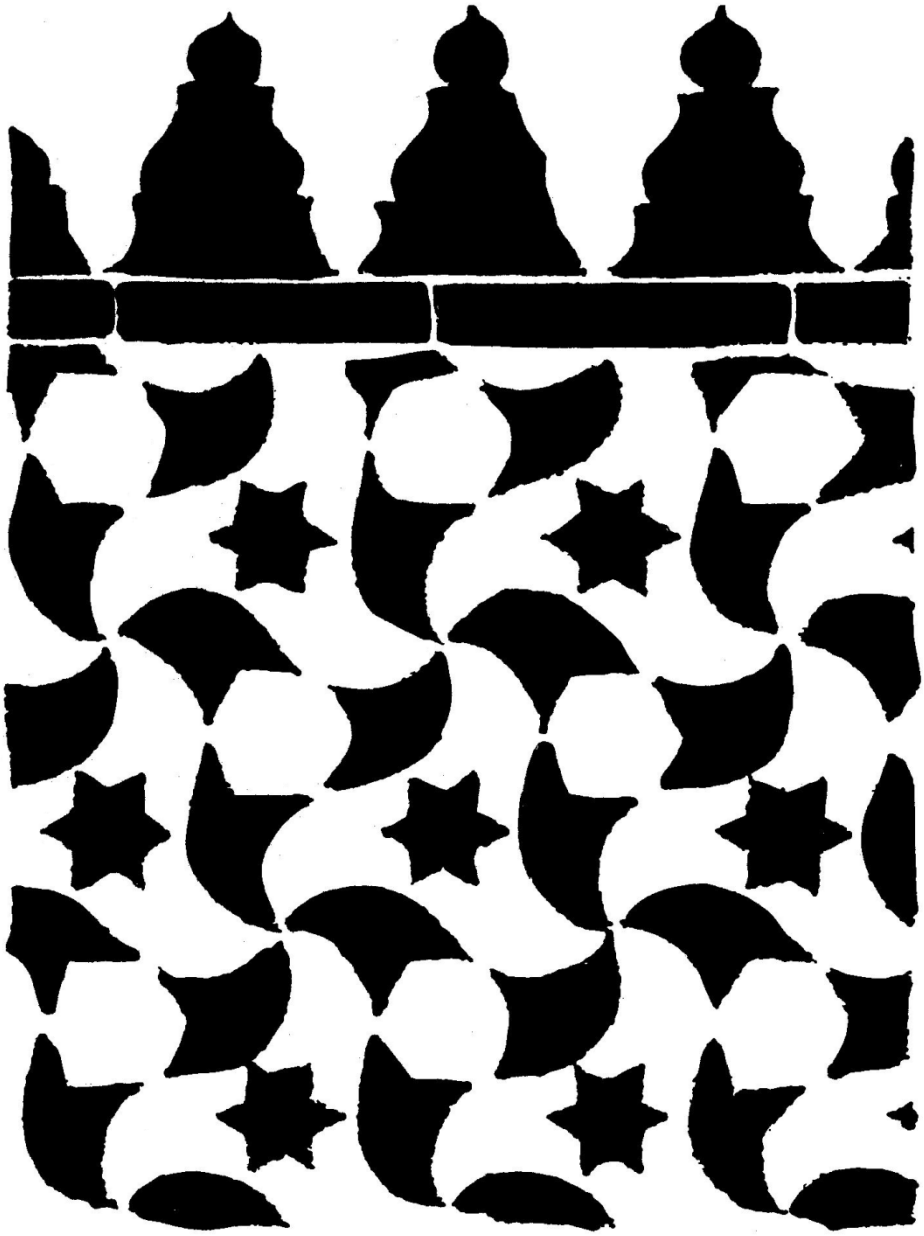


Greek key is an ancient pattern which probably oringinated in simple mat weaving using dried grass and strips of leaf and bark. The design was carved on ivory ornaments in the Ukraine 15,000 years ago.

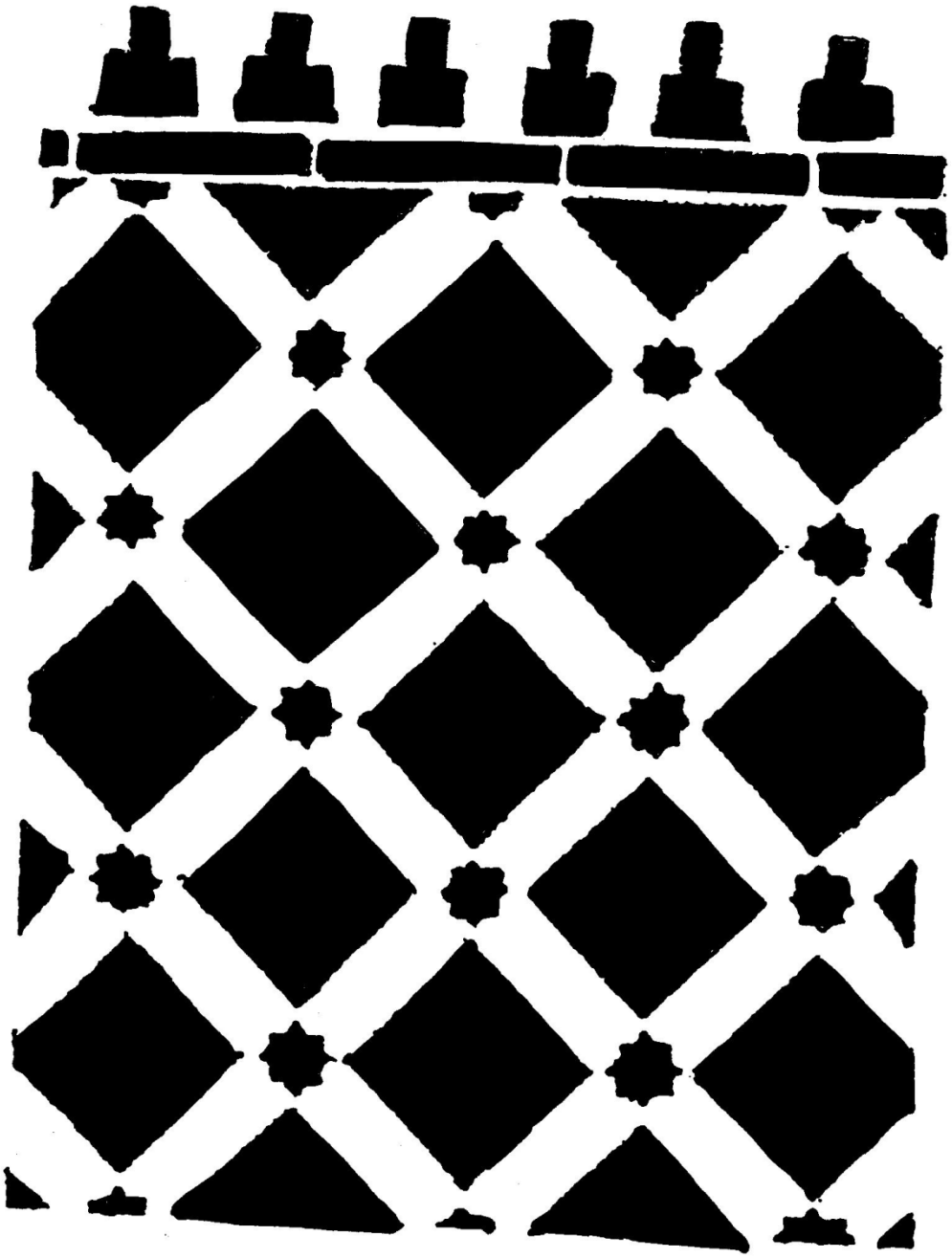
A Beshir rug from the Turkoman tribe of that name. Octagons are a common feature of these works, which integrate Turkoman and Afghan designs. The nomadic Beshir live in a border region touching Turkmenistan and Afghanistan. In other versions of the carpet, the four smaller octagons occupy the corners of the central field. In Persia, the central octagonal medallion would be echoed by the four corner pieces, each corner being one corner slice of the central design.



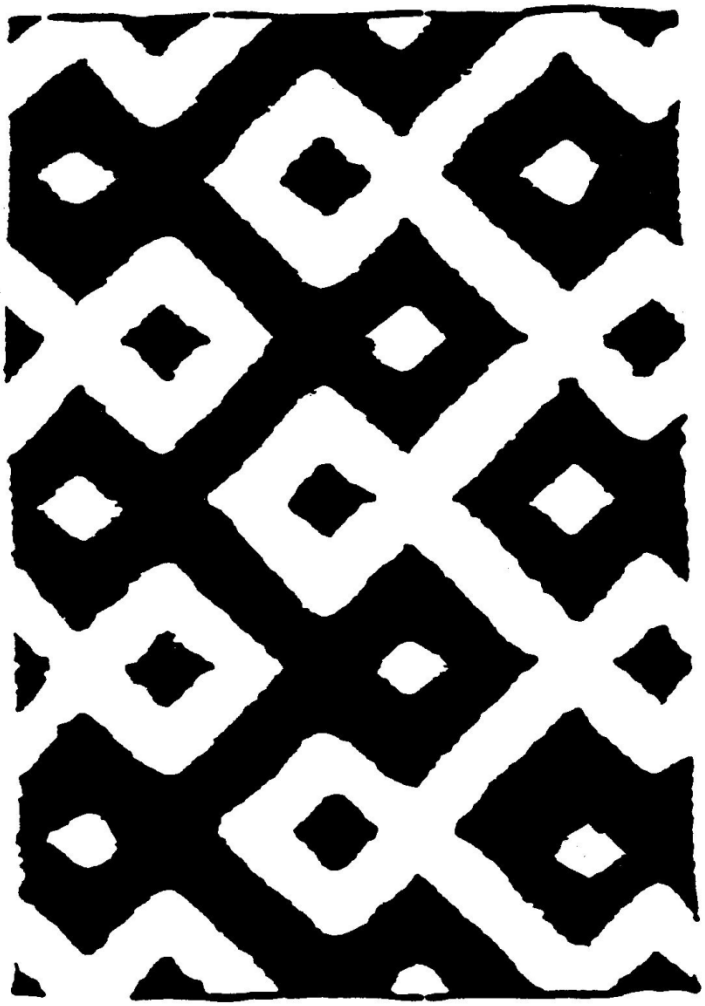
A Kelim from Shiraz, made about 1890. Shiraz is a marketing centre for the rugs made by nomadic tribes of South Iran. The hooked motifs in the hexagons of the central field are stylized versions of the tarantula spider, a motif which is also found on Turkoman rugs and in other areas. The Kelims from the Kurdish village of Diyarbakir are woven with similar hooked motifs which are in fact scorpions, included in the Kelims as a kind of charm, to ward off a recurrence of a terrible plague of scorpions which once occurred in Diyarbakir.



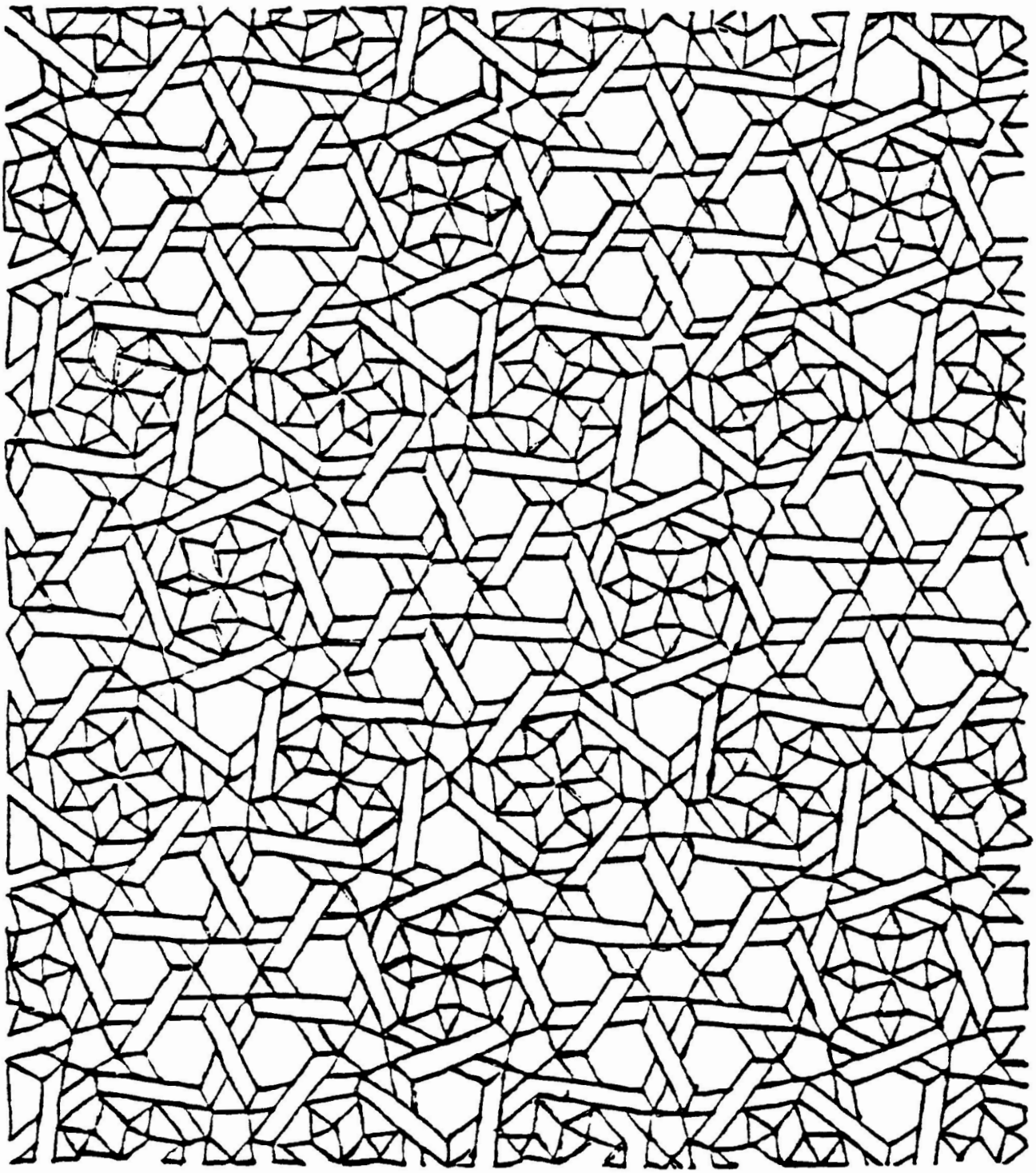
Tile mosaic from the Alhambra Palace, Granada, Spain, showing dynamic movement and points of stillness.



Another example of a tile mosaic showing points of stillness.

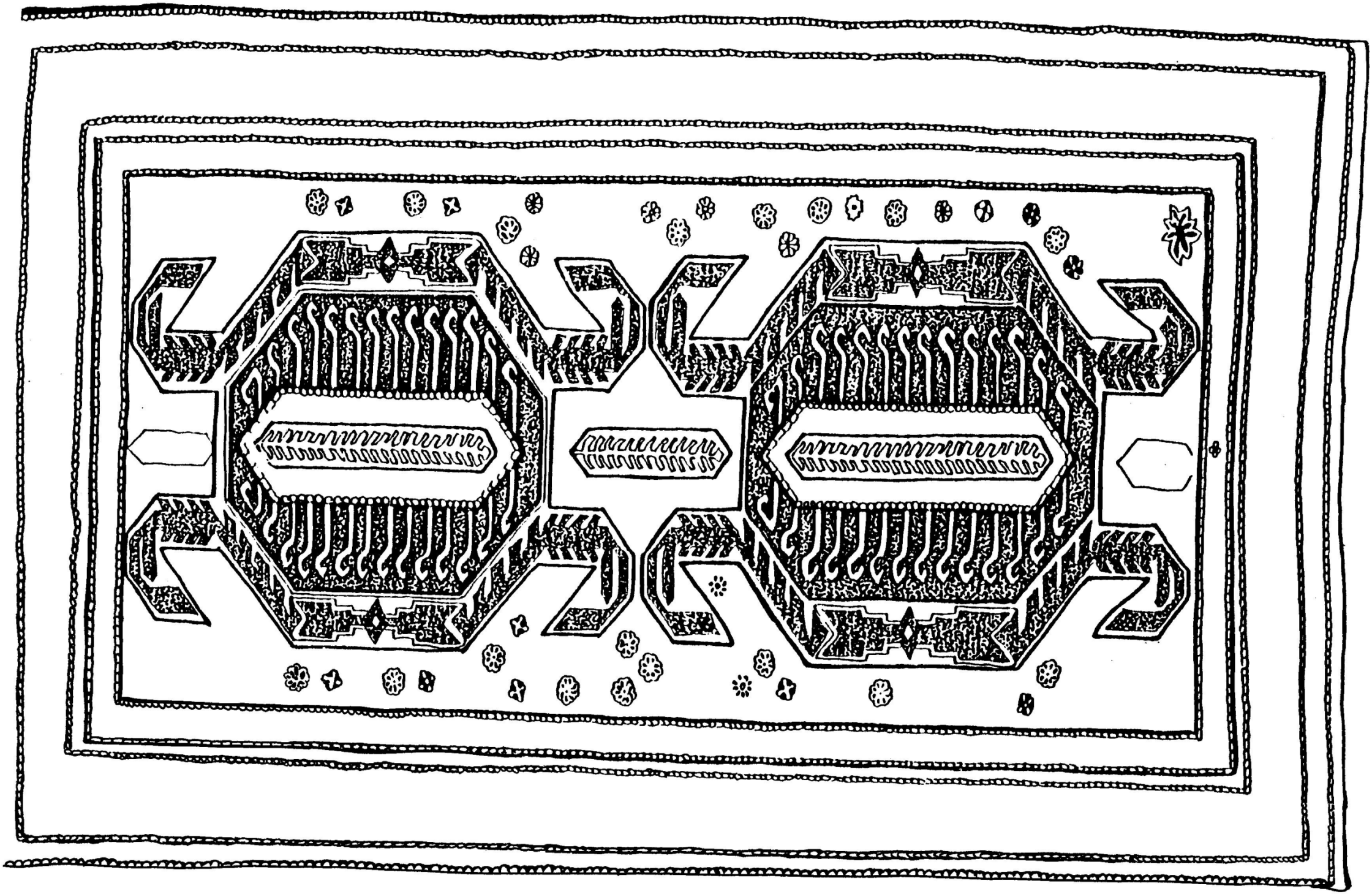


Pattern based upon the square lattice.

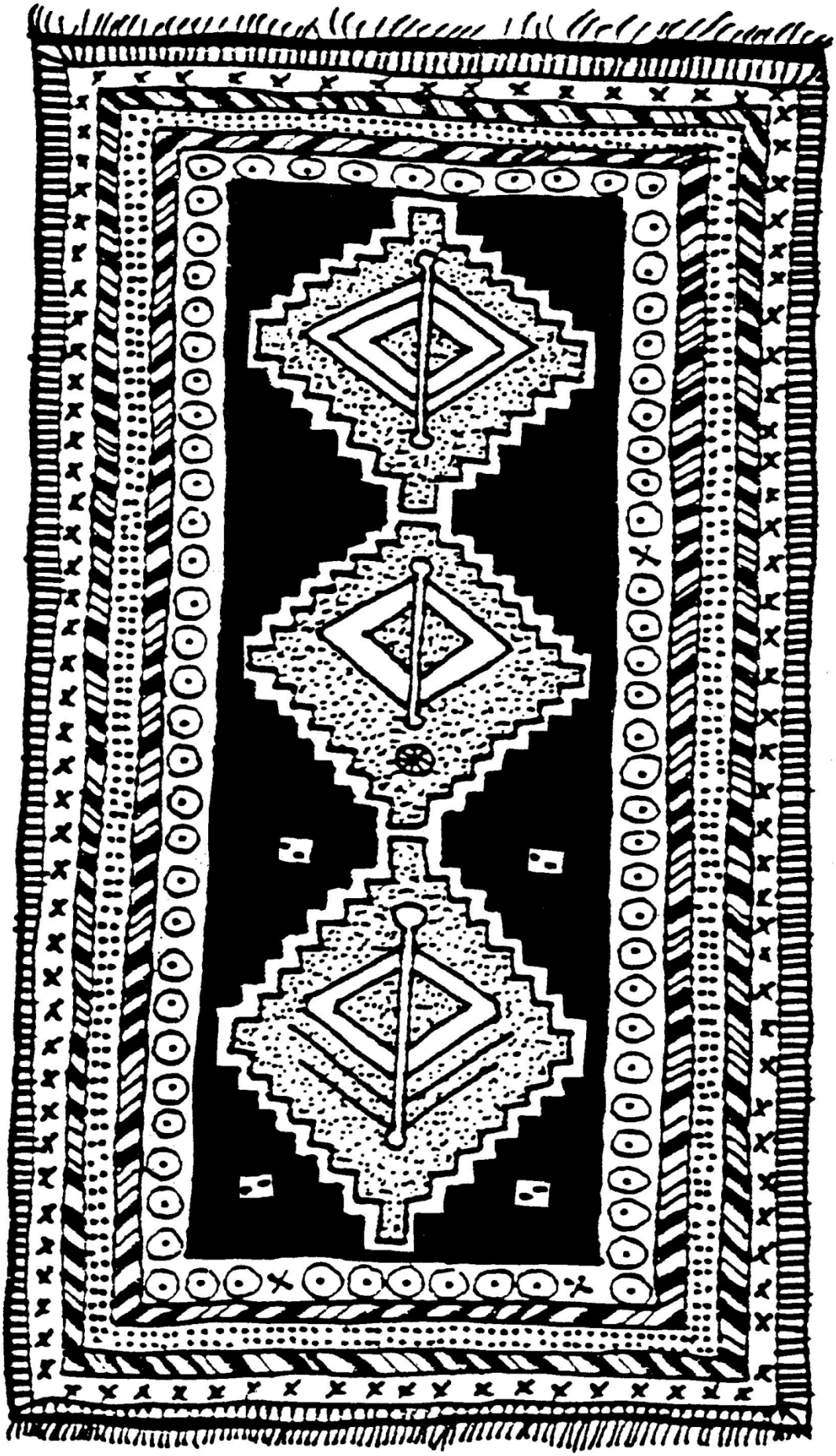


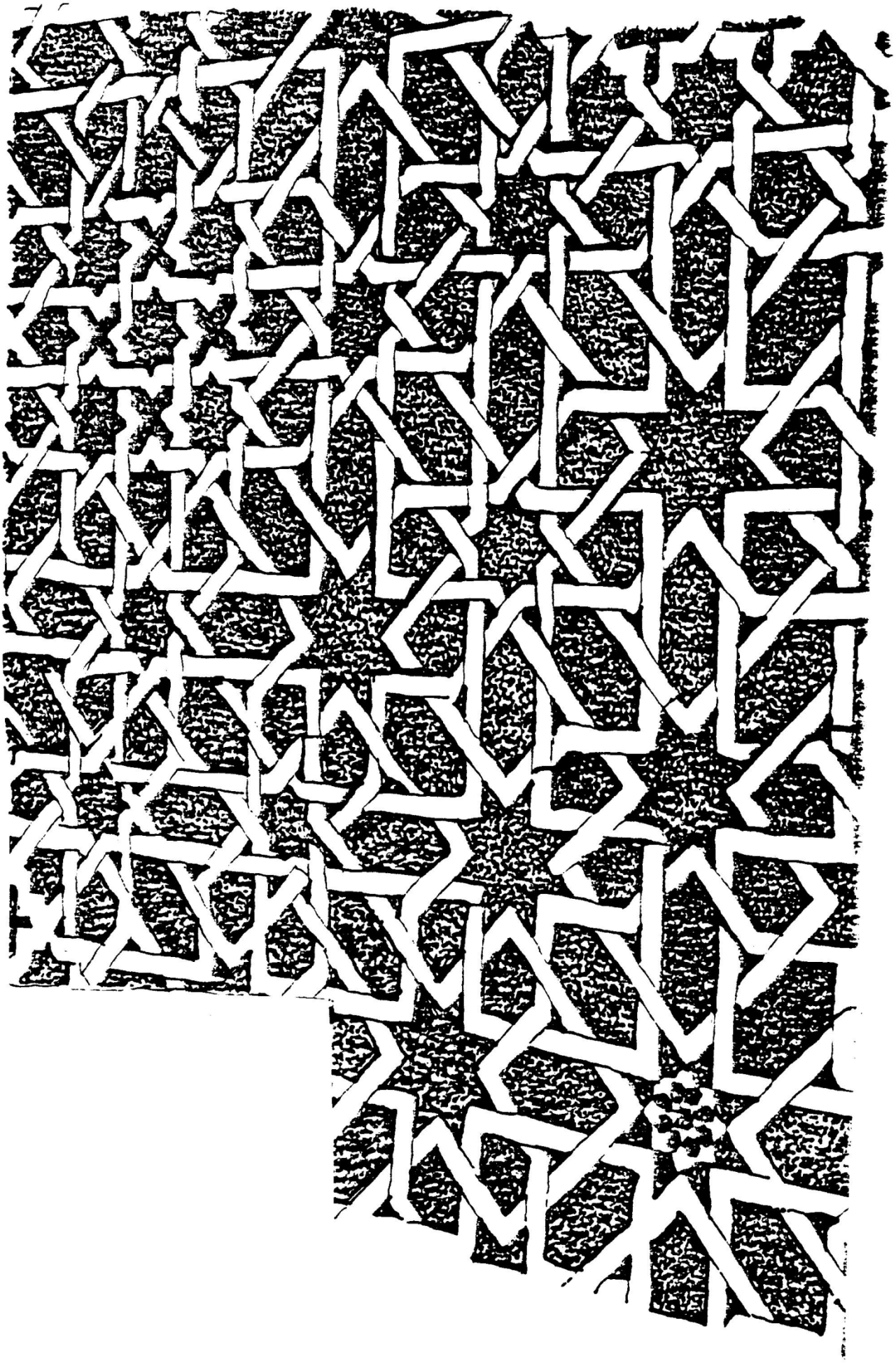
Example of complex interlace design, a mosaic made from coloured stone. Egypt.

A rug from Lenkoran on the Caspian Sea which features the tortoise motif. The tortoise is one of the four divine animals of India and in Islam too it has great significance: people who live to an old age are considered to be Allah's favourites and the tortoise both symbolizes a long life and is regarded as a lucky charm. It is an image of respect and dignity.

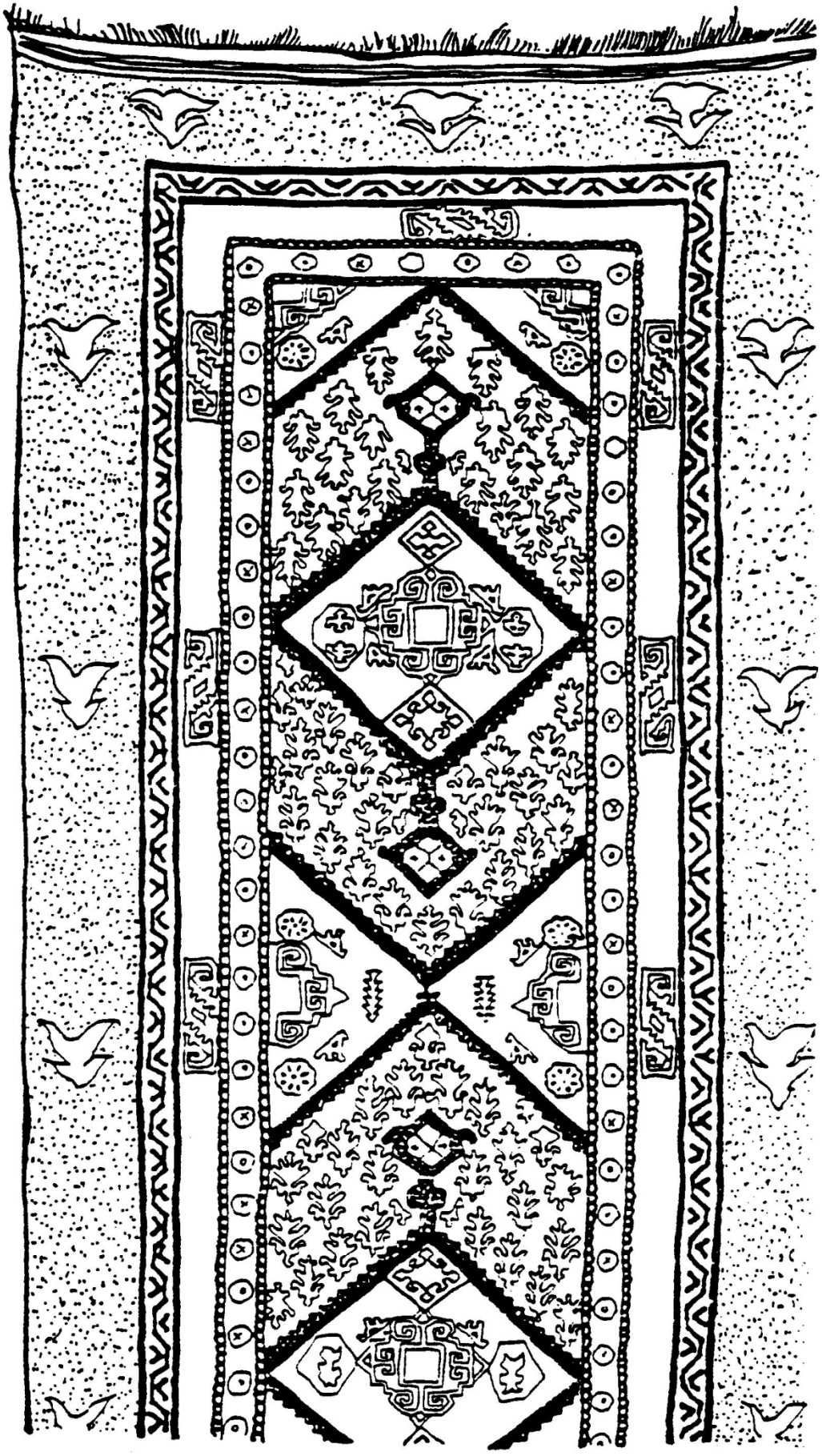


Luristan rug woven by the nomadic Luri tribe from the mountainous area of south-west Iran. This is a typical example of Luri geometric work with its three diamond motifs joined together by a stepped diagonal design: this, with the bright, luminous colours, creates a bold, striking effect. Luri rugs often have a Greek key pattern around the motif in the central field. The Greek key is an ancient pattern which probably originated in simple mat weaving using dried grass and strips of leaf and bark. The design was carved on ivory ornaments in the Ukraine 15,000 years ago.





A characteristic pattern type of Spain and North Africa, the interlace.

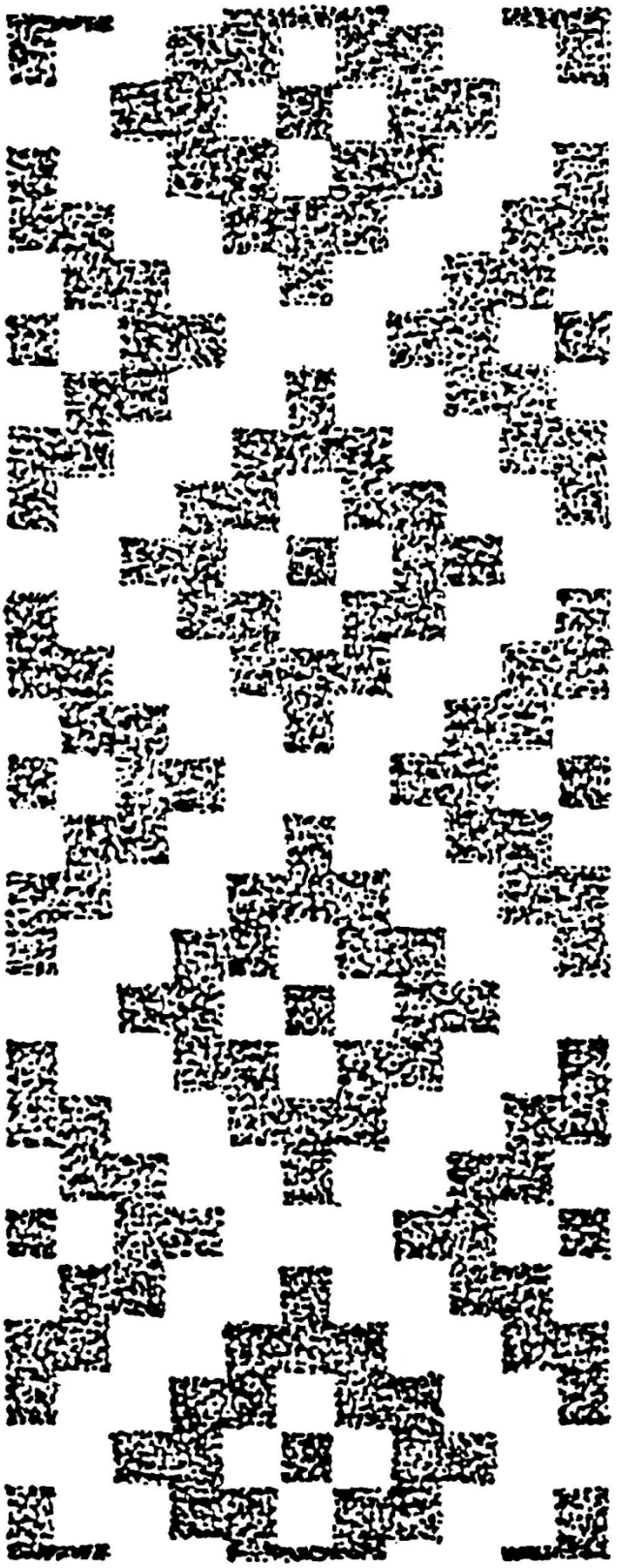


Hamadan carpet from Persia. The central field has medallions and corner pieces on a patterned rather than a plain ground. Half-medallions connect across the central field to form a bridge between the opposite inner guards. The diamond-shaped medallions have small attached pendants. The border motifs echo the decorations inside the central medallions. Here we can see the carpet as a sophisticated system of combination and variation: an abstract design full of subtle resonances.

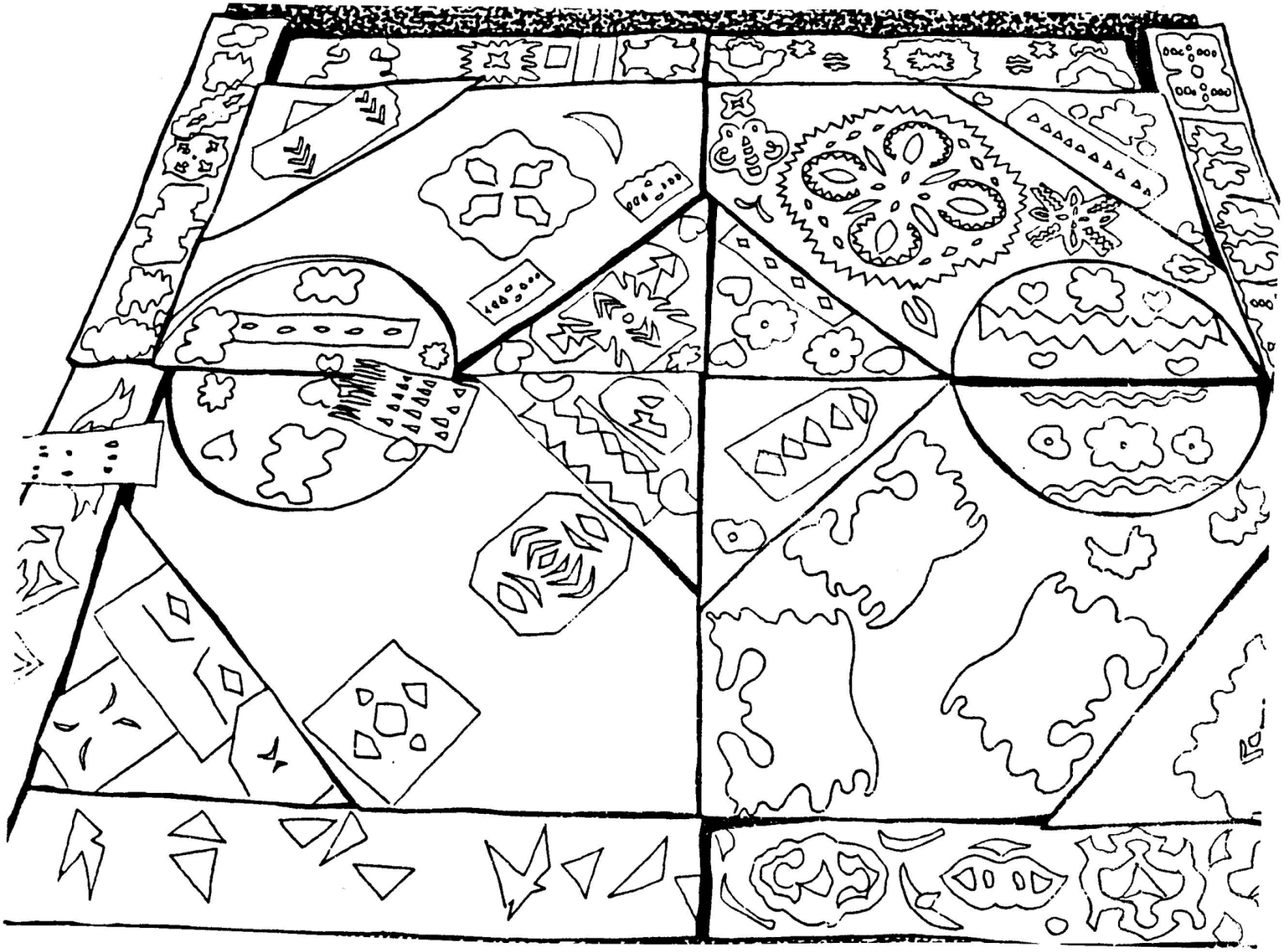
Here sense and reason in concorde blend,
In harmony and proportion,
In unity transcendent,
The mind of God revealing,
By our tangled errors so darkly hidden,
The goal of all desire,
The opener of all doors,
The answer to all questions,
The reason of all reasons,

From snares of self set free,
In august and tranquil beauty,
The Beloved's Face at last we see,
And there attain our journey's end,
Our Life's reward and final destiny,
Refuge and fulfillment in His Infinity.

An Unknown Sufi Poet.



Developing a project



A carpet plan made by school children with cut-out coloured paper glued on card: the separate cards fit together and may be arranged in different ways.

Generating patterns using LOGO.

Many of the intricate and beautiful patterns in this book can provide a rich variety of exciting starting points for exploring pattern and shape using the floor and screen turtle.

With the floor turtle, groups of children within a class may wish to create their individual patterns, and these might be cut out and mounted to create a carpet plan, similar to the one on page --. This is usually an exciting and worthwhile introductory activity with people of all ages.

Some LOGO tips.

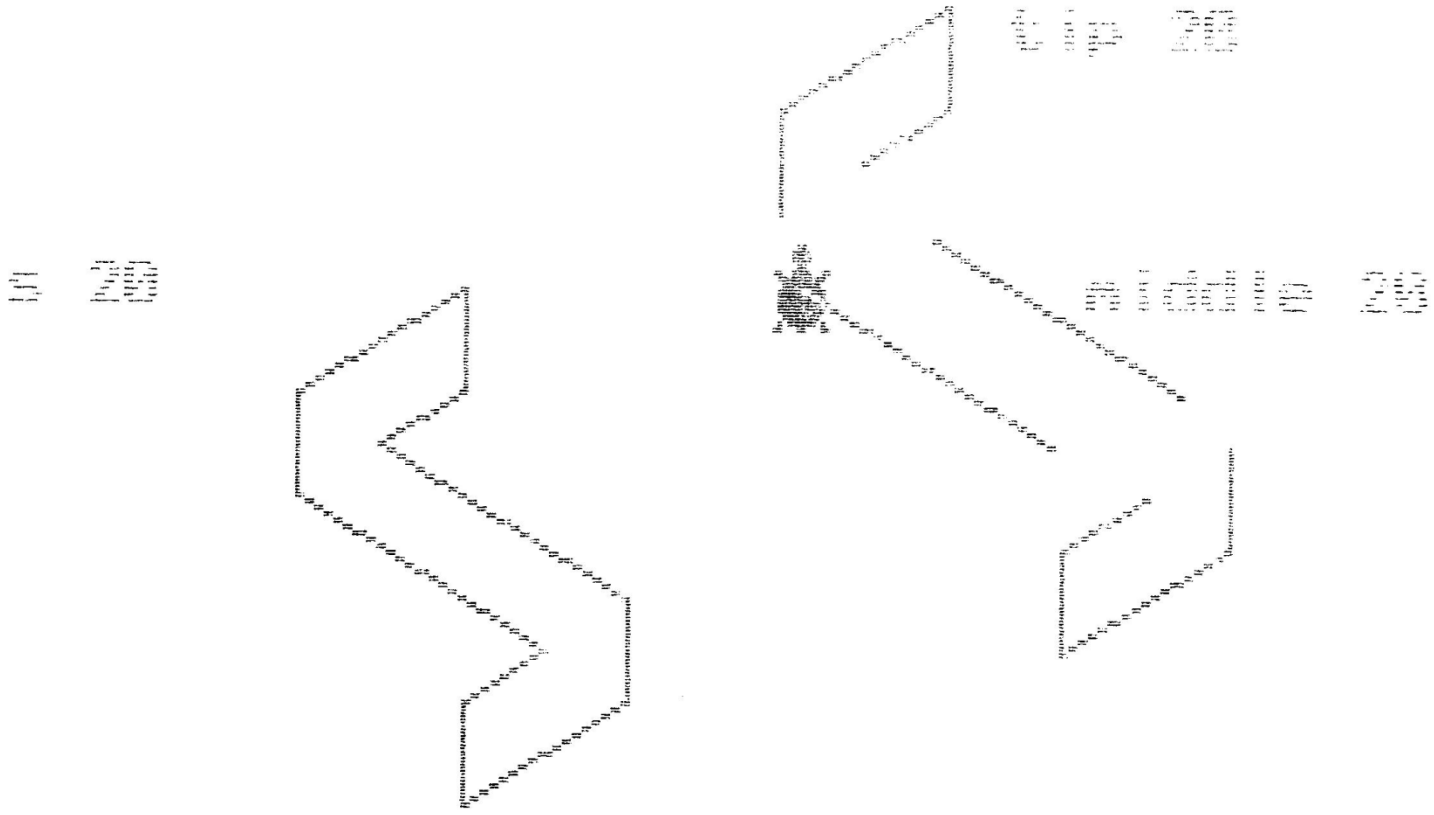
When you are doing any kind of LOGO work, you will find it a great help to have a workbook of somekind that you can use to jot down ideas, work things out in, doodle, plan and generally re-draft.

Always try and keep your procedures short, and give them meaningful names. This will help you when things go wrong.

If you find you are writing long procedures, maybe you need to consider your problem more closely.

Try and look at your overall problem, and attempt to break it down into related, but simpler sub-problems. Each of these could be considerably easier to tackle than your main problem, and you could use the solutions to these sub-problems to construct the solution to your overall problem.

If you feel you are at a dead end with a particular problem, and you can get no further, try switching to a completely different activity. Often, when you come back to your problem after an hour, morning, or couple of days, you will find you have more success.



Developing a project 1

Look closely at the pattern you are thinking about.

See if you can spot a simple basic shape that repeats to generate the overall pattern.

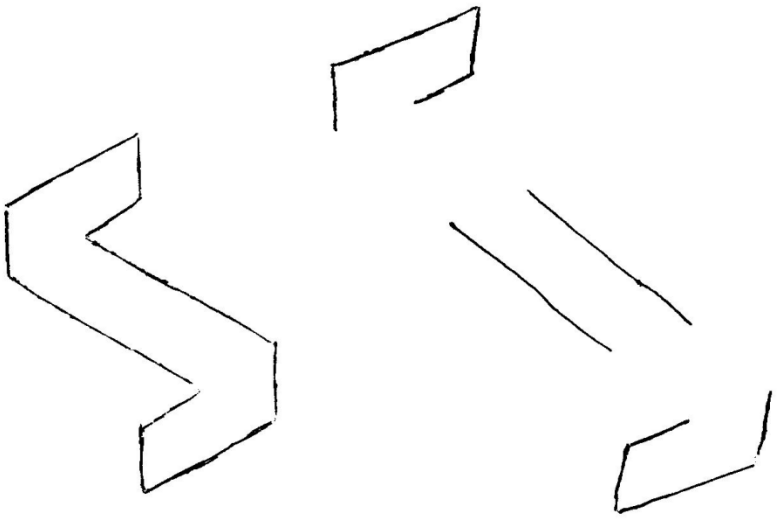
Isolate it, and consider its shape.

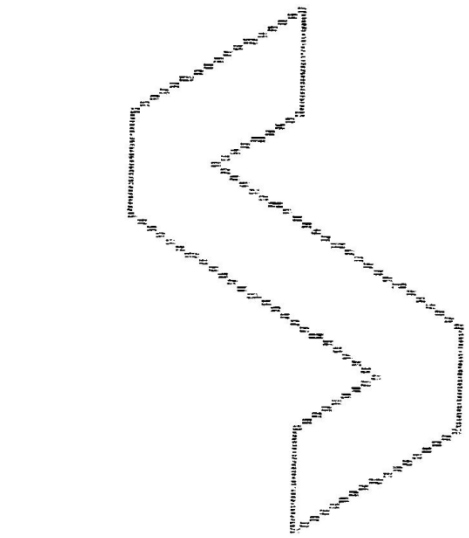
If it looks too complicated, break it up into simpler parts.

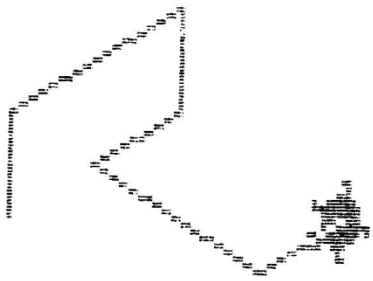
Attempt to define procedures to draw these simpler shapes, and then try to construct your overall solution using these procedures as building blocks.

```
to s :size
tip :size
middle :size
tip :size
middle :size
end

to middle :size
lt 120
fd 3 * :size
rt 60
end

to tip :size
fd :size
rt 60
fd :size * 2
rt 120
fd :size
rt 60
fd :size
end
```

Plan



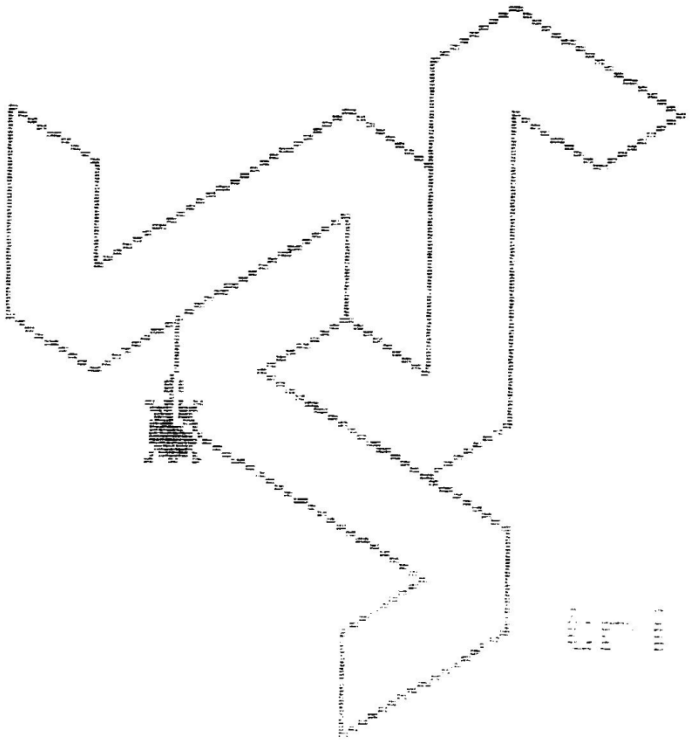




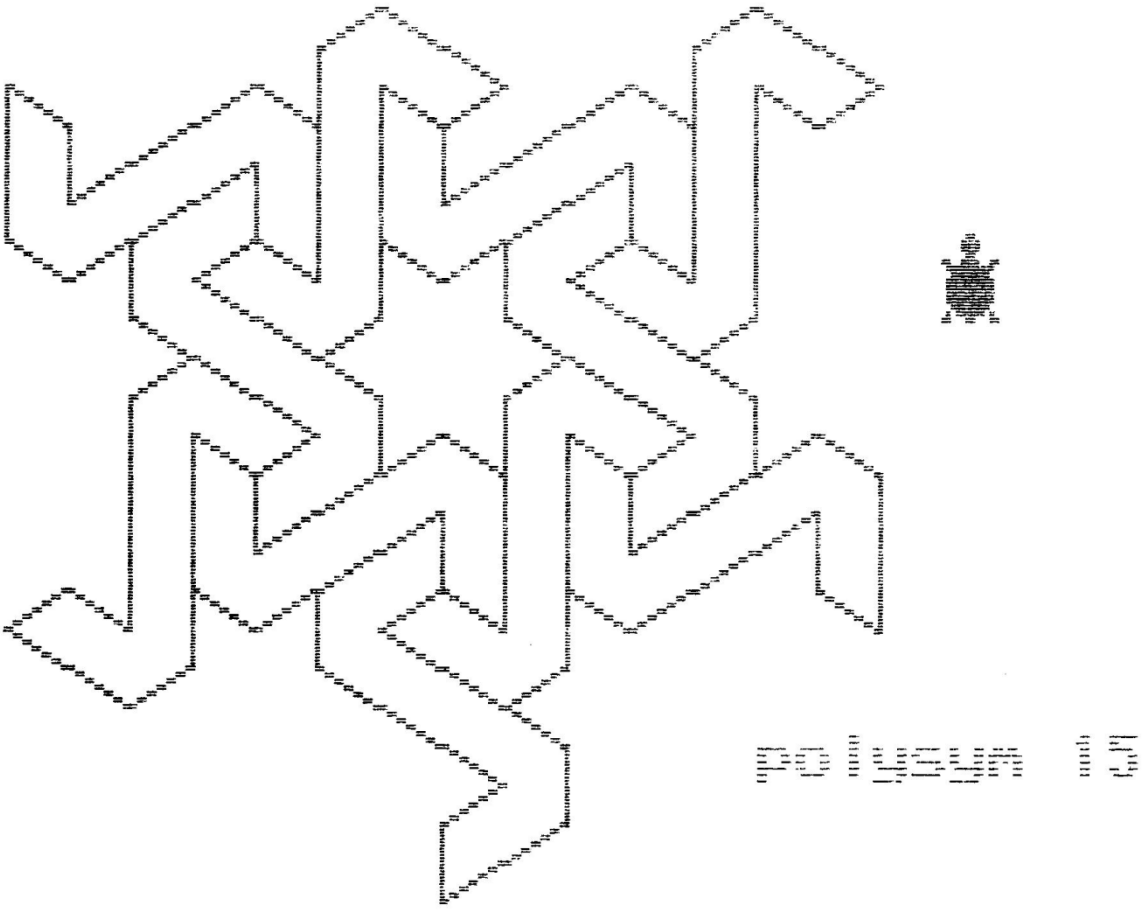
Developing a project 2

To allow you to repeat your basic shape, you may need to develop another procedure.

```
to interlock :size
fd :size
rt 60
fd 2 * :size
rt 120
fd :size
rt 60
fd :size
lt 120
fd 2 * :size
lt 60
fd :size
rt 180
end
```



```
to tri :size
repeat 3 [ s :size interlock :size]
end
```



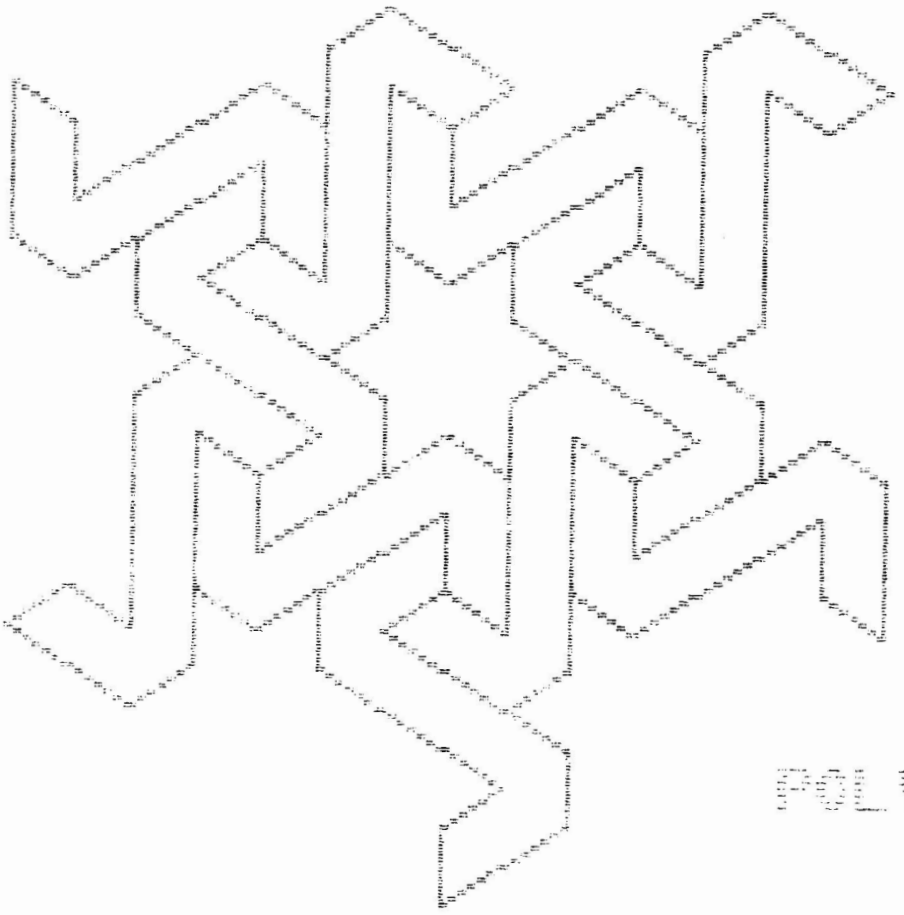
You may need to repeat this process when interfacing procedures together.

```
to polysym :size
repeat 5 [ tri :size skip :size]
end

to skip :size
rt 120
fd :size
rt 120
fd :size
rt 180
end
```

Perhaps I chose a bad starting point for the original s procedure. Because I was reluctant to alter something that worked, I found myself working around a problem of my own making.

See if you can improve this project, simplify it and make it more elegant.

```
to polysym :size
repeat 5 [ tri :size skip :size]
end

to tri :size
repeat 3 [ s :size interlock :size]
end

to s :size
tip :size
middle :size
tip :size
middle :size
end

to middle :size
lt 120
fd 3 * :size
rt 60
end

to tip :size
fd :size
rt 60
fd :size * 2
rt 120
fd :size
rt 60
fd :size
end

to interlock :size
fd :size
rt 60
fd 2 * :size
rt 120
fd :size
rt 60
fd :size
lt 120
fd 2 * :size
lt 60
fd :size
rt 180
end

to skip :size
rt 120
fd :size
rt 120
fd :size
rt 180
end
```



POLYSYM 15

Your Own Project

Some Helpful Hints

Keep your procedures short.

Use meaningful names that help you to think about the problem you are attempting.

Make each procedure you write do exactly one job.

Keep a notebook and use it to plan and jot things down that are useful to you.

If you get stuck, don't be afraid to try a completely different approach to your problem.

If a problem seems to be too difficult, change the rules. Make it simpler in some way.

Some project examples

SOME LOGO EXAMPLES.

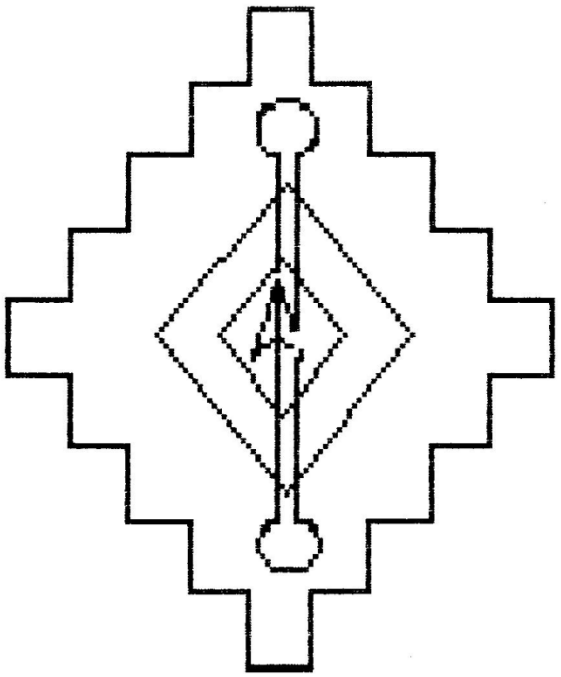
On the following pages, there are a number of worked projects by people of all ages and ability.

They are by no means definitive examples, nor are they meant to be.

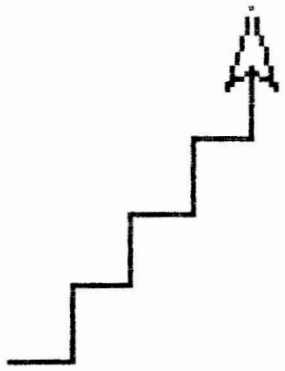
One thing you will quickly learn is that there is always a better way of doing anything, and that part of the excitement of using LOGO can be achieving the same result in a more satisfying or elegant manner.

Experiment with any procedures that you wish, and modify and improve them in any way you can. Perhaps some one else's project could be the basis for one of your own.

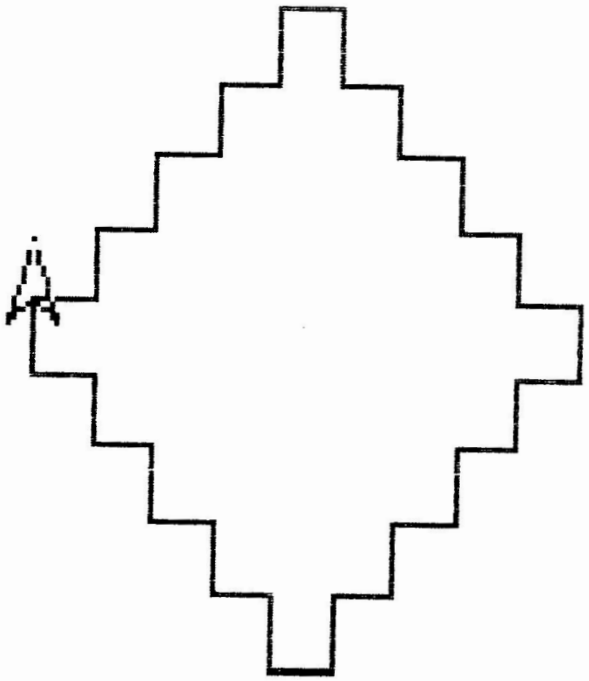
If you do come up with interesting new designs, or better ways of doing things, let us know. We would love to incorporate your ideas and projects in future editions of this book.



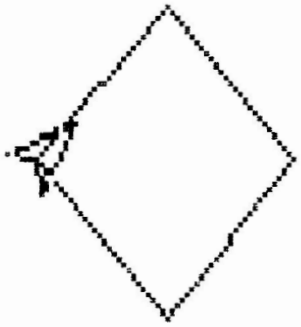
```
TO CLIMB
REPEAT 4 [RT 90 FD 50 LT 90 FD 50]
END

TO CROSS
REPEAT 4 [CLIMB RT 90 FD 50]
END

TO SQUARE
PU
BK 25
RT 90
FD 125
LT 45
PD
REPEAT 4 [FD 150 RT 90]
END

TO SQUARE1
PU
RT 45
FD 50
LT 45
PD
REPEAT 4 [FD 75 RT 90]
END
```



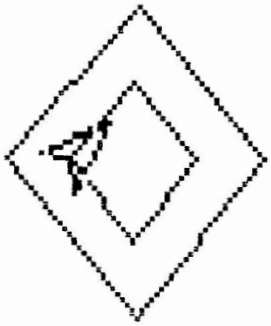
?CLIMB
?



?CROSS
?

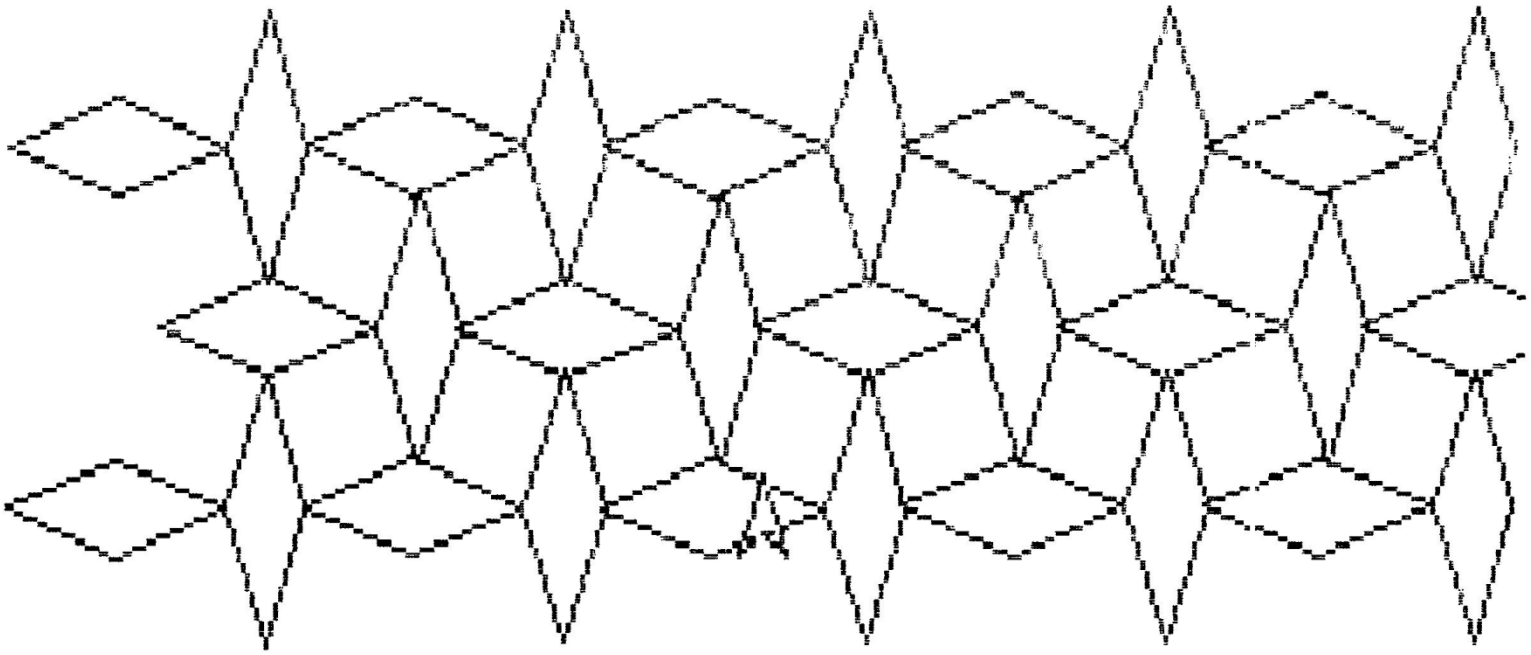


?SQUARE
?



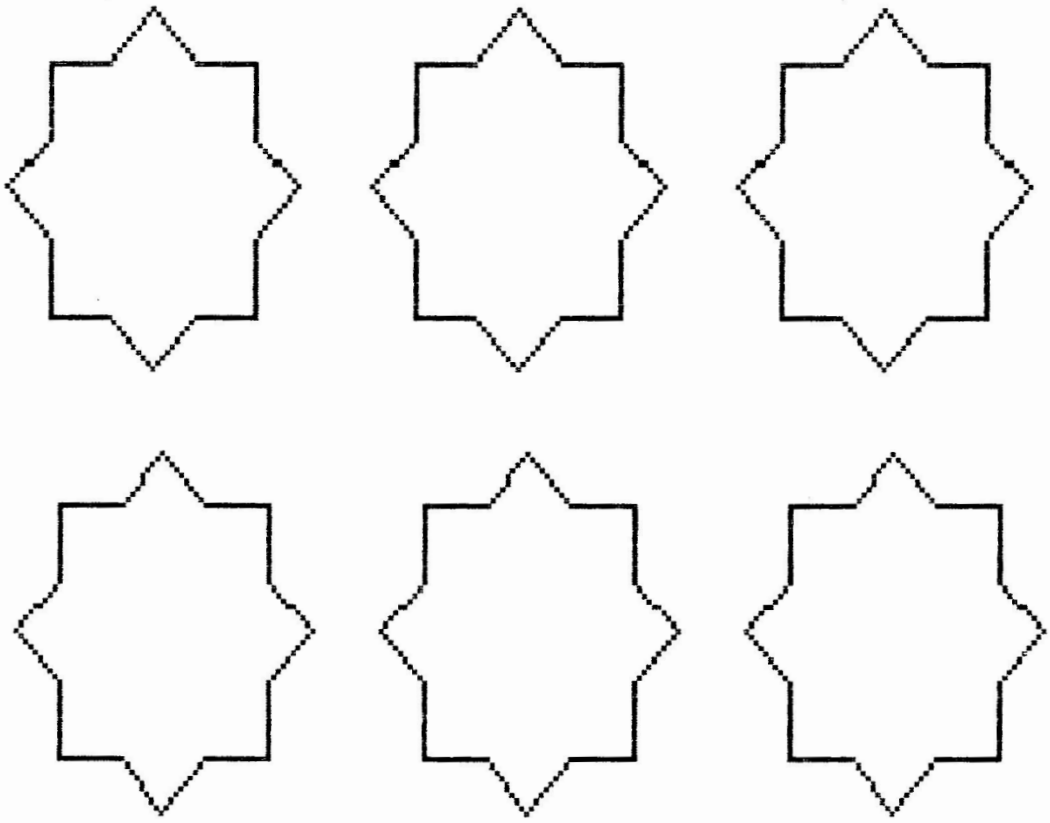
?SQUARE
?SQUARE1
?

?DUMBELL
?DUMBELL1
?



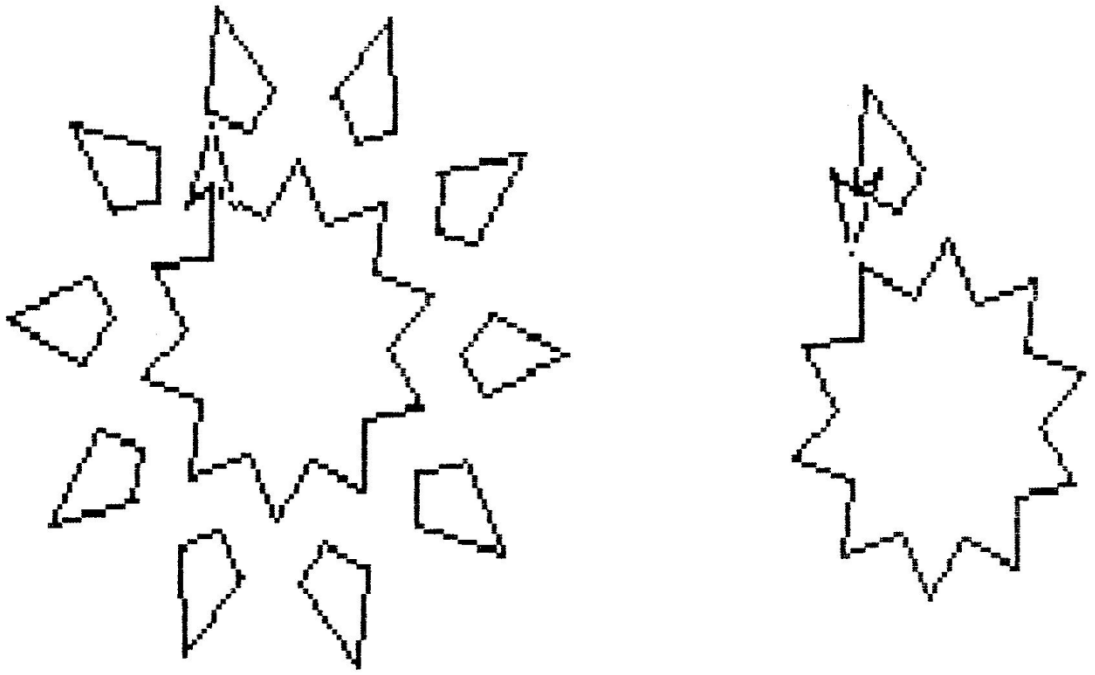
```
?RT 90
?REPEAT 5[PATTERN]
?PU
?HOME
?
```

```
?PO [DI JOIN DI2 JOIN2 PATTERN]
TO DI
RT 70
REPEAT 2 [RT 40 FD 100 RT 140 FD 100]
END

TO JOIN
PU
RT 40
FD 100
LT 110
PD
END

TO DI2
RT 20
REPEAT 2 [FD 100 RT 140 FD 100 RT 40]
END

TO JOIN2
PU
RT 70
FD 160
LT 90
FD 35
PD
END

TO PATTERN
DI
JOIN
DI2
JOIN2
END

?PRINTEROFF
```



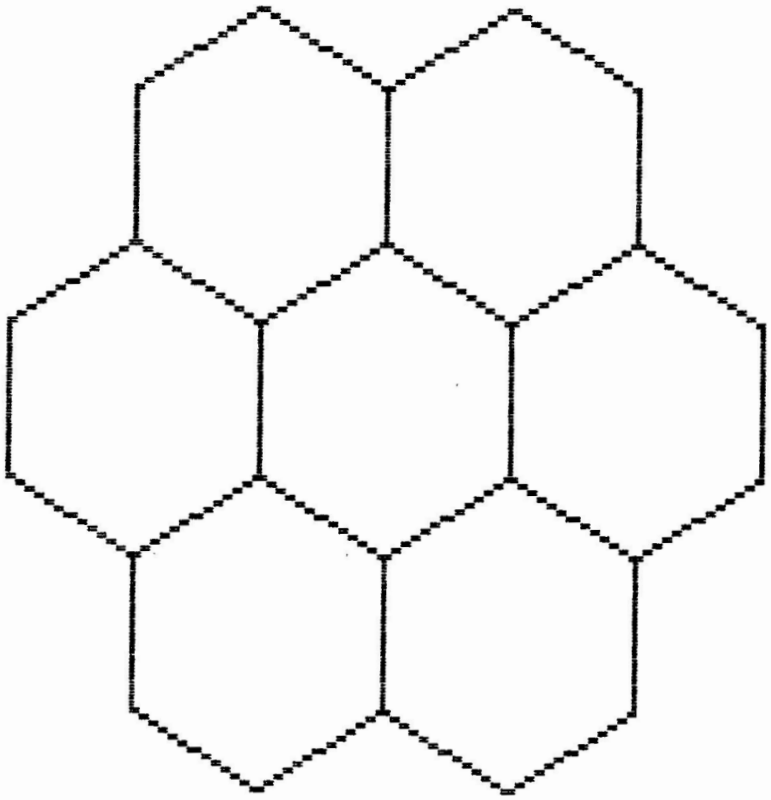
?

```
TO STARS
MOVE1
REPEAT 3 [STAR MOVE]
MOVE2
REPEAT 3 [STAR MOVE]
END
```

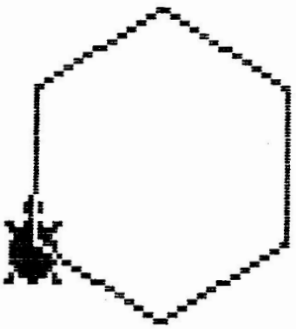


```
?STAR3
?SPIKE
?
```

```
TO STAR3
REPEAT 10 [RT 117 FD 50 LT 81 FD 50]
END

TO SPIKE
PU
FD 50
PD
RT 117
FD 35
LT 81
FD 35
LT 76
FD 74
LT 133
FD 71
END
```



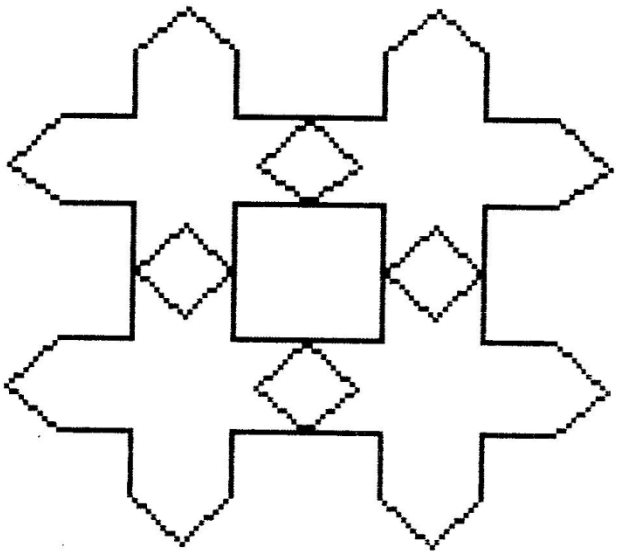
hexpat



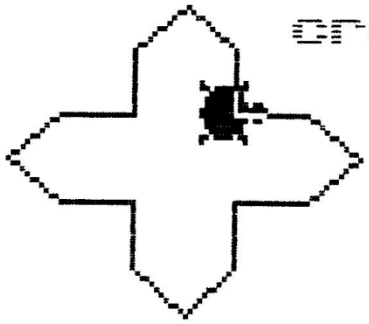
hex

```
to hex :size
repeat 6 [ fd :size rt 60 ]
end

to hexpat :size
repeat 6 [ hex :size fd :size lt 60 ]
end
```

squarecross

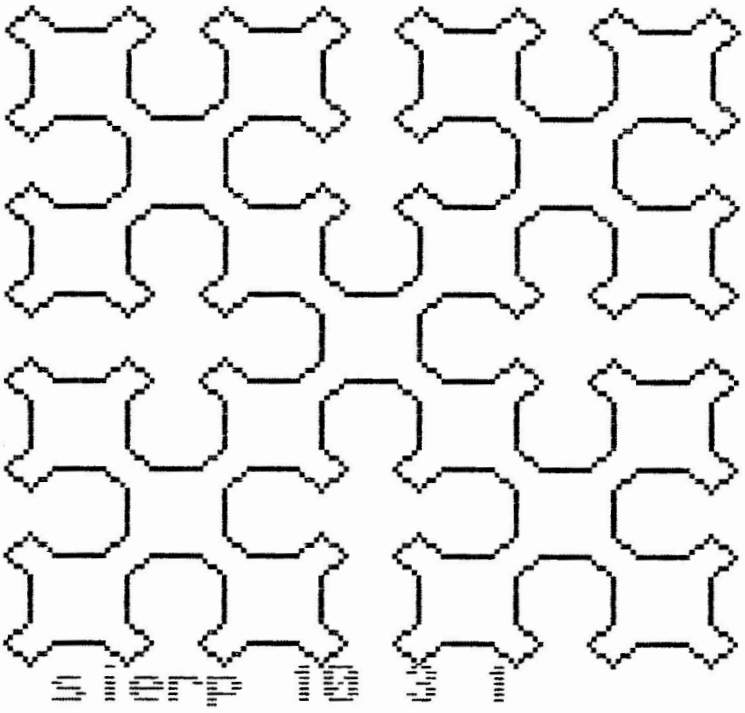


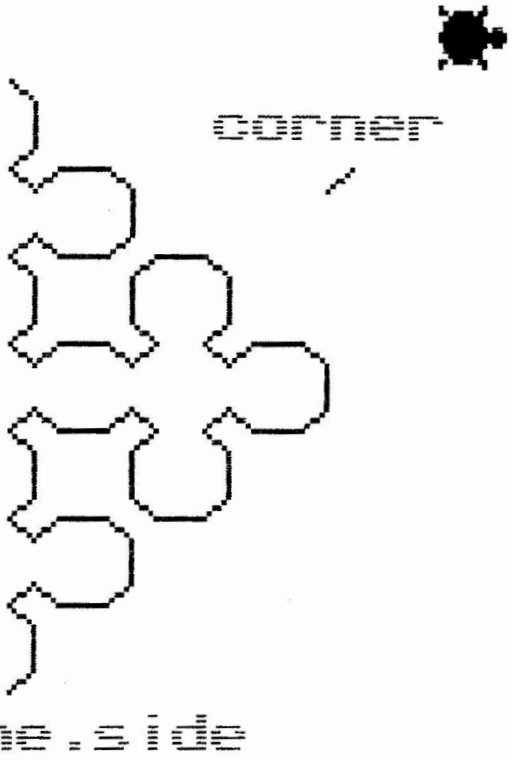
point



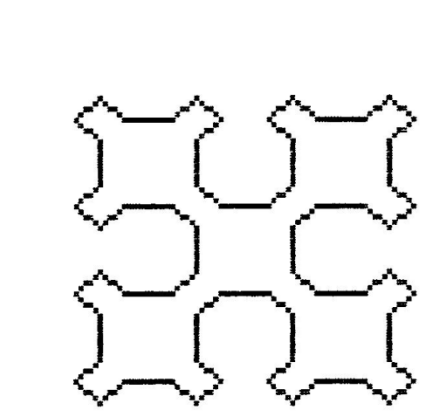
cross

```
to point :size
fd :size
rt 45
fd :size
rt 90
fd :size
rt 45
fd :size
end

to cross :size
repeat 5 [ point :size lt 90 ]
end

to pat :times
repeat :times
    [ cross 15 pu fd 50 pd lt 90 ]
end

to squarecross
repeat 4 [ cross 15 pu fd 52 pd]
end
```



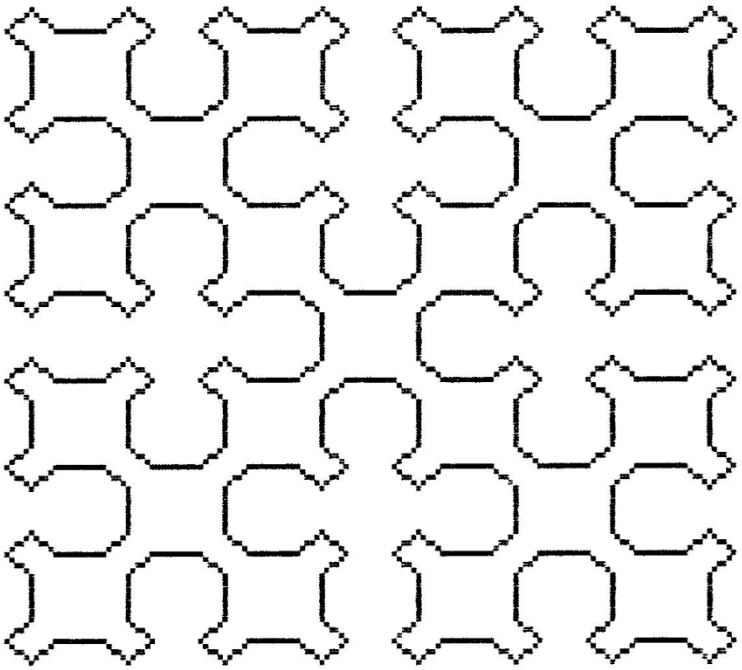



```
to one.side :s :diag :level
if :level = 0 [stop]
one.side :s :diag (:level - 1)
right 45
fd :diag
rt 45
one.side :s :diag (:level - 1)
lt 90
fd :s
lt 90
one.side :s :diag (:level - 1)
rt 45
fd :diag
rt 45
one.side :s :diag (:level - 1)
end

to sierp :s :level
make "diag :s / sqrt 2
repeat 4 [ one.side :s :diag :level
           corner :diag ]
end

to corner :s
rt 45
fd :s
rt 45
end
```



step 10 2

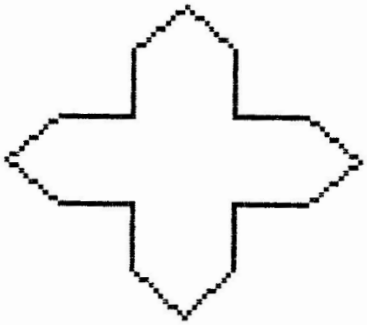
step 10 1



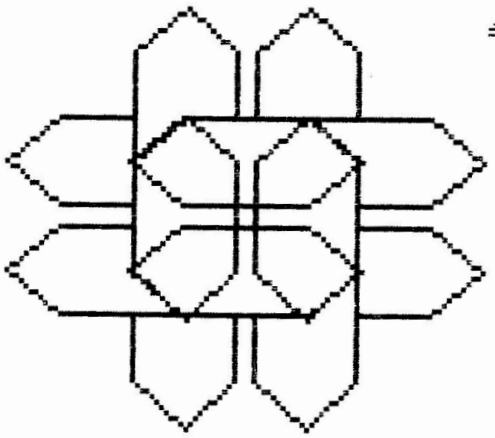
step 10 3

```
------ if your logo doesn't SQRT ------

to sqrt :num
if :num < 0 [(type [sqrt doesn't like ] :num [as input] char 13) stopall]
if :num = 1 [op 1]
if :num = 0 [op 0]
op ifelse :num > 1
     [sqrt2 :num 1 1 0]
     [1 / sqrt (1 / :num)]
end

to sqrt2 :start :inc :preguess :guess
while [not equal? :preguess :guess]
  [make "preguess :guess
   make "guess (:start + :inc) / 2
   ifelse :num > (:guess * :guess)
     [make "inc :guess]
     [make "start :guess]]
op :guess
end

to while :cond :ins
ifelse run :cond :ins [stop]
while :cond :ins
end

-----------------------------------
```

point



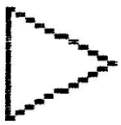
cross



4cross

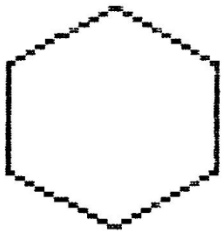
```
to point :size
fd :size
rt 45
fd :size
rt 90
fd :size
rt 45
fd :size
end

to cross :size
repeat 5 [ point :size lt 90 ]
end

to pat :times
repeat :times
    [ cross 15 pu fd 50 pd lt 90 ]
end

to 4cross
repeat 4 [ cross 15 fd 25]
end
```

square

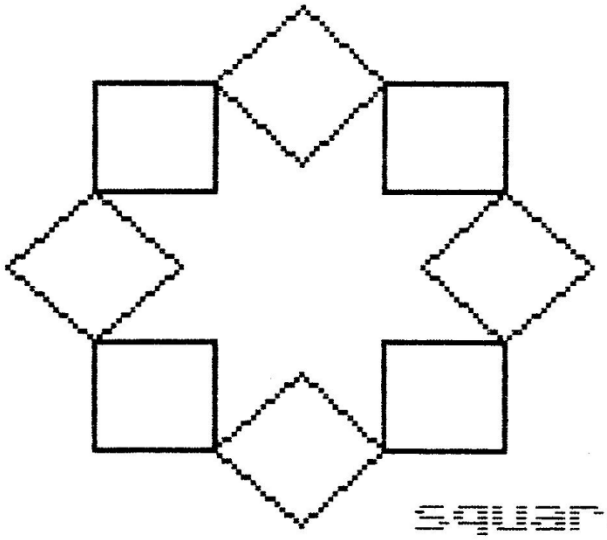


tri

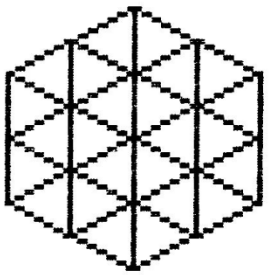
doubletri



hex

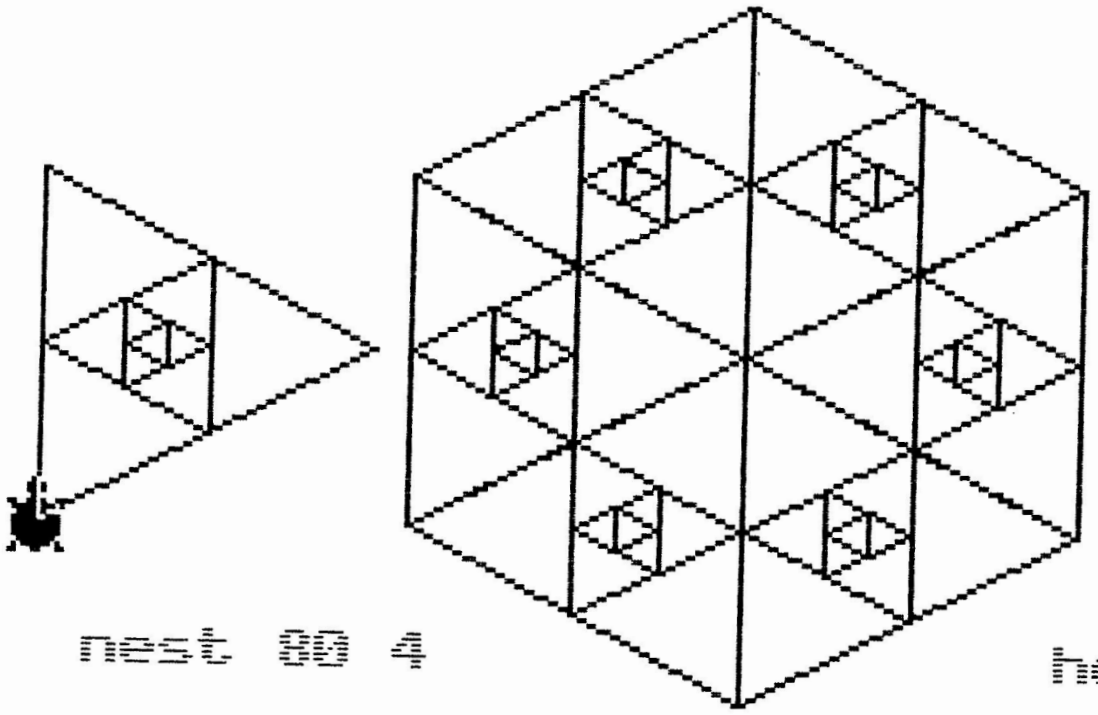


squarecircle



trihex

```
to square :size
repeat 4 [fd :size rt 90]
end

to hex :size
repeat 6 [ fd :size rt 60 ]
end

to tri :size
repeat 3 [ fd :size rt 120 ]
end

to squarecircle :s
repeat 8
          [ square :s
            fd :s rt 90 fd :s lt 45 ]
end

to doubletri :s
tri :s
fd :s/2
rt 60
tri :s/2
lt 60
bk :s/2
end

to trihex :s
repeat 6 [ doubletri :s rt 60 ]
end
```

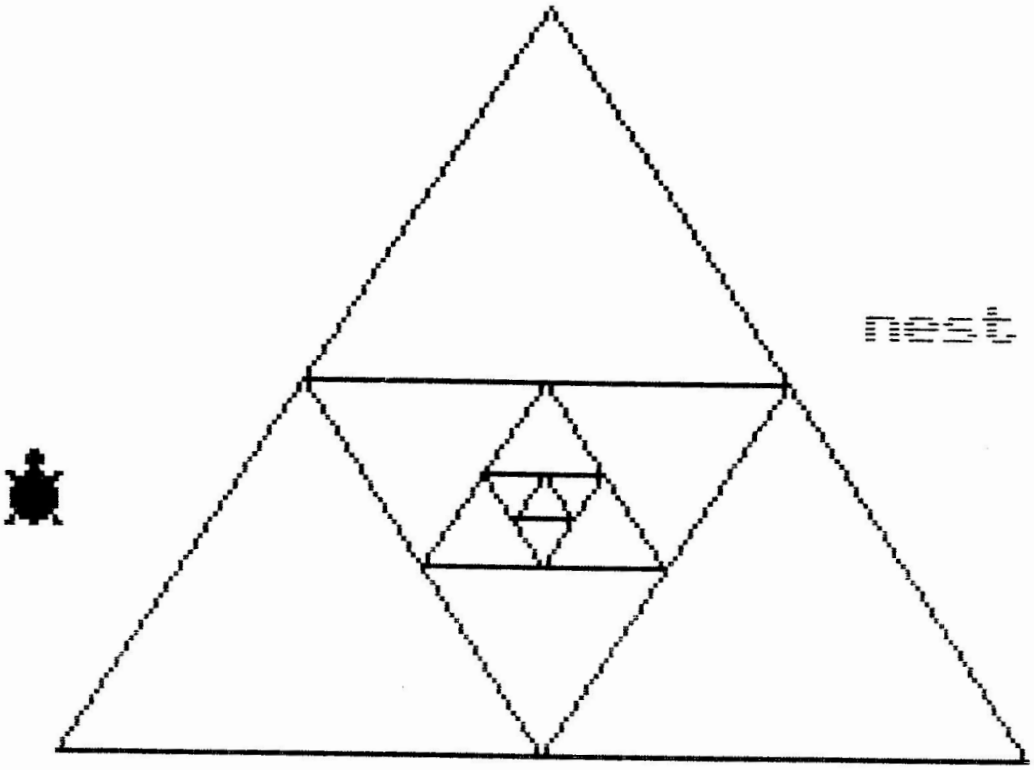


nest 80 4

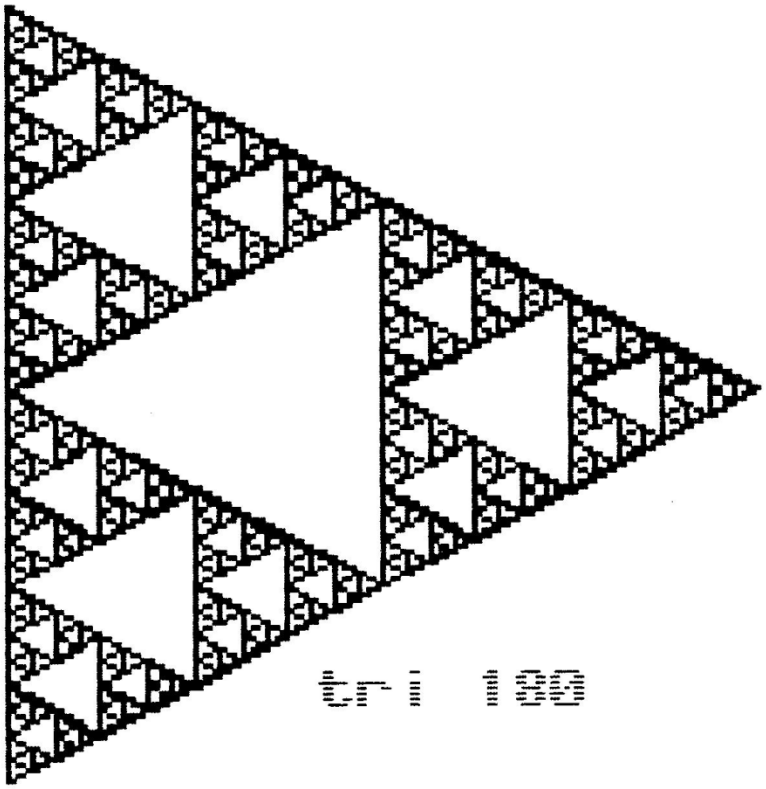
hex 80

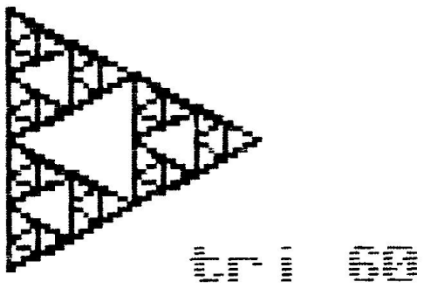
```
to nest :size :level
if :level = 0 [ stop ]
fd :size / 2
subnest :size :level
fd :size / 2
rt 120
fd :size
rt 120
fd :size
rt 120
end
```

```
to subnest :s :l
rt 60
nest (:size / 2) ( :level - 1)
lt 60
end


to hex :s
repeat 6 [ nest :s 4
           rt 60    ]
end
```



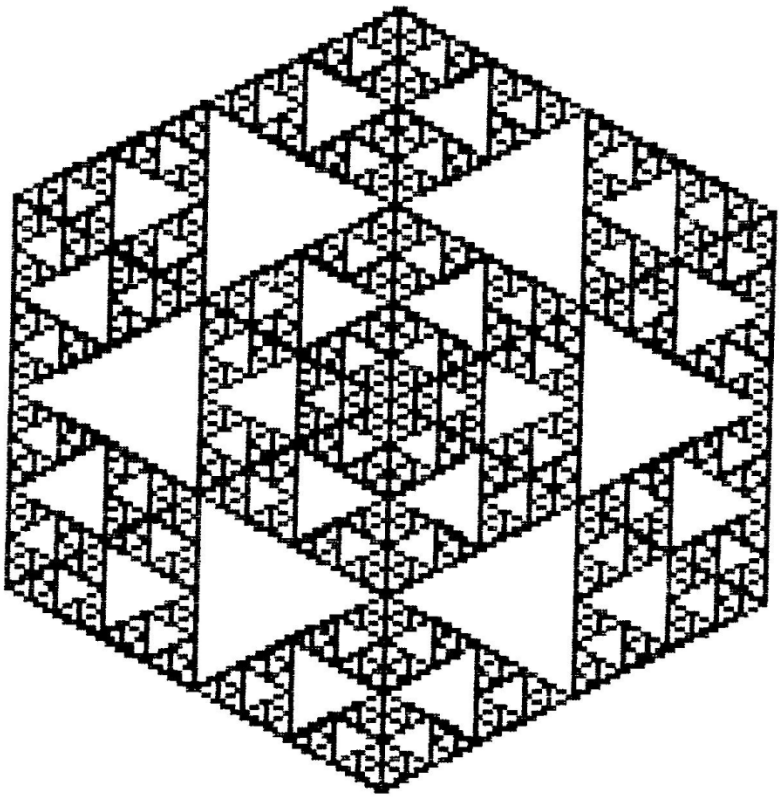
nest 200 5





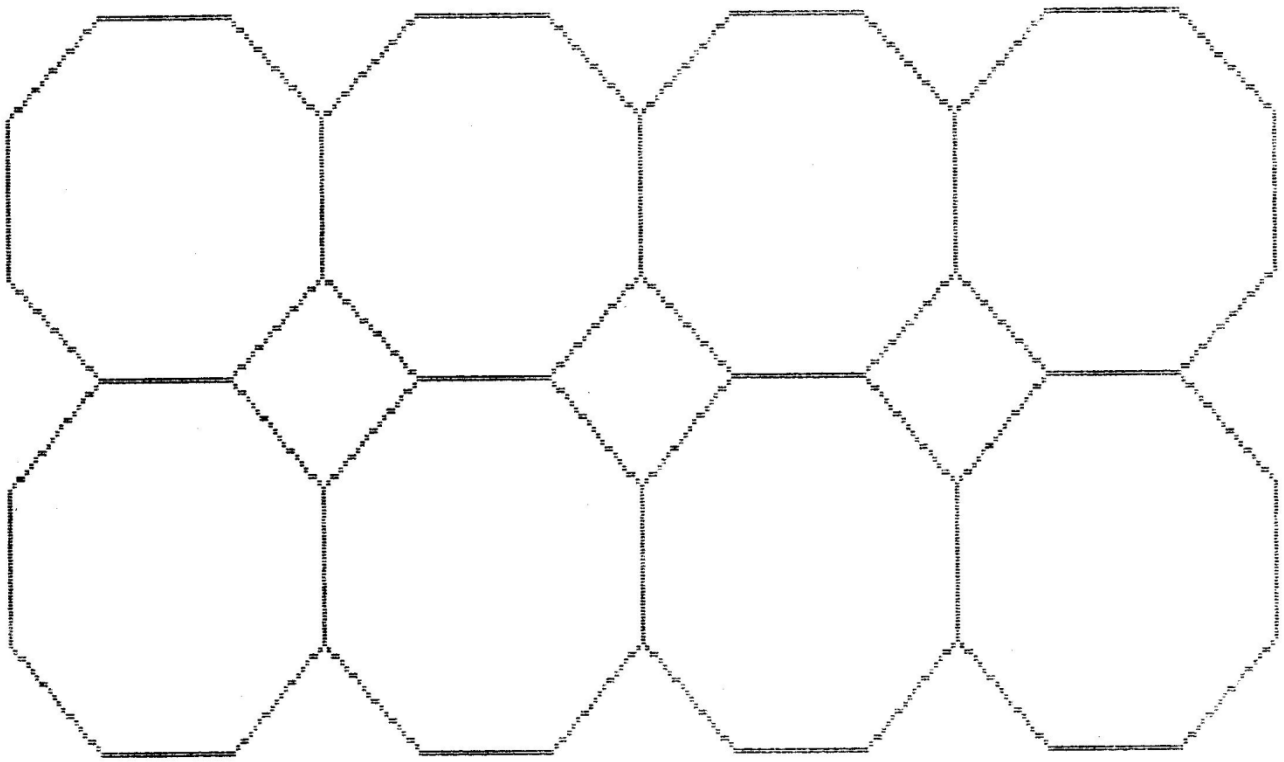

```
to tri :s
if :s < 5 [stop]
repeat 3 [ tri :s /2 fd :s rt 120]
end
```

hex 90

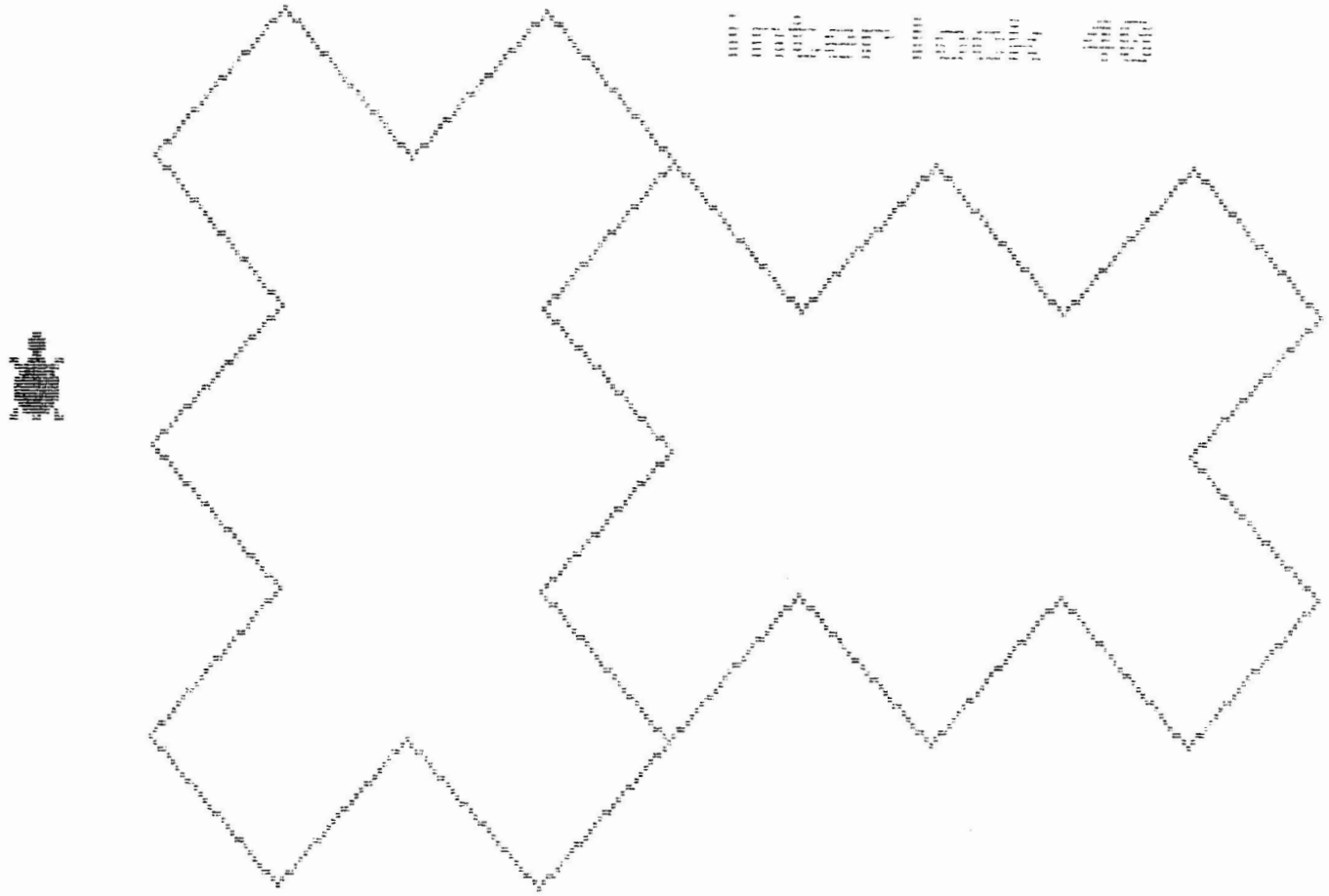


```
to tri :s
if :s < 5 [stop]
repeat 3 [ tri :s /2 fd :s rt 120]
end

to hex :s
repeat 6 [ tri :s rt 60 ]
end
```

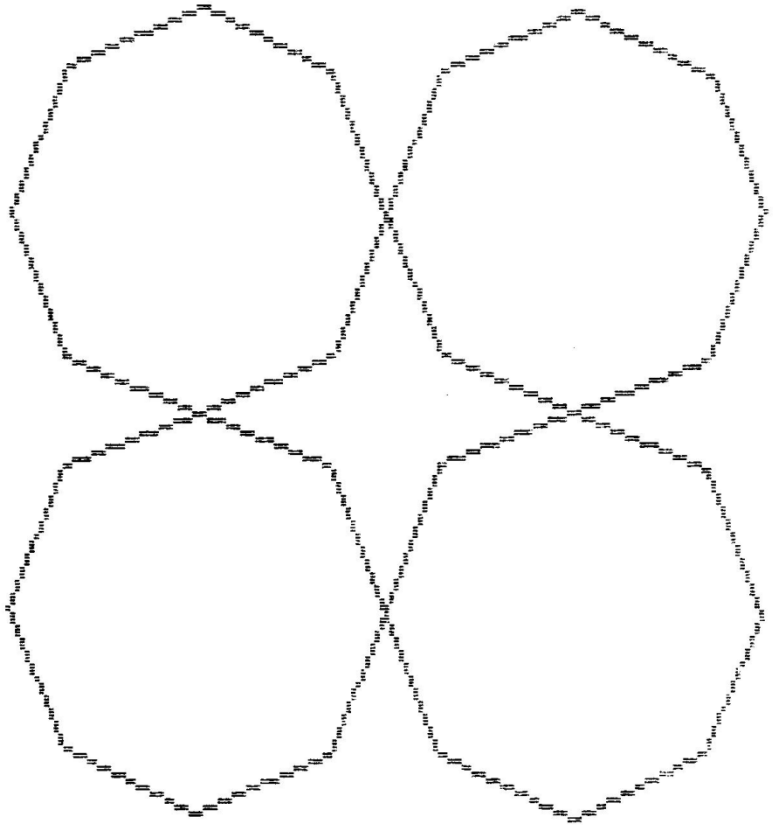
pattern 30



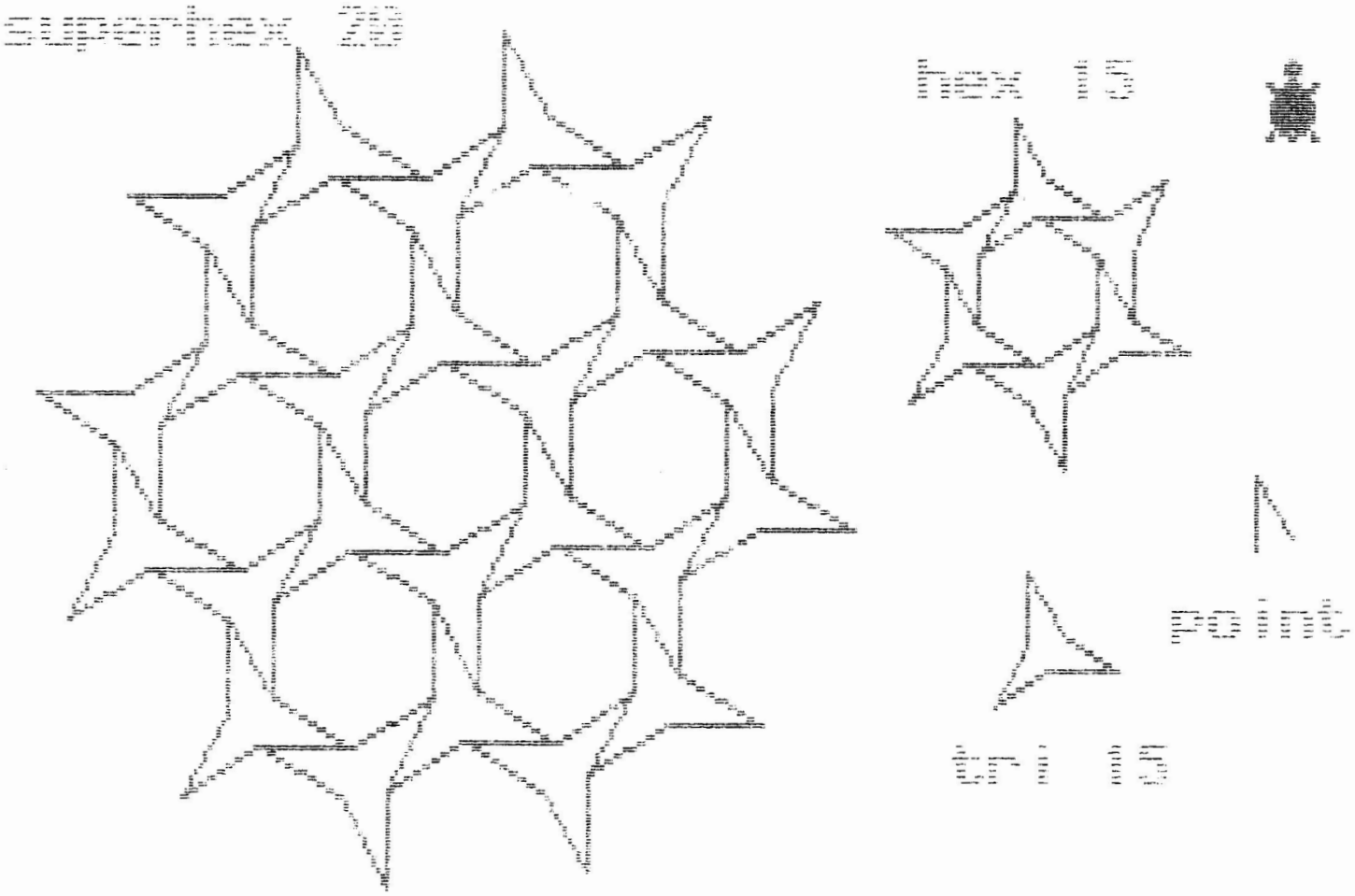
```
to octagon :size
repeat 8+5 [ fd :size rt 45 ]
end

to row :size
repeat 4 [octagon :size rt 180-45]
end

to pattern :size
make "pos pos
row :size
pu
setpos se first :pos (last :pos - :size
* 2.4)
pd
row :size
end
```



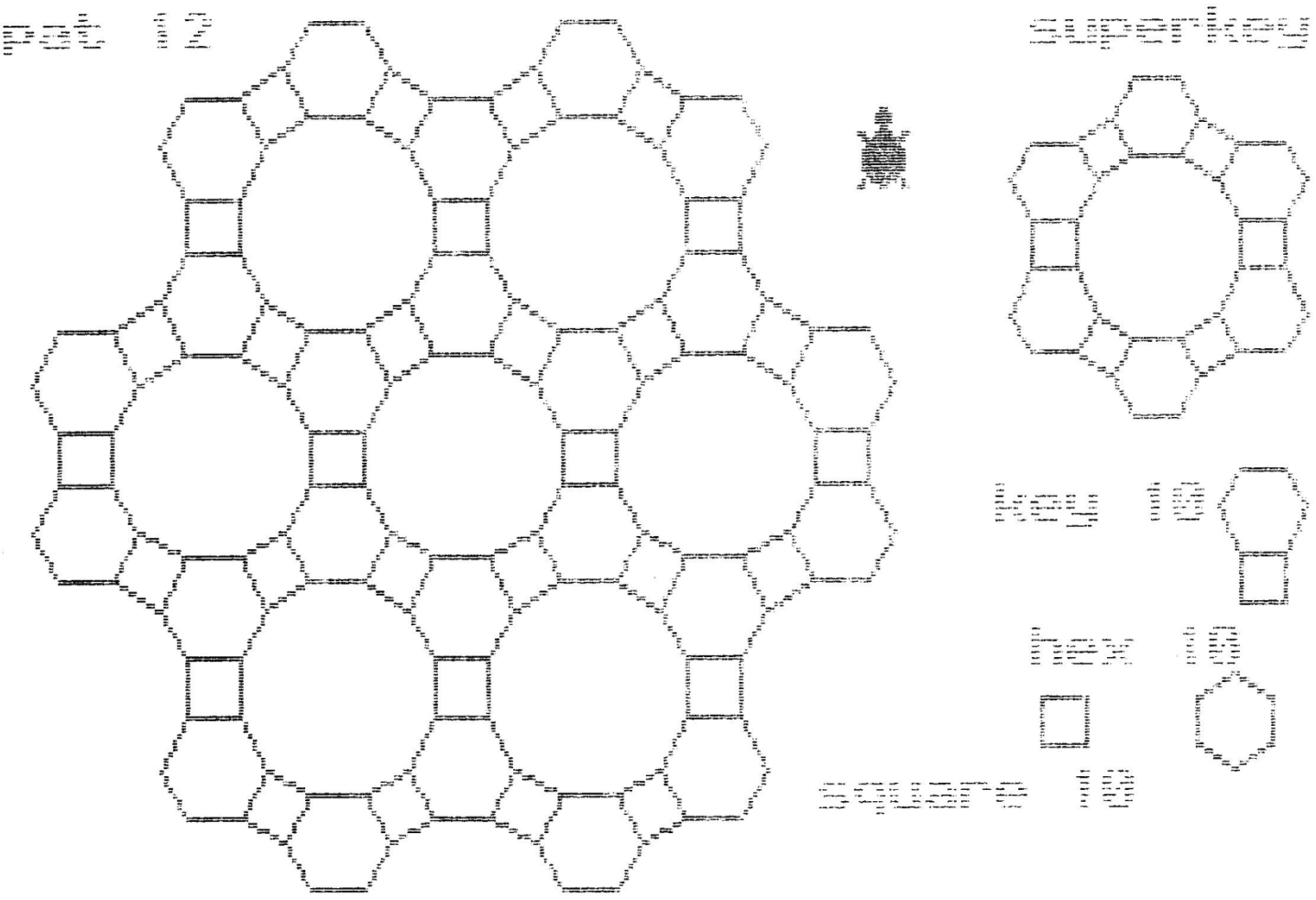

```
to corner :size
fd :size rt 90
fd :size rt 90
fd :size lt 90
end

to middle :size
fd :size
rt 90
fd :size
lt 90
end

to tomb :s
repeat 2
      [ corner :s middle :s corner :s ]
end

to interlock :s
lt 45
tomb :s
fd :s
rt 180
repeat 2 [middle :s repeat 2 [corner
:s]]
end
```



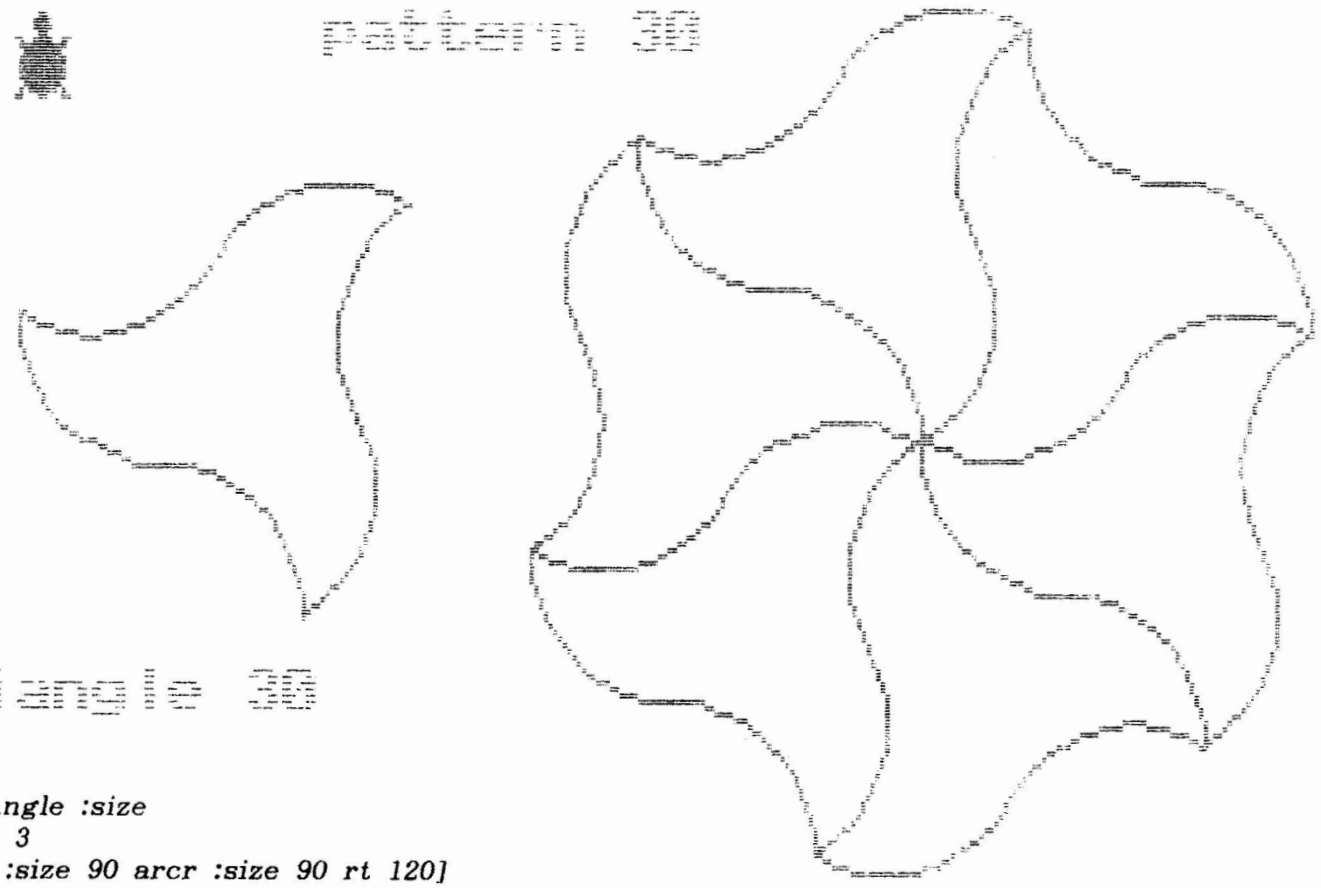

```
to octagon :size
repeat 8 [fd :size rt 45]
end

to four :size
rt 22.5
repeat 2 [octagon :size along :size]
reverse :size
octagon :size
along :size
reverse :size
octagon :size
end

to along :size
repeat 4 [ fd :size rt 45]
rt 180
end

to reverse :size
repeat 2 [ bk :size rt 45 ]
end
```




```
to superhex :size
repeat 6 [ hex :size point :size fd :size lt 60 ]
end

to hex :size
repeat 6[ tri :size fd :size lt 60]
end

to point :size
fd :size
rt 150
fd :size
lt 30
end

to tri :size
repeat 3 [point :size]
end
```



```
to square :size
repeat 4 [fd :size rt 90]
end

to hex :size
repeat 6 [fd :size rt 60]
end

to key :size
square :size
fd :size
lt 30
hex :size
end

to superkey :size
repeat 6 [key :size fd :size lt 30]
end

to pat :size
repeat 6 [superkey :size next :size]
end

to next :size
fd :size
rt 90
repeat 2 [ fd :size lt 60]
fd :size
rt 90
end
```

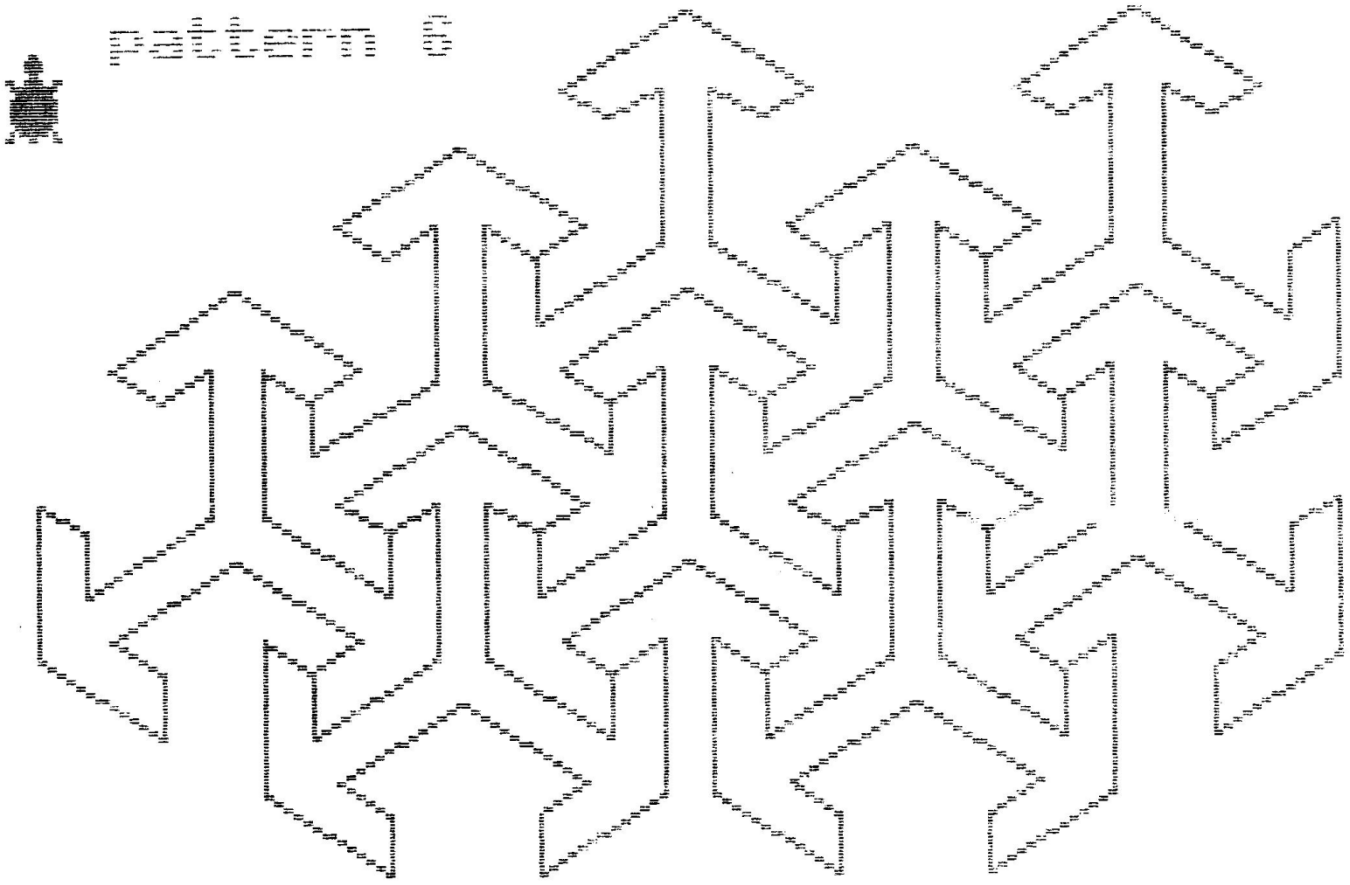



```
to triangle :size
repeat 3
 [arcl :size 90 arcr :size 90 rt 120]
end

to pattern :size
repeat 6 [ triangle :size rt 60]
end
```

ARCR and ARCL draw right and left arcs.
Their inputs are:

:RADIUS The radius of the circle from which the arc is taken.
:DEGREES The degrees of the arc.

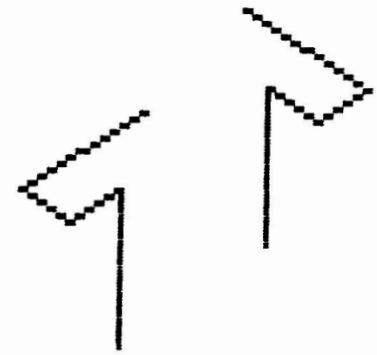
```
to arcr :radius :degrees
make "steps (2 * :radius * 3.1416 / 36)
make "rem remainder :degrees 10
repeat :degrees / 10
     [rt 5 fd :steps rt 5]
if :rem > 0
     [fd :steps * :rem / 10 rt :rem]
end


to arcl :radius :degrees
make "steps (2 * :radius * 3.1416 / 36)
make "rem remainder :degrees 10
repeat :degrees / 10
     [lt 5 fd :steps lt 5]
if :rem > 0
     [fd :steps * :rem / 10 lt :rem]
end
```



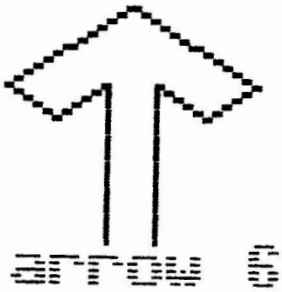

```
to pattern :size
superthree :size
left.half :size
rt 60
backright.half :size
lt 60
end

to superthree :size
repeat 3 [three :size left.half :size rt 180]
end

to three :size
repeat 3 [arrow :size lt 60]
end


to arrow :size
left.half :size
rt 60
right.half :size
end

to left.half :size
fd 5 * :size
lt 120
fd 2 * :size
rt 60
fd 2 * :size
rt 120
fd 5 * :size
end
```

```
to right.half :size
fd 5 * :size
rt 120
fd 2 * :size
rt 60
fd 2 * :size
lt 120
fd 5 * :size
end

to backright.half :size
fd 5 * :size
rt 120
fd 2 * :size
lt 60
fd 2 * :size
lt 120
fd 5 * :size
end
```

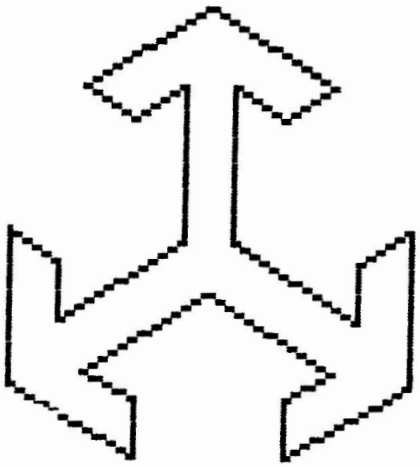
right.half 6



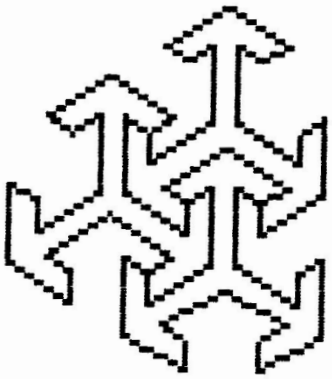
left.half 6



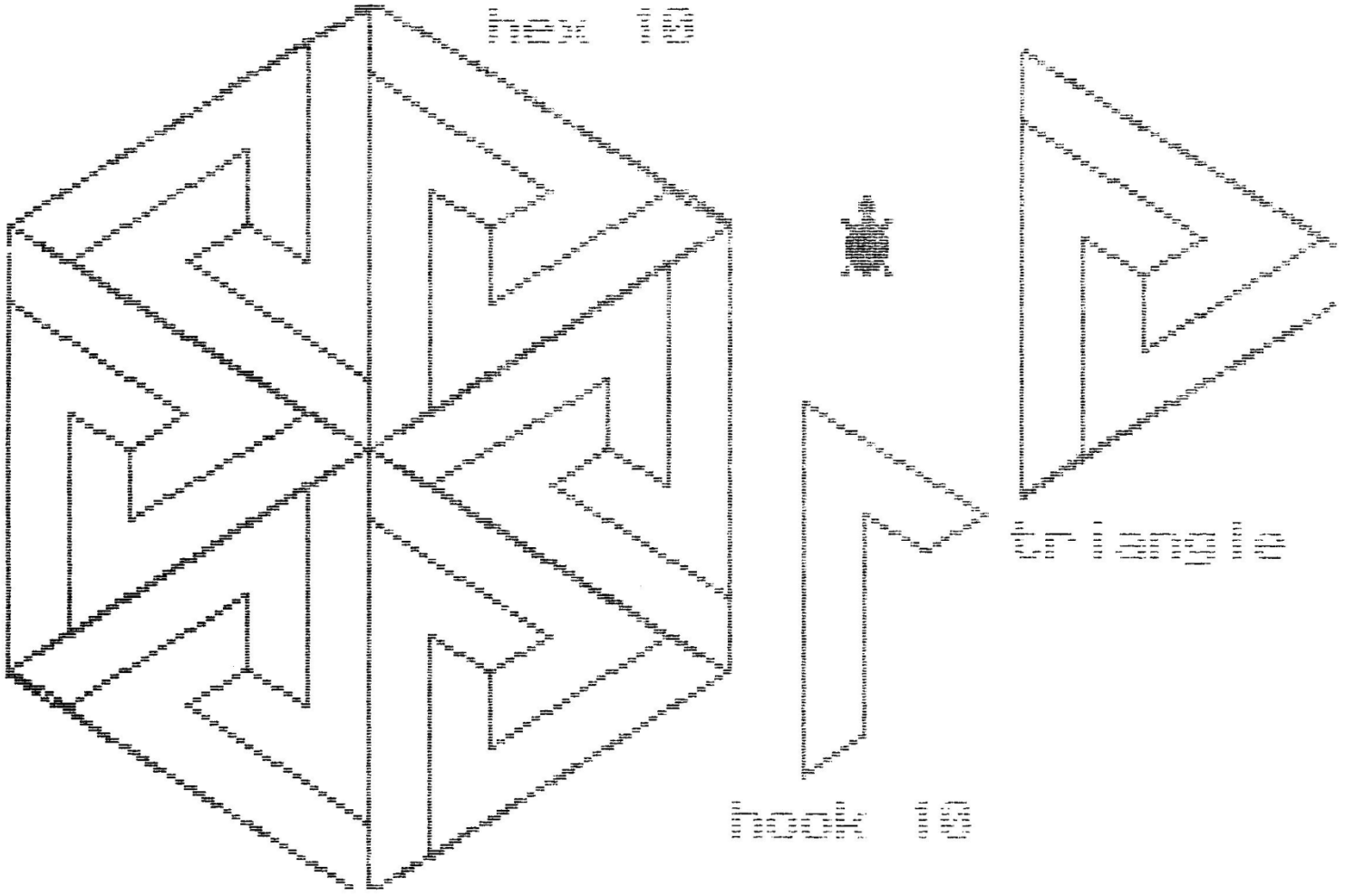
arrow 6



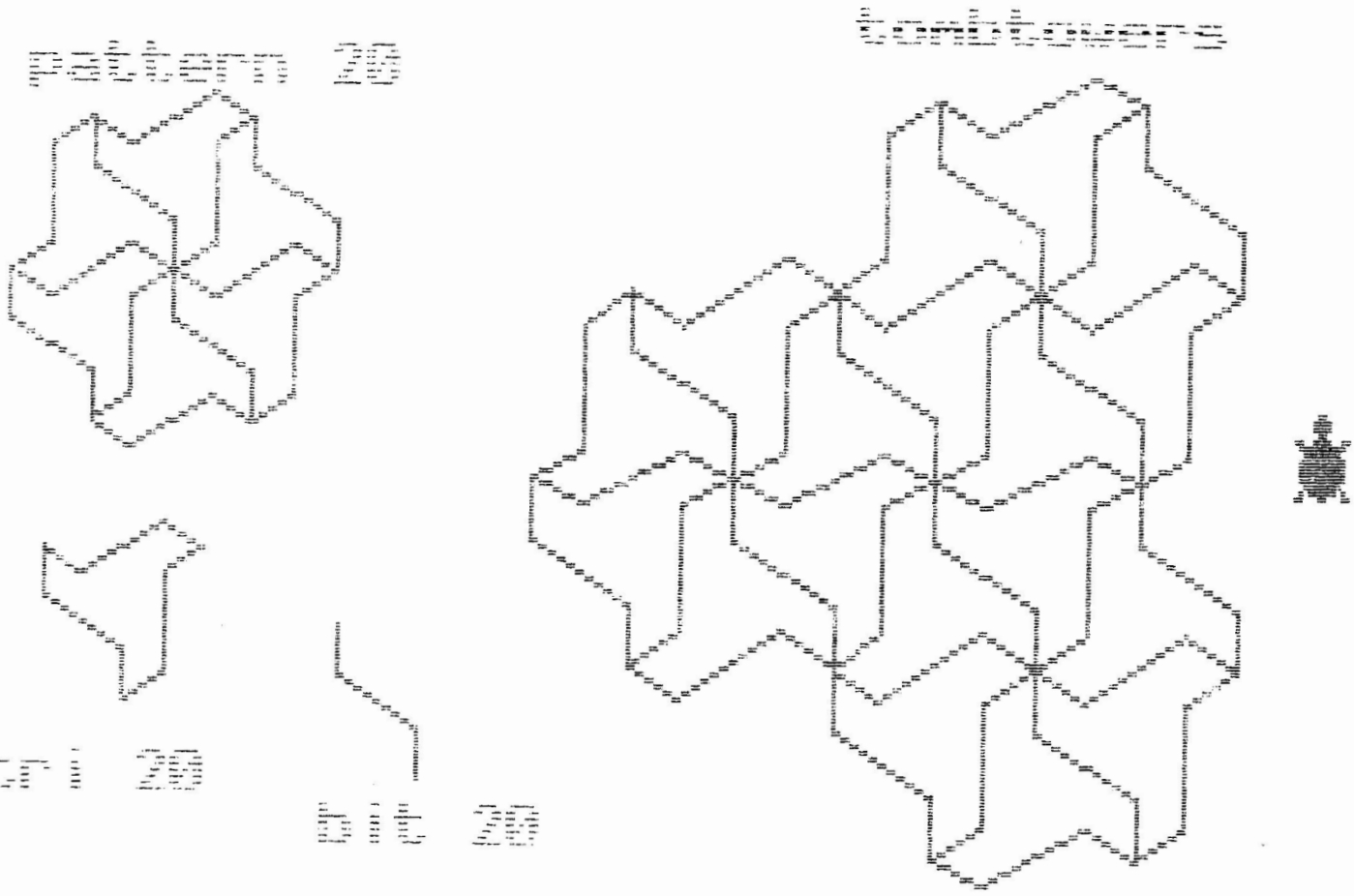
three 6



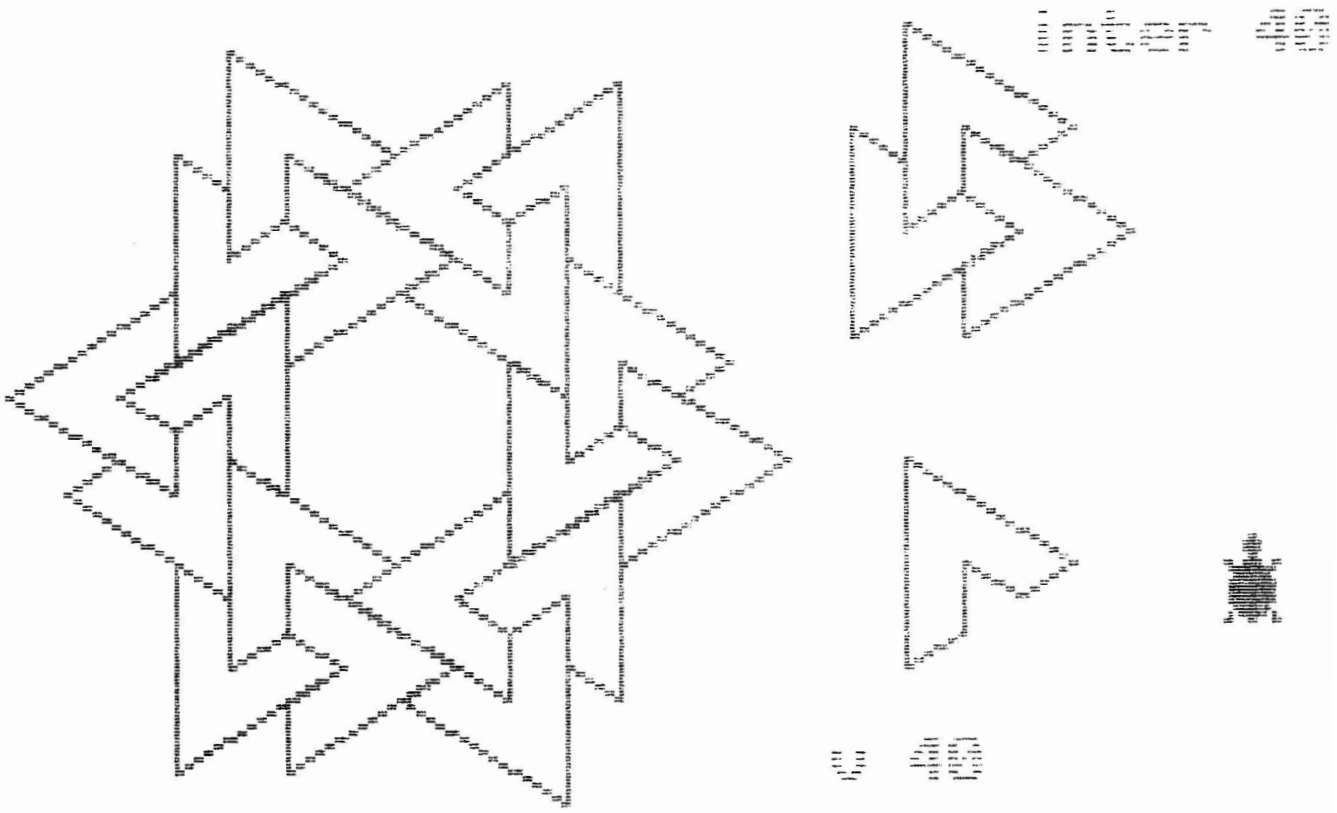
superthree 3



```
to hex :size
repeat 6 [triangle :size rt 60]
end

to triangle :size
repeat 3 [ hook :size fd 9.6 * :size rt 120]
end

to hook :size
fd 8 * :size
rt 120
fd 4.8 * :size
rt 120
fd 1.6 * :size
rt 60
fd 1.6 * :size
lt 120
fd 4.8 * :size
rt 60
fd 1.6 * :size
rt 120
end
```

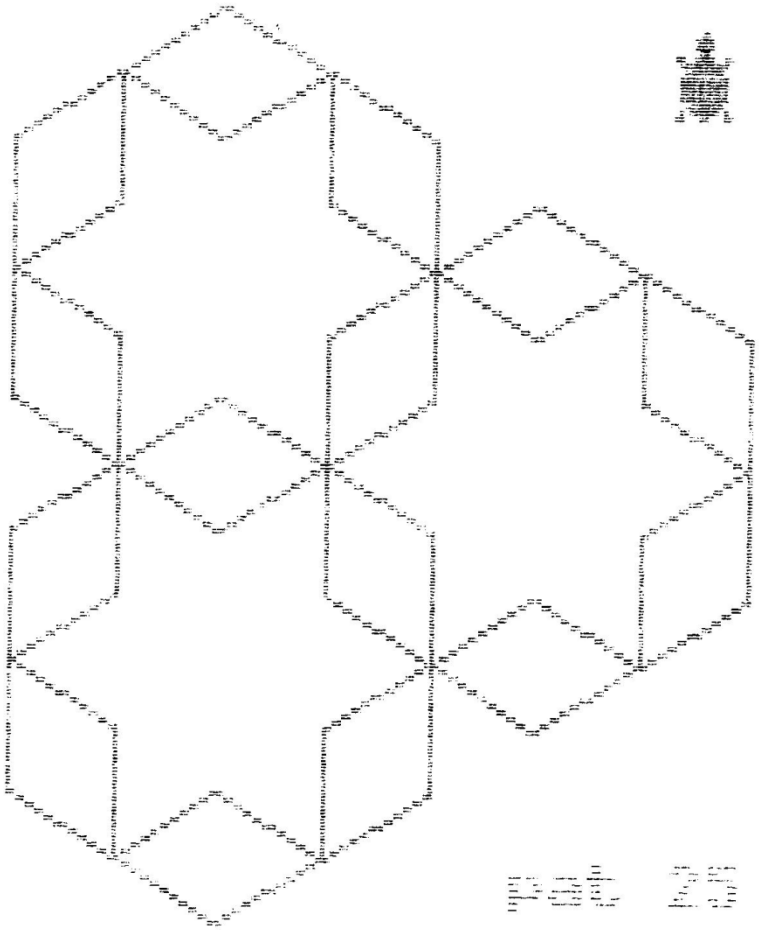


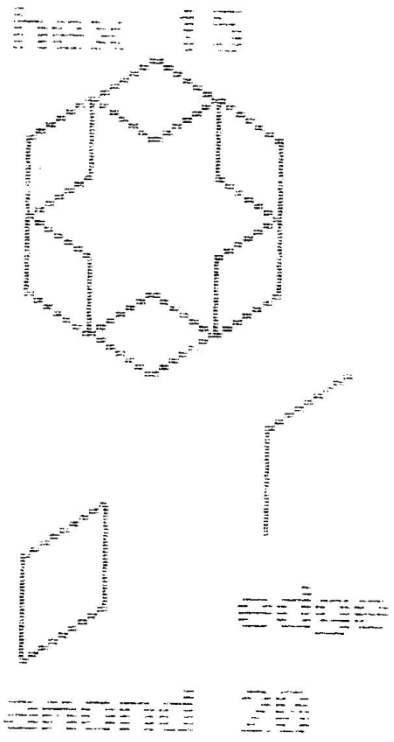

```
to tombtowers
repeat 3 [ pattern 25 lump 25]
end

to lump :size
repeat 2 [ rt 60 bit :size]
end

to pattern :size
repeat 6 [tri :size rt 60]
end

to tri :size
repeat 3 [bit :size rt 120]
end

to bit :size
fd :size/2
lt 60
fd :size
rt 60
fd :size/2
end
```



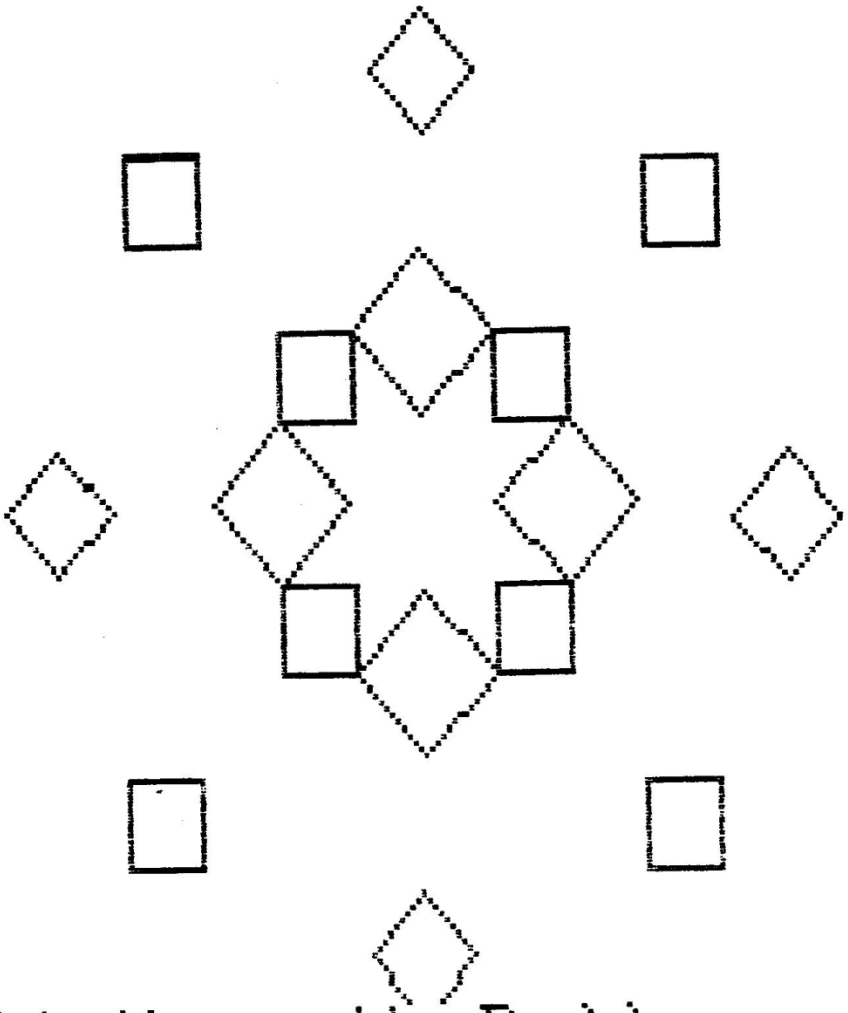
pattern 40

```
to pattern :size
repeat 6 [inter :size interface :size]
end

to inter :size
repeat 3 [v :size rt 60]
end

to v :size
fd :size/3
rt 120
fd :size/3
lt 60
fd :size/3
lt 120
fd :size
lt 120
fd :size
lt 120
fd :size/3
end

to interface :size
fd :size/3
rt 120
fd :size + :size/3
lt 120
fd :size/3
lt 60
end
```

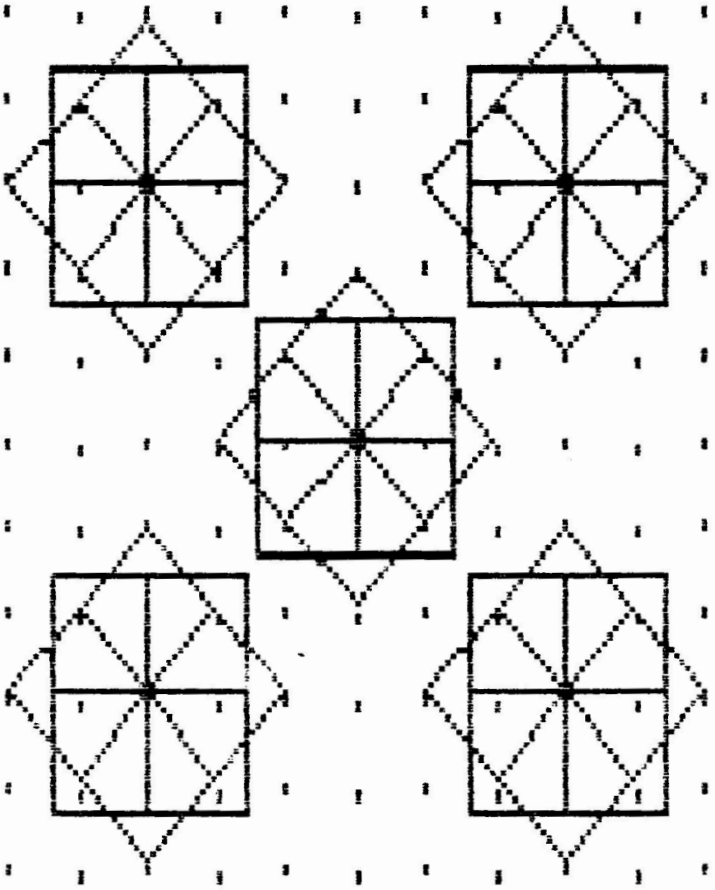




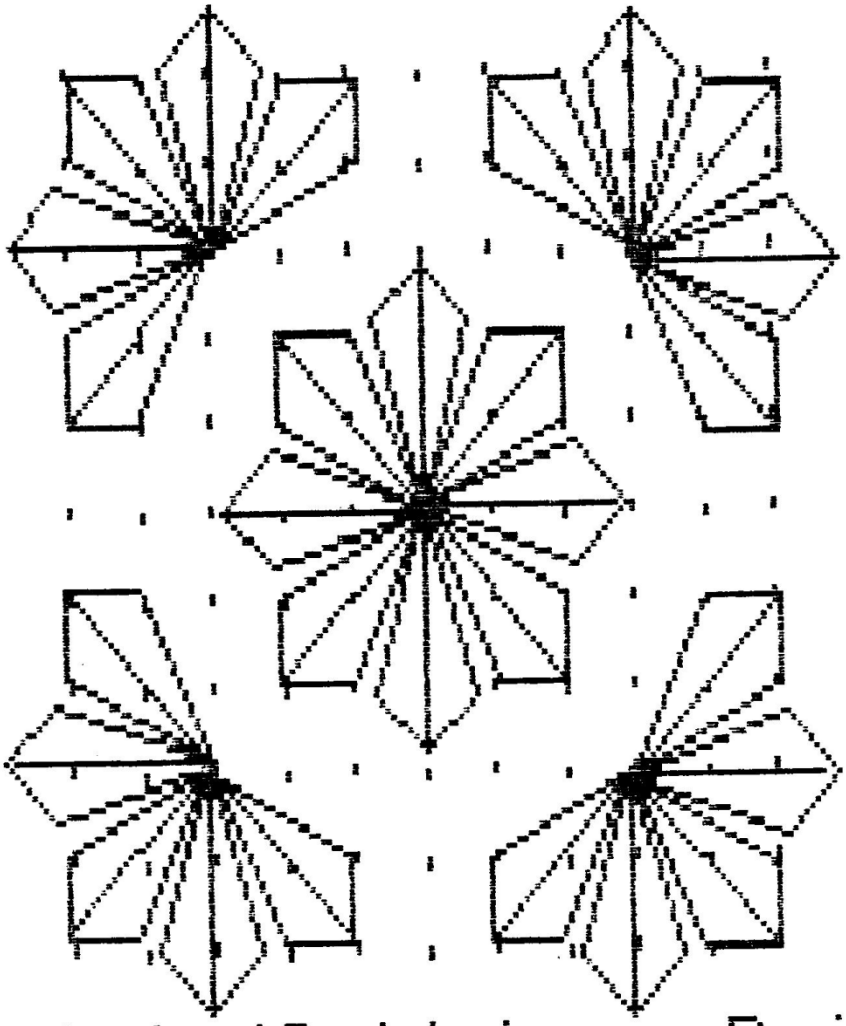

```
to pat :size
repeat 3 [hex :size rt 120]
end

to hex :size
repeat 6 [diamond :size edge :size]
end

to diamond :size
repeat 2 [edge :size rt 120]
end

to edge :size
fd :size
rt 60
fd :size
end
```



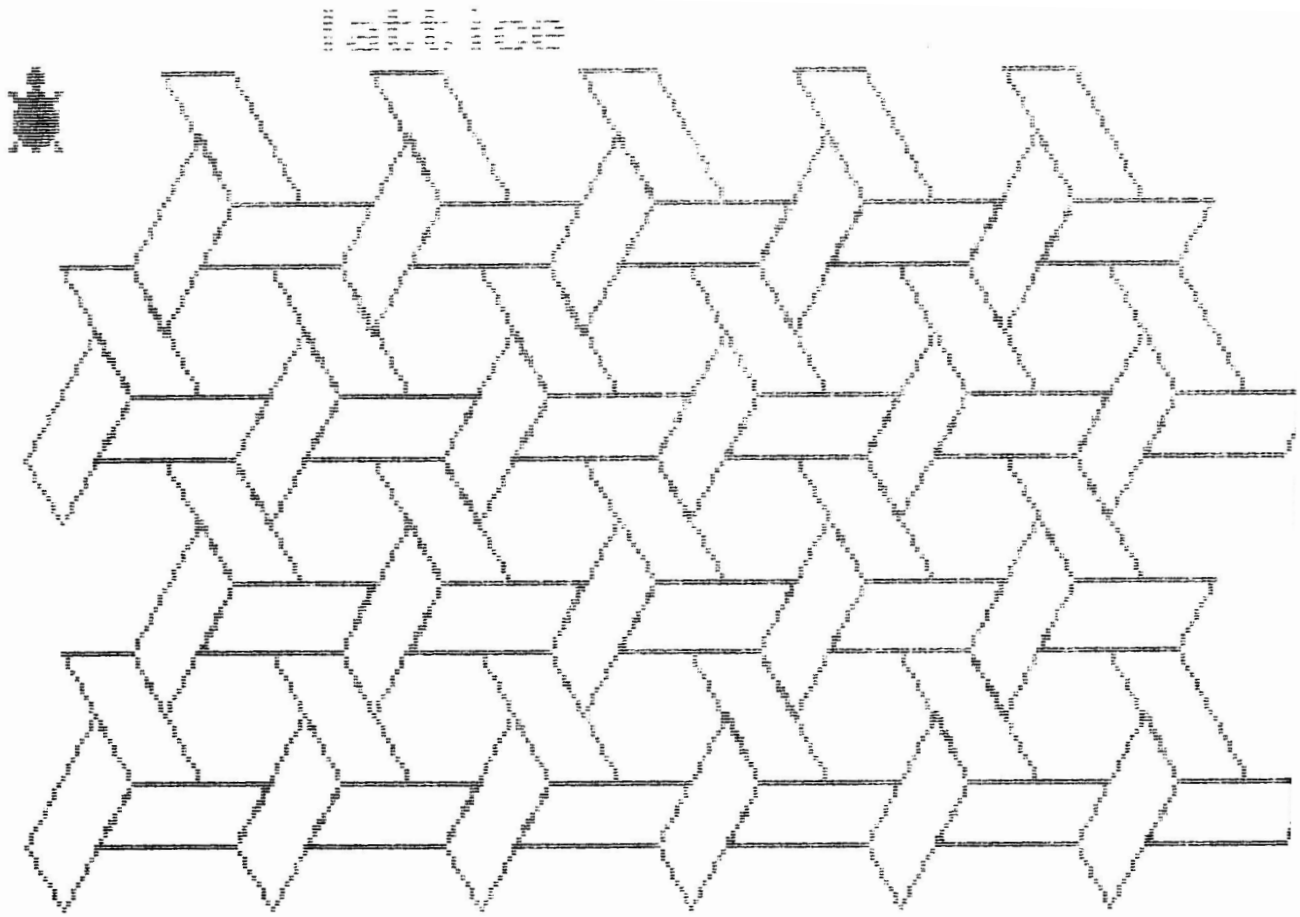
Sean Bednall,Kenneth Ball
and Mohammed Hussain
Salisbury School
?



Jane Frakes (Salisbury School)
?



Bhavesh Patel (Salisbury Primary)
?

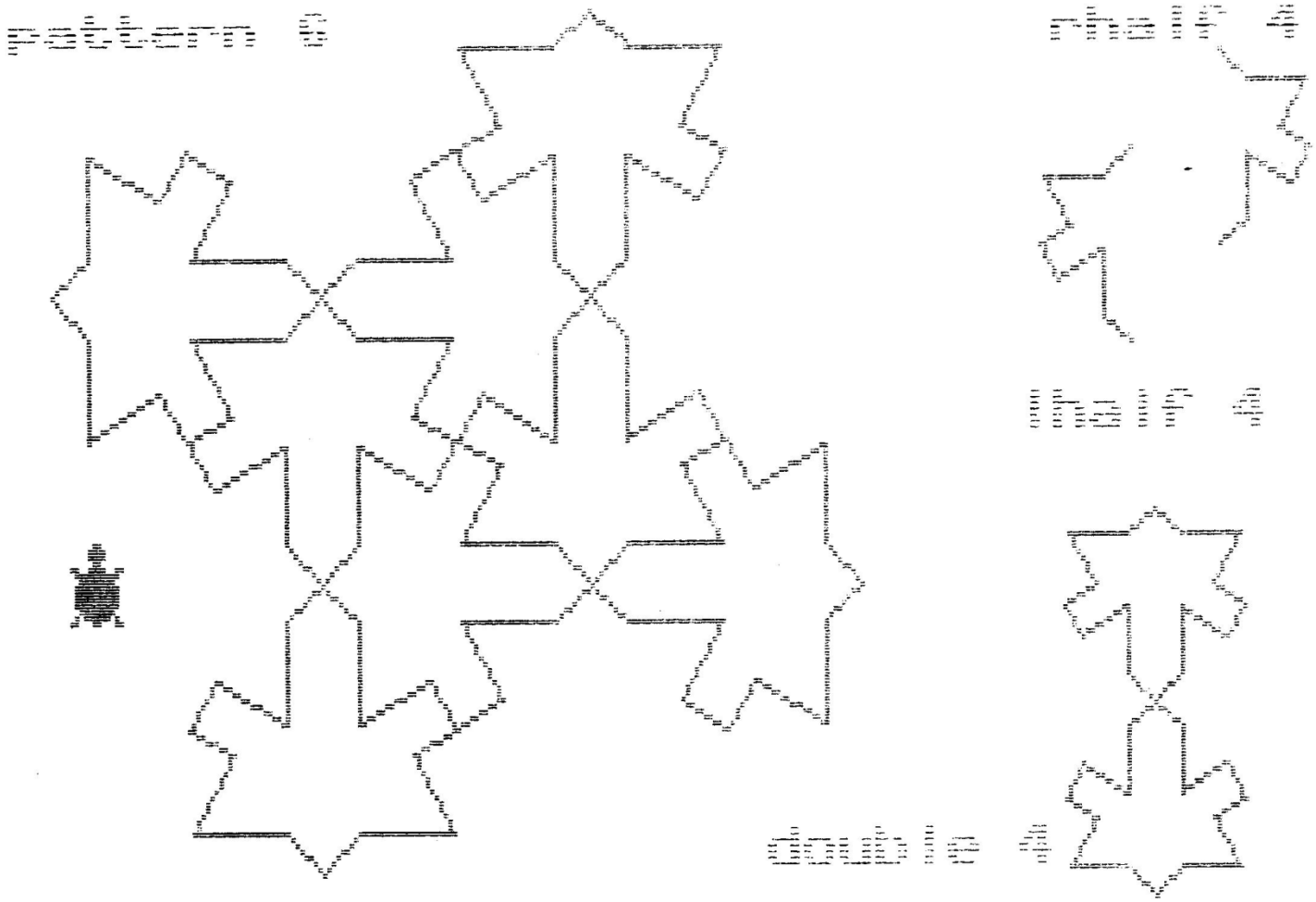


```
to lattice
cg pu setpos [-110 -60]
lt 30
pd
repeat 2 [ pattern 30]
end


to pattern :size
along 5 :size
skip :size
return 4 :size
skip :size
end


to along :times :size
repeat :times [ tri :size rt 120 skip :size lt 120]
tri :size
end

to return :times :size
repeat :times [tri :size lt 60 skip :size rt 60]
tri :size
end

to tri :size
repeat 3 [ parallel :size rt 120]
end

to parallel :size
repeat 2 [fd :size rt 120 fd :size/2 rt 60]
end
to skip :size
pu
fd 1.5 * :size
pd
end
```

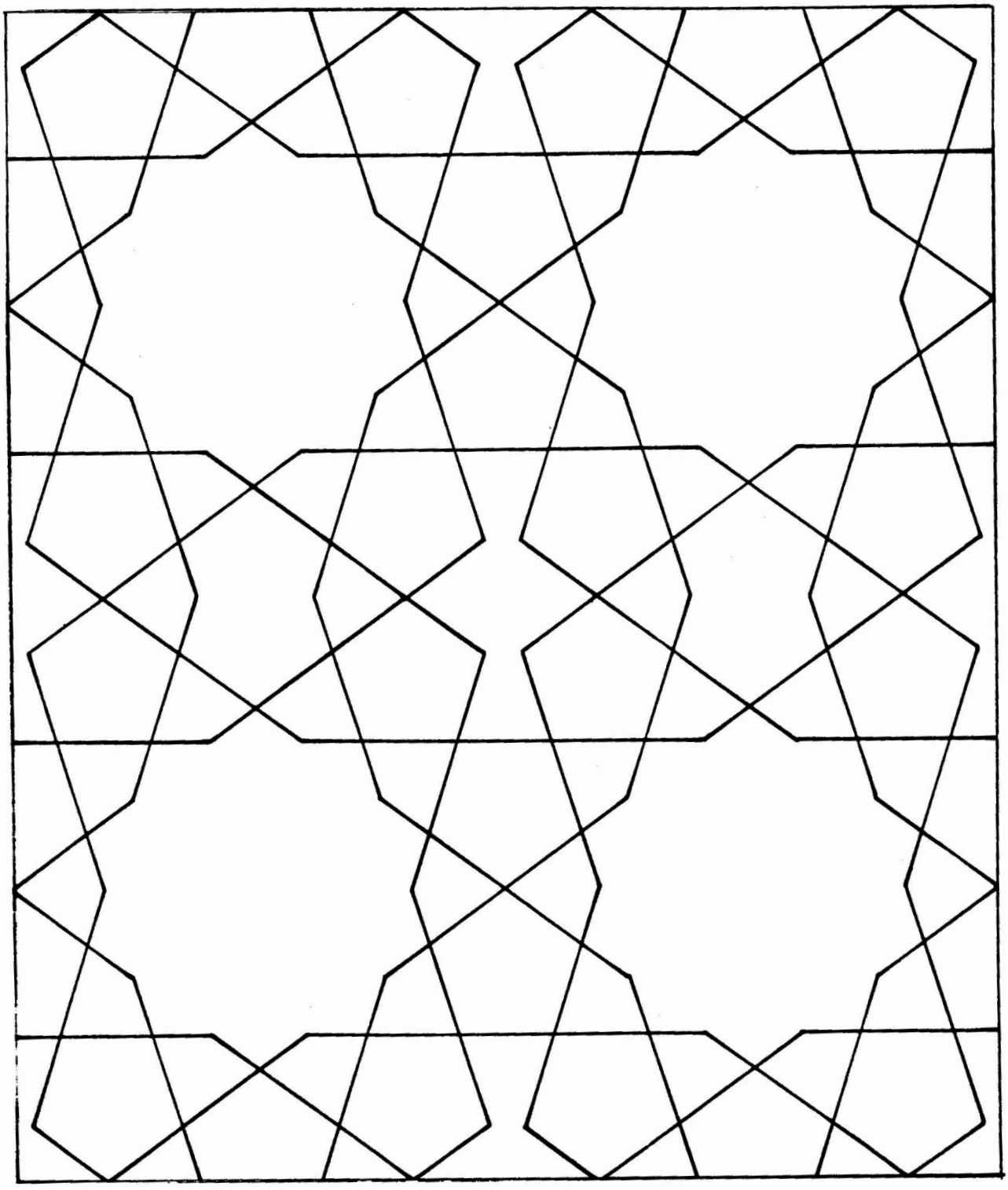
parallel 4D

tri 4D

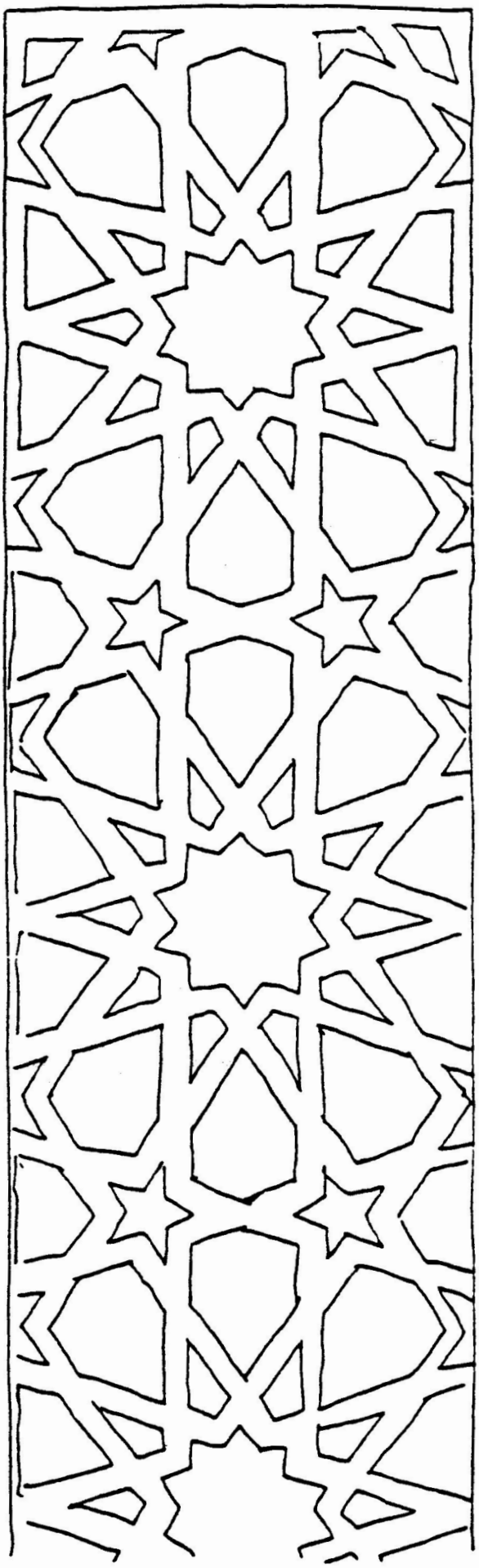
simple 4 4D



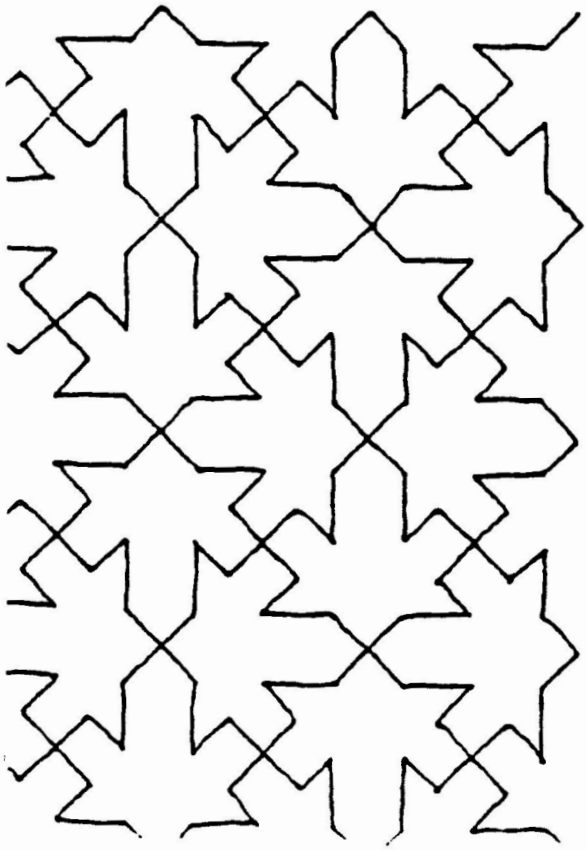

```
to pattern :size
repeat 4 [double :size skip :size]
end

to double :size
repeat 2 [ lhalf :size rhalf :size]
end

to skip :size
pu
lt 90
bk 10 * :size
pd
end

to lhalf :size
lt 45
fd 2 * :size
rt 45
fd 3.366 * :size
lt 120
fd 3 * :size
rt 90
fd 2 * :size
rt 90
fd 2 * :size
lt 90
fd 3 * :size
rt 120
fd 3.366 * :size
lt 45
fd 2 * :size
rt 90
end

to rhalf :size
fd 2 * :size
lt 45
fd 3.366 * :size
rt 120
fd 3 * :size
lt 90
fd 2 * :size
rt 90
fd 2 * :size
rt 90
fd 3 * :size
lt 120
fd 3.366 * :size
rt 45
fd 2 * :size
lt 45
end
```

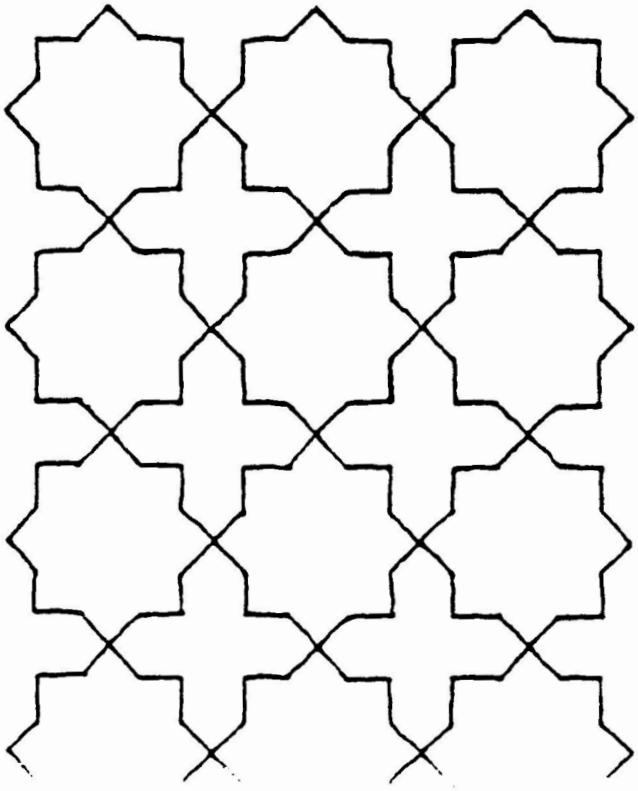


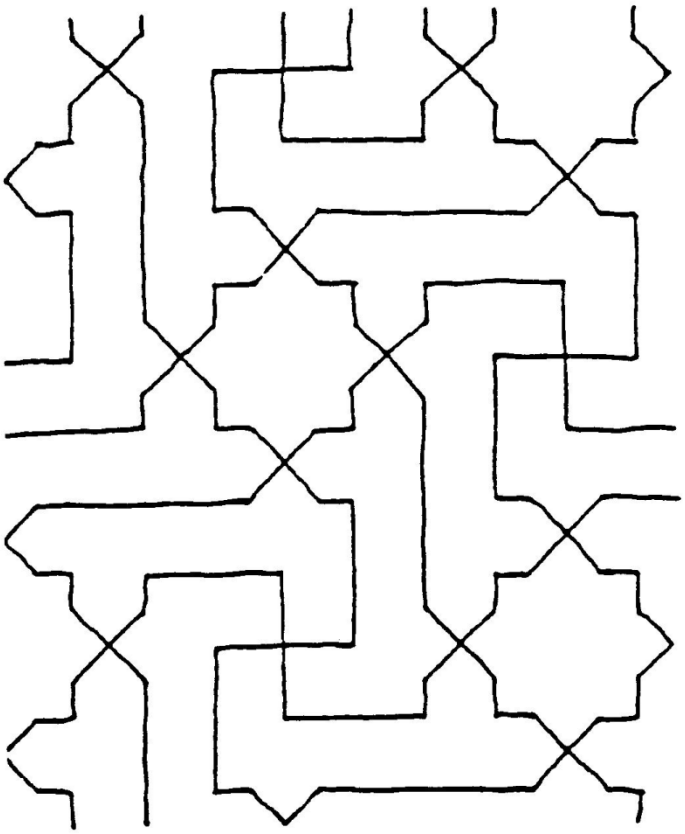
Patterns to try

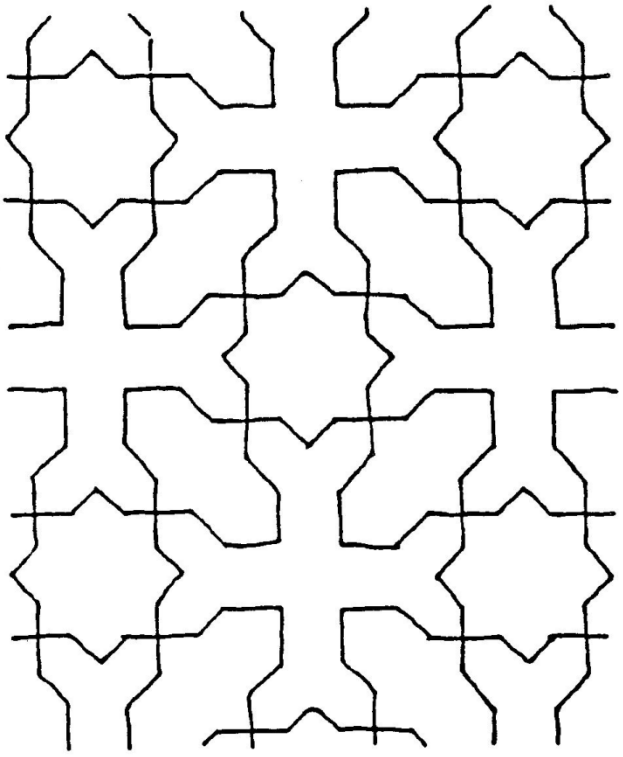


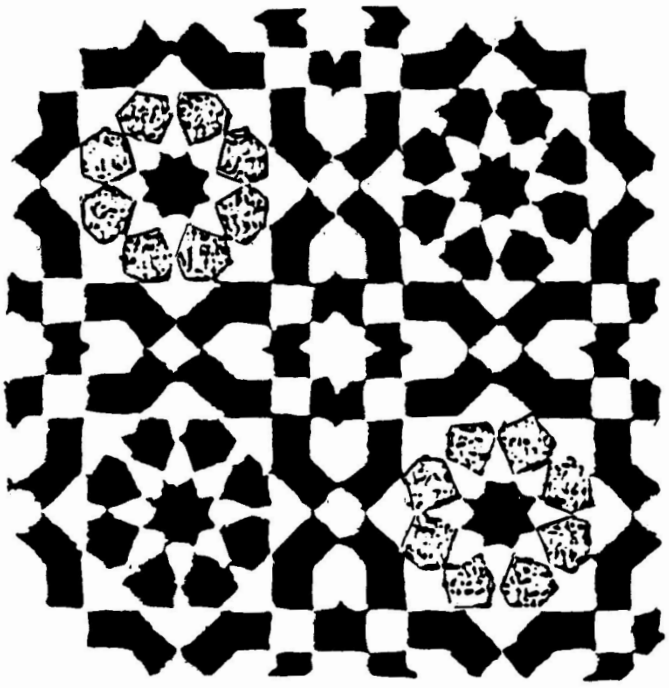
Inlaid panel from a door, Cairo, Egypt, 8th century.



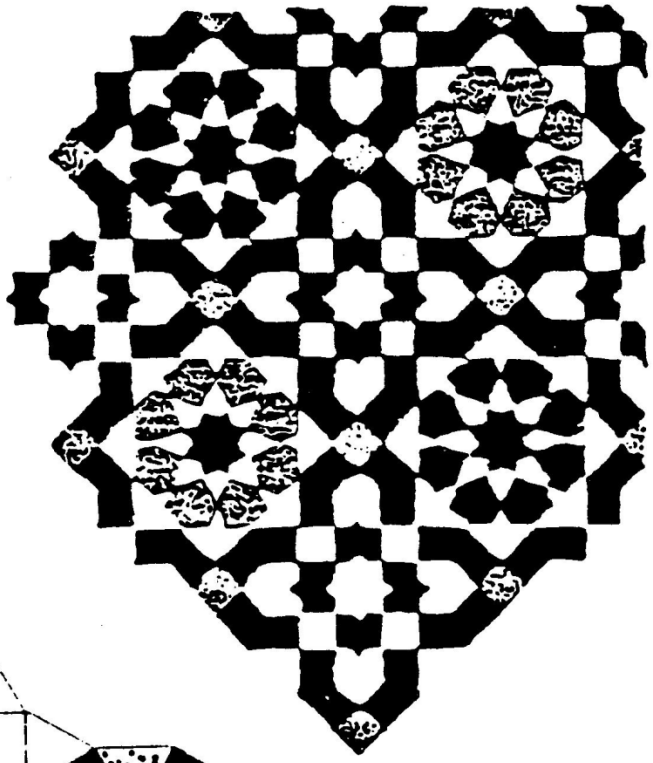


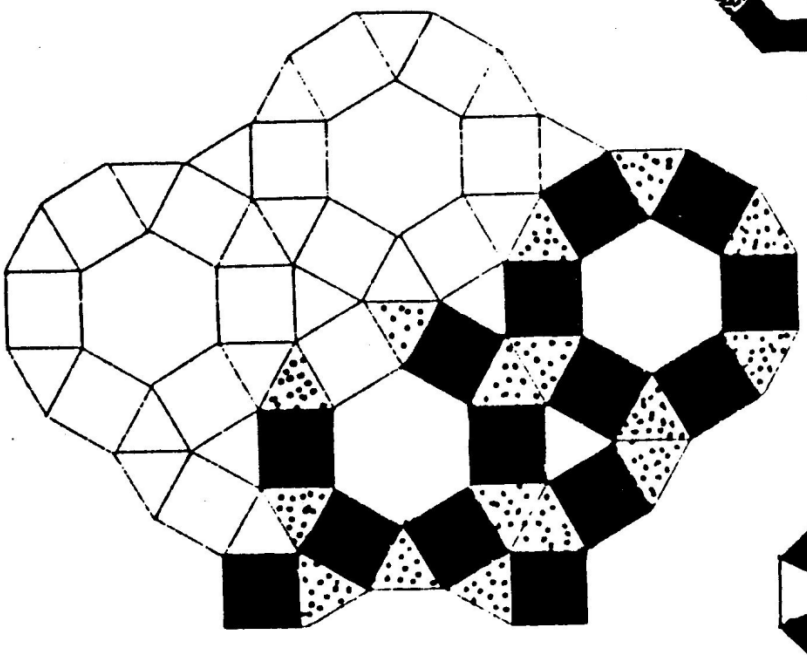


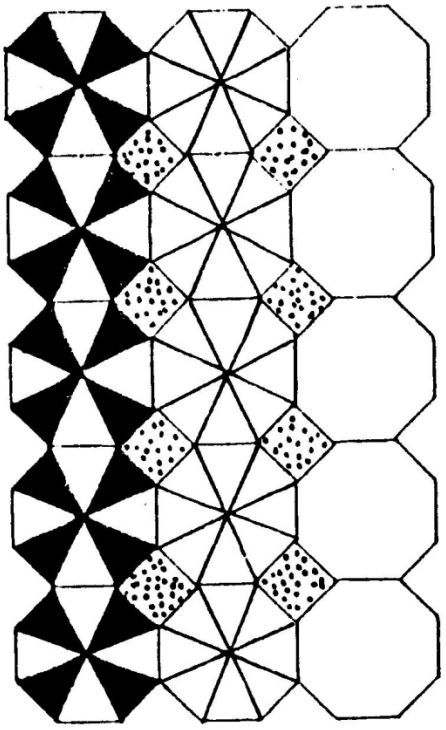


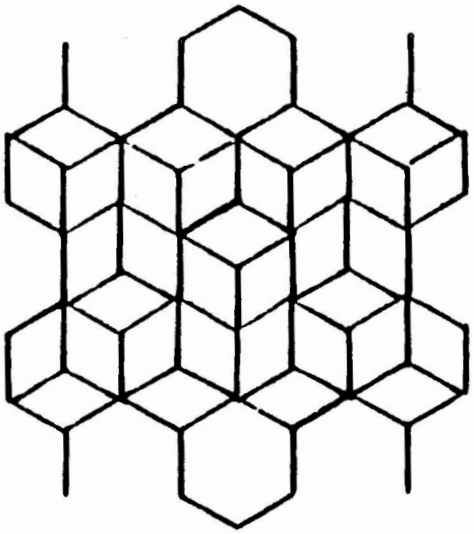


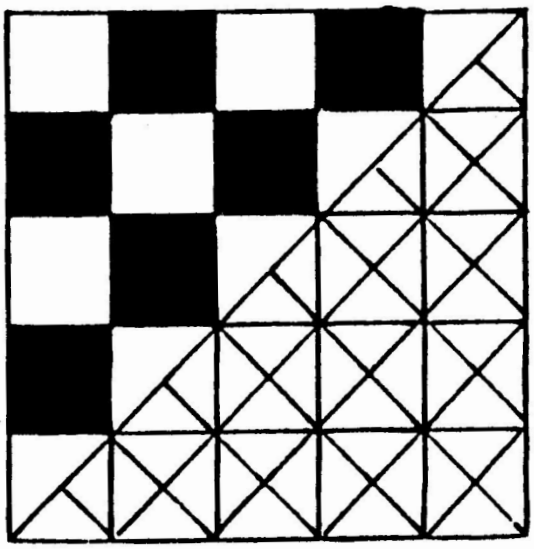
Pattern derived from star and cross.

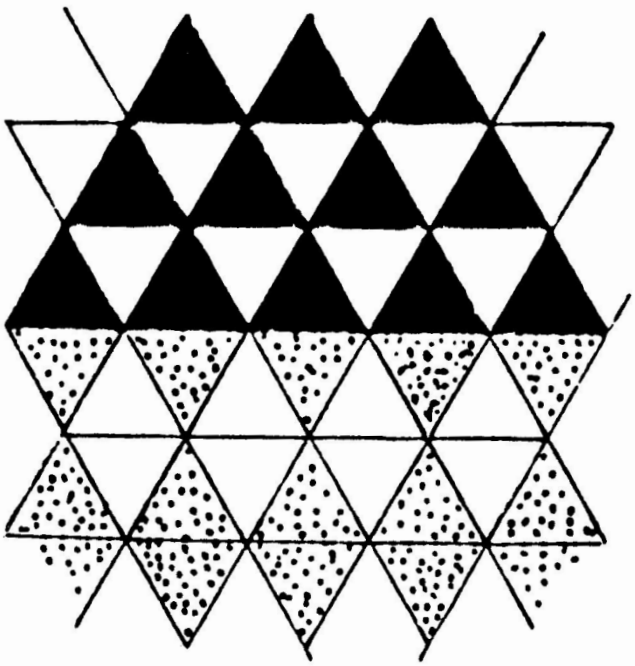


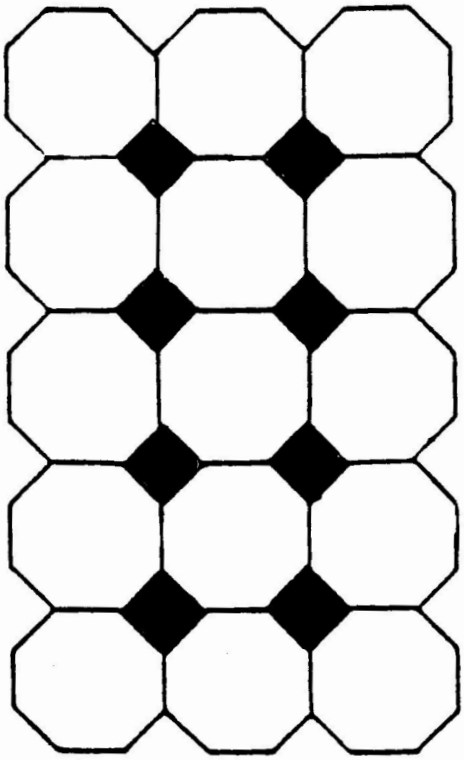


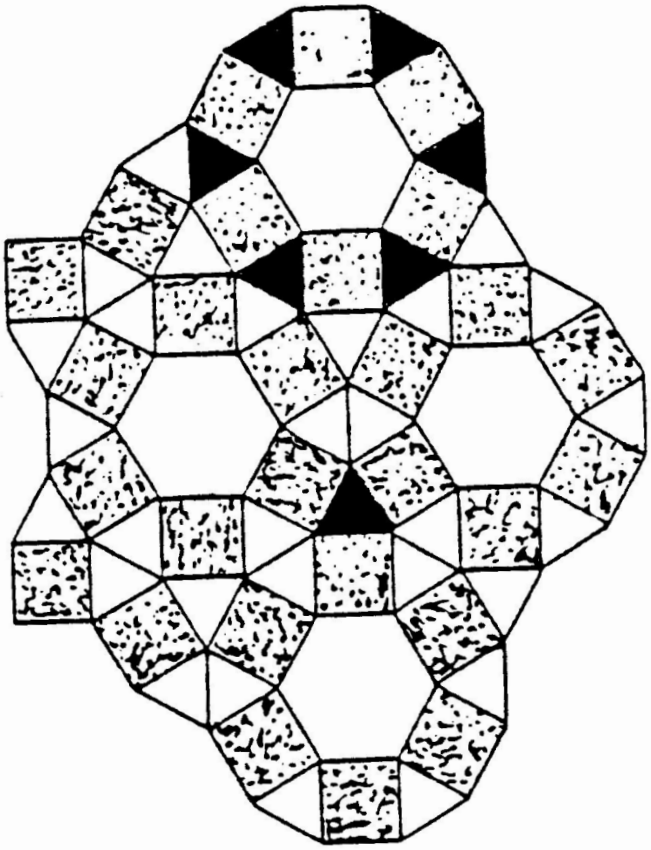


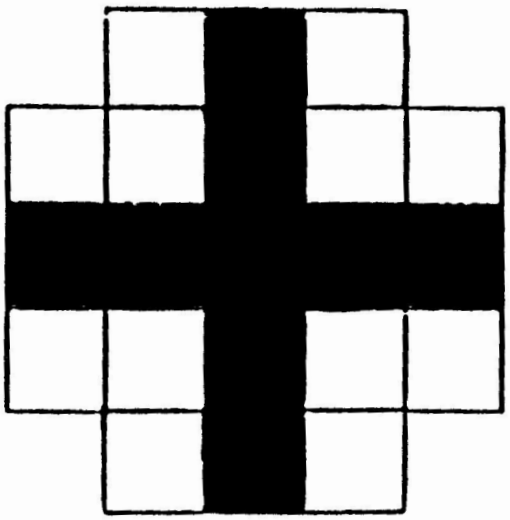


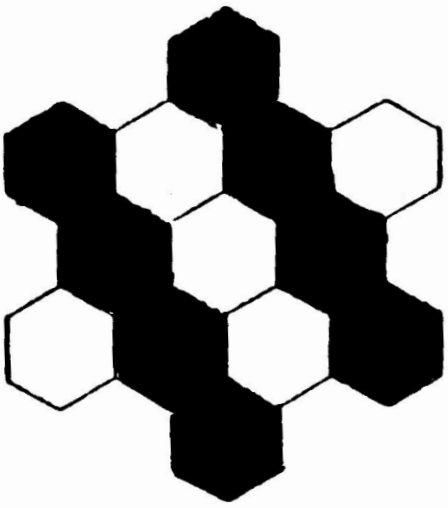


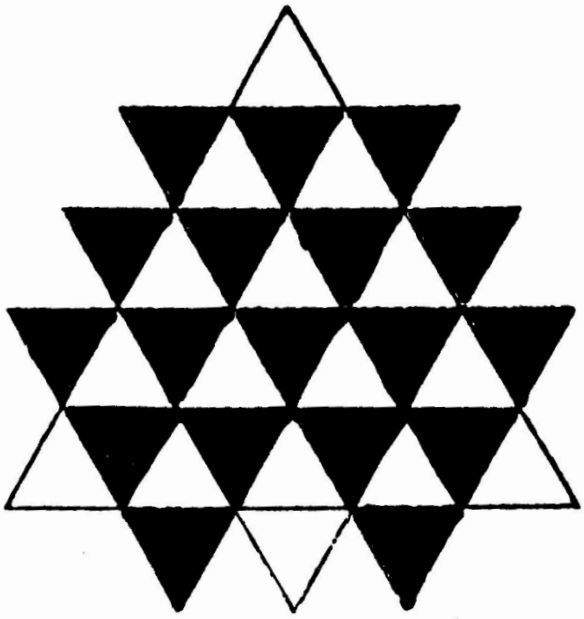


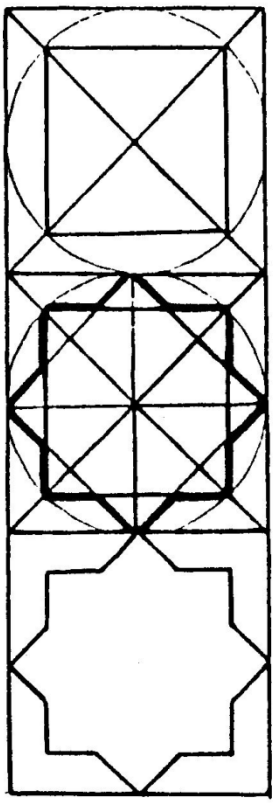


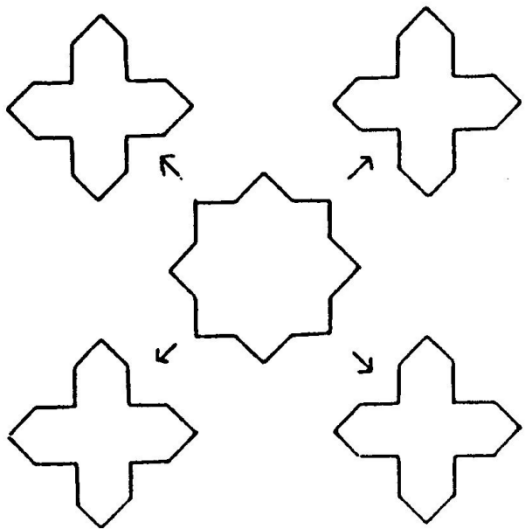


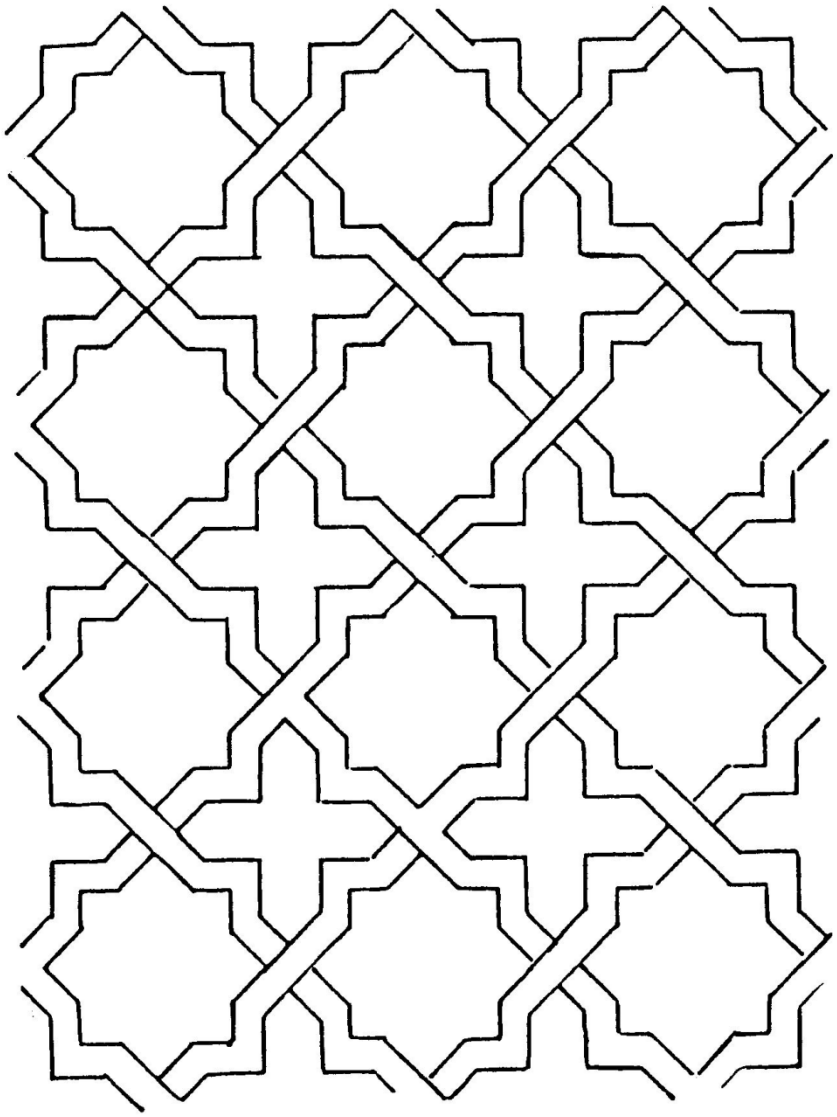


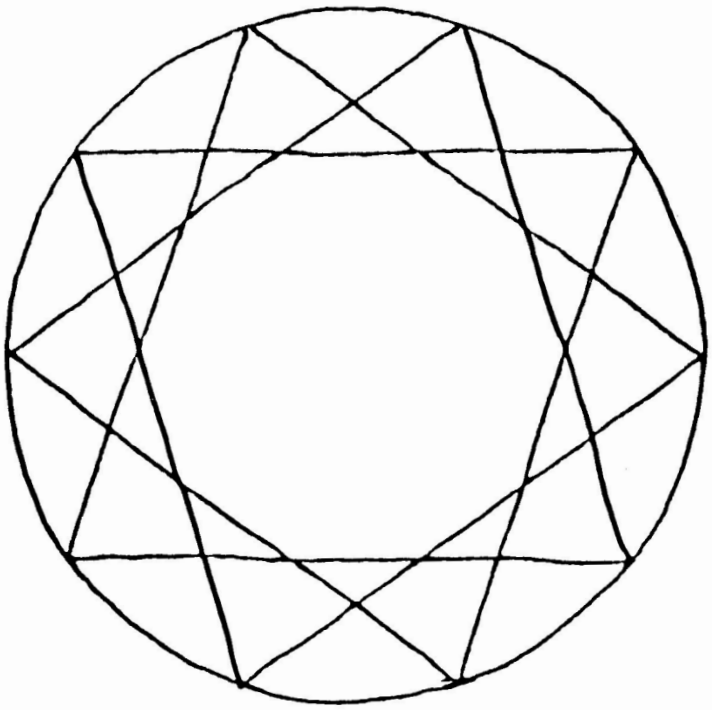




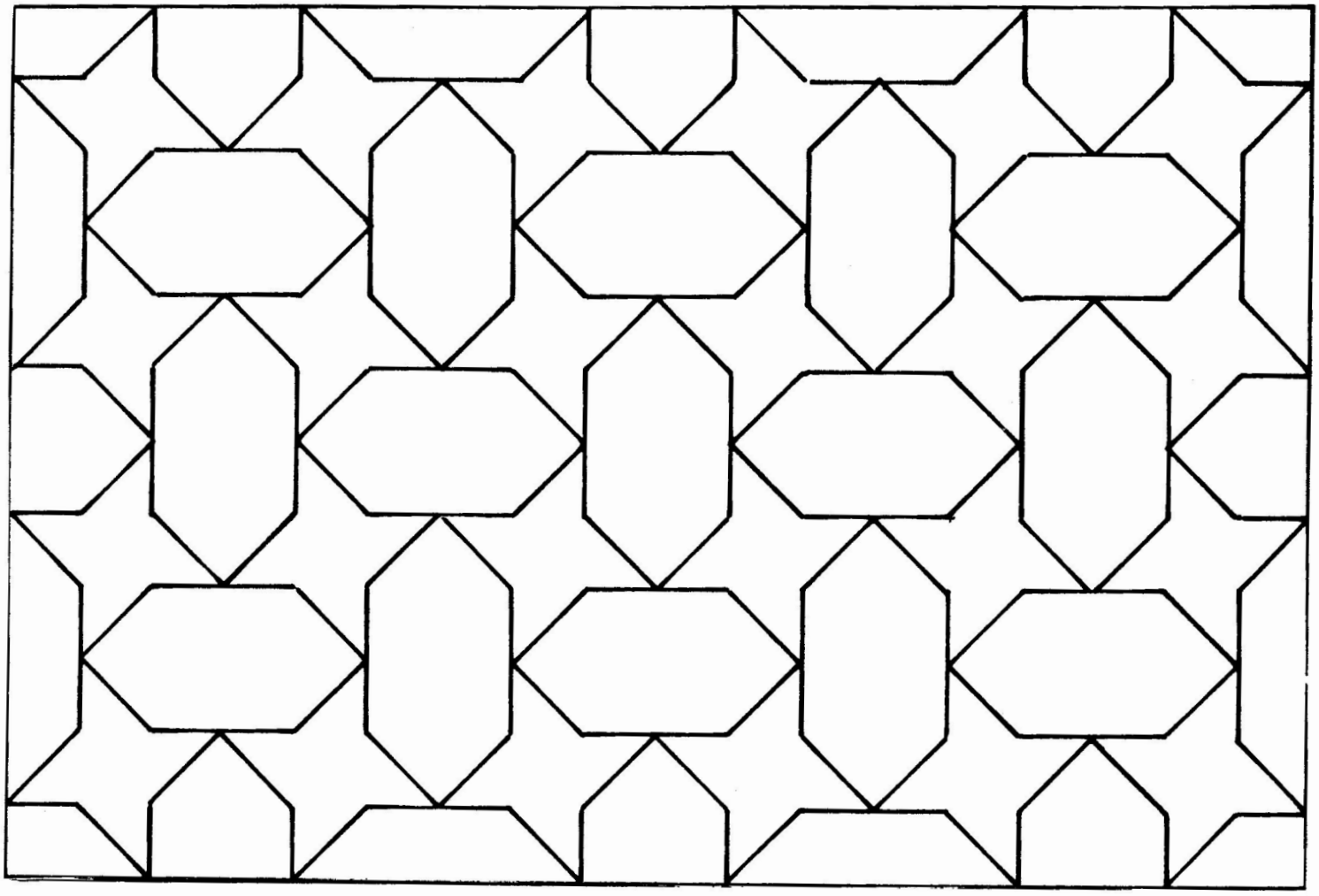


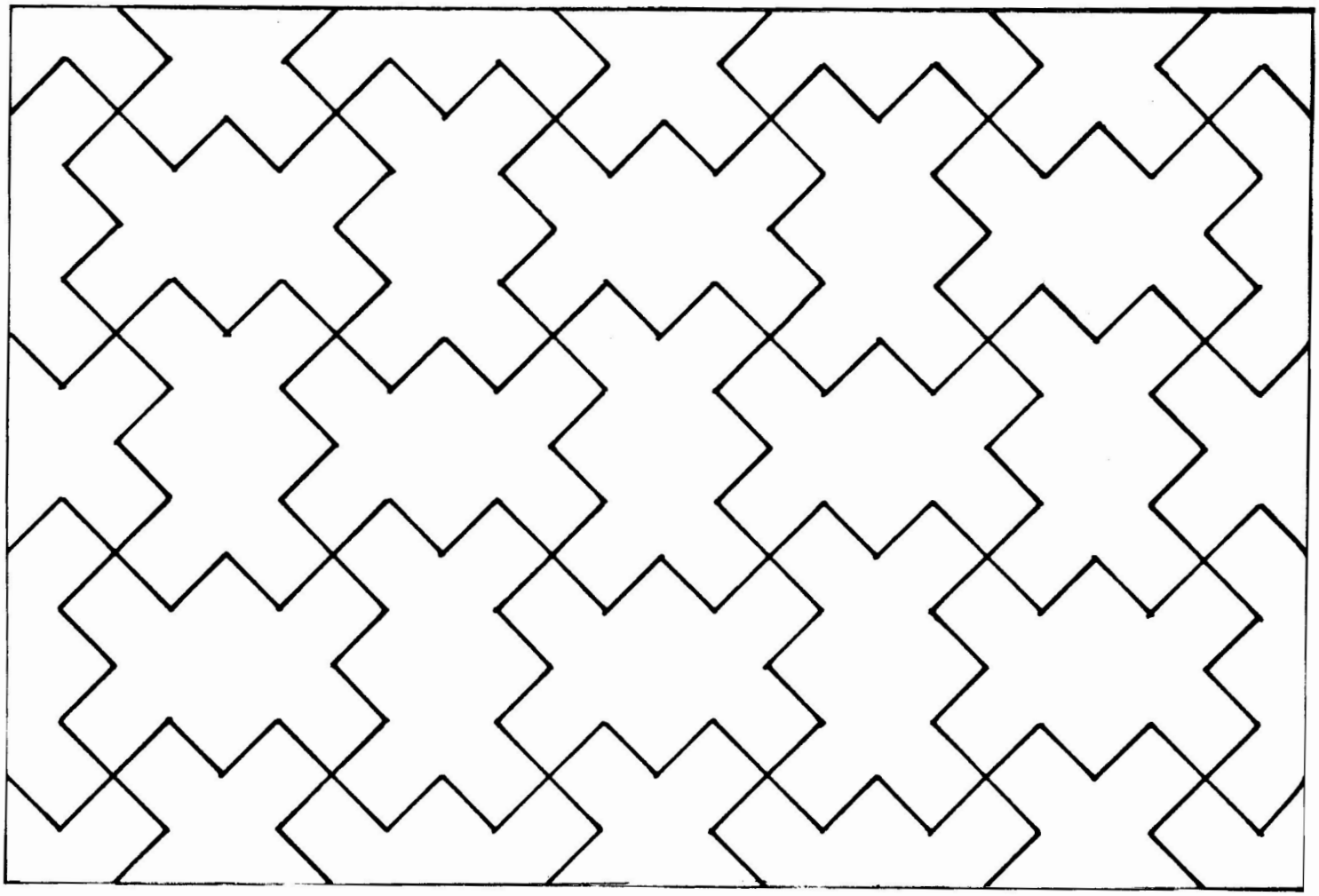


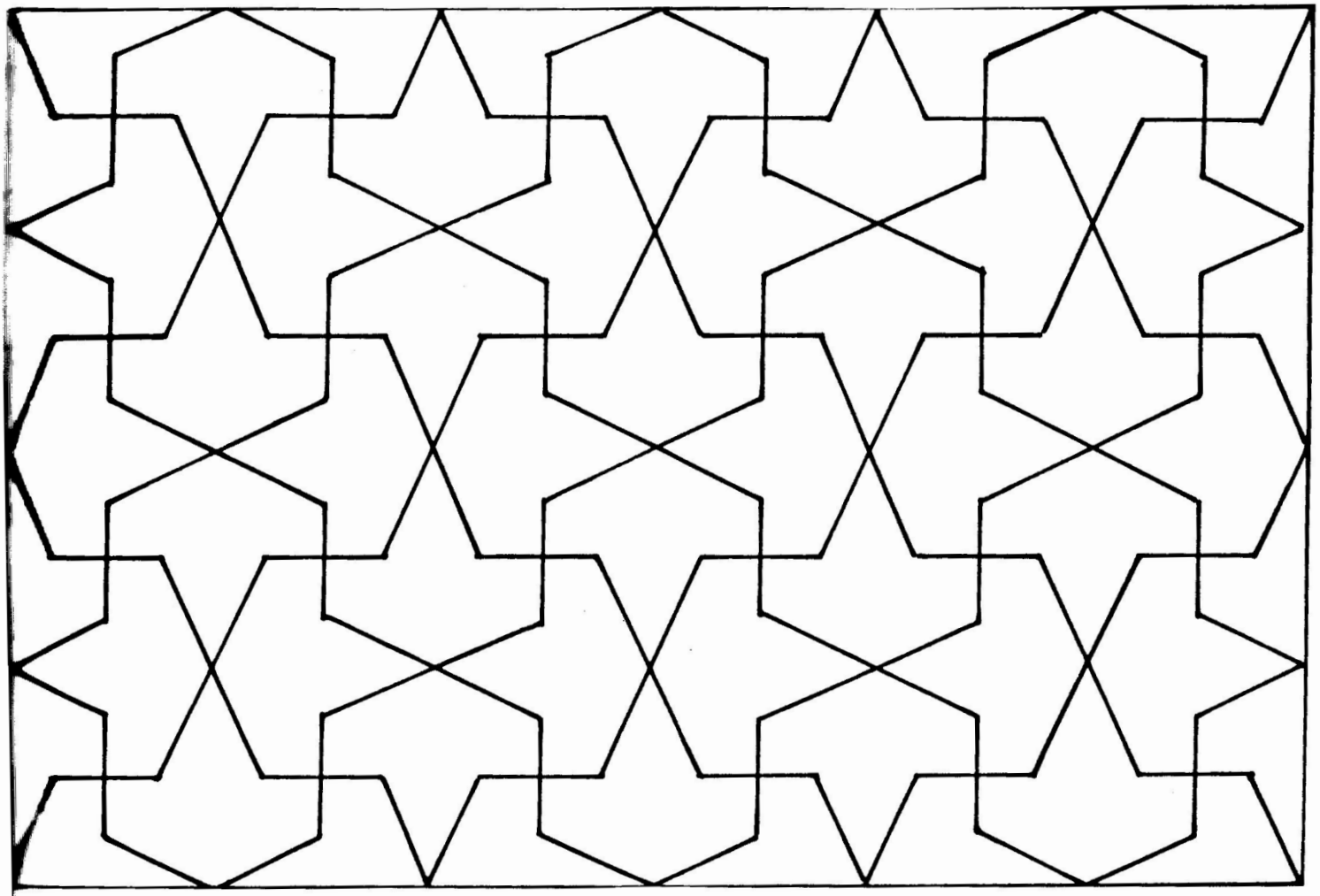


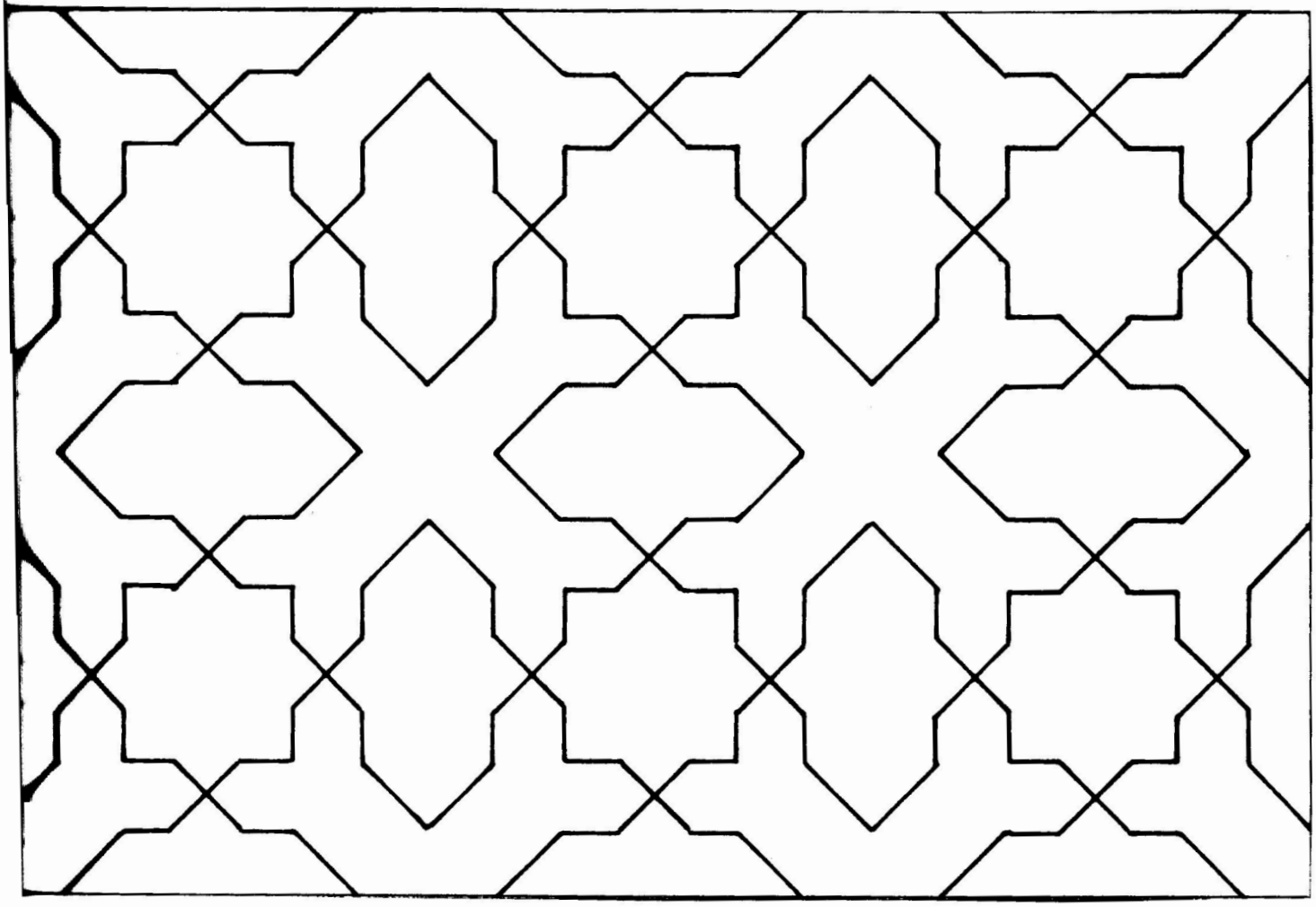


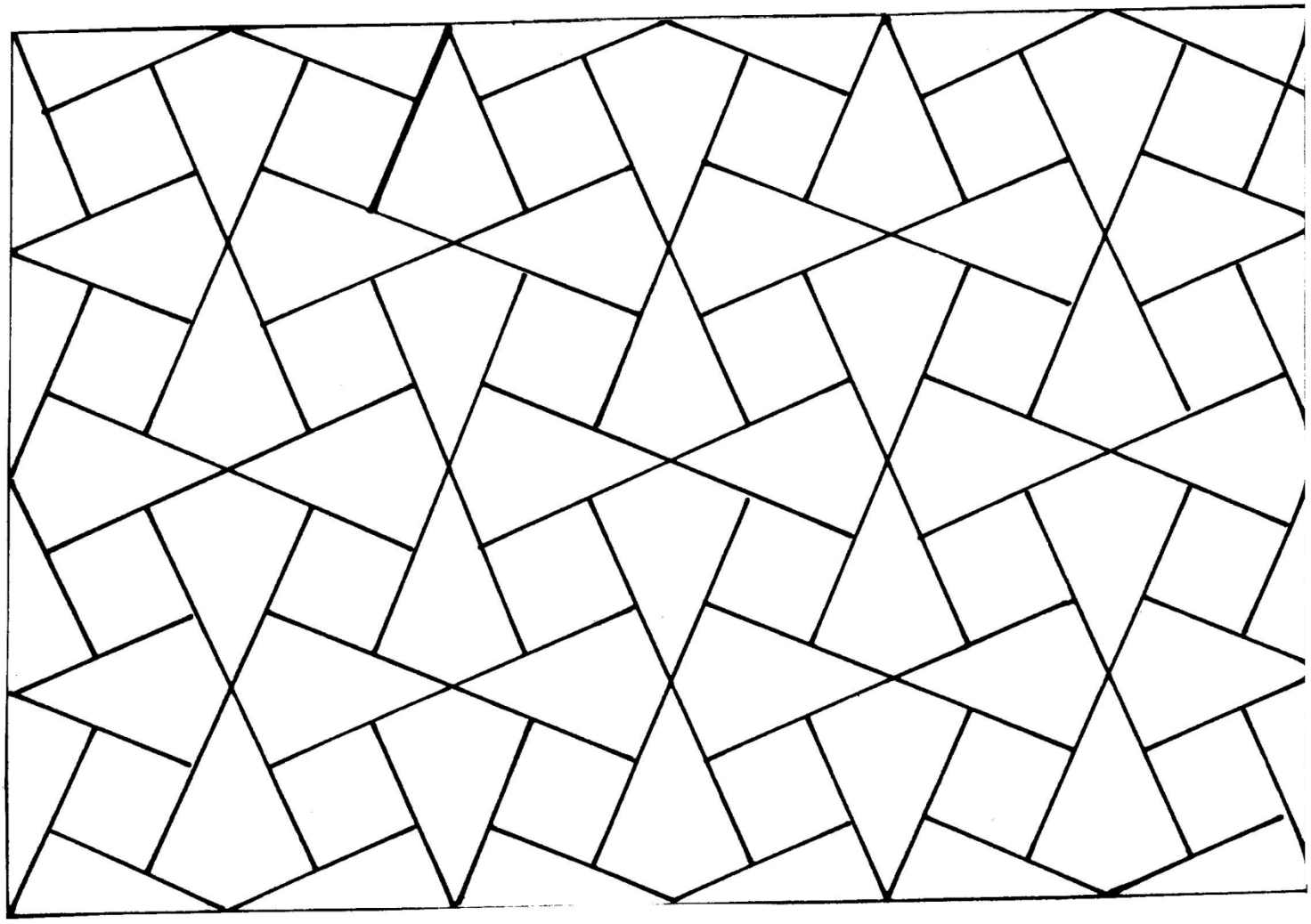
The sub-divided circle of Islamic pattern-making.

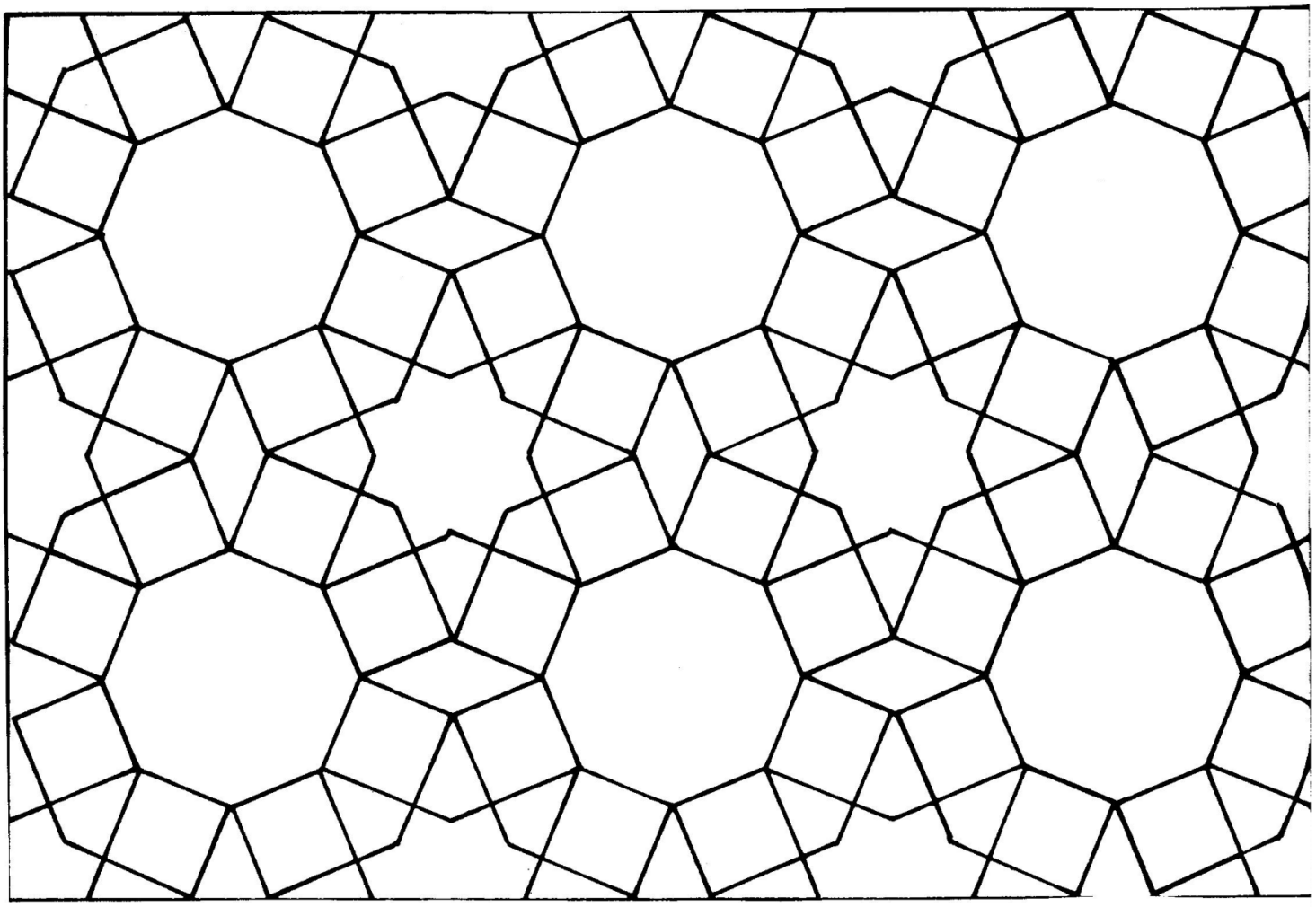


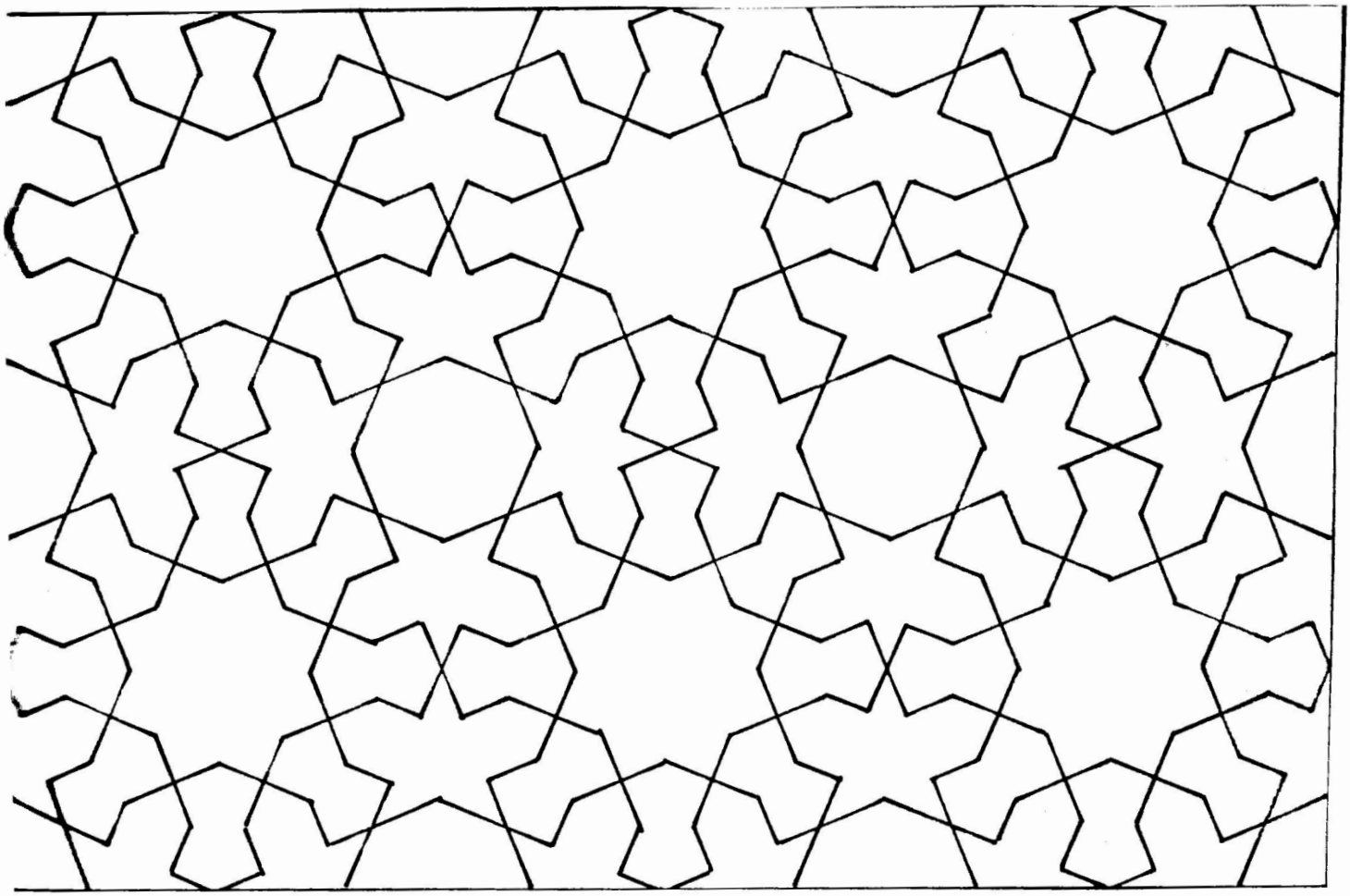


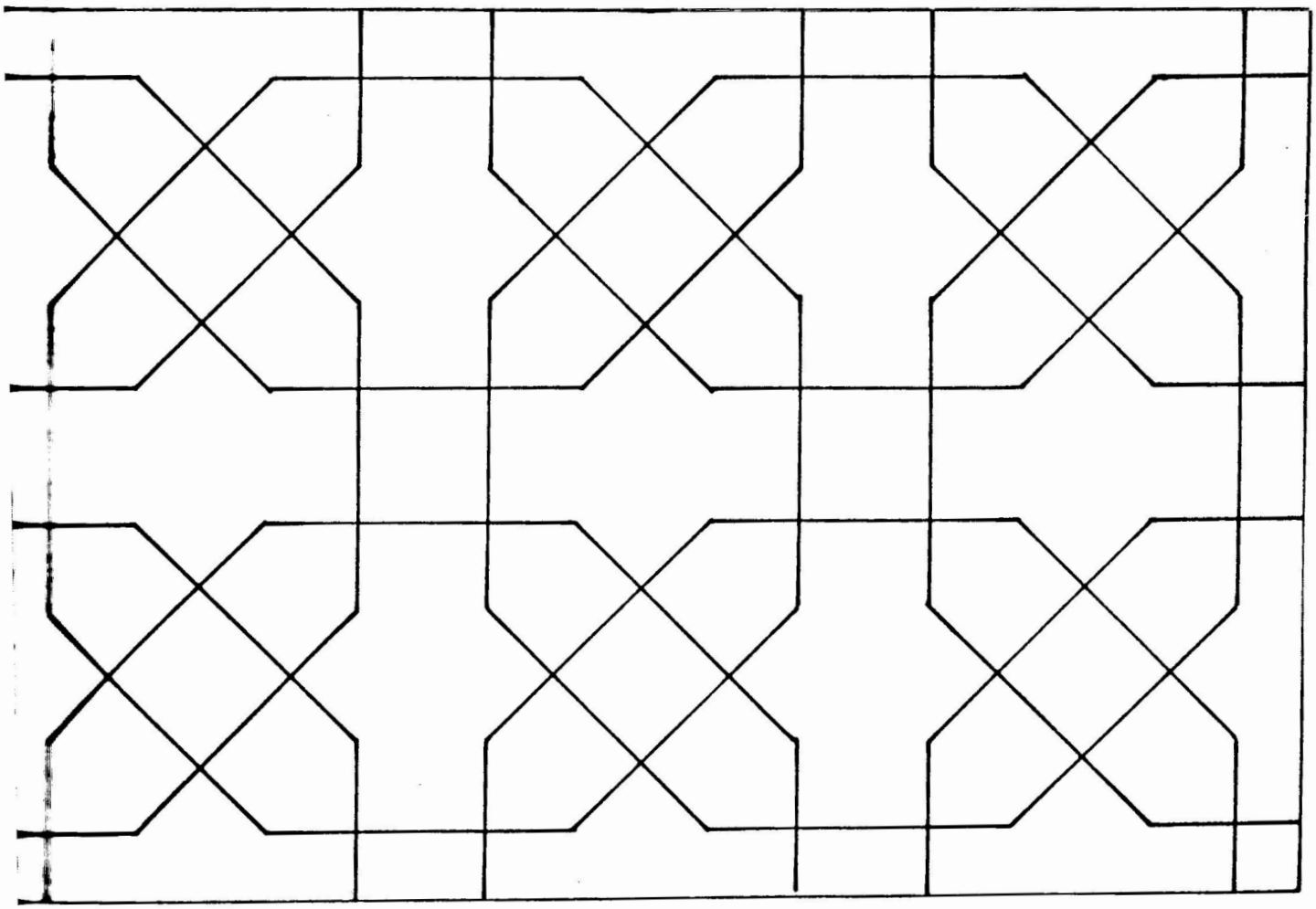


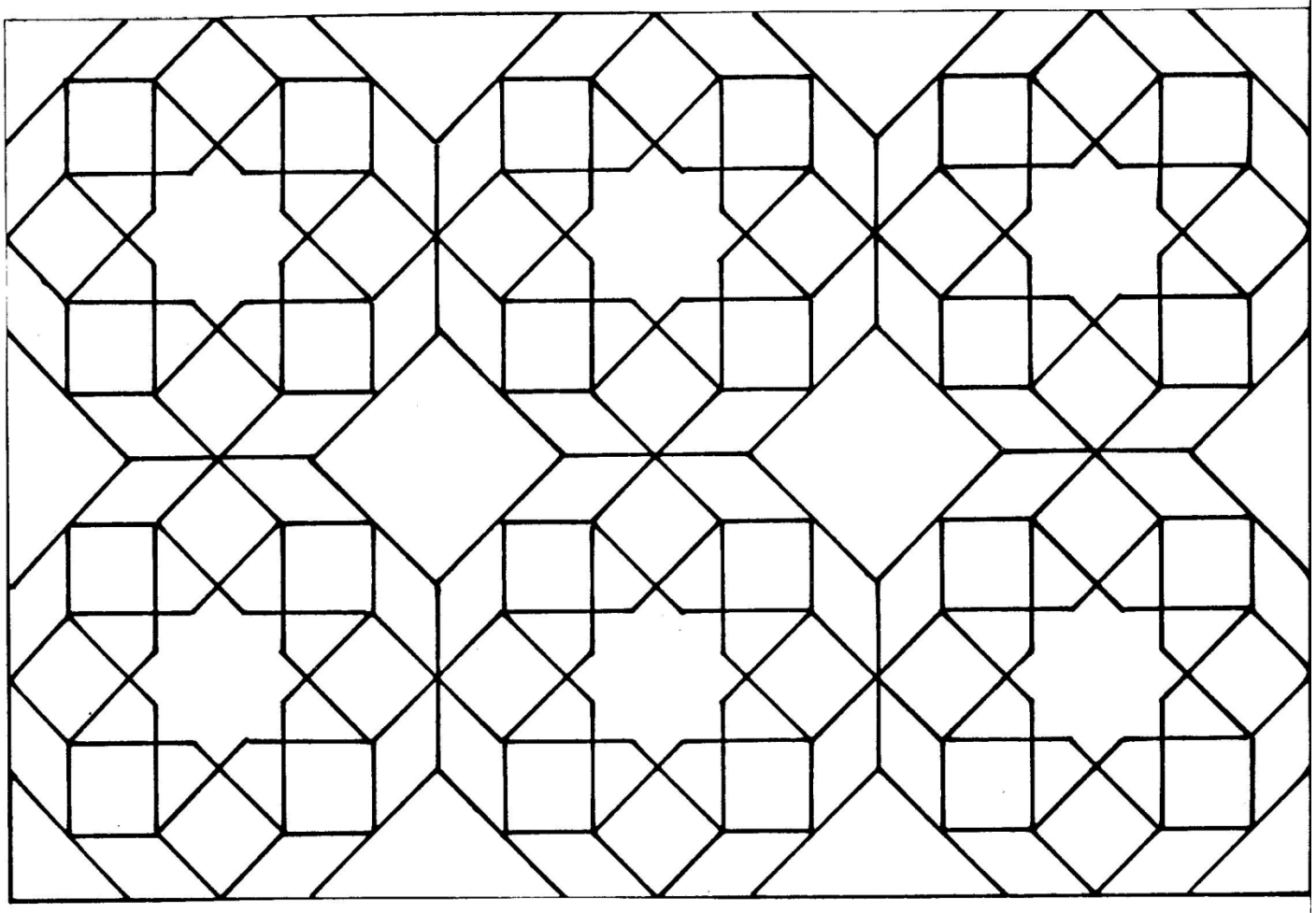


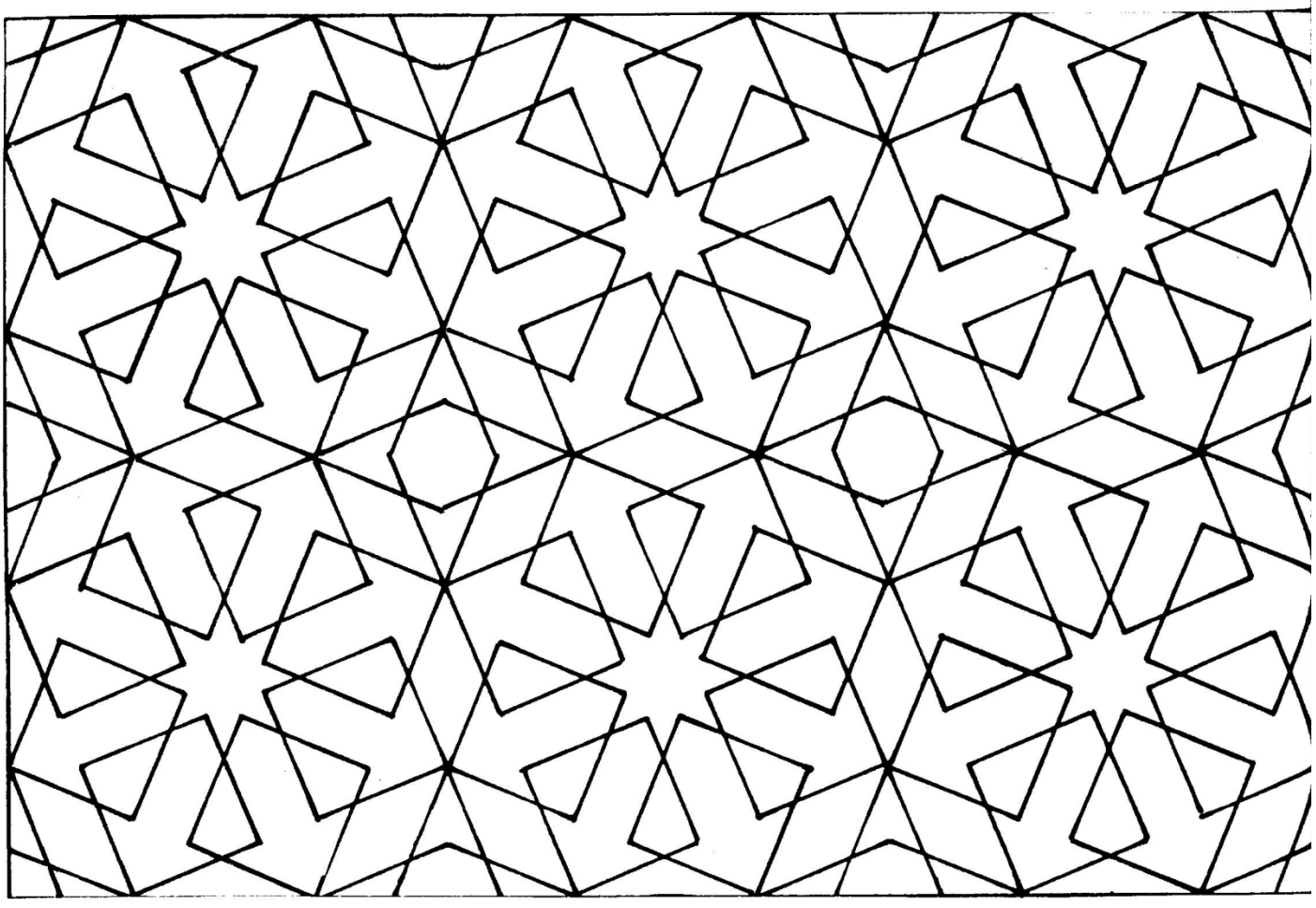


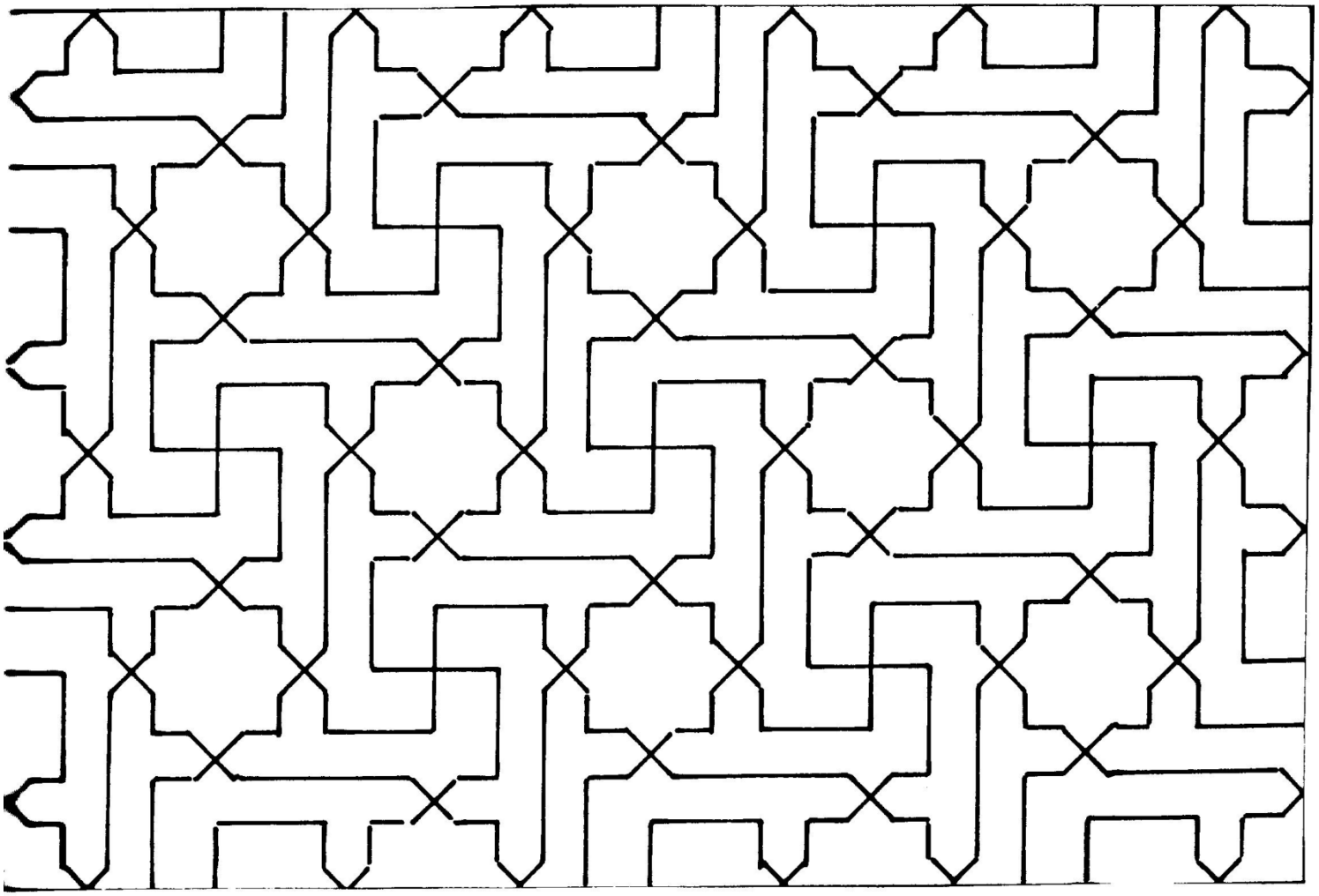


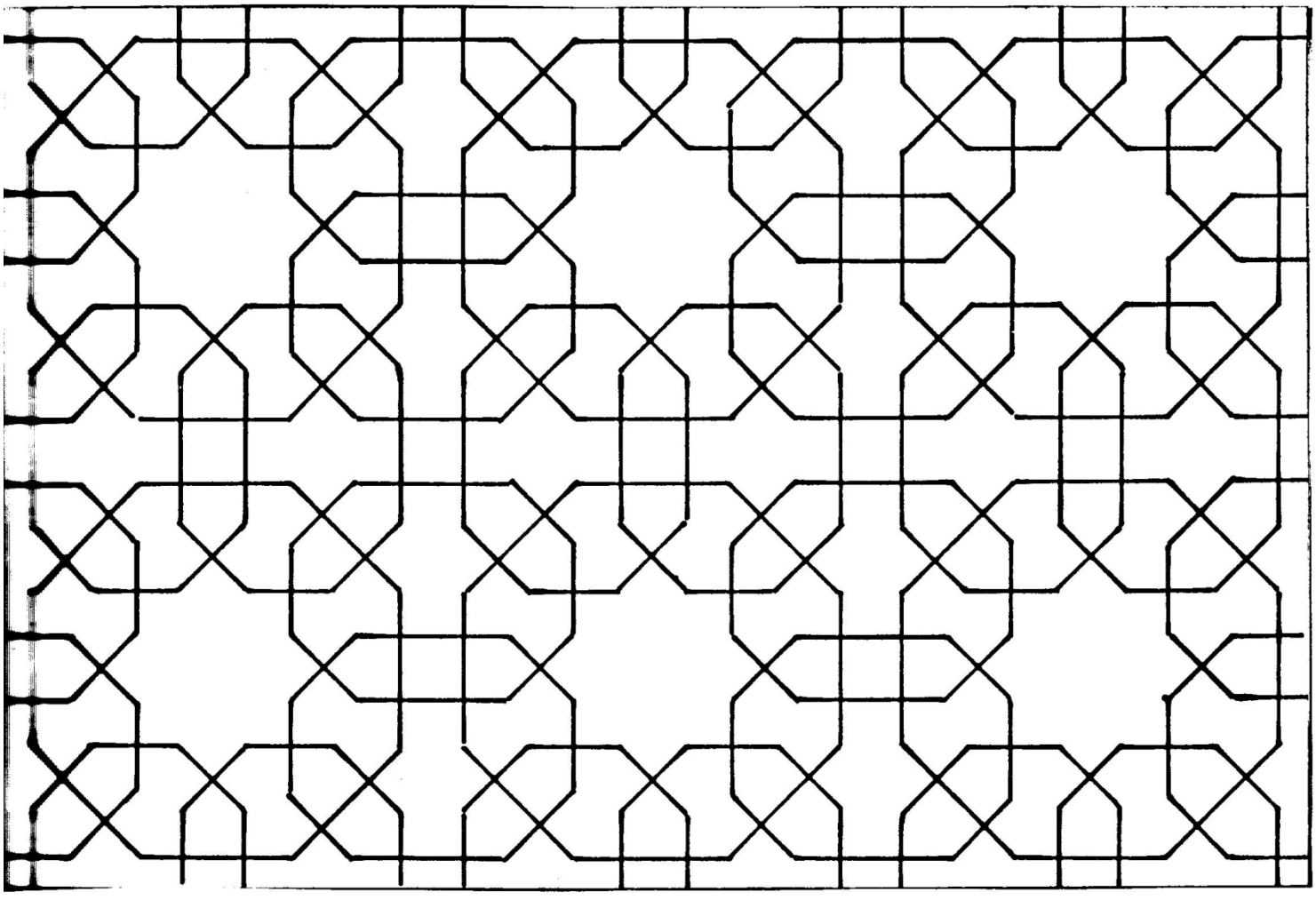


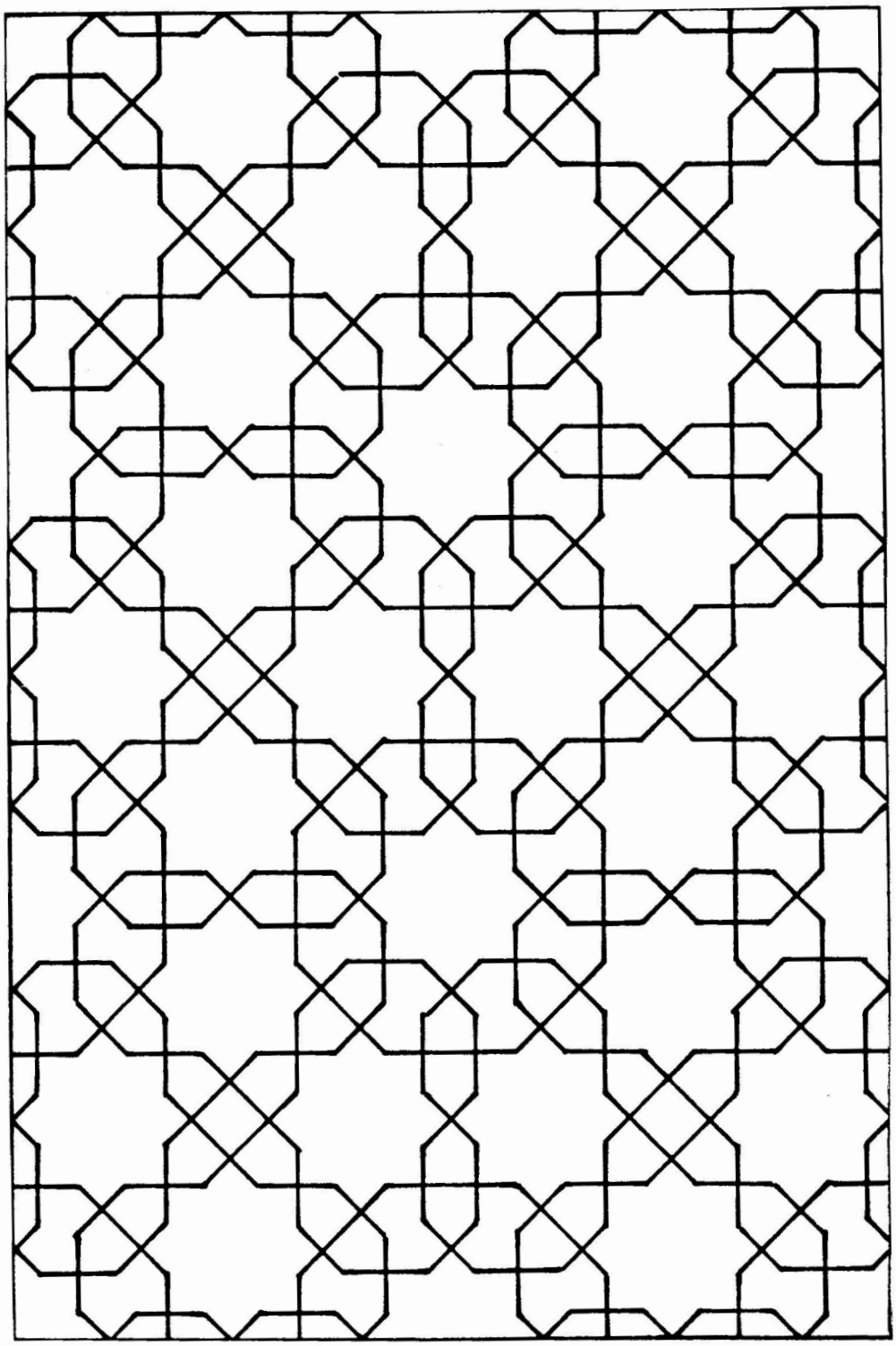


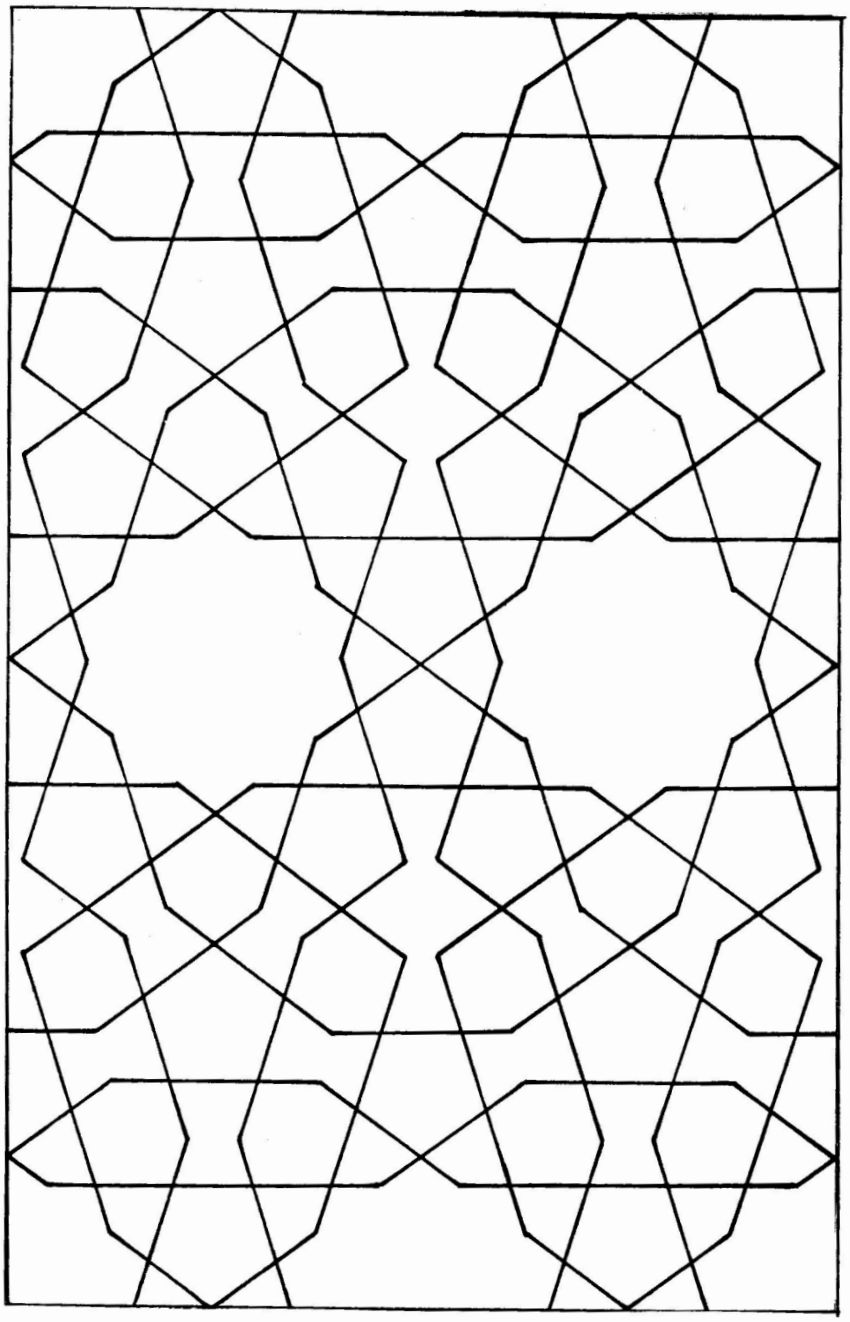


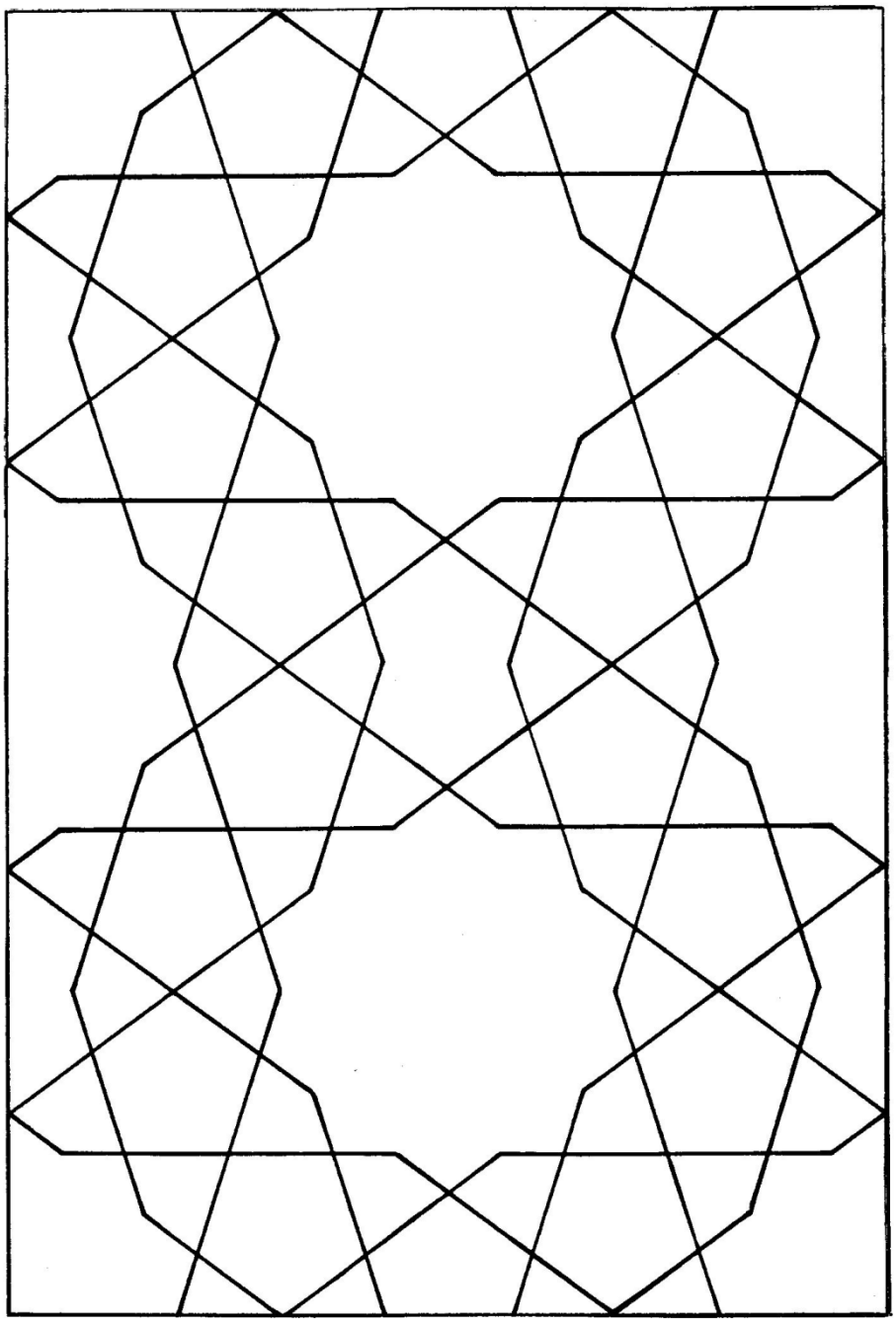


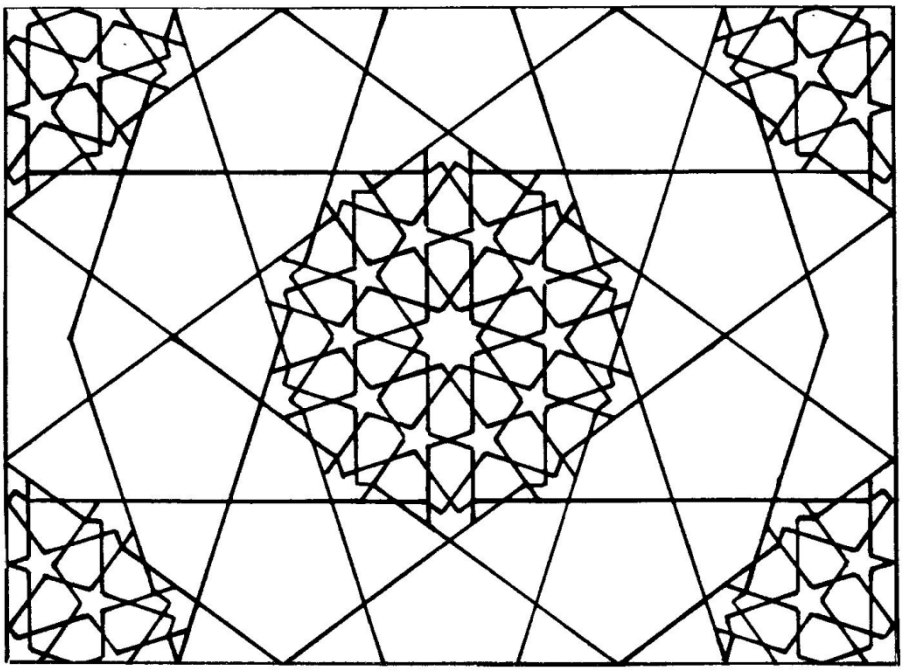


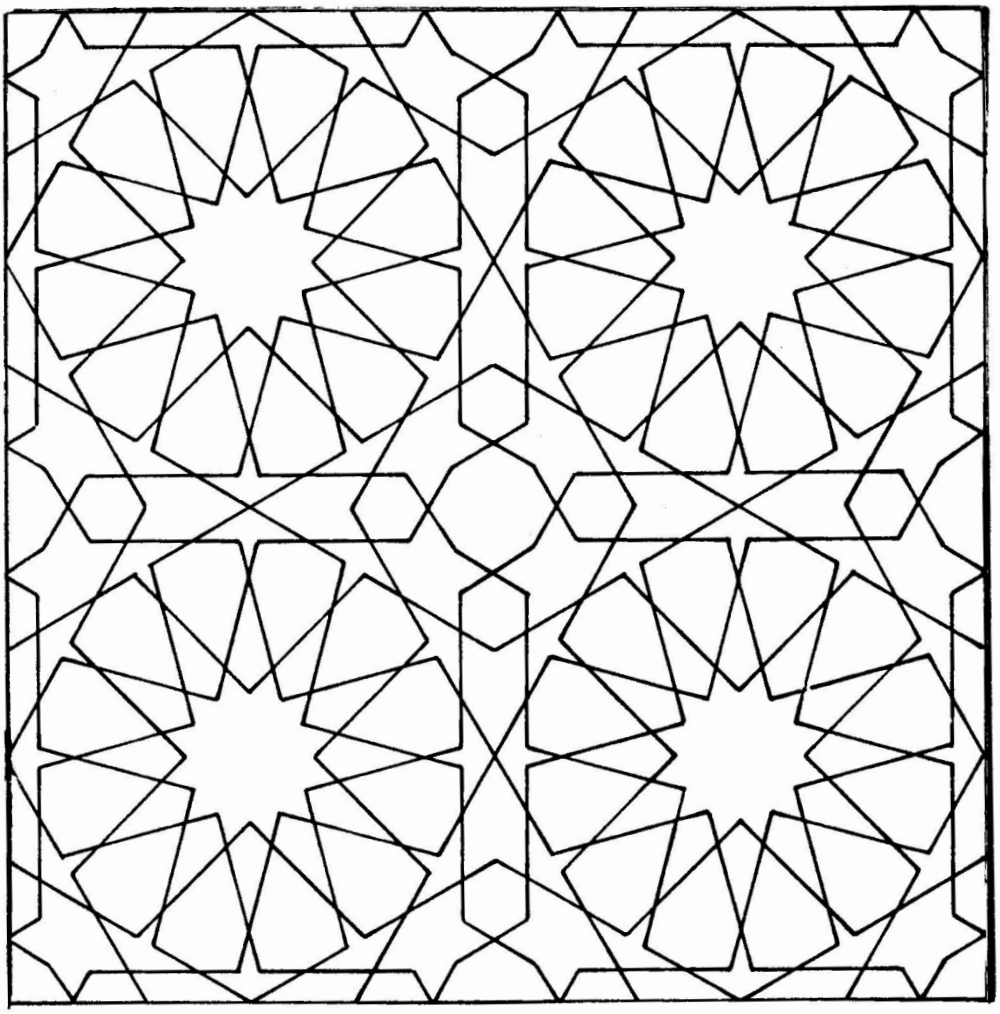


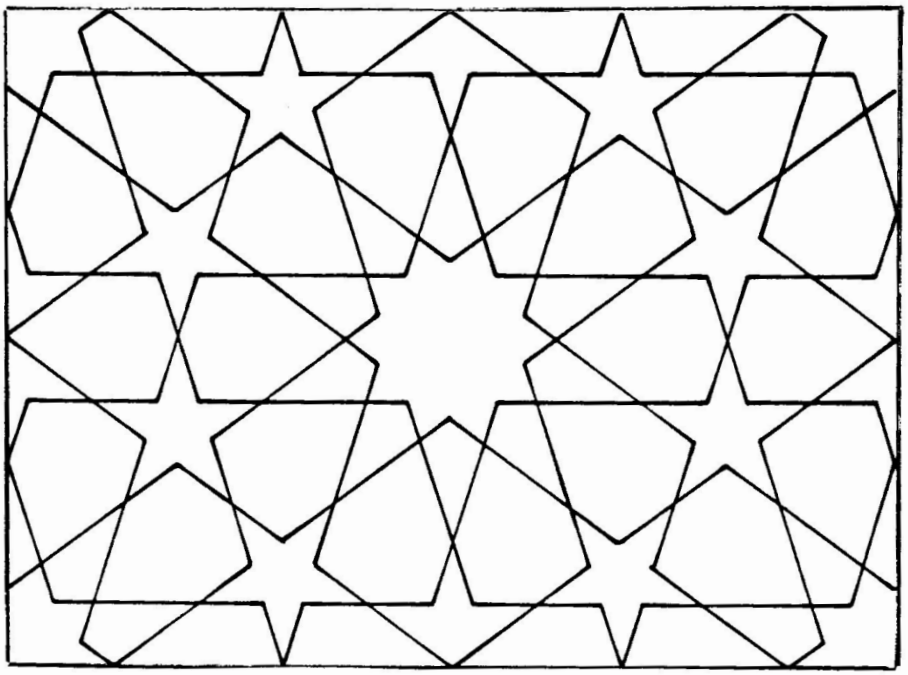


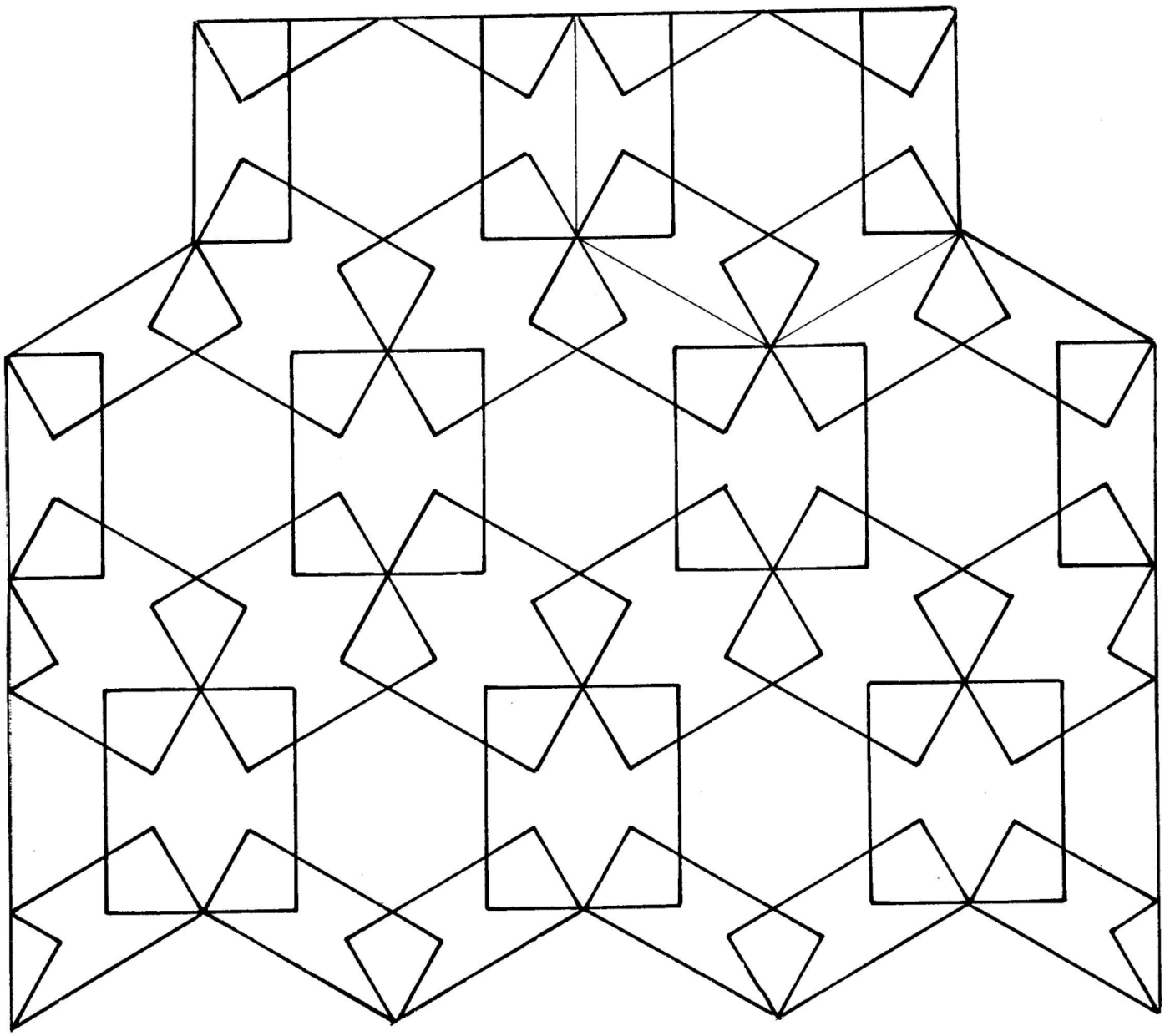


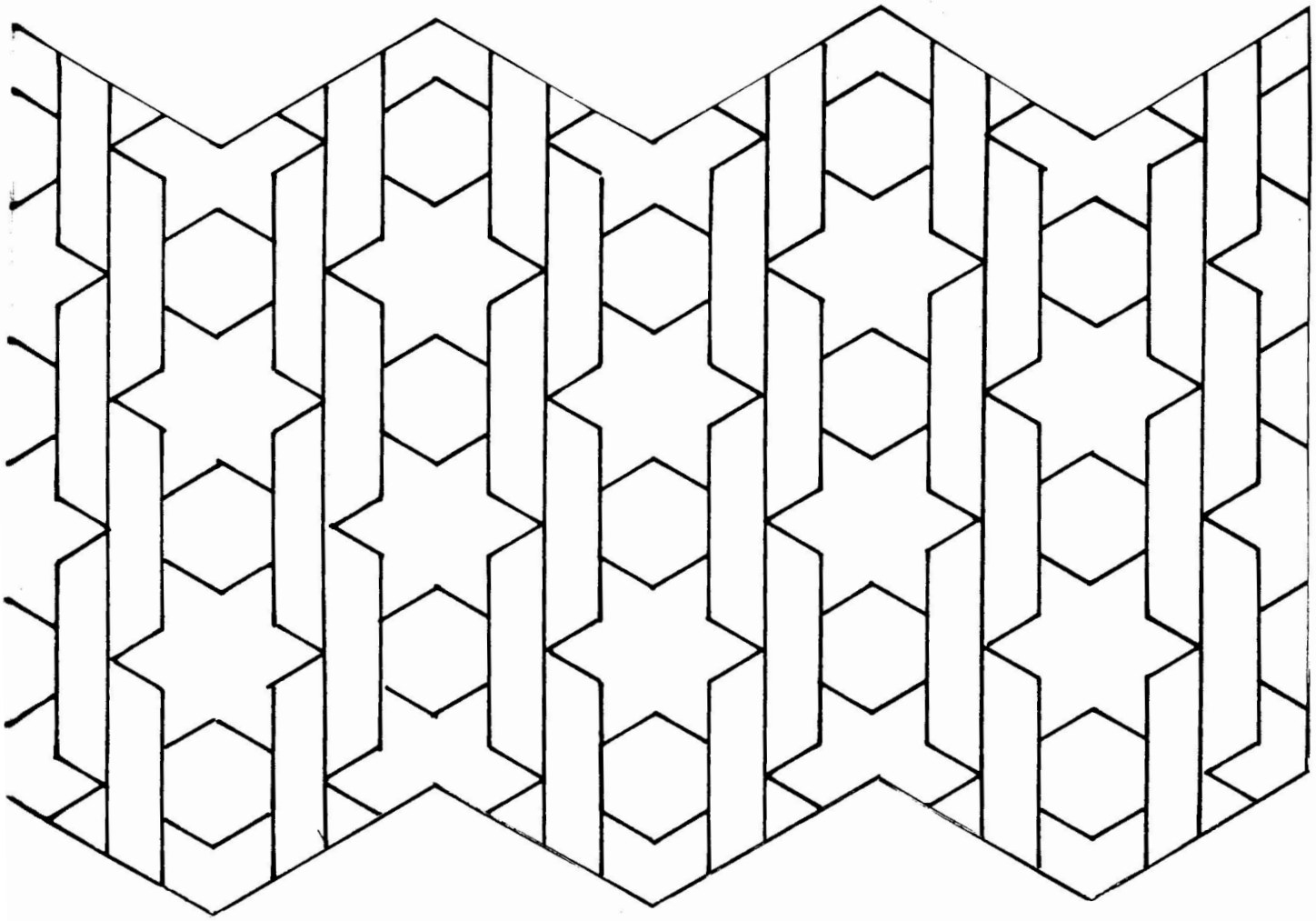


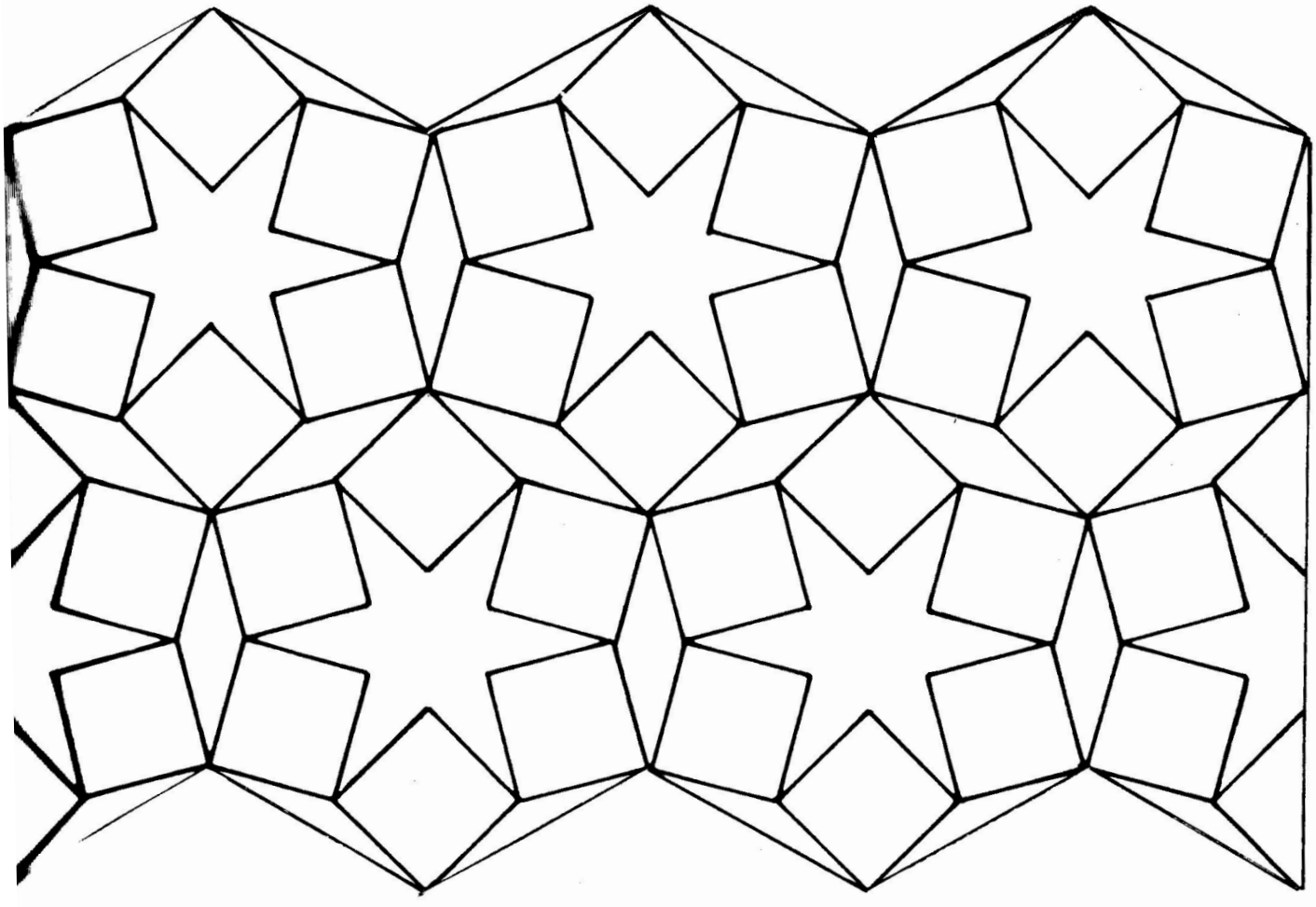


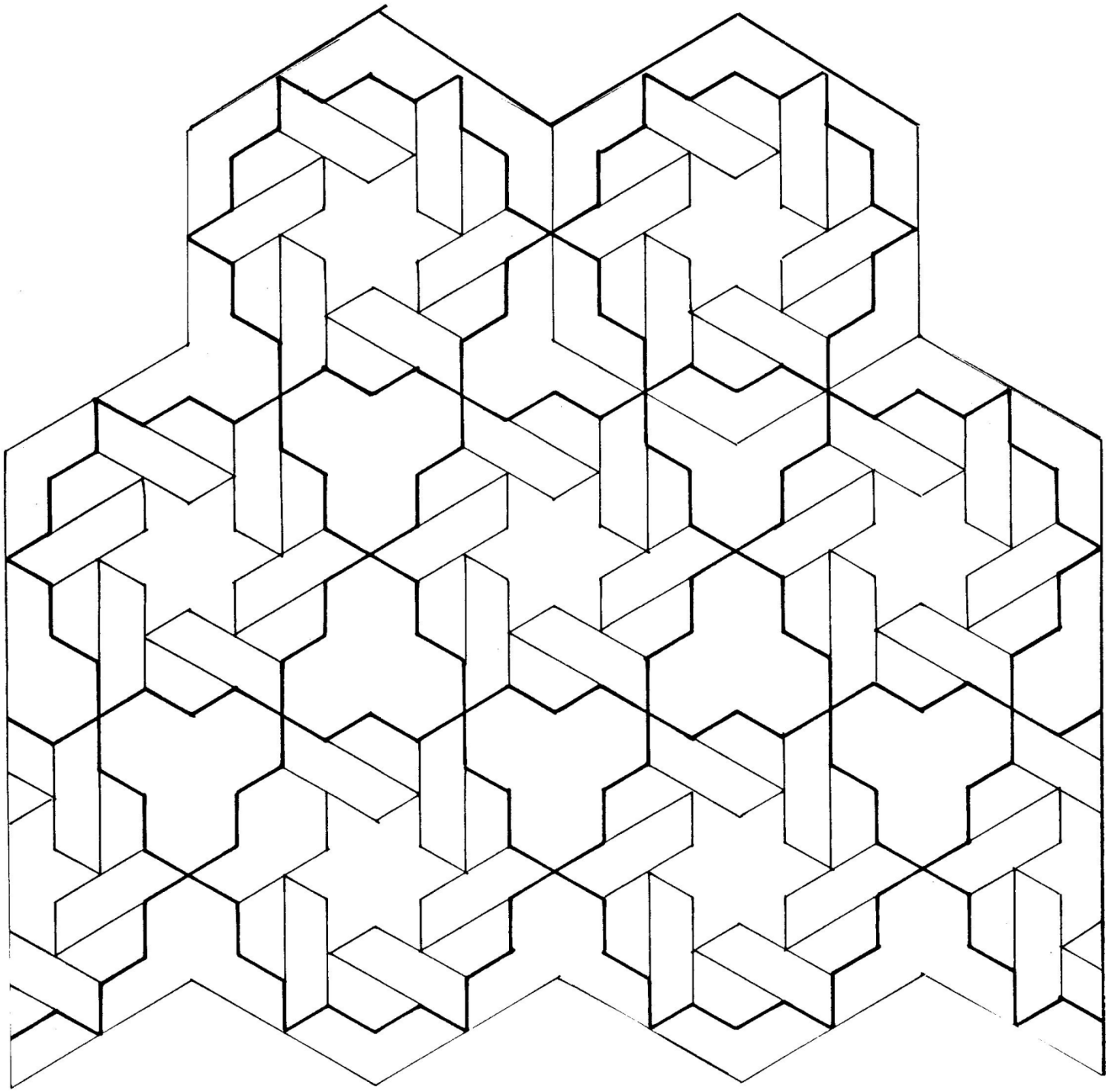


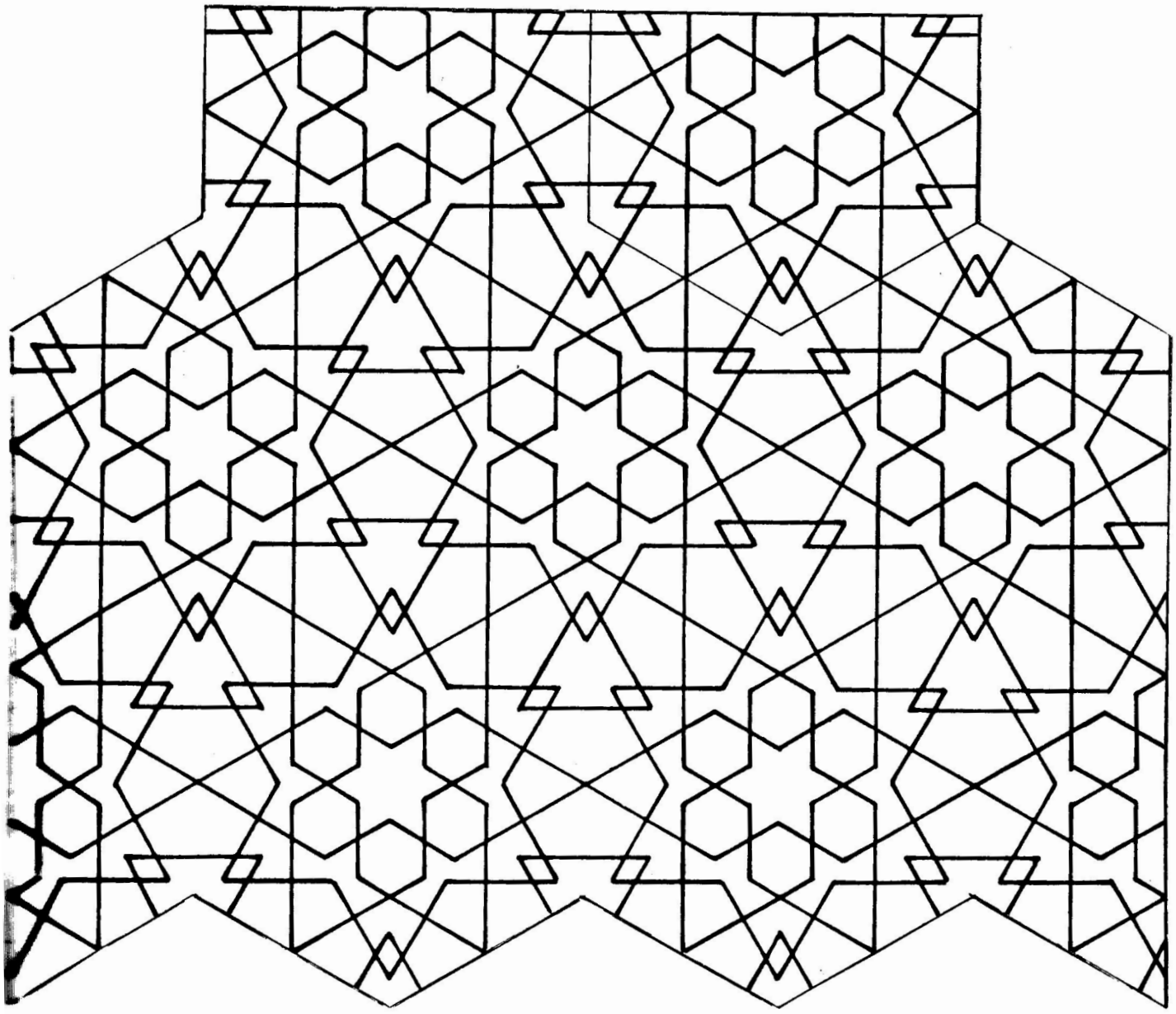


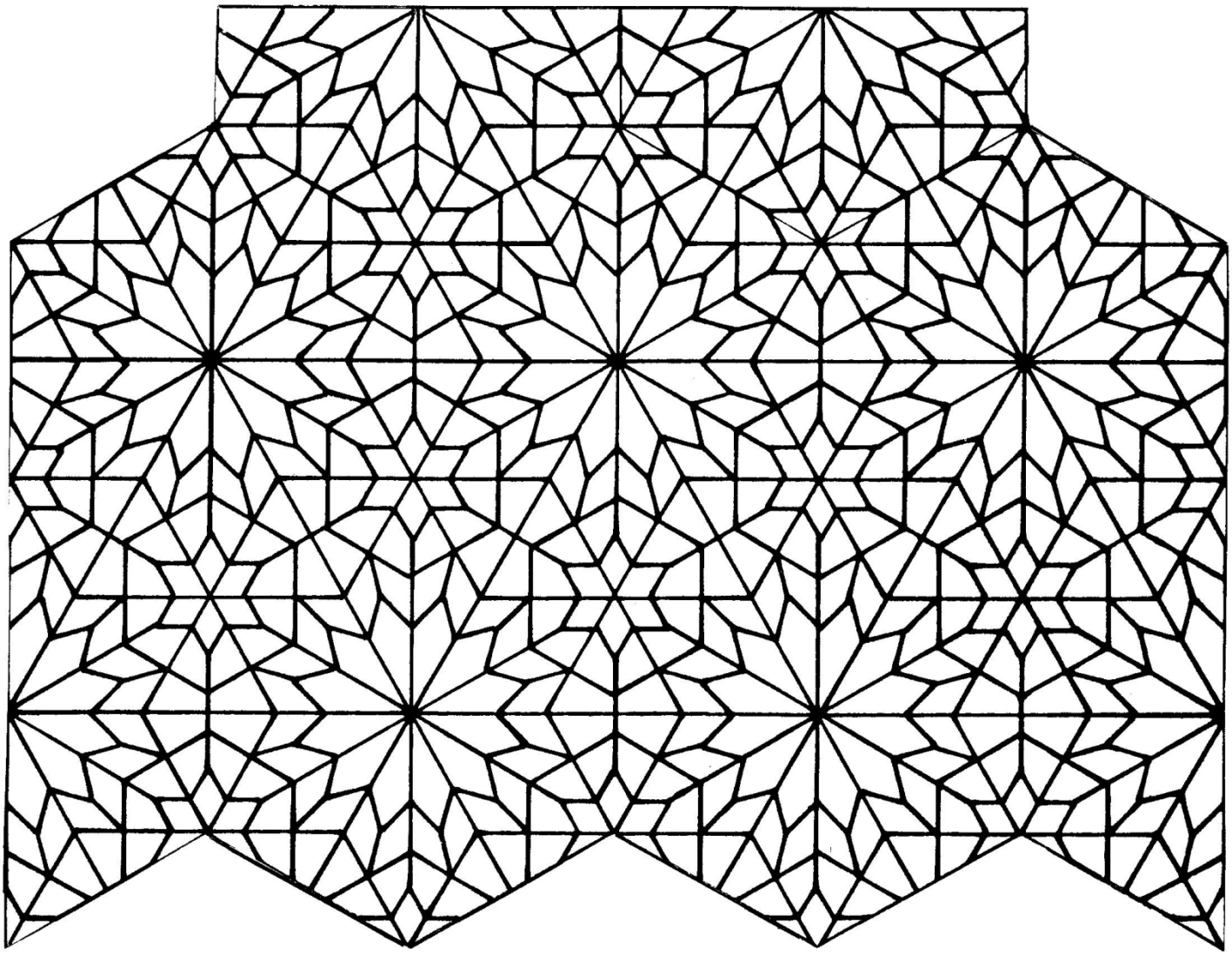


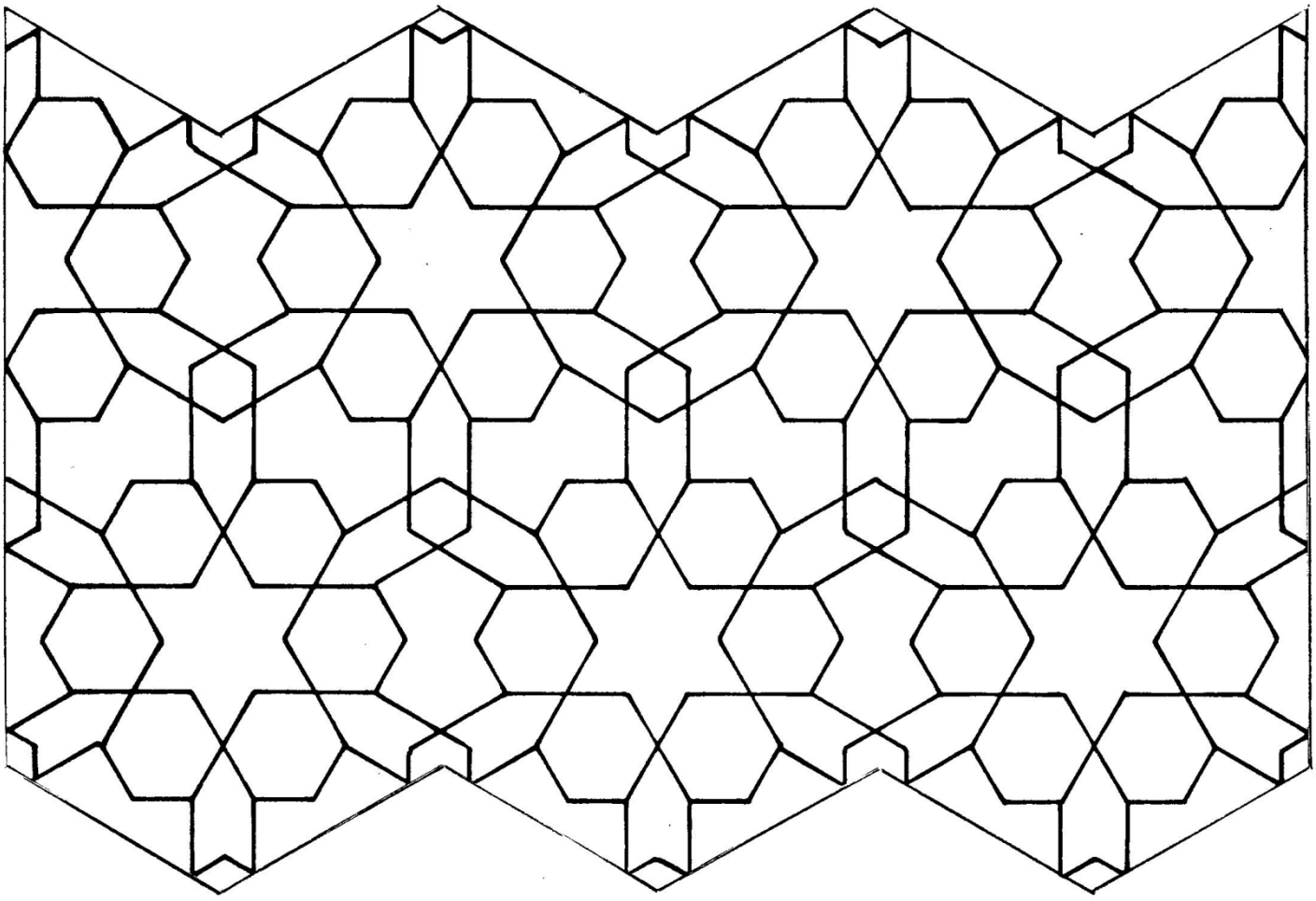


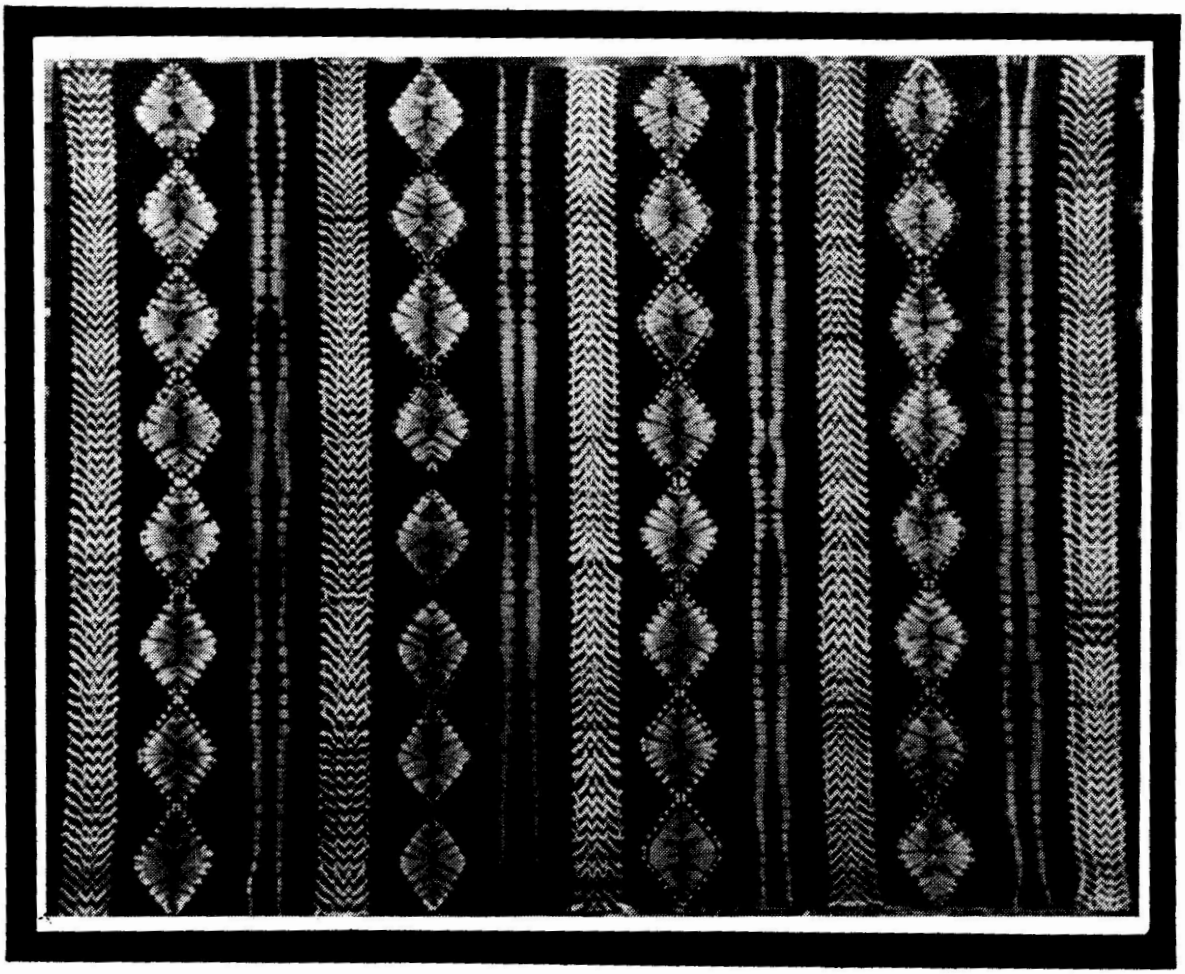










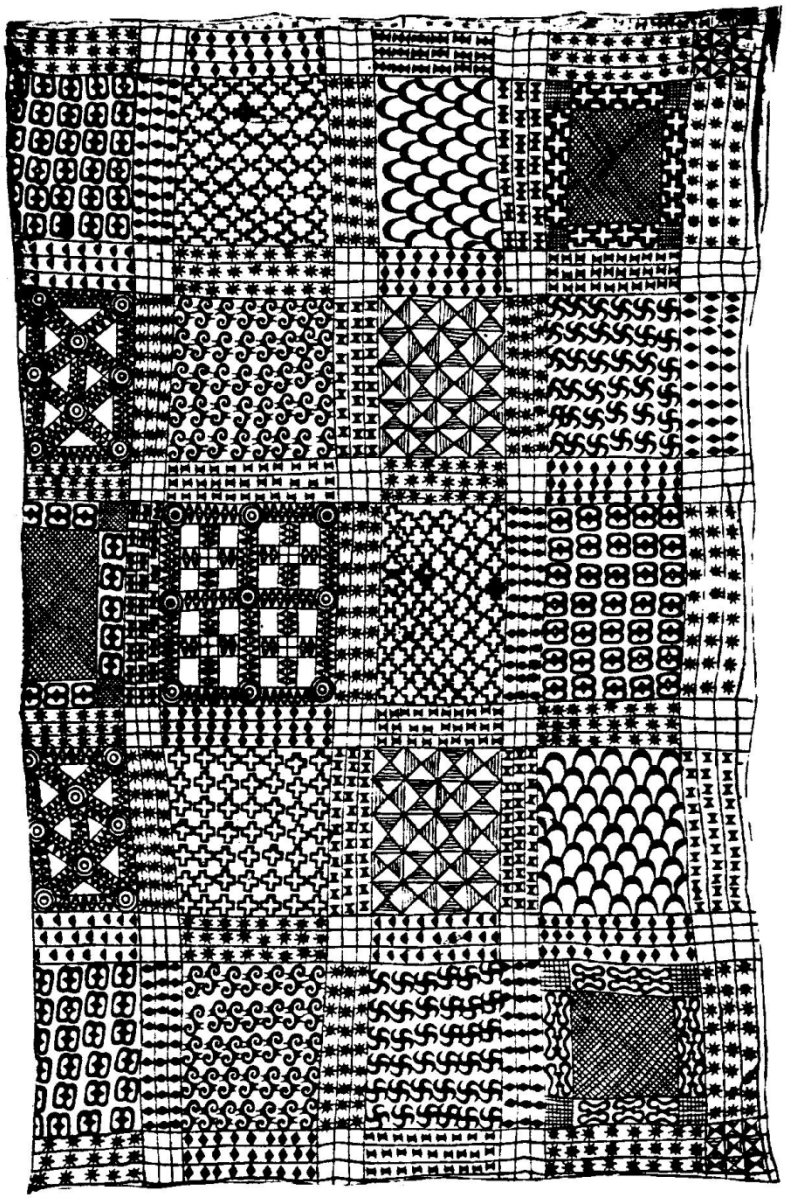


Patterns in textile design

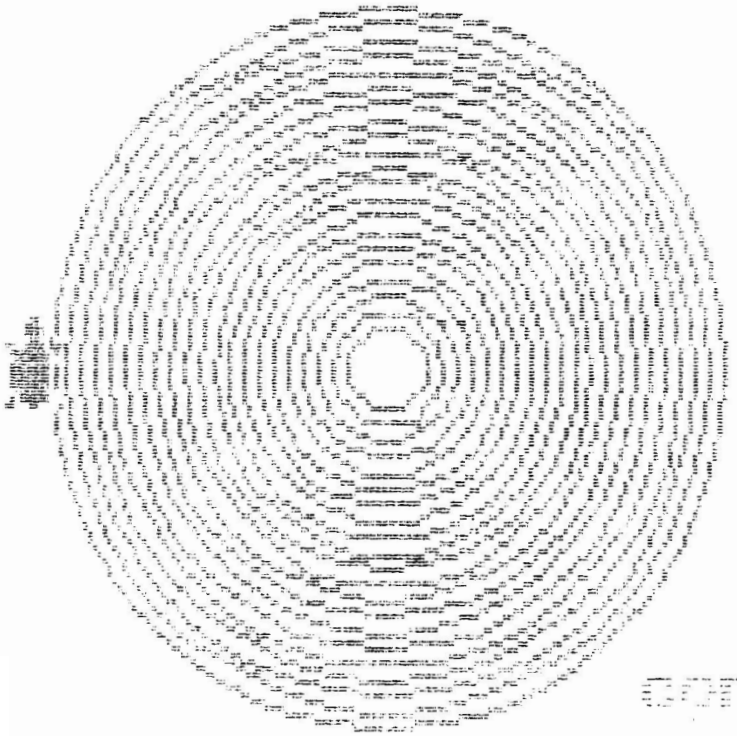
TIE AND DYE

Many Islamic patterns are developed around one shape or motif which can be repeated in a variety of ways. Simple designs can be produced in this way by using tie-dyeing or batik techniques. Much patience, great care with tying or waxing and an acceptance of trial and error learning will be necessary at the outset. After a time the results can become pre-determined by the designer and some startling effects produced.

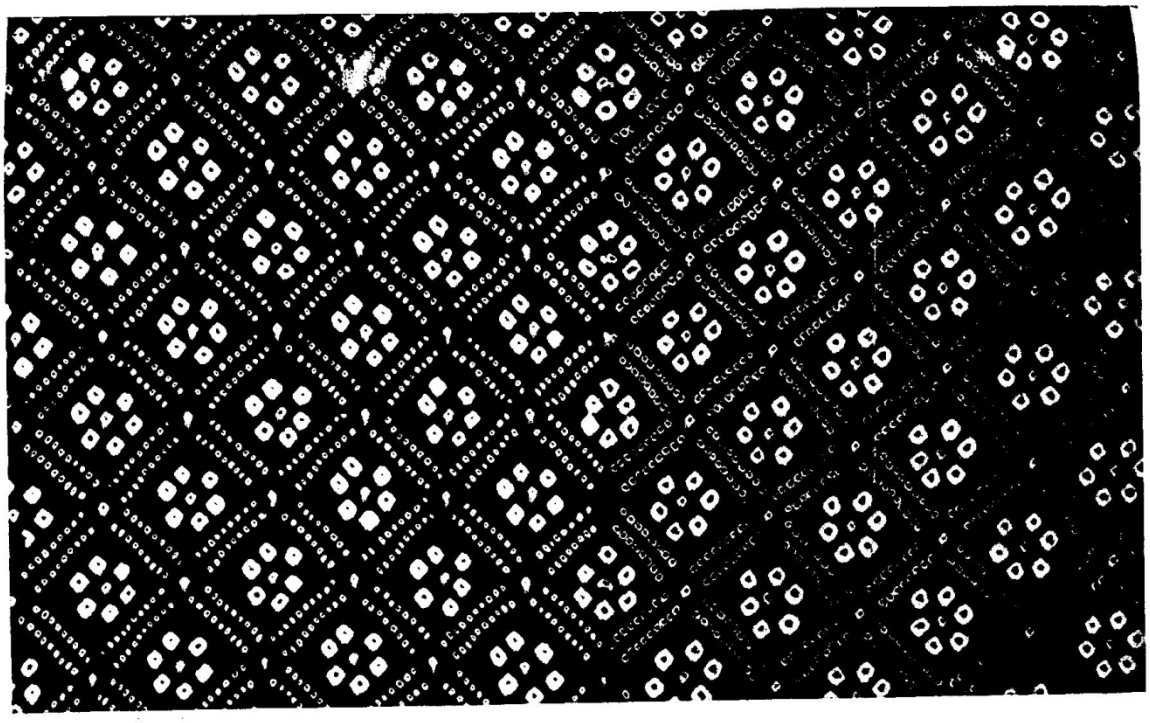
There are several ways in which these designs can be developed. They can be used as a starting point for computer designs by transferring the main motif into a LOGO procedure. Different combinations can then be tried at a far greater speed than having to keep re-tying or waxing the designs in different layouts. When an acceptable design has been achieved then this can either be re-produced through tying or by block/screen printing. e.g.



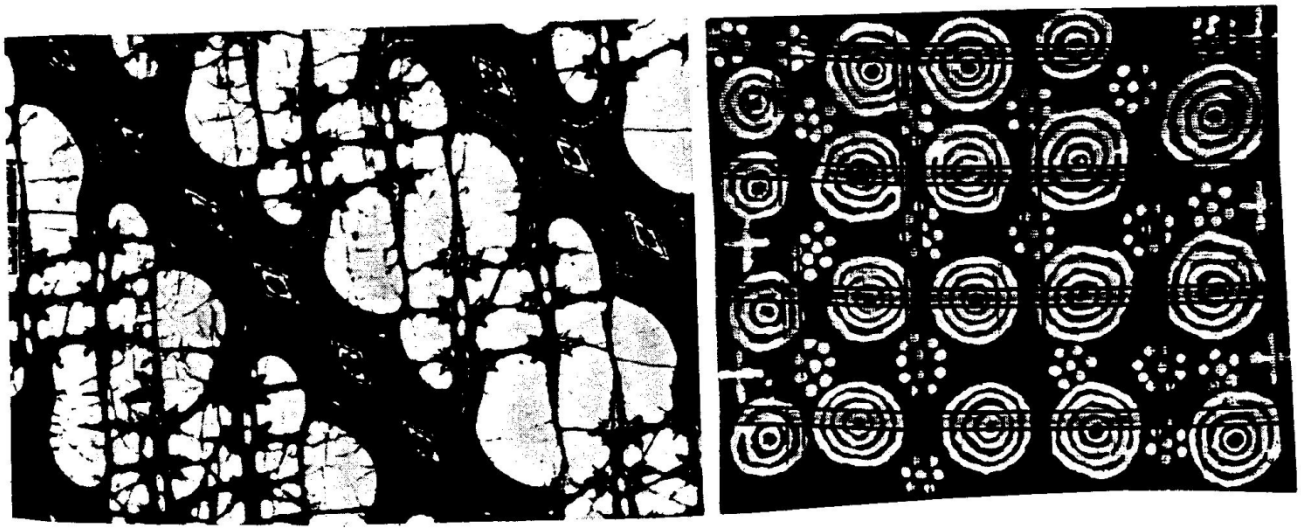
Alternatively the motif itself can be expanded and developed to produce one, large overall pattern. This can then be transferred to fabric or paper through printing and used for items such as place mats, pictures, wall hangings, scarves and many other items.



```
to concent :s
if :s > 70 [stop]
circler :s
step 3
concent :s + 3
end

to step :dist
pu lt 90 fd :dist
pd rt 90
end

to circler :radius
make "steps (2 * :radius * 3.1416 / 36)
repeat 36 [ rt 5 fd :steps rt 5]
end
```



Indian tie-and-dye work.



Javanese batik work

Generating Simple Patterns and Designs.

Learning to make patterns with your own tie-dyed papers can be a fascinating occupation. Designs need to be planned so that there are areas of dark and light, patterns which consist of balanced contrasting colours and patterns with blending harmonious colours. Continuous, all-over patterns are easy to create, the most simple being stripes.

1. *Cut some narrow strips of light coloured pattern work.*

2. *Cut some other strips, much wider, of very bright colours.*

3. *Alternate them on a darker background in parallel lines and you have a simple stripe pattern.*

Variations.

1. *Put two strips close together in between two wide strips.*

2. *Cut a pattern into the edge of the stripes.*

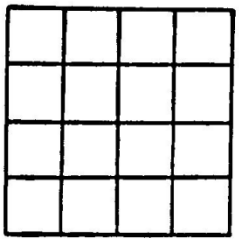
3. *Cut shapes from the middle of the wide strips and glue them in a row on the background to make a different stripe.*

4. *Superimpose a thin stripe onto a wide one.*

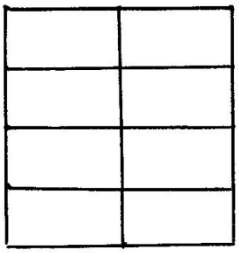
5. *Using dark and light strips of equal width, cut shapes from one side of each strip and add them to the opposite stripe.*

6. *Form a plaid pattern by crossing vertical stripes over horizontal ones. Put motifs in the spaces and use any of the suggestions 1-5.*

7. *Make a grid by crossing parallel horizontal and vertical lines (squares or rectangles) and add alternate light squares on a dark background (or vice versa) to make a draught-board pattern.*

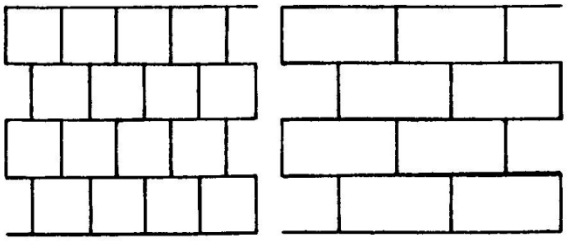


8. *Make one set of lines further apart and you have a rectangular pattern.*



9. *Move the square grid round 45 to form a diamond pattern. Cut the diamonds or squares in half with a diagonal to produce a triangular pattern.*

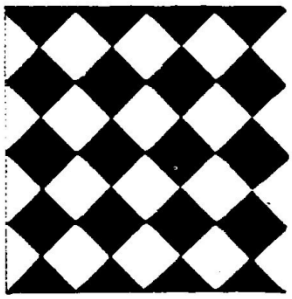
10. *Move alternate rows of squares or rectangles halfway across the shape above to form a "brick" pattern.*

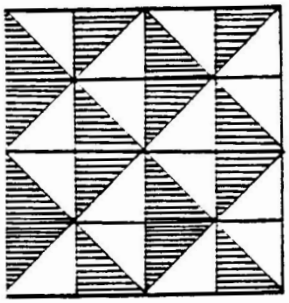


Counterchanging.

A draught board is a simple example of a counterchange pattern. It is a balanced arrangement of an equal number of identical light and dark areas. Many exciting permutations can be worked out on this basis.

This design shows equal light and dark squares with a triangle cut from one side. Each light triangle is placed in a dark square and vice versa.





These triangles have been cut from two sides of each square and placed on the opposite toned square.

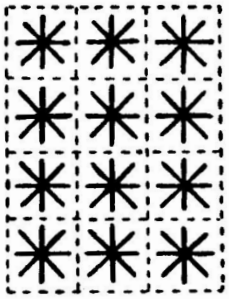
This idea can be greatly varied as long as the pieces cut from the basic shapes are identical and placed on opposite toned or coloured basic shape.

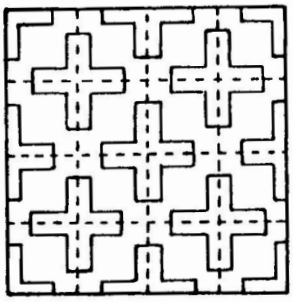
Rule: ***Nothing must be omitted. Whatever is cut from the dark shape must be replaced on the light shape and vice versa.***

"Spot" pattern.

When a motif is put in the centre of a drawn or imaginary square or rectanglular grid it makes a "spot" pattern.

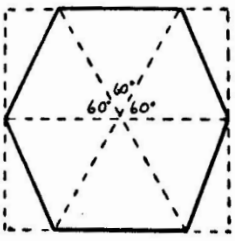
Make "spot" patterns using triangular and diamond grids or combine spots and stripes.

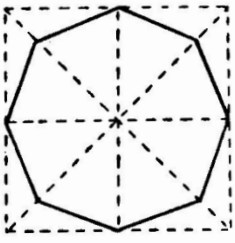




"Ogee" pattern.

Make a square and cut off each corner to form a hexagon or an octogon like this:





Round off the corners in a diamond grid and you have an "ogee" pattern. This lends itself to a design of curving stems, leaves and flowers.

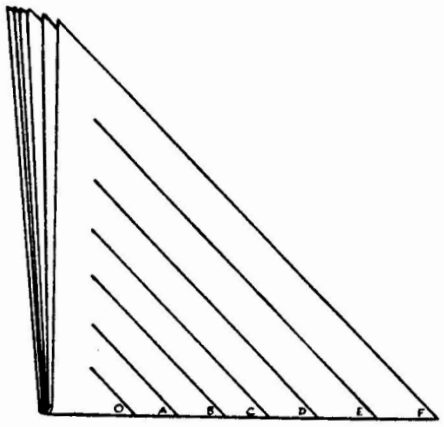
Most designs are based on these elementary principles of pattern making and you can go on building and changing in this way.

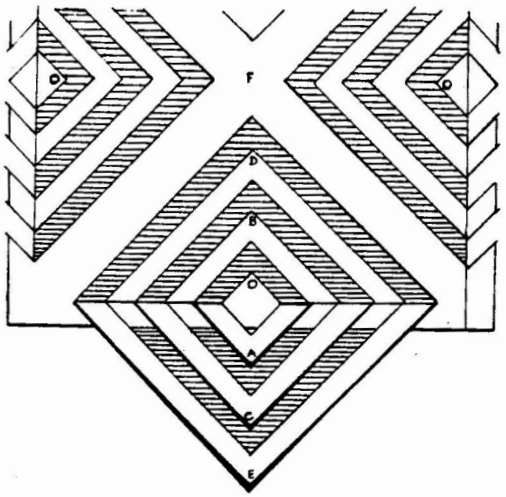
<u>Cut-out designs.</u>

These can be quite exciting and intricate. Cut-out motifs can be glued onto contrasting backgrounds, silhouettes can be shown up to advantage when glued to tie-dyed paper.

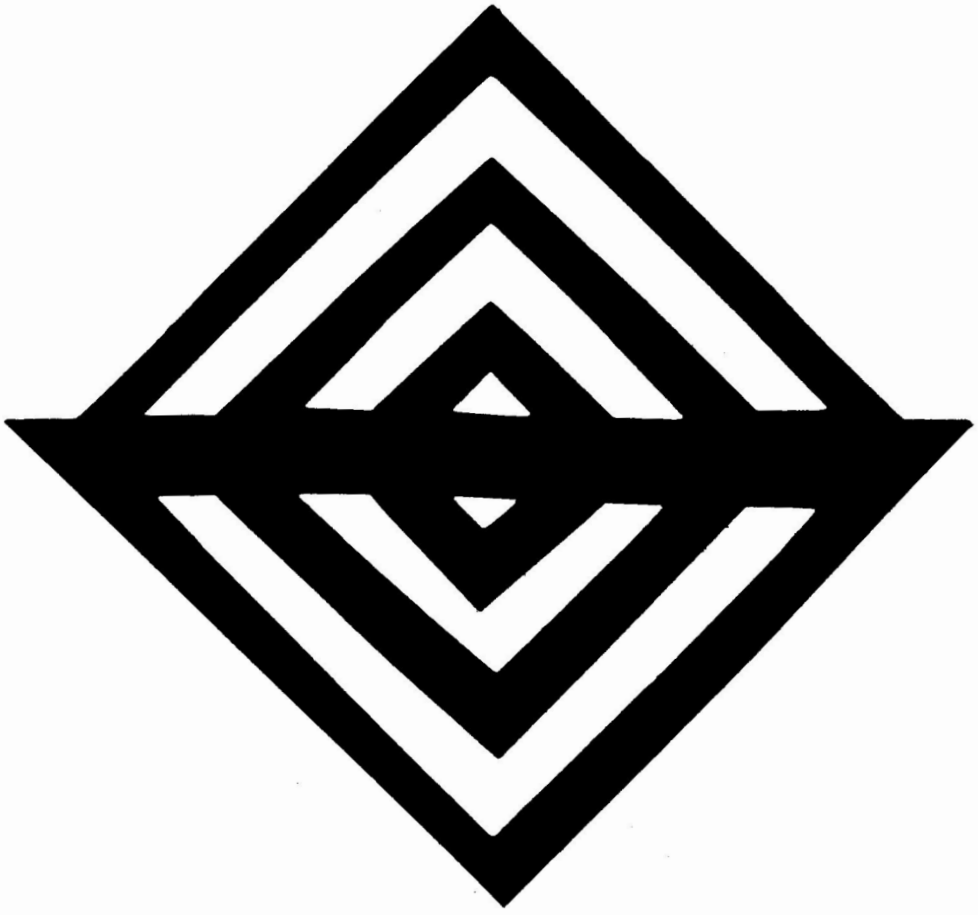
Fold and cut a piece of paper to form a ***doyley.***

Cut a regular or precise pattern by drawing on the wrong side in pencil as a guide to help you.





Cut a series of shapes which can be folded back e.g.



There are numerous combinations and variations you can try for yourselves:-

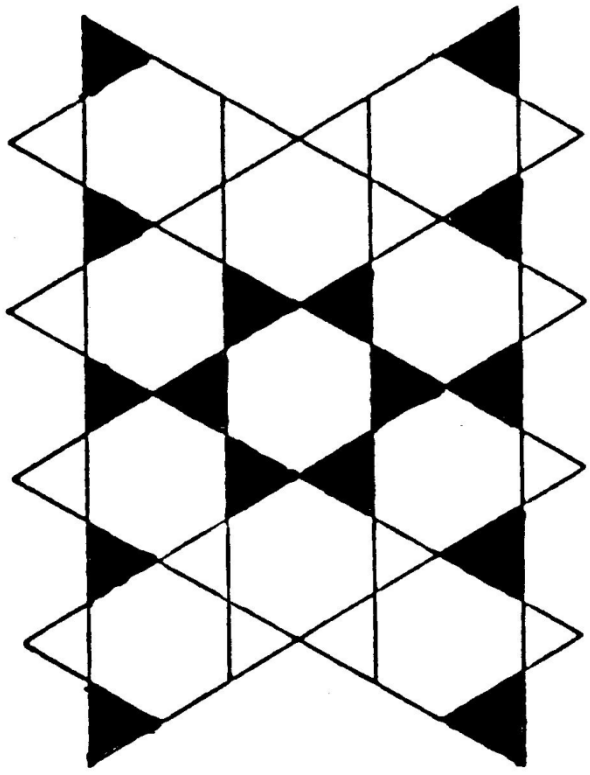
Paper weaving

Origami

Collages, murals

Posters

These can be made into book covers, tables mats, wall panels, decorations, table cloths.



What you need to tie-dye paper.

As for fabrics but instead of material use paper.

When considering tie-dyeing paper encourage the children to collect newspaper, jam jars, paper bags, envelopes, polythene bags, boxes and cartons, scraps of waste paper, wrapping paper, paper used for wrapping food and clothes, lolly and ice-cream sticks, flat pieces from date boxes and any other odd pieces of wood or found materials. String and cotton or thread for binding.

Categories of paper.

Soft and very absorbent papers.
Medium absorbent papers.
Harder, less absorbent papers.

Coloured papers are equally as good as white but the background clolour will influence the colour dyed over it. If a clean-looking effect of the the true colour is desired then only pure white will be effective.

Papers good for tie-dyeing.

Tissue paper, crepe paper, greaseproof paper, cartridge paper, wallpaper, typing, writing and note papers, envelopes, hand-made and special papers, imitation Japanese papers, real Japanese papers, English hand-made paper, India paper (English made).

Recommended books for reference:

Tie-and-Dye as an Everyday Craft. *Anne Maile*
pub. Mills & Boon Ltd.

Tie and Die Made Easy *Anne Maile*
pub. Mills & Boone Ltd.

Tie-Dyed Paper *Anne Maile*
pub. Mills & Boone Ltd.

What you need to tie-dye fabrics.

As many different types of material as it is possible to obtain both man-made and natural.

Household or liquid dyes, Dylon cold water dyes, Procion M. H., Brusho dyes, salt, fixatives.

Containers such as bowls; basins; saucepans; pie dishes; any enamel, glass, plastic or pottery containers, jam jars or empty tins.

P.V.A. adhesive, glue, gum, polycell, flour and water paste.

Fastenings and bindings of all descriptions such as:- paper clips, clothes pegs, string of all thicknesses, rubber bands, garden ties, raffia, tape, strips of torn cloth, old nylon stockings or tights.

Scissors, brushes, pins, adhesives, spoons, rubber gloves, an iron, overalls or old shirts for protection.

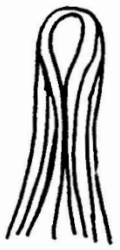


Fig. 1.

The simplest process is that of knotting the fabric and then dyeing, but there is also a simple tying method. Here a small portion of the fabric is taken and smoothed into even folds. (fig.1)

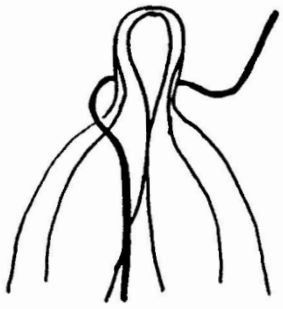


Fig. 2.

These folds are held securely and the thread laid towards the point making sure that there is enough thread to fasten off. (fig.2)

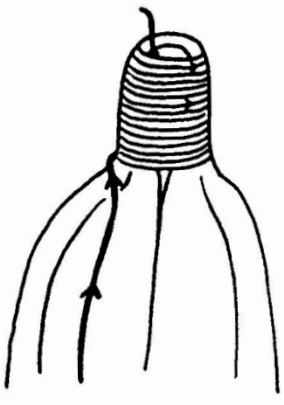


Fig. 3.

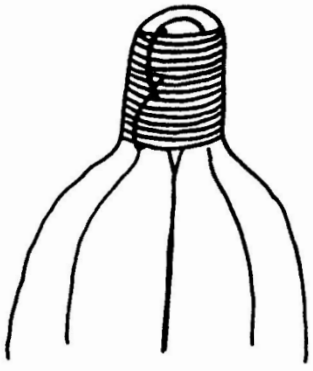
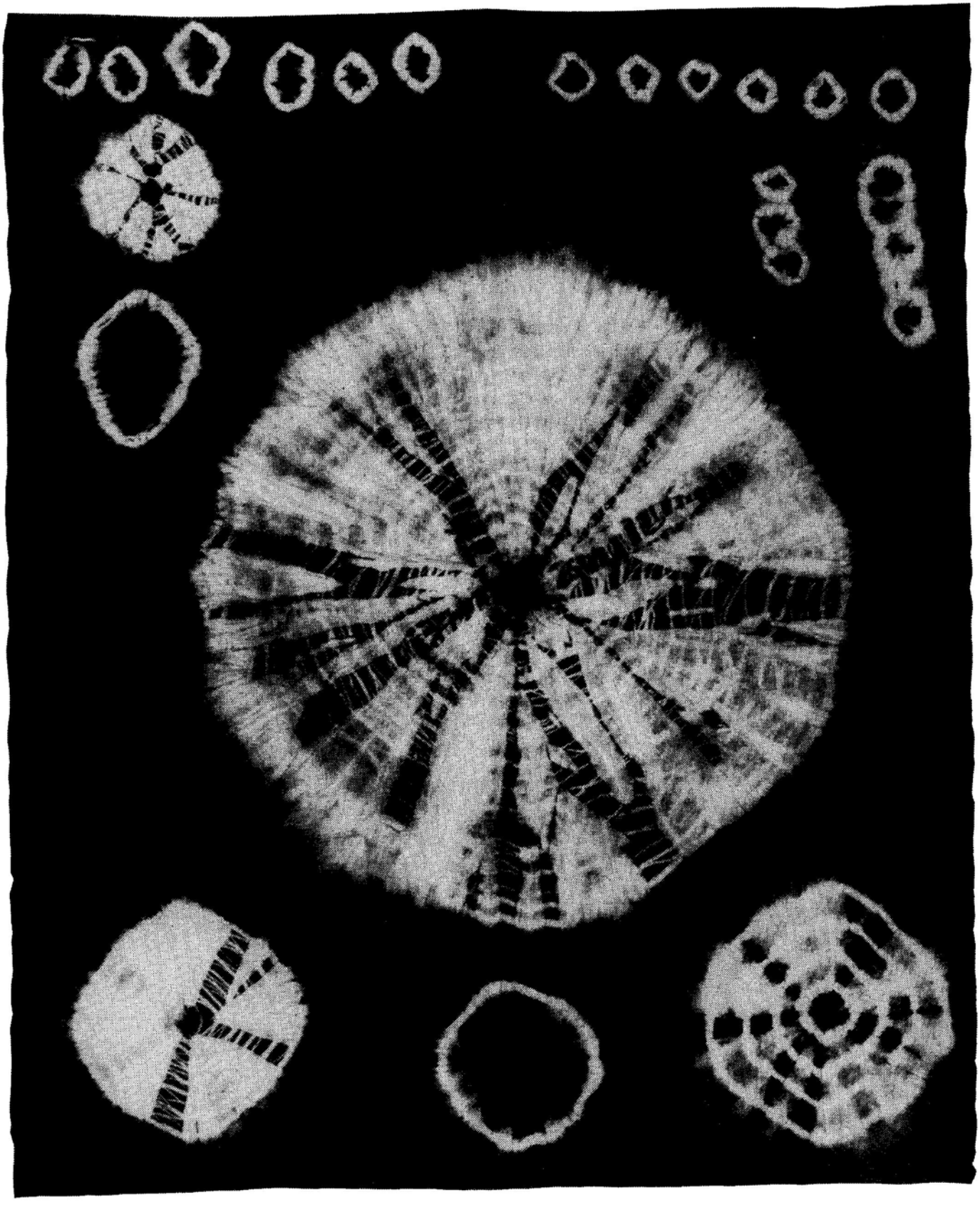


Fig. 4.

The thread is wound as tightly as possible from the edge of the spot and back again and knotted with the hanging thread. (fig.3) The thread is then cut off. (fig.4)



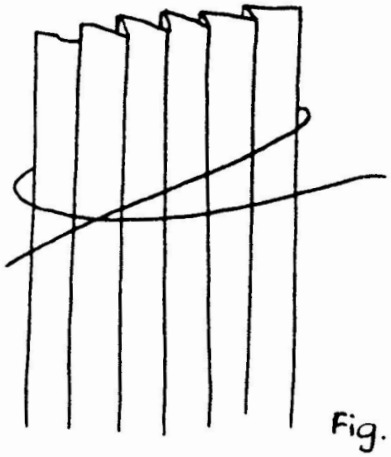
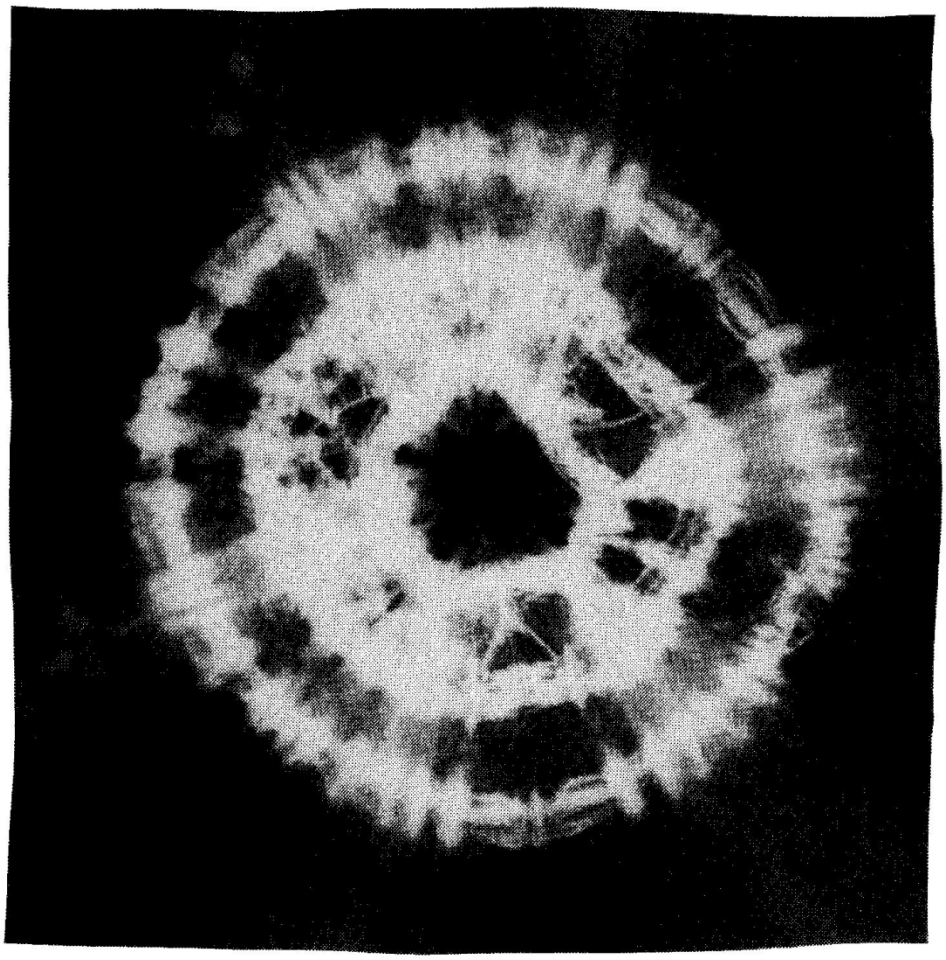
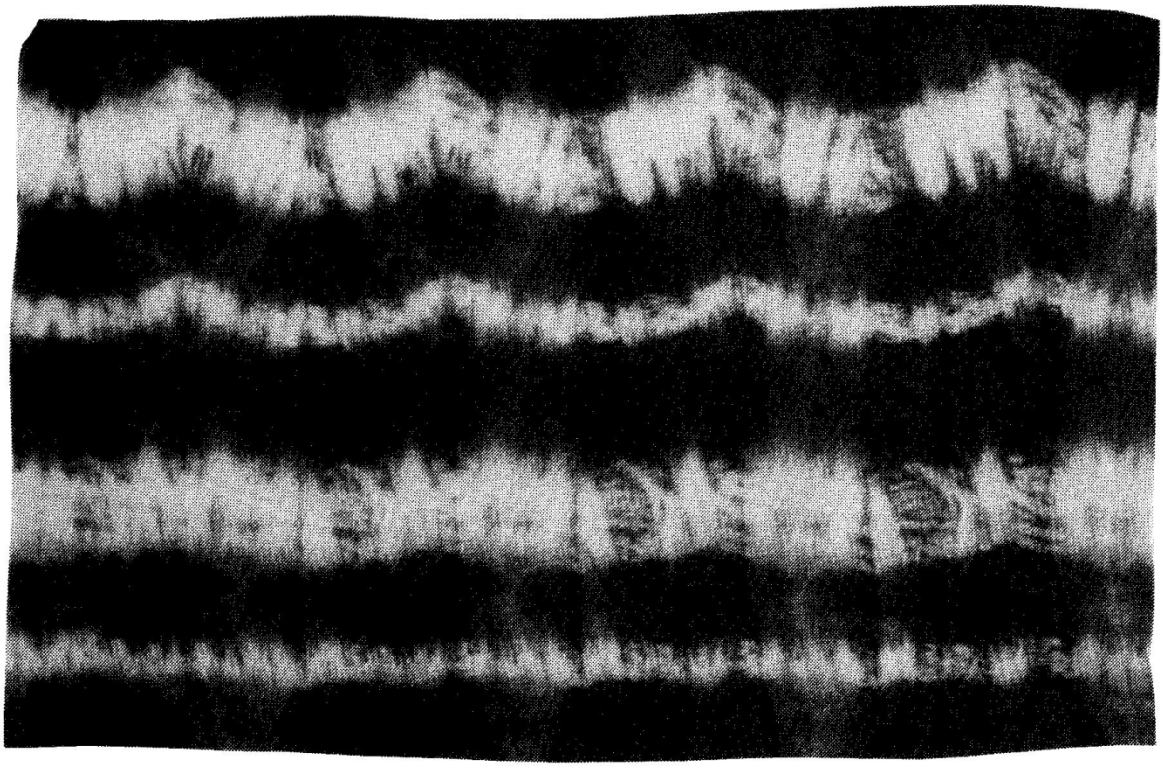
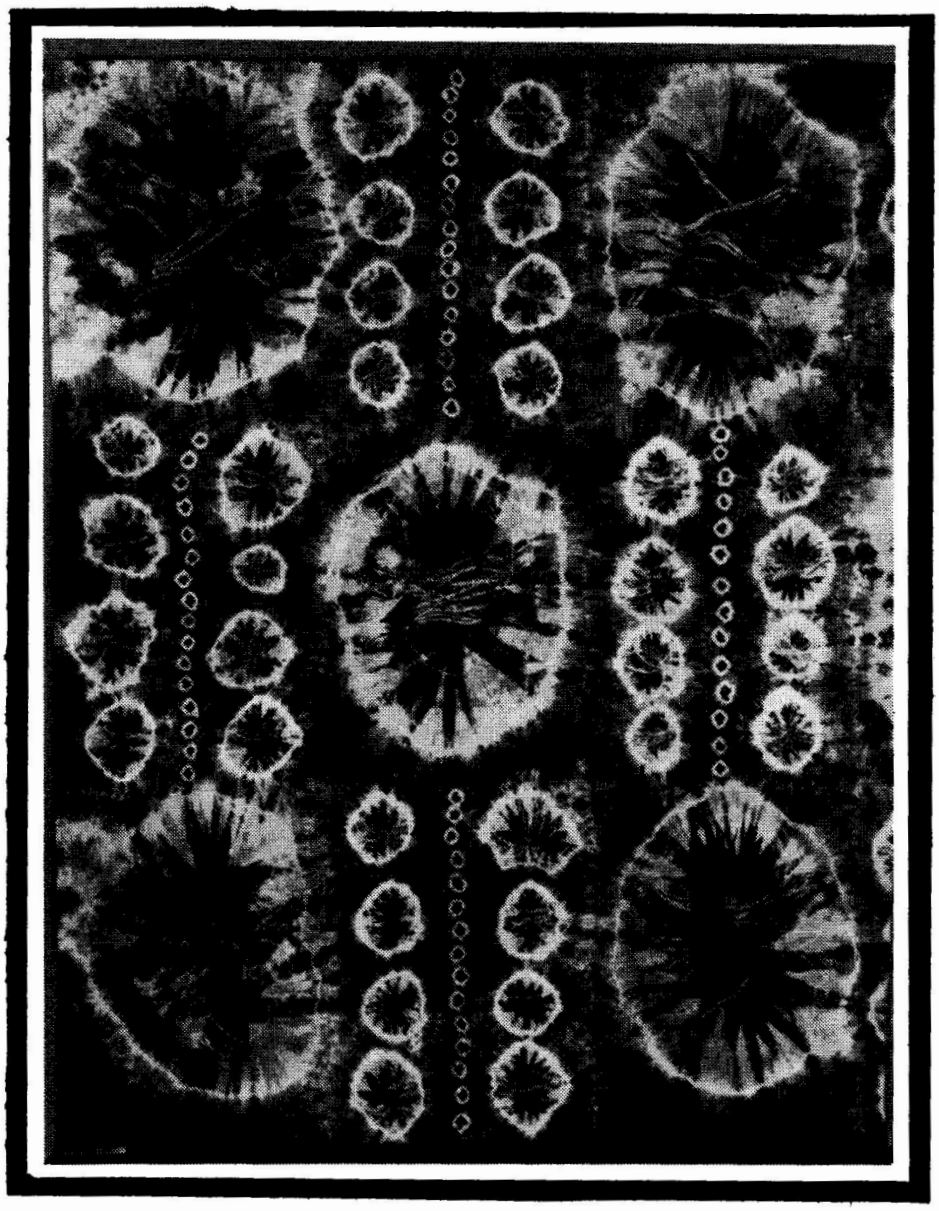


Fig. 6.

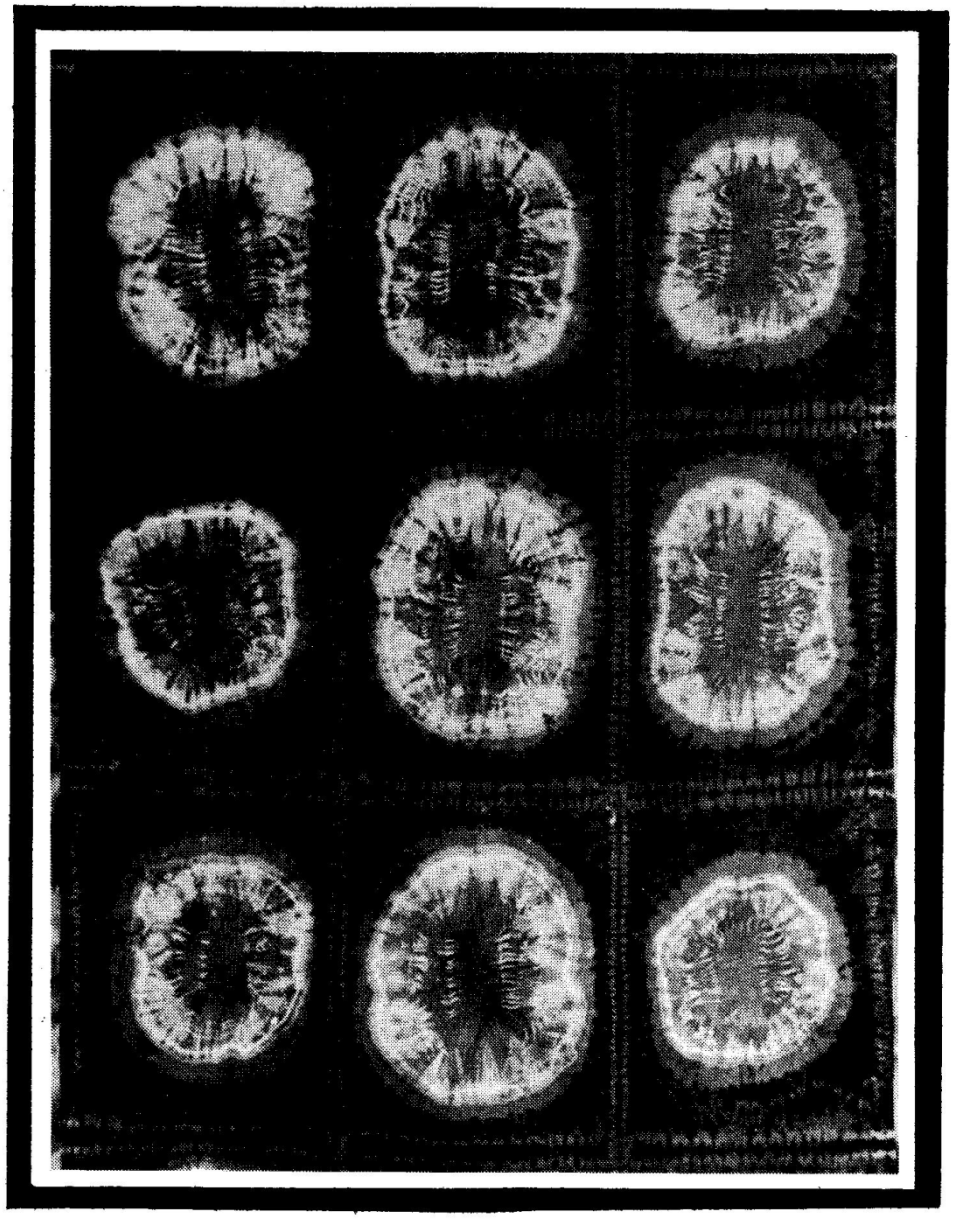
To obtain a stripe design the whole fabric is pleated so that an even gathering is produced. The thread is then wound at right angles to the pleats to form a stripe. (fig.6) The width of the stripe varies according to the thickness of the thread and the wrappings.



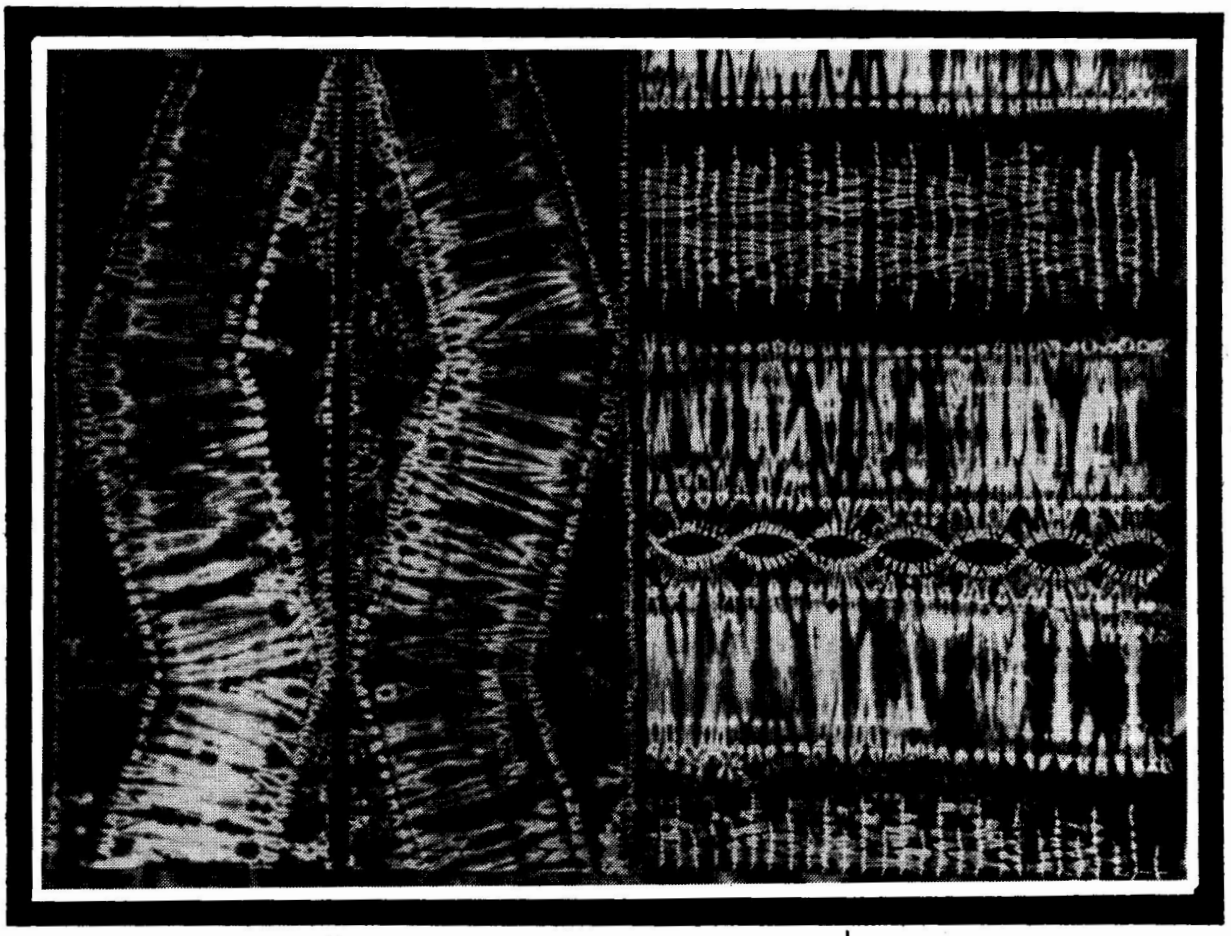




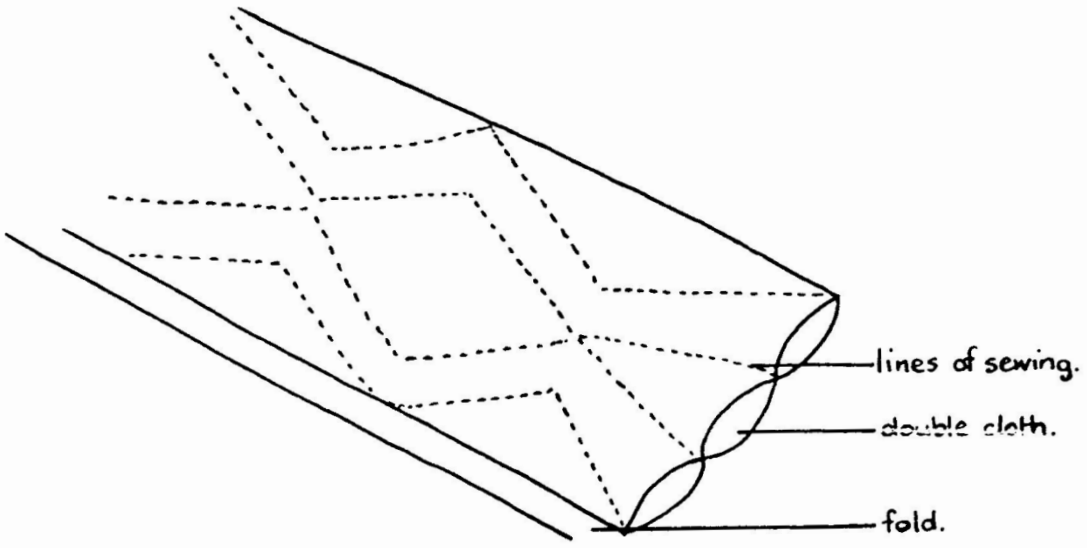
The illustration above shows a design obtained by clump tying. This consists of three different sized stones, from shingle size to large, being bound into the cloth in a half-drop repeating pattern.



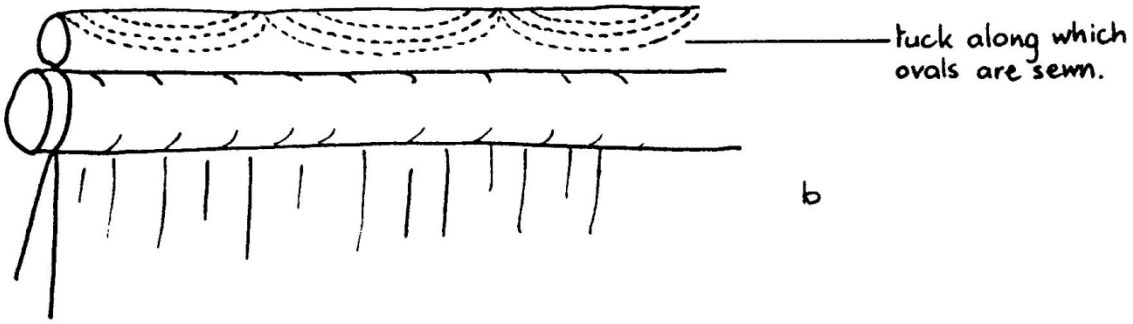
This design was also obtained by clump tying. The rectangles are formed by sewing on double cloth in small running stitches and then chunks of cork, in this case an old life-belt picked up on the beach, divided into equal portions, and bound into the cloth. This gives a simple repeat in squares with a central design and is not as interesting as the previous design which has an unusual repeat and a more distinguishable and bold texture.



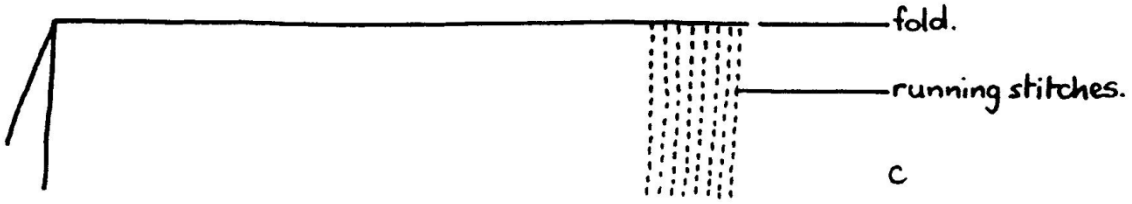
a. b.



To produce an identical pattern on a piece of cloth as in illustration (a), the cloth is simply folded in half and the diamond pattern sewn along the length of the cloth. This is known as ruching and sewing, and gives the desired repeat pattern.



The ruching tuck method is shown in illustration (b), where the cloth is placed over a circular piece of wood, with an extra tuck at the top along which ovals are sewn.



Between each ruching is a band of texture produced by a resist line of stitches on a double cloth (c). The result is a stripe pattern with unusual textural qualities.