# MORE LINE PATTERNS



a. To draw this pattern, first draw a rectangle.

b. Choose a small distance d and mark this distance along the edge of the rectangle and draw a straight line from one vertex of the rectangle to this point as in Step 1.

c. Mark the distance d along the next edge and draw the straight line as in Step 2.

c. Repeat this construction drawing straight lines spiralling inwards, marking the distance d along the next straight line that you will meet, as shown in Steps 3 and 4.



Step 1

Step 2
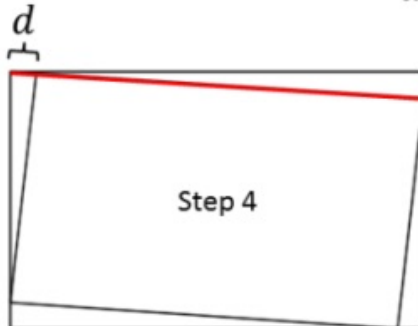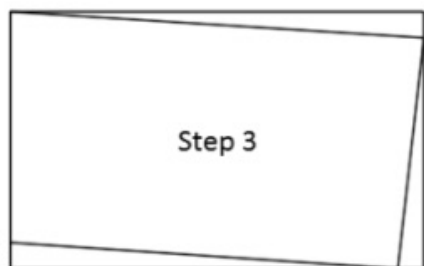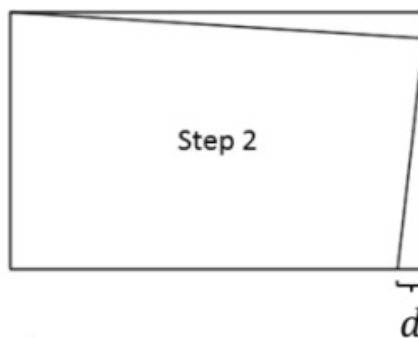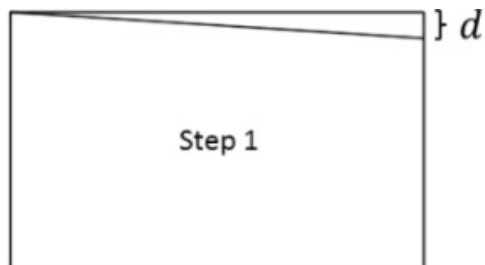
d. Continue this construction drawing straight lines spiralling inwards, marking the distance d each time along the next straight line that you meet and working your way towards the centre of the pattern.

Step 3

Step 4

Draw these patterns or create your own.
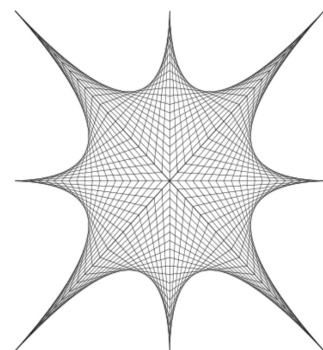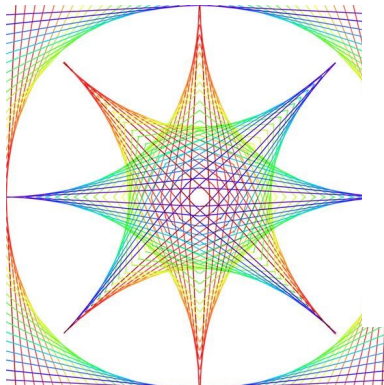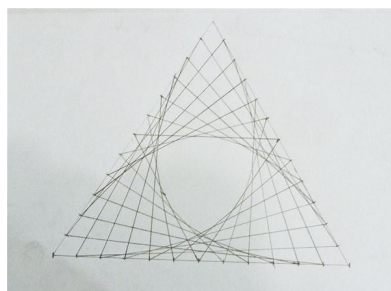
**HELP**

Each time you repeat the 4 steps as described you draw a rectangle. Each rectangle is smaller than the previous one and rotated clockwise.

See https://aiminghigh.aimssec.ac.za/grades-7-to-10-constructions-with-lines/

**NEXT**

There is no end to the variety of patterns that you can design and create in this way. The curves that appear are called *envelopes* in mathematical language.

# Notes for teacher

## Why do this activity?

This activity gives learners practice in drawing accurate geometrical constructions. To make the patterns learners need to measure lengths accurately and to follow instructions. The activity offers opportunities for talking about the geometrical properties of the shapes.

Teachers can plan to meet the needs of all learners in the class giving learners different patterns to draw. The activity may improve learners' attitude to mathematics by appealing to some learners who do not like mathematics and to others who find it difficult. The activity encourages creativity and most learners enjoy experimenting with different ways to adapt the designs to make their own patterns.

## Learning objectives

In doing this activity students will have an opportunity to use a ruler and protractor appropriately to construct geometric figures accurately, including measuring lengths accurately.

## Generic competences (some suggestions, select from list or write your own)

In doing this activity students will have an opportunity to **think flexibly**, be creative and innovative and apply knowledge and skills.

## Suggestions for teaching
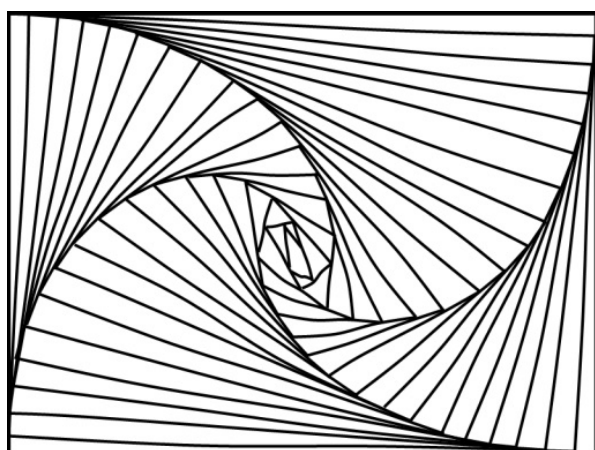


Start with the whole class and show them this picture. Ask them to describe what they see.

Tell them that they are going to copy the design and they only need to measure lengths accurately and draw straight lines. Learners will probably be surprised to hear that the picture is made entirely from straight lines.

Make sure everyone has a ruler and pencil. They can use squared paper but if they use plain paper they will need a protractor to draw accurate right angles to make the rectangle.

Suggest that they draw a rectangle 16 cm by 10 cm and take the length d to be 1 cm.

Guide the learners through the first few steps and keep reminding them that they must measure d accurately each time.

When they have copied this simple design ask them what geometrical properties they can see in the design.

Show them some other designs and tell the learners to copy one of them or to design their own pattern.

Learners can make a display for the classroom wall using the designs.
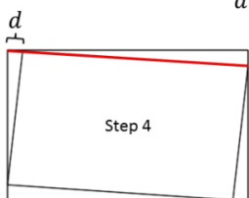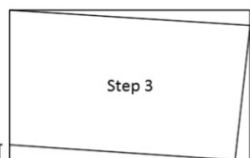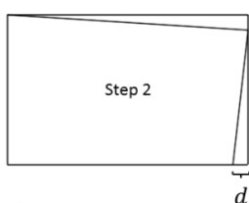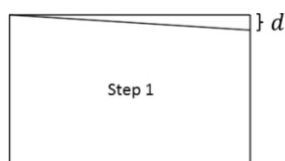
# Key questions

- What geometrical properties can you see in the design?
- Does the design have any symmetry?
- Can you describe the symmetry in the pattern?
- Can you make a different design of your own using this method?
- Did anything surprise you about the design?

# Follow up

See: https://aiminghigh.aimssec.ac.za/grades-7-to-10-constructing-circle-and-line-patterns/