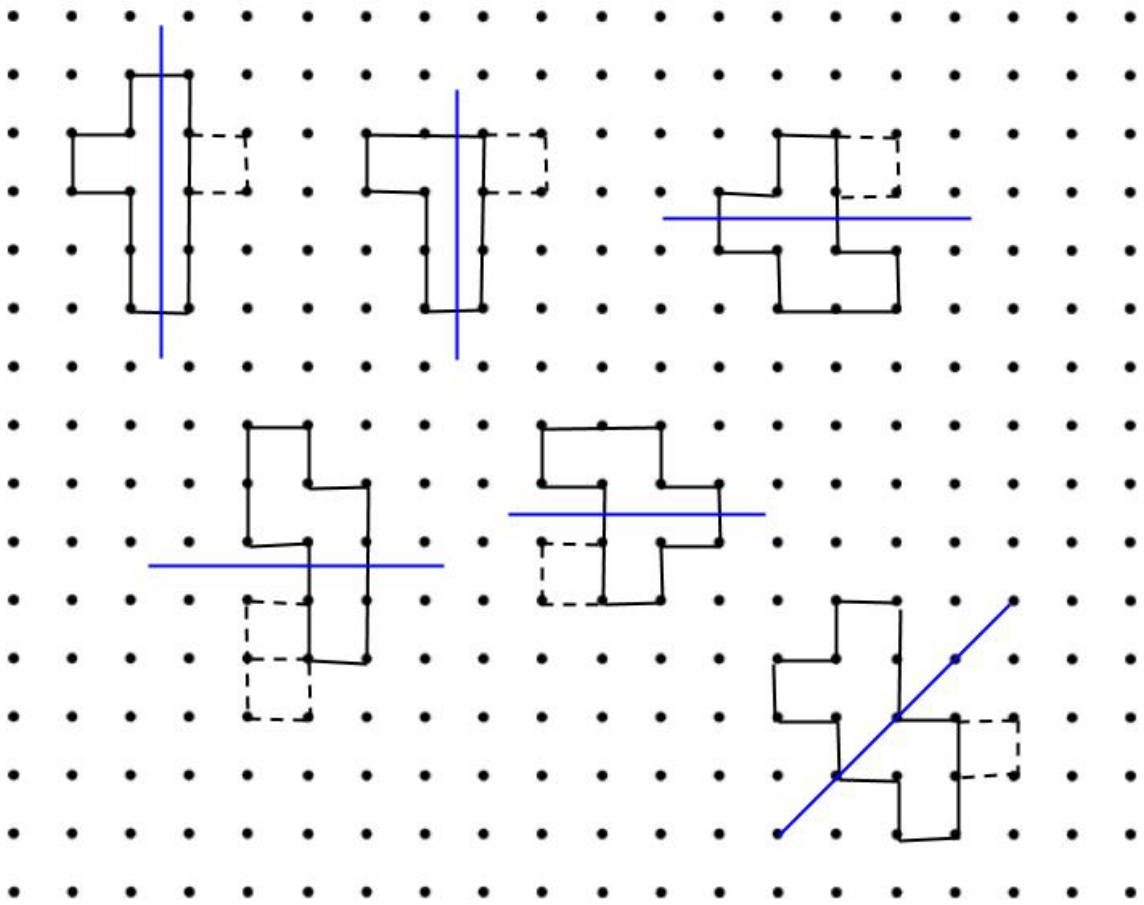
Problem of the Week
Problem A and Solution
What is Missing?

Problem

Add the fewest number of squares to each figure shown below, so that each has at least one line of symmetry?

Solution



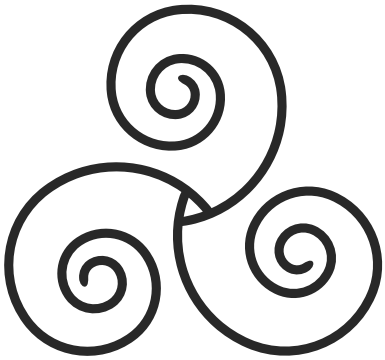
The straight, blue lines show the lines of symmetry. The dotted lines are the boxes that you may add to the figures to make them symmetrical. There may be other ways to add the same number of squares to the figures that produce a line of symmetry.

You may use miras, tracing paper, or cut out and fold to confirm the line of symmetry.

Teacher's Notes

This question asks students to modify the figures so that the results have at least one line of symmetry. When we refer to a figure that has a line of symmetry, this is identifying reflection symmetry, also known as mirror symmetry. We can confirm that a figure has this type of symmetry by making a fold along the line to confirm that that two halves of the image align perfectly.

There are other types of symmetry that can be used to describe images. Point reflection describes a symmetry of an image that, when rotated about a fixed point by 180°, will look exactly the same. The letter Z is symmetric in this way. Rotational symmetry is similar to point reflection, except the image will look exactly the same when rotated by some amount - the rotation is not restricted to exactly 180°. A classic example of this kind of symmetry is the triskelion. Here is an example:



Symmetries can be generated as a result of basic transformations: flips, slides, and turns. We can create mathematical models of the images and write mathematical functions to complete these transformations. Ultimately if we want to manipulate graphic images on a computer, we rely on mathematics to handle the details.

(Main source - Wikipedia)