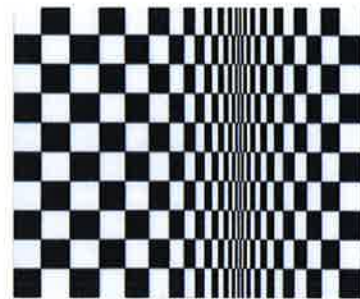
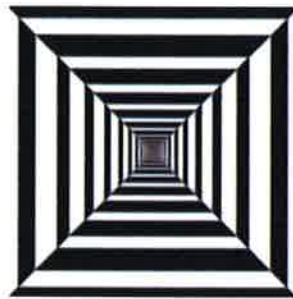
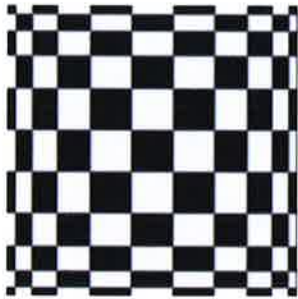


# Optical Art

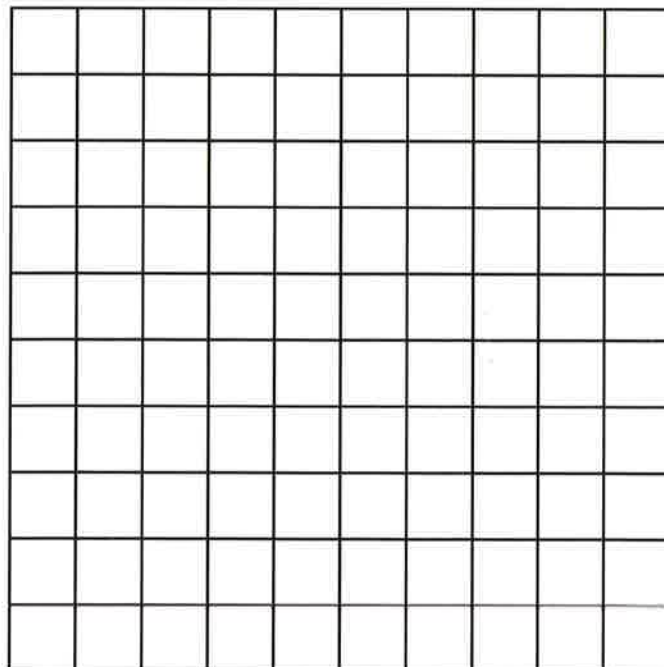
Submitted by Jo Boaler, Michael  
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Optical art consists of geometric shapes and patterns, and is often coloured in black and white. This type of art creates illusions, leaving the viewer with the impression that objects are moving, vibrating, pulsating, or warping. Some examples of optical art are given below.



Look at the 3 examples, do you see anything about the patterns that cause them to create an optical illusion?

Using the 100-square grid below, create your own interesting pattern. It may help to use a ruler and it is a good idea to experiment with different designs; doing your best to create a piece of optical art that creates an illusion. Share your designs with a classmate and find out if they see an illusion when looking at your pattern. Experiment with breaking the squares in the grid into triangles, rectangles, and other shapes.



Did you get any more ideas about the ways to create an optical illusion? Describe your mathematical thinking about ways to do that.

Can you see any patterns, fractions, or decimals in your art work? Where are they?

Can you identify any different quadrilaterals?

Think of a mathematical question that you could ask about your art work, that you can give to a friend. Ask your friend your question, and ask them to justify their answer – giving clear reasons for the methods and solutions they come up with.

If someone else wanted to recreate your art work, what directions would you give them? Give precise mathematical statements so that someone could recreate your art without looking at it.

## Teacher Notes

It is interesting to think about what creates an illusion in optical art. Do optical illusions have certain mathematical properties? One idea would be for the whole class to display their designs and look together to see if certain designs create particular visual properties. If you want to extend this task into a bigger project Wikipedia has some interesting information about optical art.

[https://en.wikipedia.org/wiki/Mathematics\\_and\\_art](https://en.wikipedia.org/wiki/Mathematics_and_art)  
[https://en.wikipedia.org/wiki/Op\\_art](https://en.wikipedia.org/wiki/Op_art)

## Mathematical Standards

These are possible CCSS Mathematical Standards, depending on the students' mathematical pathways:

### Mathematical Practices

CCSS. MATH. PRACTICE. 1 Make sense of problems and persevere in solving them.

Do students make sense of the diagrams given to them? Do they pose a question about the artwork, considering its mathematical properties?

CCSS. MATH. PRACTICE. 2 Reason abstractly and quantitatively.

Do students decontextualize from the art work and consider mathematical relations and properties?

Do they attend to the mathematical properties of the diagram?

CCSS. MATH. PRACTICE. 3 Construct viable arguments and critique the reasoning of others.

Do students reason when they are answering the question posed by the first student? Do they consider each other's reasons and notice any flaws?

CCSS. MATH. PRACTICE. 4 Model with mathematics.

Do students use the art work to describe patterns and relationships?

CCSS. MATH. PRACTICE. 5 Use Appropriate Tools Strategically.

Do students use rulers or other math tools to create their optical illusion?

CCSS. MATH. PRACTICE. 6 Attend to precision.

Do students describe their own design clearly, so that someone else can draw it without looking at the original drawing?

CCSS. MATH. PRACTICE. 7 Look for and make use of structure.

Do students look for patterns in the artwork, do they see structure inside the art?

### Content Standards

There are a lot of content standards that will be met in this task that will vary depending on students' grade level. For example, content standards involving geometry, shapes, fractions, decimals, & measurement.