THE PRODUCTIVE STRUGGLE IS REAL

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Objectives

✘ Come away with an understanding of what productive struggle looks like.

✘ Come away with an understanding of what low floor, high ceiling tasks look like.
Mistakes are Powerful

youcubed
at Stanford University
Productive Struggle

Productive struggle is developing strong habits of mind, such as perseverance and thinking flexibly, instead of simply seeking the correct solution. It encourages students to attack the problem in a way that makes sense to them.
Using this picture, how can we tell if the struggle is productive? What are the benefits of productive struggle?
Low-floor, High-ceiling Tasks

LFHC Tasks are those that all students can access. They are activities that everyone can begin and then work on at their own level and allow students to take work to different depths at different times.
What are the benefits of using LFHC tasks?

✗ Students show what they CAN DO, not what they can’t do.
✗ Hits multiple mathematical standards.
✗ Promotes positive classroom culture.

How can I tell if an activity is LFHC?

✗ All students are able to access the task and contribute.
✗ Students are able to explore higher concepts.
✗ The work is more important than the answer.
Combining the Two Ideas

When combining these two ideas, we are creating a math community that encompasses insight into the world of mathematics and developing a growth mindset, making them eager to tackle more problems.
Let's start struggling!

Sort the Street

Magic Vs

Noah

Four 4’s

Ice Cream Scoop

Optical Art
Final Food for Thought...

Teaching Habits that Promote Productive Struggle in Math
THANKS!

Any questions?

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Credits

- https://www.renaissance.com/edwords/productive-struggle/
- https://nrich.maths.org/7701
- https://kidsdiscover.com
- https://youcubed.org
Sort the Street

Here nine of the houses on my street:

Find as many different ways to sort them into groups as you can.
Noah

Noah saw 12 legs walk by into the Ark.

How many creatures could he have seen?

How many different answers can you find?
Magic Vs

Place each of the numbers 1 to 5 in the V shape so that the two arms of the V have the same total.

How many different possibilities are there?

Can you convince someone that you have all the solutions?

What happens if we use the numbers from 2 to 6? From 12 to 16? From 37 to 41? From 103 to 107?

Investigate the same problem with a V that has arms of length 4.
Optical Art

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.
Ice Cream Scoop

In shops with lots of ice-cream flavors there are many different flavor combinations, even with only a 2-scoop cone. With 1 ice-cream flavor there is 1 kind of 2-scoop ice cream, but with 2 flavors there are 3 possible combinations (eg vanilla/vanilla, chocolate/chocolate, and vanilla/chocolate).

- How many kinds of 2-scoop cones are there with 10 flavors?
- Create a poster that represents your group’s thinking.
The Four 4’s Puzzle

Using only four 4’s, find a mathematical equation that equals each integer from 1-25.
Presentation design

This presentation uses the following typographies and colors:

✘ Titles: Sniglet
✘ Body copy: Dosis

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