the nmf weekly

Ask your math friend, James

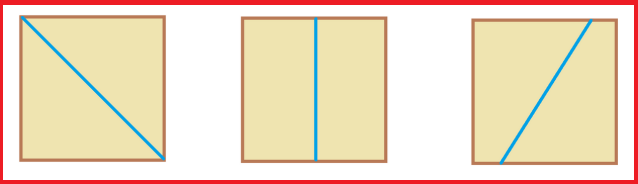
globalmathproject.org/nmf-weekly • ISSUE 3 • September 28, 2020

Math and Desserts: PUZZLE SOLUTIONS

Here are the answers to some of the puzzles from Issue #3.

puzzle #1

A perfectly square slice of bread is cut into TWO pieces by a straight line cut through the center of the square.

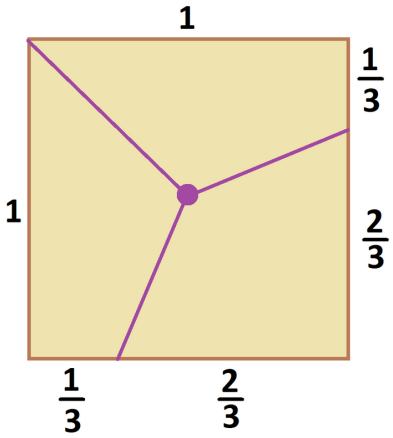


Each of the two pieces has the same area and possesses the same amount of crust.

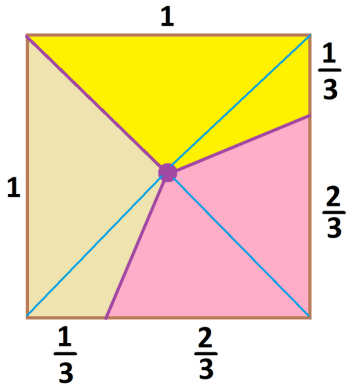
Is it possible to slice the square into THREE pieces, each of the same area and each with the same amount of crust?

ANSWER TO PUZZLE 1:

Here's one way.



Each of the three regions possesses fourth-thirds of a side of crust. To see that each region has the same area, divide each into two triangles. Each triangle has height 1/2 a side length.



Using the formula "half base times height," we see that the are of the pink region is:

(1/2) x (2/3) x (1/2) + (1/2) x (2/3) x (1/2) = 1/3.

The beige region is half the remaining area, which is half of 2/3, and so is 1/3 too. (Or compute it's area as:

(1/2) x (1/3) x (1/2) + (1/2) x (1) x (1/2) = 1/3.)

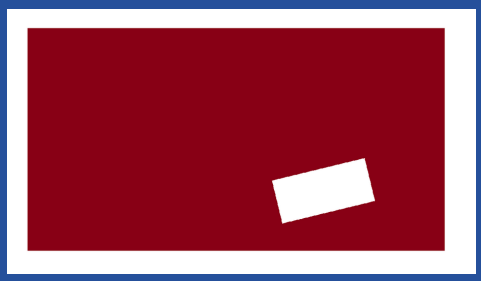
The yellow region has this area too.

puzzle #1 BONUS

Is it possible to slice a square piece of bread into 7 pieces, each possessing the same amount of crust and each having the same area?

puzzle #2

Telvar baked a rectangular pan of brownies. While they were cooling, someone came in and cut out a perfectly rectangular piece, but at an odd angle.



Telvar was disappointed because he was going to give his brownies to two friends, cutting the large rectangle into two equal parts.

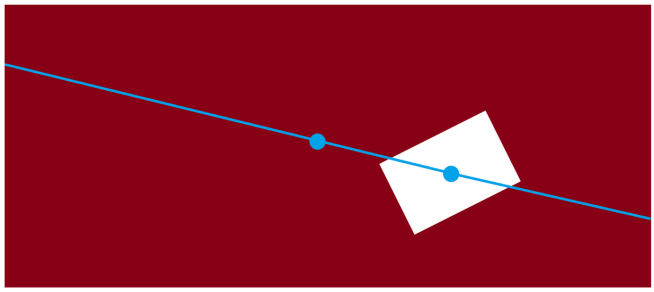
But then Telvar realize all is not lost. He figured out he could, with a single straight-line cut, still divide what remains of the brownies into two pieces of exactly the same area.

Can you see how?

ANSWER TO PUZZLE 2:

Telvar found the center of the big rectangle and the center of the rectangular hole, and then cut along the straight line that connects them both.

Do you see why this works?



puzzle #2 BONUS

How might you locate the center of a rectangular hole?

(Telvar used two pieces of string.)

The NMF Weekly is written by mathematician Dr. James Tanton as a resource for friends and fans of the 2021 National Math Festival.
Learn more at globalmathproject.org/nmf-weekly & nationalmathfestival.org