

# Don't Waste Any Dough: Making Fruit Pie

(based off of Bowland Math's Assessment Task "Fruit Pies")



Photographs: Colin Price and Bowland Maths

## Standards:

CCSS.MATH.CONTENT.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.

CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.

CCSS.MATH.PRACTICE.MP4 Model with mathematics.

## Introduction:

Introduce students to the process of making a mini-fruit pie and the constraints of the problem:

- A complete pie requires two pastry circles: one with a 10 cm diameter, and one with a 6 cm diameter.
- The dough begins as a rectangular sheet with the dimensions 60 cm by 30 cm.
- After she cuts out the first set of circles, she balls up the leftover dough and rerolls it into a smaller rectangle (but she will only use the leftover pastry in this way once).
- Note: because the dough is rolled so thin, the thickness of the dough will not be included in the calculations for the amount of remaining dough.
- Task: Find the maximum amount of pies that can be made.

More details for this activity can be found at: [http://www.bowlandmaths.org.uk/assessment/fruit\\_pies.html](http://www.bowlandmaths.org.uk/assessment/fruit_pies.html).

This website has a powerpoint and a worksheet with pictures to illustrate this problem.

Have an introductory discussion about possible strategies the students can use. Here are some ideas for discussion questions:

1. Why are two sizes of circles required for the pie?
2. Can all of the pastry be used in the first rolling? Explain how you know.
3. How do the two sizes of circles affect how they can be laid out on the dough?
4. What should be considered when rolling out the dough the second time?
5. What are some different strategies that are possible when laying out the circles on the dough?
6. How will you know whether you have found the maximum possible number of pies?
7. How will you organize your work?

**Activity:**

Have students work on the task. Teachers can informally check work with the following values:

- Area of dough at beginning:  $1800\text{cm}^2$
- Area of small circle:  $9\pi \approx 28.27\text{cm}^2$
- Area of large circle:  $25\pi \approx 78.54\text{cm}^2$

**After:**

Discuss the calculations and conclusions that students have produced. Have students explain their work and try to convince their classmates that their way is most efficient and/or effective. Consider some of the following questions to include in the discussion:

1. How did you lay out the circles for the first rolling of the dough?
2. How did you lay out the circles for the second rolling of the dough?
3. How did the layout of the circles in the first rolling affect the results of the dough in the second rolling?
4. Did anyone try a strategy that left a lot of leftover dough? Why do you think that it left so much?
5. Extension: Without changing the amount of dough, how might you try changing the problem in order to increase the number of pies?