Choosing a Cake Pan

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A Cake Problem

Nordicware has requested your services in describing their cake pans. Drawing on ideas we have studied with regard to measurement, find three different ways consumers might compare the pans. Compare the pans using the attributes you describe and then summarize by describing which pan would be your overall choice and why.

9” × 9” × 2” square

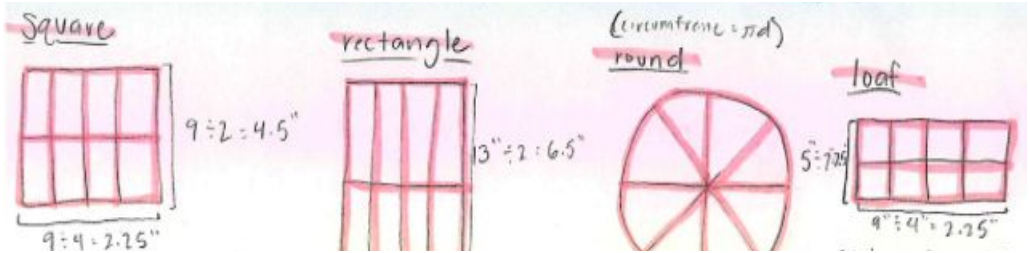
9” × 2” round

9” × 5” × 3” loaf

9” × 13” × 2” rectangle

Sample Ideas

- Amount of Frosting
  - Amount of double-sided or triple sided frosted cake pieces.
- Number of Pieces
  - Keeping the number of pieces the same and considering their change in size.
  - Keeping the size the same and varying the number of pieces.
- Ratio of Edge Pieces to Center Pieces
- Height of Slice



Sample Work

Name: _____

(Problem 2 Work Space)

The three different ways to compare these pans of cake is looking at the surface area (frosting needed to cover top of pan, Volume (area of pan), and the size of each piece if each cake was cut into 8 pieces.

Volume (area of pan) = length × width · height

Square: $9\text{in} \times 9\text{in} \times 2\text{in} = 162\text{in}^3$ Rectangle: $9\text{in} \times 13\text{in} \times 2\text{in} = 234\text{in}^3$ Round: $\pi r^2 \cdot h \; (9 \div 2 = 4.5)$ $\pi 4.5^2 \cdot 2 = 127.17\text{in}^3$ Loaf $9\text{in} \cdot 5\text{in} \cdot 3\text{in} = 135\text{in}^3$

* Rectangle is largest Volume

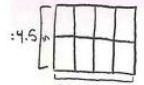
Surface Area = length × width = frosting

Square: $9\text{in} \times 9\text{in} = 81\text{in}^2$ Rectangle: $9\text{in} \times 13\text{in} = 117\text{in}^2$ Round: $\pi r^2 \; (9 \div 2 = 4.5)$ $\pi(4.5^2)\text{in} = 63.585\text{in}^2$ Loaf: $9\text{in} \times 5\text{in} = 45\text{in}^2$

* Rectangle is largest so needs the most frosting

Size of piece if each cake was cut into 8 pieces

Square

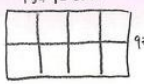


$9 \div 4 = 2.25\text{in}$

x pan is 2in deep so ch piece is 2·2.25·4.5 hich totals on area of 20.25in^3 for each slice

Rectangle

$13 \div 4 = 3.25$



The pan is 2in deep so each piece is 2·4.5·3.25 which totals 29.25in^3 for each slice

Round

$C = \pi d$

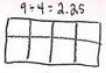
$C = 9\pi$

Divide top surface area by 8 for each slice, so $63.585\text{in}^2 \div 7.948\text{in}^2$ then multiply by 2 for height so each is 15.896in^3

Loaf

$9 \div 4 = 2.25$

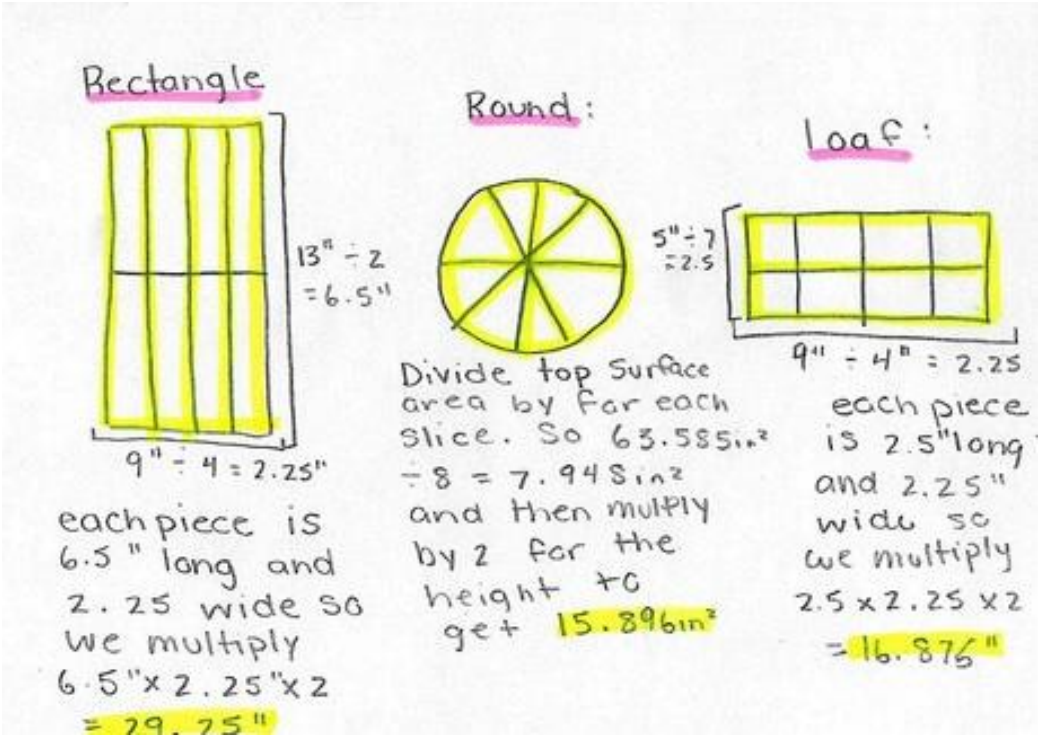
$5 \div 2 = 2.5$



the pan is 3in deep so we do 3·2.5·2.25 which totals 16.875in^3

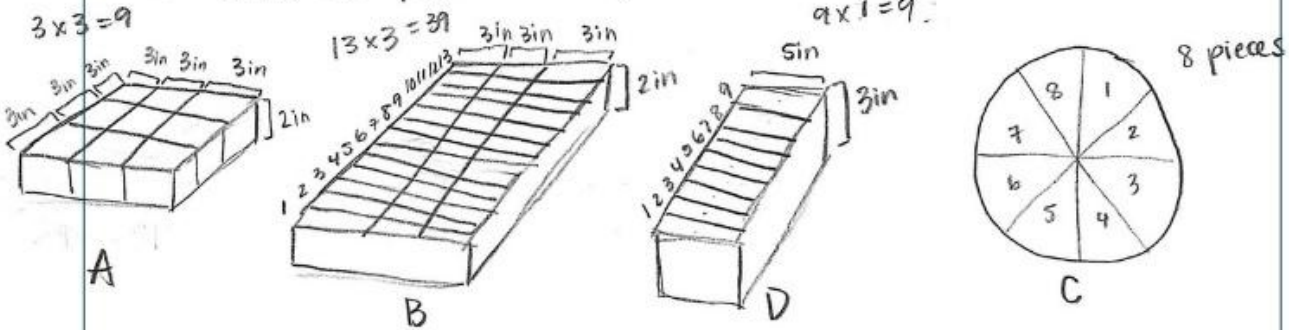
* Rectangle has biggest slices

* description on back *



Sample Work

1) The volume of each pan differs. This tells us how much batter fits into each pan. To find the volume of Pans A, B, and D, we must. Although we use the same formula for these pans, since they are all different measurements, they will all hold different amounts/have different volumes. Pan A holds $162in^3$, Pan B holds $234in^3$ & Pan D holds $135in^3$. Pan C uses the formula... $V=\pi r^2h$ since it's a cylinder shape. This tells us that Pan C holds $127.23in^3$ of batter. Ordering them from which pan can hold the most batter to least amount of batter: Pan $B=234in^3$, Pan $A=162in^3$, Pan $D=135in^3$, & Pan $C=127.23in^3$. So if you want more cake, use pan A & if you want less cake, use pan C.



References

Wickstrom, M. H. (2025, February 12). A cake problem. As presented in Bryant, K., Honey, J., & Wickstrom, M. H. *Modeling moments: Connecting Modeling to Practice*. National Council of Teachers of Mathematics Professional Development Webinar.