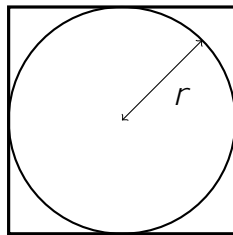


MATHEMATICS ENRICHMENT CLUB.  
Solution Sheet 12, 20 August, 2018

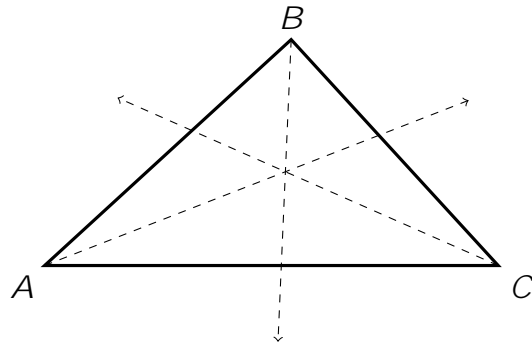
1. Suppose that the round pizza has radius  $r$ , and fits perfectly into a square box.



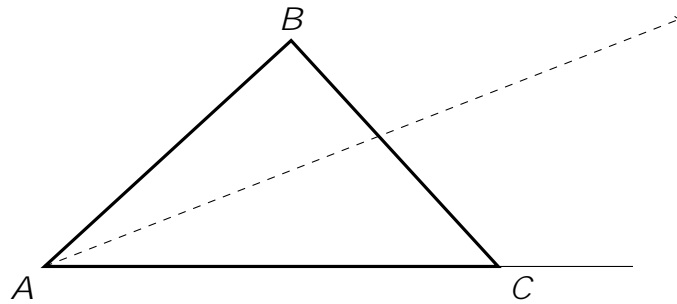
The box's sides must then be  $2r$ , so the ratio of pizza area to box area is  $\frac{r^2}{4r^2} = \frac{1}{4} \approx 0.25$ .  
If the square pizza with side length  $x$  fits neatly into a circular box, the diameter of the box would be  $x$ .

So we have to satisfy

$$z(x + y)(x +$$



Now let us consider points lying outside the triangle. We can use a similar argument to show that the common point of intersection between one bisector of the triangle and the bisectors of the exterior angles of the other two vertices of the triangle is also equidistant from  $\angle_1$ ,  $\angle_2$  and  $\angle_3$ . One of these points, marked as  $X_1$ , is shown in the diagram below.



then we have tried 1 in every spot, 2 in every spot, 3 in every spot and so on up to 7. If the safe still isn't open this means that the code contains no 1's, no 2's, no 3's and so on up to 7. That is, the code only contains 8s, 9s and 0s, but this isn't enough digits to have 7 distinct digits so the safe must have opened at some point.