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# **Dirichlet's Principle & Mathematical Logic**

Session 2 - Homework Problems

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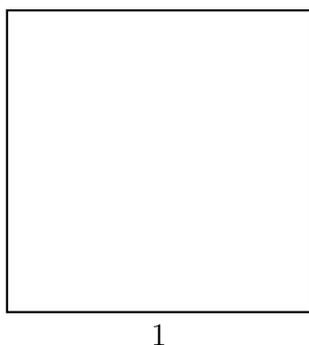
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## Question 1

An ice cream shop offers 10 different flavours of ice cream. You choose a bowl that contains 3 different flavours. How many unique combinations of 3 flavours can you select for the bowl?

## Question 2

Consider a square with side length 1. Prove that if nine points are placed inside the square, there will always be a set of three points that form a triangle with an area of  $1/8$  or less.



## Question 3

Cut this figure into three pieces that will fit together to make a square.

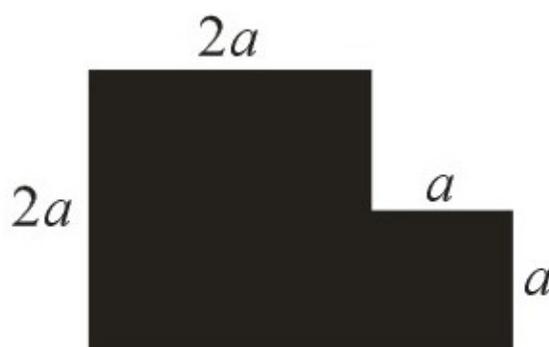


Figure 1: Geometry setup

## Question 4

A circle is inscribed in a square, with a rectangle drawn from a corner of the square to a point on the circle, as shown. If this rectangle has side lengths of 6 cm and 12 cm, what is the radius of the circle?

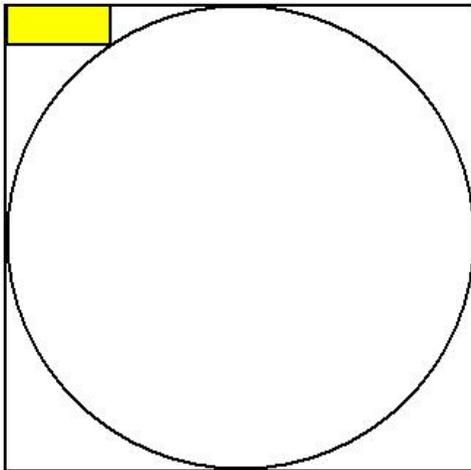


Figure 2: Original Shape