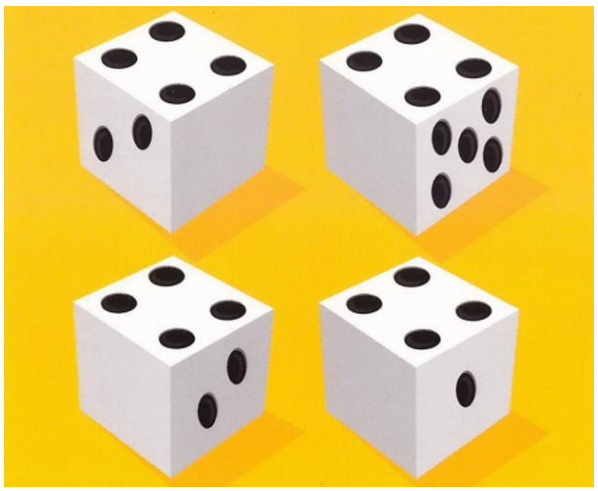
1.
These four dice show which number is on which side if a dice is rotated while keeping the '3' on top.

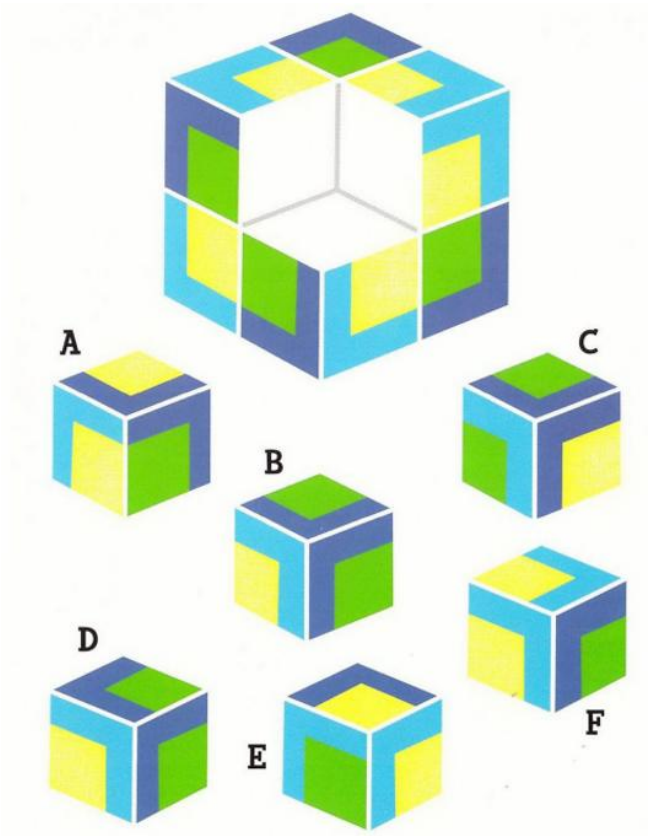
Now the dice are flipped so the '3' is at the bottom, and '4' is on top. Can you fill in the missing dots?



Which small cube completes the large cube?

Solution:

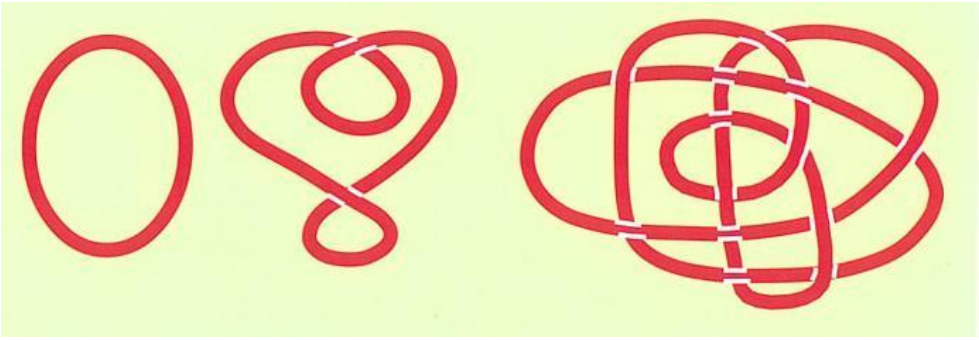
2.



Solution: B

3.

Two knots are equivalent if one can be transformed into the other. A special case is to recognize the unknot from a real knot.



The figures on the left and in the middle show an unknot and its equivalent. Is the figure on the right an unknot?

Answer: Yes

Solution: The right figure is also an unknot.

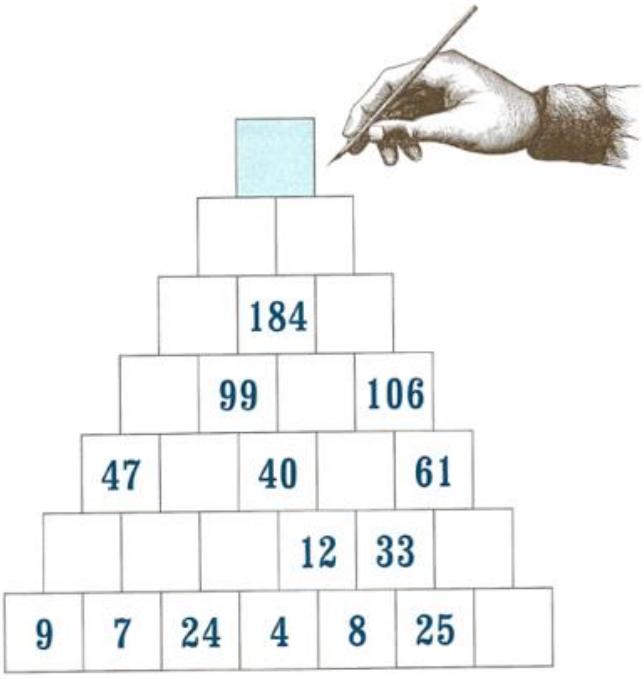
4.
A mother and father have six sons, and each son has one sister. How many people are in that family?

Answer:
9

Solution:
They have only one daughter.

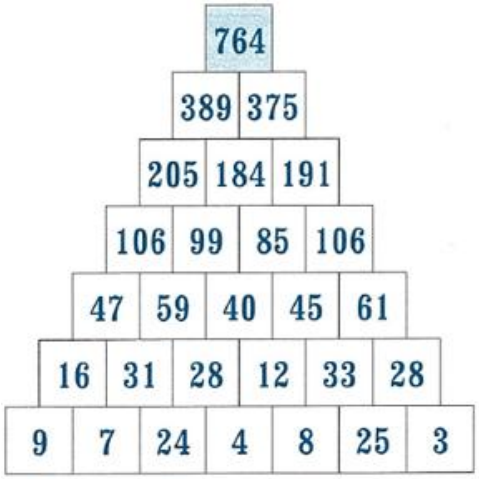
5.
Charles, the Treasury Secretary, was in a parlous state, having been involved in an accident that knocked him unconscious. Unfortunately, urgent access to his safe was needed in order to retrieve a document relating to a treaty that was due to be signed imminently, and that had received the President's personal seal of approval.

The Deputy Treasury Secretary was summoned, and remembered that Charles once told him the code was stored at the back of his diary. On opening the diary at the back page, the following partially filled tower of numbers appeared. The shaded square at the top will reveal the three-digit code. What is it?



Answer:
764

Solution:

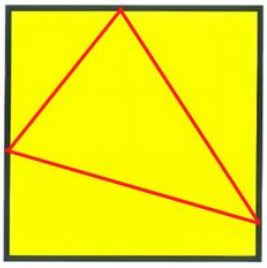


6.

(1) What is the perimeter of the smallest equilateral triangle that can be inscribed in a unit square (so that its three vertices will lie on the sides of the square)?

(2) What is the square of the area of the smallest equilateral triangle that can be inscribed in a unit square (so that its three vertices will lie on the sides of the square)?

Note: The side length of a unit square is 1. The figure below shows a triangle that is inscribed in a unit square, with its three vertices lying on the sides of the square.



Answer:
(1) 3
(2) 3/16

Solution: