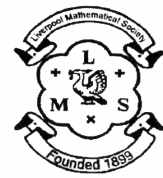
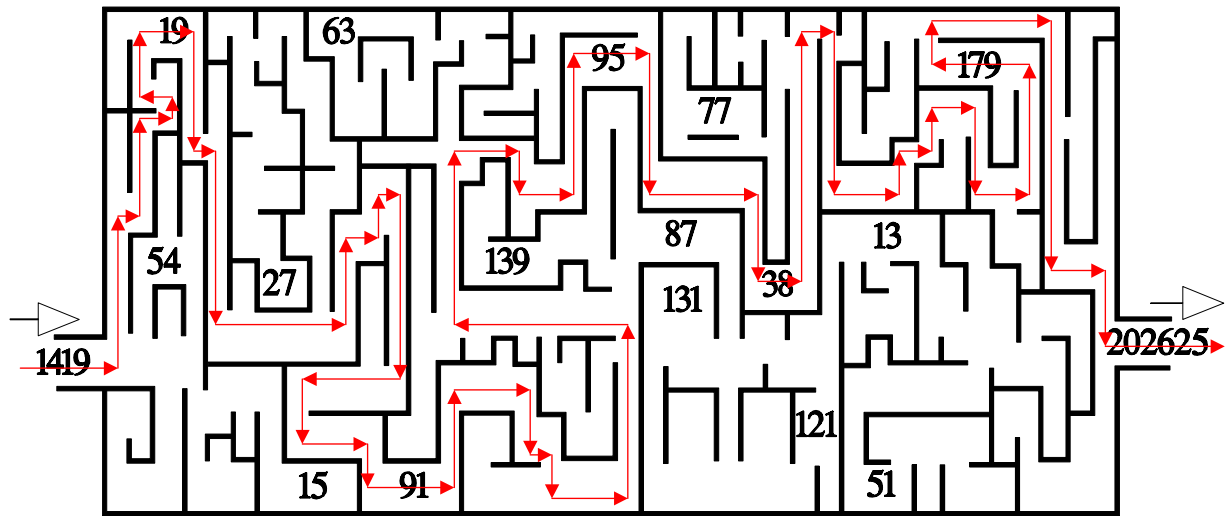




OPEN CHALLENGE '06



1. MAGICAL MAZE



$$\boxed{19} \times \boxed{91} \times \boxed{95} \times \boxed{38} \times \boxed{179} = \boxed{1117262510}$$

$1419 = IN \rightarrow I = 14 \quad N = 19$
 $202625 = OUT \rightarrow O = 20 \quad U = 26 \quad T = 25$
 Code number is alphabet position + 5
 $1117262510 = FLUTE$
 Thus the password is FLUTE.

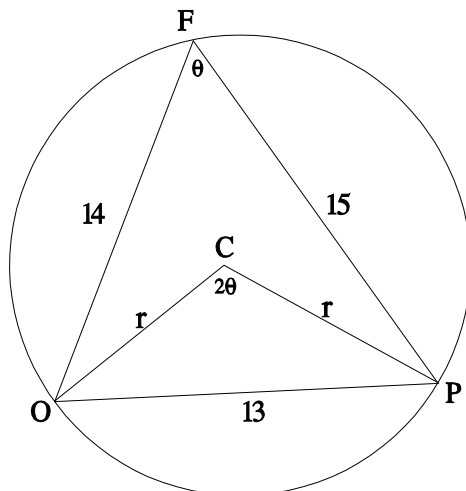
2. A LITTLE LIGHT MOVEMENT

The least possible labour involves 18 moves as follows:

Move to empty room Wardrobe; Bookcase; Piano; Wardrobe; Bookcase; Chest of Drawers; Cabinet; Bookcase; Wardrobe; Piano; Chest of Drawers; Wardrobe; Bookcase; Cabinet; Wardrobe; Chest of Drawers; Piano; Bookcase.

3. MIDDLE C

The clarinettist is at the centre of a circle of radius r .



Let $\angle OFP = \theta$

$$\cos \theta = \frac{14^2 + 15^2 - 13^2}{2 \times 14 \times 15} = \frac{3}{5}$$

$$\text{Thus } \sin \theta = \frac{4}{5}$$

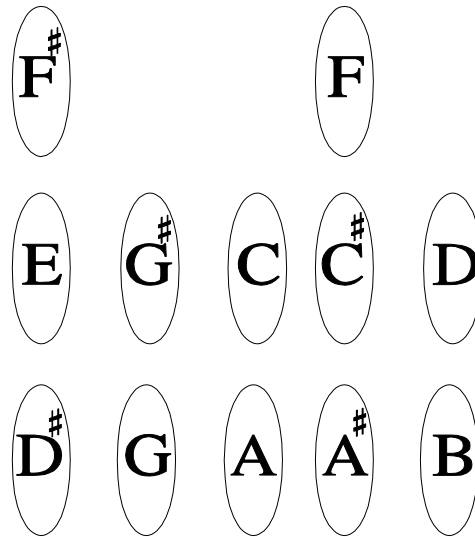
Now $\angle OCP = 2\theta$

$$\text{Thus } r = \frac{13}{2 \sin \theta} = \frac{65}{8} = 8\frac{1}{8} \text{ feet.}$$

Thus the clarinettist is $8\text{ feet } 1\frac{1}{2}\text{ inches}$ from the other three.

4. THE TRIANO

The arrangement of notes within the basic pattern is:



5. CANDLIGHT SONATA

The lengths of candles A and B are both functions of time such that:

$$A(t) = \alpha - \frac{\alpha t}{4} \quad B(t) = \alpha - \frac{\alpha t}{5}, \text{ where } \alpha \text{ is the original length of both candles.}$$

At time T $A(T) = \frac{1}{4} B(T)$

$$\alpha - \frac{\alpha T}{4} = \frac{1}{4} \left(\alpha - \frac{\alpha T}{5} \right)$$

$$4\alpha - \alpha T = \alpha - \frac{\alpha T}{5}$$

Thus

$$\frac{4}{5} T = 3$$

$$T = 3 \frac{3}{4} \text{ hours}$$

Thus Wolfgang practised for 3 hours 45 minutes.

6. SALIERI'S CONFESSION

NOW AT MY PASSING I ADMIT A GRAVE SIN. CONSUMED BY JEALOUSY I
ADMINISTERED THE POISON ARSENIC TO WOLFGANG AMADEUS MOZART AND
THUS PROCURED HIS END AND MY ADVANCEMENT.
ANTONIO SALIERI

The poison was arsenic.

The substitution code gives:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
T C H A I K O V S Y Z X W U R Q P N M L J G F E D B

Thus the code word used was TCHAIKOVSKY but as he was not born until 1840 his name would have been unknown to Salieri who died in 1825. Hence researchers are convinced that this is not genuine.