5 Minutes,

3 Problems,

0 Solutions

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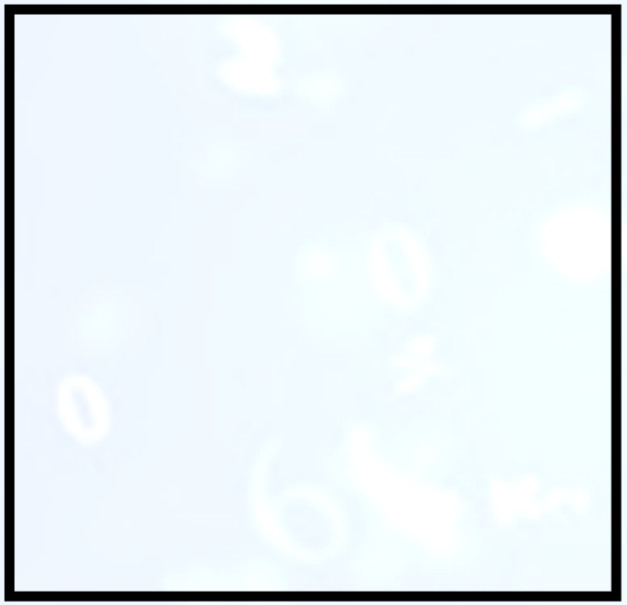
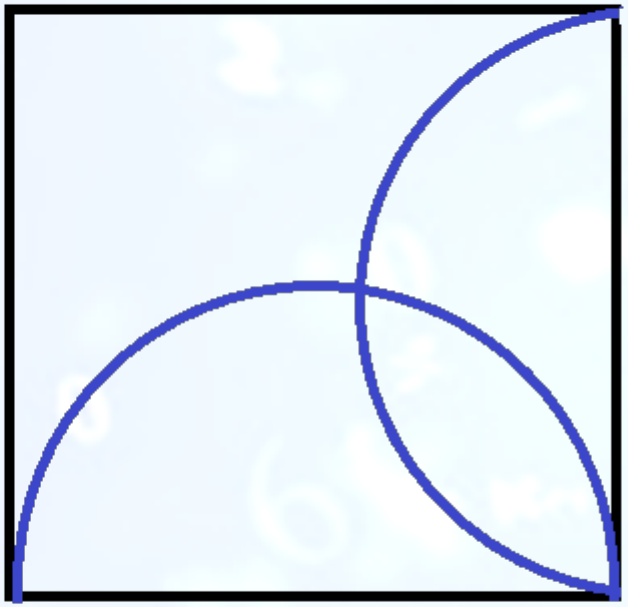
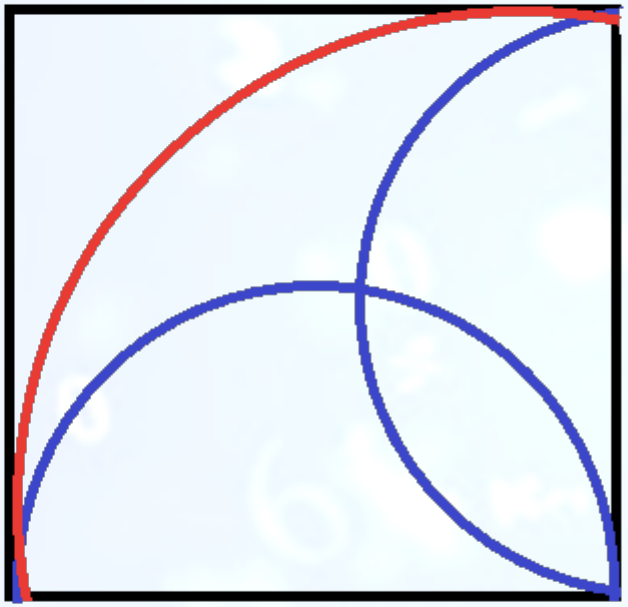
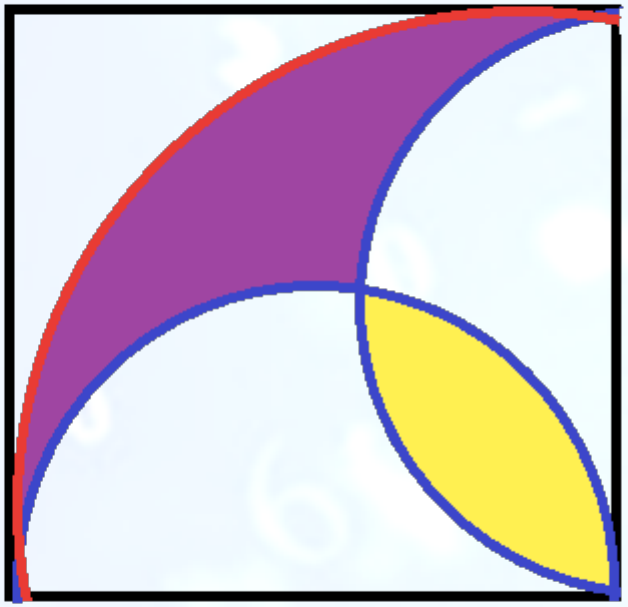
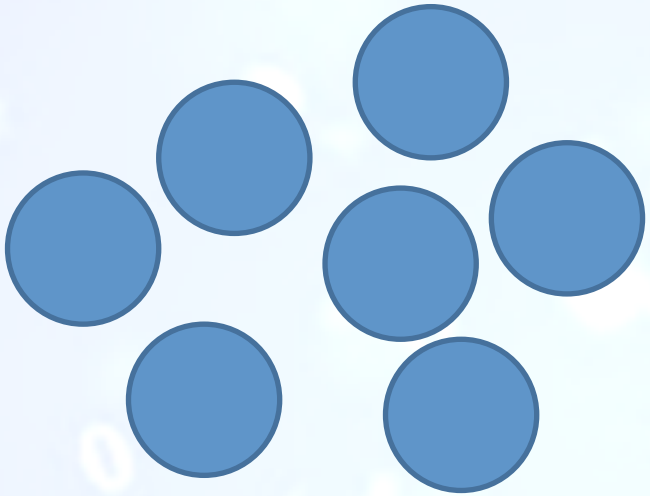








Take *n* coins and separate them into two piles



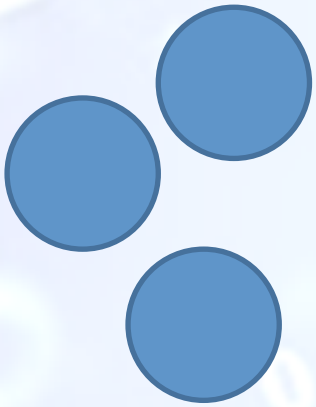
Take *n* coins and separate them into two piles

Now multiply their sizes together $3 \times 4 = 12$

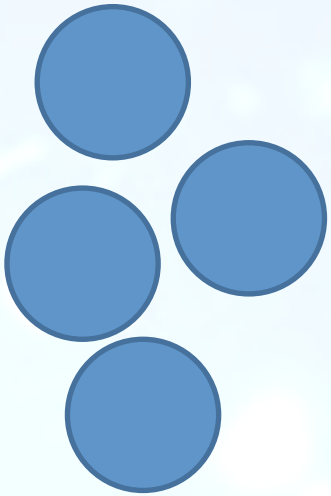
Do the same with the remaining piles
and keep going until all the coins are separated.

Add up all the products formed.

Take *n* coins and separate them into two piles

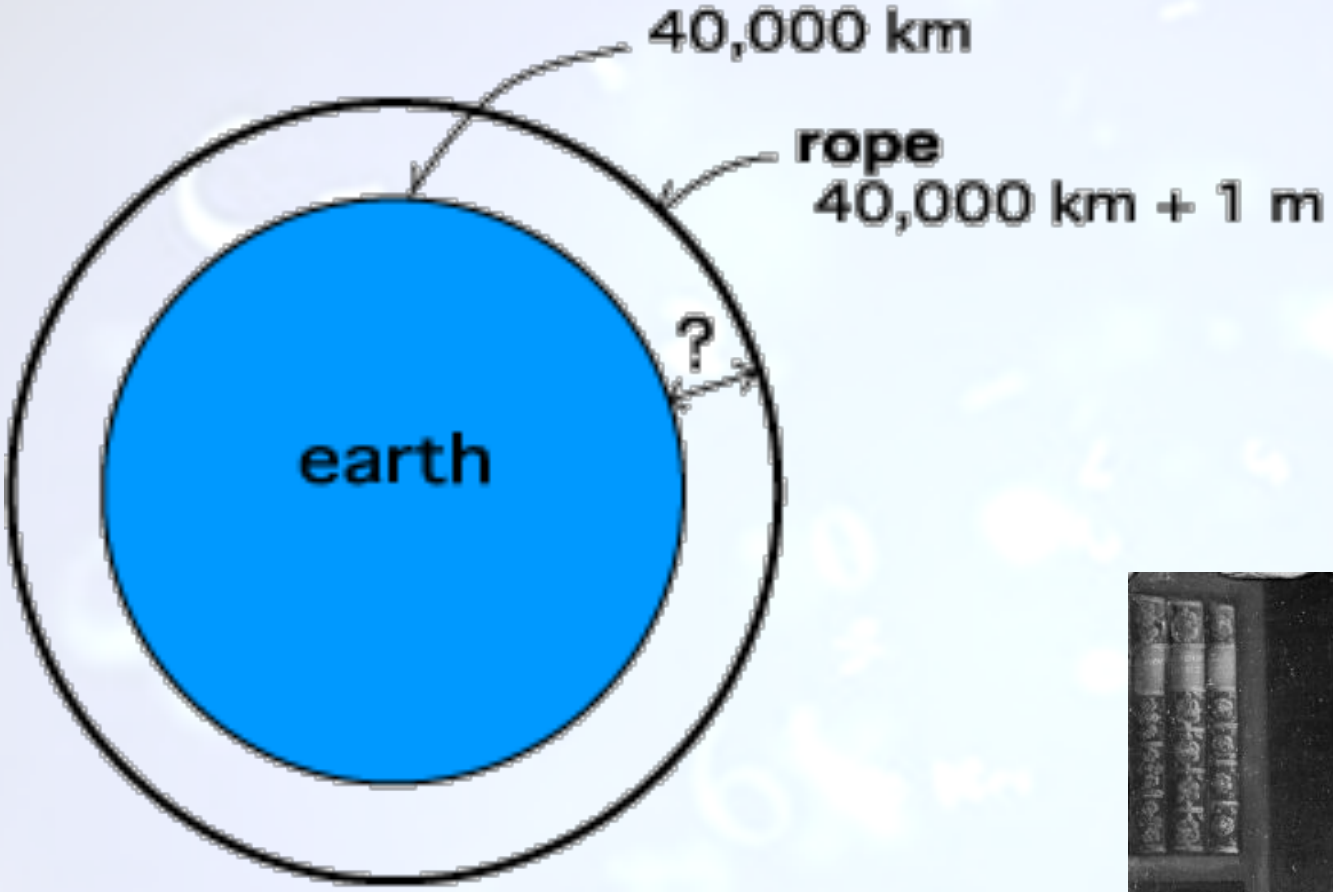


$$2 \times 1 = 2$$

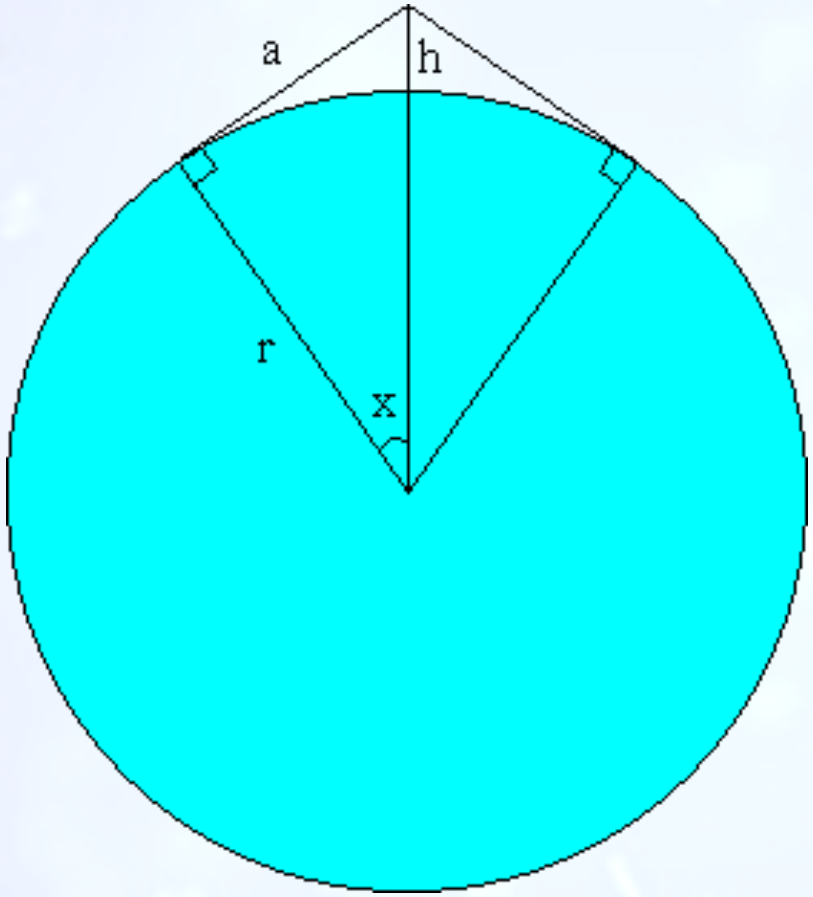


$$2 \times 2 = 4$$

$$\text{Total} = 12 + 4 + 2 + 1 + 1 + 1 = 21$$



William Whiston, 1667-1752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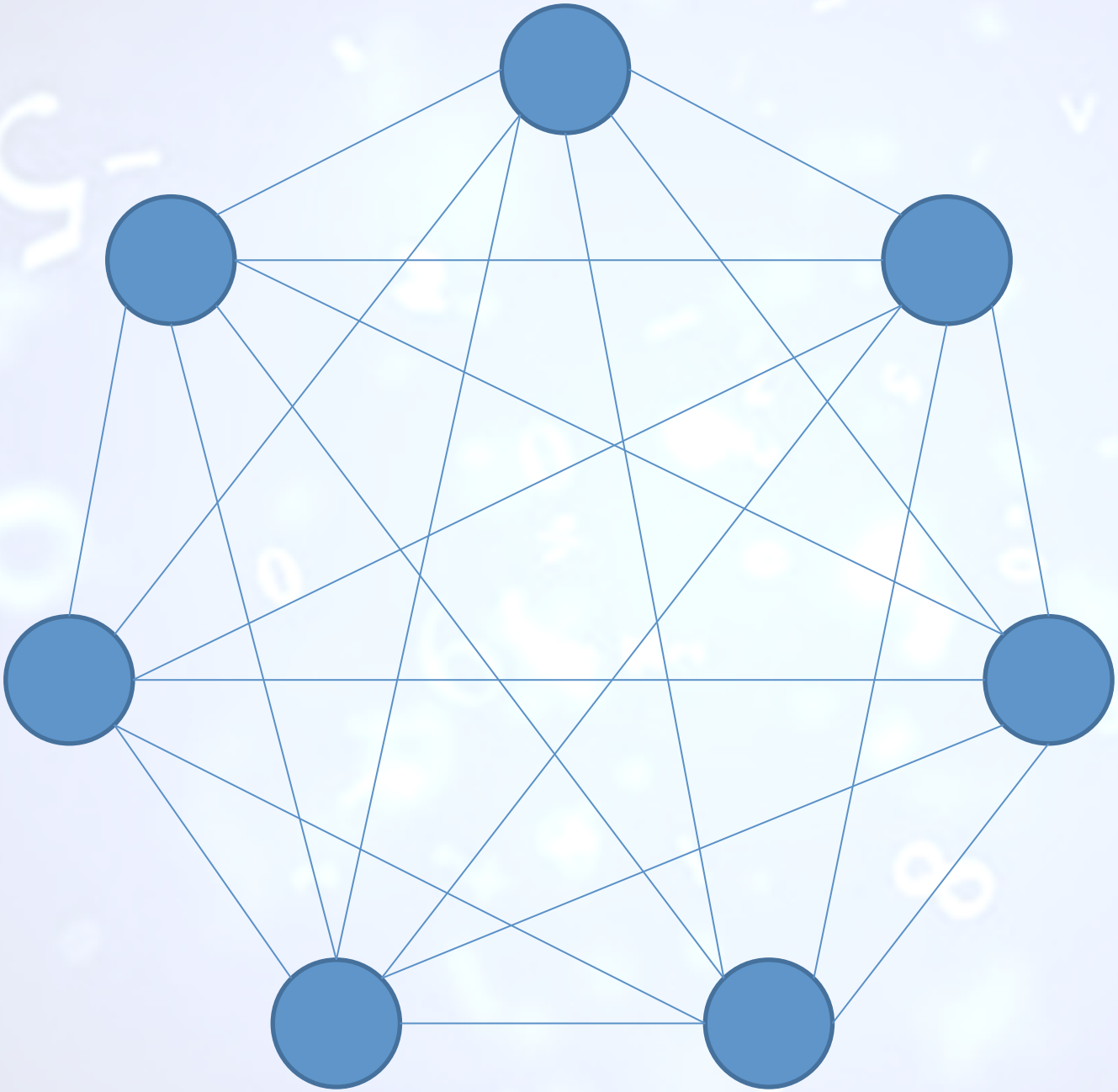

An identity for $T_n = 1 + 2 + 3 + \cdots + n$

n+1 coins

n-k coins

k+1 coins

$$T_n = T_{n-k-1} + T_k + (n-k)(k+1)$$

$$T_{2k+1} = 2T_k + (k+1)^2$$

$$T_7 = 2T_3 + 4^2$$

$$T_7 = 2T_3 + 4^2$$