

Math Club Worksheet COMC Preparation #4

Warm UP: "The Tax Man" (Game Theory) There are 18 cheques valued from \$1 to \$18. For each day you work, you can select one cheque. However the Tax Man will take the cheques that are factors of your cheque. For instance, if you select \$6, the Tax Man will take cheques \$1, \$2, and \$3. Once a cheque is taken, it doesn't get replaced. You lose if you take a cheque without any factors left. Any remaining cheques will go to the Tax Man. What is the maximum amount you can take?

Warm Up: Evaluate the expression. No Calculator: $\sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}} = ?$

Question: In a stack of logs, each row has exactly one fewer log than the row below. With 9 logs, the tallest possible stack is 4 at the bottom, 3 logs in the second row and 2 logs on the top row, making a total of 3 rows. With 2015 logs, how many rows are there in the tallest possible stack? (Australian Math Comp)

Question: can you find the sum of all the distinct roots of "x" satisfying the equation below:

$$(x^2 + x - 2)^3 + (2x^2 - x - 1)^3 = 27(x^2 - 1)^3 \text{ India Regional Mathematical Olympiad}$$

Determine all triples (a,b,c) of positive integers such that each of the numbers below is a power of 2:

$$ab - c, \quad bc - a, \quad ca - b$$

(Thailand Math Olympiad)