

A selection of fun and exciting problems.
some from last weekend's state math competition!

find the sum of the series given below:

$$\frac{1}{18} + \frac{1}{28} + \frac{1}{40} + \frac{1}{54} + \frac{1}{70} + \dots$$

- A weighted coin when tossed has the probability p of coming up heads and probability $1-p$ of coming up tails, where $0 < p < 1$. If the coin is tossed 6 times, the probability of getting 0 heads is equal to the probability of getting one head. Compute p .

The following was state math, and in a section without calculators.

$$7^3 + 8^3 + 9^3 + \dots + 18^3$$

Use the method of finite differences to find a formula which generates the following sequence.

1, 3, 6, 10, 15, 21, . . .

Use the method of finite differences to find a formula which will give the sum of the squares of the first n positive integers.

A fair coin is flipped 5 times. Given that it comes up heads exactly three times, what is the probability that it does not come up tails twice in a row?

This was state math and the answer had to be simplified correctly, also, this particular event did not permit the use of calculators.

Consider a cube with sides of length 4 units. What is the greatest straight line distance between any two points of the cube?