Bergen County Mathematics League

Good Luck To You — Good Luck To All

Contest #2 (Calculators Allowed) — 2014-2015

Part I *Time Limit: 12 minutes* Answers must be **exact** ***or*** have 4 (or more) significant digits, correctly rounded.

2-1. Which is a closer rational approximation to π: $\frac{22}{7}$ or 3.14?

2-2. What is the least number of tetrahedra into which a cube can be partitioned?

Part II *Time Limit: 12 minutes*

2-3. What are all real values of x which satisfy $|3x + 2| > x$?

2-4. The yearly salary increments received by a man equal the yearly salary increments received by his son. The man earned (yearly) 50% more than his son earned when the man earned what his son earns now. When the son earns what the man now earns, their combined salary will be \$117,000. How many dollars does the man now earn?

Part III *Time Limit: 12 minutes*

2-5. The roots of $Ax^3 + Bx^2 + Cx + D = 0$ are $\frac{12}{17}$, $-\frac{23}{11}$, and $\frac{19}{29}$. What are the three roots of $Dx^3 + Cx^2 + Bx + A = 0$?

2-6. In $\triangle ABC$, $AB = 13$, $BC = 14$, and $AC = 15$. If points X, Y, and Z are chosen on $\overline{BC}$, $\overline{AC}$, and $\overline{AB}$ respectively, what is the maximum value of

$$\frac{1}{AX} + \frac{1}{BY} + \frac{1}{CZ} ?$$

***Reminder*: A question next meet will repeat the theme of question 2-4.**

Answers

2-1. $\frac{22}{7}$

2-2. 5

2-3. all real numbers, or entire domain, or equivalent

2-4. 52 000 or \$52 000

2-5. $\frac{17}{12}$, $-\frac{11}{23}$, $\frac{29}{19}$

2-6. $\frac{1}{4}$