

**Flanders Math Olympiad 2004**

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**1** Consider a triangle with side lengths 501m, 668m, 835m. How many lines can be drawn with the property that such a line halves both area and perimeter?

**2** Two bags contain some numbers, and the total number of numbers is prime.

When we transfer the number 170 from 1 bag to bag 2, the average in both bags increases by one.

If the total sum of all numbers is 2004, find the number of numbers.

**3** A car has a 4-digit integer price, which is written digitally. (so in digital numbers, like on your watch probably)

While the salesman isn't watching, the buyer turns the price upside down and gets the car for 1626 less. How much did the car initially cost?

**4** Each cell of a beehive is constructed from a right regular 6-angled prism, open at the bottom and closed on the top by a regular 3-sided pyramidal mantle. The edges of this pyramid are connected to three of the rising edges of the prism and its apex  $T$  is on the perpendicular line through the center  $O$  of the base of the prism (see figure). Let  $s$  denote the side of the base,  $h$  the height of the cell and  $\theta$  the angle between the line  $TO$  and  $TV$ .

(a) Prove that the surface of the cell consists of 6 congruent trapezoids and 3 congruent rhombi.

(b) the total surface area of the cell is given by the formula  $6sh - \frac{9s^2}{2 \tan \theta} + \frac{s^2 3\sqrt{3}}{2 \sin \theta}$

<https://3.bp.blogspot.com/-ClTmCPYxbyw/XWur81MfOzI/AAAAAAAAAKoY/Xpkj4HewB0kFTUdKmV3jPH420s1600/2004%2Bflanders%2Bp4.png>

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