

**Nova Scotia**  

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**Math League**

2007–2008

**Game Two**

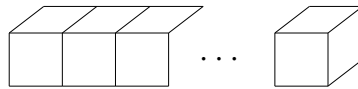
**PAIRS RELAY**

A. Let  $A$  be the smallest positive integer which when multiplied by 123 yields a product which ends in 98.

Pass on A.

B. You will receive A.

The surface area of a cube is  $6 \text{ cm}^2$ . A cubes are put together end-to-end as in the diagram below, forming one long shape.



Let  $B$  be the surface area of the resulting shape.

Pass on B.

C. You will receive B.

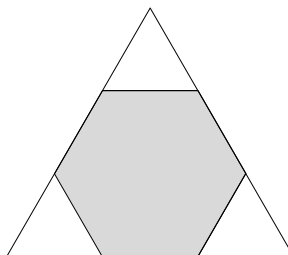
Willy said he did not sell 53 % of his widgets. Biff said that is the same as not selling  $B$  widgets.

Let  $C$  be the number of widgets Willy sold.

Pass on C.

D. You will receive C.

A regular hexagon (all sides equal, all angles equal) is inscribed in an equilateral triangle. The area of the hexagon is  $C$ . The area of the triangle is  $D$ .



Pass on D



C. Let  $x$  be the total number of widgets. Then

$$0.53x = B \implies x = \frac{B}{0.53}.$$

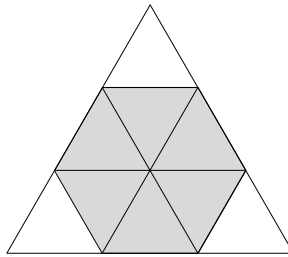
There follows

$$\begin{aligned}x &= B + C \\ \frac{B}{0.53} &= B + C \\ C &= \frac{B}{0.53} - B.\end{aligned}$$

Since  $B = 106$ , we have

$$C = \frac{106}{0.53} - 106 = 94.$$

D. Since the hexagon is regular and the triangle is equilateral, we can further divide the triangle as follows:



We then see that the hexagon is comprised of nine equal triangles, and the hexagon of six. That is

$$C = \frac{2}{3}D \implies D = \frac{3}{2}C.$$

Since  $C = 94$ , this gives  $D = 141$ .