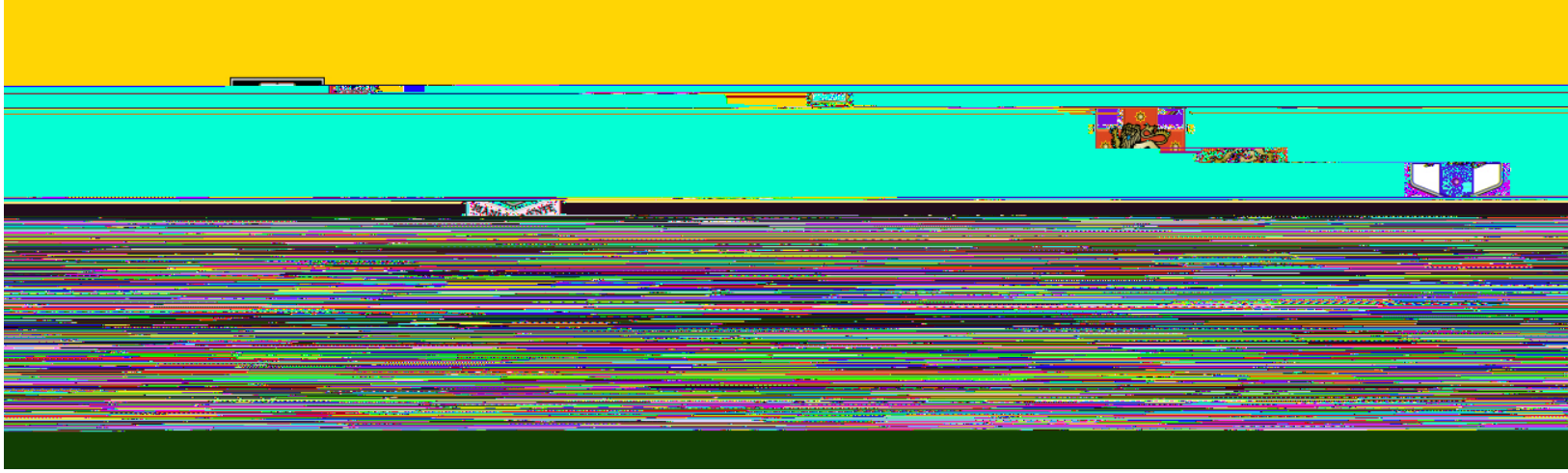

MATHEMATICS ENRICHMENT CLUB.
Solution Sheet 1, May 7, 2013

1. $\$2083\frac{1}{3}$ pro t.

2. n = 60 = 2^2 3 5, which means the number of divisors is (2 + 1)(1 + 1)(1 + 1) = 12. This is the only one, given a prime factorisation n = $p_1^{m_1}p_2^{m_2}$ $p_k^{m_k}$ the number of divisors is $(m_1 + 1)(m_2 + 1)$ $(m_k + 1)$. For n to be divisible by 1

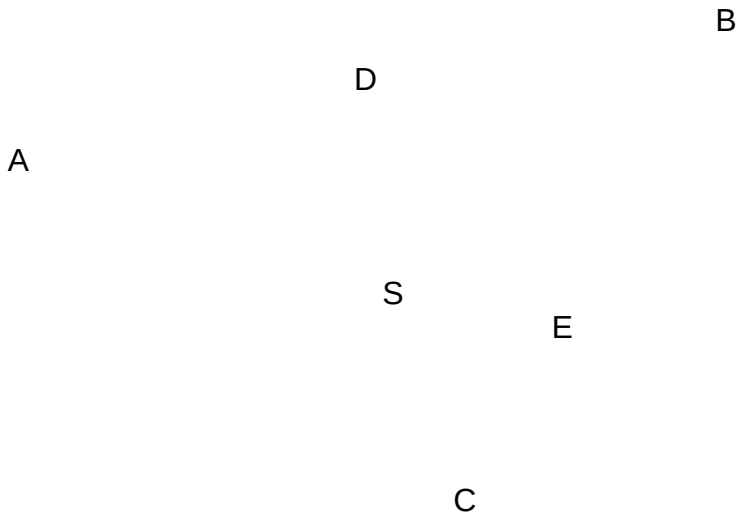

Figure 1: Showing the relevant areas for Question 6

6. Construct the line SB. Label the areas of ADS and SEC, and respectively. Knowing that a cut from the baseline of a triangle to the opposite vertex divides the triangle into two triangles whose areas are in the same ratio as the two baselines, we can label each smaller triangle's area in terms of and as in Figure 6 (shown coloured so that each red block = and each blue block =). It can then be shown (with AEC and AEB that = 3 . Thus ADS and ASC are of equal area and so jDSj : jSCj = 1 : 1, and the areas of ASB and BSE are in the ratio 6 : 2 so jASj : jSEj = 3 : 1.

7. (a) Consider an equilaterial triangle with side lengths x. Since P is interior the longest AP , BP or CP can be is x, but becat-b