

MATHEMATICS ENRICHMENT CLUB. ¹
 Problem Sheet 12, August 14, 2012

1. The number 2012 uses just three digits. How many years since 1000 AD have used just three digits?
2. Calculate the product $1 \frac{1}{2} \cdot 1 \frac{1}{3} \cdot 1 \frac{1}{4} \cdots 1 \frac{1}{100}$:
3. (a) Express $\frac{1}{3} + bc + ca = 215$, where

$b^2 = 215$ and hence find the largest possible value of b
 possible triples $a; b; c$

of non-zero numbers $a; b; c$, we produce a new triple $(b; bc; ca)$
 $(2; 6; 3)$. Suppose we repeat this process a number of times.
 never return to where we start, but that if we do, then it
 steps. Can you find triples which return to themselves after

three medians intersecting at S . Let $L; M$ be the midpoints

angles LSC and MSB have equal areas.

is area $100cm^2$, find the area of ABC .

hedron with skew edges AB, CD . (Two edges are skew if they
 do not intersect and are not in the same plane.)

skew to BC and the one skew to BD .

midpoints of a pair of skew edges is called an edge-bisector.

The bisectors of a tetrahedron intersect at a single point which
 is the centroid of the tetrahedron.

¹Some of the problems here come from T. Gagen, Uni. of Syd. and from E. Szekeres, Macquarie Uni.