

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 $\frac{1}{3}a + bc + ca = 215$, where

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

if 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

with 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.