

MATHEMATICS ENRICHMENT CLUB.  
Problem Sheet 5, June 4, 2013

1

- Express the number 504504504: as a fraction in lowest terms.
- Yvonne and Znonimir play a game. They have a pile of 500 counters and each is allowed to remove 1,2,4,8,... counters from the pile, taking turns in so doing. The last person to take a counter loses. Assuming that both play using the best possible strategy at each go, who wins?
- The last digit of  $1997^{1997}$  is  
(a) 1    (b) 3    (c) 5    (d) 7    (e) 9:
- How many planes of symmetry has a rectangular box of dimensions 2 3?
- (a) Paul measured all 6 edges of a tetrahedron ABCD and found them to be 1,3,4,5,6,8 cm. Can this be correct?  
(b) Paul then measured the edges to be 2,3,4,5,6,8.  $AB = 2$  what is the length of CD?
- (a) Prove that the angle in a semicircle is right-angle.  
(b) Show that if two chords of a circle mutually bisect each other, then they are both diameters.  
(c) Complete the following statement: If a parallelogram is inscribed in a circle then .....

Senior Questions

- Put  $x = z - \frac{1}{z}$  and hence solve, in surd form, the cubic  $x^3 + 3x = 1$ :
- Let ABC be a triangle with three medians intersecting at S. Let L; M be the midpoints of AC, AB respectively.  
(a)