

MATHEMATICS ENRICHMENT CLUB. 1
Problem Sheet 13, August 20, 2012

1. Laurie sold two cars for \$25 000 each. One he sold at a 20% profit and the other at a 20% loss. How much did he gain or lose ?
2. A pizza has radius z , and height a . What is interesting about its volume?²
3. If a triangle **ABC** has sides of length $a; b; c$ such that $a^2 + b^2 = c^2$, prove that it must be a right-angled triangle.
4. Without using a calculator, which is larger 31^{24} or 257^{15} :
5. Let $S_n = 2n(2n - 1)(2n - 2) \dots (n + 1)$. For example, $S_3 = 6 \cdot 5 \cdot 4 = 120$.
 - (a) What is the power of 2 in the prime factorisation of S_n for $n = 2; 3; 4; \dots$?
 - (b) Make a conjecture based on (i) and prove it.
- 6.