The Scottish Mathematical Council

MATHEMATICAL CHALLENGE 2007–2008

Entries must be the unaided efforts of individual pupils. Solutions must include explanations.

Answers without explanation will be given no credit.

CURRENT AND RECENT SPONSORS OF MATHEMATICAL CHALLENGE ARE

The Edinburgh Mathematical Society, Professor L E Fraenkel,

The London Mathematical Society and The Scottish International Education Trust.

Primary Division: Problems III

P3.1. Mary has three sons. All three are less than 10 years in age and the product of the ages of the younger two equals the age of the oldest. The sum of the ages of the three boys is a prime number. How old are the boys?

Explain your reasoning.

P3.2. Oor Wullie and his pals are exploring in the jungle and have to cross a rope bridge at midnight. Unfortunately the bridge is only strong enough to support two people at a time. As it is dark, they also need a torch to be used every time the bridge is crossed but they only have one torch. Wullie can cross the bridge in five minutes, Wee Eck can cross in seven minutes and Fat Bob can cross in eleven minutes. But it takes PC Murdoch twenty minutes to get across. How quickly can all four get across the bridge?

Explain your reasoning.

P3.3. A palindromic number is a number which reads the same backwards and forwards, for example 838 and 14541. As generally we do not write numbers with an initial zero, numbers such as 070 will not be included here.

(a)   Which are there more of: 10-digit or 11-digit palindromic numbers?

(b)   Which are there more of: 11-digit or 12-digit palindromic numbers?

Explain your reasoning.

END OF PROBLEM SET III