



The Scottish Mathematical Council

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MATHEMATICAL CHALLENGE 2008–2009

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.

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Junior Division: Problems 1

- J1.** After taking part in a diving competition, and before the results were announced, the five girls who had taken part were discussing how they thought the competition had gone.
Alice said: “Beth was first; Deb was last.”
Beth said: “I was second; Alice was third.”
Claire said: “I was third; Deb was fourth.”
Deb said: “Beth was third; Alice was fourth.”
Emma said: “I was first; Claire was last.”
When the results were announced, there were no ties and it turned out that each girl had made one true statement and one false statement. Find the placings of the five girls and explain your reasoning.
- J2.** On a 26-question test, 8 points were credited for each correct answer and 5 points were deducted for each wrong answer. If all questions were answered, how many were correct if the score was zero?
If Fred and Bernie both scored more than zero, but Fred scored 10 times as many points as Bernie, how many did Fred score correctly and how many did Bernie score correctly? (Again assume that all questions were answered).
- J3.** The Mathematical Challenge offices have a six-digit phone number. This is a special number because you can rearrange the six digits to make either three consecutive two-digit numbers or two consecutive three-digit numbers. The secretary knows this but has forgotten the number. The chairperson informed her it was the largest possible such number. What is the number the secretary had to remember?
- J4.** Travelling to a pop concert I know that if I average 30mph for the journey I will arrive 1 hour early, but if I average only 20mph for the journey I will arrive 1 hour late. How fast do I need to travel to arrive exactly on time?

- J5.** Sam had never fully understood the points system in football and felt that the scoring of goals should be encouraged. His idea is that 10 points should be awarded for a win, 5 points for a draw and 1 point for each goal scored, whatever the result of the match. Therefore even if you are losing 0-5 and have no hope of winning, a goal scored might make all the difference between promotion and relegation. This was tried with three teams, Hubs, Dins and Rungs. Each team scored at least one goal in every match and no team played another more than once. Hubs scored 8 points, Dins 14 points and Rungs scored 9 points. Find the score in each match.

END OF PROBLEM SET 1