The Scottish Mathematical Council

MATHEMATICAL CHALLENGE 2010–2011

Entries must be the unaided efforts of individual pupils.

Solutions must include explanations and answers without explanation will be given no credit.

Do not feel that you must hand in answers to all the questions.

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 A Brachiosaurus is 37 metres long.

Its neck is twice as long as its tail and its body is 2 metres longer than half of its tail.

How long are each of the neck, body and tail of the Brachiosaurus?

P3.2 You are given three rods of lengths 1, 3 and 9 units. Using these rods, you could measure 7 units as shown. Show how you could measure each whole number length up to 13 units.
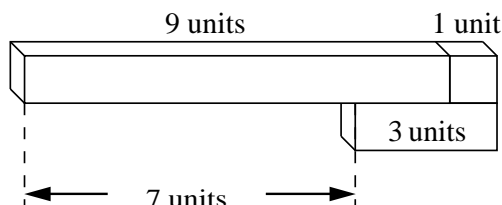
By adding a fourth rod, it is possible to measure all whole number lengths up to 40 units. What is the length of this extra rod?

Explain your answer.

P3.3 You have three boxes, each containing two *identically* wrapped Easter eggs.

One box contains two milk chocolate eggs (M), one contains two plain chocolate eggs (P) and the third contains one *milk chocolate* egg and one *plain chocolate* egg. The boxes are labelled MM, PP or MP according to their contents.

However, someone has switched all the labels so that every box is now incorrectly labelled.

You are allowed to take out one egg at a time *from* any box, check what type it is and put it back.

By doing this you can correctly label all three boxes.

What is the smallest number of eggs you would need to check in order to label the boxes correctly?

Explain your answer.

END OF PROBLEM SET III