

The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2012–2013

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

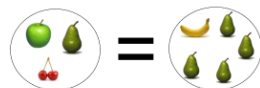
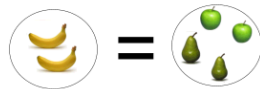
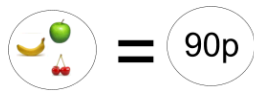
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Junior Division: Problems 1

J1.



A mathematical greengrocer had the display shown alongside in his shop window. The poster shows how the costs of one apple, one banana, one pear and a pair of cherries are related.

How much does each kind of fruit cost?

Explain your reasoning.

J2.

Alice, Bill, Colin, Daisy and Edward play a game in which each is a frog or a toad. A frog's statements are always false and a toad's statements are always true.

- | | | | |
|---|--|---|-------------------------------------|
| A | Alice says that Bill is a toad. | B | Colin says that Daisy is a frog. |
| C | Edward says that Alice is not a frog. | D | Bill says that Colin is not a toad. |
| E | Daisy says that Edward and Alice are different kinds of animals. | | |

Who of Alice, Bill, Colin, Daisy and Edward are the frogs?

J3.

Two shops, Jessies and Laskops, sell the same model of camera, Jessies for £16 more than Laskops. But then Jessies introduced a special offer giving 25% off, making the camera £2 cheaper than from Laskops.

What is the price of the camera from each shop, taking the special offer into account?

J4.

Gran, Helen, Mum and Dad sat down one evening to play a card game each starting with 20 counters. As a general rule Gran has a fair amount of luck but, on this occasion it deserted her completely and she finished well down.

Mum gained half of what Gran had lost and Helen was six down. Dad finished with four times as many counters as Gran.

How many counters did Mum finish with?

J5. In mathematics, the notation $11!$ is short for $11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$. Similarly, another example is, $4! = 4 \times 3 \times 2 \times 1$ and so $4! = 24$.

What is the greatest factor of $11!$ that is one greater than a multiple of 6?

Note: $11!$ is spoken of as 'eleven factorial'.

END OF PROBLEM SET 1