

The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2023–2024

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, The Maxwell Foundation,

The London Mathematical Society and The Scottish International Education Trust.

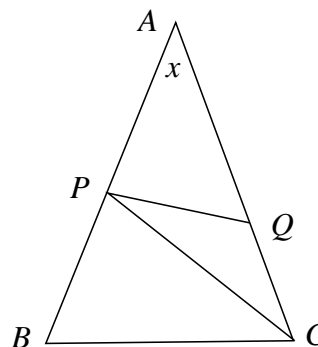
The Scottish Mathematical Council is indebted to the above for their generous support and gratefully acknowledges financial and other assistance from schools, universities and education authorities.

Particular thanks are due to the Universities of Aberdeen, Edinburgh, Glasgow, Heriot Watt, St Andrews, Stirling, Strathclyde and to George Heriot's School, Gryffe High School and Kelvinside Academy.

Middle Division: Problems 2

- M1.** Triangle ABC has $AB = AC$ and $\angle BAC = x$ is less than 60° . Point P lies on AB such that $CB = CP$. Point Q lies on AC such that $CQ = PQ$.

Determine $\angle CQP$ in terms of x .



- M2.** One hundred years ago there was a gathering to present an award to a local teacher in recognition of many years of service.

The women there numbered four-fifths of the men, 40% of whom were unmarried. Half of the married women were accompanied by their husbands and a quarter of the married men by their wives. Thirty of the women were unmarried.

How many people were there at the gathering?

- M3.** A market trader sells fruit. As a special offer, he has made up baskets of fruit. The first has four bananas, three oranges and two apples and costs £2.90; the second has three bananas, two oranges and four apples and costs £2.60; the third has two bananas, four oranges and three apples and costs £2.60. Individual fruit bought costs 20% more than the corresponding price in any of the special offer baskets. I don't fancy any of the mixtures in the baskets, but I do want at least two bananas, two oranges and three apples. So I buy bananas, oranges and apples individually and pay £3.12. How many of each fruit do I get?

SEE OVER FOR QUESTIONS M4 & M5.



Mathematical Challenge Problems 2

MIDDLE DIVISION 2023-2024

PLEASE USE CAPITALS TO COMPLETE

SURNAME

OTHER NAME(S)
(underline the one
you prefer)

SCHOOL

AGE

YEAR OF STUDY

FOR OFFICIAL USE

Marker

Marks

1	2	3	4	5

Total

— — — — - CUT ALONG HERE — — — —

Please write your solutions on A4 paper and staple the above form to them.

PLEASE WRITE YOUR NAME ON EVERY PAGE.

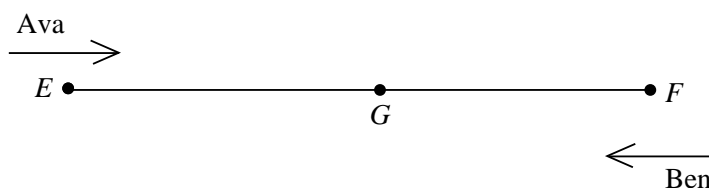
Send your entry through your school to the section organiser.

For further information on the competition, please see the School Materials which have been distributed to schools. A copy of these Materials can be obtained from

<http://www.wpr3.co.uk/MC/materials/index.html>

There are separate links for primary and secondary schools. This page also includes a list of authorities in each section and names and addresses of section organisers.

- M4.** Ava drove from town E to town F at a constant speed of 60 mph. Ben drove from F to E along the same road also at a constant speed. They started their journeys at the same time and passed each other at point G .



Ava drove from G to F in 16 minutes. Ben drove from G to E in 25 minutes. Determine Ben's constant speed.

- M5.** The numbers p , q , r , s and t are consecutive positive integers arranged in increasing order. $p + q + r + s + t$ is a perfect cube and $q + r + s$ is a perfect square. Find the smallest possible value of r .

END OF PROBLEM SET 2

CLOSING DATE FOR RECEIPT OF SOLUTIONS:

23 February 2024

For more practice on past papers visit:

www.wpr3.co.uk/MC-archive/