

## 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.

### Junior Division: Problems 2

**J1.** A cruise liner, which is 100m long, is sailing at 20 km/hr. As its bow passes a buoy, a passenger starts to walk from bow to stern at 4 km/hr. When he reaches the stern, how far past the buoy will he be?

**J2.** The directors of a company which specialises in the construction of cubes are planning to build a car park at the front of their building. This car park is in the shape of a rectangle, with a total area of 3055 square metres. They make a request to the builders that the car park is made up of square slabs, all of different sizes, and have calculated that it can be done using squares of side 3, 5, 6, 11, 17, 19, 22, 23, 24 and 25 metres.

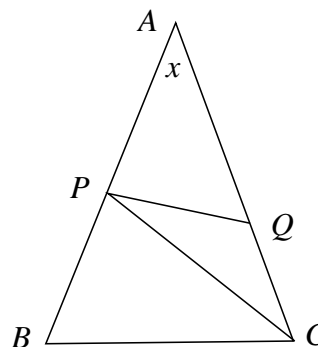
What must be the dimensions of the car park? How can the slabs be placed to fit?

**J3.** At a school, 15 students were absent on Monday, 12 were absent on Tuesday and 9 were absent on Wednesday. If none of the students was absent on all three days, what is the smallest possible total number of students that were absent on at least one day?

Justify your answer.

**J4.** Triangle  $ABC$  has  $AB = AC$  and  $\angle BAC = x$  is less than  $60^\circ$ . Point  $P$  lies on  $AB$  such that  $CB = CP$ . Point  $Q$  lies on  $AC$  such that  $CQ = PQ$ .

Determine  $\angle CQP$  in terms of  $x$ .



**J5.** 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?

### END OF PROBLEM SET 2

CLOSING DATE FOR RECEIPT OF SOLUTIONS:

23 February 2024



SMC

# Mathematical Challenge Problems 2

JUNIOR DIVISION 2023-2024

PLEASE USE CAPITALS TO COMPLETE

SURNAME

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

SCHOOL

AGE

YEAR OF STUDY

S

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.

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