The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2018−2019

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.

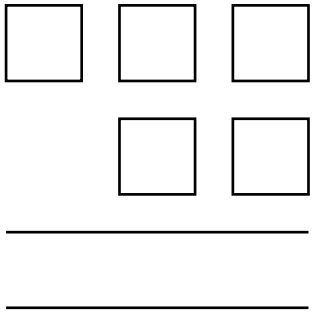
CURRENT AND RECENT SPONSORS OF MATHEMATICAL CHALLENGE ARE
The Edinburgh Mathematical Society, The Maxwell Foundation, Professor L E Fraenkel, The London Mathematical Society and The Scottish International Education Trust.

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. Each of the digits 2, 3, 5, 7 and 8 is placed one to a box in the diagram.



(a) If the two-digit number is subtracted from the three digit number, what is the smallest possible difference?

(b) If the three-digit number is multiplied by the two-digit number, what is the smallest possible product?

J2. A jeweller makes sets of small cubes out of solid silver. The jeweller has gold-plated none, some, or all of the faces on some of the cubes. The cubes in a set are all different, and no other cube can be added to the set. How many cubes are there in a set?

J3. Near where I live, there is a very short street of 14 houses numbered 1 to 14 – seven on each side with the odd numbers on one side and the even numbers on the other (numbers 1 and 2 face each other). The really interesting thing about the street is that all the people along one side have names that sound like trades or crafts, while all those on the other side have names which sound like colours.

- Mr Fletcher and Mr Wright live respectively opposite Mr Green and Mr White, who are both neighbours of Mr Black.
- Mr Smith is Mr Mason's father-in-law.
- Mr Mason lives in a higher number than Mr Brown. Mr Mason's and Mr Brown's numbers together equal those of Mr White and Mr Wright together.
- Mrs Taylor's number is twice that of her sister, Mrs Tyler.
- Mr Gray lives opposite to Mr Baker.
- Mrs Tann lives in a double-figure number opposite to her daughter, Mrs Taylor.

What is Mr Scarlett's number?

J4. An unlimited supply of petrol is available from a camp at one edge of a desert which is 800 miles wide but no petrol is available anywhere else. A truck can only carry enough petrol to travel 500 miles and is able to leave petrol to be collected later. (There is no limit on the size of such stocks and it should be assumed that no petrol is lost by evaporation or spillage.) Establish whether or not it is possible for the truck to get across the desert and, if it is, explain how.

SEE OVER FOR QUESTION J5.

SMC

Mathematical Challenge Problems 2

JUNIOR DIVISION 2018-2019

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 organsier.

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.

J5. Two ships, one 200 metres in length and the other 100 metres in length, travel at constant but different speeds. When travelling in opposite directions, it takes 20 seconds for them to completely pass each other. When travelling in the same direction, it takes 50 seconds for them to completely pass each other.

Find the speed of the faster ship.

END OF PROBLEM SET 2

CLOSING DATE FOR RECEIPT OF SOLUTIONS :

22 February 2019

For more practice, visit the online archive:

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

Look on the SMC web site:

www.scot-maths.co.uk

for information about Mathematical Challenge