



# The Scottish Mathematical Council

www.scot-maths.co.uk

## MATHEMATICAL CHALLENGE 2021–2022

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, St Andrews, Stirling, Strathclyde and to George Heriot's School, Gryffe High School and Kelvinside Academy.

### Junior Division: Problems 1

- J1.** In the diagram (not to scale) the rectangle is divided into nine smaller rectangles. The areas of five of the smaller rectangles are given. Determine the area of the rectangle labelled  $R$ .

5		2
	4	$R$
3	2	

- J2.** Forest Rovers, Southside United, Hilltown Thistle and Valley Wanderers were to play each other at football. After some of the matches had been played, a table showing some details of matches played, won, lost, drawn etc looked like this:

	Played	Won	Lost	Drawn	Goals for	Goals against	Points
Forest Rovers	2			1	0		
Southside United							0
Hilltown Thistle	1						
Valley Wanderers			0	0	4	2	6

3 points are given for a win and 1 for a draw. Complete the table and find the score in each match played, explaining how you worked it out.

- J3.**  $A$  and  $B$  are two towns connected by a single road which crosses a bridge over a wide river. James leaves  $A$  at 10.38 am and walks along the road to  $B$  at uniform speed, reaching  $B$  at 1.50 pm. On the same day Isla leaves  $B$  at 9.20 am and walks along the road to  $A$  at uniform speed, reaching  $A$  at 12 noon. They arrive at their nearest end of the bridge at the same time. James leaves the bridge one minute later than Isla.

At what time did they reach the bridge?

**SEE OVER FOR QUESTIONS J4 & J5.**



# Mathematical Challenge Problems 1

JUNIOR DIVISION 2021-2022

PLEASE USE CAPITALS TO COMPLETE

SURNAME	<input type="text"/>	FOR OFFICIAL USE				
OTHER NAME(S) (underline the one you prefer)	<input type="text"/>					
SCHOOL	<input type="text"/>					
AGE	<input type="text"/>		YEAR OF STUDY	<input type="text"/>		
		Marker	<input type="text"/>			
		Marks				
		1	2	3	4	5
		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
		Total	<input type="text"/>			

— — — — - 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.

- J4.** At present, the sum of the ages of the parents,  $P$ , is five times the sum of the ages of their children,  $C$ . Two years ago, the sum of the ages of the husband and wife was eleven times the sum of the ages of the same children. A year from now, it will be four times the sum of the ages of the same children.  
Determine the number of children.

- J5.** Two numbers  $x$  and  $y$  satisfy three of the following equations but do not satisfy the remaining one.

$$x + y = 63$$

$$x - y = 47$$

$$xy = 392$$

$$\frac{x}{y} = 8$$

What is the value of  $x$ ?

**END OF PROBLEM SET 1**

CLOSING DATE FOR RECEIPT OF SOLUTIONS :

**5 November 2021**

**Look out for Problems 2 in late November!**

**For information about Mathematical Challenge, look on the SMC web site:**

[www.scot-maths.co.uk](http://www.scot-maths.co.uk)