

## Primary Mathematical Challenges

Welcome to the 2024-2025 Scottish Primary Mathematical Challenges. This package contains

This Welcome Page (including Section Information)  
The Primary Guidelines  
Round 1 Questions  
Information About Payments and Data Protection  
How to Enter your School and Pupil Names on the Marks Website  
The Annual Poster  
Archives and Book Order Form

Once again, the name of the Section Organiser is not on the question paper. Their details are on the website but are repeated here for your convenience **but may change over the session:**

### Section 1

Aberdeen City; Aberdeenshire; Highland; Moray; Orkney Islands; Shetland Islands;  
Western Isles  
Helen Martin (h.martin@abdn.ac.uk)  
Dept. of Curr. Studies, University of Aberdeen, Faculty of Education, MacRobert Building,  
Aberdeen AB24 5UA

### Section 2

Angus; Clackmannanshire; Dundee City; Falkirk; Fife; Perth & Kinross; Stirling  
Rachel Norman (ran@cs.stir.ac.uk)  
Computing Science and Mathematics,  
University of Stirling, Stirling FK9 4LA

### Section 3

East Lothian; Edinburgh City; Midlothian; Scottish Borders; West Lothian  
Andrina Inglis (andrina.inglis@ed.ac.uk)  
Rm 3.06 Charteris Land, Moray House School of Education,  
St John's Street, Edinburgh EH8 8AQ

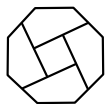
### Section 4

Argyll & Bute; Dumfries & Galloway; East Ayrshire; East Dunbartonshire;  
East Renfrewshire; Glasgow City; Inverclyde; North Ayrshire; North Lanarkshire;  
Renfrewshire; South Ayrshire; South Lanarkshire; West Dunbartonshire  
John Winter (john.winter@strath.ac.uk)  
Lord Hope Building, 141 St James Road, Glasgow G4 0LT

The competition timetable for 2023-2024 is as follows:

<i>Set No.</i>	<i>Last date for receipt of questions by schools</i>	<i>Last date for receipt of solutions from pupils</i>
<i>I</i>	Friday 23 August 2024	Friday 27 September 2024
<i>II</i>	Friday 25 October 2024	Friday 22 November 2024
<i>III</i>	Friday 10 January 2025	Friday 7 February 2025

If there are organisational difficulties you may contact me: Bill Richardson (wpr3145@gmail.com).



# The Scottish Mathematical Council

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

## MATHEMATICAL CHALLENGE 2024-2025

### PRIMARY DIVISION

#### *GUIDELINES FOR TEACHERS*

1. **Mathematical Challenge** is a problem-solving competition open to pupils educated in Scotland. The aim of the competition is to promote mathematics as a source of interest and pleasurable achievement through challenging problems which require only simple techniques and logic. The competition was introduced in 1976 for pupils at secondary school level. As the Scottish Mathematical Council recognised that there are younger children in upper primary who would benefit from the challenge of confronting interesting mathematical problems pitched at an appropriate level of difficulty, the primary competition was introduced in 1994.

**Please ensure that all teachers involved in the competition see these Guidelines.**

2. Three sets, each of three problems, will be available for downloading from the documents website [www.wpr3.co.uk/MC/materials](http://www.wpr3.co.uk/MC/materials), according to the timetable in §11 overleaf. The problems will also be available on the Mathematical Challenge Web pages. Pupils will have a month or more to attempt the problems and schools must send their solutions to be received by the local section organiser by the prescribed date. The local organiser's name and address are given on the first page of the documents website above and in the Contacts section of the Web pages.
3. **A registration fee is normally payable by participating schools. For a primary school the fee is £10 for the first 10 entrants and £8 for each subsequent batch of 10 entrants or part thereof. A fee form is included with the downloadable pack of materials. For individual participants NOT entering through a school, the fee is £8.**
4. **Solutions must be the unaided efforts of the individual pupil.** No help should be given by teachers, parents or others except to encourage clear explanation of how the problem was solved. It is assumed that pupils, in the normal course of their mathematics class work, will have met and practised a range of suitable strategies for solving problems. **The work for the competition should be undertaken in the pupils' own time. Group working is NOT appropriate in Mathematical Challenge.** Teachers are free to use past problems over a wider range of ages and abilities to suit their classroom practice.
5. Entrants are allowed to use a calculator. No problems set in **Mathematical Challenge** require the use of a computer package (e.g. a spreadsheet) to obtain a correct solution. If computer software is used, then a proper mathematical explanation of its use is essential.
6. **The competition is aimed at competent mathematics pupils in the upper primary classes. Please be aware that a large number of entries from one school can impose a considerable strain on the organisation and marking of the competition. Teachers should therefore exercise their judgement to avoid the submission of totally inadequate entries. Note that batches of essentially identical entries are not acceptable, and will be returned unmarked.**
7. At the top of page 2 of each problem sheet there is a proforma for the entrant's name, school and year. Photocopies of this should be used when submitting the entries. **Solutions should be on A4 sized paper and stapled in the top left hand corner.** Plastic wallets or other covers should not be used. Entries will not be returned.

8. The marking scheme for each problem is as follows:
- 4 : a completely correct solution, with full explanation.
  - 3 : a solution, with explanation, which is correct apart from minor omissions.
  - 2 : an attempt which contains ideas towards a solution (with explanation) but not necessarily solving the problem.
  - 1 : an indication of an interesting idea or method, but not necessarily one which could lead to a correct solution.

Explanations which show the pupil has gained some insight into the problem will gain credit even if the solution is not correct. **A solution without any explanation will be given no credit, even if the answer is correct.**

9. All Sections use a software package to assist in the processing of the results. **A Record of Entries must be made electronically by the school**, or it will not be possible to process the results.
- Go to the marks website: <https://www.scottishmathschallenge.org.uk/>
  - Choose “School Login” and enter your login details or “Register here” to set up a new account.
  - When you have logged in, go to “Add/Edit Entrants” \_ enter the names and school year of each entrant.
  - The marks will eventually appear on the “Marks page”.
  - Messages from the organiser may also appear there on the first page from time to time.

Use a paper copy of the ‘Printable version of details and entrants’ from the marks website as a cover sheet for the school's entries. This contains the school details and the alphabetical list of entrants in each section, as entered on the website. All entries submitted will be marked even if earlier problem sets are missed.

10. There are three classes of award: **Gold**, **Silver** and **Bronze**. Award winners will be selected on the basis of their performance in the solutions submitted. To win an award it will normally be necessary to submit entries to all three sets of problems.
11. The competition timetable for 2024-2025 is as follows:

<i>Set No.</i>	<i>Last date for receipt of questions by schools</i>	<i>Last date for receipt of solutions from pupils</i>
<b>I</b>	Friday 23 August 2024	Friday 27 September 2024
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12. **The problems of earlier sessions form an excellent resource.**

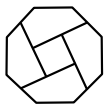
*Primary Mathematical Challenges* was published by The Scottish Mathematical Council in April 2002. It contains all the problems (with full solutions) which have been offered to primary schools since their initial involvement in 1994-1995 up to the 2000-2001 academic year as well as some problems from the Junior Division. Copies can be obtained from Bill Richardson, Kintail, Longmorn, Elgin, IV30 8RJ, price £5 (inc. p & p.).

In addition, it seems unlikely that any further books will be printed so questions and solutions for 2006-2021 can be accessed at: [www.wpr3.co.uk/MC-archive/](http://www.wpr3.co.uk/MC-archive/)  
Comments on the usefulness of these to [wpr3145@gmail.com](mailto:wpr3145@gmail.com) would be welcome.

For the secondary competition, the books *Mathematical Challenges III*, *Mathematical Challenges IV*, *Mathematical Challenges V* and *Mathematical Challenges VI* contain all problems (with full solutions) used in the years 1994-1995 to 2005-2006. These are also available at £7.50, £8, £8 and £8 (respectively).

13. If you have any questions to ask or points to make about the competition, please contact the local organiser for your section, whose name and address are given in the Contacts section of the Mathematical Challenge Web pages

[www.scot-maths.co.uk](http://www.scot-maths.co.uk)  
as well as on the materials download menu page  
[www.wpr3.co.uk/MC/materials](http://www.wpr3.co.uk/MC/materials)



# The Scottish Mathematical Council

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

## MATHEMATICAL CHALLENGE 2024–2025

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

### Primary Division: Problems I

- P1.1.** James and Mia play a two-person game in which the winner gains 2 points and the loser loses 1 point. Yesterday James won exactly 4 games and Mia had a final score of 6 points.  
What was James' final score?
- P1.2.** Over coffee the other day my friend MacAngus and I were mulling over the passing of time. 'Four years ago', MacAngus said, 'I was four times as old as young Callum and now I'm only three times as old.'  
'If you go on like that' I said, 'you'll soon both be the same age.'  
When we finished laughing over this fallacy, it occurred to me that from what MacAngus said it would be possible to figure out his age. How old is my friend MacAngus?
- P1.3.** Four explorers wish to get one of their number as far as possible into the wilderness from their base. Each explorer can carry supplies for up to 10 days. At any time supplies can be transferred between explorers and individual explorers can return to base, provided they have sufficient supplies for the return journey. Supplies cannot be left unattended in the wilderness.  
What is the greatest number of days the lead explorer can travel from the base so that all return safely?

### END OF PROBLEM SET I

CLOSING DATE FOR RECEIPT OF SOLUTIONS :

**27 September 2024**

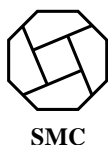
**Look out for Problems II in October!**

**Look on the MC web site: [www.scot-maths.co.uk](http://www.scot-maths.co.uk) for information about Mathematical Challenge.**

There are archives of previous questions on: [www.wpr3.co.uk/MC-archive/P/index-P.html](http://www.wpr3.co.uk/MC-archive/P/index-P.html)

Here is a shortcut for your smartphone or tablet





SMC

# Mathematical Challenge Problems I

PRIMARY DIVISION

2024-2025

**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	Total
<input type="text"/>	<input type="text"/>	<input type="text"/>	<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.**

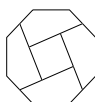
Send your entry through your school to the organiser of the section.

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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# The Scottish Mathematical Council

## MATHEMATICAL CHALLENGE (PRIMARY)

### Registration Fee 2024–2025

Participating schools are required to pay a registration fee. The fee covers all three sets of problems. The primary school fee is £10 for 1-10 entrants (in Round 1), £8 for the next 10 (or part thereof) and so on. A cheque made payable to

### SMC Mathematical Challenge

should be attached to this form (but see below) and

**returned with the first set of problems.**

School details	Name	.....
	Telephone	.....
	Address	.....
		.....
		.....
	Education Authority (where appropriate)	.....
Contact teacher	Name	.....
	email address (if used)	.....

**Payments:** we prefer to be paid by cheque but if this is not possible we will accept payment by BACS. Our account is:

SMC MATHEMATICAL CHALLENGE

The details are: **83-06-08 1054 8147.**

The reference you provide **must** include the school postcode followed by the school name.

### Data Protection

Our policy is attached. By completing and returning this form we will assume that you have read it and accept it.

### Submission of scripts

You must submit **on time** and use **correct postage**. As a guide, first class large letters rates are:

Weight below	100g	250g	500g	750g
Postage	£2.10	£2.90	£3.50	£3.50

## **Data Protection and Privacy Policy for the SMC Maths Challenge**

In the following, the data referred to is stored on the computer used for entering pupil and school details and for recording pupil performance. Access to all such information is password protected.

For each **entrant** the data stored is:

- surname, other name, school, year of study, and (after marking) the marks for each question. Permission to record this data is given by completing the tear-off form attached to the solutions.

For each **school** the data stored is:

- school name, address, phone, Primary or Secondary, LEA (Local Education Authority area), whether independent, contact teacher name and e-mail, and other information you want to add (if any).

**Teachers** have access, by logging in with their username and password, only to the data for their own school and its entrants, and are responsible for communicating results and awards to their entrants.

**Section Organisers** have access, by logging in with their username and password, only to data about schools and entrants within their own Section.

Designated members of the Maths Challenge National Committee have access, by logging in with their username and password, to all the data in the database to facilitate running the challenge.

No data will be kept for more than 4 years. This would allow for production of comparative reports over 3 years for the Scottish Mathematical Council Journal.

The data is stored on a secure server.

Contact: *scottishmathschallenge@gmail.com*

Last update: 16/8/24

## Using the marks website

A Record of Entrants must be made on the marks website by the school or it will not be possible for the section organiser to later add the marks for each entrant.

Go to the website:

<https://www.scottishmathschallenge.org.uk/>

If you have used the website for your school in a previous year and can remember the username and password log in as usual.

Otherwise choose

"Register here"

which enables you to enter your details and create a password. Your username will be your email address so please make sure that you enter this correctly. The system will send you an email with an activation link: click on this link to verify your email address and then log in.

You will need your username and password each time you log in.

Once logged in click on the link

"Edit School Details"

Check that all the contact details are correct, making changes as necessary. In particular, make sure that you select primary or secondary and the relevant local authority whenever you make changes.

Later, when you have a pile of entries, or a list of entrants, log in again and go to

"Add/Edit Entrants"

and enter

- the division (only for secondary pupils),
- the names, and
- the school year of each entrant.

When all your entrants have been added, to get a printout to send with your entries go to

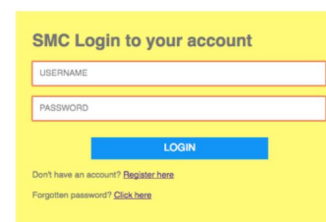
"Printable version of details and entrants"

When the marks for each round are released, to view the marks for your school go to

"Marks page"

On the main page after you log in you may, from time to time, see messages from the section organisers.

NOTE: If you experience difficulties with the website please contact either  
your section organiser or  
Helen Martin [h.martin@abdn.ac.uk](mailto:h.martin@abdn.ac.uk)



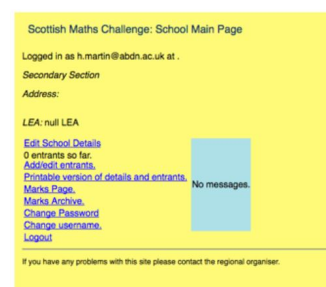
SMC Login to your account

USERNAME

PASSWORD

Don't have an account? [Register here](#)

Forgotten password? [Click here](#)



Scottish Maths Challenge: School Main Page

Logged in as h.martin@abdn.ac.uk at .

Secondary Section

Address:

LEA: null LEA

[Edit School Details](#)

0 entrants so far.

[Add/edit entrants.](#)

[Printable version of details and entrants.](#)

[Marks Page.](#)

[Marks Archive.](#)

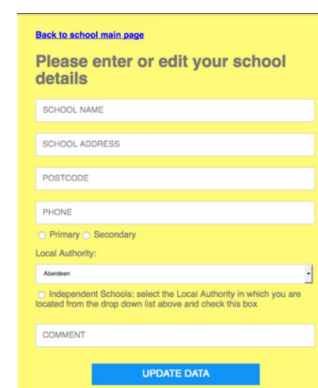
[Change Password.](#)

[Change username.](#)

[Logout](#)

No messages.

If you have any problems with this site please contact the regional organiser.



[Back to school main page](#)

Please enter or edit your school details

SCHOOL NAME

SCHOOL ADDRESS

POSTCODE

PHONE

☐ Primary ☒ Secondary

Local Authority:

☐ Independent Schools: select the Local Authority in which you are located from the drop down list above and check this box

COMMENT



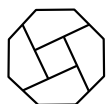
Entrant List:

Division	First Name	Surname	Year	Action
Add New:				
Primary	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Add Entrant"/>

[Back to school main page.](#)

If you have any problems with this site please contact the regional organiser.





The Scottish Mathematical Council

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

# ***MATHEMATICAL CHALLENGE***

## ***2024–2025***

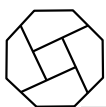


Four explorers wish to get one of their number as far as possible into the wilderness from their base. Each explorer can carry supplies for up to 10 days. At any time supplies can be transferred between explorers and individual explorers can return to base, provided they have sufficient supplies for the return journey. Supplies cannot be left unattended in the wilderness.

What is the greatest number of days the lead explorer can travel from the base so that all return safely?

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Ask your teacher for details of the new competition problems.



# **MATHEMATICAL CHALLENGE**

**2023–2024**

***Did you solve it?***

One of the highlights of the local village social life is the stage production organised by the Amateur Youth Players and the rehearsals are in full swing for *The Gondoliers*. When I called the treasurer the other day he was estimating the costs. The first scene, in case you have forgotten, shows 24 maidens of Venice making up small bunches of red and white roses. He had intended that each girl would have three red and two white roses until he realised that the red roses cost twice as much each as the white ones. He decided to give half the girls three red and two white roses each and the remainder two red and three white roses. He had cut the cost by £3. How much is a red rose?

## *Solution*

Let the cost of a red rose be £ $R$  and of white rose be £ $W$ .

12 girls had three red roses and two white roses so the cost of these is £ $(36R + 24W)$ .

The other 12 girls had two red roses and three white roses so the cost of these is £ $(24R + 36W)$ .

Originally the cost would have been £ $(72R + 48W)$  and the new cost is £ $(60R + 60W)$ .

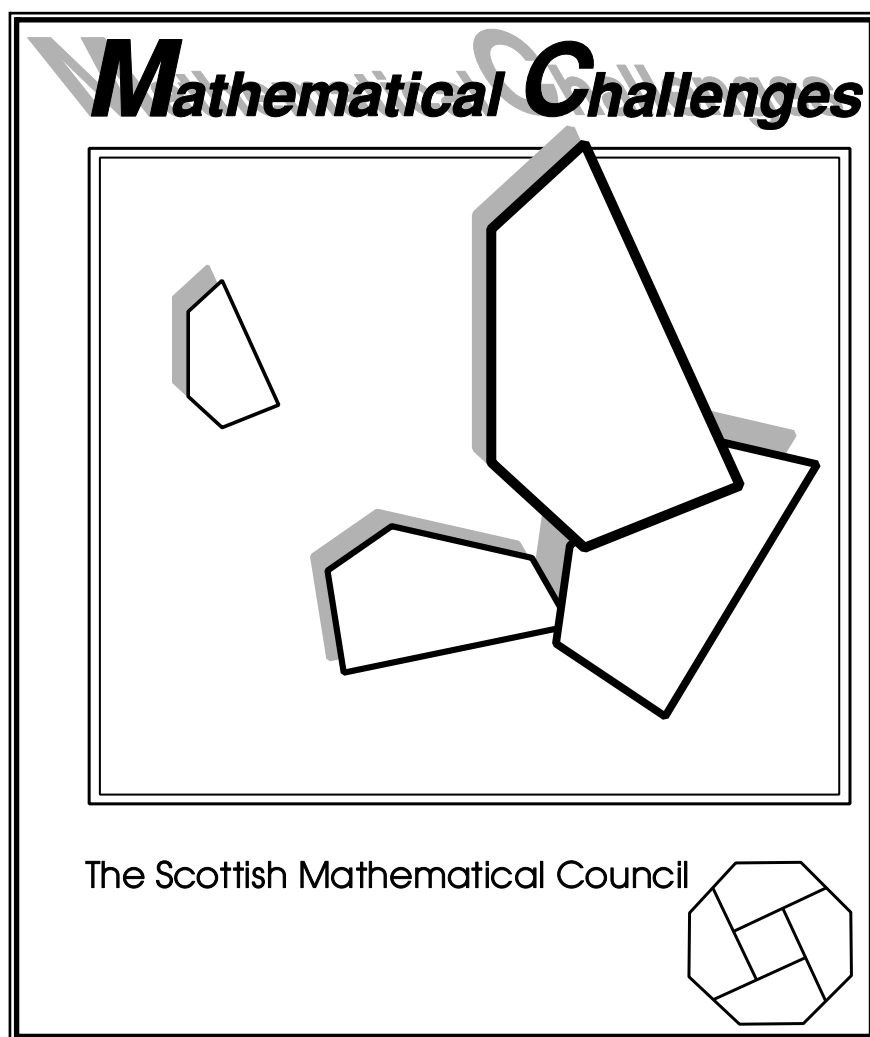
So the saving is  $(72R + 48W) - (60R + 60W) = 12R - 12W = 3$ .

But  $W = \frac{1}{2}R$  so

$$12R - 12\left(\frac{1}{2}R\right) = 3$$

$$6R = 3.$$

Hence the cost of a red rose is 50 pence.



### Archives and Books

The books listed below and there are still limited stocks. However, since 2006, an online archive has been developed. It covers all Challenges, with sheets with questions and separate sheets which include solutions. These are all available at

**[www.wpr3.co.uk/MC-archive/](http://www.wpr3.co.uk/MC-archive/)**

The books which were published are as follows:

		Price	Number	Cost
Mathematical Challenges VI	2003 to 2006	£8.00		
Mathematical Challenges V	2000 to 2003	£8.00	_____	_____
Mathematical Challenges IV	1997 to 2000	£8.00	_____	_____
Mathematical Challenges III	1994 to 1997	£7.50	_____	_____
Primary Mathematical Challenges	up to 2001	£5.00	_____	_____
		Total		_____

Copies of any of these can be obtained from

Bill Richardson, Kintail, Longmorn, Elgin IV30 8RJ

Cheques with order are preferred.

Cheques should be made payable to 'SMC Mathematical Challenge'.

A few copies of Mathematical Challenges II and also the original Blackie Mathematical Challenges are still available.

*email enquiries:- [wpr3145@gmail.com](mailto:wpr3145@gmail.com)*