February 2024

# **YBMA** News

Vol. 33 No. 2

The Newsletter of the Yorkshire Branch of the Mathematical Association

At the 2023 Joint Conference AMET, ATM, MA, NAMA and NANAMIC took another major step towards a merger into a single entity. The initial trustees of the proposed new charity AMiE have been appointed. A constitution has been submitted to the Charity Commission and a prospectus should be available to all members in March. Members will then make the final decision in April. Separate approval from all five associations will be needed for AMiE to fully replace the existing associations in April 2025.

Discussion of whether a single unified body should represent Mathematics teachers goes back many years. A long pause followed ATM's rejection of the idea of a merger with MA in 1994. Sue Pope's excellent article, appearing in both MA and ATM journals in 2012, restarted the debate. With the government exerting much greater control over the curriculum, it is now more strongly felt than ever that a unified independent voice is needed to convey the advice and concerns of mathematics teachers. A single subject association is the norm in other subjects – ASE for the Sciences, ALL for Foreign Languages, NATE for English.

How will a merger affect the Yorkshire Branch of the MA? Little detail has been available so far, but perhaps the AMiE prospectus will tell us. An influx of new members? Probably not, that's wishful thinking. Indeed, will branches have a significant role in the new organisation? Will they be seen as relics of a bygone age and no longer relevant in today's world? After all, via your smartphone you can now meet up with teachers anywhere in the country. Personally, I feel that the pandemic years have shown us that in-person meetings have something to offer that virtual meetings can't.

#### YBMA Officers 2023-24

President: Lindsey Sharp (lindseyelizab50@hotmail.com)
Secretary & Newsletter: Bill Bardelang (rgb43@gmx.com)
Treasurer: Jane Turnbull (da.turnbull@ntlworld.com)

## W. P. Milne Lecture

Thursday, 21 March 2024 14:30 – 15:30

Esther Simpson Building (LG.08) University of Leeds

**Professor Nira Chamberlain OBE** *President of the Mathematical Association* 

## Mathematics is Indisputably the Greatest Subject in the World

In this and some other countries, it is a badge of honour to say that you are no good at maths. In some quarters, mathematics is seen as boring, irrelevant and useless. However, there is a saying if you go down deep enough into anything you will find mathematics. Indeed, the future is bright, the future is mathematical.

The lecture forms part of a KS5 Maths Day at the University of Leeds. Applications for school groups have closed, but YBMA members, current or prospective, can be accommodated. Please let us know if you intend to come.

## **A Date for your Diary**

Saturday, 8 June 2024 2.30pm

## YBMA Annual General Meeting

MALL 1, School of Mathematics University of Leeds

Previous Newsletters can be found at https://www.m-a.org.uk/branches/yorkshire

## Mathematics in the Classroom

### Getting the order right

A 4-page A5 booklet is easily created by printing its pages on the two sides of a single A4 sheet and then folding the sheet in half. The pages must be set out suitably on the A4 sheet for them to appear in the correct order in the booklet.



Booklets with 8, 12, 16, … pages can be created using several 4-page booklets placed one inside another. Booklets of 8, 16, 32, … pages can instead have all pages printed on a single large sheet which is then repeatedly folded in half and stapled along the final fold. The other edges are trimmed so as to separate the pages and produce a neat finish.

The diagram below shows one side of an A0 sheet which is to be turned into a 64-page A5 booklet in portrait orientation. We will always fold it either left half over right half or top half over bottom half. The dotted lines show the resulting creases.

		77		
	10			

Determine the order of folding so that pages 10 and 47 are in the position and orientation shown.

Complete the A0 page layout.

#### Some well-known Circles, some less so

In the previous Newsletter we asked readers to draw a circle passing through two given points A, B and touching a given line l. The centre of such a circle will be equidistant from all three if it lies on the perpendicular bisector of AB, the parabola with focus A, directrix l and the parabola with focus B, directrix l.

If A, B are on opposite sides of l, no point satisfies all three conditions. If A, B are on the same side of l, then in general we have two solutions, as shown. In the particular case where A, B are equidistant from l, there is just one solution.



We can draw the required circles using only straight edge and compass. Suppose such a circle touches line l at point T. If A, B are equidistant from l, then the perpendicular bisector of AB meets l at T and the problem is reduced to drawing a circle through three points. Otherwise, draw the line through A, B to meet l at P.

Let *Q* be any point on the perpendicular bisector of *AB*. Draw the circle with centre *Q* passing through *A*, *B*. Construct the circle with diameter *PQ*. Let *R* be a point of intersection of these two circles. Then  $\angle QRP$  is a right angle and *PR* is a tangent to the circle with centre *Q*.



By the tangent-secant theorem,  $PR^2 = PA \times PB = PT^2$ .

Draw the circle with centre *P*, radius *PR*. This cuts *l* at *T* and *T'*. Construct the perpendiculars to *l* at *T*, *T'* which will meet the perpendicular bisector of *AB* at *O*, *O'* respectively. These are the centres of the circles passing through *A*, *B* and touching line *l*.

Our second challenge was to draw a circle passing through a given point A and touching each of two lines l, m. We will focus on the general case when lines l, m intersect at a point labelled C in the diagram below. Our method can readily be adapted to the case of parallel lines.



Bisect angle C. Every circle touching both l and m will have its centre on the angle bisector and is thus symmetrical about the angle bisector. Construct the perpendicular from A to find its image A'. We now have two points on the required circle and can use the method described earlier.

In the special case when A lies on the angle bisector, the perpendicular through A is a tangent to the required circle. We can then use the method for constructing the incircle and an excircle of a triangle.