

The Mathematical Gazette



Can our coinage system be improved?

Volume 102 Number 554 July 2018



CONTENTS

Articles

Linear and non-linear models for national health expenditures in the USA	Allan J. Kroopnick	193
Blocks of decimal digits	K. Robin McLean	198
All parabolas through three non-collinear points	Stanley R. Huddy and Michael A. Jones	203
Rational arc length	Russell A. Gordon	210
Can our coinage system be improved?	Peter Shiu	226
Tethering in pastures new	John D. Mahony	233
From dawn to dusk	John D. Mahony	246
The existence of triangles, tetrahedra, and higher-dimensional simplices with prescribed exradii	Mowaffaq Hajja	257
Metric relations in crossed trapezia	Martin Josefsson	264
Central force fields and Kepler's laws	Luis Blanco, María García- García, Joaquín Gutíerrez and Andrea Rios	270
The seven circles theorem revisited	John R. Silvester	280
Matter for Debate		
The importance of characterisations in geometry	Martin Josefsson	302
Notes 102.20 to 102.36		
The sum of the first <i>n</i> cubes is a square – two Proofs without Words	Stephan Berendonk	308
An addendum to Estermann's proof of the irrationality of $\sqrt{2}$	Ashvin Rajan	308

© The Mathematical Association 2018 Typeset by Bill Richardson





MIX
Paper from
responsible sources

Printed in the UK by Bell & Bain Ltd.

ISSN 0025-5572

CONTENTS (continued)

Notes 102.20 to 102.36 (continued)

Proof without Words: sums of sums of factorials is one less than a factorial: inductive step	Günhan Caglayan	309
A visual proof that \sqrt{N} is irrational	Nick Lord	311
Area of a circle via the Fundamental Theorem of Calculus	Howard Sporn	312
On an alternative formula for the area of a spherical cap	Nick Lord	314
An ad hoc limiting process	J. A. Scott	317
On the theorem of means for terms in AP and GP	J. A. Scott	317
A note on series of positive and negative terms	G.J.O. Jameson	320
Another proof of the Fundamental Theorem of Algebra	Pedro Ribeiro	326
A surprising 3-D result involving a hexagon	Michael de Villiers, Heinz Schumann	328
Cyclic gridpoint polygons	Paul Stephenson	331
Panning for gold in the streams of a regular pentagon	Tony Foster	332
A geometrical construction involving two intersecting circles	M. G. Mahmoudi	335
On the vertices of the Kiepert hyperbola	J. A. Scott	339
On repetition and divisibility of parts in partitions	Martin Griffiths	344
A difference property amongst certain pairs of Beatty sequences	Martin Griffiths	348
Teaching Notes		
Extending runs of composite numbers	Nick Lord	351
Two quick observations about rough inclined planes	Nick Lord	352
Feedback		354
Problem Corner	Nick Lord	355
Student Problems	Stan Dolan	361
Reviews		364