



© 1997–2009, Millennium Mathematics Project, University of Cambridge.

Permission is granted to print and copy this page on paper for non-commercial use. For other uses, including electronic redistribution, please contact us.

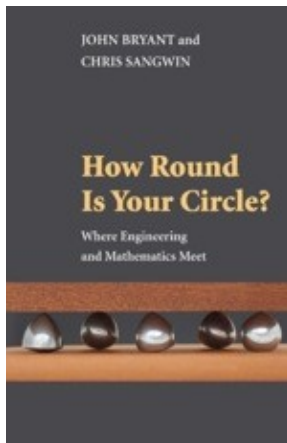
---

June 2008

Reviews

## 'How round is your circle?'

reviewed by Owen Smith



## How round is your circle? : Where engineering and mathematics meet

**John Bryant and Chris Sangwin**

In their new book John Bryant and Chris Sangwin explore the complex problems and challenges facing engineers and mathematicians now and throughout history. And these challenges don't have to come from complex questions. Take the simple problem of how to draw a straight line. The authors examine how to do this using linkages and other mechanical devices, and then ask how to divide an existing line into segments to create an accurate tool with which to measure other things. What this book excels at is taking seemingly simple problems such as these and thoroughly dissecting them down to the mathematical level.

But it's not all theory. Many of the chapters invite the reader to get their hands dirty and actually build the devices, linkages and models detailed within. I think most readers will feel an urge to build a hatchet planimeter! A great deal can be done with the minimum of tools; sometimes pencil and paper suffice. For enthusiastic model makers with access to the right equipment, construction methods for many of the more complicated pieces are included. There is a good range of figures and illustrations, and more photos, videos,

## 'How round is your circle?'

illustrations and interactivities are available on a [supporting website](#).

Bryant and Sangwin spend a lot of time looking at early attempts to draw straight lines, as well as an equally fundamental problem that has faced engineers through the ages: how to construct a mechanical linkage. We learn about James Watt's linkage from 1784, designed to constrain a straight line movement in an engine cylinder and then convert this into rotary output, and Peaucellier's linkage from 1864, which demonstrated, for the first time, that *exact* geometrical straight lines can be created from linkages. Many other uses of linkages are examined in detail, including the pantograph and creations such as Chebyshev's paradoxical mechanism.

The difference between theory and practice between constructing something using pure geometry and making a physical piece is an important part of the book. Just how accurate you need to be to make something work, and the mathematics you need to check how accurate a tool is going to be, are shown in great detail. We learn, for example, how 50 pence pieces are not round, but do have constant width, and what tests not to use to prove it!

This is a great book for engineers and mathematicians, as well as the interested lay person. Although some of the theoretical mathematics may not be familiar, you can skip it without losing the point. For school teachers and lecturers seeking to inspire, this is a fantastic resource.

### **Book details:**

*How round is your circle? : Where engineering and mathematics meet*

John Bryant and Chris Sangwin

Hardback 352 pages (2008)

Princeton University Press

ISBN-10: 069113118X

ISBN-13: 978-0-691-13118-4

---

## About the author

Owen Smith works for the [Millennium Mathematics Project](#) where he designs and develops beautiful websites, including *Plus*.



*Plus* is part of the family of activities in the Millennium Mathematics Project, which also includes the [NRICH](#) and [MOTIVATE](#) sites.