



The Fibonacci Quarterly

THE OFFICIAL JOURNAL OF THE FIBONACCI ASSOCIATION

TABLE OF CONTENTS

Fibonacci Conference and Caen Proceedings Announcements	194
Closed Forms for Certain Fibonacci Type Sums That Involve Second Order Products	<i>R. S. Melham</i> 195
Higher Order Boustrophedon Transforms for Certain Well-Known Sequences	<i>Charles K. Cook, Michael R. Bacon, and Rebecca A. Hillman</i> 201
On Moduli for Which Certain Second-Order Linear Recurrences Contain a Complete System of Residues Modulo m	<i>Lawrence Somer and Michal Krížek</i> 209
Sums of Certain Products of Fibonacci and Lucas Numbers - Part III	<i>R. S. Melham</i> 229
A Combinatorial Proof for the Generating Function of Powers of the Fibonacci Sequence	<i>Yifan Zhang and George Grossman</i> 235
Level Sizes of the Bulgarian Solitaire Game Tree	<i>Henrik Eriksson and Markus Jonsson</i> 243
New Behavior in Legal Decompositions Arising from Non-Positive Linear Recurrences	<i>Minerva Catral, Pari L. Ford, Pamela E. Harris, Steven J. Miller, Dawn Nelson, Zhao Pan, and Huanzhong Xu</i> 252
Elementary Problems and Solutions	<i>Edited by Harris Kwong</i> 276
Advanced Problems and Solutions	<i>Edited by Florian Luca</i> 282
Paul Bruckman Prize	288



The Fibonacci Quarterly

THE OFFICIAL JOURNAL OF THE FIBONACCI ASSOCIATION

TABLE OF CONTENTS

Fibonacci Conference and Caen Proceedings Announcements	290
Distinct Products in Lucas Sequences - On a Problem of Kimberling	<i>Márton Szikszai</i> 291
Divisibility of the Middle Lucasnomial Coefficient	<i>Christian Ballot</i> 297
Circular Balancing Numbers	<i>A. K. Panda and G. K. Panda</i> 309
Relationships Between k -Gonal Numbers that Are Centered k -Gonal, and Lucas and Related Numbers	<i>Russell Euler and Jawad Sadek</i> 315
Polynomial Extensions of a Diminnie Delight Revisited: Part I	<i>Thomas Koshy and Zhenguang Gao</i> 320
On Conway's Subprime Function, A Covering of \mathbb{N} and an Unexpected Appearance of the Golden Ratio	<i>Mihai Caragiu, Paul A. Vicol, and Mohammad Zaki</i> 327
On the Masked Periodicity of Horadam Sequences: A Generator-Based Approach	<i>Ovidiu D. Bagdasar and Peter J. Larcombe</i> 332
Lucas Sequences and the Hosoya Index of Graphs	<i>Gábor Nyul and Gabriella Rácz</i> 340
Some Infinite Product Identities Involving Fibonacci and Lucas Numbers	<i>Kunle Adegoke</i> 343
The Prime Numbers Without the Sieve of Eratosthenes	<i>Filip Saidak</i> 352
Generalizations of Delannoy and Cross Polytope Numbers	<i>Steven Edwards and William Griffiths</i> 357
Elementary Problems and Solutions	<i>Edited by Harris Kwong</i> 367
Advanced Problems and Solutions	<i>Edited by Florian Luca</i> 374
Paul Bruckman Prize	380
Volume Index	381

Journal for Research in Mathematics Education

EDITORIAL

- A Future Vision of Mathematics Education Research:
Blurring the Boundaries of Research and Practice to Address Teachers' Problems** 466
Jinfa Cai, Anne Morris, Charles Hohensee, Stephen Hwang, Victoria Robison, and
James Hiebert

RESEARCH COMMENTARY

- Valid Issues but Limited Scope: A Response to Kitchen and Berk's
Research Commentary on Educational Technology** 474
Douglas H. Clements and Julie Sarama
- Keeping the Focus on Underserved Students, Privilege, and Power:
A Reaction to Clements and Sarama** 483
Richard Kitchen and Sarabeth Berk

ARTICLES

- The Culture of Exclusion in Mathematics Education and
Its Persistence in Equity-Oriented Teaching** 488
Nicole L. Louie
- Predicting Student Achievement Using Measures of Teachers' Knowledge
for Teaching Geometry** 520
Margaret Mohr-Schroeder, Robert N. Ronau, Susan Peters, Carl W. Lee, and William S. Bush

BRIEF REPORT

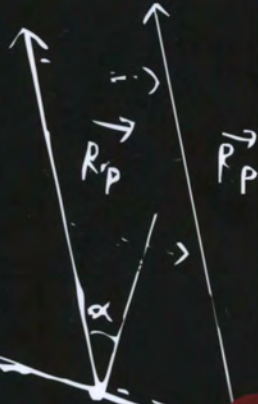
- Informal Content and Student Note-Taking in Advanced Mathematics Classes** 567
Timothy Fukawa-Connelly, Keith Weber, and Juan Pablo Mejia-Ramos

BOOK REVIEW

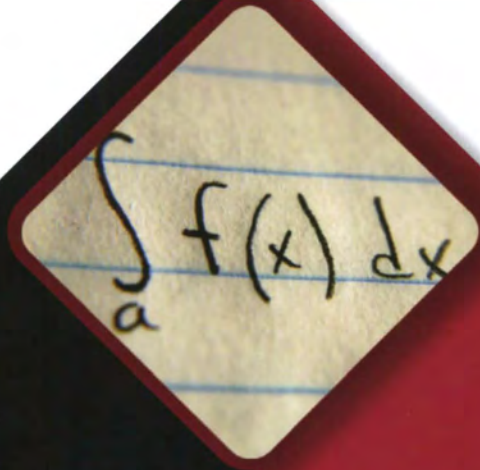
- A Review of *Tools and Mathematics: Instruments for Learning*** 580
Karen F. Hollebrands and Samet Okumuş

L

OSANGES



SBPMEE



N° 38
SEPTEMBRE 2017

NUMÉRO D'AGRÈMENT DE LA POSTE : P801339



Losanges

N°38 Septembre 2017

Éditorial, *V. Henry* 2



Réflexions

- ◆ RMT – Une frise, *P. Lambrecht et Y. Noël* 3
- ◆ Pyramide en origami, *L. Ninove* 17
- ◆ La perspective cavalière, *G. Noël* 25
- ◆ NSA, *F. Valette-Duchêne* 34
- ◆ Trouver les intrus, *B. Honclaire et Y. Noël* 45



Technologies

- ◆ Tableur et graphiques animés, *J.-M. Desbonnez* 47



Jeux et concours

- ◆ Problèmes, *M. Sebille* 60
- ◆ Mat croisé 37 : solution, *J.-M. Desbonnez* 65
- ◆ Mat croisé 38, *J.-M. Desbonnez* 66



Regards sur ...

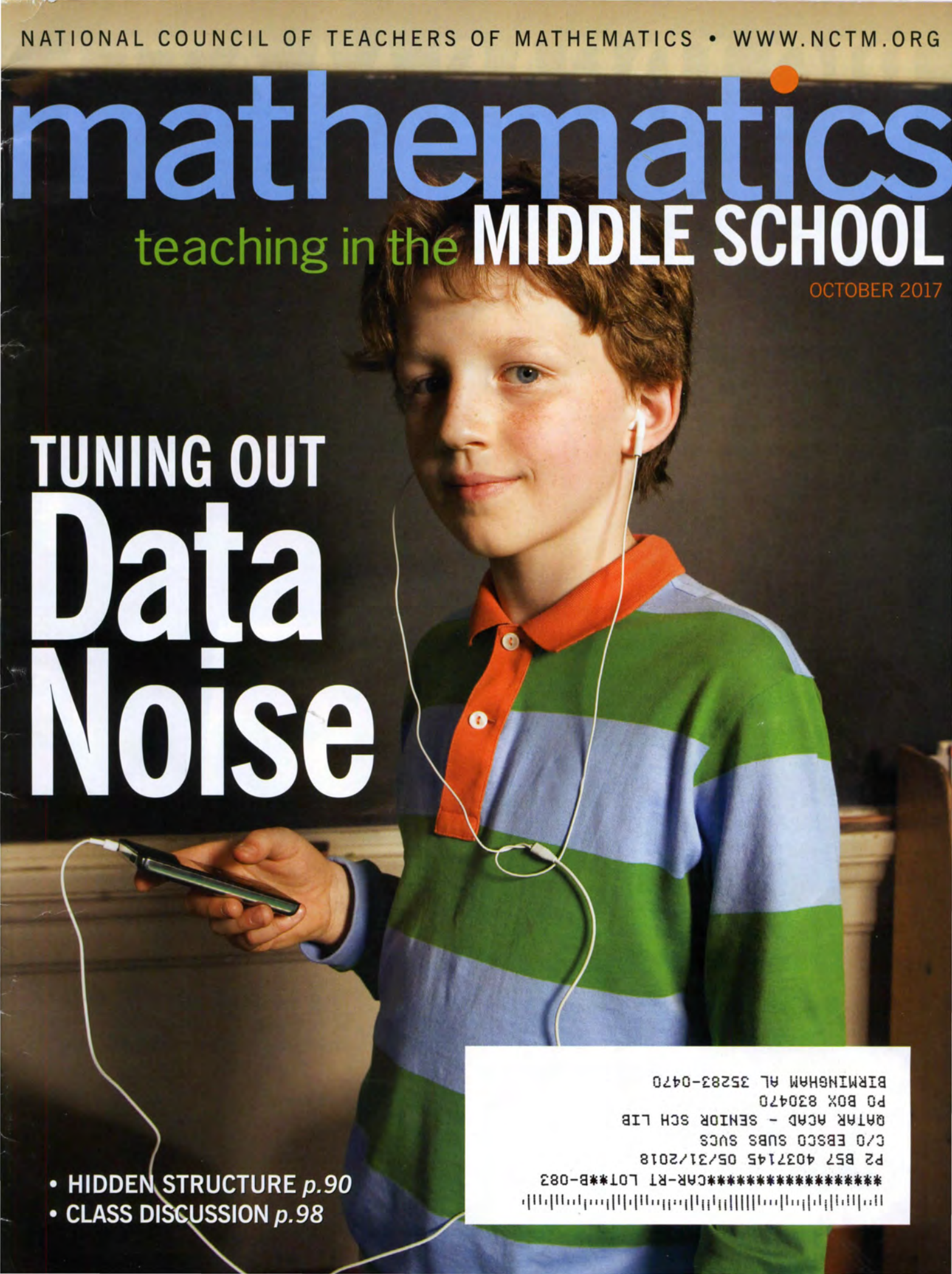
- ◆ ... le passé, *G. Noël* 67
- ◆ ... un livre, *Y. Crama* 69
- ◆ ... un livre, *J. Miewis* 70
- ◆ ... un livre et un auteur, *J.-M. Desbonnez* 71

mathematics

teaching in the **MIDDLE SCHOOL**

OCTOBER 2017

TUNING OUT Data Noise



- HIDDEN STRUCTURE *p.90*
- CLASS DISCUSSION *p.98*

*****CARR-RT LOT**B-083
 P2 B57 4037145 05/31/2018
 C/O EBSCO SUBS SUCS
 QATAR ACAD - SENIOR SCH LIB
 PO BOX 830470
 BIRMINGHAM AL 35283-0470

mathematics

teaching in the **MIDDLE SCHOOL**



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

Vol. 23, No. 2, October 2017

FEATURES

82 Working with Noise in Bivariate Data

Randall E. Groth, Matthew Jones, and Mary Knaub

Learning to work with bivariate data, a key goal of middle-grades statistics curricula, is aided by a sequence of lessons.

90 The Search for Hidden Structure

Ryota Matsuura, Sarah Sword, and Tatyana Finkelstein

Designing a lesson that uses routine exercises, creates space for language use, and provides a storyline will go far toward supporting mathematical structure.

98 Mathematics Discussions: Expectations Matter

George J. Roy, Sarah B. Bush, Thomas E. Hodges, and Farshid Safi

Various strategies can help you build a classroom environment rich with mathematical discussion.

90



98



82



COVER: BRIAN SUMMERS, GETTY IMAGES; THIS PAGE: ICEBERG, AGAWA288THINKSTOCK; SOUNDWAVES, IGORKIRILLOV/THINKSTOCK; PHOTO/DISC/THINKSTOCK; STUDENT AND TEACHER, PHOTODISC/THINKSTOCK

DEPARTMENTS

70 **Mathematics Teaching in the Middle School Online**

72 **Solve It Student Thinking**

Every Graph Tells a Story
Annie Perkins and Pamela J. Wells

76 **Cartoon Corner**

Having Interest in Gold
Rhonda Birnie

80 **Palette of Problems**

*Stephan Pelikan, Anna F. DeJarnette,
and Stephen Phelps*

106 **Quick Reads**

Using Google Apps to Develop the
Mathematical Practices
*Rebecca D. Layton, Jo Ann Cady, and
Christopher A. Layton*

112 **Informing Practice**

Generating Linear Equations
Based on Quantitative Reasoning
Mi Yeon Lee

118 **Mathematical Explorations**

Maddie and the 3×5 Note Card
Andrew Samide and Christine Kincaid Dewey

122 **Window on Resources**

128 **Math for Real**

Concrete Problems
James Metz

EXTRANEOUS

117 **Call for Manuscripts for the 2019 Focus Issue: Making Math Social**

121 **Call for Manuscripts: Teacher Education**

124 **Call for Manuscripts: The Power of Problem Solving**

76



72



looking ahead in *MTMS*

Look for these features in the November issue:

- “Strategy Keys as Tools for Problem Solving,” by Raja Herold-Blasius
- “Repeating Decimals: An Alternative Teaching Approach,” by Aina K. Appova
- “An Architecture Design Project: ‘Building’ Understanding,” by Sarah B. Bush, Judith Albanese, Karen S. Karp, and Matthew Karp

mathematics

teaching in the **MIDDLE SCHOOL**

NOVEMBER/DECEMBER 2017

Unlocking Problem Solving

*"First, I will pick
up my keys...."*



- REPEATING DECIMALS p.154
- BUILDING DESIGN p.162

*****CARR-RT LOT**B-083
P2 B47 1153215 06/30/2018
C/O EBSCO SUBS SUCS
DUS-DUSSELDORF SR SCH (SUBS)
PO BOX 830657
BIRMINGHAM AL 35283-0657

FEATURES

146 Strategy Keys as Tools for Problem Solving

Raja Herold-Blasius

A simple key image, containing a strategy, can help open doors to learning.

154 Repeating Decimals: An Alternative Teaching Approach

Aina K. Appova

Viewing repeating decimals as fractions can build on students' number sense and promote intuitive and conceptual understanding.

162 An Architecture Design Project: "Building" Understanding

Sarah B. Bush, Judith Albanese, Karen S. Karp, and Matthew Karp

Seventh-grade students investigate area, surface area, volume, proportional thinking, number sense, and technology.



146

154

162



DEPARTMENTS

- 133** *Mathematics Teaching in the Middle School Online*
- 134** *Solve It Student Thinking*
Making Squares
Annie Perkins and Pamela J. Wells
- 138** *Cartoon Corner*
He's Got All the Answers
Hoyun Cho, David B. Spangler, and Katie A. Hendrickson
- 144** *Palette of Problems*
Stephan Pelikan, Anna F. DeJarnette, Stephen Phelps
- 171** *Mathematical Explorations*
Exploring Triangles
Elana Reiser
- 174** *Window on Resources*
- 176** *Math for Real*
Mathematics on Thresholds: Kolams
Iman C. Chahine and Umamaheswari Subramanian

EXTRANEOUS

- 132** *Call for Manuscripts for the 2019 Focus Issue: Making Math Social*



134

171



looking ahead
in *MTMS*

IN FEBRUARY 2018

FOCUS ISSUE:
Productive Struggle



PERSONAL COMPUTER & INTERNET

8 424094 004683 00181
PCI 181/ PVP 3,50 € Canarias PVP. 3,65€

PRÁCTICO
Compra en **amazon**
como un experto

IDEAS PARA REGALAR

Cómo aprovechar las ventajas de las tiendas online



RIESGOS DEL WIFI GRATIS

Android 8.0 Oreo
Todas las novedades



¡LOS HEMOS PROBADO!
iPhone 8 y iPhone 8 Plus

Lego Boost
Aprender jugando



PRÁCTICO
Actualiza a la última versión de **Windows 10 Fall Creators Update**



A PRUEBA

- Apple Watch 3
- Huawei MediaPad T3 10 LTE
- Acer Predator XB252Q





30

Ideas para regalar

Compras online en Navidad



42

Reportaje

Pantallas flexibles



46

Análisis

iPhone 8 y iPhone 8 Plus



60

Software

Riesgos del WiFi gratis

Sumario

Actualidad

- 06 Tecno-Flash**
- 08 Noticias y nuevos productos**
- 22 Sabías que...**
- 24 Magazine**
La revolución de las aulas
- 28 Tenemos correo**
- 29 El pasatiempo del mes**
- 30 TEMA DE PORTADA**
Ideas para regalar en Navidad

Hardware

- 42 Magazine**
Pantallas flexibles
- 42 Análisis de productos**
 - 46 Apple iPhone 8 y iPhone 8 Plus
 - 48 Apple Watch 3
 - 49 Huawei MediaPad T3 10 Lite
 - 50 Acer Predator XB252Q
 - 51 Creative Sound Blaster X7
 - 51 Energy Sistem 6 TW
- 52 Guía de compras**
Smartwatches
- 56 Gadget**
Lego Boost
- 58 Accesorios**
Para la cocina

Software

- 60 Seguridad**
Riesgos del WiFi gratis
- 62 Alternativas gratuitas para...**
Correo de escritorio
- 62 Magazine**
8 Apps para escuchar música

Internet

68 Magazine
Todas las novedades de Android 8.0 Oreo

74 Magazine
Webs para amantes de la bicicleta

78 Enlaces

Práctico SISTEMA

82 Windows
Actualiza Windows 10 a Fall Creators Update

86 macOS
Instala Windows 10 en tu Mac

90 Android
Busca archivos repetidos y elimínalos de tu móvil

DIGITAL MEDIA

92 Descargas
Mejora tus descargas con el protocolo Torrent

94 Consolas
Conecta un disco duro externo a tu PS4 Pro

WEB

96 Compras online
Compra en Amazon como un experto

100 Navegadores
Accede a tus favoritos desde cualquier navegador

102 Trucos

106 Preguntas & Respuestas

110 En 2 minutos

112 Magazine
Cirugía más precisa con realidad mixta



68 Internet

Todas las novedades de Android 8.0 Oreo



82 Práctico

Actualiza a la última versión de Windows 10



96 Práctico

Compra en Amazon como un experto

STAFF

Jefe de redacción: Noelia Hernández
Redacción: Rubén Andrés, Juan Antonio Pascual, Sandra Artega, Regina de Miguel, María Lorente y Manuel Arenas

Maquetación: Mohsin Ghailane
Maquetación: Irene Rincón
Fotografía: DepositPhotos.com y Thinkstock.com

CONTACTO REDACCIÓN
cartas.pci@axelspringer.es

EDITA

axel springer

EQUIPO DIRECTIVO EJECUTIVO

Director General
Manuel del Campo Castillo

Directora Financiera y de Recursos Humanos
Ursula Soto

Director comercial y desarrollo de Ingresos
Javier Matallana

Directora de Operaciones de Revistas
Virginia Cabezon

Director de Desarrollo Digital y Tecnología
Miguel Castillo

EQUIPO DE DIRECCIÓN

Directora de Área de Tecnología y Entretenimiento
Mila Lavín

Director de Área de MOTOR
Gabriel Jiménez

Directora de Marketing
Marina Roch

Director de Arte
Abel Vaquero

Director de Video
Igoe Montes

Departamento Comercial:
Subdirector Comercial: Daniel Gozlan
Directora de Publicidad Tecnología: Zdenka Prieto,
Equipo Comercial: Beatriz Azcona,
Noemi Rodriguez, Estel peris
Director Brand Content: Juan Carlos García
Brand Content: Javier Abad, Susana Herreros
Responsable de Operaciones: Jessica Jaime

Producción: Ángel López
Distribución y Suscripciones: Nuria Gallego

Social Media: Nerea Nieto

Sistemas / IT:
Director de Sistemas: Jose Angel González
Técnico de Sistemas: Juan Carlos Flores

Administración:
Jefa de administración: Pilar Sanz
Bancos y proveedores: Cristina Nieto

Servicios generales: Marga Najera

DIRECCIONES Y CONTACTO

AXEL SPRINGER ESPAÑA S.A.
Calle Santiago de Compostela 2ª Planta

28035 - MADRID +34 915 140 600

CONTACTO PUBLICIDAD

Publicidad@axelspringer.es

CONTACTO SUSCRIPCIONES:

TLF 902 540 777

suscripciones@axelspringer.es

CONTACTO MARKETING

marketing@axelspringer.es

DISTRIBUCIÓN EN ESPAÑA, HISPANOAMÉRICA
Y PORTUGAL SGEL

Tel 916 576 900

TRANSPORTE

Boyaca, Tel. 917 478 800

IMPRIME

ROTOCOBRH. Tel. 918 031 676

Printed in Spain.

Depósito Legal M-02183-2003

Axel Springer España S.A. C/ Santiago de Compostela 94,
2ª planta 28035, Madrid, Tel. +34 915 140 600

Revista miembro de ARI

ARI

REVISTAS

Queda prohibida la reproducción total o parcial, por cualquier medio o en cualquier soporte de los contenidos de esta publicación sin el permiso previo y por escrito del editor.
Importante información legal: De acuerdo con la vigente normativa sobre Protección de Datos Personales, informamos de que los datos personales que nos faciliten formarán parte de un fichero responsabilidad de Axel Springer España S.A. con objeto de gestionar tu solicitud, y enviarte información comercial de estos sectores editorial, automoción, informática, tecnología, telecomunicaciones, electrónica, videojuegos, seguros, financiero y crédito, infancia y puericultura, alimentación, formación y educación, hogar, salud y productos farmacéuticos, ocio, gran consumo, cuidado personal, agua, energía y transportes, turismo y viajes, inmobiliario, juguetería, textil, ONG y productos/servicios para animales y mascotas. Para ejercer los derechos de acceso, rectificación, cancelación y oposición deberás dirigirte por escrito a Axel Springer España S.A.
C/ Santiago de Compostela 94, 2ª, 28035 Madrid.