

M500 index as at February 2017

\$2500 primality test coded, The, Tony Forbes, 157 13
\$50,000 riddle, The. 160 23
1 + 1, 150 22, 1 + 1 = 2, John Taylor, 180 27, letter, Malcolm Fowler, 178 37
10 degrees, 192 19
100 members, 189 14
100 people and 100 boxes, 263 17
100 seats, 212 11
1000000 tarts, 214 19
103653, 214 17
12 x 12 square of decimal digits, A, 249 c
15-gon, 193 0
16 polygons, 192 28
16 x 16 magic sudoku square, A, 215 0
16-bipyramid, A, 258 c
 $1782^{12} + 1841^{12} = 1922^{12}$, 260 20
196, Eddie Kent, 184 9, revisited, Tony Forbes, 205 18
2009-2014 *World Outlook for 60- milligram Containers of Fromage Frais, The*,
231 19
2145351st Fermat number, 194 26
 $2^{2976221} - 1$ is prime, Tony Forbes, 158 2
 $2^{3021377} - 1$ is prime, 160 1
24 [-1] squares, 166 c
24 squares, 164 25
24 triangles, 167 26
25 objects, 201 5
25 points, 207 18
25 steps, 227 10
27 points, 164 25
29, 187 19
 $3 + 4 + 5 = 6$, Richard Godson, 161 9
3 ratios¹, 208 15
3 theta, 177 28
30 degrees, 189 20
30 matches, 199 14
3000 bananas Problem, 158 23
31 and other special numbers, Eddie Kent, 152 6

32 pounds, 174 25; letter, Arthur Quigley, 176 26; Gail Volans, 178 37
345 square, 168 21
345 triangle, 172 7
36 circles, 197 23
39/163, 247 5
40 years, 189 14, 192 26
45 degrees, 231 7
47 primes, 196 18
4-cycle-free graphs, 192 28
50 coins, 229 18
50 pence, 190 19
500 factors, 192 28
50p in a box, 209 9
50p in a corner, 203 20
 $7n + 1$, 171 22, 173 24
81 cells, 206 19; *revisited*, Tony Forbes, 207 20
8675309, 238 7
999 nines, 226 21
 $a = b$, Keith Drever, 182 26; letter, 184 18
A to B, 211 7
Aaronovitch, David, 162 24
Abbott, P., *Teach Yourself Trigonometry*, 150 14
Abc, 175 35, 205 23
ABCD, 164 25
Abel Prize, The, Eddie Kent, 185 23
Abel, Niels, 223 21
Abelian groups, 182 8, 29
Aberdeen Proving Ground, 168 13
Ablowitz, M. J., & A. S. Fokas, *Complex Variables*, 271 18
About zero, Colin Davies, 158 16; Tony Forbes, 158 16
Abraham the Jew, bookseller, 163 9
Abramovitz, M., & I. A. Stegun, *Handbook of Mathematical Functions*, 259
3, 266 7
absent minded professor, 152 11
aces, 175 28
ACM Computer Communications Review, 182 13
Acquari, George, Re: When is a solid, 163 5
Acta Arithmetica, 213 16
Adams, Douglas, 222 15; *The Hitch Hiker's Guide to the Galaxy*, 193 28

Adams, Mike, Problem 184.8, Four regions, 184 28
 Adams, W., on pseudoprimes, 269 21
 Adamson, Ian Bruce, Solution 199.3, Two tangents, 203 16
 Adamson, Ian, Do you know your left from your right?, 219 19;
 Hadwiger's Conjecture, 230 8; Laces letter, 230 7; Re Problem 195.3,
 Doublings, 198 23; Problem 208.2, Binary tree, 208 18; Problem 211.6,
 Odds again, 211 21; Problem 222.3, Consecutive composite numbers,
 222 11; Solution 202.3, The puzzled hotelier, 228 15; Solution 202.5,
 Interesting equality, 205 16; Solution 205.2, Ants, 207 14; Solution
 205.3, Reciprocals, 207 15, Solution 207.1, 25 points, 210 16; Solution
 211.3, Trigonometrical limit, 215 18; Solution 230.4, Tanks, 233 12;
 Solution 241.2, Irrational numbers, 245 15; Tarts, 225 15; The box
 problem, 212 8
 Adamson, Michael, Factorial squares, letter, 178 38; Solution 180.2,
 Unlimited prize, 182 19; Two envelopes, 182 24
 Addition, Sebastian Hayes, 184 25; letter, 186 23
 Admissible numbers, 259 11
Advances in Applied Probability, 205 21
 Advice for authors, 272 21
 advice, 194 25
 affine transformation, The, Dick Boardman, 228 10
Afternoon Shift, 150 9
 AG(3,3), 219 c
 AG(4,3), 217 c, 26
 AGM and a formula for π , The, Tony Forbes, 261 12
 Ahmes, copier, 168 4
 Ahrens, Richard, Mrs Read's knitting machine, 179 29
 Ainley, Steve, 156 22; *Mathematical Puzzles*, 194 21
 air resistance, 265 5
 Alabaster, Gordon, Puzzles in M500 156, 158 22; Re: Problem 171.1,
 Cylinder, 174 16; Solution 176.5, Construct a square, 180 25; Tee off,
 158 22
 Alaca, S., & K. S. Williams, *Introductory Algebraic Number Theory*, 231 3
 Albers, D. J., & G. L. Alexanderson (eds), *Mathematical People*, 226 7
 Aldridge, David, Solution 185.2, Two streams, 187 14
 Aleph-Null, 257 5
 A-level calculus, 246 8
Alfonsine Tables, 178 15
 Algarotti, Francesco, *Sir Isaac Newton's Philosophy Explained for the Use of
 Ladies*, 228 8

Algebra for beginners, Chris Pile, 229 19
 Alington, Cyril, & George Lyttleton, eds, *An Eton Poetry Book*, 152 2
 Al-Jazari, *Compendium of the Theory and Practice of the Mechanical Arts*, 171
 3
 al-Kashi, π approximation, 168 1
 All play all fixture lists, John Reade, 151 3
 All the sevens, 189 17; letter, Patrick Lee, 194 27
All you Wanted to Know About Mathematics, But Were Afraid To Ask by
 Louis Lyons, Don Swan, 156 9
 Allaire, Dave, *Fractiles*, letter, 172 17
 Allenby, R. B. J. T., & E. J. Redfern, *Introduction to Number Theory with
 Computing*, 176 6
 Allenby, R. B. J. T., *Linear Algebra*, 162 16; *Rings, Fields and Groups*, 261 11
 allure of magic squares, The, Eddie Kent, 273 20
 alpenhorn of counter-intuitivity, The, Paul Teggin, 162 23
 Alphabetti Spaghetti, 227 15
 Alsina, C., & R. B. Nelson, *Math Made Visual*, Sebastian Hayes, 216 21
 alternating knot 8_{18} , The, 161 1
 alternative solution to the cups problem, An, Andrew Colin, 203 18
 amazing construction, An, Dick Boardman, 254 14
 Amazing object, 189 14, 192 27, 193 24
American Journal of Physics, 174 13
American Mathematical Monthly, 163 3, 168 3, 207 17, 267 13, 268 3
 anagrammatical concepts, 219 18
 Analogies between $Z(s)$ and $\zeta(s)$, Tommy Moorhouse, 224 1
 Anaphora, 151 2
 Anaxagoras, death of, 168 4
 Ancient Egyptian number system, The, Sebastian Hayes, 247 1
 And another bicycle problem, Ralph Hancock, 161 22
 And now for a little light relief ..., Sheldon Attridge, 195 21
 Andersen, Kasper, 235 11
 Anderson, Bernard, *Questshion*, 152 18
 Anderson, Jens Kruse, 224 19, 226 19, 20
 Andrews, G. E., *The Theory of Partitions*, 242 4, 254 5, 256 11
 Ang Tian-Se, circle measurements, 168 3
 Angle Trisection, 261 20
 Angles, 232 7
 annulus, 204 13
 Anon, What happens when you have two cows, 156 21
 Another 100 seats, 217 15

Another arithmetic progression, 228 16
Another letter from Doha, Tony Huntington, 160 7
Another magic square, 191 24
Another prime pathway, Chris Pile, 230 10
Another product, 244 7
Another sum, 237 17
answers, 220 21, 221 17
antigrams, 151 2
Antikythera, 178 8
antisocial club, The, Gareth Harries, 222 11
Ants, 205 9
Anybody, G. P. Charlton, 159 15
Apéry's number, 164 6
Apes, John Hudson, 181 23
Apocalypse soon, Eddie Kent, 154 14
Apology to Ralph Hancock, 166 25
Apostol, T. M., *Introduction to Analytic Number Theory*, 220 10, 224 5, 226 6, 228 5, 229 4, 231 3, 242 4, 252 6, 14, 253 14, 254 5, 256 11; *Modular Forms and Dirichlet Series in Number Theory*, 242 4
Appeal to former OU mathematics students, Daniel Weinbren, 248 19
Appel and Haken, 195 18, 230 8
Appel, Kenneth, colors, 195 18
application of statistics to family history, An, Colin Davies, 202 16
APRT-CLE in UBASIC, 172 3
Arabic letter, 171 23
Arabic numbers, letter, Ralph Hancock, 249 11; letter, Sebastian Hayes, 251 20
arbelos, The, 223 19
Archeology, Tony Huntington, 226 15
Archers, The, 222 21; 273 12
Archery, Ken Greatrix, 159 8
Archimedean principle, 257 5
Archimedes, 150 14, 185 1, 250 11, 269 4; computing π , 168 5
Archimedes' Cattle Problem, 273 12
Archive for History of Exact Sciences, 273 9, 272 13
Arctan integral, 263 17
Arctan sum, 237 13
Arctangent identities, 204 15; A class of, Bryan Orman, 199 15
Area of a triangle, 212 11
Area of an annulus, 204 13

Aristophanes, *Ecclesiazusae*, 171 2; *The Birds*, 168 4; *The Clouds*, 178 7
Aristotle, *Politics*, 160 12, 163 5, 165 8
ARITH, 150 16, 154 6
arithmetic geometric mean, An, 200 25
Arithmetic progression, 228 16; letter, Chris Pile, 231 20
Arithmetic/geometric mean inequality, John Spencer, 197 4
arithmetic--geometric mean, 261 12
arithmetrization of quadratic irrationals, The, Bryan Orman, 238 1
Arithmotriangulation, Bryan Orman, 236 1
Armengaud, Joel, GIMPS, 153 2, 158 2
Arno, A., on pseudoprimes, 269 21
artist encounters mathematics, An, Eddie Kent, 270 15
Aryabhata, 153 10
Associated with every integer there is a group, Martin Hansen, 153 8;
 Re:, Sheila Simpson, 158 18
Astronomy, 158 17 Atkin, [A] Oliver [L], Intelligent primality test offer,
 155 26; primes, 153 5, 154 13, 189 12, 227 20; Problem 157 3, Binomial
 coefficients, 157 21
Atkins, P. W., *Physical Chemistry*, 220 10
Attridge, Sheldon, Addition, letter, 186 23; And now for a little light
 relief ... , 195 21; Calculus and irrational numbers, letter, 188 24;
 cited, 193 18; Solution 190.2, Six celebrities, 195 11; What's next?, 193
 26
Aubel's theorem, 199 20
Augustin, Dirk, primes, 226 20
Aurifeuille, Léon-François-Antoine, factorizing method, 268 19
Australian Magazine, 156 23
Authentication and key exchange, John Bull, 182 10
average problem, 159 19
Avogadro's number, 260 14
avoiding mathematical errors, 266 15
Axiom of Choice, 163 9
Axiom of Completeness, 164 14
Babbage, Charles, 231 15; *Tables of Logarithms*, 161 4
Babylonian months, 178 7
Bachet, magic squares, 164 2
Back To The Future, 211 9, 221 1
Backhouse, Nigel, primes, 161 2
backslash minus cup, 246 9
Backward number words, Ken Greatrix, 262 14

Bacon number, 164 16
Bacon, Tony, *Classic Guitars of the Fifties*, 154 15
badgers, 200 25
Bagnall, Phil, *Calendars*, 178 3
Bailey, David, 204 3
Bailey, Rosemary, annoy a statistician, 181 25
Bain, L. J., & M. Engelhardt, *Introduction to Probability and Mathematical Statistics*, 268 8
Baker, Andrew, Solution 147.1, Add one, 150 16; Solution 172.1, 345 triangle, 175 13
Baker, Simon, thanked, 153 8
Balanced sudoku puzzles, 219 17
Balancing an ellipsoidal object, 213 24
ball units of probability, 159 3
Ballif, J. R., & W. E. Dibble, *Conceptual Physics, Matter in Motion*, 188 25
Ballinger, Ray, large prime, 165 14
Balls in legs, Ralph Hancock, 154 20; Balls and legs again, Ken Norton, 157 13
Balls, 229 13, 247 19; Bob Newman, 207 19; Eddie Kent, 153 18; Jeremy Humphries, 166 21, 199 28; Tony Forbes, 215 24
Banach--Tarski, 208 1; paradox, 163 10; anagram, from Jeremy Humphries, 268 20
bananas, 158 23
Bangkok World, 182 27
bank job, The, Jeremy Humphries, 245 17
Barbour, Chris, Solution 157.2; Lottery dates, 160 19
Barker, Tom, running out, 176 22 Barnard, Dr Christian, 179 24 Barner, Klaus, Wolfskehl, 159 7 Barnett, Paul, Problem 245.3, Power residues, 245 7
Barrie, J. M., quoted, 212 19
Barwell, Brian, 2^5 , 162 21
Base, Chris, pattern, 195 2
Bass, Thomas, *The Newtonian Casino*, 151 6
Bastow, Mark, Solution 200.2, Square with corner missing, 206 10
baths, 157 16
Battersea Power Station, 258 9, 260 c
Baxandall, Peter, John Fauvel, 181 2
BBC News, 183 20; Radio 4, 201 11, 204 22
BBC2, 201 11; *The Numbers Game*, 162 24
Beach, Scott, *Musicdots*, 174 12

Beal, Andrew, 222 7; prize, 160 23
 Bear, Sheila, obiit, 197 23
 Beasley, John, Solution 185.5, Two pegs, 185 23, 188 10
 Beauclerk, Ralph, Heron's formula, 150 14; Ptolemy's theorem, 159 10; To
 find the cube root of a compound expression, 154 8
 Bechenbach, Edwin F., interesting numbers, 154 3
 Beckmann, Petr, *A History of π* , 168 3
 Bedlam cube, 152 4
 Bee, 191 10
 Beiler, Albert, *Recreations in the Theory of Numbers*, 273 12
 Beinecke, L. W., & R. J. Wilson (eds), *Graph Connections*, 150 23
 Belic, Rade, 180 26
 Bell Centennial font, 267 16
 Bell telephone company , 267 16
 Bell Telephone Labs, 246 3
 Bell, Peter, Problem 179.4, Two cylinders, 179 25
 Bellman, R. E., editor at AMS, 195 5
 Belloc, Hilaire, *Cautionary Tales*, 205 23
 Bender, C. V., & S. A. Orszag, *Advanced Mathematical Methods for
 Scientists and Engineers*, 269 23
 Benford's law, Jeremy Humphries, 153 7
 Bennett, Ida, *Simon Short's Son Samuel*, 151 2
 Berkely, Bishop, 185 1
 Berkshire, Frank H., *The Die is Cast*, 174 15; stochastic dynamics, 174 14
 Bernard, Claude, on science, 214 1
 Bernoulli power sums, 162 4; numbers, 250 12, 258 18, 267 19, 270 1;
 numbers and prime generating fractions, Roger Thompson, 267 1
 Bernoulli, Danny and Nick, 156 15
 Bernoulli, Nicolaus, 160 13, 164 11
 Bernstein, Peter, *Capital Ideas*, Don Swan, 156 10
 Berry, Michael, *Principles of Cosmology and Gravitation*, 158 16
 Bert, Ben and Bill problem, Angus Macdonald, 199 29
 Bertrand, Joseph, gambling, 157 11
 Bertuello, Bob, Figurate numbers, 222 1; Problem 240.2, One, 240 7
 Besicovitch, A. S., swimmer, 242 17
 Bessel function, 266 9
 Beth, T., M. Frisch & G. Simmons, *Public Key Cryptography: State of the Art
 and Future Directions*, 176 6
 Betsis, Dimitrios, prime tuplets, 153 6
 Better protractor, A, Ken Greatrix, 175 14

between, 188 26
Beware the percentage, John Bull, 226 16
Bibby, John, Mathematics calendar 1998, letter, 161 19 Bible, 178 4, 250 15
Biblioteca Nacional, 232 15
Bibliotheca Mathematica, 168 4
bicycle chain, 173 26
Big Bang by Simon Singh, Eddie Kent, 205 17
Big Issue, The, 183 21
Big River, Jeremy Humphries, 175 34; letter, John Hudson, 177 22
Biggs, N. L., Polyominoes, 152 4
Bill Tutte and his amazing identity, 264 13
Binary representation of roots, John Ryan, 152 3; sequences, 246 19; tree, 208 18
Binmore, Ken G., *Mathematical Analysis*, 154 10, 193 19; speaker, 197 9
binomial coefficient ${}^{2m}C_m$, The, Sebastian Hayes, 189 15
binomial coefficient gcd, 263 17
binomial coefficient sum, 262 14, 270 14
binomial coefficients, 157 21, 193 29
binomial identities, 244 15
Binomial ratio, 259 11, 262 1; revisited, 262 1, 266 21
Birthday, Eddie Kent, 150 6; cake, 250 c; dinner, 245 3; odds, Colin Davies, 159 18
birthdays, 157 2, 225 11
Biscuits, letters, 247 20
Biseptic, 220 21, 223 16
Bishop Berkely, 185 1
Bisto, 182 20
Bits and bobs, Mark McCluney, 154 3
Black, Jaques, *The Money Spinners*, 151 7
Blackburn, David, Solution 157.4, Eleven squares, 159 17
Blackett, D. W., *Elementary Topology*, 227 6
Bloch, Arthur, *Murphy's Law and Other Reasons Why Things Go Wrong!*, 163 16
Blunkett, David, mental arithmetic, 165 15
Blythe's paradox, 152 10
Board Game, BBC, 150 23
Boardman, Dick, 262 18; 40 years, 192 26; A little heresy, 198 22; A method of solving Vigenere ciphers, 194 20; a tart problem, 263 18; Amazing object, 193 24; An amazing construction, 254 14; Calculus, 190 26; Complex complex complex, letter, 173 28; Deal or no deal,

211 8; Ellipsoids, 197 27; Jos Leys, letter, 249 10; LCM, 195 8;
 MAXIMA: a free symbolic algebra package, 210 10; Mondegreens, 222
 19; Paradoxical dice, letter, 200 28; Problem 166.3, Boat, 166 14;
 Problem 179.2, Four tans, 179 22; Problem 182.2, Nine tarts, 182 9;
 Problem 192.6, 500 factors, 192 28; Problem 193.6, Dissect a triangle,
 193 21; Problem 204.6, A triangle property, 204 14; Problem 228.5,
 Square roots, 228 21; Problem 237.1, Three squares, 237 7; Problem
 245.7, Triangle division, 245 16; Problem 249.5, Three circles, 249 15;
 Problem 250.2, Circle, 250 9; Problem 250.6, Three towns, 250 10;
 Problem 251.3, Four towns, 251 5; Problem 251.9, The Philo line, 251
 13; Problem 252.1, Three pieces, 252 5; Problem 259.2, Triangle, 259
 8; Problem 265.3, Isosceles triangle, 265 20; Problem 266.3
 suggestion, 266 17; Seven a side, 185 12; Solution 166.1, A geometric
 theorem, 168 20; Solution 166.3, Boat, 168 26; Solution 177.5, 3 theta,
 179 28; Solution 178.2, Construct another square , 180 14; Solution
 178.6, Ten blocks , 180 12; Solution 179.4, Two cylinders, 182 14;
 Solution 180.3, Fence, 184 11; Solution 181.1, Find the centre, 184 12;
 Solution 183.1, Three altitudes, 185 14; Solution 184.1, Twelve boxes,
 188 27, 192 24; Solution 184.3, Lake escape, 187 12; Solution 184.4,
 Three real numbers, 186 18; Solution 185.2, Two streams, 187 13;
 Solution 185.4, Two sins, 187 19; Solution 187.4, Cots, 190 14;
 Solution 189.3, Amazing object, 192 10; Solution 189.8, 30 degrees,
 191 12; Solution 190.2, Nested roots, 192 18; Solution 190.5, Eight
 switches, 194 24; Solution 190.7, Four roots, 193 20; Solution 191.9,
 Switch, 194 22; Solution 193.2, Thirteen tarts, 196 25; Solution 194.2,
 Surface area of an ellipsoid, 197 2; Solution 196.2, Quadrilateral, 199
 20; Solution 196.4, Snub cube, 200 18; Solution 196.6, Pendulum, 199
 23; Solution 199.6, Inscribed ellipse, 202 10; Solution 200.2, Square
 with corner missing, 206 10; Solution 200.4, Circle in a box, 210 8;
 Solution 218.3, Nearly an integer, 221 16; Solution 221.4, Eleven
 bottles, 227 17; Solution 223.3, Factorization, 225 8; Solution 224.2,
 Buried treasure, 229 8; Solution 226.4, Three squares, 230 1; Solution
 230.5, Cup-cake holder, 234 10; Solution 232.3, Three degrees, 238 12;
 Solution 232.5, Three points on a cuboid, 238 8; Solution 234.4
 Tetrahedron, 243 10; Solution 238.4, Wednesday's child, 242 6;
 Solution 240.1, Two tins of biscuits, 242 8; Solution 246.6, Loop, 250
 1; Solution 247.1, 39/163, 250 2; Solution 250.3, Ellipsoid, 259 15;
 Solution 253.1, A Diophantine equation, 254 7; Solution 253.2,
 Quadratic, 255 6; Some maths from even longer ago, 197 24;
 suggestion, 268 6; The affine transformation, 228 10; The ladder

problem yet again: Problem 204.9, 217 17; Trigonometry, letter, 202 23; Vector algebra, letter, 214 20; What mathematics will be taught in 20 years?, 211 1; Solution 271.1, Complex exponential sums, 273 16
 Boardman, R. M., Education for all, letter, 258 21; Problem 170.2, Rational square, 170 20; Problem 176.5, Construct a square, 176 28; Solution 168.2, 345 square, 170 20; Solution 168.3, Fraction, 170 22; Solution 170.2, Rational square, 173 13; Solution 174.3, Eight wires, 176 18; Solution 174.4, 32 pounds, 176 24; Solution 176.5, Construct a square, 178 28; Where does mathematics come from?, 234 14
 Boardman, Richard, Relations between trig functions of specific values, 214 12
 Boat, 166 14
 Bode, Hendrik, *Network Analysis and Feedback Amplifier Design*, 246 3
 Bodo, Bela, Solution 189.9, Magic square, 191 8
 Boethius, 160 4
 boggle, 215 15
 Boltzman's constant, 260 14
 Bomb, 255 7
 Bondi, Hermann, bouncing, 173 19; The drop of a cylinder, 174 15
Boneshakers, 226 15
Bonnie Earl of Murray, The, 219 21
Book of Common Prayer, 178 11, 18
 bookmakers, 226 17
Bookseller, The, 231 19
 Boole, George, *Laws of Thought*, 180 16
 Boolos, G. S., & R. C. Jeffrey *Computability and Logic*, 257 8
 Born, A., *Modern Physics*, 220 10
 Borromean rings and things, Chris Pile, 234 6
 Borwein, J. M., & P. B. Borwein, *Pi and the AGM: A Study in Analytic Number Theory and Computational Complexity*, 261 12
 Borwein, Jonathan, computing π , 168 3
 Borwein, Peter, 204 3; computing π , 168 3
 Botvinnick, Mikhail, 180 16
 Bouncing ball, 200 25
 Bouwens, Dirk, 173 16, 17; An early protractor, 171 18
 Bowed rail, 161 8
 Bowers, Phil, Ignorance rewarded, letter, 164 24
 box problem, The, Ian Adamson, 212 8
 Boyd, R. V., Squaws, 165 14
 Boyer, *A History of Mathematics*, 161 5

Boyer, C., 265 19
Boyfriend, The, 222 21
Boyle, 158 17
Bradby, Laurence, The ubiquitous tap, 162 24; Probability, births and
 mojos that work, 160 13; Recurring digital invariants, 163 19;
 upgrading, 165 13
Bradley, Lewis, letter, 172 25
Bragg, Melvyn, 250 14
Bragg, Sir Lawrence, gardener, 152 2
Brain dead, Jeremy Humphries, 166 19
brainbender, 151 15
Braingle, 222 11
brains hurt, 153 10
Bramer, Max, 182 28; coprime, 180 29
Brannan, D. A., M. F. Esplen & J. J. Gray, *Geometry*, 176 15, 207 7
Bray, John, QMC, 215 1
Breakfast Programme, Radio 5, 201 11
Breton, André, surrealist, 270 15
Brief introduction to Study numbers, Dennis Morris, 208 16
Brillhart, John, primality, 172 6
British Health Newsletter, 201 11
British mathematics, letter, Barbara Lee, 184 20
British Society for the History of Mathematics (BHSM *sic*), 258 17
Broadhurst, David, 224 19
Brocard angle, 195 12
Brocard points, 195 12, 202 12
Brocardian geometry, 209 1
Bromilow, Mick, An early protractor, 173 17; Solution 202.5, Interesting
 equality, 205 16
Bromley, Sue, Re: Chimps, letter, 185 18; Seven a side, 185 12; Solution
 174.2, Incredible identity, 176 19; Solution 174.5, Root 11, 176 7;
 Solution 179.2, Four tans , 181 13; Solution 179.6, Root 11 again, 181
 16; Solution 181.2, Six secs, 183 13; Solution 181.7, Five cots, 183 14
Bromsgrove Advertiser, 169 13, 174 26
Bromsgrove Standard, 160 16
Brooker, Sally, chain letter, 159 13
Brouncker's expression, 168 8
Brouwer, Luitzen, 182 7
Brown eyes, 189 7
Brown numbers, 178 39

Brown, David L., Equal sums and products, 162 25; Euler relation, 166 24;
 Problem 177.5, 3 theta, 177 28; Problem 166.1, A geometric theorem,
 166 11; Two theorems with some applications, 177 6
 Brown, David, Solution 166.1, A geometric theorem, 168 18
 Bruck, Ronald, equivalence, 166 13
 Brunelleschi, Filippo, perspective, 154 22
 Bryant, Victor, coin landing on edge, 173 19
 Bryson, Bill, *Notes From a Small Island*, 154 12
 Buchanan, Mark, 220 22
 Budd, Chris, Simulating the World, 179 23
 Budd, John V., letter, 201 22
 Budden, Frank, 174 13; non-cubical dice, 173 19
 Buell, Duncan & Jeremy Teitelbaum, eds, *Proceedings of Computational
 Perspectives on Number Theory*, 155 26
 Buffet, Warren, 151 7
 Buffon, Georges-Louis Leclerc, Comte de, 156 9, 16; on π , 233 1; π and
 needle dropping, 168 9
 bull and the silo, The, John Bull, 163 1
 Bull, John A., Small probabilities, letter, 160 17
 Bull, John, ... Again, letter, 164 22; A new solution to a classic problem,
 177 14; about the Internet, 173 25; Authentication and key exchange,
 182 10; Beware the percentage, 226 16; Cryptography – keyless and
 deniable encryption, 176 1; Deniable encryption, 190 25; Grazing
 oxen, 165 1, 169 23; Heron's formula, 150 14; hurricanes, 200 23;
 Inequalities, 196 28; Infinite product, 166 19; mathfest.com, 175 39;
 On the average, 201 1; Problem 150.1, GCE powers, 150 22; Problem
 169.2, Chords: An interesting observation, 173 10; Problem 169.4,
 Functional inequality, 169 20; Problem 177.3, Mahatma's triangle,
 177 16; Problem 180.7, Interesting series, 180 28; Problem 182.3,
 Russian roulette, 182 20; Problem 182.5, Two £10 notes, 182 21;
 Problem 182.6, n balls, 182 21; Problem 182.7, Three cos and three
 sins, 182 21; Problem 183.1, Three altitudes, 183 15; Problem 183.4,
 Two real numbers, 183 22; Problem 184.2, Monk, 184 8; Problem
 217.4, n^2 , 217 24; Problem 224.4, Integers, 224 17; Quadratic
 equations, letter, 202 21; Re: Problem 182.6, n balls, letter, 184 17; Re:
 Problem 183.4, letter, 187 23; Re: Solution 204.3, Area of an annulus,
 206 18; Roots, 193 24; Russian roulette, letter, 186 24; Small
 probabilities, 159 3; Solution 166.1, A geometric theorem, 168 20;
 Solution 168.1, Clock, 170 12; Solution 168.2, 345 square, 170 17;
 Solution 168.3, Fraction, 170 21; Solution 169.2, Chords, 172 8f;

Solution 170.1, Interesting integral, 172 12; Solution 172.1, 345 triangle, 174 20, 175 12; Solution 174.2, Incredible identity, 176 19; Solution 175.1, Nested roots, 177 13; Solution 175.2, Reciprocal inequalities, 177 11; Solution 175.3, Series squared, 177 17; Solution 177.6, Factorial derivative , 181 11; Solution 178.7, Series, 180 11; Solution 179.2, Four tans , 181 12; Solution 180.7, Interesting series, 182 9; Solution 181.3, Six-sided pencil, 183 12; Solution 183.2, Fifteen objects, 185 11; Solution 183.3, Seven real numbers, 185 24; Solution 184.2, Monk, 186 20; Solution 187.4, Cots, 190 15; Solution 187.6, Iteration, 190 17; Solution 191.7, Sum and reciprocal, 194 12; Solution 193.4, Factorial inequality, 196 21; Solution 201.1, Continued fraction, 205 13; Solution 201.2, Sine series, 205 14; Solution 204.6, A triangle property, 207 7; Solution 212.2, Area of a triangle, 219 13; The bull and the silo, 163 1; The ladder problem yet again: Problem 204.9, 217 16; The two towers problem, 159 18; What does random mean?, 158 14

Bulletin of the American Mathematical Society, 268 19

Bulletin of the London Mathematical Society, 160 10

bungee jumping, 176 23

Burali-Forti's paradox, 223 1

Buried treasure, 224 14

Burkill, J. C., *A First Course in Mathematical Analysis*, 196 10

Burks, Arthur W. (ed.) *Essays on Cellular Automata*, 195 5

Burns, Robert, *Willie's Wife*, 152 18

Burton, David M., *Elementary Number Theory*, 165 11, 190 9, 194 27, 204 3, 220 10, 221 8, 228 5, 238 1, 254 5, 256 11

Bus stop, 248 17

Business Week, 160 23

Busnois, Antoine, 160 3

but they didn't, 192 9

butterflying, 158 11

by the hundred, 196 19

Byers, Stephen, mental arithmetic, 165 15

Byers, William, *How Mathematicians Think*, 223 9

Byrd, William, dissonance, 160 6

Byrne, John, Highest common factor, 201 21

Byrne, Professor Helen, 197 9

Byron, Robert, *The Road to Oxiana*, 230 16

Bytheway, Carol, secs, 179 29

C, 159 6

C.C.T.V., 175 12
cafe wall illusion, 158 1
Cahiers d'Art, 270 15
Cake, 246 8 calculating Bernoulli numbers, 267 3
Calculation of the probability of James Davies of Deptford being the same as James Davies of Stepney, Colin Davies, 157 2
Calculus and irrational numbers, letter, Sheldon Attridge, 188 24
calculus differentiation, 188 15
Calculus universalis, Sebastian Hayes, 186 9
Calculus, 190 26
Caldwell, Chris, primes, 152 17, 154 13, 160 1, 189 12, 226 18
Calendar Stone, 154 14
calendar, 160 20, 268 15
Calendar, History of the, David Singmaster, 178 1
Calendar, Ralph Hancock, 180 27
Cameron, Peter, 217 21; Codes, 179 23; Problem 217.1, Another 100 seats, 217 15
Campbell, Jeremy, *The Improbable Machine*, 161 13, 241 1
Can a number be equal to the sum of the sum and the product of its digits?, David Singmaster, 191 6
Can, 252 5
candiru, 160 15
Canetti, Ran, deniable encryption, 176 6
Cannon balls, etc., Chris Pile, 169 18
Cantor, Georg Ferdinand Ludwig Philip, elements 192 4; infinite numbers, 192 6; sets, 257 6
Capital Ideas by Peter Bernstein, Don Swan, 156 10
card trick, A, Tommy Moorhouse, 246 18
Carmichael number, 153 7
Carmichael, Robert, *Diophantine Analysis*, 255 6
Carr, G. S., *Synopsis Of Elementary Results In Pure Mathematics*, 202 5
Carrell, Dr Alexis, 179 24
Carroll, Lewis, 189 21; 'problem', 166 21; *Alice's Adventures in Wonderland*, 158 3; 193 28, 233 16; *Phantasmagoria*, 193 28; *Pillow Problems*, 151 17; *The Hunting of the Snark*, 193 28
Carter, Matthew, Bell Centennial, 195 25; designer, 267 16
Cartwright, Dave, 151 8; M500, 171 20
casino, 265 20
Castellanos, Dario, computing π , 168 3
Castle, Frank, *A Manual of Practical Mathematics*, 150 14

Castleden, Rodney (compiler), *British History*, 161 17
Cat and dog, 162 26
cat annoyed, 190 10
catenary, 190 12
catenoid, 190 12
Cathedral of St James, 265 2
Cat-negative, Ralph Hancock, 154 12
Cats, Andrew Pettit, 182 27; letter, Colin Davies, 185 15
Cattle, Tony Forbes, 273 12
Cauchy, A.-L., 206 1
Cauchy--Riemann equations for quaternions, The, Dennis Morris, 206 1
Causality and vitalism in mathematics, Sebastian Hayes, 214 1
caustic curve, 194 5
Cayley numbers, 203 1
Cayley table, 158 18
CDF [cumulative distribution function], 256 1, 263 13
CDF of the Standard Normal Distribution, The, Ken Greatrix, 249 12
ceilidh, 192 29
Celibacy, Tony Forbes, 163 16
Cellular automata, Chris Pile, 238 16
censer, 265 2
Centaurus, 168 4
Central binomial coefficient, 218 15
Central trinomial coefficients, 242 5
Centuries, squares and balls, letter, Chris Pile, 234 13
century of theorems, A, Tony Forbes, 221 21
certain sum, a, 264 c
Céva (Giovanni)'s theorem, 207 7
Céva's theorem to the rescue, Rob Evans, 209 1
chain of seven prime Pythagorean triangles(see M500 172 2), 170 c
challenge problem, 262 14
Chambers Concise, 246 14, 15
Chan, Joel, computing π , 168 3
Chance, Michael, balls, 157 13
Chandrasekhar, S., *The Mathematical Theory of Black Holes*, 271 12
Change, 199 28
Channel 4, 171 18
chaos, 162 24
Charged particles close to a modestly charged black hole, Tommy Moorhouse, 271 8

Charles V, 163 9
Charlton, G. P., Anybody, 159 15; Solution 157.1 Monkey Nuts, 159 16
Charlton, Pete, Points, letter, 173 26; Square roots, 176 16
Chartier, Emile, 250 14
Chebyshev doggerel, 152 8; polynomials, 190 16
Cheese, 243 9
Chen, L. H. Y., J. P. Jesudason & C. H. Lai (eds), *Challenges for the 21st Century*, 225 13
Cheng Ku, life, 219 19
Chermoni, Raanan, prime k-tuplet, 270 21
Chernyak, Y. B., & R. M. Rose, *The Chicken From Minsk*, 206 18
Chetwynd, Amanda, Women mathematicians, 153 3
Cheung, Philip, Degree classification, 160 2; Monkey and nuts problem, 161 22; Problem 161.1, Bowed rail, 161 8
Chez Angelique, 152 22, 160 14, 190 24, 198 19
Chiffres, 170 24
Chimps, Christine White, 182 24; Ralph Hancock, 183 23; Rob Williams, 183 23; letter, Re:, Sue Bromley, 185 18
Chinese Remainder Theorem, 216 18
Chisholm (Young), Grace, 242 17
Chitturi, B., bound, 257 13
Chocolate math, 197 25
Chords and regions, 217 17
Chords, 169 19; again, 172 10; letter, Sebastian Hayes, 176 27
Chords: An interesting observation, 173 10
Christian, Joy, 220 22
Christie's, 154 23
Christina, Queen, 158 17
Chuck-a-Luck, 266 12
Chudnovsky brothers, 153 2; pi, 161 6
Circle in a box, 200 25
circle, 151 11
Circle, 250 9
Circles & ovals. Lytton Jarman, 152 18
Circles, 203 15, 204 13
Circuit, 243 18
Circumcircle, 219 17
Clapham, J., *A Concise Economic History of Britain*, 197 20
Clare, John, 150 9
Clarke, A. A. (tr), *Disquisitiones Arithmeticae*, 247 9

Clarke, Jeremiah, 174 12
Clarkson, Roland, primes, 160 1
class number and Wilson's theorem, The, Paul Jackson, 225 12
class number of certain quadratic fields, The, Tommy Moorhouse, 231 1
class of arctangent identities, A, Bryan Orman, 199 15
Clay, Landon T., prizes, 177 25
Clifford (W. K.) algebras, 212 1
clock problem, 159 19; Steve Murphy, 199 29
Clock, 168 20
Clocks, Nick Hobson, 211 13
Clock-watchers, Rob Evans, 208 11
closer, 150 8
Closs, Michael P., *Native American Mathematics*, 156 3
CO₂ vs CO², Caroline Walcot, 150 9
Coal, 210 20
cocked hat, 150 20
Coconut, 249 9
COD, 192 29
Coe, Jacob, cover design, 157 1
Coe, Jonathan, Mr Gorsky, 154 23
Coefficients, 221 13
Coffee cup, 242 14
Cohen, Henri, *A Course in Computational Algebraic Number Theory*, 174 23
Cohen, Paul, 192 6
Cohn, Henry -- a proof, 263 15
Cohn, P. M., *Algebraic Numbers and Algebraic Functions*, 213 15; *An Introduction to Ring Theory*, 213 15
coin landing on edge, 173 19
Coincidence, Colin Davies, 180 26
Coins game, David Kerr, 160 11
Coins, letter, Ralph Hancock, 209 25
Colbourne, C., & J. Dinitz, *The CRC Handbook of Combinatorial Designs*, 195 29
Cole, F. N., a calculation, 231 14, 268 19; on factoring large numbers, 268 19
Colin, Andrew, An alternative solution to the cups problem, 203 18
Collatz problem, 204 4
Colledge, Tony, 221 8
Collins Dictionary of Mathematics, 192 27

Collins/Rand McNally Road Atlas of the USA, Canada and Mexico, The, 175
 35
 Collins/Robert dictionary, 152 7
 Colours, 225 14; solutions 225 7
 combinatorial football problem, A, Garry Green & Terry Griggs, 244 1
 Combinatorial index, 196 21
Comic Sections by Des MacHale, Don Swan, 156 10
 comma of Pythagoras, 160 4
 Commas and brackets, 202 25
 Commissariat à l'Énergie, 168 14
Companion in BASIC, 159 6
 complete elliptic integral of the first kind, 261 1, 14
 complete elliptic integral of the second kind, 261 1
 complete graph K_n for $n = 145$, The, 216 *c*
 Complex Analysis, 164 5
 Complex complex complex, Barbara Lee, 172 21; Jeremy Humphries, 169
 22; Chris Pile, letter, 176 28; Dick Boardman, letter, 173 28; Jean
 Robertson, letter, 173 28; Ralph Hancock, 171 19
 Complex exponential sums, 271 13
 complex gamma function, The, 174 *c*
 Complex geometry, Barry Lewis, 175 1
 complex numbers are not an algebraic field extension of the real
 numbers, The, letter, Dennis Morris, 209 24
 Composite numbers and sums of squares, letter, Peter Griffiths, 241 13
 compound interest, 270 6
Computational mathematics, Don Swan, on, 150 3
 computations of π , 159 2
 compute, 210 15
Computer Journal, 243 21
 Computer terminology, Jane Kerr, 165 13
Computer Weekly, 156 22
 Concave to convex, 193 13
 Concentric circles, 208 19; revisited, 212 20
 concept of a shadow algebra, The, Dennis Morris, 209 11
 Concerning the golden ratio of Fibonacci numbers, Dennis Morris, 229 19
 Conelly, Robert, 217 21
 Conférence Générale des Poids et Mesures, 260 14
Congressus Numerantium, 267 13
 Connaught Gardens, sign, 152 9
 connect, 242 15

connected 6-vertex graphs, 267 c
Conqueror, William the, 197 20
Conroy, Pat, southern literature, 172 15
Consecutive composite numbers, 222 11
Consecutive cubes, 197 11
Consecutive integers, 197 11
Consecutive primes, 214 11
Conspiracy theory, 227 11
Constant integral, 175 29
Constants, letter, Dennis Morris, Patrick Walker, 218 19
Construct a square, 176 28
Construct another square, 178 29
Construction of the regular dodecahedron, Barbara Lee, 184 22
Continued fraction, 201 5, 237 16
Continued fractions, 251 5
contour integral, 221 8
Contra Cantor, Sebastian Hayes, 223 1
Conversion factors, 200 23; Tony Forbes, 198 25, letter, Bryan Orman, 202 22; letter, Paul Wright, 202 22
convert program, 177 27
Convex regions, 163 3
Conway, J. H., *Life*, 195 2
Conway, John H., & Richard K. Guy, *The Book of Numbers*, 164 6, 168 3, 178 3, 222 7, 232 15
Conway, John, 220 21, 271 1
Conway's and Kilminster's prime-producing fractions, Roger Thompson, 271 1
Conway's conjecture, 232 13
Conway's constant, 232 15
Conway's prime machine, 226 7
Cook, Susan, Recurring runs, 182 27
Cooke, Martin, A 'solution' to the St Petersburg paradox, 180 24; A reply to Arthur Quigley's letter in 176, 178 34; Do you know your infinity times tables?, 176 14; In the Hilbert Hotel laundrette, 180 22; Nine matches, 174 23; Return of the lazy fat lady, 183 6; Solution 176.2, Population, 178 32; Squires, 175 32; When does $28 = 0?$, 179 20; When is $\infty + \infty$ not equal to $2\infty?$, 178 30
Cool Operator, A, Barry Lewis, 168 22
Cool, Tracey, Dingbats, 220 18
Cooley, Donald G., *The Science Book of Wonder Drugs*, 151 12

Coolidge, J. L., *A Treatise On The Geometry Of The Circle And The Sphere*, 209 1

Cooper, Jilly, mental arithmetic, 165 15

Cooper, Robert, *Low-Fat Living*, 156 23

Coordinate representation of Euler algorithm, Sebastian Hayes, 204 18

Copernicus, *Revolution of Heavenly Spheres*, 159 13

Copleston, Frederick, *History of Philosophy*, 186 9

corn flakes, 160 16

correction to 166, 168 29

correction to M500:195:28:4, 197 16

Correction: M500 193, 194 15

corrigendum M500:229 13, 230 17

Corris, Geoff, Solution 184.7, Deux nombres, 189 4; Solution 189.6, Three friends, 194 10

Cosecs, 210 9

Cosets, 187 11

Cosgrave, John, new world record, 192 17

Cosh integral, 243 9

Cosines and chandeliers, Dilwyn Edwards, 196 24

Cot series, 197 17

Cotes formula has two square roots, The, Peter L. Griffiths, 263 21

Cotes formula, 271 21

Cots, 187 20

Coulomb's Law, 158 17

Count me in, 154 19

Countdown, 221 12

Countdown, Ledger White, 169 12; Ralph Hancock, 165 16; Gail Volans, letter, 167 28

counterexample, Fermat's Last Theorem, 221 15

Counting caterpillars, 243 14

Counting graphs, 244 4

Counting in cuneiform, Ralph Hancock, 153 9; Tony Wenham, 156 3

Counting out, 203 17

Counting primes, 258 20

Courses, Ken Greatrix, 181 20

Cows, 167 27, 240 17

Cox, Adrian, Problem 186.3, Two hands, 186 13; Solution 192.6, 500 factors, 195 17

Coxeter, H. S. M., 199 1; *Introduction to Geometry*, 159 13

Craik, Alex D. D., computing π , 168 3

Cramer, Gabriel, rule, 262 7
Crandall, Richard, GIMPS, 158 2; primes, 152 16; *Projects in Scientific Computing*, 165 20
Cray, 168 15 creation of irrational numbers, The, Sebastian Hayes, 186 14
Crelle's Journal, 168 11
Cresswell, Stuart, correction, 193 28; infinite time, 178 29; Problem 152.3, Pythagorean sevens, 152 23; Solution 150.2, Hill climbing, 152 20; Solution 150.3, Envelopes, 152 22; Solution 160.3, Monkey, 163 17; Solution 197.5, Toilet paper, 200 21; The rational hypotenuse, 152 6
Crick, Francis, *What Mad Pursuit*, 152 2
Crighton, David, 167 27
Crofts, Freeman Wills, *The Cheyne Mystery*, 267 19
Cromwell, Peter, *Polyhedra*, Peter Giblin, 164 18
Croquet, 233 16
Cross, F. L., & E. A. Livingstone (eds), *Oxford Dictionary of the Christian Church*, 175 27
Crossnumber 182, 184 19
Crossnumber 195 solution, 196 29
Crossnumber 202 solution, 203 19
Crossnumber, Tony Forbes, 182 23, 189 20, 195 22, 202 15
Crossword, 152 22
Crown and Anchor, 260 18
Crown and Anchor, 266 12
Crump, Thomas, *The Anthropology of Numbers*, 150 10
Cryptarithmic (mod 11), Gareth Harries, 157 20
Cryptography - keyless and deniable encryption, John Bull, 176 1
Cube, 194 29, 262 15; Patrick Lee, 167 17
Cubes with even digits, 270 1
Cubic equations, Norman Graham, 230 4
Cubic, 213 20
Cuboid in a triangular room, 214 11
cumulative distribution function, 256 1
Cunningham Project, the, 165 20
cup-cake constant, 234 12
Cup-cake holder, 230 13
Cups and downs, Paul Garcia, 184 1
cups problem, 203 18
curious definition of a real number, A, Sebastian Hayes, 212 10
curious sequence, A, Tony Forbes, 235 11

Curry, Grant, Prime numbers and groups, 166 25; Problem 168.1, Clock, 168 20, Solution 164.2, ABCD, 166 18; The set of all objects is a group, 164 4

Curtain rail, David Kerr, 161 8

curvature anomaly, A, letter, Ken Greatrix, 174 28

curve of pursuit, 211 0

Cutler, Ann, & Rudolph McShane (trs), *The Trachtenberg Speed System of Basic Mathematics*, 172 21

Cycle graphs, 258 21

Cycles, 237 15, 240 15, 263 21

Cyclic quadrilateral and chord, 258 17

Cyclic quadrilateral, 203 20, 233 17

Cycling lizards, Eddie Kent, 152 10

Cyclones, letter, 193 24

Cylinder, 171 9, 173 19, 174 16, 188 18; letter, Jim Davies, 178 36

Cylinders, letter, Ken Greatrix, 223 16

Daily Mail Weekend, 220 25

Daily Mail, 160 15, 235 4, 5

Daily Telegraph, 150 9, 154 6, 164 16, 167 24

Daish, C. B., *The Physics of Ball Games*, 153 18

Dalgety, James, 174 15

Dan Dare, 250 14

Dandalos, Nick 'The Greek', 151 7

Dante, *Paradiso*, 168 7

Darwin awards, 158 11, 13

Dates, letter, John Reade, 205 23

Davenport, J. H., 155 26

Davidson, John, Problem 269.6, Cos pi over seven, 269 4; Solution 256.5, Lost energy, 258 14; Solution 258.5, Integral, 260 12; Solution 263.4, Arctan integral, 266 11; Solution 267.1, Trigonometric integral, 269 2

Davies, Colin, About Zero, 158 16; An application of statistics to family history, 202 16; Birthday odds, 159 18; Calculation of the probability of James Davies of Deptford being the same as James Davies of Stepney, 157 2; Cats, letter, 185 15; Christmas/Hallowe'en filler, 180 28; circle howler, 151 11; Coincidence, 180 26; Eggs, letter, 167 27; Euler relation, 168 29; Fermat numbers, letter, 194 26; Find the missing terms, 177 28; Finnish tongue twisters, letter, 250 16; Flies, 181 20; Flooglepips, 154 6; Four points, 183 23; Freddy's third function, 195 19; Galileo, letter, 173 28; Gram(me) negative, 152 15; Heresy and surnames, letter, 202 20; Highest common factor, 198 21;

Jäpperivokki, 193 29; M500 194, 196 29; Lottery, letter, 170 28; Milliard, 181 21; Nuclear matters, letter, 231 21; Number names, 150 2; Numbers on swimming pools, 158 1; Old age, 182 24; oxygen howler, 151 19; Pi revisited, 253 16; Power of ten, 164 4; Primes and partitions, letter, 207 16; Problem 151.1, The geochron clock, 151 19; Problem 170.1, letter, 172 16; Problem 172.4, Grandfather clock, 172 15; Problem 172.5, Series, 172 22; Problem 177.2. Four spheres, 177 11; Problem 178.6, Ten blocks, 178 40; Problem 184 4, Three real numbers, 184 10; Problem 187.2, 29, 187 19; Problem 188.1, Ones, 188 17; Problem 190.1, 50 pence, 190 19; Rainfall, 160 15; Re: Problem 171.1, Cylinder, 176 22; Recurring digital invariants, 156 19; Scepticism in mathematics, letter, 208 25; Solution 170.1, Interesting integral, 172 13; Solution 174.3, Eight wires, 176 18; Solution 188.2, Cylinder, 190 23; Solution 194.2, Surface area of an ellipsoid, 197 3; Solution 249.4, Radium, 251 14; Special offer, 193 26; *The Parrot's Theorem* by Denis Guedj, 177 24; Times equals plus, 160 11; two questions, 191 10; Under the skin, 197 20, 205 20; π , letter, 175 39

Davies, Jim, Cylinder, letter, 178 36

Davies, John Llewelyn, & David James Vaughan (trs), *The Republic of Plato*, 165 9

Davies, Sue, From M500 39, 184 29

Davis, P. J., & R. Hersh, *The Mathematical Experience*, 237 12

Davis, Philip, & William Chinn, 3.1416 *And All That*, 159 7

Dawkins, Richard, good looking, 152 3

de Bruijn, squares, 152 4

de la Hire, Philippe, magic squares, 164 1

de Launay, Marquis, 228 9

de Moivre, A., *Miscellanea Analytica*, 169 11

de Moivre's theorem, 202 23

de Montparnasse, Kiki, model, 270 15

De Morgan Medal, 154 11

De Morgan, Augustus, *A Budget of Paradoxes*, 168 3

De pharo eddystoniensi, Ralph Hancock, 164 14

de Podesta, Michael, The UK National Lottery ... and why not to 'play', 163 7

de Saint-Exupery, Antoine, *Terre des Hommes*, 248 21

dead horse, 215 14

Deal or no deal, Jeremy Humphries, 210 17; Dick Boardman, 211 8

Dec/Oct filler, 180 13

Decagon, 172 11

Decimal continued fraction, 213 20
 Decimal currency, Barbara Lee, 174 28
 decimal time, 171 7
 Dedekind's axiom, 196 10
 Definite integral, 213 23
 Degree classification, Philip Cheung, 160 2
 Degrees of separation, Chris Pile, 164 16
 Degrees, Jeremy Humphries, 165 17
 Dehn, Max, Hilbert's third problem, 164 19
 Del Centina, A., 272 13; FLT, 273 9
 dell'Abbaco, Paulo (attrib), *Trattato d'Arithmetica*, 157 17
 Deniable encryption, 190 25
 Denmark, Prince of, 174 12
 Dennett, Daniel, out of body, 152 23
 Dennis the Small, 154 14
 Dennis, Roger, Biscuits, letter, 247 20; Inspecting the column, laces and a
 sequence letter, 230 7; Problem 230.1, Sequence, 230 11
 Dent, Susie, 221 12
 Denuys, François, π , 170 24
 Dershowitz, Nachum, & Edward M. Reingold, *Calendrical Calculations*,
 216 18
 Descartes, René, 195 21; *Geometry*, 161 4
 Descending integers, 254 16
Desert Island Discs, 229 21
 design by Lawrence Seaton, 168 c
 Design of the century, 205 0
 Designing table mats, Bryan Orman, 266 1
 Determinant, 198 10, 210 9, 264 13; equation, 261 20
 Determinants, 266 18
 determinants, 268 4, 193 1
 Dettman, John W., *Applied Complex Variables*, 220 10, 260 17
 Deux nombres, 190 27
 Developing a fractal program for a T183 calculator, Patrick Meehan, 180
 1
 Devlin, Keith, 150 16; *Goodbye, Descartes* reviewed, 156 11
 Dewdney, A. K., hailstones, 162 2
 Dharmottara, on relations, 214 4
 Diaconis, Persi, 174 14, 15
 Diagonal elements, 241 19
 diagram, 169 c

diameter graph, The, 257 20
Dibb-Fuller, Lily, Fork handles, 241 21; four candles, 260 17
Dice, 212 19; Chris Pile, 179 13
Dietel, Brian C., 201 5
difference engine, 161 4
Differential calculus in C_3 space, Dennis Morris, 233 11
differential equation on the integers, A, Tommy Moorhouse, 236 12
Differential equations and trigonometric functions, Dennis Morris, 235 8
differential length, 170 4
Digby, Sir Kenelm, 156 12 , 158 17
Digit sum ratio, 262 14
digital invariant, 165 4
digital invariants, 158 10, 21
Dijkstra, Edsger W., 215 14
Dilke, Fisher, BBC, 162 24
Dingbats, Eddie Kent, 212 14; Tracey Cool, 220 18
Diophantine equation, 159 16, 253 13
Diophantine equations, Patrick Lee, 163 14
Dirac, Paul, physics and poetry, 184 8
Directed triangles, 234 17
disaster, 227 15
Disc, 238 10
discontinuity, 193 16
discrete Fourier transform, 152 14
discrete uniform distribution, 268 8
discriminant, 202 19
Discriminants, 259 10
Dissect a triangle, 193 21
dissected squares, 252 c
Distances from the centroid, Sebastian Hayes, 180 23
Divided polygon, 198 11
divisibility tests, A note on, Shena Flower, 204 21
Division tests, Dennis Morris, 199 12
Divisor sum, 250 10
Divisor sums of powers, 257 15
Dizziness, letter, Ralph Hancock, 204 24
Do men & women design gardens differently?, Nick Pollock, 189 10
Do you know your infinity times tables?, Martin Cooke, 176 14
Do you know your left from your right?, Ian Adamson, 219 19
Doctor, doctor, 260 21

Dodecahedra, letter, 185 16
 Dodecahedron graph, 237 c
 dodecahedron, 184 22
 Dodgson, Hassard, 189 21
 dog and cat, 247 9
 Doing vector algebra properly, Dennis Morris, 212 1
 Donellan, Elaine and Richard, birthday odds, 157 2
 Donne, John, *Devotions XVII*, 193 19
 Dorner, Steven, 182 28
 Dorrie, Heinrich, *100 Great Problems of Elementary Mathematics*, 180 15
 Dot products and determinants, John Spencer, 196 23; Robin Marks, 193 1
 Dottie's number, 234 14
 Double integrals, 259 10
 Double lottery [solved], Paul Terry, 163 6
 Double lottery, Eddie Kent, 161 13
 Doublings, 195 23
 down by up to, 153 19
 Doxiadis, Apostolos, *Uncle Petros and Goldbach's Conjecture*, 175 33
 Dr Panic's improved jam sandwich, Ralph Hancock, 224 10
 Dr Strabismus (whom God preserve) of Utrecht, 171 19
 Dr Urban Panic's later adventures, Ralph Hancock, 259 17
 Drake, Stillman, music, 175 37
 Drawing the harmonic series, Sebastian Hayes, 208 1
 Drever, Keith, $a = b$, 182 26; How to solve quadratics, letter, 228 14;
 Problem 176.1, Two cyclists, 176 24; Problem 184.3, Lake escape, 184 10;
 quote, 190 19; Solution 176.3, Tricubic, 178 26; Solution 179.2, Four tans , 181 13;
 Solution 183.2, Fifteen objects, 185 11; Solution 186.5, Horse, 188 12;
 Solution 194.3, Sixteen lamps, 197 10; Solution 199.3, Two tangents, 203 16;
 What's missing?, 198 24
 Drips, Gordon Mitchell, 154 22
 du Sautoy, Marcus, 203 22, 257 1; *The Music Of The Primes*, 207 16
 Dubner, Harvey, primality, 153 6, 154 13, 172 6; Ten consecutive primes in arithmetic progression, 161 2
 Dudley, Underwood, *Elementary Number Theory*, 175 41
 Duelling lovers, 209 15
 Dugold Stewart, quoted, 186 9
 Duncan, D. E., *The Calendar*, Peter L. Griffiths, 175 26
 Dunkels, Andrejs, 177 15
 Dunlap, Richard A., *The Golden Ratio and Fibonacci Numbers*, 198 7

Dunn, John, & Colin Martin, *John Dunn's Answers Please*, 178 3
 Dürer, Albrecht, 265 18; construction, 261 20
 Dürer's *Melancholia*, 191 8
 Durrell, Clement V., *A New Geometry for Schools*, 217 17
 Dwork, Cynthia, deniable encryption, 176 6
 Dyson's Vulcan, 179 19
e -- continued fraction expansion, 263 14
e in nine digits, 177 28
e, 213 17
e: The Story of a Number by Eli Maor, Barbara Lee, 168 28
 Easy ways with eigenvectors, Dilwyn Edwards, 191 1
 Eccles, Mr D. F., up to, 153 19
 Ed (chubby), 170 29
 Eddington, Arthur S., *Fundamental Theory*, 260 15
 Eddystone lighthouse, 164 14
 Editor's email address change, 254 16
 Editorial Board, Nine matches, 174 23
 Edmunds, Noel, 210 17
 Education for all, letter, R. M. Boardman, 258 21
 Education, Eddie Kent, 163 15
 Edwards, A. W. F., *Pascal's Arithmetical Triangle*, 162 16, 221 8
 Edwards, Dilwyn, Cosines and chandeliers, 196 24; Easy ways with
 eigenvectors, 191 1; Moving point, 189 11; Problem 191.8, Infinite
 exponentiation, 191 25; Rates, 189 19; Solution 187.6, Iteration, 191
 17; Sundials, letter, 186 24; Threes are best, 184 29; When two fives
 don't make ten, 188 16
 Edwards, H. M., *Fermat's Last Theorem. A Genetic Introduction to Algebraic
 Number Theory*, 272 13, 273 9; *Riemann's Zeta Function*, 224 5
 Edwards, Joseph, *Differential Calculus*, 194 7
 Efron, Bradley, dice, 179 13
 Eggs, letter, Colin Davies, 167 27
 Eiffel Tower, 171 21
 Eight cubes, 177 10
 Eight sins, 226 12
 Eight switches, 190 21
 Eight wires, 174 24
 Eighteen, Miss Freda, 150 2
 Eighth powers, 225 14
 Einstein, Albert, 158 11; *Relativity: The Special and the General Theory*, 198
 15; stupidity, 170 2; *The Meaning of Relativity*, 152 23

Einstein, thought a bit, 161 12
Einstein's co-author, Eddie Kent, 165 12
Einstein's principle, 181 13
Election Entertainment, The, 178 17
Electoral Reform Society, 243 20
electric kettle, 194 9
electriceds@bigfoot.com, 165 12
electron charge, 260 14
electronic letter opener, 150 9
Elementary trigonometry, 255 5
Elements of statistics, Don Swan, 150 3
Eleven bottles, 221 13; revisited, 224 20
Eleven squares, 157 22
Eleven triangles in a 49 x 49 grid, 268 c
Eleven, 222 13
Elkies, Noam, 254 20
Ellingham, Christopher, Solution 200.2, Square with corner missing, 206
11
Ellipse, 181 23
ellipses and triangles, 265 c
ellipses, 234 c
Ellipsoid, 250 10; again, 199 14
Ellipsoids, 197 27
elliptic curves, 243 8
elliptic gardening problem, An, letter, Donald Preece, 202 24
Ellis, Dave, Factorial squares, letter, 178 38; Problem 172.1, 345 triangle,
172 7; Recurring digital invariants, 158 21; Solution 172.1, 345
triangle, 174 17
Ellis, H. F., quoted, 185 9
Elsey, James, Tarts, letter, 222 20
Emma Lehmer – 100 not out, Eddie Kent, 213 16
empty set, 200 25
Encarta Encyclopaedia, 192 2
Encyclopaedia Britannica, 185 19
end of an era--Paul Erdős, The, Eddie Kent, 152 8
engraving by Peter Shute, 168 c
ENIAC, 168 13, 213 16
Enquire Within, BBC R4, 165 19
Envelopes paradox, 150 22
envelopes, 194 1

Equal sums and products, David L. Brown, 162 25
Equation 216.5: letter, Basil Thompson, 220 24
Equation, 216 20; Vincent Lynch, 261 19
Equiangular spiral, 170 3
equilateral triangle problem, 159 19
Equilateral triangle, 266 17
Equilateral triangles and the trisection of angles, Bryan Orman, 262 2
Equinox, 160 11
Erdős number, 152 8
Erdős, Paul, Bernoulli numbers, 270 13; born and aged, 257 20
Errata 181.2, Six secs, 185 22
Errata 187, 189 7
Errata, Erdős & crossword, 153 19
Erratum 228, 229 13
Erratum In M500 255, 257 21
Erratum M500 270, 271 17
error 211.6 should be 212.6, 212 19
escalator problem, 159 19
Escolme, Bob, Some maths from long ago, 194 1
Estimate, 249 5
Ethelred II, 164 14
Ethelred the Unready, 154 14
Euclid Book X, 253 1
Euclid joke, 214 11
Euclid VII, 175 36
Euclid, 185 1
Euclid, Book XIII, 154 5
Euclid, Books V, VII--IX, 196 8, 9
Euclid, *Elements* book VI prop. 13, 197 4
Euclid, *Elements*, 161 3, 168 5, 188 25, 253 2
Euclid's algorithm, Ian Grant, 161 10
Euclid's lemma, 162 20
Euclidean Algorithm, 154 5
Eudemus, *History of Geometry*, 168 5
Eudora Welty, Eddie Kent, 182 28
Euler / Euclid, 232 16
Euler algorithm, 204 18
Euler line, 204 14
Euler relation, Colin Davies, 168 29; David L. Brown, 166 24; Tony Forbes, 170 22

Euler, L., 166 19, 204 1, 265 18; *De numeris amicalibus*, 158 20; *Institutiones calculi differentialis*, 158 20; *Introductio in Analysin Infinitorum*, 168 10; magic squares, 164 3; *Mechanica*, 158 20

Euler's constant, 202 8, 250 6, 252 12, 260 15; function, 246 7; Basel Problem, Peter Griffiths, 267 18

Eureka, 174 13, 205 19

Eurocheques, 179 29

Europe Environment, 150 9

European Journal of Physics, 174 15

European Report, 150 9

European Roulette, 266 14

Evans, David, Lottery ..., letter, 164 22

Evans, Martin S., Solution 161.1, Bowed rail, 163 11

Evans, Martin, Mathematical notation, 158 20

Evans, Rob, Ceva's theorem to the rescue, 209 1; Clock-watchers, 208 11; Long live geometry, 202 12; Maximum Brocard angle, comments, 195 12; Numbers on the brain, 228 18; Rotations of the sphere, 254 8; Solution 214.1, River crossing, 222 14; The Geochron world clock, 219 1

Evelyn, John, *Diary*, 158 17

Evening Standard, 160 20

Every other day, 245 17

Eves, Howard, 201 5

Excel, 184 9

excessive interest, 202 11

Exercise for reader, 250 6

existentialism, 202 17

Exoo, G., 215 21

Explanation of Julian Day Number Calculation, 268 15

Exploring Chaos, Barry Lewis, 169 14; Ken Greatrix, 171 21

exponential sum, An, 201 0; Tony Forbes, 201 24

Exponents, 217 25

Expressions that maintain their form under multiplication, Dennis Morris, 220 14

External hard disk drive, 1.8 Gb, Marion Stubbs, 154 2

Faben, John, Problem 232.5, Three points on a cuboid, 232 12

facit, 165 16

FACOM, 168 14

Factorial derivative, 177 29

Factorial digital invariants, David Singmaster, 187 25

Factorial inequality, 193 13
Factorial squares, 176 28; letters, 178 38
Factorization, 223 13, 268 19
Facts, Eddie Kent, 158 11
Fagin, Barry, prime search GIMPS, 158 2, 165 20
Fahle., W., bound, 257 13
Fahrenheit 9/11, 200 23
Fairstein, Linda, *The Kills*, 225 11
Fairthorne, Marianne, 243 13
Falcus, Michael, Gravity inside a solid body, 157 3
Family Tree Magazine, 202 16
Farewell Norma, Judith Furner, 218 20
Farris, Frank, *Creating Symmetry*, 271 13
Fauvel, John, & Jeremy Gray, *The History of Mathematics*, 161 4
Favourite lottery numbers, 180 18
Feedback, letter, Josephine Stubbs, 170 27
Feiling, K., *A History of England*, 197 20
Fejes-Toth, Laslo, packing, 156 8
Fence, 180 13
Ferguson, John, Asociation for Language Learning, 150 9
Fermat numbers, Tony Forbes, 192 16; letter, Colin Davies, 194 26
Fermat prime, 247 9
Fermat, Pierre de , 173 13
Fermat, Problem 225.5, Pythagorean triangles, 225 17
Fermat's combinatorial identity, 221 4
Fermat's Last Theorem and Pythagorean triples, Peter L. Griffiths, 257 21
Fermat's Last Theorem by Simon Singh, Eddie Kent, 160 9
Fermat's Last Theorem, 159 7, 14; a postscript, Eddie Kent, 162 16; Peter L. Griffiths, 169 8, 171 22; Bob Margolis, 170 25
Fermat's Little Theorem, 194 27, 272 12
Fermat's Room, 232 14; Eddie Kent, 230 14
Fibonacci and all that, Ron Potkin, 200 14; Re:, Sebastian Hayes, 206 14
Fibonacci generalized, 203 6
Fibonacci numbers, 212 10, 215 11; Sebastian Hayes, 234 2
Fibonacci Quarterly, 174 23
Fibonacci sequence, 248 5, 7
Fibonacci series and the golden section, The, Sebastian Hayes, 201 12
Fibonacci series, The, Sebastian Hayes, 187 1
Fibonacci type sequences, 198 5
Fibonacci, 203 2, 14, 240 16, 247 4; *Liber Abaci*, 168 7

Fibonacci's geese, 271 21
Fielding, Henry, 175 38
Fields Medal, 153 3
Fields, John Charles, prizes, 177 25
Fifteen objects, 183 21
figurate numbers, 173 1
Figurate numbers, Bob Bertuello, 222 1
Films likely to be of interest to mathematicians, 180 28
Films, Martyn Lawrence, 184 19
Financial Times, 163 15
Find the centre, 181 11
Find the missing terms, Colin Davies, 177 28; letters, 179 24 *f*
FINDDIVISOR, 271 3
Finding numbers in a grid, Tony Forbes, 216 20
fine structure constant, 260 15
Finite and discontinuous, Sebastian Hayes, 193 14
Finite integral, 272 18
Finnish and other lingual themes, Mark McCluney, 150 23
Finnish tongue twisters, letter, Colin Davies, 250 16
first irrational, The, Sebastian Hayes, 154 5
first prime, The, 175 31
Five cots, 181 23
Five digits, 181 19
Five hats, Eddie Kent, 242 13
Five hundred random clocks, 257 *c*
Five spheres, 202 9
Five triangles, 272 *c*
Five-card trick, 209 9
Fixed point, 234 14
Flagpole, 241 19
Flamel, Nicolas, *Le Livre des figures hiéroglyphiques*, 163 9
Flatiron Building, 238 17
Flatliners, 164 16
Flaubert, *Dictionary of Accepted Ideas*, 153 20
Fleet Street report, 158 13
Fletcher, Peter, 204 19; die, 178 29; Groceries, 169 22; land; migraines;
 legionnaires disease, 201 11; mobile, 178 35; Solution 158.1, 3000
 bananas, 160 21; Solution 161.1, Bowed rail, 163 10; Solution 163.2,
 The Tower of Saigon, 166 15; Solution 163.3, Prime multiplication,
 166 16; Solution 164.2, ABCD, 166 18; Solution 168.2, 345 square, 170

20; Solution 168.3, Fraction, 170 21; Solution 174.2, Incredible identity, 176 19; Solution 174.5, Root 11, 176 7; Solution 175.3, Series squared, 177 17; Solution 175.5, abc, 177 12; Solution 176.3, Tricubic, 178 26; Solution 178.7, Series, 180 11; Solution 184.2, Monk, 186 20; Solution 184.4, Three real numbers, 186 18; Solution 184.5, Triangles, 186 16; Solution 201.1, Continued fraction, 205 13; Solution 202.1, Squaring the circle, 204 16; Solution 208.1, 3 ratios, 211 12; weather, 183 20

Flies, Colin Davies, 181 20; Jack Gibson, 181 20

Flooglepips, Colin Davies, 154 6

Floor and ceiling, 267 17

Flour, letter, Jeremy Humphries, 248 21

Flower, Shena, A note on divisibility tests, 204 21

Focus: Mathematical Association of America Newsletter, 221 8

Folding a polygon, 208.0, 19

Forbes, Linda, a small contribution, 213 25; 247 8

Forbes, Tamsin, 247 8; Problem 230.5, Cup-cake holder, 230 13; Solution 230.5, Cup-cake holder, 234 10; Solution 242.6, Three cylinders, 245 12; Solution 245.1, Birthday dinner, 248 17

Forbes, Tony [unsigned], Solution 164.2, ABCD, 167 25; 'mutually touching finite cylinders', 257 11; 196 revisited, 205 18; $2^{2976221} - 1$ is prime, 158 2; 81 cells revisited, 207 20; A century of theorems, 221 21; A curious sequence, 235 11; A Latin square puzzle, 218 18; a quasi-magic sudoku-like puzzle, 212 21; A sliding-block puzzle, 244 5; About zero, 158 16; apology, 251 21; Balls, 215 24; boiling water, 251 21; Cattle, 273 12; Celibacy, 163 16; choice, 163 9; counting, 172 16; Crossnumber, 182 23, 189 20, 195 22, 202 15; Crossnumber, solution, 190 28; difference, 194 10; elliptic curves, 243 8; Euler relation, 170 22; Fermat numbers, 192 16; Find the missing terms, letter, 179 24; Finding numbers in a grid, 216 20; Fork handles revisited, 260 17; Forty-eight cubes, 181 2; Fruit cakes, 195 25; Generalized Fibonacci numbers, 203 6; Generalized Mersenne primes, 165 20; geometric solution 172.3, 172 11; Gigantic prime triplets, 226 18; hailstones, 162 2; Hats, 181 24; houseboat, 165 14; How to solve cubics, 202 18; How to solve inequalities, 243 16; How to solve quartics, 223 14; Hyperplanes that meet at a common point, 262 6; Ignorance, 163 15; Inequalities, 241 15; Interesting experiment, 188 18; Kiwi fruit, 227 11; LaTeX for M500, 191 25; London Mathematical Society, 165 15; Lottery tickets, 257 1; M500 251 recalled, 253 15; Magic Moments, 229 21; Mathematical notation, 158 20; Mathematics in the garden,

224 8; Mathematics in the kitchen--II, 190 28; Mathematics in the kitchen--V, 225 9; Mathematics in the kitchen--VI, 228 17; Mathematics in the kitchen--VII, 232 12; Mathematics in the kitchen--X, 268 3; Model railways, 183 20; More arctangent identities, 201 6; Number boggle, 215 15; On ranks and cranks, 179 17; on Y2K bugs, 172 19; Parades and resolvable Steiner systems, 195 26; Pick's theorem, 253 6; Prime k -tuplets 13, 153 4; Prime k -tuplets, 270 21; Prime k -tuplets--15, 156 14; Prime k -Tuplets--16, 158 15; Prime prime, 197 16; Prime Pythagorean triangles, 172 1; prime tests, 177 20; Prime triplets, 154 13, 161 9; Problem 157.2, Lottery dates, 157 21; Problem 163.2, The Tower of Saigon, 163 18; Problem 166.2, Words, 166 12; Problem 170.1, Interesting integral, 170 14; Problem 170.3, Reciprocals, 170 20; Problem 173.3, Primality testing, 173 20; Problem 177.1, Eight cubes, 177 10; Problem 177.6, Factorial derivative, 177 29; Problem 178.1, Lottery guarantee, 178 27; Problem 178.5, Reward a friend, 178 39; Problem 179.5, Subtract square root, 179 27; Problem 181.1, Find the centre, 181 11; Problem 181.2, Six secs, 181 14; Problem 181.3, Six-sided pencil, 181 18; Problem 181.6, Ellipse, 181 23; Problem 187.7, Task, 187 25; Problem 187.8, Seven events, 187 25; Problem 188.4, Sixteen tarts, 188 29; Problem 189.1, Neighbours, 189 3; Problem 190.6, Triangle, 190 29; Problem 191.2, LCM, 191 10; Problem 191.3, Tetrahedron, 191 11; Problem 192.4, Two boxes, 192 28; Problem 192.5, 16 polygons, 192 28; Problem 192.7, 4-cycle-free graphs, 192 28; Problem 193.3, Thirteen tarts, 193 13; Problem 193.6, Fair coin, 193 23; Problem 193.7, Binomial coefficients, 193 29; Problem 194.1, Normals to an ellipse, 194 7; Problem 194.3, Sixteen lamps, 194 28; Problem 194.4, Getting dressed, 194 28; Problem 195.3, Doublings, 195 23; Problem 196.3, Combinatorial index, 196 21; Problem 196.4, Snub cube, 196 22; Problem 197.6, 36 circles, 197 23; Problem 201.3, 25 objects, 201 5; Problem 203.3, Counting out, 203 17; Problem 206.1, Swap sort, 206 17; Problem 208.3, Concentric circles, revisited, 212 20; Problem 210.5, A monkey and a pole, comment, 223 18, 19; Problem 212.1, Fibonacci numbers, 212 10; Problem 212.6, Sudoku verification, 212 19; Problem 213.7, Orders, 213 23; Problem 213.9, Balancing an ellipsoidal object, 213 24; Problem 214.1, River crossing, revisited, 219 16; Problem 216.3, Reflection, 216 17; Problem 216.4, Four fours, 216 19; Problem 216.5, Equation, 216 20; Problem 219.2, Balanced sudoku puzzles, 219 17; Problem 220.3, Three integers, 220 21; Problem 220.5, Biseptic, 220 21; Problem 221.1, Ten hats, 221 13;

Problem 221.4, Eleven bottles, 221 13; Problem 221.4, Eleven bottles, revisited, 224 20; Problem 223.3, Factorization, 223 13; Problem 223.5, Reversing a needle, 223 21; Problem 224.5, Digit reversal, 224 19; Problem 224.6, Consecutive integers, 224 19; Problem 225.1, Toroidal planet, 225 14; Problem 225.4, I choose a number, 225 14; Problem 226.1, Conway's prime machine, 226 7; Problem 227.1, 25 steps, 227 10; Problem 227.3, Pentagonal numbers, 227 12; Problem 227.4, Ten coins, 227 13; Problem 228.1, Odd expression, 228 5; Problem 228.4, Perfection, 228 19; Problem 232.1, $\pi + e$, 232 6; Problem 234.1, Two ellipses, 234 4; Problem 235.4, Matrix, 235 17; Problem 236.1, Relationships, 236 8; Problem 240.5, Cows, 240 17; Problem 241.1, Three locks, 241 10; Problem 241.3, Four integrals, 241 15; Problem 241.5, Diagonal elements, 241 19; Problem 241.6, Flagpole, 241 19; Problem 242.1, Interesting integrals, 242 4; Problem 242.3, Central trinomial coefficients, 242 5; Problem 242.5, Coffee cup, 242 14; Problem 243.1, Cheese, 243 9; Problem 243.2, Cosh integral, 243 9; Problem 243.5, Counting caterpillars, 243 14; Problem 243.7, Circuit, 243 18; Problem 243.8, Pentadecagon, 243 18; Problem 245.1, Birthday dinner, 245 3; Problem 245.5, Numbers, 245 15; Problem 245.8, Four cylinders, 245 16; Problem 245.9, Transcendental numbers, 245 16; Problem 245.10, Every other day, 245 17; Problem 246.2, Cake, 246 8; Problem 246.6, Loop, 246 21; Problem 247.5, Sums of powers, 247 21; Problem 248.3, Integer triangles, 248 11; Problem 248.5, Handicapped coin tossing, 248 15; Problem 248.6, Bus stop, 248 17; Problem 249.1, Hypersphere, 249 5; Problem 249.2, Estimate, 249 5; Problem 249.4, Radium, 249 15; Problem 249.7, Syllables, 249 17; Problem 250.1, Quadratic sum, 250 6; Problem 250.3, Ellipsoid, 250 10; Problem 250.7, Bernoulli numbers, 250 12; Problem 250.8, Roman numerals, 250 13; Problem 251.2, Thirteen boxes, 251 3; Problem 251.4, Four more towns, 251 5; Problem 251.5, Continued fractions, 251 5; Problem 251.6, Integer, 251 9; Problem 251.8, Six-week months, 251 13; Problem 254.1, Four bottles, 254 5; Problem 255.2, Bomb, 255 7; Problem 255.3, Points of inflexion, 255 7; Problem 256.1, Two bisextics, 256 11; Problem 256.3, Two septics, 256 17; Problem 256.3, U-boat, 256 17; Problem 257.1, Sorting by prefix reversal, 257 13; Problem 257.2, Three hands, 257 15; Problem 257.4, Tracks, 257 20; Problem 258.4, Poly-Bernoulli numbers, 258 18; Problem 258.8, Cycle graphs, 258 21; Problem 259.3, Discriminants, 259 10; Problem 259.8, Binomial ratio, revisited, 262 1; Problem 260.1, Iterated trigonometric integral, 260 13;

Problem 260.3, Three dice, 260 18; Problem 261.3, Sums of powers, 261 18; Problem 262.4, Rational integral, 262 15; Problem 263.6, Simplification, 263 22; Problem 264.1, Lift off, 264 7; Problem 264.2, Tutte's Golden Identity [printed as 262.2], 264 12; Problem 264.4, Polynomial, 264 15; Problem 264.6, Semicircle dissection, 264 20; Problem 265.6, Triples, 265 21; Problem 266.4, Determinants, 266 18; Problem 267.2, Hanoi revisited, 267 17; Problem 267.3, Floor and ceiling, 267 17; Problem 267.5, Quadruples, 267 21; Problem 268.5, Factorization, 268 19; Problem 269.1, Random sequences, 269 1; Problem 269.2, Two rectangles, 269 2; Problem 269.7, Matches, 269 4; Problem 270.1, Pond, 270 1; Problem 271.1, Complex exponential sums, 271 13; Problem 272.3, Stamps, 272 19; Problem 272.4, Pseudoprimes, 272 19; Problem 272.6, Irreducible polynomials, 272 22; Problem 273.2, Square, split and add, 273 15; *Problems for Metagrobologists* by David Singmaster, 271 20; programmers, 159 15; Quasi-magic sudoku puzzles, 215 1; question, 159 15; Random quadratic equations, 204 22; Rational fundamental constants, 260 14; Re: Problem 184.9, States, 187 20; Re: Problem 188.1, Ones, 264 21; Re: Pythagorean triangles with prime leg and hypotenuse, 172 6; Recurring digital invariants, 163 19, 165 4; riddle, 160 23; Roll me over, 176 20; Rubik's Clock, 255 14; Six-region sudoku puzzles, 217 20; Six-region sudoku, 214 21; Slicing a torus in half, 204 10; Solution 147.1, Add one, 150 16; Solution 150.1 GCE powers, 152 19; Solution 157.2, Lottery dates, 161 21; Solution 158.1, 3000 bananas, 160 22; Solution 164.2, ABCD [unsigned], 167 25; Solution 168.1, Clock, 170 12; Solution 173.3, Square-free integers, 183 5; Solution 175.4, The first prime [wrongly called 175.3 in the Magazine but not in the Contents], 177 26, 179 22; Solution 176.3, Tricubic, 178 26; Solution 177.4, e in nine digits, 182 15; Solution 178.5, Reward a friend, 181 15; Solution 179.2, Four tans, 183 22; Solution 180.3, Fence, 182 16; Solution 182.2, Nine tarts, 184 26; Solution 182.3, Russian roulette, 184 24; Solution 184.7, Deux nombres, 189 4; Solution 186.3, Two hands, 238 13; Solution 186.4, Sixteen coins, 188 13; Solution 188.4, Sixteen tarts, 263 18; Solution 189.2, Brown eyes, 192 9; Solution 189.9, Magic square, 191 9; Solution 190.1, 50 pence, 195 10; Solution 190.2, Nested roots, 192 19; Solution 191.4, What's next?, 197 26; Solution 192.5, 16 Polygons, 195 9; Solution 192.6, 500 factors, 195 17; Solution 193.4, Factorial inequality, 196 20; Solution 194.2, Surface area of an ellipsoid, 197 1; Solution 197.6, 36 circles, 201 20; Solution 200.4, Bouncing ball, 203 14; Solution 202.1, Squaring the circle, 204

17; Solution 202.6, Prime sum, 206 7; Solution 203.5, 50p in a corner, 207 9; Solution 204.4, Ones, 212 16; Solution 209.4, Ladder, 212 13; Solution 210.1, Determinant, 251 11; Solution 210.2, Cosecs, 214 10; Solution 212.3, 100 seats, 217 14; Solution 213.2, e , 263 15; Solution 213.6, What is the number?, 216 8; Solution 213.10, Minor axis, 239 18; Solution 221.4, Eleven bottles, 227 18; Solution 222.4, Eleven, 252 8; Solution 226.6, Two bombs, 232 10; Solution 226.8, 999 nines, 232 8; Solution 228.1, Odd expression, 233 14; Solution 230.5, Cup-cake holder, 234 11; Solution 231.5, Four cos and four tans, 238 6; Solution 231.6, Three arctans, 240 11; Solution 232.3, Three degrees, 238 12; Solution 234.3, Fixed point, 237 16; Solution 235.2, Quartic roots, 237 8; Solution 235.3, Odd pairs, 252 7; Solution 236.1, Relationships, 250 7; Solution 238.1, Disc, 252 15, 17; Solution 240.1, Two tins of biscuits, 242 9; Solution 240.3, Double sum, 242 12; Solution 241.3, Four integrals, 247 7; Solution 241.4, Product, 244 7; Solution 241.6, Flagpole, 262 19; Solution 241.7, Multiplicative function, 243 15; Solution 242.1, Interesting integrals, 245 8; Solution 242.5, Coffee cup, 247 17; Solution 242.6, Three cylinders, 245 13; Solution 243.7, Circuit, 246 5; Solution 243.8, Pentadecagon, 247 9; Solution 244.5, Ten primes, 249 3; Solution 244.6, Flagpole integral, 258 8; Solution 245.4, GCSE question, 248 15; Solution 245.10, Every other day, 266 15; Solution 246.2, (It's a piece of) Cake, 249 7; Solution 247.1, $39/163$, 250 2; Solution 248.3, Integer triangles, 251 3; Solution 249.4, Radium, 251 15; Solution 250.3, Ellipsoid, 259 15; Solution 251.4, Four more towns, 254 12; Solution 251.6, Integer, 255 20; Solution 253.1, A Diophantine equation, 254 7, 256 6; Solution 253.7, Quintic roots, 255 19; Solution 254.4, Gaussian binomial coefficients, 258 5; Solution 254.6, Two octics, 259 9; Solution 255.3, Points of inflexion, 257 19; Solution 256.2, Three rational numbers, 266 7; Solution 256.5, Lost energy, 258 12; Solution 258.1, Battersea Power Station, 260 4; Solution 258.6, Kolmogorov Distance, 261 19; Solution 259.2, Triangle, 262 18; Solution 261.7, Integrals involving roots, 265 10; Solution 262.5, HH or TT, 264 19; Solution 268.7, Interest, 270 6; Solution 276.3, Floor and ceiling, 271 12; Solution 269.2, Two rectangles, 272 14; Solving sudoku puzzles mathematically, 209 16; surprise and delight, 251 13; Ten consecutive primes in arithmetic progression, 161 2; The \$2500 primality test coded, 157 13; The AGM and a formula for π , 261 12; the Horn of a (Mathematical) Dilemma, 173 29; The prime number theorem, 152 9; The Schur real zeros theorem, 230 15; Things that do not exist, 242 15; Titanic prime

quintuplets, 189 12; Towers: Hanoi, Saigon and beyond, 267 8;
 Tracks, 242 13; Trigonometric identities, 214 14; truncation, 271 19;
 Twelve tarts, 191 23; Twentyfive years of M500, 162 26; Two times
 five equals ten revisited, 247 18; useless prizes, 163 8; walk pictures,
 222 17; What prime is even?, 200 24; What's next?, 195 23; What's the
 next number?, 213 22, 232 15; Zoe's design, 209 25; π , 168 3
 Forbes, Zoe, Problem 184.9, States, 184 28
 Fork handles, Lily Dibb-Fuller, 241 21; revisited, Tony Forbes, 260 17
 formal mathematical definition, A, Nick Pollock, 180 20
 formatting your C: drive, 154 2
Formulae for Advanced Mathematics with Statistics Tables, 221 8
 Formulae, letter, Tony Huntington, 234 13
 Fortran IV, 267 20
 Forty years of M500, 250 17
 Forty, Eddie Kent, 194 21
 Forty-eight cubes, Tony Forbes, 181 2
 Forty-two revisited, Eddie Kent, 193 27
 Four bottles, 254 5
 Four Card Problem, The, Sebastian Hayes, 161 13, 241 1; Re:, letter,
 Sebastian Hayes, 242 16
 Four circles, Jeremy Humphries, 159 13
 Four coins, 182 21
Four Colours Suffice by Robin Wilson, Eddie Kent, 195 18
 Four cos and four sins, 231 15
 Four cylinders, 245 16
 Four fours, 216 19
 Four integrals, 241 15
 four legged table, 173 26
 Four logs, 253 17
 Four more towns, 251 5
 Four people, 174 22
 Four points and a square, 254 c
 Four points, Colin Davies, 183 23
 Four primes, 259 3
 Four roots, 190 29
 Four spheres and six planes, 262 c
 Four spheres, 177 11, 261 c
 Four sums, 253 17
 Four tans, 179 22 , 231 15
 Four towns, 251 5

Four-Post Tower of Hanoi Puzzle, 267 13
Fourteen cubes, 251 12
fourth perfect number, 260 20
Fowler, Malcolm, $1 + 1 = 2$, letter, 178 37
fractal bridge beam, A, 169 21
Fractal geometry, Barbara Lee, 178 33
Fractal music, Eddie Kent, 180 19
Fractal shapes, Sebastian Hayes, 181 4
Fractiles, letter, Dave Allaire, 172 17
Fraction, 168 21
Fractions, 271 20
FRACTRAN, 271 1
Frame, J. S. , 267 13
Frame--Stewart algorithm, 267 10
Franke, Jens, 226 18
Franklin, Geoff, Mathematics examinations through the years, 156 13;
 Two envelopes, letter, 184 19; Who needs ...?, 171 11
fraud, 151 5
fraying rope, 182 18
Freddy's third function, Colin Davies, 195 19
Free book, 216 3
free will, 214 1
French Academy of Sciences, 168 10
French are logical, The, Eddie Kent, 151 8
French Atomic Energy Commission, the, 168 14
French, A. P., & E. F. Taylor, *An Introduction to Quantum Physics*, 214 8
Frenicle, magic squares, 164 2
Freud, Clement, 171 18
Frisch, Otto, 154 12
Frisius, Gemma, *De Principiis Astronomiae & Cosmographiae*, 171 4
Fröberg, Carl-Erik, *Numerical Mathematics*, 159 6
Frolov, V. P., & A. Zelnikov, *Black Hole Physics*, 270 19, 271 12
From M500 39, Sue Davies, 184 29
Fromage frais, letter, Ralph Hancock, 231 19
Fruit cakes, Tony Forbes, 195 25
fruit pies, 152 11
Fry, Christopher, *Venus Observed*, 152 2
Fuller, Buckminster, maps, 164 19
Fun with Fourier, Robin Marks, 186 1
Fun with Pascal's triangle, Paul Jackson, 237 1

functional equation, A, Tommy Moorhouse, 266 8
 Functional inequality, 169 20
 Functions $f: \mathbb{N}^+ \rightarrow \mathbb{N}$, Tommy Moorhouse, 226 1
Funkerlied, 224 17
 Furner, Judith, Farewell Norma, 218 20; Statistics, 150 2; Winter Weekend
 experience 2011, 239 19
 Further observations on 242.2 Quintic, Tommy Moorhouse, 248 9
 Fusion, a new physics society, Paul Ruffle, 181 19
Gaberbocchus, 189 21
 Gage, Paul, GIMPS, 152 16
 Gale, Norman, root extraction program, 152 3
 Galilei, Galileo, quoted, 192 3
 Galileo, letters, 173 28, 175 37
 Gallian, Joe, 221 8
 Gallot, Yves, large prime, 165 14
 gambling fraud, 266 12
 game show, 150 20
 game show, The, Jeremy Humphries, 151 16
Gamer, The, 174 13
Games and Puzzles, 181 25
 gamma function, 202 2, 233 1
 Gamma function, 256 1
 Gangsta, Baby (B. G.), 221 12
 Garber, David, computing π , 168 3
 Garcia, Frank, *Marked Cards and Loaded Dice*, 174 14
 Garcia, Paul, Cups and downs, 184 1
 Gardiner, Simon, Solution 189.2, Brown eyes, 192 8
 Gardiner, Tony, quoted, 151 11
 Gardner, Martin, 166 18, 174 13, 202 3, 215 21, 248 14, 265 19; *Aha Gotcha*,
 154 2; *Mathematical Puzzles & Diversions*, 176 26; *Mathematical*
 Recreations, 223 19; *More Mathematical Puzzles and Diversions*, 152 5,
 150 18, 159 16; *New Mathematical Diversions from Scientific American*,
 156 7, 159 13; *Sixth Book of Mathematical Games*, 181 23
 Gardner, Martin, says, 166 18
 Gas Board, 255 10
 Gates, Bill, enough, 165 13; *The Road Ahead*, 177 19
 Gates, W. H., bound, 257 13
 Gauss, C. F., 272 6
 Gauss, C. F., *Disquisitiones Arithmeticae*, 158 20, 247 9
 Gauss, Carl, quoted, 192 3

Gaussian binomial coefficients, 254 13
 Gaussian elimination, 266 10
 Gaussian Pascal triangle, 258 3
 GCD, 225 14
 GCE powers, 150 22
 GCSE question, 203 17, 210 9
 Geard, Simon, Review of *StarOffice 5.1*, 171 10; Solution 150.1 GCE powers, 152 19; Solution 152.3, Pythagorean sevens, 154 21; Solution 164.2, ABCD, 167 25; Solution 168.2, 345 square, 170 19; Solution 186.5, Horse, 189 8; Solution 196.6, Pendulum, 199 23; Solution 197.5, Toilet paper, 200 21; Solution 199.3, Two tangents, 203 16; Solution 213.3, 100 seats, 218 8; Solution 213.8, Definite integral, 216 3
 Geertz, C., *The Interpretation of Cultures*, 156 12
 Gender in mathematics, Eddie Kent, 242 17
 genealogy, 202 16
 General formula for sums of powers, Sebastian Hayes, 183 16
 Generalized Fibonacci numbers, Tony Forbes, 203 6
 Generalized Mersenne primes, Tony Forbes, 165 20
 Generalized Principle of Relativity, The, Dennis Morris, 232 7
 generate all the primes, 271 1
Gentlemen's Magazine, 178 17
 Geochron clock, Home Planet, Andrew Pettit, 153 14
 geochron clock, The, 151 19
 Geochron world clock, The, Rob Evans, 219 1
 Geography, 158 19
 Geombinatorics, 257 20
 geometric probability, A problem in, Robin Marks, 199 1
 geometric progression, 167 1
 geometric theorem, A, 166 11
 George, Eddie, governor, 159 14
 Gerald Whitrow, Eddie Kent, 176 20; letter, Bryan Orman, 178 37
 Gerke, Stefanie, Problem 225.6, Triangulations, 225 18
 Germain, S., Remarque sur l'impossibilité de satisfaire en nombres entiers à l'équation $x^p + y^p = z^p$ (unpublished), 273 2
 Germain, Sophie, 253 14; 260 20; 272 6; her theorem, 211 17; prime pair, 165 14; [misprinted as Germaine], 253 14
 Germaine, Sophie: see Germain Gerwirth graph, The, 228 c
 Getting dressed, 194 28; again, 199 18; Robin Marks, 205 1
 Gevers, Helen, letter, 172 25
 Gibbs, Peter, constant filler, 180 18; *Polyhedra* by Peter Cromwell, 164 18

Gibson, Jack, Flies, 181 20
 Giddens, A., *New Rules of Sociological Method*, 156 12
 Gigantic prime triplets, Tony Forbes, 226 18
 Gillies, Nicola, *The Last Word*, 163 16
 Gilling, R. J. [see Gillings]
 Gillings, R., *Mathematics in the Time of the Pharaohs*, 247 2, 4, 251 20
 GIMPS project, 153 2, 160 1
 Gioia, Claudia, Problem 189.9, Magic square, 189 21; Problem 191.5,
 Another magic square, 191 24; Solution 192.6, 500 factors, 195 17
 Glassblower, from M500 16, 170 29
 glass-honey-bee problem, 159 19
 Gleick, James, *Chaos*, 171 21
 Glimpses of infinity, Jim James, 192 1
 gnomon, 196 5, 253 2
 Gnomon: $\sqrt{2}$ Ancient Greek calculator, The, Sebastian Hayes, 253 1
 Go, 164 24
 Goat, 190 20; John Spencer, 194 23
 Gockeler, M., & T. Schucker, *Differential Geometry, Gauge Theories and
 Gravity*, 227 6
 Godson, Richard, $3 + 4 + 5 = 6$, 161 9
 Golconda of golden numbers, A, Dennis Morris, 198 1
 Gold bars, 153 18
 Gold, Eddie Kent, 163 9
 Goldbach's Conjecture, 166 23
 Goldbach's conjecture, Eddie Kent, 175 33; Hugh McIntyre, 218 7; again,
 letter, Barbara Lee, 177 22
 Goldberg, Don, numbers, 152 7
 Goldberg, Lucianne, four-letter words, 166 13
 Golden Ratio pops out of 5-dimensional space, The, Dennis Morris, 221
 10
 golden ratio, 184 22, 198 1
 Golden Section, 154 5
 Goldschmidt, D. M., *Algebraic Functions and Projective Curves*, 213 15
 Golomb, Solomon W., *Polyominoes*, 152 4
 Golubitsky, Martin, 191 23
 Gomory's converse, 152 4
 Gondhawk, Sam, Solution 184.7, Deux nombres, 189 4
Goodbye, Descartes by Keith Devlin, M. E. Seeley, 156 11
 Goodstein, D. L., & J. R. Goodstein, *Feynman's Lost Lecture*, 197 24
 goodtimes virus, 154 15

googol, 215 20
 Gordon, Russell A., 201 5
 Gore, Ted, One-edge connections, 194 17; Re: Problem 182.6, n balls, 187 17; Solution 183.1, Three altitudes, 186 12; Solution 183.2, Fifteen objects, 185 11; Solution 183.3, Seven real numbers, 185 24; Solution 186.1, Polygon division, 188 19; Solution 189.8, 30 degrees, 192 23; Solution 190.6, Triangle, 193 11; Solution 197.1, Consecutive integers, 201 17; Solution 197.2, Consecutive cubes, 201 15; Solution 203.4, Cyclic quadrilateral, 208 15; Solution 212.1, Fibonacci numbers, 215 11
 Got all the gear?, 243 14
 Got where?, 169 20
 Gould, Gerald, 250 16
 Gould, Henry: <http://www.math.wvu.edu/~gould/>, 244 15
 Gould, Richard H., Solution 263.4, Arctan integral, 266 10
 Gould, Richard, Solution 241.4, Product, 244 7; Solution 245.2, Intersecting cylinders, 248 12; Solution 265.7, Population control, 268 16
 Gowers, Timothy, prizes, 177 25
 Gradients, 232 9
 Graham, Norman, Cubic equations Cardano's method, 230 5; Problem 206.3, Odd socks, 206 21; Problem 209.4, Ladder, 209 14; Problem 209.5, Duelling lovers, 209 15; Problem 215.5, Pins, 215 24; Problem 223.1, Mud, 223 13; Problem 223.2, Gun, 223 13; Problem 223.4, The arbelos, 223 19; Problem 224.1, Three rolling spheres, 224 9; Problem 224.2, Buried treasure, 224 14; Problem 224.3, Inspecting the column, 224 15; Problem 229.3, Harmonic triangle, 229 13; Quartics, letter, 230 6; Ramanujan's continued fraction, 218 16; Solution 191.2, LCM, 204 20; Solution 200.3, An arithmetic geometric mean, 208 22; Solution 203.1, Circles, 207 12; Solution 204.5, Circles [OK], 211 18; Solution 205.1, Sphere in a cone, 210 6; Solution 206.3, Odd socks, 218 14; Solution 209.5, Duelling lovers, 213 18; Solution 223.2, Gun, 229 7; Solution 223.3, Mud, 229 12; Solution 224.2, Buried treasure, 229 10; Solution 224.3, Inspecting the column, 227 19; Solution 226.4, Three squares, 230 1; Solution 228.3, Another arithmetic progression, 231 1; Solution 233.1, Hill, 238 7; Solution 233.2, Three secs, 238 11; Solution 233.3, Six tans, 240 6; Solution 233.4, Three tans, 238 6; Weighing tarts, 199 16
 Graham, R. L., 234 16
 Graham, R. L., D. E. Knuth & O. Patashnik, *Concrete Mathematics*, 244 14

Graham's number, 215 20, 234 16
 Gram(me) negative, 152 15
 Gram, Hans Christian Joachim, 151 12
 Grand Hazard, 266 13, 14
 Grand National Archery Society, 159 8
 Grandfather clock, 172 15
 Grandma, 225 15
 Granlund, Torbjorn, primes, 161 2
 Grannell, Mike, Referendum pie, 273 18
 Grant, Ian, Euclid's algorithm, 161 10; millionaire, 160 20
 Grantham, J., on pseudoprimes, 269 21
 Graph of $(\frac{1}{3} + i) e^{-17it} + \frac{1}{2} i e^{44it}$, 271 c
 graph of the truncated cuboctahedron, 269 c
 graph theory, 157 23
 graph, 213 19 graphs, 230 8
Graphs, Networks and Design, 273 20
 Graves, Robert, *Claudius the God*, 201 10
 Gravity inside a solid body, Michael Falcus, 157 3
 Grazing oxen, John Bull, 165 1, 169 23; Stephen Sparrow, 167 24
 Great Internet Mersenne Prime Search (GIMPS), 152 16, 158 2
Great St Trinian's Train Robbery, The, 164 16
 Greatrix, Ken, Solution 255.1, Elementary trigonometry, 257 10; Solution 258.1, Battersea Power Station, 259 14; "I'm even scoring in binary!", 266 19; A better protractor, 175 14; A curvature anomaly, letter, 174 28; A number puzzle, 166 1; anagrammatical concepts, 219 18; Archery, 159 8; Backward number words, 262 14; Courses , 181 20; Cyclones, 193 24; Cylinders, letter, 223 16; Exploring chaos, 171 21; Harmonic ratio, 192 27; infinite truth, 169 21; Integration of polynomial/exponential functions, 263 10; Latin squares: letter, 220 25; Lucas - who's he?, 163 4; M500 202, letter, 205 22; Mathematics in the kitchen-VIII, 239 10, 241 14; *One Million Places of π* by J. Guilloud & M. Bouyer, 170 23; Parity, letter, 241 13; Problem 169.5, A fractal bridge beam, 169 21; Problem 210.5, A monkey and a pole, 210 21; Quadrilateral, 176 23; Re: Mathematics in the kitchen-V, 228 13; Re: Solution 233.1, Hill, 242 7; Recurrence relations, 181 22; Recurring decimals, letter, 184 16; Sixteen matches, 174 26; Solution 166.1, A geometric theorem, 168 20; Solution 168.1, Clock, 170 11; Solution 170.3, Reciprocals, 175 24; Solution 172.4, Grandfather clock, 174 25; Solution 190.6, Triangle, 193 10; Solution 202.5, Interesting equality, 205 16; Solution 208.3, Concentric circles, 216 4; Solution 213.3,

Triangles, 216 10; Solution 240.1, Two tins of biscuits, 245 1; Solution 244.2, A quick number wonder, 248 11; Solution 246.2, (It's a piece of) Cake, 249 6; Solution 254.1, Four bottles, 256 12; The CDF of the Standard Normal Distribution, 249 12; The infinite truth, 169 21; The three squares problem, letter, 244 10; The Trachtenberg system, 172 20; The χ^2 distribution, 256 1; Tiling, 161 7; Trouble with infinity, 257 4
 greedy sequence of prime offsets, 267 6
 Green, Benny, 182 20
 Green, Garry, A combinatorial football problem, 244 1
 Greenroyd Bowling Club, 188 1
 Gregory numbers, 168 2
 Gregory, James, 204 1; *Vera Circuli et Hyperbolæ Quadratura*, 168 8
 Gregory's series, 168 8
 Gresham College, 184 20
 Gribenko, Dmitri, 226 19
 Griffiths, Jonathan, Solution 166.1, A geometric theorem, 168 20
 Griffiths, P. L., Mathematical Discoveries 1600--1750, 169 11
 Griffiths, Peter L., Fermat's Last Theorem and Pythagorean triples, 257 21; Fermat's Last Theorem, 169 8, 171 22; Leibniz's formula for π , letter, 236 14; Life expectancy -- the unprofessional calculation, 266 19; logarithms are hyperbolic after all, 272 18; Roots and the division of angles, 271 21; *The Calendar* by D. E. Duncan, 175 26; The Cotes formula has two square roots, 263 21; *Who Wrote the New Testament and Why?*, 175 27
 Griffiths, Peter, Composite numbers and sums of squares, letter, 241 13; Euler's Basel Problem, 267 18; Problem 187.6, Iteration, 187 22
 Griffith, C. H., designer, 267 16
 Griggs, Terry, A combinatorial football problem, 244 1
 Groceries, Peter Fletcher, 169 22
 Grommer, J., 165 12
 Grossman, M., 165 12
 Grossman, Wendy, *Man Ray: Human Equations*, 270 15
 Group cohomology: a simple set of examples, Tommy Moorhouse, 229 1
Guardian, 150 16, 160 17, 173 19, 174 15, 178 10, 15, 29
 Guedj, Denis, *The Parrot's Theorem*, Colin Davies, 177 24
 Guerrero, Nicolas, Problem 184.7, Deux nombres, 184 25
 Guess, 250 10
 Guilloud, Jean & Martine Bouyer, *Un Million de Décimales de π* , Ken Greatrix, 170 23

Guinness Book of Records, 170 23
 Gumaste, Datta, love, 180 29; morphasia, 169 25
 Gun, 223 13
 Gupta, R. C., values of π , 168 4
 Guy, R. K., Conway's prime producing machine, 271 7
 Guy, Richard, 226 7
 Hadwiger's Conjecture, Ian Adamson, 230 8
 Haig, M., *The Humans*, 27319
 hailstones, 162 2
 Hailstones, Ron Potkin, 204 4
 Hair, 273 11
 Haken, Wolfgang, colors, 195 18
 Hales, Stephen, *Vegetable Statics*, 156 8, 9, 161 9
 Hales, Thomas, packing, 156 8
 Hall, H. S., & F. H. Stevens, *A School Geometry*, 217 17, 219 15
 Hall, Ivor, Lightbulbs, 165 19
 Halmos, Paul, 192 1, 221 19
 Halsall, John, Magic squares, 167 22; Problem 162.1, Nine nines, 162 25;
 Problem 167.2, Cows, 167 27; Problem 168.3, Fraction, 168 21; Sixteen
 matches, letter, 172 16; Solution 162.1, Nine nines, 167 26; Solution
 167.2, Cows, 169 10
 Hamer, Peter, oracle of Bacon, 164 16
 Hamming, Richard Wesley, Jeremy Humphries, 182 22
 Hancock, Ralph, 151 12; Amazing object, 192 27; And another bicycle
 problem, 161 22; Arabic numbers, letter, 249 11; Balls in legs, 154 20;
 Biscuits, letter, 247 20; Calendar , 180 27; Cat-negative, 154 12;
 cereals, 160 16; Chimps, 183 23; Coins, letter, 209 25; Complex
 complex complex, 171 19; Countdown, 165 16; Counting in
 cuneiform, 153 9; De pharo eddystoniensi, 164 14; Deux nombres,
 190 27; Dizziness, letter, 204 24; Dodecahedra, letter, 185 16; Dr
 Panic's improved jam sandwich, 224 10; Dr Urban Panic's later
 adventures, 259 17; Find the missing terms, letter, 179 24; Fromage
 frais, letter, 231 19; Health and safety, letter, 205 23; Hyperbolic
 planes, letter, 239 13; Kiwi fruit, letter, 184 18; Korean mathematics,
 156 22; Laces, letter, 231 21; LEDs, 196 28; Legibility of numerals, 267
 14; letter, 272 17; letter, Coins, ships and docks, 246 15; letter, Library
 books, 164 21; lighthouse, 154 23; Limericks, 160 15; M500 184, 186
 25; M500 191, 195 25; M500 218, 220 23; More on -plexes, letter, 203
 23; Morse, 227 21; Panic strikes again, 236 15; Pea squeezing, 159 13;
 Phthongitates and epogdoi, 160 3; Pi, letter, 250 14; Pins, letter, 208

25; Problem 265.5, Telephone box, 265 21; Problem 271.3, Truncation, 271 19; Problem 271.5, Fibonacci's geese, 271 21; Proverbs, letter, 194 25; Rain, letter, 215 25; Re: M500 198, 200 28; Re: Monkeys and other tennis bicycles, 161 22; Re: Problem 234.1, Two ellipses, 237 13; Scarne, 268 20; Shannon entropy, 240 14; Solution 150.2, Hill climbing, 152 20; Solution 152.4, You can do it, 153 19; Solution 166.1, A geometric theorem, 168 17; Solution 169.1, Three people, 171 18; Solution 175.4, The first prime, 177 26, 179 22; Solution 176.2, Population, 178 32; Solution 180.3, Fence , 182 16; Solution 185.1, Three strings, 187 22; Solution 185.2, Two streams, 187 13; Solution 186.5, Horse, 188 12; Solution 187.3, Square wheels, 190 10; Solution 190.1, 50 pence, 195 10; Solution 197.5, Toilet paper, 200 21; Solution 209.4, Ladder, 212 13; Solution 258.1, Battersea Power Station, 260 7; Thirteen, letter, 188 26; Three people, letter, 174 27; Tongue-twisters and cakes, letter, 248 20; Toroidal planets, letter, 228 14; Towers of effort, 269 25; Tracks, 245 14; Was Plato joking?, 165 8; What is a solid, 160 12; What's next, letter, 202 23; What's next?, 197 28; Witnesses, 157 11

hands on science, 156 19

Hangman, 184 28, 187 20

Hanoi revisited, 267 17

Hansen, Martin, A very elementary proof [involving π], 164 5; Associated with every integer there is a group, 153 8; How to solve quadratics, 223 15; Natural number deviations, 151 15; Problem 228.2, Arithmetic progression, 228 16; Problem 244.2, A quick number wonder, 244 4; Revisiting Pascal's triangle, 221 1

hardness, 160 16

Hardy, G. H., & E. M. Wright, *An Introduction to the Theory of Numbers*, 183 5, 190 9 , 230 16, 231 14, 254 6

Hardy, G. H., 195 19, 202 1, 228 5, 272 6; *A Mathematician's Apology*, 232 16; Ramanujan, 267 19

Hardy--Littlewood conjecture / constant, 153 4

Hardy--Ramanujan number, 267 19

Harley, Robert, constant computed, 153 4

Harmonic quotients, 236 11

Harmonic ratio, 192 27

harmonic sequence, 173 3

Harmonic triangle, 229 13

Harnasz, Costel, John Fauvel, 181 1

Harries, Gareth, Cryptarithmic (mod 11), 157 20; Problem 157.4, Eleven squares, 157 22; Problems 90.1 to 90.3, 232 17; The antisocial club, 222 11

Harriot, T., *Artis analyticae praxis*, 158 20

Harrison, Ian, theme: The Geometry of Space and Time, 194 29

Harrison, John, 156 12

harmonic oscillator, 264 1

Hart, Sarah, reviewer, 271 13

Harvey-Jones, Sir John, mental arithmetic, 165 15

Hatcher, A., Algebraic Topology, 227 6

Hats, Eddie Kent, 181 24; Jeremy Humphries, 181 24; Nick Pollock, 178 22; Tony Forbes, 181 24

Have we done this?, 156 19

Hawking on theoretical physics, 214 2

Hawking, Professor, 169 20

Hayes, Sebastian, A curious definition of a real number, 212 10; *A New Kind of Science* by Stephen Wolfram, 235 1; A note on Pell's equation, 209 22; Addition, 184 25; Arabic numbers, letter, 251 20; Calculus universalis, 186 9; Causality and vitalism in mathematics, 214 1; Chords, letter, 176 27; Contra Cantor, 223 1; Coordinate representation of Euler algorithm, 204 18; Distances from the centroid, 180 23; Drawing the harmonic series, 208 1; Fibonacci numbers, 234 2; Finite and discontinuous, 193 14; Fractal shapes , 181 4; General formula for sums of powers, 183 16, Is there a Ramanujan problem?, 202 1; Leibnitz's Formula for π , 233 1; *Math Made Visual* by C. Alsina & R. B. Nelson, 216 21; Means on a circle, letter, 203 23; Multiples of eleven, 182 26; n -dimensional space--time, letter, 210 19; Non-commutative algebras and quantum entanglement, letter, 220 22; Notation for subsequencies, 154 10; Observations on Problem 182.7, 187 24; On the operator $L(x)$, 224 5; Pascal Triangle matrices - I, 173 1; Pascal Triangle matrices - II, 174 1; Pascal's triangle otherwise, 164 7; Problem 169.2, Chords, 169 19; Problem 172.3, Decagon, 172 11; Problem 172.6, Angle, 172 22; Problem 173.1, Binomial coefficients squared, 173 15; Problem 197.3, Cot series, 197 17; Problem 213.1, Pascal triangle sums, 213 17; Problem 216.2, Ramanujan's continued fraction, 216 9; Problem 217.2, Chords and regions, 217 17; Problem 230.2, Sum, 230 11; Problem 230.3, Magic, 230 11; Product of cosines, 208 20; Product of regular polygon chords, 208 24; Re: Fibonacci and all that, 206 14; Re: Problem 202.4, Commas and brackets, 206 20; Re: Sums of odd

numbers, 169 13; Re:The Four Card Problem, letter, 242 16;
 Relativity without c , 228 12; Relativity, 198 12; Rewriting
 subsequences, 162 22; Russian peasant multiplication, 243 1;
 Scepticism in mathematics, 205 10; Solution 148.3, Integers, 150 21,
 151 18; Solution 169.2, Chords, 171 12, 172 11; Solution 172.2, Chords
 again, 175 19; Solution 193.7, Binomial coefficients, 196 26; Solution
 201.1, Continued fraction, 205 13; Solution 226.4, Three squares, 232
 4; Solution 228.1, Odd expression, 233 14; Solution 228.3, Another
 arithmetic progression, 231 13; Solution 230.2, Sum, 237 11; Solution
 230.3, Magic, 237 12; Solution 248.1, Two theorems, 251 7; Sums of
 odd integers, 166 22; Sums of powers of chords (again), 189 16; The
 Ancient Egyptian number system, 247 1; The binomial coefficient
 ${}^{2m}C_m$, 189 15; The creation of irrational numbers, 186 14; The
 Fibonacci series and the golden section, 201 12; The Fibonacci series,
 187 1; The first irrational, 154 5; The Four Card Problem, 161 13, 241
 1; The Gnomon: $\sqrt{2}$ Ancient Greek calculator, 253 1; The Twins
 Paradox and related issues, 217 1; Time, 186 10; Transitivity, 150 10;
 Unique factorization, 175 36; What are real numbers and are they
 really real?, 196 1; What's in a theorem?, 210 1; *Where Mathematics
 Comes From* by George Lakoff & Rafael Nunez, 231 12; Who
 invented the zero, 156 2; Why does calculus work?, 185 1; Zero sum
 Pascal Triangle, 169 1

He keeps bob bob bobbin' along, Dave Wild, 273 20

Health and safety, letter, Ralph Hancock, 205 23

Health Department census, 194 9

heart leaps , 151 8

Heath, Thomas L., *A History of Greek Mathematics*, 253 1; Diophantus of
 Alexandria, 237 7

hedroid, 205 19

Heilbronner, E., crooked dice, 174 14

Helvétius, Claude-Adrien, *Brief of the Golden Calfe*, 163 9

Hemel Hempstead and Berkhamsted Gazette, 199 25

Henn, T. R., *The Apple and the Spectroscope*, 152 2

Hennessy, Martyn, Solution 172.1, 345 triangle, 174 19

Hensel lifting, 269 17

Heresy and surnames, letter, Colin Davies, 202 20

Herigone, P., *Cursus mathematicus*, 158 20

Herman, *Commentarii*, 158 20

Hermite--Lindemann theorem, 237 16

Heron of Alexandria, *Metrica*, 150 14

Heron's formula, 150 14, 251 1; Michael Plant, 152 9
 Heron's formula for computing square roots, 190 17
 Hess, Dick, 174 15
 Heywood, Percy, watch, 195 18
 HH or TH, 262 15
 Hide, Raymond, 31, 152 6
 Hiero II, 269 4
 Higher and higher mathematics, Bob Newman, 205 19
 Highest common factor, Colin Davies, 198 21; John Byrne, 201 21
 Highly irregular graphs, 266 5
 Hilbert, David, 192 5, 257 5; on mathematics, 214 2; *Geometry and the Imagination*, 233 1
 Hilbert's third problem, 164 19
 Hill climbing, 150 22
 Hill climbing, 150 22; Problem 150.4, 1 + 1, 150 22; Solution 148.1, A hornet's nest, 150 18
 Hill, 233 10
 Hill, I. D. voting, 243 21
 Hill, Richard, Lottery odds, letter, 173 28
 Hill, Robert, 151 15; Problem 150.2,
 Hilton, Peter, Derek Holton & Jean Pedersen, *Mathematical Reflections, In a Room With Many Mirrors*, Robin Wilson, 159 9
 Hip, hip, array!, Barry Lewis, 162 3
 Hippocrates of Chios, π exists, 168 4
 Hirschborn, Michael D., 221 8
 Hirst, Damien, everyday objects, 193 21
Histoire de l'Académie Royale de Science, 164 3
Historia Mathematica, 168 3, 272 13
 History of the Calendar, David Singmaster, 178 1
 history of time, A, David Singmaster, 171 1
 history of π , A, David Singmaster, 168 1
 HITAC, 168 15
 Hitler, photographed, 159 15
 Hobson, Nick, Clocks, 211 13; Solution 208.1, 3 ratios, 211 12; Solution 209.4, Ladder, revisited, 214 18; Solution 210.2, Cosecs, 215 22; Solution 211.4, Trigonometric product, 215 23; Solution 212.1, Fibonacci numbers, 215 11; Solution 212.7, Dice, 215 19; Solution 213.1, Pascal triangle sums, 216 1; Solution 213.5, Cubic, 216 11; Solution 213.6, What is the number?, 216 8; Solution 213.8, Definite integral, 216 3

Hockney, D., *Secret Knowledge*, 193 21
Hodges, Andrew, *Alan Turing: The Enigma*, John Lee, 174 21
Hodgkinson, Colin 'Hoppy', Balls, 153 18
Hoey, D., Recurring digital invariants, 163 21
Hoffman, Heinrich, photographs, 159 15
Hoffman, Mihael E., curvature, 163 3
Hoffman, Paul, *The Man Who Loved Only Numbers*, 170 24
Hofstadter, Douglas, 203 5
Hogben, Lancelot, *Mathematics for the Million*, 184 25
Holder, Basil, 175 38
Hole, letter, Ledger White, 164 23
Holliday, Judy, yawning, 268 20
Hollywood, 270 15
Home Planet by John Walker, 153 14
Honsberger, Ross, *From Erdős to Kiev*, 172 8
Hooke, Robert, *A Description of Helioscopes*, 171 6; *Animadversions*, 171 5
Hooke's Law, 264 1
Hopeless Student belief, the, 152 4
Hopf, Heinz, 257 20
Hoppus, Edward, tree girth, 253 16
Horizon, BBC, 158 23, 258 16
Horn of a (mathematical) dilemma, 173 c
Horses, David Singmaster, 191 20
hot when heated, 157 22
Hotel Hilbert, 257 5, 6
Hotels, letter, Ian Adamson, 228 15
House, letter, Tony Huntington, 164 23
How many graphs, 150 23
How stupid can you get, David Lang, 170 9
How the other half thinks, Dennis Morris, 203 10
How to do mathematical research, 264 17; J. J. Reynolds, 267 20
How to solve cubics, Tony Forbes, 202 18
How to solve inequalities, Tony Forbes, 243 16
How to solve quadratics, letter, Keith Driver, 228 14
How to solve quadratics, Martin Hansen, 223 15
How to solve quartics, Tony Forbes, 223 14
Howard, A. V., *Chambers's Dictionary of Scientists*, 161 9
Howard, Philip, number misunderstandings, 152 7; press gang, 175 28
Howlett, Brian, Solution 228.3, Another arithmetic progression, 231 13
Hoxinidno the Jew, *The Merciless Cormorant*, 164 21

Hsiaing, Wu-Yi, packing, 156 8
 Hua Loo Keng, *Introduction to Number Theory*, 213 23
 Hubble telescope, 238 5
 Hubble's constant, 158 17
 Hudson, John, Apes, 181 23; Big river, letter, 177 22; $\text{K}_{\text{L}}\text{yX}$: a typesetter, 175 30; Solution 179.3, Nine switches, 181 14; Solution 185.1, Three strings, 187 22; Why does calculus work?, letter, 188 23; Y2K and all that, letter, 175 37
 Huggett, A., & K. P. Tod, *An Introduction to Twistor Theory*, 227 6
 Hughes, D., Solution 242.4, Two sums, 244 14
 Hughes, David, Problem 198.1, Two knights, 198 8; Problem 198.2, Two students, 198 10; Solution 187.7, Task, 190 21; Solution 195.1, Two queens, 198 8
 Hulbert, John, Problem 180.1, Two questions about triangles, 180 10; Seven a side, 185 12
 Hume on free will, 214 1
 Humphries, Jeremy, 182 28, 29, 210 18, 222 11; a limerick, 178 41; a question, 191 11; awards, 260 13; Balls, 166 21, 199 28, 215 24; Banach Tarski anagram, 268 20; Big River, 175 34; Brain dead, 166 19; Complex complex complex, 169 22; credit card, 169 19; Deal or no deal, 210 17; Degrees, 165 17; disingenuousness, 167 23; dust sheet, 267 18; exams, 169 13; filler, 162 22; Flour, letter, 248 21; Four circles, 159 13; Gram(me) negative, 152 15; Hamming, 182 22; Hats , 181 24; heart, 201 10; Home Planet Benford's law, 153 7; In our time, letter, 250 14; Junk, 159 13; Leif, 169 7; Limerick, 158 12; limericks, 160 15; Mersenne matters, 152 16; Michael's apparatus, 151 12; Mondegreens, 222 19; More facts, 158 13; Palindromes in morse, 224 17; Pea squeezing, 161 9; per cent filler, 180 10; Photography, 159 15; Postman probability, letter, 249 10; Precision, letter, 210 20; Problem 160.3, Monkey, 160 23; Problem 164.4, 27 points, 164 25; Problem 173.2, Nine darts, 173 18; Problem 177.4, e in nine digits, 177 28; Problem 181.5, Five digits , 181 19; Problem 184.1, Twelve boxes, 184 8; Problem 185.1, Three strings, 185 9; Problem 194.5, Cube, 194 29; Problem 243.6, Piles of coins, 243 14; Problem 251.1, Increasing digits, 251 3; Pronunciation, 156 22; Questions, 151 8; quiz, 200 24; Rationality, 163 16; Re: Solution 164.3, Squares, 166 18; religion, 166 23; Runge, 162 21; Sentences, 211 21; separation, 164 16; snooker problem, 203 14, 20; some paradoxes, 152 10; Special Issue 1997, 154 11; supercomputer filler, 183 21; The bank job, 245 17; The game show, 151 16; The sonnet challenge, 152 2; too good to be true, 165 7;

under, 201 11; What do they mean?, 180 17; What's next, 199 26;
 Women drivers, 165 19; word problem, 200 11; Xmas quiz, 170 20
Hungarian Problems Book, 172 11
 Huntington, Tony [A. A.], 243 1; Solution 157.1, Monkey nuts, 160 18;
 Another letter from Doha, 160 7; Archeology, 226 15; engineers, 180
 9; Formulae, letter, 234 13; House, letter, 164 23; Letter from Qatar -
Fermat's Last Theorem, 159 14; Letters to the editor, letter, 160 17;
 Magic moments, 229 20; Numbers on swimming pools, 161 17; Oh,
 camel ye faithful, 161 23; Open University Challenge, 150 5;
 Probability, births and mojos that work II, 162 17; Problem 178.4,
 Palindromic birthdays, 178 32; Problem 191.1, Bee, 191 10; Puzzle
 generator, letter, 164 21; Russell's attic, 218 12; Snow and sausages,
 235 18; Solution 174.4, 32 pounds, 176 24; Solution 199.3, Two
 tangents, 203 16; The Petersburg paradox, 156 15; The speed of dark,
 225 19
 Huntley, H. E., *The Divine Proportion*, 198 7
 Hurwitz zeta function, 247 13
 Hurwitz, Alexander, 189 12
 Huygens, Christiaan, *Horologium Oscillatorium*, 171 5
 Hynam, Roger, illustration, 171 18
 hyperbolic circle, 171 c
 Hyperbolic Euler relations, Dennis Morris, 205 15
 Hyperbolic planes, letter, Ralph Hancock, 239 13
 hypergeometric distribution, 159 6
 Hyperplanes that meet at a common point, Tony Forbes, 262 6
 Hypersphere, 249 5
 Hypsicles, *On Rising Times*, 171 2
 I blink, 256 5
 I choose a number, 225 14
 ice cream cone, 172 c
 icosahedron graph, The, 238 c
 icosahedron, 184 22
 ideals, 213 14
IEE News, 156 19, 158 10, 165 20, 21, 166 20, 21, 184 10, 186 19, 21, 246 16
IEEE News, 164 4
 igNobel, 178 39
 Ignorance, Tony Forbes, 163 15; rewarded, letter, Phil Bowers, 164 24
Illinois Journal of Mathematics, 270 13
 Illinois University, 182 28
 I'm even scoring in binary!, Ken Greatrix, 266 19

imaginary number, 193 12
impossible structure, an, 150 1
In Our Time Radio 4, 199 14, 250 14; letter, Jeremy Humphries, 250 14
In the beginning, Eddie Kent, 156 18
In the Hilbert Hotel laundrette, Martin Cooke, 180 22
in your head, 156 23
Increasing digits, 251 3
Incredible identity, 174 23
Independent on Sunday, 159 4, 162 24
Independent, 150 2, 154 7, 158 11
Indiana and pi, 250 15
Indlekofer, Klaus-Heinz, large prime, 165 14
Induction, 268 7
Inequalities, letter, 196 28
Inequalities, Tony Forbes, 241 15
inexpensive dust sheet, an, from Jeremy Humphries, 267 18
Infinite exponentiation, 191 25
Infinite integral, 272 18
Infinite product, John Bull, 166 19
infinite series, 223 21
infinite truth, The, 169 21
Infopedia CD, 165 17
Information-age mathematics, Eddie Kent, 237 17
Inscribed ellipse, 199 25
Inspecting the column, 224 15
Inspecting the column, laces and a sequence letter, Roger Dennis, 230 7
Inspiration, Radio 4, 151 12
Institut Henri Poincaré, 270 15
Institute of Physics, 181 19
Integer density, 212 11
Integer logarithms and related zeta functions, Tommy Moorhouse, 220 1
Integer logarithms on finite fields, Tommy Moorhouse, 228 1
Integer partitions via differential equations, Tommy Moorhouse, 248 1
Integer partitions, Tommy Moorhouse, 254 1
Integer triangles, 248 11
Integer, 251 9
Integral, 217 17, 247 11, 248 14, 253 17, 258 19, 269 26
Integrals involving roots, 261 20
Integration of polynomial / exponential functions, Ken Greatrix, 263 10
Intelligent primality test offer, Oliver Atkin, 155 26

Interest, 268 22
interesting 31, 154 3
Interesting equality, 202 25
Interesting experiment, Tony Forbes, 188 18
Interesting integral, 170 14; 254 5
Interesting integrals, 242 4
Interesting representations of squares in base B , Bryan Orman, 239 1
Interesting series, 180 28
interesting, 150 9
interfered with, 158 13
International Latitude Observatory, 168 15
International Mathematics Olympiad, 199 25
Internet Magazine, 174 28
Internet Society Symposium on Network and Distributed Systems Security, 182
12
Intersecting cylinders, 245 7
intuitionism, 212 10
Inverse Symbolic Calculator, 153 4
inverse tan, 172 2
inverses of Pascal matrices, 173 1
Inversive geometry, 158 9
irascible genius, The, Eddie Kent, 180 16
Ireland, David, OU maths courses comparison, 169 22
Irrational numbers, 241 10
Irreducible polynomials, 272 22
Is there a Ramanujan problem?, Sebastian Hayes, 202 1
Isaiah, 171 2
ISO symbols, 246 1
Isosceles triangle, 265 20
Issue 264 - How to do mathematical research, J. J. Reynolds, 267 20
It's a mystery, 154 4
Italian-style dish, 253 17
ITERATE, 173 21, 23
Iteration, 187 22
It's a small world, Eddie Kent, 151 5
Jack is looking..., from Eddie Kent, 263 21
Jackson, Paul David, The Pell number 5, 231 4
Jackson, Paul, Fun with Pascal's triangle, 237 1; The class number and
Wilson's theorem, 225 12
Jacobson, Karl-Georg, 177 15

Jaffe, Arthur, prizes, 177 25
Jahresbericht der Deutschen Mathematiker-Vereinigung, 257 20
Jailhouse rock, 219 21
 Jakob von Uexküll, 188 23
 James, Jim, Mondegreens, 222 18; Problem 153.1, A not-so-obvious isomorphism, 153 18; Problem 160.1, A rational problem, 160 23; Problem 220.4, Biseptic, letter, 223 16; Solution 160.1, A rational problem, 162 20; Solution 179.5, Subtract square root , 181 8; Solution 182.7, Three cos and two sins, 184 15; Solution 183.3, Seven real numbers, 185 24; Solution 184.6, Limit, 186 21; Solution 185.4, Two sins, 187 18; Solution 186.1, Polygon division, 188 20; Solution 186.5, Horse, 188 12; Solution 201.1, Continued fraction, 205 13; Solution 201.2, Sine series, 205 14; The roots of unity, pt 1 - Fundamentals, 150 11; The roots of unity, pt 2 - Generalisation , 151 9; The roots of unity, pt 3 - Intermission, 152 12; The roots of unity, pt 4 - Convolution, 153 11; The roots of unity, pt 5 - Complications, 154 16; The roots of unity, pt 6 - Resolution, 156 4; Viète's infinite irrationable product, 176 8
 James, William, *The Meaning of Truth*, 168 13
 Japanese cars, 203 17
 Japper-wok, trans, Antti Rummukainen, 213 21
 Járai, Antal, large prime, 165 14
 Jarman, Lytton, a proof, 185 14; Circles & ovals, 152 18
 Jarry, A., 180 29
 Jigsaw, 204 9
 John Fauvel, Costel Harnasz, 181 1; Peter Baxandall, 181 2; Sidney Silverstone, 181 1
 Johnson, Dave, 167 17
 Johnson, Dr, on free will, 214 1
 Jones, Chris, What's next?, 203 5
 Jones, Claire G., *Femininity, Mathematics and Science*, 242 17
 Jones, Mr and Mrs Grover C., 160 13
 Jones, Steve, 250.14
 Jones, William, *Synopsis Palmariorum Matheseos*, 156 18, 158 20, 168 9
 Jos Leys, letter, Dick Boardman, 249 10
 Joseph, Ghevarghese, *The Crest of the Peacock*, 169 1
 Joshi, Miland, Solution 179.2, Four tans, 181 12; Solution 179.3, Nine switches , 181 14; Solution 182.7, Three cos and two sins, 184 14
Journal of Number Theory, 269 21
Journal of Recreational Mathematics, 162 21, 174 14, 177 15, 186 23

Journal of the Indian Mathematical Society, 204 17
 Julian Date Convertor, 268 15
 Julian day number, 268 14, 15
 Junk, Jeremy Humphries, 159 13
 Just an 8, 162 26
 Just desserts, Eddie Kent, 178 39
 K₁₉, 178 c
 K₂₅, K₃₃, K₄₁, K₄₉, K₇₃, K₉₇, 216 5
 K₃₉, 212 0
 K₄₉, 213 0
 K₆₅, 216 6
 K₈₁, 216 7
 Kadosh, Lior, 2⁰⁵, 162 21
 Kahan, William Morton, on π , 233 1
 Kahn, David H., *The Codebreakers*, 194 21
Kaleidoscope, 154 4
 Kali-Yuga, 178 5
 Kanada, Yasumasa, 153 2; pi, 151 8
 Kanigel, Robert, *The Man Who Knew Infinity*, 216 9, 218 16, 219 12, 232 16
 Kant, an a priori concept, 193 18
 Kaplan, Robert, *The Nothing That Is*, 176 15, 196 14
 Kaprekar numbers, 273 15
 Kasiski method, 194 20
 Kedge, Yvonne, wit, 169 24
Keep thou my way, 219 21
 Keller, Joseph B., 173 19, 174 14, 15
 Keller, Wilfred, Mersenne factoring, 268 19
 Kelly, Kevin, *Out of Control*, 241 3
 Kelly, the number 17, 152 7
 Kemeny's constant, 265 20
 Kempe, Alfred, chain, 195 18
 Kennedy, Benjamin Hall, *Revised Latin Primer*, 202 23
 Kennedy, Ludovic, *One Man's Mind*, 152 23
 Kent, Eddie, 196, 184 9; 31 and other special numbers, 152 6; A feasible time machine, 211 9; A new journal, 155 27; A new word, 172 22; A simple lever, 269 4; A supercomputer dies, 154 12; A word to the wise, 221 12; An artist encounters mathematics, 270 15; Apocalypse soon, 154 14; Balls, 153 18; barometer, 180 10; *Big Bang* by Simon Singh, 205 17; Birthday, 150 6; census, 194 9; Cycling lizards, 152 10; Dingbats, 212 14; Double lottery, 161 13; Education, 163 15;

Einstein's co-author, 165 12; Emma Lehmer – 100 not out, 213 16; Eudora Welty, 182 28; Facts, 158 11; Fermat's Last Theorem, a postscript, 162 16; *Fermat's Last Theorem* by Simon Singh, 160 9; *Fermat's Room*, 230 14; Five hats, 242 13; Forty, 194 21; Forty-two revisited, 193 27; *Four Colours Suffice* by Robin Wilson, 195 18; fourletter words, 166 13; Fractal music, 180 19; from M500 16, 170 29; Gender in mathematics, 242 17; Gerald Whitrow obiit, 176 20; Gold, 163 9; Goldbach's conjecture, 175 33; hailstones, 162 2; Hats, 181 24; heart and lungs, 166 14; idiotica, 166 25; In the beginning, 156 18; Information-age mathematics, 237 17; It's a small world, 151 5; Just desserts, 178 39; Kiwi fruit, 182 18; Laces, letter, 231 21; Large numbers, 215 20; Lottery, 167 28; M500 Special Issue, 200 29; married person looking, 263.21; Mathematical prizes, 154 11; Mental arithmetic, 165 15; monkey nuts, 160 18; Narayana's Cows, 240 16; nine matches, 172 23; Oliver Atkin obiit, 227 20; tiny particle, 169 20; plagiarist, 172 16; Powdered crabs, 158 17; Prime primes, 194 21; Problem 152.1, Crossword, 152 22; Problem 152.4, You can do it, 152 23; Problem 169.1, Three people, 169 7; Problem 182.1, Reverse and square, 182 8; Pronunciation, 232 16; *Proof* (2005), 211 16; *Quadratum Magia*, 265 18; relations, 194 19; Russell's attic, 214 19, 222 9; Seven a side, 183 21; shell found on beach, 172 24; Shorties, 268 19; Simon Singh, his book, 260 20; Sir James Lighthill, FRS, obiit, 165 16; Sixteen matches, 170 28; Skidoo, 238 17; Soap, 222 21; Solution 150.2, Hill climbing, 152 20; *Sophie's Diary* by Dora Musielak., 228 8; Space balls, 156 7; Squaring numbers, 241 12; Squawks, 179 28; Table of computations of π from 2000 BC to now, 159 2; Taxicabs and mathematics, 267 19; telephone Jack..., 189 10; The Abel Prize, 185 23; The allure of magic squares, 273 20; The end of an era - Paul Erdős, 152 8; The French are logical, 151 8; The irascible genius, 180 16; The powder of sympathy II, 156 12; The ruined gambler, 151 5; The Saint Petersburg paradox, 157 10; The state of π , 153 2; The topologist's dream, 218 7; Third year mathematics, 156 23; To what type, 155 27; Toilet paper, letter, 203 22; Triskaidekaphobia, 262 21; *Two Millennia of Mathematics* by George M. Phillips, 231 14; Units, 177 21; Voting in M500, 243 20; What is the next number?, 205 24; What's next?, letter, 210 20; Who wants to be another millionaire?, 177 25; Women in mathematics, 156 13, 232 14; Yutaka Taniyama, 160 10; π , 168 3

Kerr, David, Coins game, 160 11; Curtain rail, 161 8; Problem 162.2, Cat and dog, 162 26; Problem 189.4, 100 members, 189 14; Problem 189.6,

Three friends, 189 15; Problem 189.8, 30 degrees, 189 20; Problem 196.5, Three more friends, 196 24; Solution 148.1, A hornet's nest, 150 16; Solution 148.2, Standard deviations, 151 13; Solution 174.2, Incredible identity, 176 19; Solution 174.3, Eight wires, 176 18; Solution 174.5, Root 11, 176 6; Solution 182.5, Two £10 notes, 185 22; Solution 182.6, n balls [error: called 182.5 in 185], 185 20; Solution 183.1, Three altitudes, 186 12; Solution 183.2, Fifteen objects, 185 11; Solution 184.7, Deux nombres, 189 4; Solution 186.5, Horse, 188 12; Solution 187.7, Task, 191 14; Solution 188.2, Cylinder, 191 17; Solution 189.3, Amazing object, 192 12; Solution 191.1, Bee, 194 8; Solution 191.7, Sum and reciprocal, 194 10; Solution 194.2, Surface area of an ellipsoid, 197 3; Solution 195.1, Two queens, 198 8; Solution 196.5, Three more friends, 200 10; Three friends, 196 28

Kerr, Jane, A number puzzle, 162 2; Computer terminology, 165 13

Kershaw, D., spin, 174 15

Kessler, Ronald, *Khashoggi, The Story of the World's Richest Man*, 151 16

key exchange, 182 10

Khaleej Times, 160 7

Khayyam, Omar (Abdul-Fath Umar ibn Ibrahim al-Khayyami), 168 7; calendar, 178 13

Kida, Yuji, primes, 153 5

Kilminster, Devin, primes, 271 1

King Faisal International Prize for Science, 162 16

Kingman, John, 150 9

Kircher, Father, 158 17

Kirchhoff's first law, 197 10

Kirkman triple system, 195 28

Kirkman, Revd T. P., 195 27

Kiwi fruit, 174 25, 176 25; Eddie Kent, 182 18; Ralph Hancock, letter, 184 18; Brian O'Donnell, letter, 178 38; Tony Forbes, 227 11

Klein group, 151 3

Kleinjung, Thorsten, 226 18

K_LY_X: a typesetter, John Hudson, 175 30

Knauf, A., *Number Theory, Dynamical Systems and Statistical Mechanics*, 220 10

knight's-move magic square, 265 18

Knowledge, 168 12

Knuth, Donald E., 215 21, 246 9; T_EX – *the Program*, 177 19; *The Art of Computer Programming*, 170 24; upward arrow, 234 16

Koch curves, 181 5

Kolmogorov distance, 258 20
 Konforowitsch, A. G., *Guten Tag, Herr Archimedes*, 240 16
 Konhauser, Joseph D. E., Dan Velleman & Stan Wagon, *Which Way did the Bicycle Go?*, 177 15
 Kopel, Leslie Alan, Pythagorean theorem,, 156 18
 Korean mathematics, Ralph Hancock, 156 22
 Kraitchik, Maurice, *Mathematical Recreations*, 151 5
 Kronecker, Leopold, quoted, 192 5, 7
 Kumar, Manjit, *Quantum: Einstein, Bohr and the Great Debate*, 244 16
 Kuratowski and Wagner, 230 9
 Kurowski, Scott, 160 1, 226 19
 Kurtz, G. C., on primality, 269 21
 Kwok, Michael, 226 19 *kz* plotted, 263 *c*
 Laces, letters, 231 21; Ian Adamson, 230 7
 ladder problem yet again, The: Problem 204.9, 217 16, 17
 Ladder, 209 14
 Ladders, Robin Whitty, 219 20
Lady's and Gentleman's Diary, The, 195 28
 Lagrange, J.-L., 272 6
 Lagrangian function, 247 17; 271 10
 Lakoff, George, & Rafael Núñez, *Where Mathematics Comes From*, 234 14; Sebastian Hayes, 231 12
 Lam Lay-Yong, circle measurements, 168 3
 Lamb, Wilfred, Lottery odds, 165 18; Solution 157.4, Eleven squares, 159 17
 Lamport, Leslie, *LaTeX*, 177 19
 Landau, L. D., & E. M. Lifshitz, *Quantum Mechanics*, 259 3
 Lander, J. L., counterexample, 268 19; prime tuples, 153 6
 Landry, Fortuné, a discovery, 268 19
 Lang, David, How stupid can you get, 170 9
 Lang, Serge, *Undergraduate Algebra*, 213 15; *Algebra*, 241 17, 261 11
 langour, 171 24
 Langton spider, 171 21
 Laplace Transform, 246 3
 Large numbers, Eddie Kent, 215 20
 large prime numbers, 177 11
 Large prime quadruplets, Warut Roonguthai, 153 4, 158 15
 largest number, 257 9
 Lasky, Robert, 217 13
 last interview with Nabokov, The, Jeremy Humphries, 165 10

Last words, 238 5
 Late news, GIMPS finds largest known prime, 153 2
 $L^A T_E X$, 191 25
 Latin square puzzle, A, Tony Forbes, 218 18
 Latin square, 215 2
 Lauchenbacher, R., 272 13; FLT, 273 9
 Lawrence, Martyn, Films, 184 19; More moving points, 191 18; Problem 168.2, 345 square, 168 21; Problem 184.5, Triangles, 184 11; Solution 164.2, ABCD, 166 17; Solution 168.2, 345 square, 170 15; Solution 176.3, Tricubic, 178 26; Solution 184.5, Triangles, 186 17; Solution 187.3, Square wheels, 190 11
 Laws of Computing, 165 13
Lawyer, The, 166 19
 LCM, 191 10; Dick Boardman, 195 8
 LeBlanc, Antoine-Auguste, 272 6
 Ledermann, W., *Introduction to Group Theory*, 241 17, 261 11, 262 14
 LEDs, Ralph Hancock, 196 28
 Lee, Barbara, 199 20; British mathematics, letter, 184 20; Coins, ships and docks, letter 246 14; Complex complex complex, 172 21; Construction of the regular dodecahedron, 184 22; Decimal currency, 174 28; *e: The Story of a Number* by Eli Maor, 168 28; Fractal geometry, 178 33; Goldbach again, letter, 177 22; Heron's formula, 150 14; Lucas numbers, 165 11; Magic squares, 164 1; More lottery lines, 161 13; Notes on the history of mathematics, 161 3; Observations on Problem 171.2, $7n + 1$, 173 24; Perspective, 154 22; Problem 153.2, Gold bars, 153 18; Problem 162.3, Just an 8, 162 26; Problem 163.3, Prime multiplication, 163 19; Problem 180.5, Triangular tiles, 180 18; Problem 183.3, Seven real numbers, 183 22; Problem 196.2, Quadrilateral, 196 19; Six short problems, 159 19; Solution 162.3, Just an 8, 164 20; Solution 164.3, Squares, 166 18; Solution 168.3, Fraction, 171 16; Solution 169.1, Three people, 171 17; Solution 179.3, Nine switches, 181 14; Solution 189.3, Amazing object, 192 11; Solution 192.6, 500 factors, 195 17; Solution 249.4, Radium, 251 15; The rational hypotenuse, 150 7; *Trigonometric Delights* by Eli Maor, 188 17; Word games, 151 2; You couldn't make it up, 162 19
 Lee, John, *Alan Turing: The Enigma* by Andrew Hodges, 174 21
 Lee, Patrick, $a = b$, letter, 184 18; All the sevens, letter, 194 27; Cube, 167 17; Diophantine equations, 163 14; Moving point, 192 20; Problem 189.7, All the sevens, 189 17; Rates again, 191 21; Solution 168.2, 345

square, 170 19; Solution 182.7, Three cos and two sins, 184 15;
 Solution 189.7, All the sevens, 192 13; Solution 199.3, Two tangents,
 203 16
 Legendre, Adrien-Marie, *Elements de Géométrie*, 168 11; [*Recherches sur
 quelques objets d'Analyse ...*], 272 6
 Legibility of numerals, Ralph Hancock, 267 14
 Lehmer, D. H., primality, 172 6
 Leibnitz's Formula for π , Sebastian Hayes, 233 1
 Leibniz, 204 1
 Leibniz's formula for π , letter, Peter L. Griffiths, 236 14
 Leibniz's rules for a certain function ring, Tommy Moorhouse, 236 16
 Leibniz's series, 168 8
 Leif Erikson pun, 169 7
 lemniscate, 183 6
 length of a river, 160 9
 Leonardo da Pisa, *Liber abaci*, 158 20, 247 3
 letter frequency, 194 20
 Letter from Qatar -- *Fermat's Last Theorem*, Tony Huntington, 159 14
 Letters to the editor, letter, Tony Huntington, 160 17
 Leveson Gower, 160 15
 Levin, Eugene M., loaded dice, 174 13
 Lewis, Barry, 173 8, 9, 178 24; A Cool Operator, 168 22; A mathematical
 pursuit, 170 1; Complex geometry, 175 1; Exploring Chaos, 169 14;
 Hip, hip, array!, 162 3; Problem 172.2, Chords again, 172 10, 11;
 Problem 174.5, Root 11, 174 26; Problem 175.1, Nested roots, 175 23;
 Problem 175.2, Reciprocal inequalities, 175 28; Problem 175.3, Series
 squared, 175 28; Problem 175.5, abc, 175 35; Problem 178.7, Series,
 178 40; Problem 179.6, Root 11 again, 179 27; Solution 169.2, Chords,
 171 14, 172 10; Solution 170.1, Interesting integral, 172 13; Solution
 174.5, Root 11, 176 7; Sums of Powers, Again, 167 1; Through the
 looking glass, 158 3
 Lewis, Carl, athlete, 151 20
 Lewis, Mike, Problem 258.6, Kolmogorov distance, 258 20; problem
 suggestion, 269 3; Solution 191.7, Sum and reciprocal, 194 12;
 Solution 243.7, Circuit, 246 1; Solution 244.2, A quick number
 wonder, 248 10; Solution 244.5, Ten primes, 249 1; Solution 245.10,
 Every other day, 268 14; Solution 256.5, Lost energy, 258 12; Solution
 260.3, Three dice, 266 12
 l'Hôpital's rule, 248 4
 Library books, letter, Ralph Hancock, 164 21

Lies, damned lies & statistics, Andrew Pettit, 173 25
Life expectancy--the unprofessional calculation, Peter L. Griffiths, 266 19
life, 219 19
Lift off, 264 7
light-bulb, 243 21
Lightbulbs, Ivor Hall, 165 19
Lighthill, James, polymath, 167 27
lighthouse, 154 23
Limerick, Chris Pile, 158 12; Jeremy Humphries, 158 12; Mark McCluney,
158 12; Ralph Hancock, 160 15
Limit, 270 1
Linderholm, Carl, *Mathematics Made Difficult*, 152 8
Lindsay, Colin, solutions, 158 11; Rebus, 161 17; answer, 162 21
Linker, Elliott (Slide Rule), 163 3
lipogram, 151 2
Lipstick on your collar, 151 8
Liskeard, 173 26
literature, 172 15
little heresy, A, Dick Boardman, letter, 198 22
Lloyd, Christopher (ed), *The Sunday Times Book of Answers*, 178 18
LMS Journal of Computation and Mathematics, The, 155 27
Log 12, 231 3
Log cot integral, 264 20
logarithm base problem, 204 21
logs, 237 7
London Mathematical Society Newsletter, 151 12, 152 4, 153 3, 154 21, 159 8,
156 12, 164 20, 231 14, 260 20, 271 13
London Mathematical Society Popular Lectures 2001, 179 23
London Mathematical Society, 160 10, 197 9, 243 20
Long live geometry, Rob Evans, 202 12
Longitude Act 1714, 156 12, 171 6
Loops, 203 20
Lopez, Jose, heart and lungs, 166 14
Lord, Peter, Sundial, letter, 184 20
Lord's commentary, quoted, 156 20
Lost energy, 256 17
Lottery ..., letter, David Evans, 164 22; [lottery odds]... Again, letter,
John Bull, 164 22; [lottery]... Odds ..., letter, Alan Slomson, 164 22
lottery as taxation, 175 38
Lottery dates, 157 21

Lottery guarantee, 178 27
 lottery odds, 159 3
 Lottery odds, 165 18; letters, 173 28, 175 38
 lottery survey, 153 7
 Lottery tickets, Tony Forbes, 257 1
 Lottery, Eddie Kent, 167 28; letter, Colin Davies, 170 28 Lovett, Beryl, ...
 and back again, 161 6
 Lucas - who's he?, Ken Greatrix, 163 4
 Lucas numbers, Barbara Lee, 165 11
 Lucas, 269 5
 Lucas, Édouard, demonstration, 268 19
 Lucas, Edward, 165 11
 Lucas, Paul, met a dervish, 163 9
 Lucas--Lehmer test, 158 2, 165 20
 Luck, Martin, re-numeration, 177 16
Lucy in the sky with diamonds, 219 21
 Luftwaffe, 246 5
 Luhn, Norman, 189 12; prime k-tuplet, 270 21
 lunch, 233 7
 Luxmoore-Peake, Hugh, Solution 226.7, Squaring the circle, 230 12
 Lygeros, Nik, Ten consecutive primes in arithmetic progression, 161 2
 Lynch, Vincent, Coins, ships and docks, letter, 246 14; Equation, 261 19;
 Problem 253.1, A Diophantine equation, 253 13; Problem 262.2, Digit
 sum ratio, 262 14; Solution 239.1, Three coins, 243 17; Solution 241.6,
 Flagpole, 244 16; Solution 242.1, Interesting integrals, 245 9; Solution
 242.2, Quintic, 244 13; Solution 244.1, Elementary trigonometry, 258
 20; Solution 245.6, Quintic, 248 14; Solution 246.2, (It's a piece of)
 Cake, 249 7; Solution 247.1, 39/163, 250 2; Solution 247.3, Balls, 250
 5; Solution 251.2, Thirteen boxes, 254 18; Solution 252.2, Can, 254 19;
 Solution 253.1, A Diophantine equation, 254 6; Solution 253.2,
 Quadratic, 255 6; Solution 253.5, Integral, 255 15; Solution 253.7,
 Quintic roots, 255 19; Solution 268.1, Two triangles, 270 5; Solution
 268.5, Factorization, 270 19; Solution 268.7, Interest, 270 7
 Lyons, Louis, *All You Wanted to Know About Mathematics, but Were Afraid
 To Ask*, Don Swan, 156 9
 M_{22} graph, 221 c
 M_{67} , 268 19
 M500 156, Re., Chris Pile, 158 10
 M500 170
 M500 184, letter, Ralph Hancock, 186 25

M500 189, Bob Margolis, 191 22
M500 191, Ralph Hancock, 195 25
M500 194, 196 29
M500 198, letter, Re:, Ralph Hancock, 200 28
M500 202, letter, Ken Greatrix, 205 22
M500 218, letter, Ralph Hancock, 220 23
M500 Special Issue, Eddie Kent, 200 29; letter, Richard Woolf, 177 23
M500, Dave Cartwright, 171 20
Macclesfield Express, 201 11
Macdonald, Angus, Bert, Ben and Bill problem, 199 29
Mach, Ernst: his principle, 158 16
MacHale, Des, *Comic Sections*, Don Swan, 156 10; circle intersection, 262 10
Machin, John, an identity, 168 9
Machin's formula, 236 11, 261 16; Brian Orman, 204 1
MacKean, Jill, letter, 172 25
Maclenan, Malcolm, Solution 174.3, Eight wires, 174 24, 176 18; Solution 177.1, Eight cubes, 179 21
Macmillan Encyclopedia, 156 7
Magic Moments, Tony Forbes, 229 21
Magic moments, Tony Huntington, 229 20
Magic square, 189 21
magic square, 215 1
magic squares, 265 18
Magic squares, John Halsall, 167 22
Magic, 230 11
magidoku, 215 1
Mahabharata, 168 5
Mahatma's triangle, 177 16
Mail on Sunday, 262 14
Maistrov, L. E., *Probability Theory*, 174 13
Major, Eli, *Trigonometric Delights* [this clearly should be Maor], 214 13
Mallat, Stephane, *A Wavelet Tour of Signal Processing*, 193 9
Man Ray – Human Equations, 270 15
Mandelbrot, 156 23
Mandelbrot, Benoit, *The Fractal Geometry of Nature*, 181 4
Mandelbrot, Eddie Kent, 264 18
Maor, Eli, *e: The Story of a Number*, Barbara Lee, 168 28; *Trigonometric Delights*, 210 2, 214 13; *Trigonometric Delights*, Barbara Lee, 188 17
Marbles and fruit, 220 20

marbles, 245 9
 March March march, 171 19
 Marchant, David, Solution 241.7, Multiplicative function, 247 13
 Margolis, Bob, Fermat's Last Theorem, 170 25; M500 189, 191 22; Solution
 204.2, Surface area of a torus, 206 12; TeX, 177 18
 marking schemes, 205 15
 Markov chain, 182 8
 Marks, 205 15
 Marks, letter, Ron Potkin, 194 28
 Marks, Robin, 15-gon, 193 0; A problem in geometric probability, 199 1;
 Dot products and determinants, 193 1; Fun with Fourier, 186 1;
 Getting dressed again, 205 1; Paradoxical dice, letter, 204 25; Pascal's
 pyramid, 175 16; Pascal's pyramid, Pascal's hyperpyramid and
 Pascal's line, 177 1; Recurrence relations, 179 1; Solution 181.4, Four
 points, 189 1; Solution 186.1, Polygon division, 188 22; Solution
 190.6, Triangle, 193 11; Solution 192.5, 16 Polygons, 195 9; Solution
 194.4, Two boxes, 200 1; Solution 232.5, Three points on a cuboid,
 238 9; Solution 233.5, Croquet, 240 1; Solution 233.7, Cyclic
 quadrilateral, 238 14; Solution 234.1, Two ellipses, 237 14; Solution
 238.4, Wednesday's child, 242 7; Solution 258.1, Battersea Power
 Station, 260 1; The mathematics of bowls and marbles, 188 1; The
 order 2×3 recurrence relation, 183 1; What's next?, 197 29
Married, Single, Other, ITV, 250 7, 236 8
 Martin, Marcel, primality, 270 21
 Martin, Paul, editor, 165 16
 Mascheroni, L., *La geometria del compasso*, 180 15
 Maslanka, Chris, 199 24
Massachusetts Bar Association Lawyers Journal, 157 11
 Matches, 269 4
 matchstick (assisted freshness), 172 18
Math Horizons, 168 3
 MATHCAD [many, not individually noted], 173 21
Mathematica Scandinavica, 199 11
Mathematica Slovaca, 209 25
 MATHEMATICA, [many, not individually noted], 202 18, 271 13, 19
Mathematical Association of America Mathematics Magazine, 201 5
Mathematical Gazette, 168 13, 173 19, 174 13, 189 12, 221 8
Mathematical Intelligencer, 265 19
 Mathematical Notation, Martin Evans, Tony Forbes, Tony Wenham, 158
 20f

Mathematical prizes, 153 3; Eddie Kent, 154 11
mathematical pursuit, A, Barry Lewis, 170 1
mathematical research, 264 17
mathematical result, a, 259 12
Mathematical Spectrum, 204 18, 265 18
mathematician, a, 178 32
mathematicians, 191 21
Mathematics examinations through the years, Geoff Franklin, 156 13
Mathematics in the garden, Tony Forbes, 224 8
Mathematics in the kitchen-II, Tony Forbes, 190 28; Mathematics in the
kitchen-III, 197 19; Mathematics in the kitchen IV, 203 21;
Mathematics in the kitchen-V, Tony Forbes, 225 9; Mathematics in
the kitchen-V, Re:, Ken Greatrix, 228 13; Mathematics in the
kitchen-VI, Tony Forbes, 228 17; Mathematics in the kitchen VII,
Tony Forbes, 232 12; Mathematics in the kitchen-VIII, Ken Greatrix,
239 10, 241 14; Mathematics in the kitchen-IX, Robin Whitty, 251 21;
Mathematics in the kitchen-X, Tony Forbes, 268 3
Mathematics Magazine, 168 3; 271 7
mathematics of bowls and marbles, The, Robin Marks, 188 1
Mathematics of Computation, 170 24, 172 6, 269 21
Mathematics Review, 178 13
Mathematics Teacher, 168 3
Mathematische Annalen, 168 12
mathfest.com, John Bull, 175 39
Matousek, J., & J. Nešetřil, *Invitation to Discrete Mathematics*, 197 5
Matrix functions and polynomials, Tommy Moorhouse, 252 1
Matrix operations on a number grid, Dennis Morris, 234 8
Matrix, 235 17
Matzke, Edwin, packing, 156 9
MAXIMA: a free symbolic algebra package, Dick Boardman, 210 10
Maximum Brocard angle, comments, 195 12
Maxwell, Diana, What's the next number?, 207 18
Mayer, W., 165 12
McCarthy, Tara, *Been There, Haven't Done That – A Virgin's Memoir*, 156 12
McCluney, Mark, 151 12; Bits and bobs, 154 3; Finnish and other lingual
themes, 150 23; Limerick, 158 12; Mysterious things, 150 13; **Special
Issue** points, 150 5
McDonnell, Francis, letter, Coins, ships and docks, 246 15
McEnroe, John, *Serious*, 201 10
McGuire, Gary, 246 15

McHale, Des, error for MacHale
McIlroy, Jim, Solution 176.3, Tricubic, 178 26
McIntyre, Hugh, Goldbach's conjecture, 218 7; Riddles, letter, 214 20;
 Solution 209.4, Ladder, 212 14
McKean, Henry, & Victor Moll, *Elliptic Curves*, 199 23
McKibbon, Patrick W., 226 19
McLean, R. Robin, 174 15
McLeish, J. *Number*, 247 5
McMullin, Lin, The quartic and the golden mean, 240 15
McShane, Rudolph, trachtenburg translator , 172 22
MDCLXVI, 173 26
Mead, Larry, 175 29
mean, 208 1
Means on a circle, letter, Sebastian Hayes, 203 23
means, 201 1; means, 271 20
median, 204 14
Meehan, Patrick, Developing a fractal program for a T183 calculator , 180
 1; Recurrence systems using the T180 calculator, 173 21
Meek's method, 243 20
Mekon, 250 14
MELCOM, 168 15
Mellon, Jimmy, Solution 221.4, Eleven bottles, 227 16
Meng, Z., bound, 257 13
Menger sponge, 171 21
Mengoli, Pietro, *Novae Quadraturae Arithmetica*, 221 3
Menninger, Karl, *Number Words and Number Symbols*, 156 3
menopause, 204 19
Mensa Magazine, 154 4
Mental arithmetic, Eddie Kent, 165 15
Mercator, 151 19
Mercier, Nigel, Find the missing terms, letter, 179 24
mersennary, 171 11
Mersenne matters, Jeremy Humphries, 152 16
Mersenne Newsletter, 152 16
Mersenne number, 268 19
Mersenne prime, 158 2
Mersenne primes, 189 12; listed, 165 21
Mersenne, Marin, *Cogitata physico-mathematica*, 268 19
Messerschmidt, Reinhardt, Solution 188.1, Ones, 268 8; Solution 236.2,
 Series, 243 12; Solution 238.3, Sums, 251 17; Solution 243.3, Odd

sequence, 248 8; Solution 244.2, A quick number wonder, 248 11;
 Solution 245.5, Numbers, 248 16; Solution 250.4, Divisor sum, 256 14;
 Solution 250.9, Product, 254 19; Solution 251.1, Increasing digits, 254
 17; Solution 257.4, Tracks, 259 13; Solution 259.5, Two darts, 260 8;
 Solution 260.1, Iterated trigonometric integral, 265 17; Solution 261.4,
 Projectile, 265 14; Solution 261.7, Integrals involving roots, 265 8;
 Solution 262.5, HH or TT, 264 19; Solution 263.2, Sequences, 269 22
 Metcalf, Sally, Solution 220.1, Marbles and fruit, 224 18
 Metonic cycle, 178 3, 5, 8, 11
 Michael's apparatus, Jeremy Humphries, 151 c, 12
 Mihailescu, Preda, 189 12 Millennium, letters, 172 18, 174 27
 Miller, Lee, photographer, 270 15
 Milliard, Colin Davies, 181 21
 millihelen, 184 19
 Millington, Jon, *Curve Stitching*, 211 14
 mincemeat, 193 25
 Mindaugas, translator, 165 8
 minimum 50%, 239 13
 Minor axis, 213 24
Mishnat Ha-Midot, 168 5
 Missouri State University, 262 14
 mistakes, 207 18
 Mitchell, Gordon, Drips, 154 22
 Miura, Robert M., linearizer, 258 11
 Möbius muff, 159 9
 Möbius, 206 9
 MOBNET, 174 15
Model Engineer, 189 14
 Model railways, Tony Forbes, 183 20; letter, Chris Pile, 185 15
 Modular equation, 247 20
 Moll, Victor, Problem 236.5, Harmonic quotients, 236 11
 Mondegreen, Lady, 219 21
 Mondegreens, 219 21, 222 18, 19
 money game show, 245 17
 Monica, 166 13
 monkey and a pole, A, 210 21; reinterpreted, 223 18, 19
 Monkey-nuts, 157 21
 Monkeys and other tennis bicycles, Re:, Ralph Hancock, 161 22
 monkeys and typewriters, 173 25

Montucla, Jean-Etienne, *History of Mathematics*, 228 9; *Histoire des recherches sur la quadrature du cercle*, 168 10

Moon, Steve, 'mutually touching finite cylinders', 257 11; Solution 184.4, Three real numbers, 246 16; Solution 198.4, Determinant, 241 20; Solution 199.3, Two tangents, 203 16; Solution 200.2, Square with corner missing, 204 19; Solution 200.4, Circle in a box, 209 8; Solution 200.5, Bouncing ball, 203 12; Solution 201.2, Sine series, 205 14; Solution 202.2, Five spheres, 221 18; Solution 203.3, The puzzled hotelier, 225 16; Solution 204.1, Jigsaw, 215 16; Solution 204.7, Arctangent identities, 250 11; Solution 205.4, abc, 209 15; Solution 207.2, Parts of a partition, 210 13; Solution 207.4, Sextic, 210 13; Solution 208.1, 3 ratios, 211 12; Solution 209.3, $x^y + y^x$, 221 20; Solution 209.4, Ladder, 212 12; Solution 210.1, Determinant, 251 10; Solution 210.4, Coal, 222 12; Solution 210.5, A monkey and a pole, 223 18; Solution 211.2, Pond, 216 16; Solution 211.5, Product, 233 15; Solution 212.1, Fibonacci numbers, 215 11; Solution 213.2, e , 263 14; Solution 213.5, Cubic, 216 11; Solution 213.6, What is the number?, 216 8; Solution 215.2, Three angles, 233 16; Solution 215.5, Pins, 255 1; Solution 216.3, Reflection, 221 9; Solution 217.6, Triangle, 241 11; Solution 218.4, Repeated differentiation, 220 17; Solution 219.1, Walk, 222 16; Solution 219.3, Circumcircle, 224 12; Solution 221.3, Six tans, 264 8; Solution 223.2, Gun, 229 5; Solution 223.3, Factorization, 226 14; Solution 224.1, Three rolling spheres, 227 14; Solution 224.2, Buried treasure, 229 10; Solution 224.3, Inspecting the column, 227 19; Solution 224.4, Integers, 246 20; Solution 226.4, Three squares, 231 8; Solution 226.5, Three circles, 233 8; Solution 227.7, Pentagonal numbers, 231 16; Solution 228.3, Another arithmetic progression, 231 13; Solution 229.3, Harmonic triangle, 257 14; Solution 230.4, Tanks, 233 12; Solution 230.5, Cupcake holder, 234 10; Solution 231.1, Log 12, 257 16; Solution 231.2, 45 degrees, 241 9; Solution 231.6, Three arctans, 240 11; Solution 232.4, Gradients, 246 6; Solution 232.7, Zero, 239 17; Solution 234.2, Series, 251 11; Solution 234.4, Tetrahedron, 240 8; Solution 235.3, Odd pairs, 252 6; Solution 236.2, Series, 239 16; Solution 236.4, Real function, 240 7; Solution 236.6, Products, 244 12; Solution 237.5, Another sum, 240 13; Solution 238.1, Disc, 252 15; Solution 241.3, Four integrals, 247 7; Solution 242.5, Coffee cup, 247 14; Solution 242.6, Three cylinders, 248 18; Solution 243.2, Cosh integral, 259 12; Solution 244.3, Two sums, 249 8; Solution 244.4, Another product, 249 16; Solution 244.6, Flagpole integral, 258 6; Solution 246.2, (It's a piece of) Cake, 249 7; Solution 246.6, Loop, 250

1; Solution 248.1, Two theorems, 251 6; Solution 248.3, Integer triangles, 251 2; Solution 248.4, Integral, 251 4; Solution 252.1, Three pieces, 260 18; Solution 254.2, Interesting integral, 259 4; Solution 255.3, Points of inflexion, 257 18; Solution 259.2, Triangle, 262 16; Solution 259.4, Double integrals, 261 1; Solution 260.1, Iterated trigonometric integral, 264 18; Solution 260.2, Right-angled triangle, 264 10; Solution 261.7, Integrals involving roots, 265 10

Moore, Patrick, 182 17

Moorhouse, Tommy, A card trick, 246 18; A differential equation on the integers, 236 12; A quantum mechanical treatment of a sloping potential well, 259 1; A quotient group of \mathbb{Q}^{241} , 241 16; Analogies between $Z(s)$ and $\zeta(s)$, 224 1; Charged particles close to a modestly charged black hole, 271 8; Functions $f: \mathbb{N}^+ \rightarrow \mathbb{N}$, 226 1; Further observations on 242.2 Quintic, 248 9; Group cohomology: a simple set of examples, 229 1; Integer logarithms and related zeta functions, 220 1; Integer logarithms on finite fields, 228 1; Integer partitions via differential equations, 248 1; Integer partitions, 254 1; Leibniz's rules for a certain function ring, 236 16; Matrix functions and polynomials, 252 1; More identities involving partitions of an integer, 256 10; Prime partitions: an asymptotic result, 242 1; Problem 220.1: Marbles and fruit, 220 20; Problem 222.1, Rectangle construction, 222 7; Problem 236.2, Series, 236 9; Problem 252.3, Quadratic triangles, 252 5; Short exact sequences and group extensions, 261 10; Solution 216.2, Ramanujan's continued fraction, 219 12; Solution 220.1, Marbles and fruit, 224 18; Solution 225.1, Toroidal planet, 229 16; Solution 236.5, Harmonic quotients, 239 8; Solution 237.2, Arctan sum, 241 18; Solution 237.5, Another sum, 240 13; Solution 242.1, Interesting integrals, 247 11; Solution 242.2, Quintic, 248 8; Solution 242.4, Two sums, 245 4; Solution 244.4, Another product, 247 12; Solution 247.2, Integral, 250 8; Solution 250.1, Quadratic sum, 252 12; Solution 250.7, Bernoulli numbers, 253 14; Solution 250.9, Product, 252 10; Solution 253.2, Quadratic, 254 20; Solution 253.6, Four sums, 255 11; Solution 255.2, Bomb, 258 10; Solution 256.5, Lost energy, 258 13, 259 6; Solution 259.1, Four primes, 262 12; Solution 261.5, Angle trisection, 264 14; Solution 261.7, Integrals involving roots, 265 11; Solution 262.4, Rational integral, 266 6; Solution 262.5, HH or TT, 264 19; Solution 269.5, Coins, 271 14; Solution 269.8, Integral, 271 18; Solving a nonlinear ordinary differential equation, 260 16; The class number of certain quadratic fields, 231 1; Two methods for partitions of integers, 218 1;

Uniform acceleration, 270 16; Unrest on Tetra, 231 10; Visualizing sections of the Hopf fibration, 227 1; A functional equation, 266 8
 Morain, Francois, 226 19
 Morales, L., bound, 257 13
 Moran, Caitlin, entanglements, 236 8, 250 7
 Mordell, L. J., *Diophantine Equations*, 204 3
 More arctangent identities, Tony Forbes, 201 6
 More ars magna, 154 20
 More balls, Chris Pile, 250 6
 More Facts, Jeremy Humphries, 158 13
 More hornets, Alan Slomson, 151 17; Robert Parkhouse, 151 17
 More identities involving partitions of an integer, Tommy Moorhouse, 256 10
 More moving points, Martyn Lawrence, 191 18
 More on -plexes, letter, Ralph Hancock, 203 23
 Morić, Filip, 257 20
 Morison, Stanley, Times New Roman, 195 25
 Morley, Frank, trisector, 262 2
 Morley, Robert, 156 7
 Morris, Dennis, A Golconda of golden numbers, 198 1; A note on the non-commutative $C_2 \times C_2$ algebras, 237 6; A revolutionary view of numbers, a revolutionary view of groups, the unification of mathematics, and the unification of physics, 210 14; A revolutionary view of space, 207 1; Brief introduction to Study numbers, 208 16; *Complex Numbers – the Higher Dimensional Forms*, 220 16, 237 6; Concerning the golden ratio of Fibonacci numbers, 229 19; Constants, letter, 218 19; Differential calculus in C_3 space, 233 11; Differential equations and trigonometric functions, 235 8; Division tests, 199 12; Doing vector algebra properly, 212 1; Expressions that maintain their form under multiplication, 220 14; How the other half thinks, 203 10; Hyperbolic Euler relations, 205 15; Matrix operations on a number grid, 234 8; Noncommutative algebra, 205 8; Philosophical implications of the discovery of the natural algebras, 214 16; Quarternions and permutation matrices, 226 11; Quaternionic space, 223 10; Real space is hyperbolic, Euclidean space is imaginary, 209 10; Reciprocals of prime numbers, 190 1; Report upon Fibonacci numbers and quarternions, 203 1; Reversible numbers, 230 2; Rounder than the sphere, 224 16; *Symmetry and the Monster* by Mark Ronan, 219 18; The Cauchy--Riemann equations for quarternions, 206 1; The complex numbers are not an algebraic

field extension of the real numbers, letter, 209 24; The concept of a shadow algebra, 209 11; The Generalized Principle of Relativity, 232 7; The Golden Ratio pops out of 5-dimensional space, 221 10; *The Higher Dimensional Complex Number Algebras*, 216 3; Upon mathematical spaces, 222 8; Upon rotation, 225 1; Upon three-dimensional rotation, 234 1; Vector calculus in 2-dimensional euclidean space, 215 12; Velocity and time contraction in H -space, 211 4; What's wrong, 222 15

Morris, J. A., Heron's formula, 150 14

Morris, Scot, *The Book of Strange Facts and Useless Information*, 174 13

Morse, John Reade, 227 21; Ralph Hancock, 227 21

Moses, jokes, 155 12

Moss, Johnny, 151 7

Moss, Norman, *Men Who Play God*, 154 12

Mosteller, Fred, 173 19; *Fifty Challenging Probability Problems*, 202 21, 204 22

mother-in-law, 194 19

Moulder, A. J., Solution 199.3, Two tangents, 203 16; Solution 210.2, Cosecs, 214 10; Solution 212.2, Area of a triangle, 216 13; Solution 217.2, Chords and regions, 220 10

Moulder, Tony, Solution 224.2, Buried treasure, 229 10; Solution 224.3, Inspecting the column, 227 19

Moulson, Harold, quadrilateral, 173 29

Moving point, Dilwyn Edwards, 189 11; Patrick Lee, 192 20

Mr Gorsky, 154 23

Mr Spock, 154 10

Mrs Read's knitting machine, Richard Ahrens, 179 29

MST209 *Mathematical methods and models*, 264 7

Mud, 223 13

Multiple angle relationships in integer triangles, Chris Pile, 272 1

Multiples of eleven, Sebastian Hayes, 182 26

Multiplication, 255 10; Colin Davies, 177 20

Multiplicative function, 241 21

Murphy, Steve, 182 28; clock problem, 199 29

Musielak, Dora, *Sophie's Diary*, Eddie Kent, 228 8

Mutually touching cylinders, John Smith, 218 13

Mysterious things, Mark McCluney, 150 13

n balls, 182 21

n^2 , 217 24

Nabokov, interviewed, 165 10

Nagell--Lutz theorem, 256 8
Namagiri, 202 2
Naor, Moni, deniable encryption, 176 6
Napier's logarithms are hyperbolic after all, Peter L. Griffiths, 272 18
Napoleon Bonapart, theorem, 262 2
Narayana's Cows, Eddie Kent, 240 16
narcissistic, 260 20
NASA, 154 23; Ames Research Center, 168 15
National Institute for Standards and Technology, 176 6
national lottery, 160 20
National Lottery, 203 14
Natural number deviations, Martin Hansen, 151 15
Nature, 159 13, 205 20
Nautical Almanac, The, 171 7
Naval Code, 193 28
Naylor Prize, 154 11
Naylor, Leslie, squares, 169 24
 n -coupled harmonic oscillator, The, Bryan Orman, 264 1
 n -dimensional space--time, letter, Sebastian Hayes, 210 19
Nearly an integer, 218 20
nearly equilateral, 251 c
Neave, Henry R., *Elementary Statistics Tables*, 256 1
Necklaces, 248 7
needle dropping, 168 9
needle reversing, 223 c
negative gravity, 160 15
negative mass, 152 15
Neighbours, 189 3
Neil Armstrong, 154 23
Nelson, Harry, primes, 153 6, 161 2
Nested roots, 175 23, 190 19
Neumann, P. M., 155 27
Nevanlinna Prize, 153 3
new calculation of π , A, Roger Webster, 151 8
New Century Encyclopedia, 165 17
new journal, A, Eddie Kent, 155 27
New Kind of Science, A, by Stephen Wolfram, Sebastian Hayes, 235 1
New Scientist, 154 12, 156 8, 164 16, 220 22, 235 1, 272 17
new solution to a classic problem, A, John Bull, 177 14
new virus, A, 154 15

new word, A, Eddie Kent, 172 22
New York Times, 177 26
Newman, Bob, Balls, 207 19; Higher and higher mathematics, 205 19
News quiz, 199 17
Newton, Isaac, 161 4; *Principia Mathematica*, 188 25, 197 24, 25
Newton, Sir Isaac, mechanics breaking down, 165 1
Newton's Law, 158 17; Second Law, 264 1, 265 4
Newtonian summation formula, 267 18
Newton--Raphson, 190 17, 266 3, 5
Nicely, Thomas R., bug, 153 5
Nick's Mathematical Puzzles, 265 20, 266 17
Niddy-Noddy of the Priests, The, 164 21
Night, 273 19
Nine darts, 173 18
Nine matches, Eddie Kent, 172 23, 174 23; letter, David Singmaster, 176
28
Nine nines, 162 25
Nine primes, 247 c
Nine switches, 179 25
Nine tarts, 182 9
Niven, I., H. S. Zuckerman & H. L. Montgomery, *An Introduction to the
Theory of Numbers*, 164 6
Nixon, President, 232 3
NMBRTHRY, 155 26, 172 6, 211 21, 242 5
No survivors, 231 7
nominative determinism, 164 16
Non-commutative algebra, Dennis Morris, 205 8
Non-commutative algebras and quantum entanglement: letter, Sebastian
Hayes, 220 22
non-commutative $C_2 \times C_2$ algebras, A note on the, Dennis Morris, 237 6
Non-Euclidean geometry, 158 3, 9
Non-singular dice, David Singmaster, 174 12
Norma, 218 20
Normals to an ellipse, 194 7
North American electronic bulletin board, 150 16
Norton, Ken [Jeremy Humphries], Balls and legs again, 157 13; What do
they mean, 156 20
Norton, Simon Phillips, uniqueness, 255 21
Norwich City Council, expiry date, 165 13
not a moral issue, 197 7

Notation for subsequencies, Sebastian Hayes, 154 10
Notes and Records of the Royal Society, 242 17
Notes on the history of mathematics, Barbara Lee, 161 3
Nothin' shakin' (but the leaves on the trees), 151 8
nothing, 158 16
Notices of the American Mathematical Society, 159 7
not-so-obvious isomorphism, A, Jim James, 153 18
Nth digit of pi, 204 3
Nuclear matters, letter, Colin Davies, 231 21
Nugent, Mike, Solution 170.1, Interesting integral, 172 13
Number boggle, Tony Forbes, 215 15
Number names, Colin Davies, 150 2
number of digits in $F_{2145351}$, 194 26
number puzzle, 160 7
number puzzle, A, Jane Kerr, 162 2; Ken Greatrix, 166 1
Numbers in a row, 242 15
Numbers on swimming pools, Colin Davies, 158 13; Tony Huntington, 161 17
Numbers on the brain, 152 22; Rob Evans, 228 18
Numbers, 245 15
Numerical coincidences, 205 12
numerology, 262 21
O Botafumeiro, Bryan Orman, 265 2
O Briain, Dara, 257 1
O'Donnell, Brian, Kiwi fruit, letter, 178 38; Solution 170.3, Reciprocals, 172 14; Solution 176.1, Two cyclists, 178 25; Solution 187.3, Square wheels, 190 11
O'Hanlon, Redmond, *In Trouble Again*, 160 15
O'Shea, Tim, 150 20
obiit Claude Shannon, 180 16; Colin 'Hoppy' Hodgkinson, 153 18; Gerald Whitrow, Eddie Kent, 176 19; Glenda Mary Franklin, 213 1; John Fauvel, 181 1; Lytton Jarman, 255 5; Martyn Hennessy, 179 21; Michael Falcus, 187 1; Norman Clark, 179 21; Oliver Atkin, Eddie Kent, 227 20; Paul Erdos, 152 8; Seymour Cray, 154 12; Sheila Bear, 197 23; Sir James Lighthill, FRS, Eddie Kent, 165 16; Vic Parsons, 167 29; Yutaka Taniyama, 160 10
Observations on Problem 171.2, $7n + 1$, Barbara Lee, 173 24
Observations on Problem 182.7, Sebastian Hayes, 187 24
Ockeghem, Johannes, 160 3
Octahedron and four cylinders, 245 c

octave, 250 10
octonions, 203 3, 205 23
Odd expression, 228 5
odd order theorem, 170 27
Odd pairs, 235 16
Odd sequence, 243 11
Odds and ends, 201 10
Odds, 207 19
Oerter, Al, athlete, 151 20
Ogilvy, C. S., & J. T. Andersen, *Excursions in Number Theory*, 243 1
Oh, camel ye faithful, Tony Huntington, 161 23
Old age, Colin Davies, 182 24; Derek Peasy, 182 25; letter, Ron Potkin, 185 19
Old money, Gareth Harries, 221 21
Old Testament, 168 4
Oliver Atkin obiit, Eddie Kent, 227 20
Ollerenshaw (Kathleen)'s Theorem, 262 10, 11
On ranks and cranks, Tony Forbes, 179 16
On the average, John Bull, 201 1
On the cellular automaton of Ulam and Warburton, David Singmaster, 195 2
On the operator $L(x)$, Sebastian Hayes, 224 5
ONE + TWELVE = TWO + ELEVEN, Colin Davies, 191 10; Re:, David Singmaster, 196 16
One eighth of an ellipsoid, 259 c
One Million Places of π by J. Guilloud & M. Bouyer, Ken Greatrix, 170 23
One, 240 7
One-edge connections, Mike Warburton, 188 11; Ted Gore, 194 17
Ones, 188 17, 204 13
Open University Challenge, Tony Huntington, 150 5
Operating Systems Review, 182 12
Oppenheimer, Robert, ball park, 169 23
order 2×3 recurrence relation, The, Robin Marks, 183 1
Orders, 213 23
Ori, Amos, 211 9
Orman, Bryan, A class of arctangent identities, 199 15; A simple statics problem, 236 10; Arithmotriangulation, 236 1; Conversion factors, letter, 202 22; Designing table mats, 266 1; Equilateral triangles and the trisection of angles, 262 2; Gerald Whitrow, letter, 178 37; Interesting representations of squares in base B , 239 1; Machin's

formula, 204 1; O Botafumeiro, 265 2; Problem 198.3, Primes, 198 10;
 Problem 262.6, Tans, 262 18; Solution 172.1, 345 triangle, 175 12;
 Solution 237.5, Another sum, 239 7; Solution 237.5, Another sum, 240
 13; Solution 240.3, Double sum, 243 11; Solution 242.1, Interesting
 integrals, 245 8; Solution 262.6, Tans, 265 1; The arithmetrization of
 quadratic irrationals, 238 1; The n-coupled harmonic oscillator, 264
 1; Two times five equals ten, 246 10; Venn diagrams, 190 27; $z^n + z^k =$
 1, 263 6

Orman, Martin, letter, Minimal Sudoku, 246 15; Solution 213.8, Definite
 integral, 216 3

orthocentre, 204 14

Ostrovsky, Rafail, deniable encryption, 176 6

Ostrowski medallists, 151 12

Ostrowski, Alexander, Wolfskehl, 159 7

Otto, Srephen, lecturer, 165 16; Sir James Lighthill, letter, 167 27

OU maths courses comparison, David Ireland, 169 22

Oughtred, W., *Clavis mathematica*, 158 20

outer space, 244 17

Oxford Corpus, 221 12

Ozanam, Jacques, *Recreations in Science and Natural Philosophy*, 269 4

Pach, János, 257 20

Pacini, Andrea, 226 19

Page 21, 225 21; solutions 225 7

Page, Elsie, Plugging Pascal's triangle, 176 12; Solution 172.1, 345
 triangle, 175 11; Solution 176.3, Tricubic, 178 26; Solution 177.3,
 Mahatma's triangle, 179 27

Painleve, Paul, equation, 258 11

Pairs, 219 18

Palin, Michael, 160 15

Palindromes in morse, Jeremy Humphries, 224 17

palindromes, 151 2

palingenesis, 158 17

pancyclic graph, A, 256 c

pangrams, 151 2

Panic strikes again, Ralph Hancock, 236 15

Panic, Dr Urban, 220 23

panmagic, 265 18

Pannwitz, Erika, 257 20

Papadimitriou, C. H., bound, 257 13

Parades and resolvable Steiner systems, Tony Forbes, 195 26

paradoxical dice problem, A, David Singmaster, 199 24; letter, Dick Boardman, 200 28; letter, Robin Marks, 204 25

parallel lines, 173 26, 257 4

Paris Data Processing Center, 168 14

Parity, letter, Ken Greatrix, 241 13

Parker, John, goat, 180 29

Parkhouse, Robert, More hornets, 151 17

Parkin, T. R., counterexample, 268 19; prime tuplets, 153 6

Parramore, Hugh, Solution 148.1, A hornet's nest, 150 19

Parsons, Denys (compiler), *Funny Funny Funny*, 151 2

partial Steiner triple systems, 253 c

Partington, Jonathon, 171 19

Parts of a partition, 207 19

Pascal tetrahedron, The, Stuart Walmsley, 226 8

Pascal Triangle matrices-I, Sebastian Hayes, 173 1

Pascal Triangle matrices-II, Sebastian Hayes, 174 1

Pascal triangle sums, 213 17

Pascal's pyramid, Pascal's hyperpyramid and Pascal's line, Robin Marks, 177 1

Pascal's pyramid, Robin Marks, 175 16

Pascal's Rule, 221 2

Pascal's triangle otherwise, Sebastian Hayes, 164 7

Pascal's triangle revisited revisited, Sebastian Hayes, 225 10

Pascal's triangle with 2^n -entries, 237 5

Pascal's triangle, 162 3, 189 15

Pascal's wine, 182 23

Patiala, Maharaja of, 150 2

Patterson, Derek, an idea, 235 17

Patterson, James, *Four Blind Mice*, 231 7

Paulos, John Allen, *Innumeracy*, 150 18, 156 7, 179 13

Paulson, L. C., 155 27

PC Direct, 165 7

PDF formula, 256 1

Pea squeezing, Ralph Hancock, 159 13; Jeremy Humphries, 161 9

Pears, Alan, *Nature's Numbers* by Ian Stewart, 154 21

Pearson, Michael, 221 8

Peasy, Derek, Old age, 182 25

Pedoe, D., *Geometry, a Comprehensive Course*, 158 9

Pegasus, 168 14

Pegg, Bev, 151 8

Pell equation, 151 15
Pell number 5, The, Paul David Jackson, 231 4
Pell's equation, 209 22
Pell's equation, A note on, Sebastian Hayes, 209 22
Pell--Fermat equation, 238 3
Pendulum, 196 29
Pengelly, D., 272 13; FLT, 273 9
penguin, 154 15
Penrose, Roger, 160 11
Pentacubes, Chris Pile, 152 4
Pentadecagon, 243 18
Pentagonal numbers, 227 12
perfect number, 260 20
Perfect, Heather, *Topics in Geometry*, 204 17
Perfection, 228 19
Periodic function, 236 9
permanent, 200 29
Perpetual Calendar for Those that Have the Gout and the Pox, A, 164 21
Perrenelle, married Nicolas Flamel, 163 9
Perrin pseudoprimes, 269 14
Perrin's sequence, Roger Thompson, 269 5
Perry, Robert H., *Chemical Engineers' Handbook*, 203 16
Personal Computer World, 154 23, 162 22, 165 1
Perspective, Barbara Lee, 154 22
Peterborough, Bishop of, 182 8
Petersburg paradox, The, Tony Huntington, 156 15
Petit Robert, 152 7 Petrarchan rhyme scheme, 152 2
Pettit, Andrew, 173 28; Cats, 182 27; Geochron clock, Home Planet, 153 14; Lies, damned lies & statistics, 173 25; M500 185, letter, 187 23; Problem 189.3, Amazing object, 189 14; Reversed cheque, 271 17; Solution 183.2, Fifteen objects, 185 10; Solution 185.1, Three strings, 187 22; The two towers problem, 157 17
Phillips Collection, The, 270 15
Phillips, George M., *Two Millennia of Mathematics*, Eddie Kent, 231 14
Phillips, Nigel, problem suggestion, 269 3
Philo line, The, 251 13
Philo of Byzantium, 251 13
Philosophical implications of the discovery of the natural algebras, Dennis Morris, 214 16
Philpott, Arthur [Eddie Kent], 157 2

Philpott-Kent, Tabitha, 265 19
Photograph of a Russian T62 tank, 233 c
Photography, Jeremy Humphries, 159 15
Phthongitates and epogdoi, Ralph Hancock, 160 3
Physical Review Letters, 211 9
Physics and/or balls, Ian Saunders, 153 16
Physics Today, 185 23
pi in hexadecimal, 204 3
Pi revisited, Colin Davies, 253 16
pi, 193 23, 204 3
Pi, letter, Ralph Hancock, 250 14
pi: n th digit, 204 3
Piche, Robert, primes, 161 2
Pick, George, 253 6
Pick's theorem, Tony Forbes, 253 6; corollary, 268 18
picture, a, 177 c
Pile, Chris, 151 15; 182 29; Algebra for beginners, 229 19; Another prime pathway, 230 10; Arithmetic progressions, letter, 231 20; Borromean rings and things, 234 6; Cannon balls, etc., 169 18; Cellular automata, 238 16; Centuries, squares and balls, letter, 234 13; Complex complex complex, letter, 176 28; Degrees of separation, 164 16; Dice, 179 13; Limerick, 158 12; Lottery odds, 165 18; Model railways, letter, 185 15; More balls, 250 6; Multiple angle relationships in integer triangles, 272 1; Pentacubes, 152 4; Platonic solids, 198 18; Platonic solids, letter, 195 24; Prime pathway, letter, 239 11; Problem 164.3, 24 squares, 164 25; Re:, 167 26; Problem 167.1, 24 triangles, 167 26; Problem 178.1, Lottery guarantee, Re:, 180 26; Problem 180.4, Favourite lottery numbers, 180 18, Professor Pile's prime pathway, 229 14; revisited, 236 17; Pythagorean squares, 229 11; Re, M500 156, 158 10; Re: Problem 164.3, 24 squares, 167 26; Right-angled triangles, 228 20; Seven a side, 185 12; Solution 148.1, A hornet's nest, 150 18; Solution 157.1, Monkey nuts, 160 18; Solution 158.1, 3000 bananas, 160 22; Solution 170.2, Rational square, 174 24; Solution 172.1, 345 triangle, 174 20; Solution 173.2, Nine darts, 176 17; Solution 177.3, Mahatma's triangle, 179 26; Solution 178.5, Reward a friend, 181 15; Solution 183.2, Fifteen objects, 185 11; Solution 184.4, Three real numbers, 186 18; Solution 184.7, Deux nombres, 189 4; Solution 184.8, Four regions, 187 21; Solution 192.5, 16 Polygons, 195 8; Solution 208.4, Folding a polygon, 211 10; Solution 224.2, Buried treasure, 229 10; Solution 229.4, Balls, 234 15; Solution 247.3, Balls,

250 4; Solution 248.3, Integer triangles, 251 1; Solution 268.1, Two triangles, 270 2; Solution 268.7, Interest, 270 7; Stitched curves, letter, 211 14; Tee-off solution, 158 10; Ten blocks, 181 23

Piles of coins, 243 14

Pins, letter, Ralph Hancock, 208 25

Pins, Norman Graham, 215 24

piphobia, 245 15

pizza, 253 15

planar graph, 232 13

Planck's constant, 260 14

Plant, Michael, Heron's formula, 152 9

Plato, 160 9

Plato, *The Republic*, 160 12, 163 5, 165 8, 253 1

Platonic solids, 192 22; Chris Pile, 198 18; letter, Chris Pile, 195 24

Platonism, 184 25

plot of kz , where $z^{3003} + x^k = |z| = 1$, 263 c

Plouffe, Simon, 204 3

Plugging Pascal's triangle, Elsie Page, 176 12

Plutarch, *Lives [of the noble Grecians and Romans]*, 178 6

Pocklington, H. C., primality, 172 6

Poem, Colin West, 161 12

poetry vs physics, 184 8

Poincaré, Henri, disease, 192 5

Points of inflexion, 255 7

Points, letter, Pete Charlton, 173 26

pointsize, 195 25

Poles, 221 8

Pollock, Nick, A formal mathematical definition, 180 20; Do men & women design gardens differently?, 189 10; Hats, 178 22; Problem 175.2, Reciprocal inequalities, 175 28

Polya Prize, 154 11

Polya, George, *The Polya Picture Album*, 162 21

Poly-Bernoulli numbers, 258 18

Polygon and floorboards, 259 11

polygons, 195 c

poly-logarithm function, 258 18

Polynacci sequences, Ron Potkin, 248 5

Polynomial factorization, 261 9

Polynomial sum, 249 15

Polynomial, 259 11, 264 15

Polyominoes, N. L. Biggs, 152 4
polyonimoes, 152 c
Pond, 211 7, 270 1
Ponderings, Iain D. Brown, 162 18
Popol Vuh, 154 14
Popper, Karl, 241 2 Popular Lectures 2004, London Mathematical Society, 197 9
Population control, 265 21
Population, 176 25
Porter, David, 40 years, 192 26; Solution 152.3, Pythagorean sevens, 156 20; Solution 153.1, A not-so-obvious isomorphism, 161 18; Solution 157.2, Lottery dates, 161 20; Solution 189.1, Neighbours, 192 15; Solution 189.2, Brown eyes, 192 7; Solution 189.6, Three friends, 192 14; Solution 189.7, All the sevens, 192 13; Solution 190.6, Triangle, 203 24; Solution 190.7, Four roots, 193 20; Solution 193.1, Smallest square, 197 12; Solution 193.5, Dissect a triangle, 197 15; Solution 193.7, Binomial coefficients, 196 27; Solution 201.1, Continued fraction, 205 13; Solution 201.2, Sine series, 205 14
Porthole, 191 24
Postman probability, letter, Jeremy Humphries, 249 10
Potkin, Ron, Fibonacci and all that, 200 14; Hailstones, 204 4; Marks, letter, 194 28; Millennium, letter, 174 27; Old age, letter, 185 19; Polynacci sequences, 248 5; Problem 180.3, Fence, 180 13; Recurring decimals, letter, 184 17; Solution 180.3, Fence, 182 16; Solution 184.1, Twelve boxes, 188 28; Twelve tarts, 193 25; Useless statistics, letter, 203 22
Potts, Phil [Eddie Kent], Tee Off, 156 19
powder of sympathy II, The, Eddie Kent, 156 12
powder of sympathy, 158 17
Powdered crabs, Eddie Kent, 158 17
Power of ten, Colin Davies, 164 4; Edward Stansfield, 166 20
Power residues, 245 7
Pratchett, Terry, *Wyrd Sisters*, 162 18
Precision, letter, Jeremy Humphries, 210 20
Preece, Donald, talk, 195 26; An elliptic gardening problem, letter, 202 24
prepone, 155 27
Presley, Elvis, 219 21
Press, William H., *Numerical Recipes, the Art Of Scientific Computing*, 159 6
Preuss, S. B., his [or her] birth and death, 165 12
Primality testing, 173 20

primality, 157 13
 primality-proving, 172 4
 Prime density and centre of mass, Robin Whitty, 260 10
 Prime k -tuplets 13, Tony Forbes, 153 4
 Prime k -tuplets, Tony Forbes, 270 21
 Prime k -tuplets--15, Tony Forbes, 156 14
 Prime k -tuplets--16, Tony Forbes, 158 15
 Prime multiplication, 163 19
 prime number records, 189 13
 prime number theorem, 197 26
 prime number theorem, The, Tony Forbes, 152 9
 Prime numbers and groups, Grant Curry, 166 25
 Prime partitions: an asymptotic result, Tommy Moorhouse, 242 1
 prime pathway picture, 239 12; 229 *c*; 236 *c*
 Prime pathway, letter, Chris Pile, 239 11
 prime pathway, The, 230 *c*
 Prime prime, Tony Forbes, 197 16
 Prime primes, Eddie Kent, 194 21
 Prime Pythagorean triangles, Tony Forbes, 172 1
 Prime sum, 202 25
 prime triplet, 154 *c*, 220 *c*
 Prime triplets, Tony Forbes, 154 13, 161 9
 Prime, 231 21
 Primes and partitions, letter, Colin Davis, 207 16
 primes in arithmetic progression, 153 6
 Primes, 198 10
 primes, 200 0
 Primes, sums of two squares, and palindromic continued fractions,
 Roger Thompson, 268 1
 primitive Pythagorean triples, 272 1
 PRIMO, 270 21
 Prince, M. J., Questshion, 152 18
 Pringles crisp, 250 14
 Prisms, 240 3 *c*
 prize, 265 19
 probability density function, 256 1
 Probability, births and mojos that work, Lawrence Bradby, 160 13; II,
 Tony Huntington, 162 17
 Problem 150.1, GCE powers, John Bull, 150 22; Solution, 152 19
 Problem 150.2, Hill climbing, Robert Hill, 150 22; Solution 152 20

Problem 150.3, Envelopes paradox, Nick Shackel, 150 22; Solution, 152 22
Problem 150.4, $1 + 1$, Robert Hill, 150 22
Problem 151.1, The geochron clock, Colin Davies, 151 19
Problem 152.1, Crossword, Eddie Kent, 152 22
Problem 152.2, Numbers on the brain, 152 22
Problem 152.3, Pythagorean sevens, Stuart Cresswell, 152 23; Solution,
154 21, 156 20
Problem 152.4, You can do it, Eddie Kent, 152 23; Solution, 153 19
Problem 153.1, A not-so-obvious isomorphism, Jim James, 153 18;
Solution, 157 22, 161 18
Problem 153.2, Gold bars, Barbara Lee, 153 18
Problem 153.3, Raffle tickets, 153 19; Solution, 157 23
Problem 157.1, Monkey-nuts, John Reade, 157 21; Solution, 159 16, 17,
160 18
Problem 157.2, Lottery dates, Tony Forbes, 157 21; Solution, 160 19, 161
20*f*
Problem 157.3, Binomial coefficients, Oliver Atkin, 157 21
Problem 157.4, Eleven squares, Gareth Harries, 157 22; Solution, 159 17;
solution [not formally cited], 161 7
Problem 158.1, 3000 bananas, 158 23; Solution, 160 21*f*
Problem 159.1, Operation bumble-bee, C. A. Tamref, 159 19
Problem 160.1, A rational problem, Jim James, 160 23; Solution, 162 20
Problem 160.2, The \$50,000 riddle, 160 23
Problem 160.3, Monkey, Jeremy Humphries, 160 23; Solution, 163 17
Problem 161.1, Bowed rail, Philip Cheung, 161 8; Solution, 163 10
Problem 162.2, Cat and dog, David Kerr, 162 26; Solution, 167 26
Problem 162.3, Just an 8, Barbara Lee, 162 26; Solution, 164 20
Problem 163.1, Convex regions, 163 3
Problem 163.2, The Tower of Saigon, Tony Forbes, 163 18; Solution, 166
15
Problem 163.3, Prime multiplication, Barbara Lee, 163 19; Solution, 166
16
Problem 164.1, Go, 164 24
Problem 164.2, ABCD, John Reade, 164 25; Solution, 166 17*f*, 167 25
Problem 164.3, 24 squares, Chris Pile, 164 25; Solution, 166 18; Re:, Chris
Pile, 167 26
Problem 164.4, 27 points, Jeremy Humphries, 164 25
Problem 166.1, A geometric theorem, David L. Brown, 166 11; Solution,
168 17*f*
Problem 166.2, Words, Tony Forbes, 166 12

Problem 166.3, Boat, Dick Boardman, 166 14; Solution, 168 26
 Problem 167.1, 24 triangles, Chris Pile, 167 26
 Problem 167.2, Cows, John Halsall, 167 27; Solution, 169 10
 Problem 168.1, Clock, Grant Curry, 168 20; Solution, 170 11*f*
 Problem 168.2, 345 square, Martyn Lawrence, 168 21; Solution, 170 15*f*
 Problem 168.3, Fraction, John Halsall, 168 21; Solution, 170 21*f*, 171 16
 Problem 169.1, Three people, Eddie Kent, 169 7; Solution, 171 17*f*
 Problem 169.2, Chords, Sebastian Hayes, 169 19; An interesting
 observation, John Bull, 173 10; Solution, 171 12*f*, 172 8
 Problem 169.3, Squares in arithmetic progression, John Reade, 169 20
 Problem 169.4, Functional inequality, John Bull, 169 20
 Problem 169.5, A fractal bridge beam, Ken Greatrix, 169 21
 Problem 170.1, Interesting integral, Tony Forbes, 170 14; letter, Colin
 Davies, 172 16; Solution, 172 12*f*
 Problem 170.2, Rational square, R. M. Boardman, 170 20; Solution, 173 13,
 174 24
 Problem 170.3, Reciprocals, Tony Forbes, 170 20; Solution, 172 14, 175 24
 Problem 171.1, Cylinder, 171 9; Re:, Colin Davies, 176 22; Re:, David
 Singmaster, 173 19; Re:, Gordon Alabaster, 174 16
 Problem 171.2, $7n + 1$, 171 22; Observations on, Barbara Lee, 173 24
 Problem 172.1, 345 triangle, Dave Ellis, 172 7; Solution, 174 17*f*, 175 11
 Problem 172.2, Chords again, Barry Lewis, 172 10; Solution, 175 19
 Problem 172.3, Decagon, Sebastian Hayes, 172 11
 Problem 172.4, Grandfather clock, Colin Davies, 172 15; Solution, 174 25
 Problem 172.5, Series, Colin Davies, 172 22
 Problem 172.6, Angle, Sebastian Hayes, 172 22
 Problem 173.1, Binomial coefficients squared, Sebastian Hayes, 173 15
 Problem 173.2, Nine darts, Jeremy Humphries, 173 18; Solution, 176 17
 Problem 173.3, Primality testing, Tony Forbes, 173 20
 Problem 174.1, Four people, 174 22; Solution, 176 25
 Problem 174.2, Incredible identity, 174 23; Solution, 176 19
 Problem 174.3, Eight wires, Malcolm Maclenan, 174 24; Solution, 176 18
 Problem 174.4, 32 pounds, 174 25; Solution, 176 24
 Problem 174.5, Root 11, Barry Lewis, 174 26; Solution, 176 6*f*
 Problem 175.1, Nested roots, Barry Lewis, 175 23; Solution, 177 13
 Problem 175.2, Reciprocal inequalities, Barry Lewis & Nick Pollack, 175
 28; Solution, 177 11
 Problem 175.3, Series squared, Barry Lewis, 175 28; Solution, 177 17
 Problem 175.4, The first prime, 175 31; Solution, 177 26, 179 22
 Problem 175.5, abc, Barry Lewis, 175 35; Solution, 177 12, 178 35

Problem 176.1, Two cyclists, Keith Drever, 176 24; Solution, 178 25
 Problem 176.2, Population, 176 25; Solution, 178 32
 Problem 176.3, Tricubic, 176 27; Solution, 178 26
 Problem 176.4, Factorial squares, John Reade, 176 28
 Problem 176.5, Construct a square, R. M. Boardman, 176 28; Solution, 178 28, 180 25
 Problem 177.1, Eight cubes, Tony Forbe, 177 10; Solution, 179 21
 Problem 177.2, Four spheres, Colin Davies, 177 11
 Problem 177.3, Mahatma's triangle, John Bull, 177 16; Solution, 179 26f
 Problem 177.4, e in nine digits, Jeremy Humphries, 177 28; Solution, 182 15
 Problem 177.5, 3 theta, David L. Brown, 177 28; Solution, 179 28
 Problem 177.6, Factorial derivative, Tony Forbes, 177 29; Solution, 181 11
 Problem 178.1, Lottery guarantee, Tony Forbes, 178 27; Re., Chris Pile, 180 26
 Problem 178.2, Construct another square, 178 29; Solution, 180 14
 Problem 178.3, Square-free integers, 178 29; Solution, 183 5
 Problem 178.4, Palindromic birthdays, Tony Huntington, 178 32
 Problem 178.5, Reward a friend, Tony Forbes, 178 39; Solution, 181 15
 Problem 178.6, Ten blocks, Colin Davies, 178 40; Solution, 180 12
 Problem 178.7, Series, Barry Lewis, 178 40; Solution, 180 11
 Problem 179.1, Two cars, 179 20
 Problem 179.2, Four tans, 179 22; Solution, 181 12f, 183 22
 Problem 179.3, Nine switches, 179 25; Solution, 181 14
 Problem 179.4, Two cylinders, 179 25; Solution, 182 14
 Problem 179.5, Subtract square root, 179 27; Solution, 181 8
 Problem 179.6, Root 11 again, 179 27; Solution, 181 16
 Problem 180.1, Two questions about triangles, 180 10
 Problem 180.2, Unlimited prize, 180 11; Solution, 182 19
 Problem 180.3, Fence, 180 13; Solution, 182 16, 184 11
 Problem 180.4, Favourite lottery numbers, 180 18
 Problem 180.5, Triangular tiles, 180 18 Problem 180.6, Two pedestrians, 180 25
 Problem 180.7, Interesting series, 180 28; Solution, 182 9
 Problem 181.1, Find the centre, Tony Forbes, 181 11; Solution, 184 12
 Problem 181.2, Six secs, Tony Forbes, 181 14; Solution, 183 13, 190 16
 Problem 181.3, Six-sided pencil, Tony Forbes, 181 18; Solution, 183 12
 Problem 181.4, Four points, 181 18; Solution, 185 11, 189 1 Problem 181.5, Five digits, Jeremy Humphries, 181 19; Solution, 183 11
 Problem 181.6, Ellipse, Tony Forbes, 181 23

Problem 181.7, Five cots, 181 23; Solution, 183 14
 Problem 182.1, Reverse and square, 182 8
 Problem 182.2, Nine tarts, 182 9; Solution, 184 26
 Problem 182.3, Russian roulette, 182 20; Solution, 184 24
 Problem 182.4, Four coins, 182 21; Solution, 184 21
 Problem 182.5, Two £10 notes, 182 21; Solution, 185 22
 Problem 182.6, n balls, 182 21; Re:, letter, 184 17; Re:, Ted Gore, 187 17;
 Solution [error: called 182.5 in 185], 185 20, 189 18
 Problem 182.7, Three cos and three sins, 182 21; Observations on,
 Sebastian Hayes, 187 24; Solution, 184 14*f*
 Problem 183.1, Three altitudes, 183 15; Solution, 185 14, 186 12
 Problem 183.2, Fifteen objects, 183 21; Solution, 185 10
 Problem 183.3, Seven real numbers, 183 22; Solution, 185 24
 Problem 183.4, Two real numbers, 183 22; Solution, 185 25
 Problem 184.1, Twelve boxes, 184 8; Solution, 188 27, 190 18, 192 24
 Problem 184.2, Monk, 184 8; Solution, 186 20
 Problem 184.3, Lake escape, 184 10; Solution, 187 12
 Problem 184.4, Three real numbers, 184 10; Solution, 187 12
 Problem 184.5, Triangles, 184 11; Solution, 186 16
 Problem 184.6, Limit, 184 25; Solution, 186 21
 Problem 184.7, Deux nombres, 184 25; Solution, 189 4
 Problem 184.8, Four regions, 184 28; Solution, 187 21
 Problem 184.9, States, 184 28; Re:, Tony Forbes, 187 20
 Problem 185.1, Three strings, 185 9; Solution, 187 22
 Problem 185.2, Two streams, 185 9; Solution, 187 14
 Problem 185.3, 23 numbers, 185 13
 Problem 185.4, Two sins, 185 22; Solution, 187 18
 Problem 185.5, Two pegs, 185 23; Solution, 188 10
 Problem 186.1, Polygon division, 186 11; Solution, 188 19
 Problem 186.2, Tennis, 186 13
 Problem 186.3, Two hands, 186 13; Solution, 238 13
 Problem 186.4, Sixteen coins, 186 21; Solution, 188 13
 Problem 186.5, Horse, 186 21; Solution, 188 12, 189 8
 Problem 187.1, Cosets, 187 11 Problem 187.2, 29, 187 19
 Problem 187.3, Square wheels, 187 20; Solution, 190 10*f*
 Problem 187.4, Cots, 187 20; Solution, 190 14*f*
 Problem 187.5, Strings, 187 22
 Problem 187.6, Iteration, 187 22; Solution, 190 17, 191 17
 Problem 187.7, Task, 187 25; Solution, 190 21, 191 14*f*
 Problem 187.8, Seven events, 187 25

Problem 188.1, Ones, 188 17; Re., Tony Forbes, 264 21; Solution, 265 12, 268 8
 Problem 188.2, Cylinder, 188 18; Solution, 190 22, 191 17
 Problem 188.3, Window envelope, 188 18
 Problem 188.4, Sixteen tarts, 188 29; Solution, 263 18
 Problem 189.1, Neighbours, 189 3; Solution, 192 15
 Problem 189.2, Brown eyes, 189 7; Solution, 192 7
 Problem 189.3, Amazing object, 189 14; Solution, 192 10
 Problem 189.4, 100 members, 189 14; Solution, 198 19
 Problem 189.5, 40 years, 189 14
 Problem 189.6, Three friends, 189 15; Solution, 192 14, 194 10
 Problem 189.7, All the sevens, 189 17; Solution, 192 13
 Problem 189.8, 30 degrees, 189 20; Solution, 191 12, 192 23
 Problem 189.9, Magic square, 189 21; Solution, 191 8*f*
 Problem 190.1, 50 pence, 190 19; Solution, 195 10
 Problem 190.2, Nested roots, 190 19; Solution, 192 18
 Problem 190.3, Goat, 190 20; Solution, 193 22
 Problem 190.4, Six celebrities, 190 20; Solution [called 190.2 in 195], 195 11
 Problem 190.5, Eight switches, 190 21; Solution, 194 24
 Problem 190.6, Triangle, 190 29; Solution, 193 10, 203 24
 Problem 190.7, Four roots, 190 29; Solution, 193 20
 Problem 191.1, Bee, 191 10; Solution, 194 8
 Problem 191.2, LCM, 191 10; Solution, 204 20
 Problem 191.3, Tetrahedron, 191 11
 Problem 191.4, What's next? , 191 11; Solution, 197 26
 Problem 191.5, Another magic square, 191 24; Solution, 195 11
 Problem 191.6, Porthole, 191 24; Solution, 194 14, 16
 Problem 191.7, Sum and reciprocal, 191 24; Solution, 194 10*f*
 Problem 191.8, Infinite exponentiation, 191 25; Solution, 195 1, 224 15
 Problem 191.9, Switch, 191 25; Solution, 194 22
 Problem 192.1, Root 33, 192 15
 Problem 192.2, 10 degrees, 192 19
 Problem 192.3, Platonic solids, 192 22
 Problem 192.4, Two boxes, Tony Forbes, 192 28; Solution, 200 1
 Problem 192.5, 16 polygons, Tony Forbes, 192 28; Solution, 195 8*f*
 Problem 192.6, 500 factors, Dick Boardman, 192 28; Solution, 195 15, 17
 Problem 192.7, 4-cycle-free graphs, Tony Forbes, 192 28
 Problem 193.1, Smallest square, 193 13; Solution, 197 12
 Problem 193.2, Concave to convex, 193 13; Solution, 197 17
 Problem 193.3, Thirteen tarts, 193 13; Solution, 196 25, 197 7

Problem 193.4, Factorial inequality, 193 13; Solution, 196 20
 Problem 193.5, Dissect a triangle, 193 21; Solution, 197 15
 Problem 193.6, Fair coin, 193 23
 Problem 193.7, Binomial coefficients, 193 29; Solution, 196 26
 Problem 194.1, Normals to an ellipse, Tony Forbes, 194 7
 Problem 194.2, Surface area of an ellipsoid, 194 7; Solution, 197 1*f*
 Problem 194.3, Sixteen lamps, Tony Forbes, 194 28; Solution, 197 10
 Problem 194.4, Getting dressed, Tony Forbes, 194 28; Solution, 197 18
 Problem 194.5, Cube, Jeremy Humphries, 194 29
 Problem 195.1, Two queens, 195 22; Solution, 198 8
 Problem 195.2, Six tans, 195 22; Solution, 198 17
 Problem 195.3, Doublings, Tony Forbes, 195 23; Re., Ian Adamson, 198
 23; Solution, 200 12
 Problem 196.1, 47 primes, 196 18
 Problem 196.2, Quadrilateral, 196 19; Solution, 199 20, 21
 Problem 196.3, Combinatorial index, 196 21
 Problem 196.4, Snub cube, 196 22; Solution, 200 18*f*
 Problem 196.5, Three more friends, 196 24; Solution, 200 10
 Problem 196.6, Pendulum, 196 29; Solution, 199 22, 23
 Problem 197.1, Consecutive integers, 197 11; Solution, 201 17
 Problem 197.2, Consecutive cubes, 197 11; Solution, 201 15
 Problem 197.3, Cot series, 197 17
 Problem 197.4, Travels, 197 19
 Problem 197.5, Toilet paper, 197 19; Solution, 200 21
 Problem 197.6, 36 circles, 197 23; Solution, 201 18*f*
 Problem 198.1, Two knights, David Hughes, 198 8
 Problem 198.2, Two students, David Hughes, 198 10
 Problem 198.3, Primes, Bryan Orman, 198 10
 Problem 198.4, Determinant, 198 10; Solution, 241 20
 Problem 198.5, Divided polygon, 198 11
 Problem 198.6, Snap, 198 11
 Problem 198.7, Sums of powers, 198 16
 Problem 198.8, Four colours, Roger Winstanley, 198 20
 Problem 199.1, Ellipsoid again, 199 14
 Problem 199.2, 30 matches, 199 14; Solution, 203 11
 Problem 199.3, Two tangents, John Reade, 199 19; Solution, 203 16
 Problem 199.4, Three integers, 199 25
 Problem 199.5, Inscribed ellipse, 199 25; Solution, 202 10 [called 199.6 in
 202]
 Problem 199.6, Change, 199 28

Problem 200.1, Well spaced, 200 22; Solution, 232 1
 Problem 200.2, Square with corner missing, 200 22; Solution, 204 19, 206
 10f
 Problem 200.3, An arithmetic geometric mean, 200 25; Solution, 208 22
 Problem 200.4, Circle in a box, 200 25; Solution, 209 8, 210 8
 Problem 200.5, Bouncing ball, 200 25; Solution, 203 12f
 Problem 201.1, Continued fraction, 201 5; Solution, 205 13
 Problem 201.2, Sine series, 201 5; Solution, 205 14
 Problem 201.3, 25 objects, Tony Forbes, 201 5
 Problem 202.1, Squaring the circle, S. Ramanujan, 202 9; Solution, 204 16f
 Problem 202.2, Five spheres, 202 9; Solution, 221 18
 Problem 202.3, The puzzled hotelier, 202 9; Solution, 225 16, 228 15f
 Problem 202.4, Commas and brackets, 202 25; Re:, Sebastian Hayes, 206
 20
 Problem 202.5, Interesting equality, 202 25; Solution, 205 16
 Problem 202.6, Prime sum, 202 25; Solution, 206 7f
 Problem 203.1, Circles, 203 15; Solution, 207 12
 Problem 203.2, Rotating digits, 203 15
 Problem 203.3, Counting out, Tony Forbes, 203 17
 Problem 203.4, Cyclic quadrilateral, 203 20; Solution, 208 14
 Problem 203.5, 50p in a corner, 203 20; Solution, 207 8
 Problem 203.6, Loops, 203 20; Solution, 206 13
 Problem 203.7, Rhombus, 203 20; Solution, 244 8
 Problem 204.1, Jigsaw, 204 9; Solution, 215 16
 Problem 204.2, Surface area of a torus, 204 13; Solution, 206 12
 Problem 204.3, Area of an annulus, 204 13; Re:, John Bull, 206 18;
 Solution, 206 18
 Problem 204.4, Ones, 204 13; Solution, 212 16
 Problem 204.5, Circles, 204 13; Solution, 211 18
 Problem 204.6, A triangle property, Dick Boardman, 204 14; Solution, 207
 7
 Problem 204.7, Arctangent identities, 204 15; Solution, 250 11
 Problem 205.1, Sphere in a cone, 205 9; Solution, 210 6
 Problem 205.2, Ants, 205 9; Solution, 207 14
 Problem 205.3, Reciprocals, 205 9; Solution, 207 15
 Problem 205.4, abc, 205 23; Solution, 209 15
 Problem 206.1, Swap sort, Tony Forbes, 206 17
 Problem 206.2, 81 cells, 206 19
 Problem 206.3, Odd socks, Norman Graham, 206 21; Solution, 218 14
 Problem 207.1, 25 points, 20718; Solution, 210 16

Problem 207.2, Parts of a partition, 207 19; Solution, 210 13
 Problem 207.3, Odds, 207 19
 Problem 207.4, Sextic, 207 19; Solution, 210 13
 Problem 208.1, 3 ratios, 208 15; Solution, 211 12
 Problem 208.2, Binary tree, Ian Adamson, 208 18
 Problem 208.3, Concentric circles, 208 19; revisited, Tony Forbes, 212 20;
 Solution, 216 4
 Problem 208.4, Folding a polygon, 208 19; Solution, 211 10
 Problem 208.5, Rain, 208 19; Solution, 211 13
 Problem 209.1, 50p in a box, 209 9
 Problem 209.2, Five-card trick, 209 9 Problem 209.3, $xy + y^x$, 209 9;
 Solution, 221 20
 Problem 209.4, Ladder, Norman Graham, 209 14; Solution, 212 12, 214 18
 Problem 209.5, Duelling lovers, Norman Graham, 209 15; Solution, 213 18
 Problem 210.1, Determinant, 210 9; Solution, 251 10, 11, 266 17
 Problem 210.2, Cosecs, 210 9; Solution, 214 10, 215 22
 Problem 210.3, Triangular sextics, 210 16
 Problem 210.4, Coal, 210 20; Solution, 222 12
 Problem 210.5, A monkey and a pole, Ken Greatrix, 210 21; comment,
 Tony Forbes, 223 18, 19; Solution, 223 18
 Problem 211.1, A to B, 211 7
 Problem 211.2, Pond, 211 7; Solution, 216 16
 Problem 211.3, Trigonometric limit, 211 7; Solution [Trigonometrical
 now], 215 18
 Problem 211.4, Trigonometric product, 211 7; Solution, 215 23
 Problem 211.5, Product, 211 7; Solution, 233 15
 Problem 211.6, Odds again, Ian Adamson, 211 21
 Problem 212.1, Fibonacci numbers, Tony Forbes, 212 10; Solution, 215 11
 Problem 212.2, Area of a triangle, 212 11; Solution, 216 13, 219 13
 Problem 212.3, 100 seats, 212 11; Re., letter, Emil Vaughan, 220 23;
 Solution, 217 14, 218 8
 Problem 212.4, Integer density, 212 11
 Problem 212.5, Truncated icosahedron, 212 15
 Problem 212.6, Sudoku verification, Tony Forbes, 212 19
 Problem 212.7, Dice, 212 19 Solution, 215 19
 Problem 213.1, Pascal triangle sums, Sebastian Hayes, 213 17; Solution,
 216 1
 Problem 213.2, e , 213 17; Solution, 263 14, 15
 Problem 213.3, Triangles, 213 19; Solution, 216 10
 Problem 213.4, Decimal continued fraction, Robin Whitty, 213 20

Problem 213.5, Cubic, 213 20; Solution, 216 11
 Problem 213.6, What is the number?, 213 23; Solution, 216 8
 Problem 213.7, Orders, Tony Forbes, 213 23
 Problem 213.8, Definite integral, 213 23; Solution, 216 3
 Problem 213.9, Balancing an ellipsoidal object, Tony Forbes, 213 24
 Problem 213.X, Minor axis, 213 24; Solution, 239 18
 Problem 214.1, River crossing, 214 11; revisited, Tony Forbes, 219 16;
 Solution, 222 14
 Problem 214.2, Cuboid in a triangular room, 214 11
 Problem 214.3, Consecutive primes, 214 11
 Problem 214.4, 103653, 214 17
 Problem 214.5, 1000000 tarts, 214 19; Solution, 217 18
 Problem 215.1, Pythagoras's theorem, 215 14; Solution, 219 18
 Problem 215.2, Three angles, 215 15; Solution, 233 16
 Problem 215.3, Sine series, 215 18
 Problem 215.4, Four vertices, 215 21
 Problem 215.5, Pins, Norman Graham, 215 24; Solution, 255 1
 Problem 216.1, Rotations, 216 2
 Problem 216.2, Ramanujan's continued fraction, Sebastian Hayes, 216 9;
 Solution, 219 12
 Problem 216.3, Reflection, Tony Forbes, 216 17; Solution, 221 9
 Problem 216.4, Four fours, Tony Forbes, 216 19
 Problem 216.5, Equation, Tony Forbes, 216 20; Solution, 218 19
 Problem 217.1, Another 100 seats, Peter Cameron, 217 15
 Problem 217.2, Chords and regions, Sebastian Hayes, 217 17; Solution,
 220 10, 12
 Problem 217.3, Integral, 217 17; Solution, 218 15
 Problem 217.4, n^2 , John Bull, 217 24 Problem 217.5, Triangulating a
 triangle, 217 25
 Problem 217.6, Triangle, 217 25; Solution, 241 11
 Problem 217.7, Exponents, 217 25
 Problem 218.1, Wands, 218 6; Solution, 221 14
 Problem 218.2, Central binomial coefficient, 218 15
 Problem 218.3, Nearly an integer, 218 20; Solution, 221 16
 Problem 218.4, Repeated differentiation, 218 21; Solution, 220 17
 Problem 219.1, Walk, John Spencer, 219 16; Solution, 222 16, 17
 Problem 219.2, Balanced sudoku puzzles, Tony Forbes, 219 17
 Problem 219.3, Circumcircle, 219 17; Solution, 224 12
 Problem 219.4, Pairs, 219 18

Problem 220.1, Marbles and fruit, Tommy Moorhouse, 220 20; Solution, 224 18
 Problem 220.2, Two ingots, 220 20
 Problem 220.3, Three integers, Tony Forbes, 220 21
 Problem 220.4, RATS, 220 21
 Problem 220.5, Bisepctic, Tony Forbes, 220 21; letter, Jim James [called 220.4], 223 16
 Problem 221.1, Ten hats, Tony Forbes, 221 13
 Problem 221.2, Coefficients, 221 13
 Problem 221.3, Six tans, 221 13; Solution, 264 8
 Problem 221.4, Eleven bottles, Tony Forbes, 221 13; revisited, Tony Forbes, 224 20; Solution, 227 16; Solution, 252 8
 Problem 222.1, Rectangle construction, Tommy Moorhouse, 222 7
 Problem 222.2, Three powers, 222 7
 Problem 222.3, Consecutive composite numbers, Ian Adamson, 222 11
 Problem 222.4, Eleven, 222 13
 Problem 223.1, Mud, Norman Graham, 223 13; Solution [called 223.2 in 229], 229 12
 Problem 223.2, Gun, Norman Graham, 223 13; Solution, 229 5f
 Problem 223.3, Factorization, Tony Forbes, 223 13; Solution, 225 8, 226 14
 Problem 223.4, The arbelos, Norman Graham, 223 19
 Problem 223.5, Reversing a needle, Tony Forbes, 223 21
 Problem 224.1, Three rolling spheres, Norman Graham, 224 9; Solution, 227 14, 228 6
 Problem 224.2, Buried treasure, Norman Graham, 224 14; Solution, 229 8f
 Problem 224.3, Inspecting the column, Norman Graham, 224 15; Solution, 227 19
 Problem 224.4, Integers, John Bull, 224 17; Solution, 246 20
 Problem 224.5, Digit reversal, Tony Forbes, 224 19
 Problem 224.6, Consecutive integers, Tony Forbes, 224 19
 Problem 225.1, Toroidal planet, Tony Forbes, 225 14; Solution, 229 16
 Problem 225.2, Eighth powers, 225 14
 Problem 225.3, GCD, 225 14; Solution, 230 16
 Problem 225.4, I choose a number, Tony Forbes, 225 14
 Problem 225.5, Pythagorean triangles, Fermat, 225 17
 Problem 225.6, Triangulations, Stefanie Gerke, 225 18
 Problem 226.1, Conway's prime machine, Tony Forbes, 226 7
 Problem 226.2, Eight sins, 226 12; Solution, 229 18
 Problem 226.3, Three functions, 226 13

Problem 226.4, Three squares, 226 13 Solution, 230 1, 231 8, 232 4
 Problem 226.5, Three circles, 226 13 Solution, 233 8
 Problem 226.6, Two bombs, 226 20; Solution, 232 10
 Problem 226.7, Squaring the circle, S. Ramanujan, 226 21; Solution, 230 12
 Problem 226.8, 999 nines, Emil Vaughan, 226 21; Solution, 232 8
 Problem 227.1, 25 steps, Tony Forbes, 227 10
 Problem 227.2, Conspiracy theory, Colin Reid, 227 11
 Problem 227.3, Pentagonal numbers, Tony Forbes, 227 12; Solution, 231
 16
 Problem 227.4, Ten coins, Tony Forbes, 227 13
 Problem 227.5, Laces, 227 18
 Problem 227.6, Snellius's formula, 227 21
 Problem 228.1, Odd expression, Tony Forbes, 228 5; Solution, 233 14
 Problem 228.2, Arithmetic progression, Martin Hansen, 228 16
 Problem 228.3, Another arithmetic progression, 228 16; Solution, 231 13
 Problem 228.4, Perfection, Tony Forbes, 228 19
 Problem 228.5, Square roots, Dick Boardman, 228 21
 Problem 229.1, Red and yellow vertices, Emil Vaughan, 229 4
 Problem 229.2, Tank, 229 12; Solution, 233 13
 Problem 229.3, Harmonic triangle, Norman Graham, 229 13; Solution,
 25714
 Problem 229.4, Balls, 229 13; Solution, 234 15
 Problem 229.5, Red and yellow points, 229 15
 Problem 229.6, 50 coins, 229 18
 Problem 230.1, Sequence, Roger Dennis, 230 11
 Problem 230.2, Sum, Sebastian Hayes, 230 11; Solution, 237 11
 Problem 230.3, Magic, Sebastian Hayes, 230 11; Solution, 237 12
 Problem 230.4, Tanks, 230 11; Solution, 233 12
 Problem 230.5, Cup-cake holder, Tamsin Forbes, 230 13; Solution, 234 10
 Problem 231.1, Log 12, 231 3; Solution, 257 16
 Problem 231.2, 45 degrees, 231 7; Solution, 241 9
 Problem 231.3, No survivors, 231 7
 Problem 231.4, Four tans, 231 15
 Problem 231.5, Four cos and four sins, 231 15; Solution, 238 6, 242 16
 Problem 231.6, Three arctans, 231 15; Solution, 240 11
 Problem 231.7, Prime, 231 21
 Problem 232.1, $\pi + i$, Tony Forbes, 232 6
 Problem 232.2, Angles, 232 7; Solution, 268 5
 Problem 232.3, Three degrees, 232 7; Solution, 238 12
 Problem 232.4, Gradients, Robin Whitty, 232 9; Solution, 246 6

Problem 232.5, Three points on a cuboid, John Faben, 232 12; Solution, 238 8
 Problem 232.6, Thrackles, 232 13
 Problem 232.7, Zero, 232 16; Solution, 239 17
 Problem 233.1, Hill, 233 10; Solution, 238 7; Re:, Ken Greatrix, 242 7
 Problem 233.2, Three secs, 233 11; Solution, 238 11
 Problem 233.3, Six tans, 233 13; Solution, 240 6
 Problem 233.4, Three tans, 233 13; Solution, 238 6
 Problem 233.5, Croquet, 233 16; Solution, 240 1
 Problem 233.6, The quartic and the golden mean, Robin Whitty, 233 17; Solution, 237 10; Re:, Tony Forbes, 240 15
 Problem 233.7, Cyclic quadrilateral, Robin Whitty, 233 17; Solution, 238 14
 Problem 234.1, Two ellipses, Tony Forbes, 234 4; Re:, Ralph Hancock, 237 13; Solution, 237 14
 Problem 234.2, Series, 234 9; Solution, 251 11
 Problem 234.3, Fixed point, 234 14; Solution, 237 16
 Problem 234.4, Tetrahedron, 234 15; Solution, 240 8, 243 10
 Problem 234.5, Graham's number, 234 16
 Problem 234.6, Simplification, Emil Vaughan, 234 17
 Problem 234.7, Directed triangles, 234 17; Solution, 239 14
 Problem 235.1, Roots, 235 7
 Problem 235.2, Quartic roots, 235 16; Solution, 237 8
 Problem 235.3, Odd pairs, 235 16; Solution, 252 6, 7
 Problem 235.4, Matrix, Tony Forbes, 235 17; Solution, 273 10
 Problem 236.1, Relationships, Tony Forbes, 236 8; Solution, 250 7
 Problem 236.2, Series, Tommy Moorhouse, 236 9; Solution, 239 16, 243 12
 Problem 236.3, Periodic function, 236 9
 Problem 236.4, Real function, 236 9; Solution, 240 7
 Problem 236.5, Harmonic quotients, Victor Moll, 236 11; Solution, 239 8
 Problem 236.6, Products, 236 20; Solution, 244 12 Problem 237.1, Three squares, Dick Boardman, 237 7
 Problem 237.2, Arctan sum, 237 13; Solution, 241 18
 Problem 237.2, Cycles [yes! Two 237.2s], 237 15
 Problem 237.3, Rearrangements, Robin Whitty, 237 16
 Problem 237.4, Continued fraction, 237 16
 Problem 237.5, Another sum, 237 17; Solution, 239 7, 240 13
 Problem 238.1, Disc, Emil Vaughan, 238 10; Solution, 252 15, 17
 Problem 238.2, Zeros, 238 10
 Problem 238.3, Sums, 238 10; Solution, 251 17

Problem 238.4, Wednesday's child, 238 17; Solution, 242 6
 Problem 239.1, Three coins, 239 13; Solution, 243 17
 Problem 240.1, Two tins of biscuits, Rex Watson, 240 5; Solution, 242 8,
 245 1
 Problem 240.2, One, Bob Bertuello, 240 7
 Problem 240.3, Double sum, 240 7; Solution, 242 12, 243 11
 Problem 240.4, Cycles, 240 15
 Problem 240.5, Cows, Tony Forbes, 240 17
 Problem 241.1, Three locks, Tony Forbes, 241 10
 Problem 241.2, Irrational numbers, 241 10; Solution, 244 11, 245 15
 Problem 241.3, Four integrals, Tony Forbes, 241 15; Solution, 247 6, 7
 Problem 241.4, Product, 241 17; Solution, 244 7
 Problem 241.5, Diagonal elements, Tony Forbes, 241 19
 Problem 241.6, Flagpole, Tony Forbes, 241 19; Solution, 244 16, 262 19
 Problem 241.7, Multiplicative function, 241 21; Solution [called 241.3 in
 243], 243 15, 246 20, 247 13
 Problem 242.1, Interesting integrals, Tony Forbes, 242 4; Solution, 245 8,
 247 10, 11
 Problem 242.2, Quintic, 242 4; Further observations, Tommy Moorhouse,
 248 9; Solution, 244 13, 248 8
 Problem 242.3, Central trinomial coefficients, Tony Forbes, 242 5
 Problem 242.4, Two sums, 242 11; Solution, 244 14, 245 4
 Problem 242.5, Coffee cup, Tony Forbes, 242 14; Solution, 247 14, 17
 Problem 242.6, Three cylinders, 242 14; Solution, 245 12, 248 18
 Problem 242.7, Numbers in a row, 242 15
 Problem 243.1, Cheese, Tony Forbes, 243 9 Problem 243.2, Cosh integral,
 Tony Forbes, 243 9; Solution, 259 12
 Problem 243.3, Odd sequence, Robin Whitty, 243 11; Solution, 248 8
 Problem 243.4, Triangle, 243 13
 Problem 243.5, Counting caterpillars, Tony Forbes, 243 14
 Problem 243.6, Piles of coins, Jeremy Humphries, 243 14
 Problem 243.7, Circuit, Tony Forbes, 243 18; Solution, 246 1
 Problem 243.8, Pentadecagon, Tony Forbes, 243 18; Solution, 247 9
 Problem 244.1, Counting graphs, 244 4
 Problem 244.2, A quick number wonder, Martin Hansen, 244 4; Solution,
 248 10, 11
 Problem 244.3, Two sums, 244 4; Solution, 249 8
 Problem 244.4, Another product, 244 7; Solution, 247 12, 249 16
 Problem 244.5, Ten primes, Patrick Walker, 244 11; Solution, 249 1
 Problem 244.6, Flagpole integral, 244 15; Solution, 258 6, 8

Problem 245.1, Birthday dinner, Tony Forbes, 245 3; Solution, 248 17
 Problem 245.10, Every other day, Tony Forbes, 245 17; Solution, 266 15,
 268 14
 Problem 245.2, Intersecting cylinders, 245 7; Solution, 248 12
 Problem 245.3, Power residues, Paul Barnett, 245 7
 Problem 245.4, GCSE question, 245 11
 Problem 245.5, Numbers, Tony Forbes, 245 15; Solution, 248 16
 Problem 245.6, Quintic, 245 15; Solution, 248 14
 Problem 245.7, Triangle division, Dick Boardman, 245 16
 Problem 245.8, Four cylinders, Tony Forbes, 245 16
 Problem 245.9, Transcendental numbers, Tony Forbes, 245 16
 Problem 246.1, Euler's function, 246 7
 Problem 246.2, Cake, Tony Forbes, 246 8; Solution (It's a piece of) Cake,
 249 6, 7
 Problem 246.3, Calculus assortment, 246 8
 Problem 246.4, Stack sort, 246 9
 Problem 246.5, Binary sequences, 246 19
 Problem 246.6, Loop, Tony Forbes, Robin Whitty, 246 21; Solution, 250 1
 Problem 247.1, $39/163$, 247 5; Solution, 250 2, 3
 Problem 247.2, Integral, 247 11; Solution, 250 8
 Problem 247.3, Balls, 247 19; Solution, 250 4, 5
 Problem 247.4, Modular equation, 247 20
 Problem 247.5, Sums of powers, Tony Forbes, 247 21
 Problem 248.1, Two theorems, 248 4; Solution, 251 6, 7
 Problem 248.2, Necklaces, 248 7
 Problem 248.3, Integer triangles, Tony Forbes, 248 11; Solution, 251 1f
 Problem 248.4, Integral, 248 14; Solution, 251 4
 Problem 248.5, Handicapped coin tossing, Tony Forbes, 248 15
 Problem 248.6, Bus stop, Tony Forbes, 248 17
 Problem 249.1, Hypersphere, Tony Forbes, 249 5; Solution, 253 8
 Problem 249.2, Estimate, Tony Forbes, 249 5
 Problem 249.3, Continued fraction, S. Ramanujan, 249 11
 Problem 249.4, Radium, Tony Forbes, 249 15; Solution, 251 14, 15
 Problem 249.5, Three circles, Dick Boardman, 249 15
 Problem 249.6, Polynomial sum, 249 15
 Problem 249.7, Syllables, Tony Forbes, 249 17
 Problem 250.1, Quadratic sum, Tony Forbes, 250 6; Solution, 252 12
 Problem 250.2, Circle, Dick Boardman, 250 9
 Problem 250.3, Ellipsoid, Tony Forbes, 250 10; Solution, 259 15
 Problem 250.4, Divisor sum, 250 10; Solution, 256 14

Problem 250.5, Guess, 250 10
 Problem 250.6, Three towns, Dick Boardman, 250 10
 Problem 250.7, Bernoulli numbers, Tony Forbes, 250 12; Solution, 253 14
 Problem 250.8, Roman numerals, Tony Forbes, 250 13
 Problem 250.9, Product, 250 13; Solution, 252 10, 254 19
 Problem 251.1, Increasing digits, Jeremy Humphries, 251 3; Solution, 254 17
 Problem 251.2, Thirteen boxes, Tony Forbes, 251 3; Solution, 254 18
 Problem 251.3, Four towns, Dick Boardman, 251 5
 Problem 251.4, Four more towns, Tony Forbes, 251 5
 Problem 251.5, Continued fractions, Tony Forbes, 251 5
 Problem 251.6, Integer, Tony Forbes, 251 9; Solution, 255 20
 Problem 251.7, Fourteen cubes, 251 12
 Problem 251.8, Six-week months, Tony Forbes, 251 13
 Problem 251.9, The Philo line, Dick Boardman, 251 13
 Problem 252.1, Three pieces, Dick Boardman, 252 5; Solution, 260 18
 Problem 252.2, Can, 252 5; Solution, 254 19
 Problem 252.3, Quadratic triangles, Tommy Moorhouse, 252 5; Solution, 255 8
 Problem 253.1, A Diophantine equation, Vincent Lynch, 253 13; Solution, 254 6, 7, 256 6
 Problem 253.2, Quadratic, 253 17; Solution, 254 20, 255 6
 Problem 253.3, Four logs, 253 17
 Problem 253.4, Two colours, 253 17
 Problem 253.5, Integral, 253 17; Solution, 255 15
 Problem 253.6, Four sums, 253 17; Solution, 255 11
 Problem 253.7, Quintic roots, 253 17; Solution, 255 16, 19
 Problem 254.1, Four bottles, Tony Forbes, 254 5; Solution, 256 12, 13
 Problem 254.2, Interesting integral, 254 5; Solution, 259 4
 Problem 254.3, Three integers, 254 11
 Problem 254.4, Gaussian binomial coefficients, 254 13; Solution, 258 1, 5
 Problem 254.5, Descending integers, 254 16
 Problem 254.6, Two octics, 254 20; Solution, 259 9
 Problem 255.1, Elementary trigonometry, 255 5; Solution, 257 10, 258 20
 Problem 255.2, Bomb, Tony Forbes, 255 7; Solution, 258 10
 Problem 255.3, Points of inflexion, Tony Forbes, 255 7; Solution, 257 18, 19
 Problem 256.1, Two bisextics, Tony Forbes, 256 11
 Problem 256.2, Three rational numbers, 256 11; Solution, 266 7
 Problem 256.3, U-boat, Tony Forbes, 256 17

Problem 256.4, Two septics, Tony Forbes, 256 17
Problem 256.5, Lost energy, 256 17; Solution, 258 12*f*, 259 6
Problem 257.1, Sorting by prefix reversal, Tony Forbes, 257 13
Problem 257.2, Three hands, Tony Forbes, 257 15
Problem 257.3, Divisor sums of powers, 257 15
Problem 257.4, Tracks Tony Forbes, 257 20; Solution, 259 13
Problem 257.5, The diameter graph, 257 20
Problem 258.1, Battersea Power Station, David Singmaster, 258 9;
Solution, 259 14, 260 1*f*
Problem 258.2, Sandwiched, 258 17
Problem 258.3, Cyclic quadrilateral and chord, 258 17
Problem 258.4, Poly-Bernoulli numbers, Tony Forbes, 258 18
Problem 258.5, Integral, 258 19; Solution, 260 12
Problem 258.6, Kolmogorov distance, Mike Lewis, 258 20; Solution, 261
19
Problem 258.7, Counting primes, 258 20
Problem 258.8, Cycle graphs, Tony Forbes, 258 21
Problem 259.1, Four primes, 259 3; Solution, 262 12
Problem 259.2, Triangle, Dick Boardman, 259 8; Solution, 262 16, 18
Problem 259.3, Discriminants, Tony Forbes, 259 10
Problem 259.4, Double integrals, 259 10; Solution, 261 1
Problem 259.5, Two darts, 259 11; Solution, 260 8
Problem 259.6, Polygon and floorboards, 259 11
Problem 259.7, Admissible numbers, 259 11
Problem 259.8, Binomial ratio, 259 11; revisited, Tony Forbes, 262 1
Problem 259.9, Polynomial, 259 11
Problem 260.1, Iterated trigonometric integral, Tony Forbes, 260 13;
Solution, 264 18, 265 17
Problem 260.2, Right-angled triangle, 260 17; Solution, 264 10
Problem 260.3, Three dice, Tony Forbes, 260 18; Solution, 266 12
Problem 261.1, Polynomial factorization, 261 9
Problem 261.2, Trigonometric double integral, 261 18
Problem 261.3, Sums of powers, Tony Forbes, 261 18
Problem 261.4, Projectile, 261 19; Solution, 265 14
Problem 261.5, Angle Trisection, 261 20; Solution, 264 14
Problem 261.6, Determinant equation, 261 20; Solution, 263 1
Problem 261.7, Integrals involving roots, 261 20; Solution, 265 8*f*
Problem 261.8, Sin integral, 261 21
Problem 262.1, Binomial ratio, 262 1; Solution, 266 20
Problem 262.2, Digit sum ratio, Vincent Lynch, 262 14; Solution, 264 16

Problem 262.3, Binomial coefficient sum, 262 14
 Problem 262.4, Rational integral, Tony Forbes, 262 15; Solution, 266 6
 Problem 262.5, HH or TH, 262 15; Solution, 264 19
 Problem 262.6, Tans, Bryan Orman, 262 18; Solution, 265 1
 Problem 263.1, 100 people and 100 boxes, 263 17
 Problem 263.2, Sequences, 263 17; Solution, 269 22
 Problem 263.3, Binomial coefficient gcd, 263 17
 Problem 263.4, Arctan integral, 263 17; Solution, 266 10, 11
 Problem 263.5, Cycles, 263 21 Problem 263.6, Simplification, Tony Forbes,
 263 22
 Problem 264.1, Lift off, Tony Forbes, 264 7
 Problem 264.2, Tutte's Golden Identity, Tony Forbes, 264 12
 Problem 264.3, Determinant, 264 13; Solution, 266 16, 268 4
 Problem 264.4, Polynomial, Tony Forbes, 264 15 Problem 264.5, Two
 planets, 264 18
 Problem 264.6, Semicircle dissection, Tony Forbes, 264 20
 Problem 264.7, Log cot integral, 264 20
 Problem 265.1, Three circles, 265 11
 Problem 265.2, Seven squares, 265 19
 Problem 265.3, Isosceles triangle, Dick Boardman, 265 20
 Problem 265.4, Stopping time, 265 20
 Problem 265.5, Telephone box, Ralph Hancock, 265 21
 Problem 265.6, Triples, Tony Forbes, 265 21
 Problem 265.7, Population control, 265 21; Solution, 268 16
 Problem 266.1, Highly irregular graphs, 266 5
 Problem 266.2, Snooker without friction, 266 9
 Problem 266.3, Equilateral triangle, 266 17
 Problem 266.4, Determinants, Tony Forbes, 266 18
 Problem 266.5, Binomial ratio revisited, 266 21
 Problem 267.1, Trigonometric integral, 267 7; Solution, 269 2
 Problem 267.2, Hanoi revisited, Tony Forbes, 267 17
 Problem 267.3, Floor and ceiling, Tony Forbes, 267 17; Solution, 271 12
 Problem 267.4, Bernoulli numbers, 267 19; Solution, 270 8
 Problem 267.5, Quadruples, Tony Forbes, 267 21 Problem 268.1, Two
 triangles, 268 4; Solution, 270 2f
 Problem 268.2, Induction, 268 7
 Problem 268.3, Sequences, 268 13
 Problem 268.4, Triangles in a grid, 268 18
 Problem 268.5, Factorization, Tony Forbes, 268 19; Solution, 270 19
 Problem 268.6, Squares with even digits, 268 21; Solution, 270 20

Problem 268.7, Interest, 268 22; Solution, 270 6f
 Problem 269.1, Random sequences, Tony Forbes, 269 1
 Problem 269.2, Two rectangles, Tony Forbes, 269 2; Solution, 272 14
 Problem 269.3, Three in a line, 269 3
 Problem 269.4, Three-sided dice, 269 3
 Problem 269.5, Coins, 269 3; Solution, 271 14
 Problem 269.6, Cos pi over seven, John Davidson, 269 4
 Problem 269.7, Matches, Tony Forbes, 269 4
 Problem 269.8, Integral, 269 26; Solution, 271 18
 Problem 270.1, Pond, Tony Forbes, 270 1
 Problem 270.2, Bernoulli numbers, 270 1
 Problem 270.3, Cubes with even digits, 270 1
 Problem 270.4, Limit, 270 14
 Problem 270.5, Binomial coefficient sum, 270 14; Solution, 272 17
 Problem 271.1, Complex exponential sums, Tony Forbes, 271 13;
 Solution, 273 16
 Problem 271.2, Two-digit squares, 271 16
 Problem 271.3, Truncation, Ralph Hancock, 271 19
 Problem 271.4, Fractions, 271 20
 Problem 271.5, Fibonacci's geese, Ralph Hancock, 271 21
 Problem 272.1, Finite integral, 272 18
 Problem 272.2, Infinite integral, 272 18
 Problem 272.3, Stamps, Tony Forbes, 272 19
 Problem 272.4, Pseudoprimes, Tony Forbes, 272 19
 Problem 272.5, Sums of digits of powers, 272 20
 Problem 272.6, Irreducible polynomials, Tony Forbes, 272 22
 Problem 273.1, Hair, 273 11
 Problem 273.2, Square, split and add, Tony Forbes, 273 15
 Problem 273.3, Rational integral, 273 20
 Problem 273.4, Sums of reciprocals of primes, 273 21
 Problem 273.5, Twisted prisms, 273 22
 Problem of the week, 239 19 problem, 194 5, 7
 Problems 90.1 to 90.3, Gareth Harries, 232 17
Proceedings of Symposia in Applied Mathematics, 195 5
Proceedings of the Cambridge Philosophical Society, 172 6
Proceedings of the Laotian Philosophical Society, 205 19
Proceedings of the London Mathematical Society, 174 21, 195 17, 207 17
*Proceedings of the The Institute of Electrical and Electronics Engineers
 Symposium on Research in Security and Privacy*, 182 12
 Product of cosines, Sebastian Hayes, 208 20

Product of digits, David Singmaster, 197 8
Product of regular polygon chords, Sebastian Hayes, 208 24
Product, 211 7, 241 17, 250 13
Products, 236 20
Professor Pile's prime pathway, Chris Pile, 229 14; revisited, Chris Pile, 236 17
Projectile, 261 19
Pronunciation, Eddie Kent, 232 16; Jeremy Humphries, 156 22
Proof (2005), Eddie Kent, 211 16
Proof, 228 8
protractor, An early, Dirk Bouwens, 171 18; analysis, 173 16, 17
Proverbs and well-known sayings, 192 29
Proverbs, 211 12
Proverbs, letter, Ralph Hancock, 194 25
pseudocode, 271 2
pseudoprimes, 269 5
Pseudoprimes, 272 19
Ptolemy (Claudius)'s theorem, 150 15, 204 17; Ralph Beauclerk, 159 10
Ptolemy, *Almagest*, 156 2, 159 12, 168 5
Pudding Lane, 173 26
Pulisa Siddhanta, 168 5
Purvis, Bill, Solution 203.5, 50p in a corner, 207 8; What's next?, letter, 215 25
Putting Computer Systems to Work, Bob Margolis, 164 17
Puzzle generator, letter, Tony Huntington, 164 21
Puzzle panel, 163 17, 196 16, 199 24
puzzled hotelier, The, 202 9
Puzzles in M500 156, Gordon Alabaster, 158 22
Puzzles, 156 23
Pythagoras, musician, 160 3
Pythagoras, numbers, 160 12
Pythagoras's theorem, 215 14
Pythagorean sevens, 152 23
Pythagorean squares, Chris Pile, 229 11
Pythagorean theorem, Leslie Alan Kopel, 156 18
Pythagorean triangles, 225 17
QBASIC, 169 14; 170 1
QUADRAT, 173 22
Quadratic equations, letter, John Bull, 202 21
quadratic residue, 269 10

Quadratic sum, 250 6
 Quadratic triangles, 252 5
 Quadratic, 253 17
 Quadratum Magia, Eddie Kent, 265 18
 Quadrilateral problem, 199 20
 Quadrilateral, 196 19; Ken Greatrix, 176 23
 quadruple trefoil knot, 159 1
 Quadruples, 267 21
 Qualcomm, Inc., 182 28
 quantum mechanical treatment of a sloping potential well, A, Tommy Moorhouse, 259 1
 quantum mechanics, 220 22
 Quarternions and permutation matrices, Dennis Morris, 226 11
 quarternions, 203 1, 206 1
 quartic and the golden mean, The, 233 17
 Quartic roots, 235 16
 Quartics letter, Norman Graham, 230 6
 Quasi-magic sudoku, 213 25; puzzles, Tony Forbes, 215 1
 quasi-magic sudoku-like puzzle, a, Tony Forbes, 212 21
 Quaternionic space, Dennis Morris, 223 10
 Queen of Hearts, 240 1
 query, 165 c
 Questions, Jeremy Humphries, 151 8
 Questshion, 152 18
 Quetelet, Adolphe, gambling, 157 11
 quick number wonder, A, 244 4
 Quigley, Arthur, Millennium, letter, 172 18; reply, Martin Cooke, 178 34
 Quigley, Arthur, 32 pounds, letter, 176 26; Solution 174.4, 32 pounds, 176 24
 Quintic roots, 253 17
 Quintic, 242 4, 245 15
 quotient group of $\mathbb{Q}241$, A, Tommy Moorhouse, 241 16
 Rabelais, François, a list, 164 21
 rabies, 224 14
 Radford, E. M., *Mathematical Problem Papers*, 194 7
 Radford, Tim, 160 17
 Radio 4, 156 23, 167 24; Square on the Pythagoras, 162 24
 Radio 5, 165 15, 172 15,
Radio Times, 154 4
 Radium, 249 15

Radnitzky, Emmanuel, painter, 270 15
Radulphus, 164 14
Raffle tickets, 153 19
Rahn, J. H., *Teutsche Algebra*, 158 20
Rain, 208 19; letter, Ralph Hancock, 215 25
Rainfall, Colin Davies, 160 15
Ramanujan, composite, 195 17
Ramanujan, Janakiammal, 267 19
Ramanujan, Srinivasa Aiyangar, FRS, 202 1, 204 17, 216 3, 232 16, 267 19, 272 6; Notebook 2, 270 1; Problem 202.1, Squaring the circle, 202 9; Problem 226.7, Squaring the circle, 226 21; Problem 249.3, Continued fraction, 249 11; Ramanujan's continued fraction, Norman Graham, 218 16
random points on a sphere, 239 18
Random quadratic equations, Tony Forbes, 204 22
Random sequences, 269 1
random, 158 14
Ransome, Arthur, *Swallows and Amazons*, 152 21
Rapaport, Elvira (trs.), *Hungarian Problem Book*, 171 13
rat density, 154 7
Rates, Dilwyn Edwards, 189 19; again, letter, 191 21
rateyourmusic.com, 227 21
Rational fundamental constants, Tony Forbes, 260 14
rational hypotenuse, The, Barbara Lee, 150 7; Stuart Cresswell, 152 6
Rational integral, 262 15, 273 20
Rational points on elliptic curves, 255 c
rational problem, A, 160 23
Rational square, 170 20
Rationality, Jeremy Humphries, 163 16
rationals, filler, 241 10
RATS, 220 21
rattleback, 150 13
Ray, Man, photographer, 270 15
Read, Ronald, How many graphs?, 150 23
Reade, John, All play all fixture lists, 151 3; Dates, letter, 205 23; Morse, 227 21; Problem 157.1, Monkey-nuts, 157 21; Problem 164.2, ABCD, 164 25; Problem 169.3, Squares in arithmetic progression, 169 20; Problem 176.4, Factorial squares, 176 28; Problem 189.5 40 years, 189 14; Problem 199.3, Two tangents, 199 19; Recurring decimals, 184 17; Solution 147.1, Add one, 150 15; Solution 153.1, A not-so-obvious

isomorphism, 157 22; Solution 153.3, Raffle tickets, 157 23; Solution 168.2, 345 square, 170 18; Solution 175.5, abc, 178 35; Solution 187.4, Six secs, 190 16; Solution 195.2, Six tans, 198 17; Subsequences, 157 10; V.A.T., letter, 172 17

Real function, 236 9

real number, A curious definition of a, Sebastian Hayes, 212 10

Real space is hyperbolic, Euclidean space is imaginary, Dennis Morris, , 209 10

Rearrangements, 237 16

Rebus, 156 23; answer, 158 11; Paul Teggin, 160 18; Colin Lindsay, 161 17; answers to M500 160, 161, 162 21

Reciprocal inequalities, 175 28

Reciprocals, 170 20; 205 9; of prime numbers, Dennis Morris, 190 1

Recorde, Robert, *Ground of Artes*, 158 20; *The Whetstone of Witte*, 156 18, 161 3

Rectangle construction, 222 7

Recurrence relations, Dave Turtle, 182 1; Ken Greatrix, 181 22; Robin Marks, 179 1

Recurrence systems using the T180 calculator, Patrick Meehan, 173 21

Recurring decimals, letters, 184 16, 17, 186 22

Recurring digital invariants, Colin Davies, 156 19; Dave Ellis, 158 21; Lawrence Bradby, 163 19; Tony Forbes, 165 4

Recurring runs, Susan Cook, 182 27

recycling, 187 23

Red and yellow points, 229 15; vertices, 229 4

Rees, Sir Martin, 198 20

Referendum pie, Mike Grannell, 273 18

Reflection, 216 17

Reid, Colin, Problem 227.2, Conspiracy theory, 227 11

Reilly, Alan, Things, 159 15

Reissner--Nordstrom metric, 271 9

Relations between trig functions of specific values, Richard Boardman, 214 12

Relationships, 236 8, 250 7

Relativity without c , Sebastian Hayes, 228 12

relativity, 270 16

Relativity, Sebastian Hayes, 198 12

Repeated differentiation, 218 21

reply to Arthur Quigley's letter in 176, A, Martin Cooke, 178 34

Report upon Fibonacci numbers and quaternions, Dennis Morris, 203 1

Resistance matrix, Edward Stansfield, 160 16
restaurant bills, 222 15
Return of the lazy fat lady, Martin Cooke, 183 6
Reverse and square, 182 8
Reversed cheque, Andrew Pettit, 271 17
Reversible numbers, Dennis Morris, 230 2
Reversing a needle, 223 21
Review of StarOffice 5.1, Simon Geard, 171 10
Revisiting Pascal's triangle, Martin Hansen, 221 1
revolutionary view of numbers, a revolutionary view of groups, the
unification of mathematics, and the unification of physics, A, Dennis
Morris, 210 14
revolutionary view of space, A, Dennis Morris, 207 1
Rewriting subsequences, Sebastian Hayes, 162 22
Reynolds, J. J., Issue 264 - How to do mathematical research, 267 20
Rhodes, David, chain letter, 159 13
rhombicuboctahedron graph, 224 c
Rhombus, 203 20
Ribenboim, P., *Fermat's Last Theorem for Amateurs*, 272 13, 273 9
Ribet, Kenneth A., 160 10, 225 13
Richards, D., *Advanced Mathematical Methods with Maple*, 259 3
Richards, E. G., calendars, 268 15
Richards, Paul, Problem 180.2, Unlimited prize, 180 11; Solution 213.6,
What is the number?, 216 8
Richardson, L. F., 181 6
Rickert, N. W., 189 12
riddle of the gold bars, the, 246 14
Riddles, letter, Hugh McIntyre, 214 20
Riemann hypothesis, 152 9
Riemann zeta function, The, 175 c
Riemann, Bernhard, 206 1
Riesel, Hans, *Prime Numbers and Computer Methods for Factorization*, 153 4,
172 6
Right-angled triangle, 260 17
Right-angled triangles, Chris Pile, 228 20
Riis, Soren, 221 13
Rindler metric, 271 8
River crossing, 214 11, 219 16
Roberts, J. D., biased dice, 174 13
Robertson, David, Under the skin, 199 27

Robertson, Jean, Complex complex complex, letter, 173 28
Robertson, Stewart, Solution 241.2, Irrational numbers, 244 11; Solution
244.2, A quick number wonder, 248 10
Robinson, Robert, *The Dog Chairman*, 165 10
Rogers, Ambrose, packing, 156 8
Roll me over, Tony Forbes, 176 20
Rolph, Simon, Problem 180.6, Two pedestrians, 180 25
Roman numerals, 250 13
Ronan, Mark, *Symmetry and the Monster*, Dennis Morris, 219 18
Roonguthai, Warut, Large prime quadruplets, 153 4, 158 15 Root 11, 174
26
Root 11 again, 179 27
Root 33, 192 15
Roots and the division of angles, Peter L. Griffiths, 271 21
roots of unity, The, Jim James, part 1: Fundamentals, 150 11; part 2:
Generalisation, 151 9; part 3: Intermission, 152 12; part 4:
Convolution, 153 11; part 5: Complication, 154 16; part 6: Resolution,
156 4
Roots, 193 24, 235 7
Rosier, Norma, large prime numbers, 177 19; Winter Week-End, 152 17,
159 9
Rosser, W. G. V., *Introducing Relativity*, 217 13
Rossi, Hugo, quoted, 232 3
Rotating digits, 203 15
Rotations of the sphere, Rob Evans, 254 8
Rotations, 216 2
Roth, Bruce, Two failed attempts to dispose of Fermat's Last Theorem,
258 16
Rothman, Patricia, 242 17
Rothschild, B. L., 215 21, 234 16
Rounder than the sphere, Dennis Morris, 224 16
round-tower, 172 21
Rowe, A. W., 174 15
Rowlands, John, & Sheila Rowlands (eds), *Second Stages In Researching
Welsh History*, 202 21
Rowley, Chris, usable TeX, 177 19
Royal Society, 168 10
Royal St George Golf Club, 154 13
Rubik cube 5^3 , 248 c
Rubik cube, 250 14

Rubik's Clock, Tony Forbes, 255 14
rude, 172 25
Ruffle, Paul, Fusion, a new physics society, 181 19
ruined gambler, The, Eddie Kent, 151 5
Rule 30, 235 *bc*
Rule 90, 235 *c*
Rummukainen, Antti, Japper-wok (trans), 213 21
Runge, Michael S., 2^o5, 162 21
Russell on mathematics, 214 2
Russell, Bertrand, & Alfred North Whitehead, *Principia Mathematica*, 175
40, 223 1
Russell, Bertrand, 202 2; on mathematics, 163 15; *A Sequel to Elementary
Geometry*, 219 15
Russell's attic, Eddie Kent, 214 19, 222 9; Tony Huntington, 218 12
Russian peasant multiplication, Sebastian Hayes, 243 1
Russian phrases, 249 15
Russian roulette, 182 20; letters, 186 24
Rutherford, Carrie, Solution 245.1, Birthday dinner, 248 17; Solution
254.1, Four bottles, 256 13
Ryan, John, Binary representation of roots, 152 3
Ryanair, 192 22
Sabuco, Oliva, *New Philosophy of Human Nature*, 232 14
Säfhholm, Sten, prime tuplets, 153 6
Sagan, Carl, *The Demon Haunted World*, 154 12
Sainsbury's, 195 25
Saint Petersburg paradox, The, Eddie Kent, 157 10
Saint-Exupery, Antoine de, *Terre des Hommes*, 248 21
Saint-Victor library, 164 21
San Jose Mercury, 152 16
Sandwiched, 258 17
Saros, 178 1, 7
Satsuma segments, 204 12
Saunders, Ian, Physics and/or balls, 153 16
Sawhney, Nitin, dancer, 232 16
sca[e]lers, 211 13
Scaliger, Joseph (1540–1609), 268 14
Scarne, John, 266 12; *Scarne on Cards*, 266 12; *Scarne on Dice*, 174 14, 266
12, 268 20
Scarne, Ralph Hancock, 268 20
Scarnecchia, Orlando Carmelo (Scarne), 268 20

Scepticism in mathematics, Sebastian Hayes, 205 10; letter, Colin Davies, 208 25
Schaum (Daniel), *Mathematical Tables*, 197 27
Schneier, Bruce, *Applied Cryptography*, 176 6
Schoenberg, Arnold, 262 21
scholium, 253 1
school inspections, 153 3
School of hard sums, 257 3
Schott, Father, 158 17
Schur real zeros theorem, The, Tony Forbes, 230 15
Schuster, Peter-Klaus, *Melencolia I – Dürers Denbild*, 265 18
Schutz, B., *A First Course in General Relativity*, 270 19, 271 12
Schwartz, Joseph, *Einstein for Beginners*, 198 15
Schwarzschild metric, 271 8
sci.math, 163 1
Science Now, 156 22; 157 13
Science of Secrecy, The, 177 29
Science, 215 21
Scientific American, 160 10, 162 2, 167 26, 175 37, 182 29, 184 20, 195 5, 215 21, 217 13, 223 19, 248 14, 265 19
Scientific Sport, 154 4
SCILAB, 249 2
scorer, darts, 197 29
Scott Of The Antarctic, 235 18
Scott, George, 156 7
Scott, Giles Gilbert, 265 21; improver, 258 9
Scott, Miss Charlotte Angas, 156 13
Searcoid, Michael O', *Elements of Abstract Analysis*, 213 15
Seaton, Lawrence, design, 168 c
See Chin Woon, a construction, 268 13
Seeley, M. E., *Goodbye, Descartes* by Keith Devlin, 156 11
Selberg, Atle, prime number theorem, 152 8
Seldon, John, Solution 193.3, Thirteen tarts, 197 7; Under the skin, 199 27
Seleucid dynasty, zero, 156 2
self similarity, 170 4
self-descriptive sequence, 232 17
Selfridge, J. L., primality, 172 6
Semicircle dissection, 264 20
semi-magic square, 215 1
Senechal, Marjorie, & George Fleck (eds), *Shaping Space*, 164 18

Sentences, Jeremy Humphries, 211 21
separation, 164 16
sequence 1, 1, 3, 7, 19, 51, ..., The, Patrick Walker, 223 12
Sequence, 230 11
Sequences, 205 25, 263 17, 268 13
Serebriakoff, Victor, timber, 253 16
Series , 178 40, 236 9, 234 9
Series squared, 175 28
set of all objects is a group, The, Grant Curry, 164 4
Seven a side, Chris Pile, 185 12; Dick Boardman, 185 12; Eddie Kent, 183
21; John Hulbert, 185 12; John Smith, 185 12; Sue Bromley, 185 12
Seven events, 187 25
Seven real numbers, 183 22
Seven squares, 265 19
seven times nine, 242 13
sewage treatment, 174 26
Sewell, Wayne, *Weaving a Program*, 177 19
Sextic, 207 19
Shackel, Nick, 151 15; Problem 150.3, Envelopes paradox, 150 22;
Solution 148.1, A hornet's nest, 150 19
Shakespeare plays, 207 15
Shakespeare, 270 15
Shakespeare, W., *As You Like It*, 171 4
Shakespearian sonnet, 152 2
shampoo, 218 11
Shanks, D., on primality, 269 21
Shanks, Daniel, incredible, 174 23; *Solved and Unsolved Problems in
Number Theory*, 196 4; π , 170 24
Shannon entropy, Ralph Hancock, 240 14
Shannon, Bill, a mathematical joke, 172 25; honours, 169 25
Shannon, Claude, *Collected Papers*, 180 17
Sharp, John, finder, 258 9
Sharpe, David, 204 18
Sharpey-Schafer, J. M., 173 19, 174 15
Shaw Mike, Solution 269.2, Two rectangles, 272 14
Shell found on beach, 172 24
Shields, C. O., bound, 257 13
Shimura, Goro, & Yutaka Taniyama, *Modern Number Theory*, 160 10
SHIP to DOCK, 243 9
Ships and docks 2 problem, 246 15

Shirakawa, Toshihiro, magic, 273 20
 shoemaker's knife, 223 19
 shoes from Ralph Hancock, 253 13
 Short exact sequences and group extensions, Tommy Moorhouse, 261 10
Shorter Oxford, 220 21
 Shorties, Eddie Kent, 268 19
 Shute, Peter, engraving, 168 c
 Sierpiński triangle, 178 33
 Sierpiński's carpet, 171 21
 Sierpiński's Gasket, 171 21, 195 2
 Sightsavers charity, 177 29
 Silverman, J. H., & J. Tate. *Rational Points on Elliptic Curves*, 256 9, 257 19
 Silverstone, Sidney, John Fauvel, 181 1
 Simmons, George F., *Differential Equations with Applications and Historical Notes*, 175 41
 Simon Singh, his book, Eddie Kent, 260 20
 simple lever, A, Eddie Kent, 269 4
 simplicity, 266 20
 Simplification, 234 17, 263 22
 Simpson, Sheila, Re, Associated with every integer there is a group, 158 18
Simpsons, The, 260 20, 267 19
 Sin integral, 261 21
 Sinbad, from M500 16, 170 29
 Sine series, 201 5, 215 18
 Singh, Simon, *Fermat's Last Theorem (or Fermat's Enigma: The Epic Quest to Solve the World's Greatest Mathematical Problem)*, 156 8, 158 23, 159 7, 14, 160 9, 177 29, 258 16, 17, 260 20; *Big Bang*, 205 17, 260 20; *Fermat's Last Theorem and the Wolfskehl prize*, 159 7; *The Code Book*, 177 29, 260 20; CD, 194 20; *The Science of Secrecy*, 177 29; *The Simpsons and their Mathematical Secrets*, 258 16, 260 20; *Trick or Treatment? Alternative Medicine on Trial*, 260 20
 Singleton, Thirteen, 150 2
 Singmaster, David, 157 17, 262 15; A history of time, 171 1; A history of π , 168 1; A paradoxical dice problem, 199 24; Can a number be equal to the sum of the sum and the product of its digits?, 191 6; Factorial digital invariants, 187 25; Find the missing terms, 179 25; Galileo, 173 27; Galileo, letter, 175 37; History of the Calendar, 178 1; Horses, 191 20; Medieval Chronology, 171 1, 178 1; Nine matches, letter, 176 28; Non-singular dice, 174 12; On the cellular automaton of Ulam and Warburton, 195 2; opportunity, 264

19; Problem 179.1, Two cars, 179 20; Problem 185.4, Two sins, 185 22;
 Problem 191.6, Porthole, 191 24; Problem 258.1, Battersea Power
 Station, 258 9; *Problems for Metagrobologists*, Tony Forbes, 271 20;
 Product of digits, 197 8; Re: ONE + TWELVE = TWO + ELEVEN,
 196 16; Re: Problem 171.1, Cylinder, 173 19; Russian roulette, letter,
 186 24; Solution 191.6, Porthole, 194 16; Solution 193.2, Concave to
 convex, 197 17; Sources in Recreational Mathematics, 196 16; Two
 cars, letter, 179 23
 Sir James Lighthill, Eddie Kent, 165 16; letter, Steve Otto, 167 27
Sitzungsberichte der Preussischen Akademie der Wissenschaften, 165 12
 Six celebrities, 190 20
 Six primes, 270 c
 Six secs, 181 14
 Six short problems, Barbara Lee, 159 19; Solutions, A. J. Welton, 163 12
 Six tans, 195 22, 221 13, 233 13
 Six-region sudoku puzzles, Tony Forbes, 217 20
 Six-region sudoku, Tony Forbes, 214 21
 Six-sided pencil, 181 18
 Sixteen lamps, 194 28
 Sixteen matches, Eddie Kent, 170 28; Ken Greatrix, 174 26; letter, John
 Halsall, 172 16
 Sixteen tarts, 188 29
 Six-week months, 251 13
 Skidoo, Eddie Kent, 238 17
Skye boat song, 219 21
 Slatkevicius, Rytis, 226 19
 Slicing a torus in half, Tony Forbes, 204 10
 slicing vertices, 239 7
 sliding blocks, 244 5, 6
 sliding-block puzzle, A, Tony Forbes, 244 5; solution, Dick Boardman,
 244 6
 Sloane, Neil, *The On-Line Encyclopedia of Integer Sequences*, 195 4, 205 21,
 257 13
 Slomson, Alan, ... Odds ..., letter, 164 22; An early protractor, 173 16;
 More hornets, 151 17
 Slowinski, David, primes, 152 16, 153 2, 158 2, 160 1
 small but finite, 150 13
 small ditrigonal icosidodecahedron, A, Marion Stubbs, 183 24
 Small probabilities, John Bull, 159 3; letter, John A. Bull, 160 17
 small tarts, 193 25

Smallest square, 193 13
Smith, D. E. (ed.) *A Budget of Paradoxes*, 168 3
Smith, Edson, 226 19
Smith, Geoff, moderator, 167 17
Smith, John, Mutually touching cylinders, 218 13; Seven a side, 185 12;
Solution 182.6, n balls, 189 18; Solution 184.1, Twelve boxes, 190 18;
Solution 187.3, Square wheels, 190 10; Solution 187.4, Cots, 190 15;
Solution 196.4, Snub cube, 200 20; Solution 214.5, 1000000 tarts, 217
18; Solution 218.1, Wands, 221 14
Smolin, Lee, *Atoms of space and time*, 217 13
Snap, 198 11
snarks, 241 22
Snarks, 241 *c*
Snellius's formula, 227 21
snooker problem, Jeremy Humphries, 203 14; solution, 207 19
Snow and sausages, Tony Huntington, 235 18
snub cube graph, The, 225 *c*
Snub cube, 196 22
snub dodecahedron, 196 0
Soane, Sir John, 265 21
Soap, Eddie Kent, 222 21
Sobel, Dara, *Longitude*, 156 12
Society for Industrial and Applied Mathematics Journal on Computing, 182 13,
213 15
Society for Research into Higher Education, 248 19
Socrates / Glaucon [Σωκράτης / Γλαυκῶν], 165 8,9
Soddy, Frederick, *The Kiss Precise*, 159 13
Sole, Tim, *The Ticket to Heaven*, 177 15
Solent M202 Newsletter, 162 26, 250 17
solid of revolution problem, 167 17
solitaire, 185 23
Solution 108.1, Darts, 256 16
Solution 147.1, Add one, 150 15*f*
Solution 148.1, A hornet's nest, 150 16*f*
Solution 148.2, Standard deviations, David Kerr, 151 13
Solution 148.3, Integers, 150 21, 151 18
Solution to the sliding-block puzzle, Dick Boardman, 244 6
Solutions to 'Six short problems', A. J. Welton, 163 12
solutions, Page 21, Colours (14), 225 7

Solving a nonlinear ordinary differential equation, Tommy Moorhouse, 260 16
 Solving sudoku puzzles mathematically, Tony Forbes, 209 16
 SOMA cube, 152 5
 Some maths from long ago, Bob Escolme, 194 1; from even longer ago, Dick Boardman, 197 24
 Something to ponder, 239 7
 Songs likely to be of interest to mathematicians, 204 25
 sonnet challenge, The, Jeremy Humphries, 152 2
 Sophie Germain and Fermat's Last Theorem – I, Roger Thompson, 272 6, – II, Roger Thompson, 273 1
 Sophie Germain primes, 272 7
 Sophie Germain's Theorem, 272 7, 273 1
 Sorting by prefix reversal, 257 13
 Sotheby's, 270 15
 Sothic cycle, 178 5
 Space balls, Eddie Kent, 156 7
 space-time, 232 7
 Sparrow, Stephen, Grazing oxen, 167 24
 Special Issue 1997, Jeremy Humphries, 154 11
 Special Issue points, 150 4f
 Special Issue, call, 166 19
 Special offer, Colin Davies, 193 26
Spectator, 175 38
 speed of dark, The, Tony Huntington, 225 19
 Spence, Gordon GIMPS, 158 2
 Spencer, George F., epitaph, 163 16
 Spencer, Gratis P., epitaph, 163 16
 Spencer, Joel, quoted, 192 1
 Spencer, John, Arithmetic/geometric mean inequality, 197 4; Dot products and determinants, 196 23; Goat, 194 23; Problem 219.1, Walk, 219 16; Solution 190.3, Goat, 193 23; Solution 190.6, Triangle, 193 12; Solution 191.6, Porthole, 194 14; Solution 191.7, Sum and reciprocal, 194 11; Solution 196.2, Quadrilateral, 199 21; Solution 199.3, Two tangents, 203 16; Solution 201.1, Continued fraction, 205 13; Solution 215.1, Pythagoras's theorem, 219 18; Solution 216.5, Equation, 218 19
 Sphere in a cone, 205 9
 Spiegel, Murray R., *Theory and Problems of Complex Variables*, 172 8
 spiral, 156 c

Spivak, Mike, *Complex Analysis*, 152 7
Spooner, Reverend W. A., 204 25
Spreadsheets, 161 10
square free, 183 5
square root extraction, 150 7
square root of 69, 194 28
Square roots, 228 21
Square roots, Pete Charlton, 176 16
Square wheels, 187 20
Square with corner missing, 200 22
Square, split and add, 273 15
Square-free integers, 178 29
Squares in arithmetic progression, 169 20
Squares with even digits, 268 21
Squaring numbers, Eddie Kent, 241 12
Squaring the circle, 202 9, 226 21
Squawks, Eddie Kent, 179 28
Squaws, R. V. Boyd, 165 14
Squires, Martin Cooke, 175 32
St Augustine quoted, 192 2
St John's Wood, 156 22
St Pancras Old Church, 265 21
St Petersburg paradox, A 'solution' to the, Martin Cooke, 180 24
Stack sort, 246 9
Stamps, 272 19
Stannard, Russell, *Astronomy and planetary science* (S281), 158 16
Stansfield, Edward, Power of ten, 166 20; Resistance matrix, 160 16;
 Solution 182.7, Three cos and two sins, 184 15; Solution 243.7,
 Circuit, 246 5; Solution 244.2, A quick number wonder, 248 11;
 Solution 252.3, Quadratic triangles, 255 8; Solution 264.3,
 Determinant, 268 4
Start the week, 232 16
state of π , The, Eddie Kent, 153 2
statics problem, A simple, Bryan Orman, 236 10
Statistics, Judith Furner, 150 2
Stcherbaysky, F. T., Buddhist Logic, 214 9
Steele, Guy, analyst, 268 20
Steers, Hugh, 178 24
Stein, Gertrude, *Geographical History of America*, 155 24
Steiner system S(3, 6, 22), 221 c

Steiner system, 209 0, 257 1, 3
Steiner systems, 195 26, 27
Steiner, Jakob, *Die geometrischen Konstruktionen ausgeführt mittels der
gareden Linie und Eines festen Kreises*, 180 15
Steingrimsson, Einar, 246 9
Steinhaus, H., *Mathematical Snapshots*, 222 20
stellated pentagon, 163 c
Stephens, Joan, Solution 148.1, A hornet's nest, 150 19
Stern, Martin, dates, 178 13
Sertenbrink, Meyrignac and Mackay, 265 18
Stevin, Simon, *La thiende*, 158 20
Stewart, B. M., 267 13
Stewart, I., & D. Tall, *Algebraic Number Theory and Fermat's Last Theorem*,
231 3
Stewart, Ian, 191 23; *Galois Theory*, 228 5; *Does God Play Dice?*, 162 24;
Mathematical Recreations, 195 5; *Nature's Numbers*, 162 24
Stewart, Ian, *Nature's Numbers*, Alan Pears, 154 21
Stewart, William G., 171 18, 21
Sting, The, 266 12, 268 20
Stirling's formula, 244 15
Stirling's approximation, 267 3
Stitched curves, letter, Chris Pile, 211 14
stochastic dynamics, 174 14
Stojiljkovic, Dragan, 180 26
Stolarsky, K. B., 201 5
Stoll, Robert R., *Set Theory and Logic*, 206 20
Stone, Jeremy, 154 12
Stopping time, 265 20
Stoppie, Jeffrey, *A Primer of Analytic Number Theory*, 221 8
Størmer formula, 170 23
Strand Magazine, 216 9, 219 12
Strauss, Andrew, editor, 270 15
Strawberry Fields forever, 227 21
STRETCH, 168 14
string theory, 223 20
Strings, 187 22
Strockis, Mindaugas, 202 23
Stubbs, Josephine, Feedback, letter, 170 27

Stubbs, Marion, 156 18, 181 25, 220 16; A small ditrigonal icosidodecahedron, 183 24; External hard disk drive, 1.8 Gb, 154 2; founder, 162 26

Study numbers, 211 4

Study, Eduard, 208 16

Subsequences, John Reade, 157 10

Subtract square root, 179 27

Sudborough, I. H., bound, 257 13

sudoku puzzle, 206 0, 19

Sudoku puzzle, 246 15

sudoku puzzles, 219 17

Sudoku verification, 212 19

sudoku, 209 16, 215 1, 217 20

Sulvasutras, The, 168 4

Sum and reciprocal, 191 24

Sum, 230 11

summation convention, 228 12

Sums of digits of powers, 272 20

Sums of odd integers, Sebastian Hayes, 166 22; Re., Sebastian Hayes, 169 13

Sums of powers of chords (again), Sebastian Hayes, 189 16

Sums of powers, 198 16, 247 21, 261 18

Sums of Powers, Again, Barry Lewis, 167 1

Sums of reciprocals of primes, 273 21

Sums, 238 10

Sunday Telegraph, 192 15

Sunday Times see *The Sunday Times*

Sundial, letter, 184 20

Sundials, letter, 186 24

supercomputer dies, A, Eddie Kent, 154 12

Surface area of a torus, 204 13

Surface area of an ellipsoid, 194 7

surname frequencies, 202 21

Sutton, John, mental arithmetic, 165 15

Suzuki, Misako, 160 11

Swan, Don, *All You Wanted to Know About Mathematics, but Were Afraid To Ask* by Louis Lyons, 156 9; *Capital Ideas* by Peter Bernstein, 156 10; *Comic Sections* by Des McHale, 156 10; two OU courses, 150 3

Swap sort, 206 17

Switch, 191 25

Syllables, 249 17
Sylow (Ludwig)'s theorems, 262 12
Sylow, Mr & Mrs, 156 22
Sylvester's Determinant Theorem, 268 4
Symbolics Inc., 168 15
table mat $G(14, \pi/32) \cong 0.994689$, 266 *c*
Table of computations of π from 2000 BC to now, Eddie Kent, 159 2
tablets, 245 17
Talmud, 168 4
Tamref, C. A., Problem 159.1 Operation bumble-bee, 159 19
Taniyama, Toyo, 160 10
Taniyama, Yutaka, 160 10
Tank, 229 12
Tanks , 230 11
Tans, 262 18
Tansey, D. M., $a = b$, letter, 184 18; Solution 182.7, Three cos and two sins, 184 15; Solution 187.6, Iteration, 190 17
Tansey, David, Solution 184.2, Monk, 186 20; Solution 184.3, Lake escape, 187 12
Tarquin publications, 221 8
Tarts, Ian Adamson, 225 15
Tarts, James Elsey, 222 20
taxi cab number 172 9, 267 19
taxicab numbers, 267 19
Taxicabs and mathematics, Eddie Kent, 267 19
Taylor expansion, 266 18
Taylor, Bill, Tower of Saigon, 163 18
Taylor, John, $1 + 1 = 2$, 180 27
Tchebychev's theorem, 197 26
Tea, 243 13
Tee Off, Phil Potts, 156 19; solution, 158 10, 22
Teeko, a board game, 268 20
Teggin, Paul, Rebus, 160 18; answer, 162 21; The alpenhorn of counterintuitivity, 162 23
Telegraph, 191 23, 204 19, 238 5
Telephone box, 265 21
telephone Jack..., from EK, 189 10
Teller, Edward, 154 12; ball park, 169 23
Ten blocks, 178 40; Chris Pile, 181 23
Ten coins, 227 13

Ten Commandments of OU mathematics, The, Martyn Lawrence, 225 20
 Ten consecutive primes in arithmetic progression, Harvey Dubner *et al.*,
 161 2
 Ten hats, 221 13
 Ten primes, 244 11
 Tenenbaum, M., & H. Pollard, *Ordinary Differential Equations*, 199 22
 tennis, 150 20
 Tennyson, *Half a league*, 178 29
Terre des Hommes, Antoine de Saint-Exupery, 248 21
 Terry, Paul, Double lottery, 163 6; Lottery odds, letter, 175 38; Solution
 161.1, Bowed rail, 163 10; Solution 168.2, 345 square, 170 17; Solution
 168.3, Fraction, 170 22; Solution 176.3, Tricubic, 178 26; Solution
 181.5, Five digits, 183 11; Solution 191.5, Another magic square, 195
 11
 tetrahedral pyramids, 166 18
 Tetrahedral representation of an STS(15) , 199 0
 Tetrahedron, 191 11
 tetrahedron, A (truncated)⁷, 246 c
 Tetrahedron, letter, Stuart Walmsley, 243 19
 tetratetrahedron, 239 7
 T_EX, Bob Margolis, 177 18
 Texas Instruments, 180 1
 Thames Valley Radio, 182 27
The Sunday Times, 152 23, 178 17
The Times , 152 6, 153 19, 154 23, 156 7, 13, 165 15, 16, 169 20, 171 11, 177
 11, 26, 181 24, 182 28, 191 22, 193 27, 201 10, 202 17, 207 20, 215 20,
 236 8, 250 7, 262 10
The Times Diary, 171 18
 Theon of Smyrna, 196 6, 253 1
 Theorem of the day 209, 269 1
 Theorem of the Day, 221 21, 230 15, 265 20, *bc*, 268 13
 There has to be an easier way, Martin Wright, 181 16
 Things that do not exist, Tony Forbes, 242 15
 Things, Alan Reilly, 159 15 Third Programme, 211 9
 Third year mathematics, Eddie Kent, 156 23
 Thirteen boxes, 251 3
 Thirteen tarts, 193 13
 Thirteen, letter, 188 26
 Thirty-five years of M500, 220 16
 thirty-nine planes in AG(3,3), 219 c

Thompson, Basil, Equation 216.5: letter, 220 24; Solution 183.4, Two real numbers, 185 25; Solution 186.1, Polygon division, 188 20; Solution 190.3, Goat, 193 22; Solution 191.8, Infinite exponentiation, 195 1; Solution 193.4, Factorial inequality, 196 20; Solution 195.3, Doublings, 200 12; Solution 196.6, Pendulum, 199 23; Solution 197.6, 36 circles, 201 18; Solution 200.2, Square with corner missing, 206 11; Solution 201.1, Continued fraction, 205 13; Solution 201.2, Sine series, 205 14; Solution 202.6, Prime sum, 206 7; Solution 211.3, Trigonometrical limit, 215 18; Solution 213.5, Cubic, 216 11; Solution 213.8, Definite integral, 216 3; Solution 219.1, Walk, 222 17; Solution 224.1, Three rolling spheres, 228 6; Solution 225.3, GCD, 230 16; Solution 241.3, Four integrals, 247 6; Solution 241.4, Product, 244 7; Solution 242.1, Interesting integrals, 247 10; Solution 244.2, A quick number wonder, 248 11; Solution 245.1, Birthday dinner, 248 17; Solution 245.4, GCSE question, 248 15

Thompson, Roger, Bernoulli numbers and prime generating fractions, 267 1; Conway's and Kilminster's prime-producing fractions, 271 1; Perrin's sequence, 269 5; Primes, sums of two squares, and palindromic continued fractions, 268 1; Solution 267.4, Bernoulli numbers, 270 8; Sophie Germain and Fermat's Last Theorem – 1, 272 6; – II, 273 1

Thorne, K., C. Misner & J. Wheeler, *Gravitation*, 271 12

Thornycroft, Chris, quoted, 184 20

Thrackles, 232 13

Three altitudes, 183 15

Three angles, 215 15

Three arctans, 231 15

Three circles, 226 13, 249 15, 265 11

three classical geometrical problems, 262 4

Three coins, 239 13

Three cos and three sins, 182 21

Three cylinders, 242 14

Three degrees, 232 7

Three dice, 260 18

three easy steps, 224 11

Three friends, 189 15; David Kerr, 196 28

Three functions, 226 13

Three hands, 257 15

Three in a line, 269 3

Three integers, 199 25, 220 21, 254 11

Three locks, 241 10
Three more friends, 196 24
Three people, 169 7; letter, Ralph Hancock, 174 27
Three pieces, 252 5
Three points on a cuboid, 232 12
Three powers, 222 7
Three rational numbers, 256 11
Three real numbers, 184 10
Three rolling spheres, 224 9
Three sausages in a circle, 176 c
Three secs, 233 11
three squares problem, letter, The, Ken Greatrix, 244 10
Three squares, 226 13, 237 7
Three tans, 233 13
Three towns, 250 10
three-cycle behaviour, 152 10
Threes are best, Dilwyn Edwards, 184 29
Three-sided dice, 269 3
Thrinacian isle of Sicily. 273 12
Through the looking glass, Barry Lewis, 158 3
Through] ... and back again, Beryl Lovett, 161 6
Thurber, James, *The Wonderful O*, 151 2
thurible, 265 2
Tiling, Ken Greatrix, 161 7
timber, 237 7
time machine, A feasible, Eddie Kent, 211 9
Time, Sebastian Hayes, 186 10
Times equals plus, Colin Davies, 160 11
Times: see *The Times*
tiraboleiro, 265 2
Tit, 156 13
Titanic prime quintuplets, Tony Forbes, 189 12
Titchmarsh quoted, 214 13
Titchmarsh, E. C., *The Theory of the Riemann Zeta-Function*, 214 13
To find the cube root of a compound expression, Ralph Beauclerk, 154 8
To what type?, Eddie Kent, 155 27
Today, 153 10
Toilet paper, letter, Eddie Kent, 203 22
Toller Fratrum monastery, 164 14
Tomita, Seiji, 247 21

Tommy Tutone, 238 17
tongue twisters, 151 2; 246 14
Tongue-twisters and cakes, letter, Ralph Hancock, 248 20
Tony Forbes Modified Game, 266 12
Tony Huntington, 243 1
Topics in Pure Mathematics, 162 26
Topics in the history of mathematics, 156 3
Toplic, Manfred, 161 2; factor search, 172 2
topologist's dream, The, Eddie Kent, 218 7
topology, 218 7
TopoSnax, 259 17
Toroidal planet, 225 14
Toroidal planets, letter, Ralph Hancock, 228 14
torus, 204 10, 13, 206 12
Touchette, Hugo, Solution 191.8, Infinite exponentiation, 224 15
Tower of Brahma, 269 25
Tower of Hanoi, 195 2; solution, 267 10
Tower of Saigon, The, 163 18; strategy, 267 10
Towers of effort, Ralph Hancock, 269 25
Towers: Hanoi, Saigon and beyond, Tony Forbes, 267 8
Trachtenberg system, Ken Greatrix, 172 20
Trachtenburg, Professor Jakow, 172 20
Tracks, 257 20; Ralph Hancock, 245 14; Tony Forbes, 242 13
Transactions of the American Mathematical Society, 215 21, 234 16
Transactions on Information Theory, 182 13
Transcendental numbers, 245 16
Transitivity, Sebastian Hayes, 150 10
Travels, 197 19
tree forest, 157 23
trial and error, 221 19
Triangle division, 245 16
Triangle property, A, 204 14
Triangle, 190 29, 217 25, 243 13, 259 8
Triangles in a grid, 268 18
triangles, 159 19
Triangles, 213 19
triangular numbers, 221 3
Triangular sextics, 210 16
Triangular tiles, 180 18
Triangulating a triangle, 217 25

Triangulations, 225 18
 Tricubic, 176 27
Trigonometric Delights by Eli Maor, Barbara Lee, 188 17
 Trigonometric double integral, 261 18
 Trigonometric identities, Tony Forbes, 214 14
 Trigonometric integral, 267 7
 Trigonometric limit, 211 7
 Trigonometric product, 211 7
 Trigonometry, letter, Dick Boardman, 202 23
 Triples, 265 21
 Triskaidekaphilia, Bryan Orman, 235 12
 Triskaidekaphobia, Eddie Kent, 262 21
 Trouble with infinity, Ken Greatrix, 257 4
 truncated cubeoctahedron, 232 c
 Truncated icosahedron, 212 15
 Truncated octahedron graph, 239 c
 Truncated tetrahedron graph, 240 c
 truncated truncated truncated truncated truncated cube, A, 244 c
 Truncation, 271 19
 Truran, Trevor, five sided dice, 174 13
 Tsaban, Boaz, computing π , 168 3
 Tucows, 156 22
 Turing, Alan, 174 21; prime search, 165 20
 turn-up, 186 13
 Turtle, Dave, Recurrence relations, 182 1; Solution 192.6, 500 factors, 195
 15
 Tush, David, 2^5 , 162 21
 Tutone, Tommy, 238 17
 Tutte's Golden Identity, 264 12
 TV science, 250 11
 Twelve boxes, 184 8
 Twelve tarts, letter, 193 25
 Twelve tarts, Tony Forbes, 191 23
 Twenty-five years ago, 170 29, 171 23172 25, 173 29, 174 29, 175 40, 176 29,
 177 29, 178 41, 199 29, 232 17, 254 21
 Twenty-five years of M500, Tony Forbes, 162 26
 Twins Paradox and related issues, The, Sebastian Hayes, 217 1
 Twisted prisms, 273 c, 22
 Two £10 notes, 182 21
 Two bisextics, 256 11

Two bombs, 226 20
Two boxes, 192 28
Two cars, 179 20; letter, David Singmaster, 179 23
Two colours, 253 17
Two cyclists, 176 24
Two cylinders, 179 25
Two darts, 259 11
Two discs, Dick Boardman, 245 10
Two ellipses, 234 4
Two envelopes, Michael Adamson, 182 24; letter, 184 19
Two failed attempts to dispose of Fermat's Last Theorem, Bruce Roth,
258 16
Two ingots, 220 20
Two knights, 198 8
Two Loupekine snarks, 242 *c*
Two methods for partitions of integers, Tommy Moorhouse, 218 1
two numbers, 184 13
Two octics, 254 20
Two pedestrians, 180 25
Two planets, 264 18
Two queens, 195 22
Two questions about triangles, 180 10
Two real numbers, 183 22
Two rectangles, 269 2
Two Ronnies, 260 17
Two septics, 256 17
Two students, 198 10
Two sums, 242 11, 244 4
Two tangents, 199 19
Two theorems with some applications, David L. Brown, 177 6
Two theorems, 248 4
Two times five equals ten, Bryan Orman, 246 10; revisited, Tony Forbes,
247 18
Two tins of biscuits, 240 5
two towers problem, The, Andrew Pettit, 157 17; John Bull, 159 18
Two triangles, 268 4
two Weekends 2016, 266 21
two words, 222 11
Two-digit squares, 271 16
Two-up gambling game, 158 11

ubiquitous tap, The, Laurence Bradby, 162 24
 U-boat, 256 17
 UK National Lottery ... and why not to 'play', The, Michael de Podesta,
 163 7
 Ulam, Stanislaw M., patterns, 195 5
 Un nombre, 186 13
 Under the skin, 199 27; Colin Davies, 197 20, 205 20
 Uniform acceleration, Tommy Moorhouse, 270 16
 Unique factorization, Sebastian Hayes, 175 36
 universe that amounts to nothing, The, 158 16
 University Challenge, Open, Tony Huntington, 150 5
 Unlimited prize, 180 11
 Unrest on Tetra, Tommy Moorhouse, 231 10
 unrestricted Perrin pseudoprimes, 269 5
 Upon mathematical spaces, Dennis Morris, 222 8
 Upon rotation, Dennis Morris, 225 1
 Upon three-dimensional rotation, Dennis Morris, 234 1
 ups and downs, 153 19
 Upside down?, Emil Vaughan, 232 11
 Urban, S. E., & P. K. Seidelmann, eds., *Explanatory Supplement to the
 Astronomical Almanac*, 268 15
 Urdang, Laurence, *The Facts on File Dictionary of Mathematical Allusions*,
 152 7
 US Chief of Naval Operations, 154 23
 Useless statistics, letter, Ron Potkin, 203 22
 Ussher, James, *Annals of the World*, 178 4
 USSR Olympiad Problem Book, 176 27
 V.A.T., letter, John Reade, 172 17
 Valuation rings, Richard Williams, 213 1
 van der Poorten, Alf, 211 21
 Vaughan, Emil, 223 21; Problem 226.8, 999 nines, 226 21; Problem 229.1,
 Red and yellow vertices, 229 4; Problem 234.6, Simplification, 234 17;
 Problem 238.1, Disc, 238 10; Re Problem 212.3: 100 seats: letter, 220
 23; Upside down?, 232 11
 Vaughan, Robert, 251 21
 Vautier, Eric, 226 19
 Vector algebra, letter, Dick Boardman, 214 20
 Vector calculus in 2-dimensional euclidean space, Dennis Morris, 215 12
 vectors, 212 1 Velocity and time contraction in *H*-space, Dennis Morris,
 211 4

Venn diagrams, Bryan Orman, 190 27
 ver Eecke, P., *Diophante d'Alexandrie*, 169 11
 Verbal arithmetic, 263 21
 very elementary proof [involving π], A, Martin Hansen, 164 5
 Vic Parsons, obit, 167 29
 Vickers, R. L., 202 16
 Viète, François, *Variorum de rebus mathematicis resposarum*, 168 7
 Viète's infinite irrational product, Jim James, 176 8
 Vigenere ciphers, 194 20
 Vigenere ciphers, A method of solving, Dick Boardman, 194 20
 Vintro, Maria, women-philosophers, 232 14
 virtuous, 267 20
 Visualizing sections of the Hopf fibration, Tommy Moorhouse, 227 1
 Vitruvius, *De architectura*, 168 5
 Voit, W., bound, 257 13
 Volans, Gail, 32 pounds, letter, 178 37; Countdown, letter, 167 28;
 Solution 174.1, Four people, 176 25
 von Staudt and Clausen theorem, 267 4
 Voting in M500, Eddie Kent, 243 20
 Waddell, Sid, Hypotenuse, 248 11
 Wagon, S., Euclidean algorithm, 268 3
 Wagon, Stan, 239 19; *The Banach--Tarsky Paradox*, 222 10
 Wagstaff, S. S., Jr, Bernoulli numbers, 270 13
 Waitrose, 224 21
 Walcot, Caroline, CO_2 vs CO^2 , 150 9
 Waldo, C. A., 250 15
 Waldram, Percy J., *The Principles of Structural Mechanics*, 185 2
 Walk d269, 222 c
 Walk, 219 16
 Walker, Henry, bird watching, 195 19
 Walker, John, Home Planet, 153 14
 Walker, Patrick, Constants, letter, 218 19; Problem 244.5, Ten primes, 244
 11; Solution 210.2, Cosecs., 214 10; Solution 244.2, A quick number
 wonder, 248 11; The sequence 1, 1, 3, 7, 19, 51, ..., 223 12
 Wallis, J., *De sectionibus conicis*, 158 20
 Walmsley, Stuart, Solution 217.2, Chords and regions, 220 12; Solution
 226.2, Eight sins, 229 18; Solution 233.6, The quartic and the golden
 mean, 237 10; Solution 234.4, Tetrahedron, 240 8; Solution 234.7,
 Directed triangles, 239 14; Solution 249.1, Hypersphere, 253 8;
 Solution 253.7, Quintic roots, 255 16; Solution 254.4, Gaussian

binomial coefficients, 258 1; Solution 259.1, Four primes, 261 6;
 Solution 261.6, Determinant equation, 263 1; Tetrahedron, letter, 243
 19; The Pascal tetrahedron, 226 8
 Walsh, Luther, primes, 152 17
 Wands, 218 6
 Warburton, Mike, connections, 195 5; One edge connections, 188 11
 Warren, Gerald, 178 15
 Was Plato joking?, Ralph Hancock, 165 8
 Wason, Peter, 241 1; four cards, 161 13
 water organ, 160 3
Waterfront, 154 22
Watford Observer, 192 9
 Watkins, Harold, *Time Counts*, 178 3
 Watson, F. R., *Elementary Mathematics from an Advanced Perspective*, 202 24
 Watson, Rex, Problem 240.1, Two tins of biscuits, 240 5
 Wavy wheel object, 179 c
weakest link, The, 178 29
 Webb, Keith, heart and lungs, 166 14
 Weber, Robert L., *Science with a Smile*, 178 4
 Webster, Roger, A new calculation of π , 151 8; π approximations, 168 2
 Wednesday's child, 238 17
Weekend Times, 169 20
 Weighing tarts, Norman Graham, 199 16
 Wei-Hwa Huang, a puzzle, 263 21
 Weil, Simone, 250 14
 Weinbren, Daniel, Appeal to former OU mathematics students, 248 19
 Weinrich, Jonathan, 178 24
 Weir, Peter, 162 2, 27, 181 25; hailstones, 162 2
 Weisstein, E., *Concise Encyclopaedia of Mathematics*, 190 9
 Well spaced, 200 22
 Wells, David, 181 25; *The Penguin Book of Curious and Interesting Puzzles*,
 163 12; *The Penguin Dictionary of Curious and Interesting Geometry*, 199
 20; *The Penguin Dictionary of Curious and Interesting Numbers*, 152 6,
 158 10, 186 22, 195 1
 Wells, John, 156 7
 Welton, A. J., Solution 157.1 Monkey nuts, 159 17; Solutions to 'Six short
 problems', 163 12
 Welty, Eudora, *A Curtain of Green*, 182 28; *Death of a Travelling Salesman*,
 182 28
 Wendel, H. G., 199 1

Wenham, Tony, Counting in cuneiform, 156 3; Mathematical notation, 158 21
 Wenninger, M. J., *Polyhedron Models*, 164 18
 Wenzclides, 265 18
 West, 175 32
 West, Colin, Poem, 161 12
 West, John, computing π , 168 3
 Westrheim, Margo, *Calendars of the World*, 178 15
 Wet Wet Wet, 171 19
 Weyl, Hermann, quoted, 188 10
 What are real numbers and are they really real?, Sebastian Hayes, 196 1
 What are they up to?, 153 19
 What do they mean?, Jeremy Humphries, 180 17; Ken Norton, 156 20
 What does random mean?, John Bull, 158 14
 What happens when you have two cows, Anon, 156 21
 What is a solid, Ralph Hancock, 160 12
 What is the next number?, Eddie Kent, 205 24
 What is the number?, 213 23
 what is x ?, 265 21
 What mathematics will be taught in 20 years?, Dick Boardman, 211 1
 What prime is even?, Tony Forbes, 200 24
What's in a number, 153 2
 What's in a theorem?, Sebastian Hayes, 210 1
 What's missing?, 194 29; Keith Drever, 198 24
 What's next, Jeremy Humphries, 199 26; letter, Ralph Hancock, 202 23
 What's next?, 191 11, 193 26, 197 28; Chris Jones, 203 5; letter, Bill Purvis, 215 25; letter, Eddie Kent, 210 20; Tony Forbes, 195 23
 What's the next number?, 210 18; Diana Maxwell, 207 18; Tony Forbes, 213 22, 232 15
 What's wrong, Dennis Morris, 222 15
 When does $28 = 0$?, Martin Cooke, 179 20
 When is $\infty + \infty$ not equal to 2∞ ?, Martin Cooke, 178 30
 When is a solid, Re:, George Acquari, 163 5
 When two fives don't make ten, Dilwyn Edwards, 188 16
 Where can I put my new Theorem of the Day?, Robin Whitty, 216 18
 Where does mathematics come from? letter, R. M. Boardman, 234 14
 Whettlock, Phillip, Solution 221.4, Eleven bottles, 227 17
 White, Christine, Chimps, 182 24; Solution 168.2, 345 square, 170 16

White, Ledger, Countdown, 169 12; Hole, letter, 164 23; Solution 262.1, Binomial ratio, 266 20 White, Sue, technology, 173 29 Whitrow, Gerald, *Time in History*, 176 19

Whittaker, E. T., & G. N. Watson, *A Course of Modern Analysis*, 220 10, 247 12, 252 11, 265 11, 266 7

Whittle, Peter, *Probability and Expectation*, 159 5

Whitty, Robin, 221 21, 230 15, 232 12, 262 10, 264 12, 265 20; a problem, 261 18; Dottie's number, 234 14; Ladders, 219 20; Mathematics in the kitchen – IX, 251 21; Prime density and centre of mass, 260 10; Problem 213.4, Decimal continued fraction, 213 20; Problem 232.4, Gradients, 232 9; Problem 233.6, The quartic and the golden mean, 233 17; Problem 233.7, Cyclic quadrilateral, 233 17; Problem 237.3, Rearrangements, 237 16; Problem 243.3, Odd sequence, 243 11; Problem 246.6, Loop, 246 21; Solution 188.1, Ones, 265 12; the LLL algorithm, 253 6; The quartic and the golden mean, 240 15; *Theorem of the day*, 228 19

Who invented the zero?, Sebastian Hayes, 156 2

Who wants to be a millionaire?, 200 24

Who wants to be another millionaire?, Eddie Kent, 177 25

Why does calculus work?, Sebastian Hayes, 185 1; John Hudson, letter, 188 23

Why the Pope's Mule Doth Eat but at Set Times, 164 21

Wichmann, B. A., 243 21

Widman, J., *Behennde und hubsche Rechnung auf allen Kaufmanschaften*, 158 20

Wikipedia, 244 17, 246 14

Wild, Dave, He keeps bob bob bobbin' along, 273 20; Solution 108.1, Darts, 256 16; Solution 200.1, Well spaced, 232 1; Solution 202.3, The puzzled hotelier, 228 16; Solution 203.6, Loops, 206 13; Solution 210.1, Determinant, 266 17; Solution 231.5, Four cos and four sins, 242 16; Solution 232.2, Angles, 268 5; Solution 241.7, Multiplicative function, 246 20; Solution 244.5, Ten primes, 249 3; Solution 262.2, Digit sum ratio, 264 16; Solution 262.5, HH or TT, 264 19; Solution 264.3, Determinant, 266 16; Solution 268.6, Squares with even digits, 270 20; Solution 247.1, 39/163, 250 3; Solution 235.4, Matrix, 273 10; Solution 270.5, Binomial coefficient sum, 272 17

Wilder, Raymond L., *Evolution of Mathematical Concepts*, 156 3

Wilensky, Robert, monkeys, 173 25

Wiles, Andrew, 160 10, 23, 227 20, 260 20; FLT, 159 7, 258 16; prizes, 151 12, 162 16, 177 25

William I, 199 27
William the Conqueror, 197 20
Williams, H. C., on primality, 269 21
Williams, Rob, Chimps, 183 23
Williamson, John, 224 14
Willich's Popular Tables, 182 25
Wilson Stothers obit, 230 9
Wilson, P. W., *The Romance of the Calendar*, 178 3
Wilson, Robin, *An Introduction to Graph Theory*, 273 20; *Combinatorics: Ancient & Modern*, 273 20; *Four Colours Suffice*, 195 18, 230 8; *How many graphs?*, 150 23; *How to Solve Sudoku*, 207 18; *Mathematical Reflections: In a Room with Many Mirrors* by Peter Hilton, 159 9
Wimbledon commentator, quoted, 151 8
Window envelope, 188 18
Windows filler, 180 9
Windows, a disaster, 154 5
Wing, V., *Astronomica britannica*, 158 20
winning, 189 19
Winstanley, Henry, 164 14
Winstanley, Roger, Problem 197.1, Consecutive integers, 197 11; Problem 198.8, Four colours, 198 20
Winter Week-End 17, Norma Rosier, 159 9
Winter Weekend experience 2011, Judith Furner, 239 19
Winter, D., Recurring digital invariants, 163 21
Wirth, Tobias, 226 18
Witnesses, Ralph Hancock, 157 11
Wittgenstein, Ludwig, 205 24
wobble, 163 17
Wolff, Heinz, mental arithmetic, 165 15
Wolfram Demonstrations Project, The, 239 18
Wolfram, S., *A New Kind of Science*, 235 1
Wolfskehl, Paul, prize, 159 7
Woltman, George, GIMPS, 152 16, 158 2, 226 19
Woman's Hour, 152 3, 156 12
Women drivers, Jeremy Humphries, 165 19
Women in mathematics, Eddie Kent, 156 13, 232 14
Woodall, D. R., 243 21
Woodhouse, Chris, Mondegreens, 222 19
Woolf, Richard, M500 Special Issue, letter, 177 23; Special Issue points, 150 4

Woon, S. C., a construction, 268 13
 Word games, Barbara Lee, 151 2
 word to the wise, A, Eddie Kent, 221 12 Words, 166 12
 Wrench, J. W., Jr, π approximations, 168 3
 Wrench, John W., π , 170 24
 Wright, Martin, There has to be an easier way, 181 16
 Wright, Paul, Conversion factors, letter, 202 22
 Wright, Sylvia: mondegreens named, 219 21
 Wroblewski, Jaroslav, primes, 226 20, 270 21
 wrong answer, 193 24
 Wronski, Hoëné, 175 41
 Xmas quiz, Jeremy Humphries, 170 20
 $x^y + y^x$, 209 9
 Y2K and all that, letter, John Hudson, 175 37
 Yao, Carl, 2⁰⁵, 162 21
 Yates, Samuel, 189 12
 Yellow Pig, 152 7
You and Yours, R4, 169 19, 175 28
 You couldn't make it up, Barbara Lee, 162 19
 Young, Robert M., *Excursions in Calculus*, 166 19
 Young, William Henry, 242 17
 YouTube, 240 16, 270 15
 Yutaka Taniyama, Eddie Kent, 160 10
 Zermelo--Fraenkel, 202 25
 Zero sum Pascal Triangle, Sebastian Hayes, 169 1
 zero, 158 15
 Zero, 232 16
 Zeros, 238 10
 Zervos, Christian, historian, 270 15
 ZF, 206 20
 Zhi-Wei Sun, 235 11, 242 5
 Zimmerman, Paul, factor search, 172 3; Ten consecutive primes in
 arithmetic progression, 161 2
 $z^n + z^k = 1$, Bryan Orman, 263 6
 Zoe's design, 220 21; Tony Forbes, 209 25
 Zorn's lemon, 195 21
 Zwiebach, B., *A First Course in String Theory*, 256 11
 $\pi + e$, 232 6
 Π for periphery, 168 9
 π , 151 8, 154 23, 159 2

π , a brief history, 170 24
 π , letter, Colin Davies, 175 39
 π , Nth digit of, 204 3
 χ^2 distribution, The, Ken Greatrix, 256 1