

and stand. Canon PW1156A 15in printer. Sage, Accounts, Payroll, SuperWriter, SuperCalc, SuperPlanner software, 20 spare disks. Cost over £3,500. Unused in boxes. £2,950. Tel: 01-866 3268.

● SIRIUS 128k, 1.2Mb, with usual software, including Basic compiler. Very good condition, £1,300 ono. Tel: 01-427 6067.

● FOR SALE: TRS-80 Model 3, 48k RAM, one disk, and Hi-Res graphics board. TRS-

80 Quick Printer (electrostatic), CGP-115 colour printer/plotter, all leads, manuals and software. £1,000 ono. Must sell quickly! Tel: (Nigel) (0966) 33441 or 32521.

● APPLE II+, with disk drive,

£500 ono. DB master and DB utilities 1 and 2, £200 ono. Apple Logo, £60 ono.

AppleWriter 1.1, £35. Tel: (06473) 3388 (eves. Tony).

● FOR SALE. View Word processor ROM for BBC Micro model B, plus manuals

and printer drivers. Hardly used, £42.50. Tel: Stevenage (0438) 721216 (after 5pm).

● BBC "B" DFS, £250. Torch CP/N card and Perfect software, £200. Green monitor, £50. Epson FX100, £300. Tel: (0256) 75717.

## LEISURE LINES

### Brain-teasers from J J Clessa

2531"

#### Quickie

I know a young man whose mother is older than his grandmother. How can this be?

#### Prize Puzzle

Jul 85

The idea for this month's puzzle comes from Roy Newham of Nottingham.

A roll of cloth 60ins wide has to be cut into a number of lengths so that each length and each diagonal is always an exact different number of inches. No

measurement (except the width) is ever repeated.

How long is the roll?

Answers please, on postcards only (letters are automatically disqualified) to PCW Prize Puzzle, July Leisure Lines, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG. Entries to arrive not later than 31 July 1985.

#### April Prize Puzzle

This wasn't too difficult a problem,

although about 10 per cent of the 180 entries had the wrong solution. The correct answer is 300, 325, 351, which are the smallest three consecutive triangular numbers whose product is a perfect square.

The winning entry came from SJ Mudd of Brentwood, Essex. Congratulations, your prize is on its way.

Thank you to all those who directed me to prime number tables which do not include unity — it seems there are some in existence.

## NUMBERS COUNT

### Mike Mudge considers the 'Numeri Idonei' of Leonhard Euler and awards a prize in the field of triperfect numbers.

Among the extensive correspondence and papers of Leonhard Euler (1707-1783) there are various strictly arithmetical theorems for which Euler does not have a proof and which he does not even state precisely. Included in these are references to the sequence:  $d=1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 18, 21, \dots, 1320, 1365, 1848$ , containing 65 terms up to this point.

These numbers all have the following property:

If  $d=ab$  and if a number  $n$  can be expressed *uniquely* in the form  $n=ax^2+by^2$  where  $ax$  and  $by$  are coprime (that is,  $ax$  and  $by$  have no common factor other than unity), then either  $n$  is *prime* or it is *twice* a prime or it is a *power* of 2. Any odd number that can be written uniquely in this form must be a prime.

Euler calls these  $d$  'Numeri Idonei' because they can be used for primality tests. For example,  $d=57=3 \cdot 19$  yields the prime number 1000003 because this can be uniquely written  $19 \cdot 8^2 + 3 \cdot 577^2$  where  $19 \cdot 8=152$  and  $3 \cdot 577=1731$  coprime.

For example,  $d=1848=1 \cdot 1848$  yields the prime number 18518809 with the unique representation  $197^2 + 1848 \cdot 100^2$  where 197 and 184.100 are coprime.

It is still unknown whether Euler's 65 Numeri Idonei are the only such numbers. Euler only proved that cases  $d=1, 2, 3$  have the required property.

**Problem** Obtain the full listing of 65 Numeri Idonei less than or equal to 1848. Attempt to find further such numbers.

Generate sub-tables of prime numbers from each of these  $d$ -values, and compare their union with a complete table of prime numbers or with an implementation of a sieve technique for the determination of all prime numbers up to the required maximum value.

Readers are invited to submit their program listing, output and hardware details together with their conclusions relating to this problem to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffs WV4 5NF. Tel: (0902) 892141. A suitable prize will be awarded to the 'best' entry received by 1 October 1985. Criteria will include accuracy, originality and efficiency, not necessarily in that order.

*Please note that submissions can only be returned if a suitable stamped addressed envelope is included. Expanded reviews of previous problems, together with, subject to the approval of the contributor, copies of detailed programs from the prize-winning entry may also be requested.*

#### Prize-winner January

**Congruent numbers** The response to this problem was very disappointing, probably due to its underlying mathe-

matical nature. Substantive contributions were received from 'regulars' including Gareth Suggett, 31 Harrow Road, Worthing BN11 4RB and Richard F Tindall of 26 Poplar Close, Great Shelford, Cambridge. Readers interested in pursuing this problem further may contact the above or Robin Merson, 2 Vine Close, Wrecclesham, Farnham, Surrey GU10 4TE, who has been working in this area for years.

Relevant references include *Unsolved Problems in Number Theory* by RK Guy (Springer 1981) and the paper by Ronald Alter, *The Congruent Number Problem*, American Mathematical Monthly Vol 87, 1980, pp43-45.

#### Triperfect numbers

Dave Arnold of Buxton, Derbyshire was examining  $T_7$  as published in PCW May on his Video Genie and found 'it appeared to be OK when I checked the sum of divisors, but on further examination 301, 541 and 901 are composite and the number is not therefore triperfect'. Exchanges of correspondence between RF Tindall and D Arnold took the search for  $T_7$  up in stages to  $2^{60}-1$  without success. For this enterprise and collaborative effort Dave Arnold is nominated as this month's prizewinner; an award in the area of congruent numbers may be considered in the future if further results are forthcoming.