LEISURE LINES

Brain-teasers courtesy of JJ Clessa.

No prizes, no answers for this one. Which letter in the alphabet comes next in the series: t, e, l, h, b . . .?

Prize puzzle

Seven applicants were interviewed for the position of private secretary to the chairman of the company. Each applicant was awarded marks out of 100 for shorthand and typing respectively. By coincidence, the final ranking was in exact reverse alphabetical order.

(1) George came 4th in both tests.
(2) Erica was 2nd in shorthand.
(3) Freda scored 80 marks altogether.
(4) Arthur came 6th in typing.
(5) Diane scored 22 for typing.
(6) Claudine scored 30 for shorthand.
(7) Someone scored for typing the same as Erica scored for shorthand.
(8) Brian was 5th for shorthand, and scored 40 for typing.

What were each applicant's marks?

Answers on postcards, please, or back of envelopes only, to reach *PCW*, Leisure Lines March 1987, 32–34 Broadwick Street, London W1A 2HG, no later than 31 March 1987.

December prize puzzle

Exactly 99 entries for this problem although many solutions were possible, so we accepted any that matched the requirements. Several entries were disqualified since they didn't satisfy the boundary length criteria.

The winning card, drawn at random, came from Mrs J Hill of Bristol. Congratulations Mrs Hill, your prize is on its way. Meanwhile, to all the not-quite-lucky-enough ones, keep puzzling — it could be your turn next.

Mrs Hill's winning solution is given below.

A	A	A	A	A
B	B	B	C	C
B	D	B	C	E
D	D	C	C	E
D	D	E	E	E

END

NUMBERS COUNT

This month Mike Mudge tackles the many interesting computational problems associated with right-angled (otherwise known as Pythagorean) triangles.

A Pythagorean (or right-angled) triangle may be defined uniquely by giving the lengths, a and b, of its two shorter sides (the legs). The length, c, of the third and longest side (the hypotenuse) is then given by the formula $c^2=a^2+b^2$, this being an algebraic statement of the Theorem of Pythagoras (c570–500 BC).

The perimeter of such a triangle is P=a+b+c while its area is A=½ab.

For example:
a=119, b=120, here:
$c=\sqrt{(119^2+120^2)}=169$,
P=119+120+169=408,
A=½ (119) (120)=7140.

In everything that follows, a, b and c are restricted to be positive integers (whole numbers).

Problem (i) Find Pythagorean triangles such that the area plus the square of the sum of the legs is itself the square of an integer (1643).

Problem (ii) Find Pythagorean triangles such that the area plus the shorter leg is itself the square of an integer (1693).

Problem (iii) Find Pythagorean triangles such that the area plus the hypotenuse is itself the square of an integer (1676).

Problem (iv) Find *at least two* triples of Pythagorean triangles such that each member of a triple has the same perimeter while the areas of the members of a triple are in arithmetic progression (by which we mean that the difference between the two larger areas is equal to the difference between the two smaller areas — 1819).

Problem (v) Find *all* quadruples of Pythagorean triangles having a common perimeter less than 10^6 within each quadruple (1950). (The dates in brackets following each problem indicate when a substantial, although not necessarily complete, solution appeared.)

Readers are encouraged to send their thoughts, together with complete or partial attempts at the solutions to the above problems, to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, Staffordshire WV4 5NF, tel (0902) 892141, to arrive by 1 June 1987.

It would be appreciated if such submissions contained a brief summary of results together with thoughts relating to these problems, in a form suitable for future publication in *PCW*.

Submissions will be judged using suitably vague criteria, and a prize will be awarded to the 'best' contribution received by the closing date.

Please note that submissions can only be returned if a stamped addressed envelope is provided.

Mike Mudge welcomes correspondence on any subject within the areas of number theory and other computational mathematics. Particularly welcome are suggestions, either general or particular, for future 'Numbers Count' articles; replies to all letters will be answered in due course.

Isolated readers can be put in contact with others sharing the same interests; however, greater efficiency regarding published problems should result from contacting the prizewinner directly.

Review: September '86

The response to this problem was particularly disappointing; so much so that it is re-opened for submissions by 1 June 1987.

Details of the problem are given in the September 1986 issue or in *Computers in Number Theory* (AOL Atkin and BJ Birch, Academic Press 1971) or may be obtained from the author.

It is concerned with s(n), the sum of all the positive integers which divide exactly into n, thus s(98)=1+2+7+14+49+98=171 and seeks solutions of s(q)+s(r)=s(q+r). Many results are known for the case $q+r=p^2$ where p and q are prime and $r=2^nk^2$ with n and k odd integers: k taking value 5, having been the subject of investigation by MJT Guy on the Titan computer.

Interested readers may contact Gareth Suggett at 31 Harrow Road, Worthing, Sussex BN11 4RB who has begun an investigation of this problem using a BBC machine.

END