A. $3r^2$ *B*. $2r^2$ *C*. $3r^2\sqrt{\frac{3}{4}}$ *D*. $r^2\sqrt{3}$ *E*. $3r^2\sqrt{3}$

22. The number 121_b written in the integral base, b, is the square of an integer for:

A. $b=10$ only *B*. $b=10$ and $b=5$ only *C*. $2 \leqslant b \leqslant 10$
D. $b>2$ *E*. no value of b.

23. In $\triangle$ *ABC*, *CD* is the altitude to *AB*, and *AE* the altitude to *BC*. If the lengths of *AB*, *CD*, and *AE* are known, the length of *DB* is: *A*. not determined by the information given *B*. determined only if *A* is acute *C*. determined only if *B* is acute *D*. determined only if *ABC* is an acute $\triangle$ *E*. none of these is correct.

40. The limiting sum of the infinite series $1|10+2|10^2+3|10^3+\ \ldots$ whose nth term is $n/10^n$, is:

A. $\frac{1}{9}$ *B*. $\frac{10}{81}$ *C*. $\frac{1}{8}$ *D*. $\frac{17}{72}$ *E*. larger than any finite quantity.

The Editor, The *Mathematical Gazette*.

Dear Sir,— Following a reference by Mr A. P. Rollett, during a recent lecture, to the minimum length of road required to connect the four corners of a square, I have tried to reduce the problem to a simple form. Take a piece of wood, 3 tin-tacks, and a piece of string, and tie one end of the string to corner B. Carry the string around corner A, and centre O, and up and around the mid-point of string AB. Pull down, and the maximum length of the loose end will indicate the minimum lay-out of the road system i.e. AM plus MB plus OM, together with a similar figure in the lower half of the square. If a pencil were attached to the loose end, and the eye of a needle employed to keep the junction in position, the relevant graph could be drawn, and would support the result, readily obtainable by using the calculus, that $\angle$AMB$=120°$

Yours faithfully, R. C. Thomas

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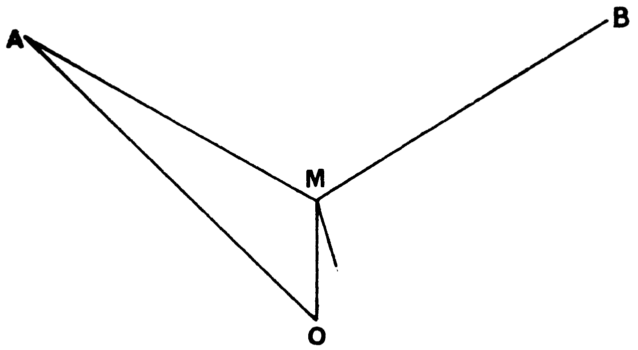

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