" $ACXDYB$ is a hexagon inscribed in a line-pair ", or " $CX$ and $BY$ form homographic pencils with a common ray and two pairs of corresponding rays which meet at infinity " Or, as analytical methods would not be forbidden by the regulations, they might resort to areal coordinates.

Yours, etc.,

A. ROBSON.

SIR,—Scholarship candidates given Mr Newling's 1894 Tripos question solved it by means of similarity, overlooking the construction which gave his neat proof by congruence.

I suggest that the examiners *expected* the following (longer) solution. I use Mr. Newling's notation, but produce $BY$ to cut $AC$ at $P$ and draw $AZ$ parallel to $BY$ cutting $BC$ at $Z$ ; also $AXY$ cuts $BC$ at $O$. Then

$$(AXOY) = D(AXOY) = D(AECY) = -1,$$

for $AE = EC$ and $DY$ is parallel to $AC$ ;

$$(ZCOB) = A(ZCOB) = A(ZPYB) = -1,$$

for $BY = YP$ and $AZ$ is parallel to $BY$. From these it follows that $CX$ is parallel to $AZ$ and $BY$

Yours, etc.,

H. V STYLER.

## PARTIAL FRACTIONS.

To the Editor of the *Mathematical Gazette.*

SIR,—Teachers may be interested in points which arise from time to time in examination answers, as a guide to possible misunderstanding by their pupils. I have recently found a rather large number of candidates who attempted to evaluate an integral of the form

$$\int \frac{dx}{(a+bx^2)\sqrt{(c+dx^2)}}$$

by the step

$$\frac{1}{(a+bx^2)\sqrt{(c+dx^2)}} \equiv \frac{Ax+B}{a+bx^2} + \frac{C}{\sqrt{(c+dx^2)}}$$

with variants of the actual form of " partial fractions " By various devices the coefficients $A$, $B$, $C$ were calculated.

I am writing because it seems to me that such work implies a fundamental misunderstanding of partial fractions themselves. The mechanical calculations are effected (a conference on really tidy methods would help examiners—and candidates!) but it is possible that many candidates do not fully understand just *why* their steps are legitimate.

Of course it is possible to perform mathematical calculations without fully understanding all the theory, as, say, in logarithms. But here positive dangers arise, and a treatment of the subject which excludes these seems desirable.

Yours, etc., E. A. MAXWELL.

Queens' College, Cambridge.

## STARRED QUESTIONS.

To the Editor of the *Mathematical Gazette.*

SIR,—The question of what makes a good scholarship question is an interesting one on which a great variety of opinion must be held by your readers. It would be valuable to have views from university teachers as well as school teachers.

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Mr. Durell's example and Mr. Robson's two have the good quality of being off the beaten track, but whereas Mr. Durell's will yield to several sensible attacks, Mr. Robson's two (as far as I can see) have the defect (?) of possessing only one vulnerable point. Unless the candidate regards the triad in (i) or the fraction in (ii) as representing some geometrical entity he is unlikely to get a solution. I maintain that this would not occur to a sensible candidate until he had tried a more normal method of approach. He is therefore bound to *waste* time over questions so heavily disguised, and the more thorough and persevering he is the more time he will waste. Such questions are more suitable for trying over the week-end than in competitive examinations.

There is no harm in conundrums if they are obviously conundrums; for example, " Prove that the arithmetic mean of all the integers less than and prime to $n$ is $\frac{1}{2}n$ " (Cambridge), but they must be original.

I would put in a plea for the type of question which tests powers of generalisation: for example, " A small ring $R$ can slide over a smooth horizontal table, and to it are tied three strings which pass through holes $A$, $B$, $C$ in the table and at their free ends carry weights $W$. Show that, if one angle of the triangle, say $A$, equals or exceeds 120°, $R$ cannot rest except possibly at $A$, but that otherwise $R$ can rest at the point at which $BC$, $CA$, $AB$ each subtend an angle of 120° Show that this point is unique and that it gives a least value to the sum $AR+BR+CR$ " This question set in the Merton Group, March 1942, is good as far as it goes. But it could with advantage go further: " Give a construction for finding a point $P$ at which the sum $u\ AP+v\,.BP+w\ \ CP$ is least " or " at which $AP+BP+CP+DP$ is least, where $D$ is a fourth coplanar fixed point ", with a note that the question was long and carried higher marks.

Yours, etc., R. C. LYNESS.

P.S. If my cap does not fit Mr. Robson's questions, I apologise to him, but it is worth flourishing as it certainly does fit far too many scholarship questions.

## ERRORS IN MATHEMATICAL TABLES.

To the Editor of the *Mathematical Gazette*.

SIR,—For many years I have acted as an unofficial clearing-house on the subject of errors in mathematical tables. I have checked and inter-compared many tables, and noted all lists of errors published by others. I am now renewing my efforts in this direction, to provide material not only for a forthcoming American Quarterly on Mathematical Tables and Aids to Computation, of which more news will be given later in this *Gazette*, but also for a book entitled *A Computer's Guide to Mathematical Tables*, which I am now preparing for post-war printing.

I should be very glad to be informed of any known errors in tables, or to have references that might otherwise be overlooked to lists of errors. Where possible, the date or edition referred to should be quoted, as errors in early editions often do not appear in later editions. News of unpublished tables would also be appreciated.

There is still much useful work that can be done in checking tables, especially by inter-comparisons and by differencing. If any reader of this note would like to volunteer for such work, it will be provided, and full credit given for all results obtained.

Yours, etc., L. J COMRIE.

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