CORRESPONDENCE.

SPELLING.

To the Editor of the *Mathematical Gazette*.

SIR,—In a School Certificate script I once had a gem which should be added to Dr. Maxwell's list. It was " hysoseles "

Yours, etc., BERTHA JEFFREYS.

Girton College, Cambridge.

EXAMINATION QUESTIONS.

To the Editor of the *Mathematical Gazette*.

SIR,—The question quoted by Mr. Newling from the Tripos of 1894 is not altogether contemptible, for it affords an excellent exercise in the art of presenting a proof economically in a form independent of the accidents of a figure. In the argument

$$CE/YF = EA/YF = EX/AF = EX/FB$$

each ratio is algebraic, that is, bears a significant sign.

Mr. Newling has by no means found a record low level. My own entry for this competition is from a London M.Sc. examination paper, 1937, and I back it against all comers :

" Establish the identity

$$\Sigma \frac{e_\alpha - e_\beta}{\surd(\wp u - e_\alpha) - \surd(\wp u - e_\beta)} = -2\{\surd(\wp u - e_1) + \surd(\wp u - e_2) + \surd(\wp u - e_3)\}$$

where on the left-hand side the three differences are taken in the cyclic order (1 2 3)."

Yours, etc., E. H. NEVILLE.

SIR,—Would the Tripos examiners of 1894 expect one of the following arguments :

(i) Take a series of positions of AXY Then $(X \quad .) = (Y . \quad)$ and D is a common point of both ranges. Hence $B(Y \quad .) = C(X \quad .)$ and BDC is a common ray. Hence the locus of the intersection of BY and CX is a straight line, which, by taking two special cases of AXY, namely AB and AC, is the line at infinity.

(ii) Apply Pappus' theorem to the two triads of collinear points

1	2	3
A	X	Y
D	B	C

$\begin{pmatrix} AB \\ DX \end{pmatrix} \begin{pmatrix} AC \\ DY \end{pmatrix} \begin{pmatrix} BY \\ CX \end{pmatrix}$ are collinear ; that is, BY, CX intersect on the line at infinity.

(iii) Apply the reciprocal of Pappus to the two triads of concurrent lines

1	2	3
AB	AC	AX
DF	DE	DC

Then BY, CX and the line at infinity are concurrent.

Yours, etc., L. SADLER.

SIR,—Mr. Newling's question (*Gazette*, p. 191) could best be answered by Mr. A. N. Whitehead, who was one of the examiners in the Tripos of 1894. If the same question were set in 1944, the candidates would probably say

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" $ACXDYB$ 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

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

by the step

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

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.