The required force is $M\left(\mu+\frac{\alpha}{g}\right)$ gm. wt.

Yours, etc., A. W. SIDDONS.

To the Editor of the *Mathematical Gazette*.

DEAR SIR,—Certainly it is true that teachers of mechanics are divided in their choice of the most appropriate system of units to use in introducing the subject. But is it not also true that there is a danger of this being decided for us by the compilers of our examination syllabuses? Moreover, they not only influence teaching directly, but also decide the emphasis of our elementary textbooks.

What justification is there for continuing to examine pupils in mechanics at the Ordinary level of the G.C.E., either as a separate subject or as part of a paper in "Additional Mathematics"? Few teachers are allowed more than 60 periods in which to teach the subject before the examination is taken. In that time they may either try to introduce the ideas of mechanics (and I regard such a course as being of great educational value to a pupil who is not intending to specialise in science or mathematics); or they may prepare for the examination. It is surely impossible adequately to do both.

If a teacher makes the attempt, however, he is virtually compelled to adopt the gravitational system of units, whatever his own preference. No boy at that age can be expected to master two different sets of equations; and at present the examiners have decreed that, although they may ask him to define a poundal or to distinguish weight from mass, he shall give his answers in lb.wt and in ft.lb. So long as the examination continues, we shall be expected to enter our pupils for it. Is there not then a case for having two alternative syllabuses, one on the lines of the existing syllabus, the other based on the use of absolute units and involving a more fundamental treatment of dynamics?

Yours faithfully, D. A. QUADLING.

LAPLACE TRANSFORMS.

To the Editor of the *Mathematical Gazette*.

SIR,—In his review of *Transformation Calculus and Electrical Transients* by S. Goldman (*Gazette*, XXXIV, No. 309) Mr. H. V. Lowry deplores the fact that the author defines the Laplace transform of a function $f(t)$ by

$$\int_0^\infty e^{-st}f(t)\,dt$$

rather than by

$$p\int_0^\infty e^{-pt}f(t)\,dt.$$

In favour of the "p-method", Mr. Lowry instances the fact that it transforms a constant into itself. However, in an elementary course which excludes the inversion integral, the extra p in the "p-method" adds considerably to the labour of splitting up the rational algebraic fractions arising into their partial fractions. On this account, the saving in time seems to leave the advantage with the "s-method".

Yours, etc., M. HUTTON.

CAR WHEELS.

To the Editor of the *Mathematical Gazette*.

SIR,—The question posed by Professor Brown in the discussion on "The

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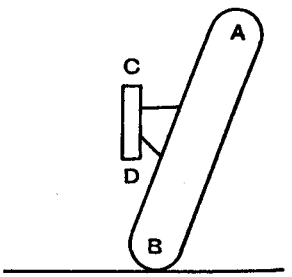
Teaching of Mechanics ", quoted on p. 178 of *Gazette* No. 309, was a perfectly fair one : I do not believe, however, that the explanation given is correct.

Whether the turning of the front wheels raises or lowers the c.g. of the car depends not on the inclination of the wheels to the ground, but on the inclination of the pivot-axles, about which the wheels are turned when steering. The most important principle to bear in mind when designing the front wheels of a car is that the pivot-axle should meet the ground in the same point as the tyre (looked at from the front). So, as in Fig. 1, the wheel AB is made to lean out and the pivot-axle CD is vertical. The reason for this is so that there should not be an excessive torque tending to wrench the wheel off. The reaction of the ground at B is vertical, and so we require the axle to be vertically above B.



In order to obtain a certain amount of " castoring " effect (automatic straightening-out after a turn), another method is used. The pivot-axle is sloped forward (from 6° to 10°) so that it meets the ground in front of the point of contact of the wheel. It can be seen that this arrangement actually makes the c.g. *drop* when the wheels are turned, but this result is more than counterbalanced by the dynamical effect of the trailing of the point of contact behind the line of the pivot-axle, the frictional resistances at the point of contact giving couples which tend to restore the wheels to the straight.

One other point about the front wheels. The pivot-axle does not in general point exactly to the centre-line of the wheels, but slightly inside it. Consequently when going forward the wheels tend to splay out, and to counteract this they are made to " lead-in ", so that the front edges of the wheels are about $\frac{1}{2}$ inch closer together than the rear edges.

Yours, etc., F. G. MAUNSELL.

A PRIORITY REFERENCE.

Mr. C. E. Walsh writes to point out that the result in Note 2223 (*Gazette*, xxxv, p. 189) was proved by him in *Edinburgh Mathematical Notes*, No. 37, (1949), pp. 22-3.

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