Note on the Characteristic of a Logarithm.—Students might be reminded that a number consists of so many digits, the value of each of which depends on its position. The values might be written above the separate digits just as we write £ s. d. over money columns. Thus, 523·7046 would be written

10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}	10^{-4}
5	2	3	7	0	4	6

Rule for finding Characteristic.—The characteristic is the index of the power of 10 placed over the first significant digit in the number.

It may easily be found by counting the number of places which the first significant digit lies left or right of the units digit.

Rule for finding position of Decimal Point in a number whose logarithm is given.—After the anti-logarithm has been written down, place the pencil point after the first digit, then move the pencil right or left through the number of places indicated by the characteristic (+ signifies move to the right, − move to the left).

P. Comrie

Two Illustrations of Newton's Third Law.—I. *Statical.*—The first body A, say a wooden block, is suspended by a rubber cord (R) and a spring balance (S) from a fixed support. A copy of the scale is taken on paper, inverted and gummed on so that the zero is opposite the index when the block A hangs freely.

It is clear that if A be pushed from below, the upthrust will be registered by the balance.

The second body B, say a second block, is placed on the top of a Salter's Family Scale, and the index adjusted to read zero.

It is clear that any downward force exerted on B will be registered by the scale (F.S.).

The upper system is now lowered till A and B act on one another.

The *upthrust* on A (by B) registered by the spring balance will always be equal to the *downthrust* on B (by A) registered by the Family Scale.

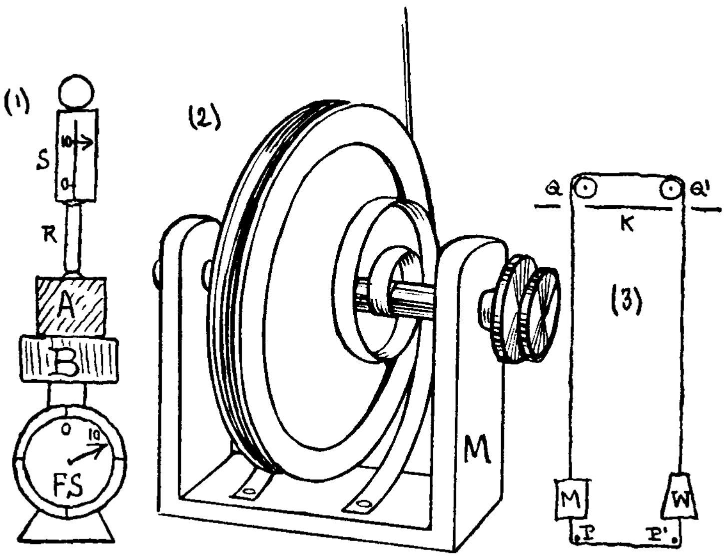
The india-rubber connection enables us to take various readings.

The support for the spring balance may conveniently be a retort stand: the scales are not necessarily interfered with, as readings can be taken by difference: the second block (B) may be replaced by a beaker of water.

II. *Dynamical.*—This is an experimental solution of the well-known problem of the "Climbing Monkey."

"A monkey (weight 30 lbs.) tries to climb a rope which passes over a pulley and carries a weight of 30 lbs. at the other end. Describe the motion."

The opinions of a class of 40 boys will generally be equally divided in favour of five or six different solutions, all wrong but one.



The climber used (M, Figs. 2 and 3) consists of a wooden pulley about 4 inches in diameter, mounted in the usual way, but having two strong clock springs attached, the inner end of each to the axle, and the outer to the frame. The cord, wound as indicated, will on being pulled out coil up the spring. If the frame be then let go, the spring uncoils and the whole apparatus climbs the cord. The pulley is enclosed in an empty chalk-box through a hole in the top of which the cord freely passes.

In arranging the experiment, the cord is pulled out to its fullest extent, is then passed over two small pulleys (Q and Q′, Fig. 3) and tied to a weight (W) equal to that of the climber (about $1\frac{1}{2}$ lbs).

Another cord attached below M and W passes under two hooks P and P′ and keeps all steady. K is a protecting board placed under Q and Q′.

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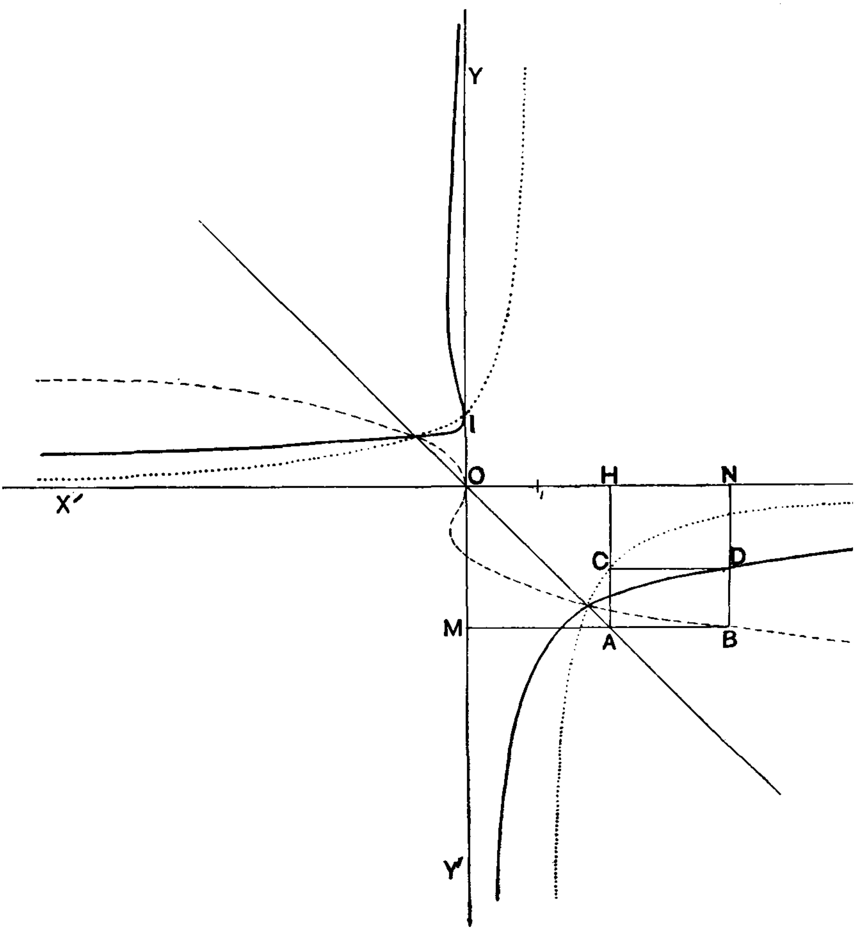
The experiment is finished by burning the cord between P and P′; M and W mount side by side.

J. A. M'Bride

A Method of Graphing Freedom Equations.—Draw axes XOX′, YOY′. Draw graph of $y=\phi(t)$, taking OX as a positive axis of t. (In Figure $\phi(t)=\dfrac{1}{1-t}$; see dotted line). Draw graph of $x=f(t)$, taking OY′ as positive axis of t. (In Figure $f(t)=t^3-t^2$; see broken line). Take any point A in the line



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