$$m_1 U \int_{t_o}^{t_1} \log \frac{m}{m_1} \cdot \frac{dV}{dx} dt = m_1 \int_{t_o}^{t_1} (n+1)\, g_o^2 (t_1 - t) dt \text{ by (x)}$$

$$= \tfrac{1}{2} m_1 (n+1) g_o^2 (t_1 - t_o)^2$$

$$= \frac{m_1 U^2}{2(n+1)} \left(\log \frac{m_o}{m_1} \right)^2 \text{ by (xi).}$$

Comparing this with (ix) we see that this energy deficiency is a fraction $1/(n+1)$ of the maximum possible energy increment. If then $n = 4$, the transfer is 80% efficient.

It may be remarked in conclusion that a complete discussion of a rocket's motion in a field of force can only be undertaken after a general system of dynamical equations, such as Lagrange's, has been modified to apply to a system of variable mass.

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The Coloured Cubes Problem

By F. DE CARTEBLANCHE

THERE is a puzzle (sold commercially as the "Tantalizer") which consists of a set of 4 cubes whose faces are coloured each with one of four colours, say green, red, orange and white, or G, R, O, W for short. The problem is to stack these cubes in a vertical pile (thus forming a square prism) in such a way that each of the four vertical faces of this pile contains all four colours.

In order to make the discussion clearer we shall give names to the faces of the cubes in this way: the front, or nearest face will be named the x face; and opposite face, or back, will be named the x' face. On the right will be the y face, and on the left the y' face. The top will be the z face and the bottom the z' face. The problem then requires us to arrange the four cubes so that the x faces have all different colours, and the same for the x', y, and y' faces. If, for example, we had a set of cubes coloured and arranged in the following way, we would have a solution. (I am not sure if this is the same as the commercial version.)

Face	Cube number 1	2	3	4
x (front) . .	R	G	O	W
x' (back) . .	O	R	W	G
y (right) . .	W	O	G	R
y' (left) . .	O	R	W	G
z (top) . .	G	W	G	R
z' (bottom)	G	W	R	W