If we change the independent variable to s, where $rs=1$, (1) becomes

$$\frac{d^2\log\rho}{ds^2} = -\frac{4\pi}{k}\frac{\rho}{s^4};$$

or, if $\log\rho = u$, $\quad \frac{4\pi}{k} = e$,

$$\frac{d^2u}{ds^2} = -\frac{e}{s^4}\epsilon^u.$$

This seems to be the simplest form into which the equation can be transformed.

To transform a rectangle into a square.

By W. Peddie.

Let l be the length of the rectangle and b its breadth, while s is the side of the square equal to it in area; s is found, of course, by taking $l:s=s:b$. A number of different cases arise.

I. $2s<l+b$. Fig. 18 represents the method of cutting the rectangle in this case. AC is the rectangle and AF the equal square. Make HM = BC, QF = MC, NB = QM. The proof is evident.

II. $2s=l+b$. In this case EB = QF, BC = DQ, ∴ EC is similar and equal to GQ.

III. $2s>l+b$. Three cases arise.

α. $2s>l$. This includes method I., and the method shown in Fig. 19.

β. $2s=l$. Then AQ = EC.

γ. $2s<l$.

Let $l=(k+\theta)s$, where k is an integer and θ a proper fraction. If we cut off portions of the rectangle of length s, the above method applies directly if $2\theta s \nless s$ *i.e.*, if $\theta \nless \frac{1}{2}$. Again if $\theta<\frac{1}{2}=\frac{1}{p}$ where p is an integer, the solution is easy. If p is an improper fraction consistent with the condition $\theta<\frac{1}{2}$, the simplest method is to cut up the rectangle into an equal number of parts, so as to form a rectangle of suitable breadth. In some of these cases the transformation is produced by simple sliding of the various parts parallel to themselves. In others the parts have to be rotated through a right angle.

Another solution of the problem is given in Dr Charles Hutton's *Recreations in Mathematics and Natural Philosophy.*