Shrewsbury School.

MATHEMATICS PRIZE, 1954

1. Evaluate (i) $(0.3168)^{0.7523}$ (ii) $\dfrac{-0.6241}{\log_{10} 0.036}$

2. Replace the stars and letters by numbers in the following square root :—

$$
\begin{array}{rr|lllll|lll}
 & x & * & * & * & y & y & * & x & * & * \\
 & & * & * & & & & & & & \\
\cline{3-4}
 & * \; * & & y & * & y & & & & & \\
 & & & y & x & * & & & & & \\
\cline{4-6}
* & * \; * & & & x & * & y & * & & & \\
 & & & & x & * & y & * & & & \\
\cline{5-8}
\end{array}
$$

3. Find four consecutive numbers which are divisible by 5, 7, 9, 11 respectively.

4. In the triangle ABC, the internal bisector of $\hat{BAC}$ meets BC at D, and X, Y are the feet of the perpendiculars from B and C onto AD. If M is the mid-point of BC, prove MX = MY.

5. Describe a square OPQR, given one vertex O, and two parallel lines on which lie the verticies P and R.

6. On a moving stairway, I find that if I walk down twenty-six steps I require thirty seconds to reach the bottom, but if I make thirty-four steps I require only eighteen seconds. If each step is eight inches high, what is the height of the stairway ?

TURN OVER.

7. If p_5 is equal to the numerator when $a_1+\cfrac{1}{a_2+\cfrac{1}{a_3+\cfrac{1}{a_4+\cfrac{1}{a_5}}}}$ is expressed as a single fraction, prove that $p_5=a_5p_4+p_3$, where p_4 and p_3 are equal to the numerators of similar fractions which terminate at the terms in a_4 and a_3 respectively.

By dividing each side of this result by p_4, prove that

$$\frac{p_5}{p_4} = a_5+\cfrac{1}{a_4+\cfrac{1}{a_3+\cfrac{1}{a_2+\cfrac{1}{a_1}}}}$$