UNIVERSITY OF LONDON.

Matriculation Examination—January, 1880.

ARITHMETIC AND ALGEBRA.

Examiners—Dr. John Hopkinson, M.A., F.R.S, and Rev. Prof. Townsend, M.A., F.R.S.

1. From $1\frac{1}{4}\frac{9}{13}$ of $\frac{1}{4}\frac{3}{8}$ of $\frac{2}{2}\frac{3}{4}\frac{1}{0}$ of a mile subtract $\frac{3}{4}^{5}$ of $2\frac{1}{8}$ of a foot, and express the result in metres. [One metre may be taken as $39\frac{3}{8}$ inches.]

2. Multiply 0.0316228 by itself, giving the result correctly to six significant figures.

3. Obtain the square root of 0.03456789 correctly to seven places of decimals.

4. Find the product of $0.\dot{5}3846\dot{1}$ and $0.3\dot{2}85\dot{7}1\dot{4}$, reducing the result to a vulgar fraction expressed in its simplest form.

5. Given that a gallon of water weighs 10lbs., that a cubic foot of water weighs 1,000 ounces, and that a litre is a cubic decimetre; find how many litres there are in a gallon.

6. Find r and s in terms of a and b, p and q, so that $x^4+px^3+qx^2+rx+s$ may be divisable by x^2+ax+b, whatever x be.

7. Solve the simultaneous equations

$$\tfrac{1}{3}x+y+7z=41;\ x+\tfrac{2}{3}y+7z=42;$$
$$x+y+z=15.$$

8. Reduce

$$\frac{x^4+a^2x^2+a^4}{x^2-a^2}\times\frac{x+a}{x^2+ax+a^2}\div\frac{x^2-ax+a^2}{x-a}$$

$$-\frac{x^3-a^3}{x^3+a^3}\times\frac{x^2-ax+a^2}{x-a}\times\frac{x+a}{x^2+ax+a^2}$$

to its simplest form.

9. A milkman has three cans of 10, 7 and 4 quarts capacity, respectively: the first is full, the other two are empty: he is required to divide the ten quarts into five quarts in the ten-quart can and five quarts in the seven-quart can. How will he do it?

10. Three numbers are in geometrical progression: the sum of the first and third exceeds the double of the second by unity; and if from the difference of the first and third one be taken, the result is one-third of the second. What are the numbers?

11. A agrees to pay B a total sum of £300, in three instalments of £100, at the ends of one, two and three years, respectively. He fails to make any payments; and at the end of four years B demands payment. Reckoning compound interest at 4 per cent., how much should B receive?

12. Assuming, for the purpose of this question, that a full-rigged ship has 40 hands, a schooner 15, and a steamer 10; on a certain day 36 vessels, all either ships, schooners or steamers, arrived in port: they had, in all, 750 hands; the hands on board the ships would be just numerous enough to man all the schooners and twice as many steamers as arrived that day. How many of the vessels were ships, schooners and steamers, respectively?

GEOMETRY.

Examiners—Dr. J. Hopkinson, M.A., F.R.S., and Rev. Professor Townsend, M.A., F.R.S.

[Candidates are at liberty to use all intelligible abbreviations in writing out their answers.]

1. Two finite right lines, of any lengths, being supposed to radiate, in any directions, from a common terminal point; shew that the angle they determine is equal to that determined by their two productions through the point.

2. Two rectilinear segments, of any lengths, being supposed to have a common middle point, but not a common direction; shew, assuming the preceding property, that they are the two diagonals of a parallelogram.