

UNIVERSITY WORK.

MATHEMATICS.

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ARITHMETIC AND ALGEBRA.

Examiners—Dr. John Hopkinson, M.A.,
F.R.S., and Benjamin Williamson, Esq.,
M.A., F.R.S.

1. Simplify

$$\frac{\{(r_1' - r_1') 1\frac{1}{2} - (s_1' - r_1' a) (1\frac{1}{2} + \frac{1}{2})\}}{(\frac{1}{12} - \frac{1}{2}) \frac{1}{2} - \frac{3}{88}}$$

2. Express $\sqrt{\frac{9.864 \times 0.01234}{0.005678 \times 0.0008765}}$ as

an ordinary decimal fraction correctly to three significant figures.

3. Express $\sqrt{\frac{0.428571 \times 0.7714285}{0.285714 \times 0.0571428}}$ as a

vulgar fraction, reducing to its simplest form.

4. If a farmer lays two tons of lime on an acre of land, how many grammes is that per square metre? Express the result correct to the nearest integer.

[Assume—One metre = $39\frac{3}{8}$ inches; one kilogramme = $2\frac{1}{2}$ lbs.; and one ton = 2,240 lbs.]

5. Six terms are in Arithmetical Progression, and also in Geometrical Progression, and their sum is 54. What are they?

6. Resolve into factors

$$x^6 - 1 \text{ and } x^4 + 10x^3 + 35x^2 + 50x + 24.$$

7. Simplify

$$\frac{x^3 + (a+b)x^2 + (ab+1)x + b}{bx^3 + (ab+1)x^2 + (a+b)x + 1} \text{ and}$$

$$\frac{x^3 + y^3 + z^3 - 3xyz}{x^4 + y^4 + z^4 - 2x^2yz - 2y^2xz - 2z^2xy + y^2z^2 + z^2x^2 + x^2y^2}$$

8. Find the ratio of two numbers, the

arithmetic mean of which is five-fourths of the geometric mean.

9. Suppose that gold is worth fifteen times as much as silver, and that silver is worth one hundred times as much as copper. Find the proportions of the metals in a certain coin worth 4s., having given that a coin with double as much gold, the same quantity of silver, and five times as much copper, would be worth 7s. 9d.; a coin having five times as much gold, the same silver, and twice as much copper, would be worth 19s.; and, lastly, that a coin with the same gold, double the silver, and one-half the copper, would be worth 4s. 3d.

10. Divide £100 between three men, five women, four boys, and three girls, so that each man has as much as a woman and a girl, each woman as much as a boy and a girl, and each boy half as much as a man and a girl.

NATURAL PHILOSOPHY.

Examiners—Prof. W. G. Adams, M.A.,
F.R.S., and William Garnet, Esq., M.A.

[Not more than *eight* questions are to be attempted, of which at least *two* must be selected from section A.]

A.

1. State Newton's Second Law of Motion.

Two bodies whose masses are 31 ozs. and 33 ozs. respectively, suspended at the two ends of a thin string passing over a smooth pulley, are allowed to move freely for three seconds. What will be the velocity acquired, and what will be the space traversed, by each body?

2. A half-ton shot is discharged from an eighty-one ton gun with a velocity of 1620 feet per second. What will be the velocity with which the gun will recoil, if the mass of the powder be neglected?

Will the gun or the shot be able to do