The interest on a sum of money for 2 years is $71\frac{188}{100}$, and the discount for the same time is $63\frac{17}{20}$; Find the rate per cent. and the sum of money.

4. A Building Society wishes to realize 10% on its loans ; the instalments paid to it can be re-invested at 3% per half year ; extending the formulæ A=PR^n to include the case of n being fractional, show that the quarterly instalment on a loan of $1,000, payable in six years, is

$$1,000 \ (1.1)^6 \ \times \ \frac{\sqrt{1.03}-1}{(1.04)^{12}-1}$$

5. A retail dealer bought a quantity of broad cloth and marked it for sale at an advance of 20 per cent. on cost ; in measuring it off to his customers he used a false yard measure, by which he gained on the entire sale an additional sum of $39, making on the whole a profit of $379.20 : Find the cost price of the cloth and the length of his yard-stick.

6. By the construction of the Canada Pacific Railway, 80 per cent. is added to the debt of the Dominion ; for the next fourteen years after the completion of the road $5,000,000 of the principal, in addition to the interest, is annually paid off, and at the end of that time the rate of interest on the national debt is reduced 10 per cent. ; if, in spite of these reductions, it is found that the interest on the public debt is still 20 per cent. more than before the increased debt, find the cost of the Pacific Railway.

7. Examine the merits of the following definition : " Four quantities are said to be proportional when a part of the first is contained in the second as often as a like part of the third is contained in the fourth." Give examples of its failure.

Where do you consider that the notion of ratio is first introduced in works on arithmetic ?

Given that the distance through which a body draws another in one second varies as the force of attraction ; that the force of attraction is directly proportional to the mass of the first body, and inversely to the square of the distance from the centre ; that the mass is proportional to the product of the density and volume ; and that when the earth's volume and density are

each unity, those of Jupiter are 1387.431 and .22 respectively : Find how far a body will fall from rest in one second at the surface of Jupiter, if at the surface of the earth it fall through 16.08 feet in the same time.

8. A person has an estate which yields a net income of £1620, after paying expenses to the extent of 10 per cent. He sells it and invests the proceeds in the 4½ per cents at 96, the income now being subject to charges of 5%, and his net income is £16. 17s. 6d. less than before : Find for how many years purchase on the gross income he sold his property.

9. English standard gold is $\frac{1}{12}$ alloy, and 44½ guineas weigh one pound troy ; the weight of a shilling is 87$\frac{3}{11}$ grains troy, and pure silver 14$\frac{1888}{4840}$ heavier than an equal value of pure gold. If silver were to fall one per cent. in value, find what change would have to be made in the alloy in a shilling in order that 20 shillings might still be equal to £1, the alloy being supposed of the same specific gravity as silver, and the weight of the shilling unchanged.

10. (a) The three sides of a triangle are 20, 30, and 25 respectively : Find the position of the point which is equally distant from the three angles.

(b) Two sides of a triangle are 8 and 12½ repectively, and the line bisecting the angle they contain is 6 : Find the third side.

ALGEBRA.
Time—Three Hours.

1. Investigate Horner's method of division.

Divide $x^9 - 3x^8 - 31 x^7 + 25x^6 + 3x^5 - 8x^3 + 19x^2 + 8x + 10$ by $3x^4 - 21x^3 + 9x - 6$ showing the "final remainder."

Find the value of $2x^5 + 803x^4 - 398x^3 + 1605x^2 - 1204 x + 422$, when $x = -402$.

2. If $f(x)$, a rational and integral function of x is divided by $x^2 + px + q$, the remainder is

$$\frac{f(a) - f(B) + a f(B) - B f(a)}{a - B}, \text{where } a,$$

B are the roots of $x^2 + px + q = 0$.

Examine the case where $p^2 = 4q$.

3. Show without actual expansion that