

ALGEBRA.

I.

1. Divide $1-x^n$ by $1-x$.

Expand $(1+x)(1+x^2)(1+x^4)(1+x^8)\dots(1+x^{2^{r-1}})$ in ascending powers of x .

2. Show how to find the least whole number which is accurately divisible by each of two given whole numbers.

Find the least number of ounces of standard gold that can be coined into an exact number of half sovereigns; standard gold being coined at the rate of £3 17s. 10½d., to an ounce.

3. Define a fraction, and from your definition prove a rule for adding together two fractions with different denominators.

Add together the fractions—

$$\frac{a^2-bc}{(a+b)(a+c)} \quad \frac{b^2-ac}{(b+c)(b+a)} \quad \frac{c^2-ab}{(c+a)(c+b)}$$

4. Prove a rule for extracting the square root of a compound Algebraical quantity.

Show that if—

$$x_1+ax_2+bx_3+cx+d$$

be a complete square, the coefficients satisfy the Equation

$$c^2-a^2d=0.$$

Is it necessary that the coefficients satisfy any other Equation?

5. Eliminate x, y, z , between the Equations

$$\frac{y}{z} + \frac{z}{y} = a, \quad \frac{z}{x} + \frac{x}{z} = b, \quad \frac{x}{y} + \frac{y}{x} = c.$$

6. Show that a quadratic equation cannot have more than two roots, and solve the following equations:

$$(1) \quad \frac{1}{3}\left(x - \frac{a}{3}\right) - \frac{1}{4}\left(x - \frac{a}{4}\right) + \frac{1}{5}\left(x - \frac{a}{5}\right) = 0$$