2. Extract the square root of $ab - 2a\sqrt{(ab - a^2)}$, and find the simplest real forms of the expression

$\sqrt{(3+4\sqrt{-1})}+\sqrt{(3-4\sqrt{-1})}$.

3. Solve the equations:

(1). $2x^4+x^3-11x^2+x+2=0$.

(2). $x^2+y^2+z^2=a^2$
$yz+zx+xy=b^2$
$x+y-z=c$.

(3). $\sqrt{(x^2+5x+4)}+\sqrt{(x^2+3x-4)} = x+4$.

4. Prove that the number of positive integral solutions of the equation $ax+by=c$ cannot exceed $\frac{c}{ab}+1$.

In how many ways may £11 15*s.* be paid in half-guineas and half-crowns?

If $xy=ab(a+b)$, and $x^2-xy+y^2=a^3+b^3$, shew that $\left(\frac{x}{a}-\frac{y}{b}\right)\left(\frac{x}{b}-\frac{y}{a}\right)=0$.

6. Given the sum of an arithmetical series, the first term, and the common difference, shew how to find the number of terms. Explain the negative result. *Ex.* How many terms of the serie' ·. 10, 14, &c., amount to 96?

7. Find the relation between p and q, when $x^3+px+q=0$ has two equal roots, and determine the values of m which will make $x^2+max+a^2$ a factor of $x^4-ax^3+a^2x^2-a^3x+a^4$.

8. In the scale of relation in which the radix is r, shew that the sum of the digits divided by $r-1$ gives the same remainder as the number itself divided by $r-1$.

9. Assuming the Binomial Theorem for a positive integral index, prove it in the case of the index being a positive fraction.

Shew that the sum of the squares of the co-efficients in the expansion of $(1+x)^n$ is $\underline{|2n} \div (\underline{|n})^2$, n being a positive integer.

10. Sum the following series:—

(1). $1+3x+5x^2+7x^3+$ &c. to n terms.

(2). $\frac{1}{3\times 8}+\frac{1}{8\times 13}+$ &c. to n terms and to infinity.

11. Shew that $\begin{vmatrix} bc, & -ac, & -ab \\ b^2-c^2, & a^2+2ac, & -a^2-2ab \\ c^2, & c^2, & (a+b)^2 \end{vmatrix}$ is divisible by $abc(a+b+c)$.

EUCLID.

[N.B.—Sixty marks to each question: 225 marks to count a full paper.]

1. In any right-angled triangle, the square which is described on the side subtending the right angle, is equal to the square described on the sides which contain the right angle.

AB, AC are two finite straight lines, from B a perpendicular BD is let fall on AC (produced if necessary), and from C a perpendicular CE is let fall on AB (produced if necessary). The rectangle contained by AB and AE is equal to the rectangle contained by AC and AD. (To be proved by Book I.)

2. The angles in the same segment of a circle are equal to one another.

In a right-angled triangle, the straight line joining the right angle to the point of intersection of the diagonals of the square described on the hypothenuse (on the side remote from the right angle) will bisect the right angle.

3. In a circle, the angle in a semi-circle is a right angle; and the angle in a segment greater than a semi-circle is less than a right angle; and the angle in a segment less than a semi-circle is greater than a right angle.

ABC is a triangle and O is the centre of its inscribed circle. Show that AO passes through the centre of the circle described about BOC.

4. If two triangles have one angle of the one equal to one angle of the other, and the sides about the equal angles proportionals, the triangles must be equi-angular to one another and must have those angles equal, which are opposite to the homologous sides.

The side BC of a triangle ABC is produced to D so that AD is a mean proportional to BD and DC, show how to determine the position of the point D.

5. The sides about the equal angles of triangles which are equi-angular to one another, are proportionals; and those which are opposite to the equal angles, are homologous sides.

From the angular points, A, B. C, of a triangle straight lines are drawn through any the same point in the plane of the triangle and meet the sides BC, CA, AB (produced