Algebra and Geometry.

Examiner, - - - T. AINSLIE YOUNG, M.A.

Algebra.

1. (*a*) Find the following products, without actual multiplication :—

     (I) $(3a-1)(3a+b)$.   (III) $(x-2)(x-3)(x-4)$.

     (II) $(3x+4y+z)(3x+4y-5z)$.

   (*b*) Resolve into factors :—

     (I) $a^2-2ac-b^2+2bd+c^2-d^2$.   (III) $9x^4+5x^2y^2+y^4$.

     (II) $3x^3-30x^2+48x$.   (IV) $8x^2+34xy+21y^2$.

2. Simplify   (I) $\dfrac{1}{2x+2}-\dfrac{4}{x+2}+\dfrac{9}{2(x+3)}-\dfrac{x-1}{x^2+5x+6}$

       (II) $\dfrac{x^2+x-2}{x^2-x-20}\times\dfrac{x^2-5x+4}{x^2-4}\div\left\{\dfrac{x^2+3x+2}{x^2-2x-15}\times\dfrac{x+3}{x^2}\right\}$

3. Solve   (I) $\dfrac{x}{x-1}-\dfrac{x-1}{x-2}=\dfrac{x-3}{x-4}-\dfrac{x-4}{x-5}$

      (II) $\dfrac{2(x-b)}{3x-c}=\dfrac{2x+b}{3(x-c)}$

4. The sum of three numbers is 70; and if the second is divided by the first, the quotient is 2, and the remainder 1; but if the third is divided by the second, the quotient is 3 and the remainder 3; what are the numbers ?

5. A farmer buys *m* sheep for $p, and sells *n* of them at a gain of 5 per cent; how must he sell each of the remainder to gain 10 per cent on the whole ?

Geometry.

1. The straight lines joining the extremities of two equal and parallel straight lines towards the same parts, are themselves equal and parallel.

State the converse of this proposition.

2. Describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given rectilineal angle.

3. If a straight line be divided into any two parts, the squares on the whole line and on one of the parts are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.

4. What proposition of the second book would be formed from Euclid II. 12, by bringing the vertex A down to the point D in the side BC produced ?

5. The straight line drawn through the points of bisection of two sides of a triangle is parallel to the third side.