The total number of questions answered should not exceed six.
(Candidates should see that answers to questions in excess of six are cancelled).

Mathematical Tables may be obtained from the Superintendent.
Candidates should state the text-book used in order to indicate the sequence followed.

1. Prove that the sum of any two sides of a triangle is greater than the third side.
Deduce that the sum of any three sides of a quadrilateral is greater than the remaining side. [30 marks]

2. The square on one side of a triangle is equal to the sum of the squares on the other two sides. Prove that the triangle is right-angled.
P, Q, R are squares. Show how to construct another square X such that \( X = P + Q + R \). [30 marks]

3. Construct geometrical diagrams to illustrate the identities:
(i) \((a + b)^2 = a^2 + 2ab + b^2\);
(ii) \((a - b)^2 = a^2 - 2ab + b^2\), when \( a > b \). [31 marks]

4. Show, without proof, how to construct a square equal in area to a given rectangle.
Prove that the perimeter of the square is never greater than that of the rectangle. [31 marks]

5. Prove that the opposite angles of a cyclic quadrilateral are together equal to two right angles.
ABCD is a cyclic quadrilateral. The sides BA and CD when produced meet at \( X \); BC and AD produced meet at \( Y \). Prove that the bisectors of the angles BXC and BYA meet at right angles. [31 marks]
6. The medians AD and BE of the triangle ABC intersect at G. P is the mid-point of AG, and Q is the mid-point of BG. Prove that PEDQ is a parallelogram, and hence show that GD = \frac{1}{4}AD, and GE = \frac{1}{4}BE. [32 marks.]

7. Given two sides of a triangle, show that the area is greatest when they contain a right angle.
   From a point not on the circumference of a circle, whose centre is O, draw a line cutting the circle at X and Y so that the triangle OXY may be as large as possible. [33 marks.]

8. An aeroplane passed in succession directly over two observation posts A and B, 1,600 yards apart, and a village C. When passing over C its angles of elevation as observed at A and B were 14° 46' and 25° 30' respectively. Assuming that A, B, C are in the same horizontal line, calculate:
   (i) the height at which the aeroplane was flying.
   (ii) the distance between A and C. [34 marks.]

9. ABC is a triangle whose sides are a, b, c units long respectively. Circles are described having A, B, C as centres, and such that each circle touches the other two. Express in terms of a, b, c, the lengths of their radii.
   Give a geometrical method for constructing the circles (i) when all three touch externally; (ii) when the circle with A as centre, is touched internally by the other two. [35 marks.]

10. ABCD is a rectangle, 12 ins. by 8 ins., whose diagonals intersect at E; P is the mid-point of BE. Calculate:
    (i) the number of degrees in the angle DPA.
    (ii) the length of PA. [35 marks.]