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INTERMEDIATE CERTIFICATE EXAMINATION, 1935.

MATHEMATICS (Geometry).

FRIDAY, 14th *JUNE*.--Morning, 10 a.m. to 12.30 p.m.

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. Describe accurately a triangle, ABC, such that $AB = AC$, $BC = 3.4$ ins., angle $A = 50°$.

(A protractor may be used.)

Draw a circle passing through the vertices, A, B, C, and measure its diameter. [Proof is not required, but all construction lines should be clearly shown.]

[28 marks.]

2. Using ruler and compass only, draw a perpendicular PQ to a line AB from a point P outside the line.

R and S are two other points on AB such that $PR = PS$: prove that R and S cannot lie on the same side of PQ.

[30 marks.]

3. Two chords, AB and XY, of a circle intersect at P : prove that the rectangle AP.PB is equal to the rectangle XP.PY.
State the converse theorem ; proof need not be given.

[31 marks.]

4. Explain what is meant by an "*axis of symmetry*" of a geometrical figure.

How many axes of symmetry has each of the following :

    (i) an equilateral triangle ;

    (ii) an isosceles triangle ;

    (iii) a parallelogram which is equiangular but not equilateral;

(iv) a parallelogram which is equilateral but not equiangular :

(v) a parallelogram which is both equilateral and equiangular :

(vi) a parallelogram which is neither equilateral nor equiangular ?

Illustrate your answer by rough diagrams in which axes of symmetry are indicated by dotted lines.

[31 marks.]

5. ABCD is a quadrilateral in which AB is parallel to CD : using the formula for finding the area of a triangle, prove that the area of $ABCD = \frac{1}{2}(AB + CD)p$, where $p =$ the perpendicular distance between AB and CD.

Hence find a point X on AB produced such that the triangle BXC and the quadrilateral ABCD shall be equal in area.

[32 marks.]

6. Solve the following, either by using a large scaled diagram on squared paper or otherwise :

A pole stands vertically on level ground ; when the angle of elevation of the sun was 37° the shadow of the pole was 78 feet long. Find :

(i) the height of the pole ;

(ii) the length of the shadow when the sun was 56° above the horizon ;

(iii) the angle of elevation of the sun when the shadow of the pole was 62 ft. long.

[33 marks.]

7. Through a point on a circle a tangent and a chord are drawn : prove that the angles between those two lines are equal to the angles in the alternate segments of the circle.

Two circles touch one another at P ; through P two lines, APB CPD, are drawn, meeting one circle at A, C and meeting the other at B, D : prove that AC is parallel to BD.

[34 marks.]

8. ABC is a triangle having AC = 4·6 ins., CB = 2·4 ins. ; the perpendicular from A to CB meets CB produced at D such that CD = 3·9 ins. Calculate the length of AB and hence find the number of degrees in each of the angles of the triangle ABC.

[35 marks.]

9. Show how to inscribe an equilateral triangle in a circle.

The diameter of a circle is d ins. long and the difference between the side of the inscribed square and the side of the inscribed equilateral triangle is one inch : calculate the length of the side of the triangle and show that $d = 2 (\sqrt{3} + \sqrt{2})$.

[35 marks.]