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(Department of Education)

INTERMEDIATE CERTIFICATE EXAMINATION, 1959.

MATHEMATICS—GEOMETRY.

THURSDAY, 4th JUNE.—MORNING, 10 TO 12.30.

The total number of questions answered should not exceed *six*.

Mathematical Tables may be obtained from the Superintendent.

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1. Prove that the three angles of a triangle are together equal to two right angles.

In a triangle ABC the angle BCA is an angle of 80° and the internal bisectors of the angles ABC, CAB meet at D. Calculate the size of the angle ADB.

[30 marks.]

2. Prove that parallelograms on the same base and between the same parallels are equal in area.

Using ruler and compass only and showing all construction lines clearly, construct (i) a parallelogram ABCD in which AB=2″, BC=1″, AC=$2\frac{1}{2}$″, and (ii) a rhombus equal in area to ABCD.

[30 marks.]

3. Explain, with the aid of a diagram, how to inscribe a circle in a given triangle, and give proof.

In an equilateral triangle show that the centre of the inscribed circle is also the centre of the circumscribed circle.

[30 marks.]

4. Two chords of a circle, PQ and RS, intersect inside the circle at X. Prove that PX.XQ=RX.XS.

A circle which passes through R, S, and M, the mid-point of PX, cuts XQ produced at Y. Prove XQ=QY.

[35 marks.]

5. In a triangle ABC the internal bisector of the angle BAC cuts BC at D. Prove that BD:DC=BA:AC.

If the internal bisector of the angle ABC cuts AD at I, prove that AI is greater than ID.

[35 marks.]

6. (i) The radius of a given circle is 3 inches. If a point P is such that the length of the tangent from it to the given circle is 4 inches, find the locus of P.

(ii) Two given circles are of equal radius and do not intersect. If a point X is such that the tangents from it to the two circles are equal to each other, find the locus of X.

[35 marks.]

7. (i) A man walks 300 yards from P in a direction 50° north of west. Find the least distance he must then walk (*a*) to reach a point due north of P, (*b*) to reach a point due west of P.

(ii) A triangle ABC is right-angled at C. CB is produced to D making BD=BA and D, A are joined. Denoting the angle ABC by x show that $\tan\frac{x}{2}=\frac{\sin x}{1+\cos x}$ and $\sin x=2\sin\frac{x}{2}\cos\frac{x}{2}$.

[35 marks.]