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INTERMEDIATE CERTIFICATE EXAMINATION, 1948.

MATHEMATICS—GEOMETRY.

WEDNESDAY, 16th 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.

ABC is a triangle and D is the mid-point of the base AC. If BD is equal to half AC, prove that the angle ABC is a right angle.

[30 marks.]

2. In the case of any two chords of a circle, prove that the one which is nearer to the centre is greater than the one more remote.

Or

Show, with proof, how to draw any one common tangent to two circles which do not touch.

[30 marks.]

3. Construct a triangle of sides 5 cm., 6 cm., and 7 cm., respectively, and then construct a square equal in area to the triangle. Explain your method.

[30 marks.]

4. Draw geometrical diagrams to illustrate the identities :—

    (i) $a(a-b) \equiv a^2 - ab$;

    (ii) $(a-b)^2 \equiv a^2 - 2ab + b^2$.

    [$a > b$ in each case.]

Give a short explanation in each case to show how your diagram illustrates the identity.

[30 marks.]

5. A, B, R are three points on the circumference of a circle. The tangent at R meets AB produced at T. Prove that AT.TB=TR².

Two circles cut one another at **X** and **Y** and a point **Z** is taken on **XY** produced. Tangents ZR, ZS are now drawn, one to each circle. Prove that ZR=ZS.

[30 marks.]

6. Prove that the square on the side subtending an acute angle in a triangle is equal to the sum of the squares on the sides containing that angle diminished by twice the rectangle contained by one of those sides and the projection of the other side upon it.

In a triangle ABC the sides AB and AC are equal, and BD is the perpendicular from B to AC. Prove that BC²=2AC.CD.

[35 marks.]

7. Construct a straight line $\sqrt{3}$ inches long, and show how to divide a given straight line internally and externally in the ratio $\sqrt{3}:1$. Give proof.

[35 marks.]

8. A triangle ABC is such that sin A=$\frac{2}{3}$, sin B=$\frac{4}{5}$ and the perpendicular CD from C to AB is 3 inches long. Construct the triangle. Calculate the lengths of AD, DB and hence write down the values of (i) cos A, (ii) tan A, (iii) cos B, (iv) tan B.

[Protractor may not be used.]

[35 marks.]

9. Two boats, A and B, put out to sea from the same place at the same time. A goes in a direction 27° East of North and **B** goes in a direction 42° East of North. One hour after setting out A has travelled 8 miles and B is then due East of A. Find how far B is due East of A and, also, how far B is from the starting point.

[35 marks.]