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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1942.

MATHEMATICS.—GEOMETRY.—PASS.

WEDNESDAY, 10*th JUNE*.—MORNING, 10 A.M. TO 12.30 P.M.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. Prove that equal chords of a circle are equi-distant from the centre.

P is a point $3\frac{1}{2}$ ins. from the centre of a circle 2 ins. in radius. Draw a line PQR cutting the circle at Q, R such that QR=3 ins.

[30 marks.]

2. ABC is a triangle and M is the mid-point of BC. Prove that $AB^2+AC^2=2(AM^2+BM^2)$.

P, Q are two points outside a line XY : show how to find a point R on XY such that PR^2+QR^2 may be a minimum.

[30 marks.]

3. Prove that the perpendiculars drawn from the vertices of a triangle to the opposite sides are concurrent.

[30 marks.]

4. Two circles intersect at P, Q. The line PQ is produced to R. Prove that the tangents drawn to the two circles from any point on QR are equal.

If tangents are drawn from R to any number of circles through P, Q, what is the locus of their points of contact ?

[30 marks.]

5. The angle A of a triangle ABC is bisected internally and the bisector meets BC at D. Prove that AB : AC=BD : DC.

If AB=13″, BC=12″, AC=11″, find the length of AD.

[30 marks.]

6. Show how to find a point M on a straight line AB, such that $AB.BM=AM^2$. Give proof.

[35 marks.]

7. Prove that the areas of similar triangles are proportional to the squares on their corresponding sides.

Show how to describe a triangle DEF so that it shall be similar to a given triangle ABC but that its area shall be three times that of ABC.

[35 marks.]

8. The sides of a triangle are 13 ins., 11 ins., 5 ins. respectively. Find

(i) the number of degrees in the largest angle,

(ii) the length of the shortest perpendicular from a vertex to the opposite side.

[35 marks.]

9. Prove that

$$\cos(A+B)=\cos A\cos B-\sin A\sin B,$$

where $A+B<90°$.

Find, in surd form, the value of $\cos 75°$.

[35 marks.]