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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1958.

MATHEMATICS—GEOMETRY.

THURSDAY, 12th 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 in a right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides.

[30 marks.]

2. Prove that the medians of a triangle are concurrent.

If L, M, N are the mid-points of the sides of a triangle ABC, show that the medians of the triangle ABC bisect the sides of the triangle LMN.

[30 marks.]

3. Prove that an angle at the centre of a circle is double an angle at the circumference standing on the same arc; and deduce that angles in the same segment of a circle are equal.

Two circles intersect at X and Y. P and S are points on one of the circles and PX, SX produced cut the other circle at Q, R respectively. Prove that $\angle PYQ = \angle SYR$.

[30 marks.]

4. Draw a geometrical diagram to illustrate the identity

$$(a+b)(a-b)=a^2-b^2 \qquad [a>b]$$

and explain clearly how your diagram illustrates the identity.

Show, with proof, how to divide a given straight line into two parts such that the rectangle contained by the whole line and one part may be equal to the square on the other part.

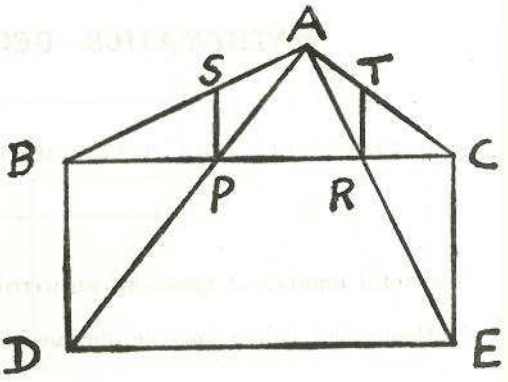
[35 marks.]

5. If two circles touch each other, prove that their centres and the point of contact are in one straight line.

Two circles, centres A and B, touch externally at P. A straight line through P cuts the circle of centre A in Q and cuts the other circle in R. Prove that AQ is parallel to BR.

[35 marks.]

6. ABC is a triangle. A rectangle BDEC is constructed on BC (see diagram) and AD, AE cut BC in P, R, respectively. The perpendiculars drawn to BC at P, R cut AB, AC in S, T, respectively. If BC=2BD, prove that PR=2PS=2RT.



[35 marks.]

7. (i) Show how to construct an angle A such that $\cos A = \frac{2}{3}$, without using the Tables.

(ii) A field is in the shape of a quadrilateral PQRS in which PQ=120 yards, PS=80 yards, $\angle SPQ = 130°$, $\angle SPR = 70°$, and $\angle PRQ = 90°$. Find the area of the field and the size of the angle PRS, as accurately as the Tables allow.

[35 marks.]