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(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1940.

MATHEMATICS (Geometry).

FRIDAY, 14th JUNE.—MORNING, 10 A.M. TO 12.30
P.M.

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

Mathematical Tables may be obtained from the Superintendent.

1. Prove that parallelograms on the same base and of the same height are equal in area.

[30 marks.]

2. Give a geometrical construction for trisecting a straight line. Give proof.

[30 marks.]

3. ABCD is a quadrilateral whose diagonals AC, BD intersect at O. If $AO=OC$ and $BO=OD$ prove (i) that ABCD is a parallelogram; (ii) that any straight line drawn through O bisects the area of ABCD.

[30 marks.]

4. Draw a geometrical diagram to illustrate the identity

$$(a+b)(a-b) = a^2 - b^2, \quad [a \text{ greater than } b].$$

The diagram should be clearly marked and accompanied by a short explanation showing how it illustrates the identity.

[30 marks.]

5. Show, with proof, how to inscribe a circle in a triangle.

ABC is a triangle in which $\angle ABC = 90^\circ$. Prove that $AB + BC$ is equal to the sum of the diameter of the circumcircle and the diameter of the incircle of the triangle.

[30 marks.]

6. On a line $2\frac{1}{2}$ ins. long describe a segment of a circle which shall contain an angle of 50° .

Proof need not be given but all construction lines should be clearly shown. The use of the protractor is permitted.

[30 marks.]

7. Construct a quadrilateral ABCD in which $AB = 2.3$ ins., $BC = 2.8$ ins., $CD = 3$ ins., $DA = 1.7$ ins., $AC = 4$ ins.

- (i) construct a rectangle equal in area to ABCD ;
- (ii) construct and measure the side of a square equal in area to that rectangle.

[35 marks.]

8. AB and CD are two chords of a circle which intersect at right angles at a point O within the circle. Prove that $OA^2 + OB^2 + OC^2 + OD^2$ is equal to the square on the diameter of the circle.

[35 marks.]

9. Construct carefully an angle whose sine is 0.6. Find, without using the Tables, its cosine and its tangent.

Now measure the angle you have constructed and look up its cosine and its tangent in the Tables. Compare these with the values you have obtained.

[35 marks.]

10. A high pole stands vertically in a pond. Supposing that you are unable to approach close to the pole state clearly what measurements you would make and how you would use them in order to ascertain the height of the top of the pole above the level of the water.

[35 marks.]