

AN ROINN OIDEACHAIS

(Department of Education.)

INTERMEDIATE CERTIFICATE EXAMINATION, 1942.

MATHEMATICS (Geometry).

WEDNESDAY, 10th 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. D is a point inside a triangle ABC. Prove that (i) $DB+DC$ is less than $AB+AC$, (ii) the angle BDC is greater than the angle BAC.

[30 marks.]

2. Prove that the angle at the centre of a circle is double of the angle at the circumference standing on the same arc.

What theorem can be deduced from this when the arc is half the circumference?

[30 marks.]

3. Draw any triangle (with unequal sides) and on the longest side construct a rhombus equal in area to the triangle. Give proof.

[30 marks.]

4. AB and CD are two chords in a circle, centre O, such that AB is greater than CD. Prove that AB is nearer to the centre than CD.

If the angles AOB and COD are supplementary, prove that the triangles AOB and COD are equal in area.

[30 marks.]

5. Draw any circle and take two points A, B on the circumference. Find a point C on AB so that $AC=2CB$. Find also a point P on the circumference such that $AP=2PB$.

[No proof required but the method of construction should be briefly stated.]

[30 marks.]

6. Show how to construct an isosceles triangle having each of its base angles double of the vertical angle. Give proof.

[30 marks.]

7. Prove that if a straight line be drawn parallel to one of the sides of a triangle, it shall cut the other sides proportionally.

ABCD is a quadrilateral in which AB is parallel to DC. A parallel to AB meets AD, BC at L, M and cuts the diagonals at P, Q. Prove that $LP=QM$.

[35 marks.]

8. Show how to divide a straight line internally into two parts so that the square on one part may be equal to twice the square on the other.

[35 marks.]

9. The hands of a clock are 4 cm. and 3 cm. long respectively. Find the distance (in a straight line) between their ends at a quarter-past four.

[35 marks.]

10. From the top of a bridge over a straight canal an observer finds that the angle of depression of the prow of a barge is 25° . One minute later the angle is 35° . Assuming that the barge is approaching the bridge at a uniform speed, find how many more minutes will elapse before it reaches the bridge.

[35 marks.]