ROINN OIDEACHAIS AN

(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS (Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1936.

PASS.

MATHEMATICS (GEOMETRY)

THURSDAY, 18th JUNE.-Morning, 10 A.M. TO 12.30 P.M.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

Candidates should state the text-book used in order to indicate the sequence followed.

1. Prove that a diameter of a circle subtends a right angle at any point on the circumference.

ABCD is a rectangle in which AB=a ins., BC=b ins.; circles on AB, BC as diameters intersect again at P. Prove

(i) that P lies on AC,

(ii) that BP= $ab/\sqrt{a^2+b^2}$ ins.

[30 marks.]

2. Prove (i) that the medians of a triangle are concurrent and (ii) that they divide one another in the ratio 2:1.

Hence show that the sum of the medians of a triangle is greater 730 marks. than 3 of the perimeter.

3. Define a "regular polygon." Prove that the vertices of any regular polygon are concyclic. [30 marks.]

4. Show how to inscribe a regular ten-sided figure in a circle without using a protractor.

(Proof need not be given).

If the radius of the circle is 3 ins. calculate the length of the side [30 marks.] of the regular decagon.

 Prove that a line drawn parallel to one side of a triangle divides the other sides proportionally.

ABC is a triangle in which AB=11 ins., BC=15 ins., B=90°. P and Q are points on BA, BC respectively such that BP= 5 ins., BQ=12 ins. PQ and AC, when produced, meet at R: find the length of QR.

[Hint: Through Q draw a line parallel to AB.] [30 marks.]

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

Construct a triangle similar to and three times as large as a given triangle. [30 marks.]

7. Through a point P within a circle whose centre is Q and radius rany chord XPY is drawn: prove that $XP \cdot PY = r^2 - QP^2$.

Show how to draw a chord LPM so that LP=2PM.

[35 marks.]

8. Prove that $\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$, where $90^{\circ} > A > B$.

Hence find the value of tan15° in its simplest surd form.

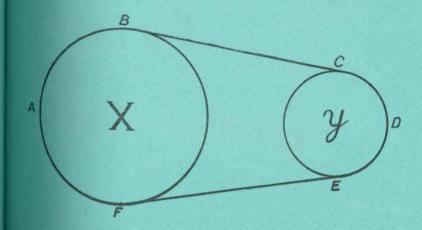
[35 marks.]

9. Prove that the area of a triangle ABC is $\sqrt{s(s-a)(s-b)(s-c)}$, where 2s=a+b+c.

Calculate the length of the shortest altitude of the triangle whose sides are 8 ins., 6 ins., 3 ins. respectively. [35 marks.]

10. Show how to draw a direct common tangent to two circles.

An endless taut string, ABCDEFA, passes round two wheels, X, Y, as shown in the diagram. The radii of X and Y are 10 ins. and 6 ins. respectively and their centres are 24 ins. apart. Calculate the length of the string. [35 marks.]



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