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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1950.

MATHEMATICS—GEOMETRY.

WEDNESDAY, 7th JUNE.—MORNING, 10 TO 12.30.

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

Mathematical Tables may be obtained from the Superintendent.

1. Show, with proof, how to bisect a given angle geometrically. Prove that any point on the bisector is equi-distant from the arms of the angle.

[30 marks.]

2. Construct accurately a triangle whose sides shall be $2\frac{1}{2}$ ins., $3\frac{1}{2}$ ins., 5 ins., respectively, in length.

If the sides of a triangle are $2\frac{1}{2}$ ins., $3\frac{1}{2}$ ins., x ins., respectively, in length, what is (i) the greatest value, (ii) the least value x can have?

[30 marks.]

3. Prove that two parallelograms are equal in area when they stand on the same base and lie between the same parallels.

A rectangle is 3 ins. long and 2 ins. wide. Construct a parallelogram equal in area to the rectangle and having two sides 4 ins. and $3\frac{1}{2}$ ins. respectively in length.

[30 marks.]

Or,

3. Draw geometrical diagrams to illustrate the following identities, when $x>y$:

(i) $(x-y)^2=x^2-2xy+y^2$;

(ii) $x^2-y^2=(x+y)(x-y)$.

Give a short explanation in each case to show how your diagram illustrates the identity.

[30 marks.]

4. A segment of a circle is greater than half the circle : prove that the angle in the segment is less than a right angle.

On a line AB, 3 ins. long, construct a segment of a circle which shall contain an angle of 60°. Measure the radius of the circle.

[35 marks.]

5. ABCD is a square whose side is $2a$ units in length. E, F are the mid-points of CD, CB respectively. AF meets BE at K. Prove that the angle AKB is a right-angle and find the length of AK in terms of a.

[35 marks.]

Or,

5. P is a point between the arms of an angle BAC. Show, with proof, how to draw through P a line XPY meeting AB, AC at X, Y respectively and such that XP=PY.

[35 marks.]

6. The internal bisector of the angle A of a triangle ABC meets BC at D: prove that AB : AC=BD : DC.

PQRS is a square whose side is one unit in length. The diagonal QS is drawn and the bisector of the angle SQR meets SR at X. Calculate the length of SX and the length of XR and express the value of $\tan 22\frac{1}{2}°$ in simplest form.

[35 marks.]

Or,

6. In an acute-angled triangle ABC, AB=4 ins., the perpendicular from A on BC=3·2″, and the perpendicular from B on AC=3 ins. Use your Tables to find the length of the third perpendicular, the lengths of the sides BC, AC and the size of the angle ACB.

[35 marks.]

7. Travelling at a uniform speed of 9 miles per hour, a boat left A at 3 p.m. and for 20 minutes proceeded in a direction 20° south of west. It then altered its course to 40° west of north and reached a point B at 4 p.m. It then proceeded due south until it reached a point C due west of A. At what time did the boat reach C and how far was it from A at that time ?

[35 marks.]