

Notes on Mathematics—No. IV.

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For the March number we have promised a few hints on Mathematical Drawing. Below is a list of problems carefully drawn up and graded in such a way that they may be used for Grades VIII, IX and X of the Nova Scotian and other schools. In general, not more than one problem of a particular type is given, and the teacher can enlarge at pleasure. It is perhaps not too much to say that if Grade VIII can do I—XV, Grade IX I—XXV and Grade X all of the examples, and do them *understandingly*, that they will be able to pass, with credit, the provincial examination.

I. Draw a line in length 4 in.; 5 cm.; 6.9 dm.; 4.75 cm.

II. Draw any line AB. At A make two angles of 17 deg., one on each side. Also angles of 77, 117, 217, 267, 352, and 392 degrees on each side.

III. Draw AB 9.63 cm. Make angles of 90 deg. at A and B on opposite sides of the line. On these lines mark off AC=4.2 cm., BD 6.9 cm. Join CD and measure it. Measure all the acute angles in the figure.

IV. Draw an obtuse and an acute-angled triangle. Measure the angles and sides of each. (Test the angles by seeing if sum = 180 degrees.) Draw perpendiculars from each of the vertices and measure them.

V. The foot of a ladder leaning against a house is 19 feet from the base of the house, and reaches up 29 feet on the side of the house. Find length of ladder and angle of elevation with the level ground.

VI. A triangle has sides 30, 40, 35. Find angles and length of all perpendiculars from the vertices. Find area in three different ways.

VII. A man tramps 49 rods north and then 57 rods east. Find distance he has covered in a straight line and the angle made with the north direction.

VIII. Two sides of a triangle are 75 ft. and 42 ft. and contained angle 169 deg. Find other side and angles and area.

IX. If two houses are 90 ft. apart, and a rope is stretched from one window in first house, 41 ft. high, to window in second house, 11 ft. high, find length of rope, provided the windows are exactly opposite each other.

X. Two islands, B and C, are distant from a lighthouse A, 5 miles and $3\frac{1}{2}$ miles respectively. The angle at A is 39 deg. Find distance BC.

XI. A town B is 14 miles due east of another town A. A town C is 19 miles from A and 17 miles from B. How far is C west from A? How far north?

XII. Find area and angles of a triangle whose sides are 171.5, 92.3, 280.4.

XIII. Two houses A and B are 1728 ft. apart. Find distance of a third house C from A and B, if $BAC=47$ deg., $ABC=57$ deg.

XIV. A ship starts from A and sails north 40 miles to B, then west 15 miles to C, then northwest 11.7 miles to D. Find distance AD and direction compared to north (north X deg. east.)

XV. Construct a parallelogram whose area is 48 sq. ft., and whose base is 8 ft., and one of the angles at the base 119 deg.

XVI. Construct a parallelogram, one of whose sides is 20 ft., another 8 ft., and whose area is 100 sq. ft.

XVII. Draw a square of 7 cm. Draw a rhombus with length of side the same and one angle 45 deg. Find difference in area, if any.

XVIII. Two steamers sail from same port at same time. The first sails N.W. 12 miles per hour, the other W. 67 deg. S. at 17 miles per hour. How far apart are they at end of 3 hours.

XIX. Find number of acres in a plot of land bounded as follows. From A north 25 rods to B, then northeast 10 rods to C, then east 14 rods to D, then south 20 rods to E, thence to A.

XX. In the following construct both triangles, if possible, and measure the remaining parts and the area of each:

(a) $AB=79$ ft., $BC=53$ ft., $A=39$ deg.

(b) $AB=69$ ft., $BC=89$ ft., $A=129$ deg.

(c) $AB=60$ ft., $BC=30$ ft., $A=30$ deg.

(d) $AB=14$ ft., $BC=19$ ft., $A=79$ deg.

XXI. ABCD is a quadrilateral. Given $AB=4.1$, $BC=5.1$, $B=139$ deg., $C=93$ deg., $A=76$ deg. Find other parts and area.

XXII. Given in a triangle ABC, $AB=47$, $A=72$ deg., $C=59$ deg. Find other parts.

XXIII. Draw a circle with radius 4.2 cm. Draw two diameters containing angle of 60 deg. At the extremities of the diameters draw four tangents. Find angles, sides, and area of resulting figure (a rhombus.)

XXIV. Draw a rectangle 4 in. by 3 in. Take middle points of sides and connect them in order around the rectangle. What is the resulting figure? Find its area. What fraction is it of the original area?