The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Wednesday, August 19, 1959 — 8:30 to 11:30 a.m., only

Name of pupil.....Name of school.....

Name and author of textbook used.....

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form.

1 Find the number of degrees in each interior angle of a regular polygon of 9 sides. 1.....

2 In parallelogram $ABCD$ the number of degrees in angle A is represented by x and in angle B by $5x - 120$. Find the number of degrees in angle A. 2.....

3 An exterior angle at the base of an isosceles triangle is 115°. Find the number of degrees in the vertex angle. 3.....

4 Two chords, AB and CD, of circle O intersect at E. If the number of degrees in angle AEC is represented by $2a$ and in arc AC by $3a$, find, in terms of a, the number of degrees in arc BD. 4.....

5 In triangle ABC, a line parallel to AC intersects AB at D and BC at E. If $AD = 12$, $DB = 8$ and $BE = 9$, find EC. 5.....

6 Two sides of a triangle are 6 and 10 and the angle included between these sides is 30°. Find the area of the triangle. 6.....

7 Find the length of an altitude of an equilateral triangle whose side is 9. 7.....

8 Find the length of a side of a square whose diagonal is 6. 8.....

9 The area of a rhombus is 30 and one diagonal is 10. Find the other diagonal. 9.....

10 The coordinates of the end points of a diameter of a circle are $(-2, 1)$ and $(6, 9)$. Find the coordinates of the center of the circle. 10.....

11 Find the length of the line segment joining the points $(-1, 3)$ and $(5, 8)$. 11.....

12 Write an equation of the locus of points whose ordinates are 2 more than three times their abscissas. 12.....

13 Chords AB and CD intersect within a circle at E. If $AE = 8$, $EB = 9$ and CE is twice ED, find ED. 13.....

14 In rectangle $ABCD$, diagonal AC is drawn. If BC is 9 and AB is 15, find angle ACB to the *nearest degree*. 14.....

15 The areas of two similar triangles are 20 and 45. If a side of the smaller triangle is 4, find the length of the corresponding side of the larger triangle. 15.....

16 Two triangles are similar. The sides of the smaller triangle are 4, 6 and 8, and the perimeter of the larger triangle is 27. Find the length of the shortest side of the larger triangle. 16.....

17 A tangent and a secant are drawn to a circle from an external point. If the whole secant is 16 and its external segment is 4, find the length of the tangent. 17.....

18 The circumference of a circle is 30π. Find the length of the radius of the circle. 18.....

19 Find the area of a sector whose angle is 50° in a circle whose area is 72. 19.....

Directions (20–24): Indicate the correct completion for *each* of the following by writing on the line at the right the letter *a*, *b*, *c* or *d*.

20 In right triangle *DEF*, the right angle is at *F* and *FH* is the altitude to the hypotenuse. *DF* is a mean proportional between (*a*) *DE* and *EF* (*b*) *DE* and *FH* (*c*) *DH* and *HE* (*d*) *DH* and *DE* 20.....

21 The total number of points that are one inch from a circle whose radius is 5 inches and that are also one inch from a line through the center of the circle is (*a*) 8 (*b*) 2 (*c*) 6 (*d*) 4 21.....

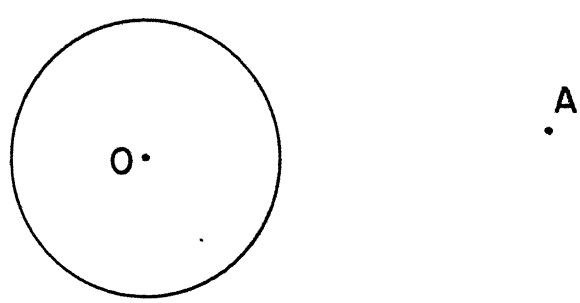
22 If four common tangents can be drawn to two circles, the circles are (*a*) intersecting (*b*) externally tangent (*c*) completely outside each other (*d*) internally tangent 22.....

23 Triangle *ABC* is circumscribed about a circle with side *AB* tangent to the circle at point *R*. If *AR* equals *RB*, then triangle *ABC* must have (*a*) 3 equal sides (*b*) 2 equal sides (*c*) no equal sides (*d*) one side equal to twice the radius 23.....

24 If a student has Room 101 for a homeroom, he is a senior. John does not have Room 101 for a home room; therefore, he is not a senior. This argument is an example of (*a*) reasoning from an inverse (*b*) reasoning from a converse (*c*) indirect reasoning (*d*) circular reasoning 24.....

Directions (25): Leave all construction lines on the paper.

25 Construct a tangent to circle *O* from point *A*.



Part II

Answer three questions from this part.

26 Prove: An angle formed by two secants is measured by one-half the difference of the intercepted arcs. [10]

27 In trapezoid $ABCD$, the longer base is AB. R is the midpoint of DC and $RA = RB$.

a Prove: Trapezoid $ABCD$ is isosceles. [6]

b AD and BC are extended to meet at S.
Prove: Triangle SDC is isosceles. [4]

28 Prove: The area of a regular polygon is equal to one-half the product of its perimeter and its apothem. [10]

29 In the acute isosceles triangle ABC, $AC = BC$, CD is perpendicular to AB and meets AB at D. BE is perpendicular to AC and meets AC at E. Prove: $CB \times AE = AB \times AD$. [10]

30 In quadrilateral $ABCD$, angle A equals angle B and AD is less than BC. Prove: Angle ADC is greater than angle DCB. [Hint: Draw a line from D parallel to AB.] [10]

*31 *a* Write a formula for the slope m of a straight line in terms of the coordinates (x_1, y_1) and (x_2, y_2) of two points on the line. [2]

b Find the slope of the line through the points $(-1, -2)$ and $(3, 6)$. [2]

c Write an equation of the line whose slope is 2 and which passes through the point $(1, -2)$. [3]

d Write an equation of the locus of points equally distant from the points $(-2, 3)$ and $(4, 3)$. [3]

*This question is based on one of the optional topics in the syllabus and may be used in place of any question in either part II or part III.

Part III

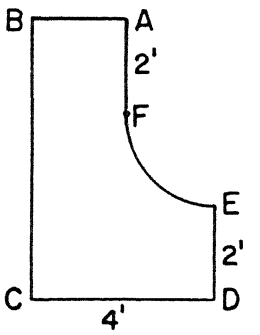
Answer two questions from this part. Show all work.

32 In triangle ABC, angle A is 51°, angle B is 55° and AC is 13. CD is the altitude from C to AB.

a Find, to the ***nearest integer***, AD, CD and DB. [2, 2, 3]

b Using the results found in *a*, find the area of triangle ABC. [3]

33 The figure at the right represents a cross section of a retaining wall. Angles A, B, C and D are right angles, CD is 4 feet, ED is 2 feet, arc FE is a quarter of a circle whose radius is 2 feet and AF is 2 feet. Find, to the ***nearest tenth of a square foot***, the area of the cross section. [Use the approximation $\pi = 3.14$.] [10]



34 In isosceles trapezoid $ABED$, AB is the longer base. The equal sides are extended to meet at C. DE is 12, CD is 20, DA is represented by x and AB by y, and the perimeter of the trapezoid is 50.

a Write a set of two equations that can be used to find the value of x and of y. [6]

b Solve for x and for y. [4]

35 The vertices of triangle ABC are $A(-1, -2)$, $B(4, 3)$ and $C(3, 10)$.

a Using graph paper, draw triangle ABC. [2]

b Show that triangle ABC is isosceles. [4]

c Find the area of triangle ABC. [4]

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING
TENTH YEAR MATHEMATICS

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Use only *red* ink or pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use check marks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 20–24, allow credit if the pupil has written the correct answer instead of the letter *a*, *b*, *c* or *d*.

(1) 140
(2) 50
(3) 50
(4) *a*
(5) $13\frac{1}{2}$
(6) 15
(7) $\frac{9}{2}\sqrt{3}$ *or* 7.8
(8) $3\sqrt{2}$ *or* 4.2
(9) 6
(10) (2, 5)
(11) $\sqrt{61}$ *or* 7.8
(12) $y = 3x + 2$
(13) 6
(14) 59
(15) 6
(16) 6
(17) 8
(18) 15
(19) 10
(20) *d*
(21) *a*
(22) *c*
(23) *b*
(24) *a*

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers in Mathematics*. Care should be exercised in making deductions as to whether the error is purely a mechanical one or due to a violation of some principle. A mechanical error generally should receive a deduction of 10%, while an error due to a violation of some cardinal principle should receive a deduction ranging from 30 percent to 50 percent, depending on the relative importance of the principle in the solution of the problem.

Part II

*31 *a* $m = \frac{y_2 - y_1}{x_2 - x_1}$ [2]
b 2 [2]
c $y = 2x - 4$ [3]
d $x = 1$ [3]

Part III

32 *a* $AD = 8$ [2]
$CD = 10$ [2]
$BD = 7$ [3]
b 75 [3]

33 16.9 [10]

34 *a* $\frac{20}{x + 20} = \frac{x}{y}$ [3]
$2x + y = 38$ [3]
b $x = 10$
$y = 18$ [4]

35 *b* $BC = \sqrt{50}$
$AB = \sqrt{50}$ [4]
c 20 [4]