10

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, January 25, 1965 — 1:15 to 4:15 p.m., only

The last page of the booklet is the answer sheet, which is perforated. Fold the last page along the perforation and then, slowly and carefully, tear off the answer sheet. Now fill in the heading of your answer sheet. When you have finished the heading, you may begin the examination immediately.

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet.

1 If two parallel lines are cut by a transversal and the two interior angles on the same side of the transversal are represented by $x°$ and $(5x - 60)°$, find the number of degrees in the smaller angle.

2 The longer base of a trapezoid is 20 inches, and the line segment joining the midpoints of the nonparallel sides is 18 inches. Find the number of inches in the length of the other base.

3 The length of a diagonal of a square is $5\sqrt{2}$ inches. Find the number of square inches in the area of the square.

4 If the sum of seven of the angles of an eight-sided polygon is 1,010 degrees, find the number of degrees in the remaining angle.

5 Point P is on chord AB of circle O so that $AP = 3$ and $PB = 7$. Find the product of the segments of any other chord drawn through P.

6 A line parallel to side AB of triangle ABC intersects side AC at D and side BC at E. If $DE = 6$, $AB = 9$ and $AC = 12$, find the length of CD.

7 The areas of two similar triangles are 50 and 72 square inches, respectively. If the length of one side of the smaller triangle is 10 inches, find the number of inches in the length of the corresponding side of the larger triangle.

8 The perimeter of a rhombus is 24 inches and one of its angles equals 60 degrees. Find the number of inches in the length of the shorter diagonal of the rhombus.

9 Express in radical form the area of an equilateral triangle if one of its sides is 10.

10 The points A, B, C, D and E taken in order divide a circle into equal arcs. If chords AB and AC are drawn, find the number of degrees in angle BAC.

11 The coordinates of vertices A and B of an isosceles triangle ABC are (0,1) and (10,1), respectively. If $AC = BC$, find the abscissa of point C.

12 A secant and a tangent are drawn to a circle from an external point. The secant is 16 inches long and its external segment is 4 inches long. Find the number of inches in the length of the tangent.

13 Two adjacent sides of a parallelogram are 10 and 12. If its area is 60, find the number of degrees in an acute angle of the parallelogram.

14 The radius of a circle is 9 and the angle of a sector of this circle is 80°. Find the area of this sector in terms of π.

15 Two chords, AB and CD, intersect within a circle at point E. Angle AEC is 60° and arc AC is 80°. Find the number of degrees in arc DB.

16 In a circle, an arc of 45° is 10 inches long. Find the number of inches in the length of the circumference of the circle.

17 Point P lies between two parallel lines a and b, which are 3 inches apart. Find the number of points that are equidistant from a and b and 2 inches from P.

[OVER]

18 The sides of a right triangle are 8, 15 and 17. Find to the *nearest degree* the number of degrees in the smallest angle of the triangle.

19 The coordinates of point A are $(-2,-1)$ and the coordinates of point B are $(4,7)$. Find the length of segment AB.

20 A rectangle with adjacent sides 5 and 12 is inscribed in a circle. Find the diameter of the circle.

21 The perimeter of a regular polygon is 80 inches and its apothem is 10 inches. Find the number of square inches in the area of the polygon.

22 Write an equation of the locus of points whose abscissas are 3 more than twice their ordinates.

Directions (23–28): For *each* statement or question, write on the separate answer sheet the *number* preceding the word or expression that, of those given, best completes the statement or answers the question.

23 If a diameter of the larger of two circles is three times the diameter of the smaller circle, the ratio of the area of the smaller circle to the area of the larger circle is

(1) $\frac{1}{2}$
(2) $\frac{1}{3}$
(3) $\frac{1}{4}$
(4) $\frac{1}{9}$

24 The perimeter of rectangle $ABCD$ is 28. In $\triangle ABC$ the length of AC could be

(1) 11
(2) 14
(3) 18
(4) 22

25 A quadrilateral is inscribed in a circle. If one angle of the quadrilateral is 40°, the opposite angle must be

(1) 320°
(2) 140°
(3) 50°
(4) 40°

26 The medians to sides AC and BC of scalene triangle ABC meet at point F. If CF is drawn and extended to meet AB at D, then

(1) $\angle ACD = \angle BCD$
(2) $AF = FB$
(3) $CF = FD$
(4) $AD = DB$

27 In triangle ABC, angle $A = 80°$ and angle $B > 60°$. Which of the following is true?

(1) Triangle ABC cannot be obtuse.
(2) Triangle ABC cannot be isosceles.
(3) Angle $C > 80°$.
(4) Angle $C < 80°$.

28 Which is the *inverse* of the statement "If two chords of a circle are equal, they are equidistant from the center"?

(1) If two chords of a circle are not equal, they are not equidistant from the center.
(2) If two chords in a circle are not equidistant from the center, they are not equal.
(3) Equal chords in a circle are equidistant from the center.
(4) If two chords in a circle are equidistant from the center, they are equal.

Directions (29–30): Leave all construction lines on the answer sheet.

29 On the answer sheet, construct a line tangent to circle O at P.

30 On the answer sheet, construct the median to side AB in triangle ABC.

Answers to the following questions are to be written on paper supplied by the school.

Part II

Answer four questions from this part. Show all work unless otherwise directed.

31 Prove *either* *a* or *b*: [10]

a If two angles of a triangle are equal, the sides opposite these angles are equal.

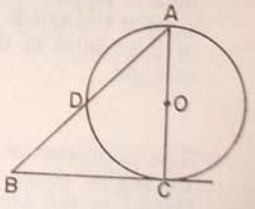
OR

b The area of a triangle is equal to one-half the product of a side and the altitude drawn to that side.

32 In the accompanying figure, AC is a diameter of circle O, BC is tangent to the circle at C, secant BA intersects the circle at D.

Prove:

$AB \times AD = (AC)^2$ [10]



33 Given circle O whose radius is 3 and a point P on the circle:

a Describe fully the locus of points at a distance 2 from the circle. [3]

b Describe fully the locus of points at a distance m from point P. [3]

c How many points are there which satisfy the conditions given in both *a* and *b* if

(1) $m = 2$? [2]
(2) $m = 3$? [2]

34 Given parallelogram $ABCD$ with M the midpoint of AB and P the midpoint of CD. Lines DM and PB are drawn. Prove $DMBP$ is a parallelogram. [10]

35 Two tangents are drawn from an external point to a circle whose radius is 12 inches. The arcs intercepted by the tangents are in the ratio 1 : 4.

a Find the number of degrees in the smaller intercepted arc. [2]

b Find the number of degrees in the angle formed by the two tangents. [2]

c Find to the *nearest inch* the distance from the external point to the center of the circle. [6]

36 The vertices of a triangle are A (−3,1), B (4,2) and C (−2,−1).

a Using graph paper, draw triangle ABC. [1]

b Find the lengths of the three sides of triangle ABC. [3]

c Show that triangle ABC is a right triangle. [3]

d Find the area of triangle ABC. [3]

*37 Points A (0,0) and B (0,4) are two consecutive vertices of parallelogram $ABCD$. The equation of diagonal AC is $y = x$ and the equation of diagonal BD is $y = 4$. The diagonals intersect at point E.

a Find the coordinates of point E. [3]

b Find the coordinates of point C. [2]

c Find the coordinates of point D. [2]

d Write an equation of line AD. [3]

*This question is based on an optional topic in the syllabus.

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ANSWER SHEET

Pupil..... Teacher.....

School.....

Name and author of textbook used.....

Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all questions in this part.

1.....	9.....	17.....
2.....	10.....	18.....
3.....	11.....	19.....
4.....	12.....	20.....
5.....	13.....	21.....
6.....	14.....	22.....
7.....	15.....	23.....
8.....	16.....	24.....

Questions 25 through 30 should be answered on the back of this page.

[OVER]

FOR TEACHERS ONLY

10

SCORING KEY

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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 checkmarks 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 23–28, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) 40
(2) 16
(3) 25
(4) 70
(5) 21
(6) 8
(7) 12
(8) 6
(9) $25\sqrt{3}$
(10) 36
(11) 5
(12) 8
(13) 30
(14) 18π
(15) 40
(16) 80
(17) 2
(18) 28
(19) 10
(20) 13
(21) 400
(22) $x = 2y + 3$
(23) 4
(24) 1
(25) 2
(26) 4
(27) 4
(28) 1

Part II

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 percent, 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.

33 *a* Two circles concentric with circle O and having radii of 1 and 5, respectively [3]
b A circle with center P and radius m [3]
c (1) 2 [2]
(2) 4 [2]

35 *a* 72 [2]
b 108 [2]
c 15 [6]

36 *b* $\sqrt{5}, \sqrt{45}, \sqrt{50}$ *or* $\sqrt{5}, 3\sqrt{5}, 5\sqrt{2}$ [3]
d $7\frac{1}{2}$ [3]

37 *a* (4,4) [3]
b (8,8) [2]
c (8,4) [2]
d $y = \frac{1}{2}x$ [3]