The University of the State of New York

10

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, January 27, 1969 — 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

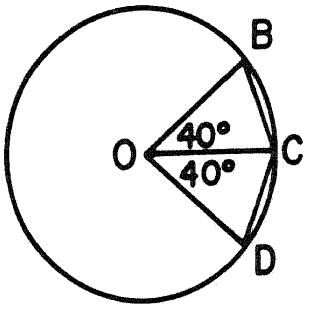
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet.

1 In a circle the endpoints of a diameter are A and B. If the coordinates of A and B are $(-1,3)$ and $(5,5)$, respectively, find the coordinates of the center of the circle.

2 The diagonals of a rhombus are 18 and 32 units, respectively. Find the area of the rhombus.

3 Two supplementary angles are in the ratio 2:7. How many degrees are there in the measure of the *smaller* angle?

4 In the accompanying figure, angles BOC and COD are central angles in circle O, each containing 40°. Chords BC and CD are drawn. Find the number of degrees in angle BCD.



5 If the bases of a trapezoid are 6 inches and 10 inches, respectively, what is the number of inches in the length of the median of the trapezoid?

6 Quadrilateral $ABCD$ is inscribed in circle O. If the difference between $\angle A$ and $\angle C$ is 40°, what is the number of degrees in the *smaller* of these two angles?

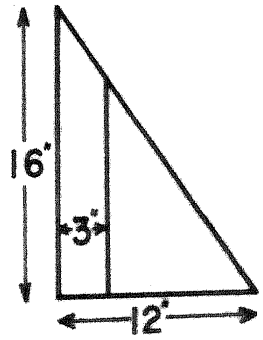
7 In a circle whose radius is 5, there is a chord whose length is 8. How far is this chord from the center of the circle?

8 Trapezoid $ABCD$ is inscribed in a circle. The longer base AB is a diameter of the circle, and the minor arc CD contains 80°. Find the number of degrees in the obtuse angle formed by the diagonals of the trapezoid.

9 Point M is the midpoint of side DC in rectangle $ABCD$. Line BM is drawn. The area of $\triangle BCM$ is what fractional part of the area of rectangle $ABCD$?

10 In $\triangle ABC$, C is a right angle and CD is the altitude to hypotenuse AB. If $AC = 6$ and $AD = 4$, what is the length of AB?

11 In the accompanying figure, the legs of a right triangle are 16 inches and 12 inches. Find the number of inches in the length of the line segment parallel to the 16-inch side and 3 inches from it.



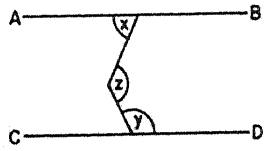
12 A vertical pole 15 feet high is standing on level ground and the angle of elevation of the sun is 38°. Find to the *nearest foot* the length of the shadow cast by the pole.

13 Tangents PA and PB are drawn to circle O from an external point P. If the length of PA is 6 inches and angle P contains 60 degrees, what is the number of inches in the length of chord AB?

14 The radius of the circle inscribed in an equilateral triangle is 4. Find the altitude of the triangle.

[OVER]

15 In the accompanying figure, $AB \parallel CD$, $\angle x = 68°$, and $\angle y = 117°$. Find the number of degrees in $\angle z$.



16 If the radius of a circle is 6 and the area of a sector in the circle is 9π, how many degrees are in the angle of the sector?

17 Write an equation of the locus of points whose ordinates are equal to —3.

18 Point P is 10 inches from the center of circle O whose radius is 6 inches. Find the number of inches in the length of a tangent from point P to the circle.

Directions (19–28): 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.

19 In triangle ABC, the exterior angle at $C = 100°$ and angle $B = 20°$. Triangle ABC must be
(1) an acute triangle
(2) a right triangle
(3) an obtuse triangle
(4) an equiangular triangle

20 Which point lies at the greatest distance from the origin?
(1) (0,—9)
(2) (—2,9)
(3) (—7,—6)
(4) (8,5)

21 In circle O, chord AB bisects chord CD at E. If $AE = 9$ and $EB = 16$, what is the length of chord CD?
(1) 12
(2) 24
(3) 48
(4) 72

22 The acute angles of a right triangle are 30° and 60°, respectively. The legs of the triangle are in the ratio
(1) 1:2
(2) $1:\sqrt{2}$
(3) 1:3
(4) $1:\sqrt{3}$

23 The center of the circle inscribed in any triangle is the point of intersection of the
(1) angle bisectors
(2) medians
(3) altitudes
(4) perpendicular bisectors of the sides

24 If the vertex angle of an isosceles triangle is greater than 60°, then
(1) the base is equal in length to one leg
(2) the base is the longest side of the triangle
(3) an exterior angle at the base is less than 120°
(4) each of the legs of the triangle is longer than the base

25 The regular polygon whose apothem is one-half of a side is
(1) an equilateral triangle
(2) a square
(3) a regular pentagon
(4) a regular hexagon

26 In a square whose side is 8, the midpoints of the sides are joined to form a second square. Then the midpoints of the sides of this square are joined to form a third square. What is the ratio of the area of the first square to the area of the third?
(1) $\sqrt{2}:1$
(2) 2:1
(3) 3:1
(4) 4:1

27 Two chords of a circle intersect within the circle and are perpendicular to each other. Which statement must always be true?
(1) The chords are equal.
(2) One chord is a diameter.
(3) The product of the segments of one chord equals the product of the segments of the other.
(4) One chord bisects the other.

28 What is the contrapositive (inverse of the converse) of the statement, "If John has a fever, then he is sick"?
(1) If John does not have a fever, then he is sick.
(2) If John is sick, then he has a fever.
(3) If John is not sick, then he does not have a fever.
(4) If John does not have a fever, then he is not sick.

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

29 *On the answer sheet,* construct the locus of points equally distant from the sides of $\angle AOB$.

30 *On the answer sheet,* inscribe in circle O a square with one vertex at P.

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

Part II

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

31 Prove *either* *a* or *b* but *not* both: [10]

a If two sides of a triangle are equal, the angles opposite these sides 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 Given square $ABCD$ with E, F, G, and H the midpoints of AB, BC, CD, and DA, respectively.

a Prove triangle $EFG \cong$ triangle EHG. [6]

b If $AB = 6$, find the

(1) length of EF [2]

(2) area of $\triangle EFG$ [2]

33 Answer both *a* and *b*:

a An isosceles trapezoid has an area of 84 square units. The lower base angles are each 45° and the altitude of the trapezoid is 6 units.

(1) If the shorter base is represented by b, express the longer base in terms of b. [2]

(2) Find the number of units in the length of the shorter base. [2]

b The area of a rectangle is also 84 square units. The length of the rectangle is 8 units more than the width.

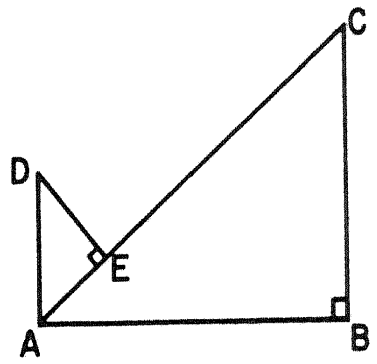
(1) If the width of the rectangle is represented by w, write an equation, in terms of w, involving the area, that can be used to find the width. [3]

(2) Using the equation written in answer to $b(1)$, find the number of units in the width of the rectangle. [3]

34 *a* Using graph paper, draw the quadrilateral whose vertices are A (5,6), B (—5,4), C (—6,—3), and D (7,—6). [2]

b Find the area of quadrilateral $ABCD$. [8]

35 In the accompanying figure, DA and CB are perpendicular to AB, and DE is perpendicular to AC.



a Prove: $\frac{AD}{AC} = \frac{AE}{BC}$ [6]

b If $\angle ADE = 42°$ and $AB = 40$, find CB to the *nearest foot.* [4]

36 Using the indirect method, prove that, in $\triangle ABC$, if side AC is *not* equal to side BC, then the median CD is *not* perpendicular to side AB. [10]

*37 Given points (—1,—2) and (3,4). [10]

a Find the distance between the two points.

b Find the slope of the line containing these points.

c Find the coordinates of the midpoint of the segment determined by these points.

d Write an equation of the line containing the two given points.

e If the point $(2,k)$ lies on the line determined in part *d*, find the value of k.

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

Part I Score:.....
Rater's Initials:
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The University of the State of New York

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TENTH YEAR MATHEMATICS

Monday, January 27, 1969 — 1:15 to 4:15 p.m., only

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.

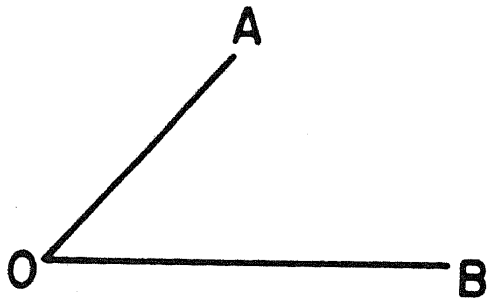
25.....

26.....

27.....

28.....

29



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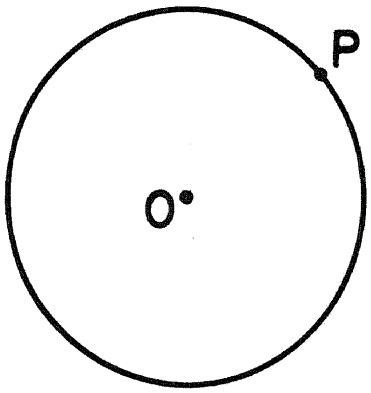

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FOR TEACHERS ONLY

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SCORING KEY

TENTH YEAR MATHEMATICS

Monday, January 27, 1969 — 1:15 to 4:15 p.m., only

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 19–28, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) (2,4)

(2) 288

(3) 40

(4) 140

(5) 8

(6) 70

(7) 3

(8) 130

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

(10) 9

(11) 12

(12) 19

(13) 6

(14) 12

(15) 131

(16) 90

(17) $y = -3$

(18) 8

(19) 1

(20) 4

(21) 2

(22) 4

(23) 1

(24) 2

(25) 2

(26) 4

(27) 3

(28) 3

[OVER]

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.

32 *b* (1) $3\sqrt{2}$ *or* 4.23 [2]
(2) 9 [2]

33 *a* (1) $b + 12$ [2]
(2) 8 [2]

b (1) $w(w + 8) = 84$ [3]
(2) 6 [3]

34 *b* 109 [8]

35 *b* 36 [4]

*37 Allow a total of 10 credits, 2 credits for each of the following:

a $\sqrt{52}$ *or* $2\sqrt{13}$

b $\frac{3}{2}$

c (1,1)

d $3x - 2y = 1$ *or* $y = \frac{3}{2}x - \frac{1}{2}$

e $\frac{5}{2}$