The University of the State of New York

10

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, June 17, 1968 — 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 Two parallel lines are cut by a transversal. The measures in degrees of two interior angles on the same side of the transversal are $2x$ and $3x - 10$, respectively. Find in degrees the measure of the *smaller* of the two angles.

2 One side of a rectangle is twice the length of the other side, and the perimeter is 36. Find the *area* of the rectangle.

3 Vertex angle A of isosceles triangle ABC contains 80°. How many degrees are there in the measure of the *exterior* angle at B?

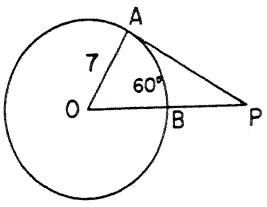
4 The difference between the measures of two complementary angles is 50°. Find in degrees the measure of the *smaller* angle.

5 What is the length of an altitude of an equilateral triangle whose side is 10? [Answer may be left in radical form.]

6 The bases of an isosceles trapezoid are 8 and 14, respectively, and the altitude is 4. Find the length of one of the nonparallel sides of the trapezoid.

7 The area of a rhombus is equal to the area of a square whose side is 6. If the length of one diagonal of the rhombus is 8, how long is the other diagonal?

8 In the accompanying diagram, PA is tangent to circle O at A. The radius of the circle is 7, and arc AB contains 60°. Find the distance OP.



9 Write the coordinates of the midpoint of the line segment joining the points whose coordinates are $(-2,3)$ and $(4,-3)$, respectively.

10 The circumference of a circle is 24π. What is the length of one side of a regular hexagon inscribed in this circle?

11 In circle O, whose radius is 10, central angle AOC measures 72°. Express in terms of π the length of arc AC.

12 A tangent and a secant are drawn to a circle from an external point. The tangent is 10 units long, and the secant is 25 units long. Find the number of units in the length of the external segment of the secant.

13 What is the total number of points that are 3 units from a given line and $3\frac{1}{2}$ units from a given point on that line?

14 An angle is formed by two tangents drawn to a circle from an external point. If one of the intercepted arcs measures 240°, what is the number of degrees in the measure of the angle?

15 In a triangle a line segment is drawn joining the midpoints of two sides. Find the ratio of the area of the small triangle thus formed to the area of the given triangle.

16 The sides of a right triangle are 8, 15, and 17, respectively. What is the length of the altitude to the shortest side?

17 The perimeters of two similar polygons are in the ratio 4:9. If a side of the smaller polygon is 2, what is the length of the corresponding side of the larger polygon?

18 Two chords, PQ and RS, of a circle intersect within the circle at T. If $RT = 2$, $TQ = 3$, and $PT = 4$, find the length of TS.

19 Write an equation of the locus of points whose ordinates are twice their abscissas.

20 In right triangle ABC, $\angle C = 90°$. If $AB = 50$ units and $BC = 28$ units, what is the measure of angle A to the *nearest degree*?

Directions (21–29): 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.

21 Which one of the following number triples can *not* represent the length units of the sides of a triangle?

(1) (2,3,4)
(2) (3,1,1)
(3) (3,4,5)
(4) (3,4,4)

22 If a trapezoid is inscribed in a circle, then

(1) one of its bases must be a diameter
(2) its diagonals must intersect at the center of the circle
(3) the trapezoid must be isosceles
(4) the adjacent sides must be equal

23 A circle whose center is the point (—2,6) is tangent to the x-axis. The coordinates of the point of tangency are

(1) (0,6)
(2) (—2,0)
(3) (0,—2)
(4) (6,0)

24 In triangle ABC, angle $C = 90°$. If $AB = 15$ and $AC = 12$, which of the following statements is *not* true?

(1) $\cos A = \frac{4}{5}$
(2) $\tan A = \frac{3}{4}$
(3) $\sin B < 1$
(4) $\tan B < 1$

25 A circle is inscribed in a square whose side is 8. The circumference of the circle is

(1) 64π
(2) 16π
(3) 8π
(4) 4π

26 The altitude to the hypotenuse of a right triangle divides the triangle into two triangles which must be

(1) isosceles
(2) congruent
(3) equal in area
(4) similar

27 A circle with an area of 72 square inches has a sector whose angle measures 40°. The number of square inches in the area of this sector is

(1) 8
(2) 8π
(3) 16
(4) 16π

28 Given the statement "All rectangles are parallelograms." Which statement is a logical conclusion from the given statement?

(1) If $ABCD$ is a parallelogram, then it is a rectangle.
(2) If $ABCD$ is not a rectangle, then it is not a parallelogram.
(3) If $ABCD$ is not a parallelogram, then it is not a rectangle.
(4) All parallelograms are rectangles.

29 If in $\triangle RST$, $\angle R = 71°$ and $\angle S = 37°$, then

(1) $ST > RS$
(2) $RS > RT$
(3) $RS = ST$
(4) $RT > ST$

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

30 By construction *on the answer sheet*, locate the center K of the circle which can be circumscribed about triangle ABC.

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.

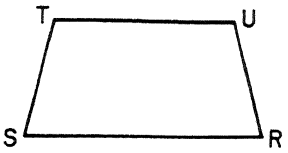
31 Prove *either* *a* or *b* but *not* both: [10]

a A diameter perpendicular to a chord of a circle bisects the chord and its arcs.

OR

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

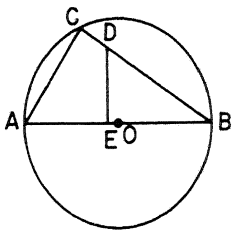
32 In quadrilateral $TURS$, $UR = TS$ and $\angle R = \angle S$. Prove that $\angle U = \angle T$. [10]



33 Given chords AC and BC of circle O. Line segment DE is perpendicular to diameter AB at E as shown in the accompanying figure.

Prove:

$BA \times BE = BC \times BD$ [10]



34 Given right triangle ABC with the right angle at C. [For questions *b*, *d*, and *e*, write on your answer sheet the *number* of the expression that best completes the statement.] [10]

a Describe fully the locus of points equidistant from points A and B.

b The point at which this locus intersects AB is called the

(1) center of the inscribed circle
(2) center of the circumscribed circle
(3) orthocenter (the point of intersection of the altitudes)
(4) centroid (the point of intersection of the medians)

c Describe fully the locus of points equidistant from sides AC and AB.

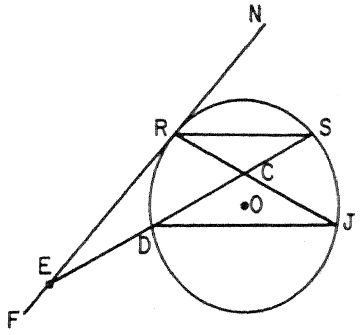
d The locus described in part *c* will intersect the locus of points equidistant from sides AB and BC in

(1) 1 point
(2) 2 points
(3) 3 points
(4) 0 points

e The loci in parts *c* and *d* can be used to determine the

(1) center of the inscribed circle
(2) center of the circumscribed circle
(3) orthocenter (the point of intersection of the altitudes)
(4) centroid (the point of intersection of the medians)

35 In the accompanying figure, line FN is tangent to circle O at R and chord RS is parallel to chord DJ. Chord SD is extended through D to meet the tangent at E. Chord RJ intersects chord SD at point C.

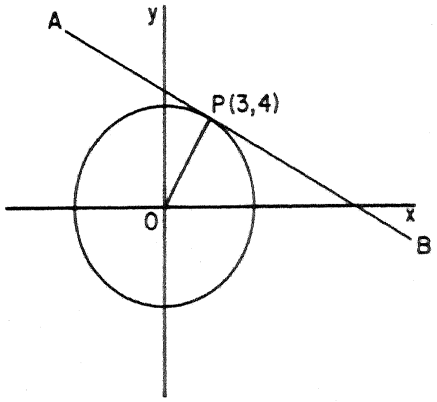


If $\overset{\frown}{DJ} : \overset{\frown}{JS} : \overset{\frown}{SR} = 4 : 1 : 3$, find the number of degrees in the measure of

a arc JS [2]
b angle FRS [4]
c angle RCS [2]
d angle RES [2]

36 The vertices of quadrilateral $QRST$ are Q (a,b), R $(0,0)$, S $(c,0)$, and T $(a + c,b)$. Using methods of coordinate geometry, *prove* that quadrilateral $QRST$ is a parallelogram. [10]

*37 In the accompanying figure, point P $(3,4)$ lies on circle O whose equation is $x^2 + y^2 = 25$. Line APB is tangent to circle O at point P and has a slope of $-\frac{3}{4}$.



a Write an equation of line APB. [4]
b Using coordinate geometry, verify that point R $(11,-2)$ lies on tangent APB. [2]
c Find the length of segment PR. [2]
d Find to the *nearest degree* the measure of $\angle PRO$. [2]

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

360

Part I Score:
Rater's Initials:

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Monday, June 17, 1968 — 1:15 to 4:15 p.m., only

ANSWER SHEET

pil.....Teacher.....

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ame 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.

.....	9.....	17.....
.....	10.....	18.....
.....	11.....	19.....
.....	12.....	20.....
.....	13.....	21.....
.....	14.....	22.....
.....	15.....	23.....
.....	16.....	24.....

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

[OVER]

342

25 .....

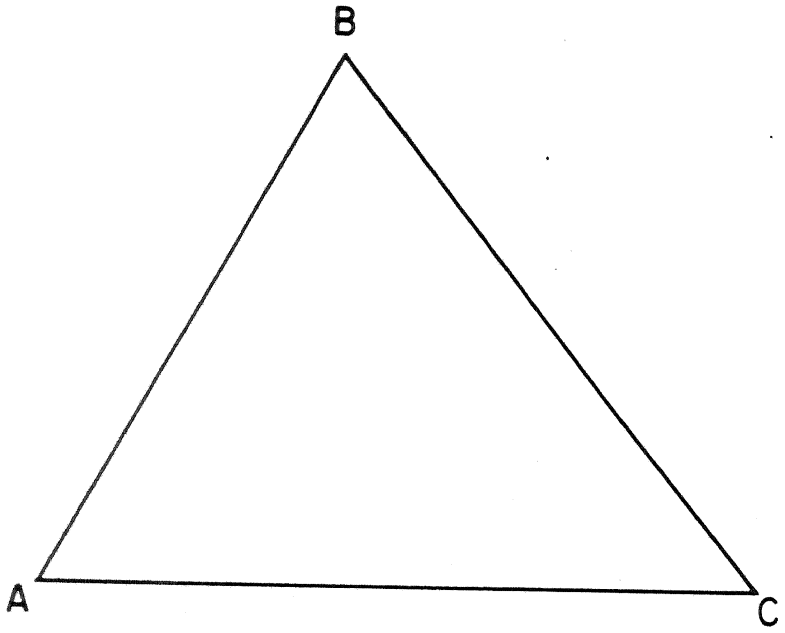
26 .....

27 .....

28 .....

29 .....

30



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Tear Here

FOR TEACHERS ONLY

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SCORING KEY

TENTH YEAR MATHEMATICS

Monday, June 17, 1968 — 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 21–29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) 76

(2) 72

(3) 130

(4) 20

(5) $5\sqrt{3}$

(6) 5

(7) 9

(8) 14

(9) (1,0)

(10) 12

(11) 4π

(12) 4

(13) 4

(14) 60

(15) 1:4

(16) 15

(17) $4\frac{1}{2}$

(18) 6

(19) $y = 2x$

(20) 34

(21) 2

(22) 3

(23) 2

(24) 4

(25) 3

(26) 4

(27) 1

(28) 3

(29) 2

[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.

34 *a* The locus of points equidistant from points A and B is the perpendicular bisector of line segment AB. [2]

b 2 [2]

c The locus of points equidistant from sides AC and AB is the bisector of angle CAB. [2]

d 1 [2]

e 1 [2]

35 *a* 40 [2]

b 120 [4]

c 140 [2]

d 40 [2]

*37 *a* $3x + 4y = 25$ [4]

c 10 [2]

d 27 [2]