

The University of the State of New York
 REGENTS HIGH SCHOOL EXAMINATION
TENTH YEAR MATHEMATICS

Monday, June 19, 1967 — 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

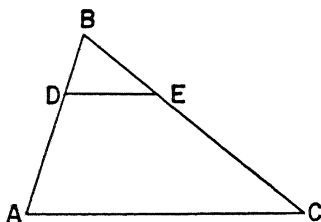
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet.

1 Acute triangle ABC is inscribed in a circle. If $AB = BC$ and minor arc AC measures 100° , find the number of degrees in angle A .

2 Two adjacent sides of a rhombus are represented by $(3x - 1)$ inches and $(2x + 7)$ inches, respectively. Find the number of inches in the perimeter of the rhombus.

3 In parallelogram $ABCD$, $AB = 12$, $AD = 10$, and angle $A = 30^\circ$. Find the area of parallelogram $ABCD$.

4 In the accompanying diagram, DE is parallel to AC . If $BD = 2$, $BE = 3$, and $AB = 6$, find the length of EC .



5 The center of circle O is located at $(2,6)$ and the point $A(7,8)$ lies on the circle. Express in radical form the length of the radius of the circle.

6 If a side of an equilateral triangle is s , express the area of the triangle in terms of s .

7 In circle O , radius OS is perpendicular to radius OT . Point R lies on the major arc ST and chords RS and RT are drawn. Find the number of degrees in angle SRT .

8 Corresponding altitudes of two similar triangles are 6 and 14. If the perimeter of the first triangle is 21, what is the perimeter of the second triangle?

9 The radius of the circle inscribed in an equilateral triangle is 6. Find the radius of the circumscribed circle.

10 Quadrilateral $ABCD$ is inscribed in circle O . If angle $A = 50^\circ$, find the measure in degrees of angle C .

11 In the right triangle ABC with the right angle at C , $AC = 8$ and $BC = 11$. Find angle A to the nearest degree.

12 A tangent and a secant are drawn to a circle from an external point. If the internal and external segments of the secant are 12 and 4, respectively, find the length of the tangent.

13 The coordinates of M , the midpoint of line segment AC , are $(1,0)$. If the coordinates of A are $(0,-2)$, what are the coordinates of C ?

14 The area of a circle is 9π . Express in terms of π the circumference of this circle.

15 The altitude to the hypotenuse of a right triangle is 4. If the length of one segment of the hypotenuse is 2, find the length of the other segment.

16 From an external point C , two lines are drawn tangent to circle O at points A and B . If angle $ACB = 70^\circ$, find the number of degrees in the measure of the minor arc AB .

17 In a circle whose diameter is AB , chords AC and BC are drawn. If AB is 6 inches and AC is 3 inches, find in radical form the number of inches in the length of chord BC .

- 18 Write an equation of the locus of points whose ordinates are 5 more than three times their abscissas.
- 19 In circle O , chords AB and CD intersect at E , the midpoint of CD . If $BE = 9$ and $AE = 4$, find the length of chord CD .
- 20 Find the number of square units in the area of a triangle whose vertices are the points $(0,3)$, $(0,-5)$, and $(2,3)$.
- 21 A sector of a circle whose angle is 120° has an area of 27π . Find the radius of this circle.

Directions (22–28): 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.

- 22 If the three angles of a triangle are represented by $(x + 30)^\circ$, $(4x + 30)^\circ$, and $(10x - 30)^\circ$, the triangle must be
- | | |
|---------------|-------------|
| (1) obtuse | (3) right |
| (2) isosceles | (4) scalene |
- 23 If the sum of the interior angles of a polygon equals the sum of the exterior angles, the polygon has
- | | |
|-------------|-------------|
| (1) 5 sides | (3) 3 sides |
| (2) 6 sides | (4) 4 sides |
- 24 What is the locus of the midpoints of all line segments drawn from a given point to a given line?
- | | |
|---------------|-----------------|
| (1) one line | (3) one circle |
| (2) two lines | (4) two circles |

- 25 If the lengths of two sides of a triangle are 3 and 5, the length of the third side may be
- | | |
|-------|-------|
| (1) 1 | (3) 6 |
| (2) 2 | (4) 8 |
- 26 The median AD of triangle ABC divides the triangle into two triangles which are always
- | | |
|---------------|-------------------|
| (1) congruent | (3) equal in area |
| (2) similar | (4) isosceles |
- 27 If $a > b$ and c is a positive number, which of the following relationships is *not* true?
- | | |
|---------------------|---------------------|
| (1) $ac > bc$ | (3) $a + c > b + c$ |
| (2) $c - a > c - b$ | (4) $a - c > b - c$ |
- 28 Given the statement, "If a boy drives a car, he must be at least 16 years old." Which conclusion follows logically from this statement?
- | |
|--|
| (1) James is 16 years old; therefore he drives a car. |
| (2) Tom does not drive a car; therefore he is not yet 16 years old. |
| (3) Phil is not yet 16 years old; therefore he does not drive a car. |
| (4) All 16-year-old boys drive cars. |
- 29 *On the answer sheet*, construct the complement of angle ABC .
- 30 *On the answer sheet*, divide the line segment AB into three equal parts.

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

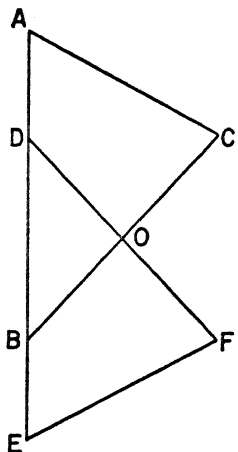
Part II

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.

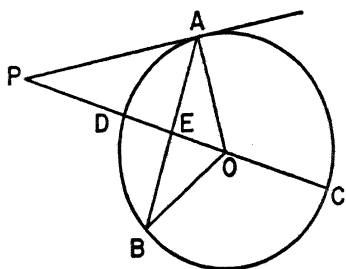
OR

- b* The area of a regular polygon is equal to one-half the product of its perimeter and its apothem.



- 32 Given: On line AE , $AD = BE$; DF and BC are equal and bisect each other at O .
 Prove: $AC = EF$ [10]

- 33 In the accompanying figure, PA is a tangent to circle O at point A . Secant PDC passes through the center O and is perpendicular to chord AB at E . Radii OA and OB are drawn.

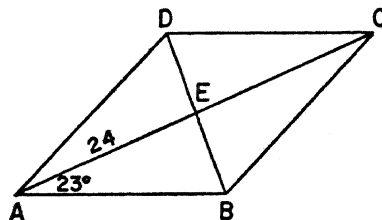


Prove: $\frac{OP}{OB} = \frac{PA}{BE}$ [10]

- 34 The vertices of trapezoid $ABCD$ are $A(0, -4)$, $B(12, 5)$, $C(6, 11)$, and $D(2, 8)$.
a Find the coordinates of points E and F , the midpoints of the legs AD and BC , respectively. [3]
b Find the length of EF . [3]
c Show, by means of coordinate geometry, that the median of trapezoid $ABCD$ is equal to one-half the sum of the bases. [4]

- 35 Point P is 3 inches from line m .
a Describe fully the locus of points at a distance of 1 inch from line m . [3]
b Describe fully the locus of points at a distance of x inches from point P . [3]
c How many points are there which satisfy the conditions given in both a and b
 (1) if $x = 4$? [2]
 (2) if $x = 1$? [2]

- 36 In the accompanying figure, $ABCD$ is a rhombus. Diagonal AC makes an angle of 23° with side AB and $AE = 24$.



- a* Find the length of EB to the *nearest integer*. [3]
b Using the result found in answer to *a*, find the area of the rhombus. [2]
c Find the length of AB to the *nearest integer*. [3]
d Find to the *nearest integer* the length of the altitude of the rhombus from D to side AB . [2]

- *37 The vertices of parallelogram $ABCD$ are $A(-2, 4)$, $B(2, 6)$, $C(7, 2)$, and $D(k, 0)$.
a Find the slope of line AB . [3]
b Express the slope of line CD in terms of k . [2]
c Using the results found in answer to *a* and *b*, find the value of k . [2]
d Write an equation of line BD . [3]

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

Page 5 & 6

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Paper

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Part I Score:..... Rater's Initials:
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TENTH YEAR MATHEMATICS

Monday, June 19, 1967 — 1:15 to 4:15 p.m., only

ANSWER SHEET

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

Grade.....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.

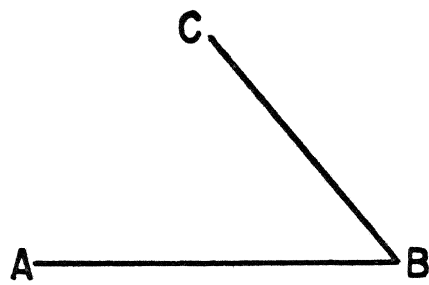
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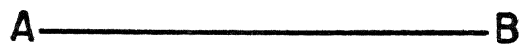
27.....

28.....

29



30



FOR TEACHERS ONLY

10

SCORING KEY TENTH YEAR MATHEMATICS

Monday, June 19, 1967 — 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 22–28, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

- | | |
|-----------------------------|---------------------------------|
| (1) 65 | (15) 8 |
| (2) 92 | (16) 110 |
| (3) 60 | (17) $\sqrt{27}$ or $3\sqrt{3}$ |
| (4) 6 | (18) $y = 3x + 5$ |
| (5) $\sqrt{29}$ | (19) 12 |
| (6) $\frac{s^2\sqrt{3}}{4}$ | (20) 8 |
| (7) 45 | (21) 9 |
| (8) 49 | (22) 2 |
| (9) 12 | (23) 4 |
| (10) 130 | (24) 1 |
| (11) 54 | (25) 3 |
| (12) 8 | (26) 3 |
| (13) (2,2) | (27) 2 |
| (14) 6π | (28) 3 |

[OVER]

TENTH YEAR MATHEMATICS — *concluded*

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 (1,2) and (9,8) [3]
 b 10 [3]

(35) a Two lines parallel to m , one on either side at a distance 1 inch from m [3]
 b A circle with center at P and radius equal to x inches [3]
 c (1) 3 [2]
 (2) 0 [2]

(36) a 10 [3]
 b 480 [2]
 c 26 [3]
 d 18 [2]

*(37) a $\frac{1}{2}$ [3]
 b $\frac{2}{7-k}$ [2]
 c 3 [2]
 d $6x + y = 18$ [3]