The University of the State of New York

10

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Wednesday, August 14, 1968 — 8:30 to 11:30 a.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 $\triangle ABC$, $\angle A$ is 4 times as large as $\angle B$. If the measure of the exterior angle at C is 130°, what is the number of degrees in the measure of $\angle B$?

2 Each angle of a regular polygon measures 150°. Find the number of sides in the polygon.

3 An inscribed angle and a central angle intercept the same arc in a circle. If the inscribed angle has a measure of $x°$, express in terms of x the number of degrees in the measure of the central angle.

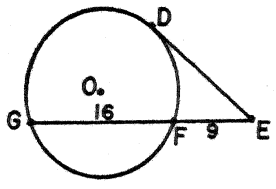
4 An angle formed by two tangents to a circle intercepts a minor arc of 130°. Find the number of degrees in the measure of this angle.

5 The altitude of a trapezoid is 6 and one base is 9. If the area of the trapezoid is 51, what is the length of the other base?

6 Each leg of an isosceles triangle is 11 inches and each base angle measures 50°. Find to the *nearest tenth of an inch* the length of the altitude drawn to the base of the triangle.

7 The diagonals of two squares are 10 and 20, respectively. Find the ratio of the area of the smaller square to the area of the larger square.

8 Tangent DE and secant GFE are drawn to a circle, as shown in the accompanying figure. If $GF = 16$ and $FE = 9$, find the length of DE.



9 The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments of 4 and 12, respectively. Find the length of the shorter leg of the right triangle.

10 In rectangle $ABCD$, side $AB = 6$, side $BC = 9$, and diagonal AC is drawn. Find $\angle CAD$ to the *nearest degree*.

11 Find the length of a side of a square whose diagonal is $4\sqrt{2}$.

12 Express in radical form the length of the apothem of a regular hexagon whose side is 10.

13 The coordinates of the midpoint of line segment AB are (2,5). If A is the point (—3,2), what are the coordinates of B?

14 The area of a circle is 56π. The area of a sector in this circle is 7π. Find the number of degrees in the angle of the sector.

15 Find the perimeter of a rhombus whose diagonals are 10 and 24, respectively.

16 In circle O, chords AB and CD intersect at point E. If $AE = 3x$ inches, $EB = x$ inches, $CE = 9$ inches, and $ED = 12$ inches, what is the number of inches in the length of EB?

17 If the points (—3,—2) and (5,4) are the endpoints of a diameter of a circle, what is the length of a diameter of this circle?

18 The width of a rectangle is represented by x and its length by $x + 2$. If the area of the rectangle is 24, find its width.

19 In triangle ABC, a line parallel to AC intersects AB at D and BC at E. If $BD = 4$, $DA = 6$, and $AC = 15$, find the length of DE.

72

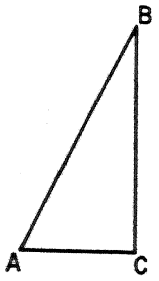
Directions (20–29): For *each* statement or question, write on the separate answer sheet the *number* preceding the word or expression that, of those given, best completes the statement or answers the question.

20 The difference between the supplement and the complement of an angle of 62° is
(1) 28° (3) 90°
(2) 62° (4) 118°

21 Two circles each have a radius of 4 inches. The centers of the two circles are 6 inches apart. The number of common tangents that can be drawn to the circles is
(1) 1 (3) 3
(2) 2 (4) 4

22 A line which *always* divides a triangle into two triangles equal in area is
(1) a median
(2) an altitude
(3) an angle bisector
(4) a line joining the midpoints of two sides of the triangle

23 In the accompanying figure, triangle ABC is a right triangle with hypotenuse AB. Side AC is equal to
(1) $AB \cos A$
(2) $AB \sin A$
(3) $BC \sin A$
(4) $BC \cos A$



24 A regular polygon is inscribed in a given circle. As the number of sides of the polygon increases,
(1) each interior angle decreases
(2) each central angle increases
(3) the perimeter remains the same
(4) the apothem increases

25 An equation of the locus of points whose ordinates are 3 more than twice their abscissas is
(1) $x = 2y + 3$ (3) $y = 2x + 3$
(2) $x = 2y - 3$ (4) $y = 2x - 3$

26 In $\triangle ABC$, AC is greater than AB. The bisector of angle BAC meets BC in E. Angle BEA is always
(1) greater than $\angle CEA$
(2) less than $\angle CEA$
(3) equal to $\angle EAC$
(4) equal to $\angle ECA$

27 The figure formed by joining the midpoints of the sides of a trapezoid in order is always a
(1) rhombus (3) rectangle
(2) parallelogram (4) square

28 For which statement is the converse true?
(1) If two triangles are congruent, then the corresponding angles are equal.
(2) If two angles are vertical angles, then they are equal.
(3) If two triangles are congruent, then they are equal in area.
(4) If two sides of a triangle are equal, then the angles opposite these sides are equal.

29 Which pair of points will determine a line parallel to the x-axis?
(1) (1,1) (2,3) (3) (2,3) (2,5)
(2) (1,1) (3,3) (4) (2,5) (4,5)

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

30 By construction *on the answer sheet*, circumscribe a circle about right 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.

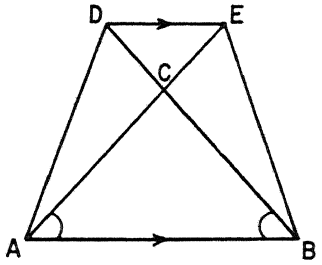
31 Prove *either* *a* or *b* but *not* both: [10]

a An angle inscribed in a circle is measured by one-half its intercepted arc. [Prove only the case in which one side of the angle is a diameter of the circle.]

OR

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

32 Given: In triangle ABC, angle ABC = angle BAC, as shown in the accompanying figure. Sides AC and BC are extended to E and D, respectively, so that $DE \parallel AB$. Line segments AD and BE are drawn.

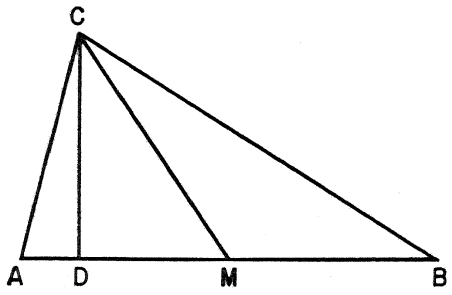


Prove:

a $CD = CE$ [5]

b $\triangle ABD \cong \triangle ABE$ [5]

33 In triangle ABC, CD is the altitude to AB and CM is the median to AB, as shown in the accompanying figure.



If $AB = 24$, $CD = 12$, and $CM = 15$, find the

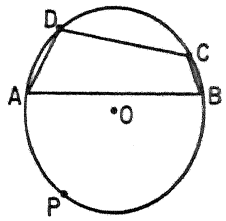
a area of $\triangle BCM$ [2]

b length of segment DM [3]

c area of $\triangle ACD$ [3]

d ratio of the area of $\triangle ACD$ to the area of $\triangle ABC$ [2]

34 In the accompanying figure, $ABCD$ is a quadrilateral inscribed in circle O. Arcs AD, DC, and CB are represented by $(2y - 30)°$, $(x + 10)°$, and $(y - 20)°$, respectively. The measures of angles A and B are 70° and 80°, respectively.



a In terms of x and y, write a set of equations that can be used to solve for x and y. [4]

b Solve the set of equations written in answer to part *a*. [4]

c Find the number of degrees in arc APB. [2]

35 Given: Triangle ABC is inscribed in a circle and point P lies on chord BC. Line AP extended meets the circle at point D. Chord BD is drawn.

Prove: $AC:BD = AP:BP$ [10]

36 Three of the vertices of square $ABCD$ are A (8,6), B (2,4), and C (4,—2).

a Find the coordinates of point M, the midpoint of diagonal AC. [1]

b Find the coordinates of vertex D. [2]

c Find the number of square units in the area of square $ABCD$. [4]

d If side AB extended meets the x-axis at point K (—10,0), find the number of square units in the area of triangle AKD. [3]

*37 Parallelogram $RSTU$ is placed on the XY plane. The coordinates of R are $(0,b)$, S (2,0), T (5,5), and U (x,y). [10]

a If the slope of RS is —2, find the value of b.

b Find the slope of ST.

c Using the result obtained in part *a*, express in terms of x and y the slope of RU.

d Write an equation of the line passing through R and U.

e Using the equation written in part *d*, determine whether or not the point (3,10) lies on the line.

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

75

Tear Here

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

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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.

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25.....

26.....

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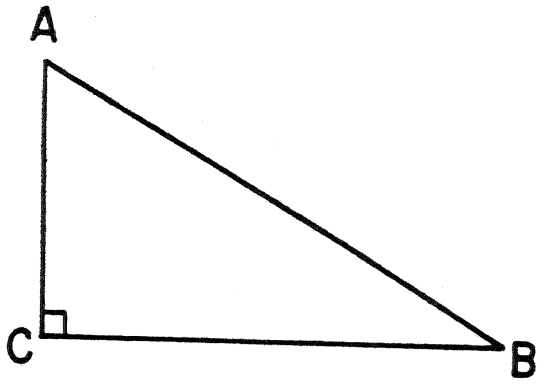

FOR TEACHERS ONLY

10

SCORING KEY

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 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 20–29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) 26

(2) 12

(3) $2x$

(4) 50

(5) 8

(6) 8.4

(7) 1:4

(8) 15

(9) 8

(10) 34

(11) 4

(12) $5\sqrt{3}$ *or* $\sqrt{75}$

(13) (7,8)

(14) 45

(15) 52

(16) 6

(17) 10

(18) 4

(19) 6

(20) 3

(21) 2

(22) 1

(23) 1

(24) 4

(25) 3

(26) 2

(27) 2

(28) 4

(29) 4

[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.

33 *a* 72 [2]
b 9 [3]
c 18 [3]
d 1:8 [2]

34 *a* $70 = \frac{1}{2}(x + y - 10)$
$80 = \frac{1}{2}(x + 2y - 20)$ [4]

b $x = 120$
$y = 30$ [4]

c 190 [2]

36 *a* (6,2) [1]
b (10,0) [2]
c 40 [4]
d 60 [3]

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

a 4

b $\frac{5}{3}$

c $\frac{y-4}{x}$

d $y = \frac{5}{3}x + 4$ *or* $5x - 3y + 12 = 0$

e No