The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, January 26, 1960 — 9:15 a.m. to 12:15 p.m., only

Name of pupil.....Name of school.....

Name and author of textbook used.....

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form.

1 The number of degrees in one acute angle of a right triangle is four times the number of degrees in the other acute angle. Find the number of degrees in the smaller acute angle. 1.....

2 Find the diagonal of a rectangle whose sides are 9 and 12. 2.....

3 Parallel lines AB and CD are intersected by transversal EF. The number of degrees in a pair of alternate interior angles is represented by $2x - 60$ and $x + 40$, respectively. Find the value of x. 3.....

4 Find the circumference of a circle whose diameter is 28. 4.....

5 The area of a circle is 25π. Find the radius of the circle. 5.....

6 Regular pentagon $ABCDE$ is inscribed in circle O. Diagonals AC and BE intersect in F. Find the number of degrees in angle AFB. 6.....

7 In circle O, diameter AB is perpendicular to chord CD at E. Chord CD is 12 inches long and AE is 4 inches long. Find the number of inches in the length of the diameter. 7.....

8 Find the area of an isosceles right triangle if the length of each leg is 6. 8.....

9 In triangle ABC, D is the midpoint of AB and E is the midpoint of AC. The area of triangle ABC is 24. Find the area of triangle ADE. 9.....

10 The area of a trapezoid is 21 and the sum of the bases is 14. Find the length of the altitude. 10.....

11 A vertical rod 3 feet in length casts a shadow whose length is 5 feet. At the same time a tree casts a shadow 60 feet in length. If both the rod and the tree stand on level ground, find the number of feet in the height of the tree. 11.....

12 The legs of a right triangle are 6 and 8. Find to the *nearest degree* the smaller acute angle. 12.....

13 The altitude upon the hypotenuse of a right triangle divides the hypotenuse into segments that are 2 inches and 8 inches in length. Find the number of inches in the length of the altitude. 13.....

14 One side of a rhombus is 12 and one of the angles contains 60°. Find the area of the rhombus. 14.....

15 Write an equation of the locus of points whose distance from the origin is 3 units. 15.....

16 Find the coordinates of the midpoint of the line segment joining the points whose coordinates are (0, 3) and (—4, 1). 16.....

17 Find the length of the line segment joining the points whose coordinates are (0, 3) and (—4, 1). 17.....

Directions (18–21): If the blank space in each statement below is replaced by the word *always*, *sometimes* (but not always), or *never*, the resulting statement will be true. Select the word that will correctly complete *each* statement and write this word on the line at the right.

18 The diagonals of a rectangle ... bisect each other. 18.....

19 In circle O chord AB is drawn. Arc AB is ... equal to chord AB. 19.....

20 Two right triangles are ... congruent if two sides of one are equal to the corresponding sides of the other. 20.....

21 In triangle ABC, angle A is greater than 60°. Side BC is ... the longest side of the triangle. 21.....

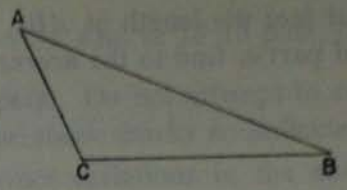
Directions (22–24): Write on the line at the right of *each* of the following the *number* preceding the expression that best completes the statement or answers the question.

22 The total number of points equally distant from both the x and y coordinate axes and two inches distant from the origin is
(1)1 (2)2 (3)3 (4)4 22.....

23 The inverse of the statement " If two angles of a triangle are equal, the opposite sides are equal " is
(1) If two sides of a triangle are equal, the opposite angles are equal.
(2) If two sides of a triangle are not equal, the opposite angles are not equal.
(3) If two angles of a triangle are not equal, the opposite sides are not equal.
(4) The base angles of an isosceles triangle are equal. 23.....

24 Which of the following statements is a postulate?
(1) The sum of the angles of a triangle is equal to a straight angle.
(2) Through a given point only one straight line can be constructed parallel to a given line.
(3) Parallel lines are lines that lie in the same plane and do not intersect, however far they are extended.
(4) A diameter perpendicular to a chord of a circle bisects the chord. 24.....

25 Construct a circle circumscribed about triangle ABC.



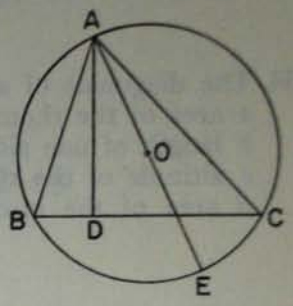
Part II

Answer three questions from this part.

26 Prove: If two angles of a triangle are equal, the sides opposite these angles are equal. [10]

27 In the diagram at the right, triangle ABC is inscribed in circle O. AD is an altitude and AE is a diameter.

Prove: $AB \times AC = AD \times AE$. [10]



28 Prove: If the three angles of one triangle are equal to the three angles of another triangle, the triangles are similar. [10]

29 In triangle ABC, $BC > AC$. The bisectors of angles A and B meet at point F. Prove: $BF > AF$. [10]

30 In triangle ABC, points A and B are fixed with $AB = 10$ inches. Describe fully the locus of point C if

a the area of $\triangle ABC$ is 20 square inches [4]

b angle ACB is a right angle [3]

c $\triangle ABC$ is isosceles $(AC = BC)$ [3]

*31 The vertices of parallelogram $ABCD$ are $A(0, 0)$, $B(3, 5)$, $C(x, y)$ and $D(1, 9)$.

a Express in terms of x and y the slopes of lines BC and DC. [4]

b Using the results obtained in part *a*, write *two* equations that can be used to find x and y. [2]

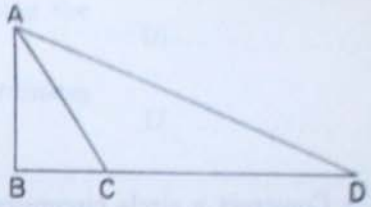
c Find the coordinates of C. [4]

* This question is based on one of the optional topics in the syllabus and may be used in place of any question in either part II or part III.

Part III

Answer two questions from this part. Show all work.

32 In the figure at the right, angle B is 90°, angle ACB is 58°, angle D is 23° and $BC = 60$ feet.



a Find to the *nearest foot* the length of AB. [4]

b Using the result of part *a*, find to the *nearest foot* the length of CD. [6]

33 The vertices of a triangle are $P(-4, -5)$, $R(6, -3)$ and $S(2, 1)$.

a Using graph paper, draw $\triangle PRS$. [2]

b Find the length of PR. [Answer may be left in radical form.] [2]

c Find the coordinates of the midpoint of PR. [2]

d Find the length of the median (ST) drawn to PR. [Answer may be left in radical form.] [2]

e Express in *simplest* form the ratio of ST to PR. [2]

34 The diagonals of a rhombus are 30 and 40. Find the

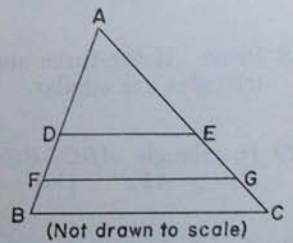
a area of the rhombus [2]

b length of one side [3]

c altitude of the rhombus [2]

d area of the inscribed circle [Answer may be left in terms of π.] [3]

35 The length of the base BC of triangle ABC is 12. DE and FG are drawn parallel to BC so that the area of triangle ABC is divided into three equal parts. Find the



a length of DE [5]

b length of FG [5]

[Answers may be left in radical form.]

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING TENTH YEAR MATHEMATICS

Tuesday, January 26, 1960 — 9:15 a.m. to 12:15 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 check marks 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 22–24, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) 18

(2) 15

(3) 100

(4) 28π *or* 88

(5) 5

(6) 108

(7) 13

(8) 18

(9) 6

(10) 3

(11) 36

(12) 37°

(13) 4

(14) $72\sqrt{3}$ *or* 124.6

(15) $x^2 + y^2 = 9$

(16) $(-2, 2)$

(17) $\sqrt{20}$ *or* $2\sqrt{5}$ *or* 4.5

(18) always

(19) never

(20) always

(21) sometimes

(22) 4

(23) 3

(24) 2

[OVER]

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%, 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.

Part II

30 Phrases such as the following should be allowed credit as indicated:

a two lines parallel to AB, one on either side, and at a distance of 4 inches from AB [4]

b a circle with diameter AB [3]

c a line perpendicular to AB at its midpoint [3]

31 *a* slope of BC is $\frac{y-5}{x-3}$ [4]

slope of DC is $\frac{y-9}{x-1}$

b $\frac{y-5}{x-3} = \frac{9}{1}$ and $\frac{y-9}{x-1} = \frac{5}{3}$ [2]

c (4, 14) [4]

Part III

32 *a* 96 [4]

b 166 [6]

33 *b* $\sqrt{104}$ or $2\sqrt{26}$ [2]

c (1, —4) [2]

d $\sqrt{26}$ [2]

e 1:2 [2]

34 *a* 600 [2]

b 25 [3]

c 24 [2]

d 144π [3]

35 *a* $\sqrt{48}$ or $4\sqrt{3}$ or 6.9 [5]

b $\sqrt{96}$ or $4\sqrt{6}$ or 9.8 [5]