The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, January 20, 1958 — 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 Find the number of degrees in the sum of the interior angles of a polygon of seven sides. 1.....

2 In a circle, diameter AB bisects chord CD at E. If $CD = 12$ and $BE = 4$, find EA. 2.....

3 CD is the altitude to the hypotenuse of right triangle ABC. If $AD = 9$ and $BD = 16$, find CD. 3.....

4 The area of a trapezoid is 55 square inches. If the bases of the trapezoid are 9 inches and 13 inches, find the number of inches in the altitude. 4.....

5 In triangle ABC, angle A is $60°$ and angle B is $50°$. Which is the shortest side of triangle ABC? 5.....

6 The sides of a triangle are 5, 6 and 9. Find the shortest side of a similar triangle whose perimeter is 60. 6.....

7 Point A is 10 inches from the center of a circle whose radius is 6 inches. Find the number of inches in the length of the tangent to the circle from point A. 7.....

8 A circle whose radius is r is inscribed in a square. Express the area of this square in terms of r. 8.....

9 Central angle AOB in circle O contains $80°$ and X is any point on major arc AB. Find the number of degrees in angle AXB. 9.....

10 Equilateral triangle ABC is inscribed in a circle. Find the number of degrees in the acute angle formed by side AB and the tangent at B. 10.....

11 Find the area of the regular polygon whose perimeter is 40 and whose apothem is 5. 11.....

12 The diagonals of a rhombus are 4 and 6. Find a side of the rhombus. 12.....

13 Find the side of an equilateral triangle whose area is $36\sqrt{3}$. 13.....

[OVER]

14 Two adjacent sides of a parallelogram are 6 and 18 and the included angle is 30°. Find the area of the parallelogram. 14.....

15 In triangle ABC, angle $A = 48°$, $AB = 12$ and BD is the altitude to AC. Find BD to the *nearest tenth*. 15.....

16 If the number of degrees in angles A and B of parallelogram $ABCD$ are represented by $2x + 10$ and $3x + 40$, respectively, find the value of x. 16.....

17 The x-axis is the perpendicular bisector of the line segment AB. If the coordinates of point A are $(5, 4)$, write the coordinates of point B. 17.....

18 If the coordinates of the center of a circle are $(6, 9)$ and the circle passes through the point $(10, 12)$, find the length of the radius of the circle. 18.....

Directions (19–24): Indicate the correct completion for *each* of the following by writing on the line at the right the letter a, b, c or d.

19 If the radius of a circle is increased by x inches, the circumference is increased by (*a*) x in. (*b*) 2 in. (*c*) 2π in. (*d*) $2\pi x$ in. 19.....

20 A given point is 8 inches from a given straight line. The number of points which are 3 inches from this line and, also, 6 inches from this point is (*a*) 0 (*b*) 2 (*c*) 3 (*d*) 4 20.....

21 The ratio of the radii of two circles is 2:3. If the area of the smaller circle is 12 square inches, the number of square inches in the area of the larger circle is (*a*) 8 (*b*) 18 (*c*) 27 (*d*) 216 21.....

22 Similar polygons are defined as polygons which have (*a*) corresponding angles equal (*b*) corresponding sides equal and corresponding angles equal (*c*) corresponding sides proportional and corresponding angles equal (*d*) corresponding sides proportional 22.....

23 Given the statements below:

(1) The sum of the angles of a triangle is a straight angle.

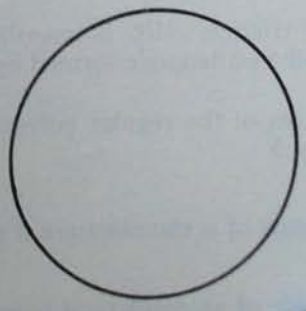
(2) When two parallel lines are cut by a transversal, the alternate interior angles are equal.

(3) The acute angles of a right triangle are complementary.

A logical sequence in which these statements can be proved is (*a*) 3, 1, 2 (*b*) 2, 3, 1 (*c*) 2, 1, 3 (*d*) 1, 3, 2 23.....

24 An equation which represents the locus of points equidistant from points (4, 0) and (8, 0) is (*a*) $x = 12$ (*b*) $y = 6$ (*c*) $x = 6$ (*d*) $y = 0$ 24.....

25 Find, by construction, the center of the circle at the right.

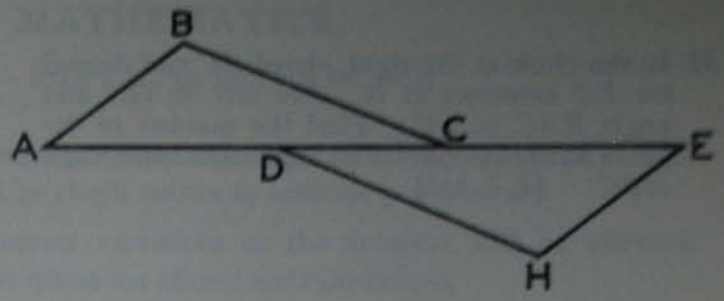


Part II

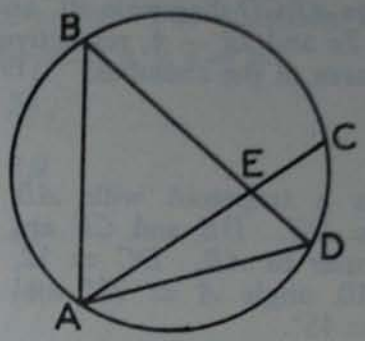
Answer three questions from this part.

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

27 In the figure at the right, AE is a straight line, $AD = CE$ and BC is equal and parallel to DH.
Prove: $AB = EH$. [10]



28 In the diagram at the right, B is the midpoint of major arc AC. Chords BD and AC intersect at E. Chords AD and AB are drawn.
Prove: $BD \times BE = (AB)^2$. [10]



29 Prove: An angle formed by two secants intersecting outside a circle is measured by one-half the difference of the intercepted arcs. [10]

30 Given a square whose side is represented by s.

a Express the area of the inscribed circle in terms of π and s. [3]

b Express the area of the circumscribed circle in terms of π and s. [5]

c Find, in *simplest form*, the ratio of the area of the inscribed circle to the area of the circumscribed circle. [2]

*31 Given the points $A(x, 3)$, $B(4, 5)$, $C(6, 4)$ and $D(10, 5)$.

a Find the slope of the line through the points C and D. [2]

b Write an expression which represents the slope of the line through the points A and B. [2]

c Find the value of x that will make the line through A and B parallel to the line through C and D. [2]

d Write an equation of the line passing through the point B and perpendicular to the y-axis. [2]

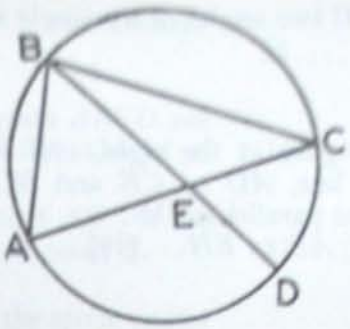
e Write an equation of the line passing through the origin and point D. [2]

* 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 circle at the right, chord AC and diameter BD intersect at E. Arc $AB = 68°$ and angle $BAC = 64°$. Find the number of degrees in arc AD, arc BC, angle BEC and angle ABC. [2, 2, 3, 3]

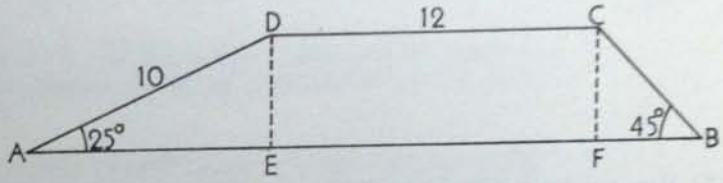


33 In rhombus $ABCD$ diagonals AC and BD intersect at E. The lengths of AC and BD are represented by $2x$ and $2x - 4$, respectively. Side $BC = 10$ and the perimeter of triangle $BEC = 24$. Find the area of the rhombus. [10]

34 $ABCD$ is a trapezoid with AB parallel to DC. DE and CF are perpendicular to AB. $DC = 12$, $AD = 10$, angle $A = 25°$ and angle $B = 45°$.

a Find, to the *nearest tenth*, the length of DE, AE, FB and AB. [2, 2, 1, 1]

b Find, to the *nearest integer*, the area of the trapezoid $ABCD$. [4]



35 *a* Given the points $A(-2, 4)$, $B(4, 5)$ and $C(x, y)$. If B is the midpoint of line segment AC, find, by the use of algebra, the value of x and the value of y. [3]

b Show that the lines joining the points $(5, 3)$, $(15, 3)$ and $(10, 8)$ form an isosceles right triangle. [7]

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING
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 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 19–24, allow credit if the pupil has written the correct answer instead of the letter *a*, *b*, *c* or *d*.

(1) 900

(2) 9

(3) 12

(4) 5

(5) AC

(6) 15

(7) 8

(8) $4r^2$

(9) 40

(10) 60

(11) 100

(12) $\sqrt{13}$ *or* 3.6

(13) 12

(14) 54

(15) 8.9

(16) 26

(17) $(5, -4)$

(18) 5

(19) *d*

(20) *b*

(21) *c*

(22) *c*

(23) *c*

(24) *c*