The University of the State of New York

TENTH YEAR MATHEMATICS

Wednesday, August 20, 1958 — 8:30 to 11:30 a.m., only

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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 line joining the midpoints of two sides of a triangle is 6. Find the third side of the triangle.

1................

2 In parallelogram $ABCD$, angle A is represented by $x°$ and angle B by $(2x - 30)°$. Find the number of degrees in angle A.

2................

3 Find the number of degrees in the sum of the interior angles of a polygon of eight sides.

3................

4 In a circle a central angle is drawn equal to an inscribed angle. If the arc of the central angle is represented by x, represent the arc of the inscribed angle in terms of x.

4................

5 Two secants from an external point to a circle intercept arcs of 100° and 30°. Find the number of degrees in the angle formed by the two secants.

5................

6 In a circle, chords AB and CD intersect at E. If $AE = 5$, $EB = 6$ and $EC = 4$, find ED.

6................

7 A tangent and a secant are drawn from a point to a circle. If the tangent is 8 and the external segment of the secant is 6, find the secant.

7................

8 The coordinates of the end points of a line segment are $(-1, 2)$ and $(3, 5)$. Find the coordinates of the midpoint.

8................

9 The coordinates of the end points of a line segment are $(-1, 2)$ and $(3, 5)$. Find the length of the line segment.

9................

10 Write an equation of the locus of points whose ordinates are one more than twice their abscissas.

10................

11 Two sides of a parallelogram are 8 and 10 and the included angle is 30°. Find the area of the parallelogram.

11................

12 The bases of a trapezoid are 6 and 10 and the altitude is 5. Find the area of the trapezoid.

12................

13 The areas of two similar triangles are 16 and 36. If a side of the smaller triangle is 6, find the corresponding side of the larger triangle.

13................

[1] [OVER]

14 The area of an equilateral triangle is $4\sqrt{3}$. Find a side of the triangle. 14................

15 Find the number of points that are 1 inch from a given line and also 2 inches from a given point on the given line. 15................

16 The circumference of a circle is 25. Find the length of an arc of $72°$ on this circle. 16................

17 The area of a circle is 36π. Find the length of a radius of this circle. 17................

18 Two adjacent sides of a rectangle are 3 and 4. Find, to the *nearest degree*, the number of degrees in the angle formed by a diagonal and the larger side. 18................

Directions (19–21): Indicate the correct completion for *each* of the following by writing the letter *a, b, c* or *d* on the line at the right.

19 If two sides of a triangle are 3 and 6, the third side may be (*a*) 8 (*b*) 2 (*c*) 3 (*d*) 9 19................

20 In right triangle ABC, the right angle is at C and CD is the altitude to the hypotenuse. Then AC is the mean proportional between (*a*)AD and DB (*b*)DB and BC (*c*)AB and BC (*d*)AD and AB 20................

21 Given the statements below:

(1) An angle formed by two chords intersecting inside the circle is measured by one-half the sum of the intercepted arcs.

(2) A central angle is measured by its intercepted arc.

(3) An angle inscribed in a circle is measured by one-half its intercepted arc.

A logical sequence in which these statements can be proved is (*a*) 1, 3, 2 (*b*) 3, 2, 1 (*c*) 2, 3, 1 (*d*) 2, 1, 3 21................

Directions (22–24): For *each* of the following, tell whether the statement is always true, sometimes true or never true by writing the word *always, sometimes* or *never* on the line at the right.

22 If a circle can be circumscribed about a polygon, the polygon is regular. 22................

23 From a point A outside a circle, AB and AC are drawn tangent to the circle at B and C respectively; BC is drawn. If $BC = AB$, triangle ABC is equilateral. 23................

24 In triangles ABC and DEF, angle $A = 50°$, angle $B = 62°$, angle $D = 50°$ and angle $E = 78°$. Triangle ABC is similar to triangle DEF. 24................

Directions (25): Leave all construction lines on the paper.

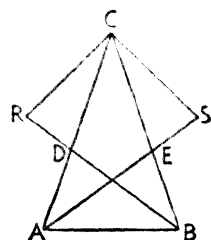25 Construct a tangent to circle O at point A.

[2]
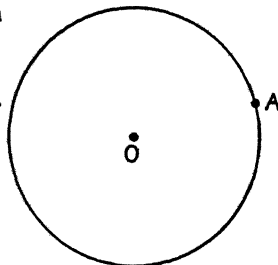
Part II
Answer three questions from this part.

26 Prove: Two right triangles are congruent if the hypotenuse and leg of one are equal to the corresponding parts of the other.   [10]

27 In the figure at the right, $CA = CB$, DB bisects angle CBA, AE bisects angle CAB and $DR = ES$.

   Prove: a $AE = DB$ [5]
          b $RC = CS$ [5]

28 Prove: The area of a triangle is equal to one-half the product of a side and the altitude drawn to that side.   [10]

29 In the figure at the right, AB is a diameter of circle O, C is any point on arc AB, BR is tangent to the circle at point B, a perpendicular from C to BR meets BR at D, AC and CB are drawn.

   Prove:
     $(CB)^2 = AB \times CD$ [10]
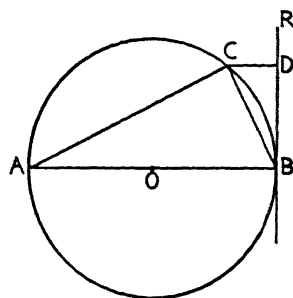
30 In triangle ABC, angle A is greater than angle B. CA is extended through A to D and CB is extended through B to E. The bisectors of angles DAB and EBA meet at O.

   Prove:
     AO is greater than BO [10]

*31 The vertices of quadrilateral $ABCD$ are $A(-4, 1)$, $B(2, -2)$, $C(4, 1)$ and $D(-2, 4)$. Show by means of slopes that $ABCD$ is a parallelogram.   [10]

   *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.

[3]   [OVER]

Part III
Answer two questions from this part. Show all work.

32 In the figure at the right, trapezoid *ABCD*, with bases *AB* and *DC*, is inscribed in a circle so that *AB* is a diameter of the circle. A tangent at *C* meets *AD* extended through *D* at *K*. Chord *DF* meets *AB* at *E*. If arc *DC* = 100° and arc *AF* is twice arc *FB*, find
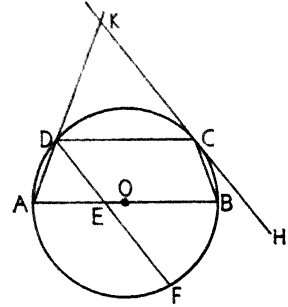
    a the number of degrees in arcs *AD*, *CB*, *AF* and *FB*   [4]

    b the number of degrees in angles *AED*, *AKC* and *DCK*   [6]

33 In the figure at the right, diagonal *AC* is drawn in quadrilateral *ABCD*. Angle *ABC* = 90°, angle *BAC* = 35°, angle *ACD* = 90°, angle *CAD* = 48° and *AC* = 12.
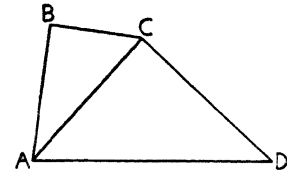
    a Find, to the *nearest integer*, *AB*, *BC* and *CD*.   [6]

    b Using the results found in *a*, find the area of *ABCD*.   [4]

34 The equal sides of isosceles triangle *ABC* are *AC* and *CB*. *D* is a point on *AC* and *E* is a point on *CB* such that *DE* is parallel to *AB*.

    a If *CD* = *x* + 4, *CA* = 2*x* + 3, *DE* = *x* + 6 and *AB* = *x* + 12, write an equation that could be used to solve for *x*.   [2]

    b Solve for *x* and find *DE*, *AB* and *DA*.   [4, 1, 1, 2]

35 *a* The vertices of triangle *ABC* are *A*(−1, 1), *B*(10, 4) and *C*(1, 7). Show that triangle *ABC* is a right triangle.   [5]

    b The vertices of triangle *DEF* are *D*(1, 2), *E*(7, 4) and *F*(5, 8). Find the area of triangle *DEF*.   [5]

[4]

FOR TEACHERS ONLY

10

INSTRUCTIONS FOR RATING
TENTH YEAR MATHEMATICS

Wednesday, August 20, 1958 — 8:30 to 11:30 a.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 19–21, allow credit if the pupil has written the correct answer instead of the letter *a*, *b*, *c* or *d*.

(1) 12	(14) 4
(2) 70	(15) 4
(3) 1080	(16) 5
(4) $2x$	(17) 6
(5) 35	(18) 37
(6) $7\frac{1}{2}$	(19) *a*
(7) $10\frac{2}{3}$	(20) *d*
(8) $(1, 3\frac{1}{2})$	(21) *c*
(9) 5	(22) sometimes
(10) $y = 2x + 1$	(23) always
(11) 40	(24) never
(12) 40	
(13) 9	