The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Wednesday, August 13, 1975 — 8:30 to 11:30 a.m., only

The last page of the booklet is the answer sheet. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

On page 5 you will find the " Tables of Natural Trigonometric Functions " which you may need to answer some questions in this examination. Fold this page along the perforations, and tear it off also slowly and carefully.

When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer paper cannot be accepted if you fail to sign this declaration.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

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. Write your answers in the spaces provided on the separate answer sheet.

1 In parallelogram $ABCD$, E is the midpoint of $\overline{DC}$ and F is the midpoint of $\overline{AD}$. If $FE = 7$, what is the length of diagonal $\overline{AC}$?

2 The circumferences of two circles are in the ratio 3:4. If the radius of the smaller circle is 12, what is the radius of the larger circle?

3 In $\triangle ABC$, side $\overline{BC}$ is extended through vertex C to a point D. If $m\angle DCA = 85$, which is the *longest* side of $\triangle ABC$?

4 How many sides does a regular polygon have if the measure of each exterior angle is 36°?

5 The measure of minor arc $\overset{\frown}{AB}$ of a circle is 96°. Find the number of degrees in the measure of the acute angle formed by chord $\overline{AB}$ and a tangent drawn to the circle at B.

6 The coordinates of point A are $(-2,5)$ and the coordinates of point C are $(1,9)$. What is the length of $\overline{AC}$?

7 The lengths of the bases of a trapezoid are 12 and 24, respectively. What is the length of the median of the trapezoid?

8 The measures of an interior angle and an exterior angle at a vertex of a polygon are represented by $x°$ and $(3x - 52)°$, respectively. Find x.

9 The midpoint of $\overline{AB}$ is M. The coordinates of M are $(3,-2)$ and the coordinates of A are $(-1,0)$. What are the coordinates of B?

10 If two circles are tangent internally, what is the total number of possible common tangents to the circles?

11 The measure of one angle of a right triangle is 30° and the length of the side of the triangle opposite this angle is 8. Find the length of the hypotenuse.

12 The perimeter of a regular polygon is 64 and its apothem is 8. What is the area of the polygon?

Directions (13–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

13 Given the statement "All of the students in homeroom 126 are over 15 years of age." Which contains a logical conclusion from the given statement?
(1) Mike is in homeroom 126; therefore, he is 18 years old.
(2) Mary is not in homeroom 126; therefore, she is not over 15 years old.
(3) Tony is 18 years old; therefore, he is in homeroom 126.
(4) Sue is not over 15 years old; therefore, she is not in homeroom 126.

14 A set of regular polygons is inscribed in a given circle. The polygon with the greatest number of sides has the *smallest*
(1) apothem
(2) perimeter
(3) area
(4) measure of each central angle

15 The ratio of the lengths of the legs of a right triangle is 5:12. What is the ratio of the length of the shorter leg to that of the hypotenuse?
(1) 13:5
(2) $\sqrt{119}$:5
(3) 5:13
(4) 5:$\sqrt{119}$

16 An equation of $\overleftrightarrow{AB}$ is $3x + 4y = 6$. Which point lies on $\overleftrightarrow{AB}$?
(1) $(0,2)$
(2) $(2,0)$
(3) $(-2,0)$
(4) $(4,-3)$

17 In the accompanying figure, $\overline{ABCD}$ and $m\angle 1 = m\angle 4 = 135$.
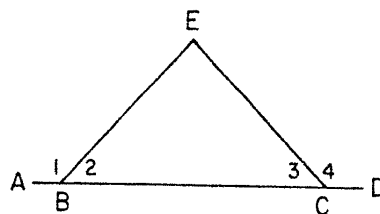
Triangle EBC must be
(1) right and isosceles
(2) acute and isosceles
(3) obtuse and isosceles
(4) equilateral

18 A regular pentagon is defined as a polygon which has
  (1) five noncongruent sides
  (2) five congruent sides
  (3) five congruent angles
  (4) five congruent sides and five congruent angles

19 In the diagram, $\triangle ABE \sim \triangle DCE$ with $\angle A \cong \angle D$ and $\angle B \cong \angle C$. If $AE = 2$, $DE = 4$, and $AB = \sqrt{15}$, find CD.
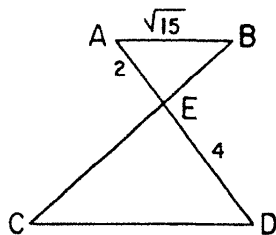
  (1) 15
  (2) $\dfrac{\sqrt{15}}{2}$
  (3) $2\sqrt{15}$
  (4) $\sqrt{30}$

20 In the accompanying figure, secant $\overline{PAC}$ and tangent $\overline{PB}$, drawn to circle O from external point P, intercept $\overset{\frown}{AB}$ and $\overset{\frown}{BC}$. If $m\overset{\frown}{AB} = 46$ and $m\overset{\frown}{BC} = 120$, find $m\angle P$.
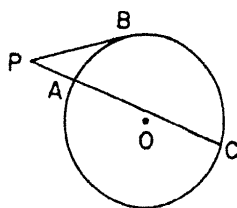
  (1) 23
  (2) 37
  (3) 74
  (4) 83

21 The perimeter of an isosceles triangle is 50 and the length of the base is 14. If s represents the length of one of the congruent sides of the triangle, which equation could be used to find s?
  (1) $s + 14 = 50$
  (2) $s - 14 = 50$
  (3) $2s + 14 = 50$
  (4) $2s - 14 = 50$

22 In right triangle ABC, angle C is the right angle, $AC = 6$, $BC = 8$, and $AB = 10$. Which function has the largest value?
  (1) $\tan A$
  (2) $\tan B$
  (3) $\sin A$
  (4) $\cos A$

23 Which is always true of the diagonals of an isosceles trapezoid?
  (1) They are congruent to each other.
  (2) They bisect each other.
  (3) They are perpendicular to each other.
  (4) They bisect the angles of the trapezoid.

24 Given the proportion $\dfrac{a}{b} = \dfrac{c}{d}$. Which can *not* be derived from the given proportion?
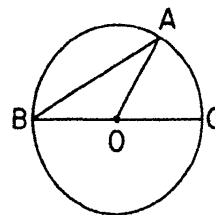 (1) $\dfrac{a}{c} = \dfrac{b}{d}$
  (3) $\dfrac{b}{a} = \dfrac{d}{c}$
  (2) $\dfrac{a}{d} = \dfrac{b}{c}$
  (4) $\dfrac{a + b}{b} = \dfrac{c + d}{d}$

25 As shown in the accompanying figure, $\overline{BC}$ is a diameter of circle O. What is the ratio of the measure of $\angle AOC$ to the measure of $\angle ABC$?

  (1) 1:1
  (2) 1:2
  (3) 1:3
  (4) 2:1

26 If the bases of two triangles are congruent and the corresponding altitudes to these bases are also congruent, then the triangles are always
  (1) congruent
  (2) similar
  (3) equal in perimeter
  (4) equal in area

27 The length of a side of a rhombus is 10 and the length of one diagonal is 16. What is the length of the other diagonal?
  (1) 12.5
  (2) $\sqrt{156}$
  (3) 12
  (4) 6

28 If the length of each side of a triangle is multiplied by 2, then the area of the triangle is multiplied by
  (1) 8
  (2) 2
  (3) 6
  (4) 4

29 The supplement of the complement of an acute angle is
  (1) an obtuse angle
  (2) an acute angle
  (3) a right angle
  (4) a straight angle

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

30 On *the answer sheet*, construct the locus of the vertices of all isosceles triangles having $\overline{AB}$ as the base.

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 The measure of an angle inscribed in a circle is equal to one-half the measure of its intercepted arc. [Consider only the case when one side of the angle is a diameter.]

OR

b The square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the legs.

32 Given: $\triangle ABC$, D and E are points on $\overline{AC}$ and $\overline{BC}$ such that $\overline{AD} \cong \overline{BE}$ and $\overline{AE} \cong \overline{BD}$.
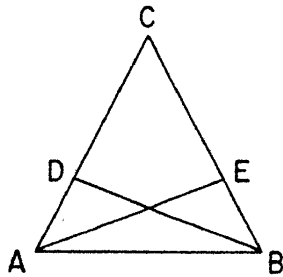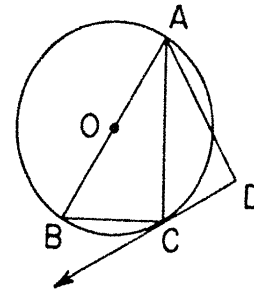

Prove: $\overline{AC} \cong \overline{BC}$ [10]

33 In quadrilateral $PQRS$, $\overline{PQ} \cong \overline{QR}$ and $\overline{PS} \cong \overline{SR}$. Diagonal $\overline{QS}$ is extended through S to T. $\overline{PT}$ and $\overline{RT}$ are drawn.

Prove: a $\triangle QPS \cong \triangle QRS$ [5]
      b $\overline{PT} \cong \overline{RT}$ [5]

34 a Graph the quadrilateral whose vertices are $A(2,-2)$, $B(6,4)$, $C(-1,5)$, and $D(-5,2)$. [2]
   b Find the area of the above quadrilateral. [8]

35 In the accompanying figure, $\overline{AB}$ is a diameter of circle O. $\overrightarrow{DC}$ is tangent to the circle at C, and $\overline{AD} \perp \overleftrightarrow{CD}$. Chords $\overline{AC}$ and $\overline{BC}$ are drawn.

Prove: $AB \times AD = (AC)^2$ [10]

36 Isosceles trapezoid $ABCD$ with bases $\overline{DC}$ and $\overline{AB}$ is shown in the accompanying diagram. Diagonal $\overline{BD}$ is perpendicular to side $\overline{AD}$, and $\overline{DE}$ is the altitude to base $\overline{AB}$.
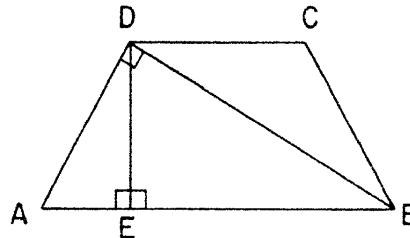
If $AB = 15$ and $AE = 3$, find the

a length of $\overline{DC}$ [2]
b length of $\overline{DE}$ [3]
c area of $ABCD$ [2]
d length of the radius of the circle circumscribed about $ABCD$ [3]

*37 Three of the vertices of parallelogram $ABCD$ have coordinates $A(2,7)$, $B(-1,1)$, and $C(3,-1)$.
   a Find the coordinates of vertex D. [2]
   b Find the slopes of $\overleftrightarrow{AD}$ and $\overleftrightarrow{DC}$. [2,2]
   c Show that $ABCD$ is a rectangle, and state a reason for the conclusion. [4]

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

Tables of Natural Trigonometric Functions
(For use with 9th and 10th Year Mathematics Regents Examinations)

Angle	Sine	Cosine	Tangent	Angle	Sine	Cosine	Tangent
1°	.0175	.9998	.0175	46°	.7193	.6947	1.0355
2°	.0349	.9994	.0349	47°	.7314	.6820	1.0724
3°	.0523	.9986	.0524	48°	.7431	.6691	1.1106
4°	.0698	.9976	.0699	49°	.7547	.6561	1.1504
5°	.0872	.9962	.0875	50°	.7660	.6428	1.1918
6°	.1045	.9945	.1051	51°	.7771	.6293	1.2349
7°	.1219	.9925	.1228	52°	.7880	.6157	1.2799
8°	.1392	.9903	.1405	53°	.7986	.6018	1.3270
9°	.1564	.9877	.1584	54°	.8090	.5878	1.3764
10°	.1736	.9848	.1763	55°	.8192	.5736	1.4281
11°	.1908	.9816	.1944	56°	.8290	.5592	1.4826
12°	.2079	.9781	.2126	57°	.8387	.5446	1.5399
13°	.2250	.9744	.2309	58°	.8480	.5299	1.6003
14°	.2419	.9703	.2493	59°	.8572	.5150	1.6643
15°	.2588	.9659	.2679	60°	.8660	.5000	1.7321
16°	.2756	.9613	.2867	61°	.8746	.4848	1.8040
17°	.2924	.9563	.3057	62°	.8829	.4695	1.8807
18°	.3090	.9511	.3249	63°	.8910	.4540	1.9626
19°	.3256	.9455	.3443	64°	.8988	.4384	2.0503
20°	.3420	.9397	.3640	65°	.9063	.4226	2.1445
21°	.3584	.9336	.3839	66°	.9135	.4067	2.2460
22°	.3746	.9272	.4040	67°	.9205	.3907	2.3559
23°	.3907	.9205	.4245	68°	.9272	.3746	2.4751
24°	.4067	.9135	.4452	69°	.9336	.3584	2.6051
25°	.4226	.9063	.4663	70°	.9397	.3420	2.7475
26°	.4384	.8988	.4877	71°	.9455	.3256	2.9042
27°	.4540	.8910	.5095	72°	.9511	.3090	3.0777
28°	.4695	.8829	.5317	73°	.9563	.2924	3.2709
29°	.4848	.8746	.5543	74°	.9613	.2756	3.4874
30°	.5000	.8660	.5774	75°	.9659	.2588	3.7321
31°	.5150	.8572	.6009	76°	.9703	.2419	4.0108
32°	.5299	.8480	.6249	77°	.9744	.2250	4.3315
33°	.5446	.8387	.6494	78°	.9781	.2079	4.7046
34°	.5592	.8290	.6745	79°	.9816	.1908	5.1446
35°	.5736	.8192	.7002	80°	.9848	.1736	5.6713
36°	.5878	.8090	.7265	81°	.9877	.1564	6.3138
37°	.6018	.7986	.7536	82°	.9903	.1392	7.1154
38°	.6157	.7880	.7813	83°	.9925	.1219	8.1443
39°	.6293	.7771	.8098	84°	.9945	.1045	9.5144
40°	.6428	.7660	.8391	85°	.9962	.0872	11.4301
41°	.6561	.7547	.8693	86°	.9976	.0698	14.3007
42°	.6691	.7431	.9004	87°	.9986	.0523	19.0811
43°	.6820	.7314	.9325	88°	.9994	.0349	28.6363
44°	.6947	.7193	.9657	89°	.9998	.0175	57.2900
45°	.7071	.7071	1.0000	90°	1.0000	.0000	

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Wednesday, August 13, 1975 — 8:30 to 11:30 a.m., only

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..........................	11..........................	21..........................
2..........................	12..........................	22..........................
3..........................	13..........................	23..........................
4..........................	14..........................	24..........................
5..........................	15..........................	25..........................
6..........................	16..........................	26..........................
7..........................	17..........................	27..........................
8..........................	18..........................	28..........................
9..........................	19..........................	29..........................
10..........................	20..........................	30 Answer question 30 on the other side of this sheet.

30

A _____ B

Your answers for Part II should be placed on paper provided by the school.

The declaration below should be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination, and that I have neither given nor received assistance in answering any of the questions during the examination.

_____
Signature

FOR TEACHERS ONLY

10 TENTH YEAR MATHEMATICS

Wednesday, August 13, 1975 — 8:30 to 11:30 a.m., only

Use only *red* ink or *red* 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.

SCORING KEY

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 13–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 14	(11) 16	(21) 3
(2) 16	(12) 256	(22) 1
(3) $\overline{AB}$ or AB or c	(13) 4	(23) 1
(4) 10	(14) 4	(24) 2
(5) 48	(15) 3	(25) 4
(6) 5	(16) 2	(26) 4
(7) 18	(17) 1	(27) 3
(8) 58	(18) 4	(28) 4
(9) $(7,-4)$ or $\begin{array}{l} x = 7 \\ y = -4 \end{array}$	(19) 3	(29) 1
(10) 1	(20) 2	

[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.

(34) b 41.5   [8]

(36) a 9   [2]

   b 6   [3]

   c 72   [2]

   d 7.5   [3]

(37) a (6,5) *or* $\begin{array}{l} x = 6 \\ y = 5 \end{array}$ [2]

   b $-\frac{1}{2}$, 2   [2,2]