The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, June 18, 1979 — 1:15 to 4:15 p.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.

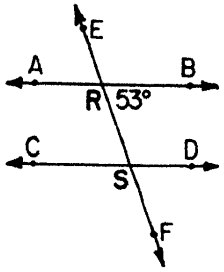
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

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

1 If the measures of the angles of a triangle are represented by x, $2x + 6$, and $3x - 6$, find the value of x.

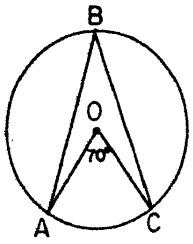
2 In the accompanying diagram, transversal $\overleftrightarrow{EF}$ intersects parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at points R and S, respectively. If $m\angle BRS = 53$, find $m\angle CSF$.



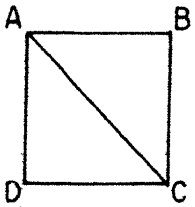
3 In $\triangle ABC$, $m\angle A = 30$ and the measure of an exterior angle at B is 120°. Which is the *longest* side of the triangle?

4 If the legs of a right triangle have lengths 5 and 10, find the area of the triangle.

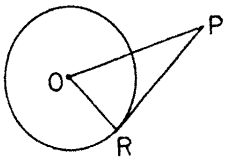
5 In the accompanying diagram, $\angle AOC$ is a central angle and $m\angle AOC = 70$. Find the number of degrees in the measure of inscribed angle ABC.



6 In the accompanying diagram, the length of a side of square $ABCD$ is 3. Find, in radical form, the length of $\overline{AC}$.



7 In the accompanying diagram, tangent $\overline{PR}$ is drawn to circle O from external point P. If the radius of the circle is 6 and $OP = 10$, what is the length of $\overline{PR}$?

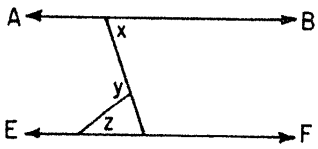


8 The endpoints of a line segment are $(3a,9b)$ and $(7a,-3b)$. Express, in terms of a and b, the coordinates of the midpoint of the segment.

9 If the length of a side of an equilateral triangle is 10, find, in radical form, the length of an altitude of the triangle.

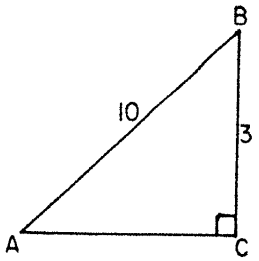
10 In trapezoid $ABCD$, the lengths of bases $\overline{AB}$ and $\overline{CD}$ are 10 and 16, respectively. The length of the altitude of the trapezoid is 8. What is the area of trapezoid $ABCD$?

11 In the accompanying figure, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{EF}$. $m\angle x = 70$, and $m\angle y = 105$. Find $m\angle z$.



12 What is the length of the radius of a circle whose area is $\frac{9}{4}\pi$?

13 In the accompanying figure, $\triangle ABC$ is a right triangle. If hypotenuse $AB = 10$ and $BC = 3$, find $m\angle A$ to the *nearest degree*.



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Directions (14–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

14 The length of the median to the hypotenuse of a right triangle is 6. What is the length of the hypotenuse?

(1) 12 (3) 3
(2) 6 (4) 4

15 In $\triangle ABC$, $\overline{DE}$ joins points D and E on $\overline{AB}$ and $\overline{BC}$, respectively, $\overline{DE} \parallel \overline{AC}$, and DE is one-fourth as long as AC. The ratio of the perimeter of $\triangle DBE$ to the perimeter of $\triangle ABC$ is

(1) $\frac{1}{12}$ (3) $\frac{1}{16}$
(2) $\frac{1}{2}$ (4) $\frac{1}{4}$

16 Two circles intersect in exactly two points. What is the total number of common tangents that can be drawn to the circles?

(1) 1 (3) 3
(2) 2 (4) 0

17 Line $\overleftrightarrow{AB}$ is parallel to line $\overleftrightarrow{PQ}$. If the slope of $\overleftrightarrow{AB}$ is $\frac{2}{3}$, the slope of $\overleftrightarrow{PQ}$ must be

(1) $-\frac{2}{3}$ (3) $-\frac{3}{2}$
(2) $\frac{2}{3}$ (4) $\frac{3}{2}$

18 An exterior angle at the base of an isosceles triangle is *always*

(1) obtuse
(2) acute
(3) right
(4) equal to the sum of the base angles

19 If the measure of each exterior angle of a regular polygon is 40°, what is the total number of sides in the polygon?

(1) 6 (3) 9
(2) 8 (4) 10

20 Which figure does *not* always have congruent diagonals?

(1) rectangle (3) rhombus
(2) square (4) isosceles trapezoid

21 The apothem of a regular polygon is 4 and the perimeter of the polygon is 32. The area of the polygon is

(1) 16 (3) 64
(2) 32 (4) 128

22 Two chords intersect in a circle such that one chord is divided into segments with lengths 4 and 5 and the other into segments of lengths 2 and x. What is the value of x?

(1) 18 (3) 7
(2) 10 (4) $4\frac{1}{2}$

23 The length of the line segment that joins two points whose coordinates are $(4,-1)$ and $(7,5)$ is

(1) 5 (3) $\sqrt{29}$
(2) $\sqrt{13}$ (4) $\sqrt{45}$

24 Which set of numbers could be the lengths of the sides of a right triangle?

(1) $2,6,\sqrt{40}$ (3) $4,6,\sqrt{40}$
(2) 2,18,20 (4) 4,36,40

25 Which is an equation of the straight line that passes through the point (3,2) and is parallel to the x-axis?

(1) $x = 3$ (3) $y = 3$
(2) $x = 2$ (4) $y = 2$

26 Secants $\overline{PAB}$ and $\overline{PCD}$ are drawn to circle O from external point P. If $m\overset{\frown}{AC} = 54$ and $m\overset{\frown}{BD} = 116$, what is $m\angle P$?

(1) 31 (3) 85
(2) 54 (4) 116

27 The ratio of the corresponding sides of two similar triangles is 4:7. The ratio of the area of the smaller triangle to the area of the larger triangle is

(1) $2:\sqrt{7}$ (3) 16:49
(2) 2:7 (4) 4:7

28 In a circle with radius 6, what is the measure in degrees of an arc whose length is 2π?

(1) 60 (3) 30
(2) 20 (4) 120

29 Which is the inverse of the statement, "If a triangle is equilateral, then it is equiangular"?

(1) If a triangle is not equiangular, then it is not equilateral.
(2) If a triangle is not equilateral, then it is not equiangular.
(3) An equilateral triangle is equiangular.
(4) An equiangular triangle is not equilateral.

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

30 *On the answer sheet,* construct the locus of points that are equidistant from vertices A and B of parallelogram $ABCD$.

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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.

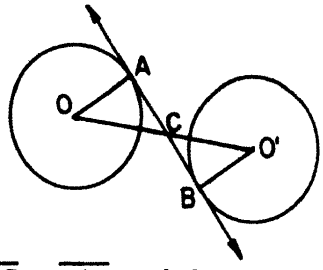
31 Prove *either a* or *b* but *not* both.

a The measure of an angle formed by two chords intersecting inside the circle is equal to one-half the sum of the measures of the intercepted arcs. [10]

OR

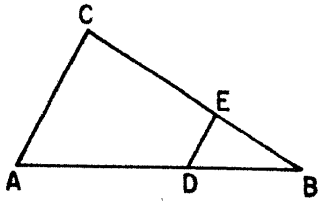
b The area of a parallelogram is equal to the product of the length of one side and the length of the altitude drawn to that side. [10]

32 Given: circle $O \cong$ circle O', radii OA and $O'B$, $\overleftrightarrow{AB}$ is a common internal tangent, and $\overline{OO'}$ intersects $\overleftrightarrow{AB}$ at C.



Prove: $\overline{OC} \cong \overline{O'C}$ [10]

33 Given: $\triangle ABC$ with $\overline{ADB}$, $\overline{CEB}$, and $\overline{DE} \parallel \overline{AC}$.



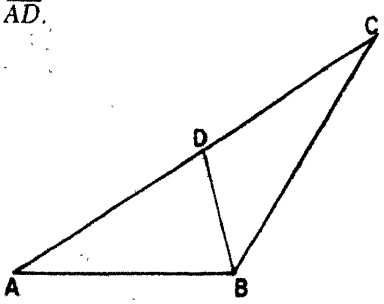
a Prove: $BA \times BE = BC \times BD$ [6]

b If $BE = 3$ and $EC = 5$, find the numerical value of:

(1) $\dfrac{\text{area } \triangle BED}{\text{area } \triangle BCA}$ [2]

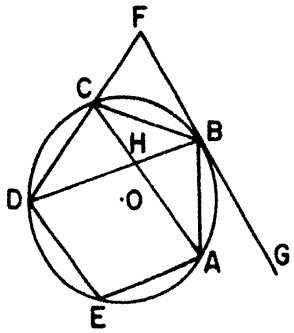
(2) $\dfrac{\text{area } \triangle BED}{\text{area trapezoid } ADEC}$ [2]

34 Given: $\triangle ABC$, $\overline{ADC}$, $\overline{BD}$ is drawn such that $\overline{AB} \cong \overline{AD}$.



Prove: $BC > DC$ [10]

35 Given: $ABCDE$ is a regular pentagon inscribed in circle O, secant $\overline{FCD}$, $\overleftrightarrow{FG}$ is tangent to circle O at B, $\overline{CHA}$, $\overline{DHB}$.



Find: *a* $m\overset{\frown}{BC}$ [2]

b $m\angle EAB$ [2]

c $m\angle CBF$ [2]

d $m\angle DHC$ [2]

e $m\angle F$ [2]

36 The coordinates of the vertices of $\triangle ABC$ are $A(-2,-2)$, $B(8,-2)$, and $C(1,6)$.

a Find the coordinates of midpoint M of side $\overline{AB}$. [2]

b Find, in radical form, the length of median $\overline{CM}$. [2]

c Describe fully the locus of points two units from A. [3]

d Write an equation of the locus of points equidistant from A and B. [3]

*37 The points $A(-2,0)$, $B(10,3)$, $C(5,7)$, and $D(1,k)$ are the vertices of a trapezoid whose bases are $\overline{AB}$ and $\overline{DC}$.

a Find the slope of $\overline{AB}$. [2]

b Express the slope of $\overline{DC}$ in terms of k. [2]

c Using the results found in answer to parts *a* and *b*, find the value of k. [3]

d Write an equation of $\overleftrightarrow{AB}$. [3]

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

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF EDUCATIONAL TESTING

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	

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, June 18, 1979 — 1:15 to 4:15 p.m., only

Part I Score: .....

Rater's Initials:

.....

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.**

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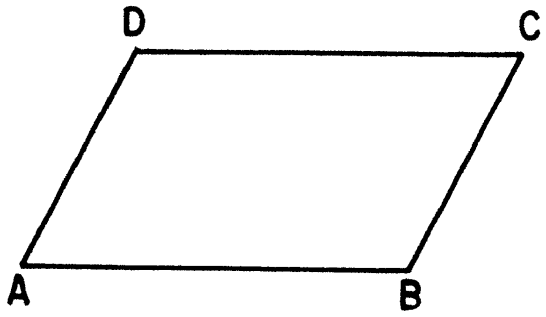

Your answers for Part II should be placed on paper provided by the school.

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

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SCORING KEY

TENTH YEAR MATHEMATICS

Monday, June 18, 1979 — 1:15 to 4:15 p.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.

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 14–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 30

(2) 127

(3) $\overline{AB}$ *or* AB *or* c

(4) 25

(5) 35

(6) $3\sqrt{2}$ *or* $\sqrt{18}$

(7) 8

(8) $(5a, 3b)$ *or* $\begin{matrix} x = 5a \\ y = 3b \end{matrix}$

(9) $5\sqrt{3}$ *or* $\sqrt{75}$

(10) 104

(11) 35

(12) $\frac{3}{2}$

(13) 17

(14) 1

(15) 4

(16) 2

(17) 2

(18) 1

(19) 3

(20) 3

(21) 3

(22) 2

(23) 4

(24) 1

(25) 4

(26) 1

(27) 3

(28) 1

(29) 2

[OVER]

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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) *b* (1) $\frac{9}{64}$ [2]

(2) $\frac{9}{55}$ [2]

(35) *a* 72 [2]

b 108 [2]

c 36 [2]

d 72 [2]

e 72 [2]

(36) *a* $(3,-2)$ *or* $\begin{array}{l} x = 3 \\ y = -2 \end{array}$ [2]

b $\sqrt{68}$ *or* $2\sqrt{17}$ [2]

c a circle with center A and radius 2

or [3]

$(x + 2)^2 + (y + 2)^2 = 4$

d $x = 3$ [3]

(37) *a* $\frac{1}{4}$ [2]

b $\frac{7 - k}{4}$ [2]

c 6 [3]

d $y = \frac{1}{4}(x + 2)$

or

$y - 3 = \frac{1}{4}(x - 10)$ [3]

or

$x - 4y = -2$