The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, August 17, 1971 — 8:30 to 11:30 a.m., only

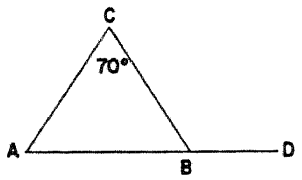
The last page of the booklet is the answer sheet, which is perforated. Fold the last page along the perforation and then, slowly and carefully, tear off the answer sheet. Now fill in the heading of your answer sheet. On page 5, which is perforated, you will find the "Tables of Natural Trigonometric Functions," which you will need to answer some questions in this examination. Fold this page along the perforation, and tear it off. When you have torn off these two pages and finished the heading, you may begin the examination immediately.

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.

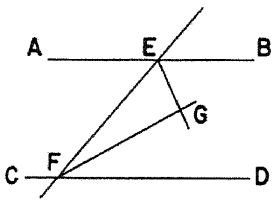
1 In quadrilateral $ABCD$, side $\overline{AB}$ is parallel to side $\overline{CD}$. If $m\angle BAD = (2x - 3)$ and $m\angle ADC = (3x + 8)$, find x.

2 In the figure below, given $\overline{ABD}$ and the measure of vertex angle C of isosceles triangle ABC is 70°. Find $m\angle CBD$.



3 If each of three angles of a quadrilateral measures 95°, how many degrees are in the measure of the fourth angle?

4 In the diagram below, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{DC}$.

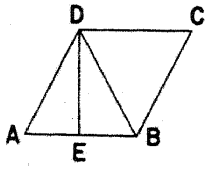


If $\overline{EG}$ is the bisector of $\angle BEF$ and $\overline{FG}$ is the bisector of $\angle EFD$, find $m\angle EGF$.

5 The area of a rhombus is 28. If the length of one diagonal of the rhombus is 10, find the length of its other diagonal.

6 The parallel sides of a trapezoid are 6 inches and 7 inches long. If the distance between the parallel sides is 8 inches, what is the area, in square inches, of the trapezoid?

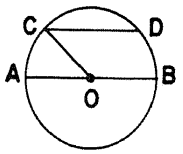
7 In the figure below, $ABCD$ is a rhombus and altitude $\overline{DE}$ bisects side $\overline{AB}$.



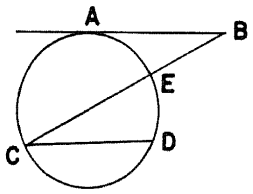
If a side of the rhombus is 8, find the length of the shorter diagonal.

8 If the sides of a triangle are 5, 12, and 13, find the area of the triangle.

9 As shown in the diagram below, $\overline{OC}$ is a radius and $\overline{AB}$ is a diameter of circle O. Chord $\overline{CD}$ is parallel to $\overline{AB}$, and $m\overset{\frown}{CD} = 50$. Find $m\angle AOC$.



10 In the diagram below, given $\overline{CEB}$, $m\angle ABE = 30$, and $\overline{AB} \parallel \overline{CD}$. Find $m\overset{\frown}{ED}$.



11 If the center of a circle is the point (—5,—2) and one endpoint of a diameter is (—2,—2), what is the ordered pair of the other endpoint of the given diameter?

12 In parallelogram $ABCD$, $m\angle A = (5x + 26)$ and $m\angle C = (3x + 40)$. Find x.

13 Write an equation of the locus of points whose ordinates are 3 more than their abscissas.

14 A secant and a tangent are drawn to a circle from an external point. The secant is 20 inches long and its external segment is 5 inches long. Find the number of inches in the length of the tangent.

15 Two similar polygons have corresponding sides in the ratio 2 : 3. If the area of the larger polygon is 18, find the area of the smaller.

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Directions (16–29): For *each* statement or question, write on the separate answer sheet the *numeral* preceding the word or expression that, of those given, best completes the statement or answers the question.

16 The supplement of an acute angle must be
(1) an acute angle
(2) a right angle
(3) an obtuse angle
(4) a straight angle

17 Which is a correct sequence for the definitions of the polygons involved?
(1) parallelogram, quadrilateral, rectangle, square
(2) square, parallelogram, rectangle, quadrilateral
(3) rectangle, quadrilateral, parallelogram, square
(4) quadrilateral, parallelogram, rectangle, square

18 The vertices of a quadrilateral are (0,0), (3,0), $(a,4)$, and (4,4). If the quadrilateral is a parallelogram, then a value of a may be
(1) 1
(2) 2
(3) 3
(4) -1

19 If two sides of a triangle are of length 8 and 14, the third side may be of length
(1) 25
(2) 12
(3) 6
(4) 5

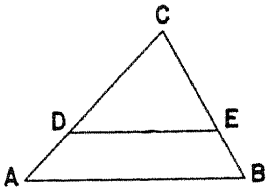
20 In triangle ABC, if $m\angle A = 60$ and $m\angle B > m\angle A$, it follows that
(1) $AB > AC$
(2) $AB > BC$
(3) $AC > BC$
(4) $BC > AC$

21 The sides of a right triangle are 3, 4, and 5. The sine of the smallest angle of this triangle is
(1) $\frac{3}{5}$
(2) $\frac{3}{4}$
(3) $\frac{4}{5}$
(4) $\frac{5}{3}$

22 Two sectors in the same circle have central angles with measures in the ratio of 1 : 4. The areas of the sectors are in the ratio of
(1) $1:\sqrt{2}$
(2) 1 : 2
(3) 1 : 16
(4) 1 : 4

23 Given a set of regular polygons arranged in increasing order of the number of sides. As the number of sides increases, the measure of an interior angle
(1) always increases
(2) always decreases
(3) remains the same
(4) increases and then decreases

24 In the figure below, $\overline{DE}$ is parallel to base $\overline{AB}$ of triangle ABC.



Which is a correct proportion?
(1) $\frac{AB}{DE} = \frac{CA}{DA}$
(2) $\frac{CA}{CD} = \frac{CB}{EB}$
(3) $\frac{CD}{DA} = \frac{DE}{AB}$
(4) $\frac{CA}{DA} = \frac{CB}{EB}$

25 Triangle ABC has vertices A (1,5), B (9,5), and C (9,1). What are the coordinates of the center of a circle which is circumscribed about triangle ABC?
(1) (5,3)
(2) (4,0)
(3) (6,4)
(4) (4,2)

26 Two regular polygons with the same number of interior angles are always
(1) equal
(2) congruent
(3) similar
(4) triangles

27 Two tangents $\overline{BA}$ and $\overline{BC}$ are drawn to circle O from point B. If the measure of the major arc AC is twice the measure of the minor arc AC, find $m\angle ABC$.
(1) 75
(2) 60
(3) 45
(4) 30

28 Two circles with radii of 5 and 10, respectively, are tangent internally. The distance between their centers is
(1) $2\frac{1}{2}$
(2) 5
(3) $7\frac{1}{2}$
(4) 15

29 In circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If E is the midpoint of $\overline{AB}$ and $AE > CE$, then
(1) $CE = DE$
(2) $CE > DE$
(3) $AE < DE$
(4) $AE > DE$

30 Given $\overline{CA} \perp \overline{AB}$. Construct *on the answer sheet*, an angle x equal in measure to 45 degrees.

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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.

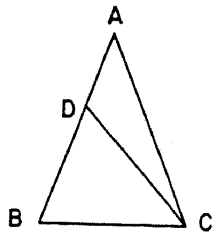
31 Prove *either* *a* or *b* but *not* both: [10]

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

OR

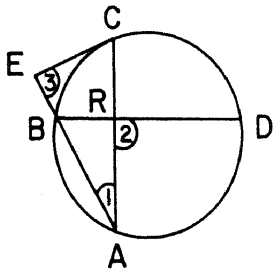
b An angle formed by two chords intersecting inside the circle is measured by one-half the sum of the intercepted arcs.

32 Given: $\overline{AB} \cong \overline{AC}$
$\overline{CB} \cong \overline{CD}$



Prove: $AB \times DB = (CB)^2$ [10]

33 Given: tangent $\overline{EC}$ and secant $\overline{EBA}$, chord $\overline{BD}$ intersects chord $\overline{AC}$ at R; $m\overset{\frown}{AB}$: $m\overset{\frown}{BC}$: $m\overset{\frown}{CD}$: $m\overset{\frown}{DA} = 4:3:5:6$

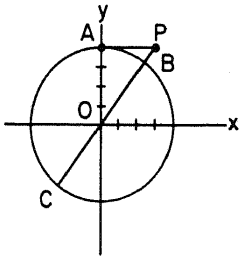


Find: *a* $m\overset{\frown}{BC}$ [2]
b $m\overset{\frown}{DA}$ [1]
c $m\angle 1$ [2]
d $m\angle 2$ [2]
e $m\angle 3$ [3]

34 Secants $\overline{PAB}$ and $\overline{PCD}$ are drawn to a circle from an external point P and chords $\overline{AB}$ and $\overline{CD}$ thus formed are congruent. Chord $\overline{BD}$ is drawn.

Prove: *a* $\angle B \cong \angle D$ [6]
b $\overline{AP} \cong \overline{CP}$ [4]

35 On a set of coordinate axes, circle O is drawn with its center at the origin. Segment $\overline{PA}$ is drawn tangent to circle O at A and secant $\overline{PBC}$ is drawn passing through point O. The coordinates of A and P are (0,4) and (3,4), respectively.



a Find PO. [2]

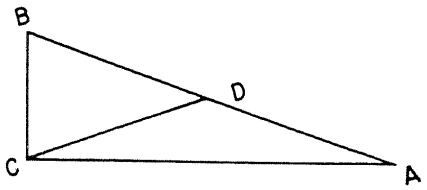
b Find PC. [2]

c Find PB. [2]

d Write an equation of $\overleftrightarrow{AP}$. [2]

e Write an equation of circle O. [2]

36 Given: $\triangle ABC$ with D a point on side $\overline{AB}$ such that $\overline{DC} \cong \overline{DB}$ and $DB > BC$.



Prove: $m\angle B > m\angle A$ [10]

*37 Given $\triangle RST$ with R (0,0), S ($2a$,0), and T ($2b$,$2c$) where $a > 0$, $b > 0$, and $c > 0$.

Using the given information, express:

a the coordinates of M, the midpoint of $\overline{RS}$ [2]

b the coordinates of N, the midpoint of $\overline{ST}$ [2]

c the slope of $\overleftrightarrow{MN}$ [3]

d the length of $\overline{MN}$ [3]

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

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THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

BUREAU OF ELEMENTARY AND SECONDARY 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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Part I Score:.....
Rater's Initials:
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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, August 17, 1971 — 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.

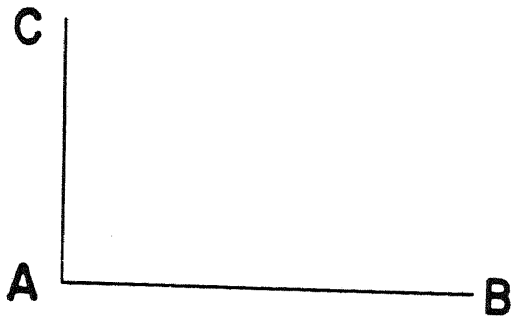
Part I

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.....	

Answer question 30 on the back of this page.

30



FOR TEACHERS ONLY

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SCORING KEY

TENTH YEAR MATHEMATICS

Tuesday, August 17, 1971—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 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 16–29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) 35

(2) 125

(3) 75

(4) 90

(5) 5.6

(6) 52

(7) 8

(8) 30

(9) 65

(10) 60

(11) (—8,—2)

(12) 7

(13) $y = x + 3$

(14) 10

(15) 8

(16) 3

(17) 4

(18) 1

(19) 2

(20) 3

(21) 1

(22) 4

(23) 1

(24) 4

(25) 1

(26) 3

(27) 2

(28) 2

(29) 3

[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.

(33) *a* 60 [2]
b 120 [1]
c 30 [2]
d 90 [2]
e 80 [3]

(35) *a* 5 [2]
b 9 [2]
c 1 [2]
d $y = 4$ [2]
e $x^2 + y^2 = 16$ [2]

(37) *a* $(a,0)$ [2]
b $(a + b, c)$ [2]
c $\frac{c}{b}$ [3]
d $\sqrt{b^2 + c^2}$ [3]

DO YOU KNOW...

...that classroom teachers returned over 3,700 Regents examination evaluation forms to the Education Department last year? The comments and suggestions made by these teachers were carefully reviewed by the Department subject-matter and testing specialists and by the teachers who prepared this year's examinations.

Be sure to fill out the Evaluation Form and give it to your principal for return in the Regents box. Your comments about the Regents examinations are important! They will be taken into consideration when future examinations are prepared.