The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, April 5, 1974 — 9:15 a.m. to 12:15 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.

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.

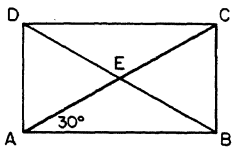
1 In $\triangle ABC$, an exterior angle at vertex C is acute. Which side of $\triangle ABC$ is the *longest* side?

2 The measure of the vertex angle of an isosceles triangle is 100°. Find the number of degrees in the measure of an exterior angle at the base of the triangle.

3 The lengths of the legs of a right triangle are 7 and 24, respectively. Find the length of the hypotenuse.

4 Find the length of the altitude of a trapezoid if the lengths of the bases are 3 and 9 and the area is 24.

5 In rectangle $ABCD$ shown below, diagonals $\overline{DB}$ and $\overline{AC}$ intersect at E, $m\angle CAB = 30$, and $AE = 6$. Find CB.



6 In rhombus $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. If $m\angle DAB = 100$, then find $m\angle ADE$.

7 Triangle ABC is inscribed in circle O, $m\overset{\frown}{AB} = (2x + 5)$, $m\overset{\frown}{BC} = (3x + 6)$, and $m\overset{\frown}{AC} = (4x - 2)$. Find x.

8 The vertices of quadrilateral $ABCD$ are $A(0,0)$, $B(0,5)$, $C(5,5)$, and $D(5,0)$. Express, *in radical form*, the length of diagonal $\overline{BD}$.

9 Find the area of a right triangle, the lengths of whose legs are 7 and 8, respectively.

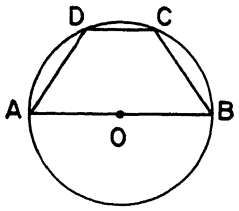
10 Find the number of sides in a regular polygon which has an exterior angle measuring 30°.

11 If the measures of two consecutive angles of a parallelogram differ by 20°, find, in degrees, the measure of the *smaller* angle.

12 A circle is circumscribed about a regular hexagon. If the length of the radius of the circle is 8, find the perimeter of the hexagon.

13 If the coordinates of M and N are $(-5,3)$ and $(7,0)$, respectively, what are the coordinates of the midpoint of $\overline{MN}$?

14 In the accompanying diagram, trapezoid $ABCD$ is inscribed in circle O so that one of its bases, $\overline{AB}$, is a diameter of the circle. If $m\overset{\frown}{AD} = 70$, find $m\angle BAD$.



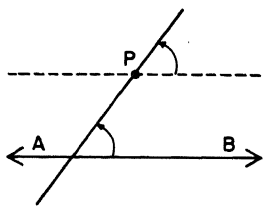
15 In $\triangle ABC$, $\angle C$ is a right angle. If $m\angle A = 47$ and $AC = 12$, find BC to the *nearest integer*.

Directions (16–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

16 If the altitudes to two sides of a triangle are congruent, then the triangle must be

(1) scalene
(2) right
(3) isosceles
(4) obtuse

17 The accompanying diagram shows the construction of a line through P parallel to $\overleftrightarrow{AB}$. On which theorem is this construction based?



(1) Alternate interior angles of parallel lines are congruent.
(2) Corresponding angles of parallel lines are congruent.
(3) If two straight lines are cut by a transversal so that the alternate interior angles are congruent, the lines are parallel.
(4) If two straight lines are cut by a transversal s that the corresponding angles are congruent, th lines are parallel.

18 In $\triangle ABC$, if $m\angle A = x$ and $m\angle B = y$, what is $m\angle C$?

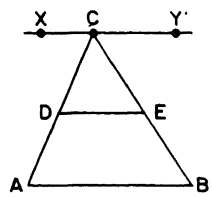
(1) $x + y$
(2) $180 - x + y$
(3) $x + y - 180$
(4) $180 - (x + y)$

19 Point P is 2 inches from $\overleftrightarrow{AB}$. What is the total number of points that are 1 inch from $\overleftrightarrow{AB}$ and also 1 inch from P?

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

20 In the accompanying figure, $\overline{XY} \parallel \overline{DE}$, $\overline{DE} \parallel \overline{AB}$, and $\overline{CD} \cong \overline{DA}$. Which congruence follows from this given information?

(1) $\overline{DE} \cong \overline{AB}$
(2) $\overline{CD} \cong \overline{CE}$
(3) $\overline{AD} \cong \overline{EB}$
(4) $\overline{CE} \cong \overline{EB}$

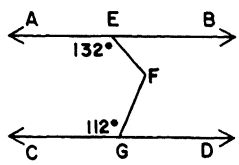


21 The altitude to the hypotenuse of a right triangle divides the triangle into two smaller triangles which *must* be

(1) equal in area
(2) congruent
(3) similar
(4) isosceles

22 In the accompanying diagram, line $\overleftrightarrow{AB}$ is parallel to line $\overleftrightarrow{CD}$. If $m\angle AEF = 132$ and $m\angle CGF = 112$, then $m\angle EFG$ equals

(1) 48
(2) 68
(3) 116
(4) 122



23 In a parallelogram, the sum of the lengths of two adjacent sides will always be

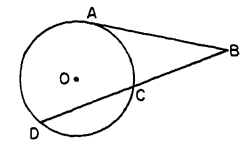
(1) greater than the sum of the lengths of the diagonals
(2) greater than the length of either of its diagonals
(3) equal to the length of one of the diagonals
(4) greater than the length of one of the diagonals, but less than the length of the other

24 In $\triangle ABC$, D is a point on $\overline{AB}$, E is a point on $\overline{AC}$, and $\overline{DE}$ is parallel to $\overline{CB}$. If $AD = 6$, $DB = 4$, and $AC = 15$, then EC equals

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

25 In the accompanying figure, $\overline{AB}$ is tangent to circle O at A and secant $\overline{BCD}$ is drawn. Which statement is always true?

(1) $AB^2 = BC \times DC$
(2) $AB^2 = DB \times BC$
(3) $DB = DC + AB$
(4) $DB^2 = AB \times BC$



26 Given the statement "If a quadrilateral is a parallelogram, its diagonals bisect each other." Which statement is a converse of the given statement?

(1) If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.
(2) If a quadrilateral is not a parallelogram then its diagonals do not bisect each other.
(3) If the diagonals of a quadrilateral do not bisect each other, then it is not a parallelogram.
(4) The diagonals of a parallelogram bisect each other.

27 A square is inscribed in a circle. If the diagonal of the square is 10, what is the area of the circle?

(1) 10π
(2) 20π
(3) 25π
(4) 100π

28 The slope of the line through the points (2,3) and (—3,3) is

(1) positive
(2) negative
(3) zero
(4) undefined

29 The length of the shorter base of a trapezoid is 1, and the length of the median is 3. What is the length of the *longer* base?

(1) 5
(2) 2
(3) 3
(4) 4

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

30 *On the answer sheet,* locate by construction the center, O, of the circle which can be inscribed in $\triangle ABC$.

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.

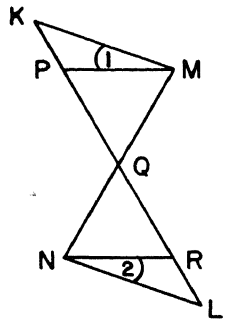
31 Prove *either a* or *b*, but *not* both: [10]

a The sum of the measures of the angles of a triangle is 180 degrees.

OR

b The area of a regular polygon is equal to one-half the product of its perimeter and the length of its apothem.

32 Given: $\overline{KPQRL}$, $\overline{MQN}$, $\overline{KM}$, $\overline{NL}$, $\overline{MP}$, and $\overline{NR}$. $\overline{KL}$ and $\overline{MN}$ bisect each other at Q. $\angle 1 \cong \angle 2$.
Prove: $\overline{PM} \cong \overline{NR}$



33 In rhombus $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. A perpendicular segment is drawn from E to side $\overline{AB}$ of the rhombus, intersecting $\overline{AB}$ at F.
Prove: $(AE)^2 = AF \times AD$

34 Regular pentagon $ABCDE$ is inscribed in circle O. Radii $\overline{OA}$ and $\overline{OE}$ are drawn. Apothem $\overline{OR}$ is drawn to side $\overline{AE}$ whose length is 8.
Find:

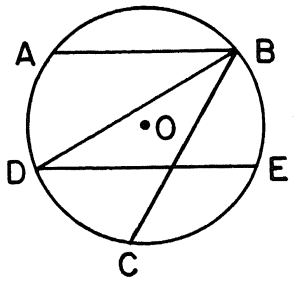
a $m\angle OAE$ [2]

b the length of apothem $\overline{OR}$ to the *nearest tenth* [3]

c the length of radius $\overline{OA}$ to the *nearest whole number* [3]

d the area of sector AOE, using the results above [*Leave answer in terms of* π.] [2]

35 In the figure at the right, $\overline{AB}$, $\overline{BC}$, $\overline{BD}$, and $\overline{DE}$ are chords of circle O. If DB bisects $\angle ABC$ and $\overline{DE} \parallel \overline{AB}$, prove that $\overline{DE} \cong \overline{BC}$.



36 The vertices of $\triangle ABC$ are $A(0,0)$, $B(6,0)$, and $C(3,4)$.

a Show that $\triangle ABC$ is isosceles. [3]

b (1) Describe fully the locus of points 3 units from A. [2]

(2) Write the equation of this locus. [2]

c (1) Describe fully the locus of points equidistant from A and B. [2]

(2) Write the equation of this locus. [1]

*37 Given: Trapezoid $ABCD$ with bases $\overline{AD}$ and $\overline{BC}$. The coordinates of the vertices are $A(3,1)$, $B(1,7)$, $C(4,9)$, and $D(k,5)$.

a What is the slope of $\overline{BC}$? [2]

b Using your answer in part *a*, find k. [3]

c Write the equation of the altitude from B to $\overline{AD}$. [5]

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

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	

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

Friday, April 5, 1974 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Pupil.....Teacher.....

School.....

Name and author of textbook used.....

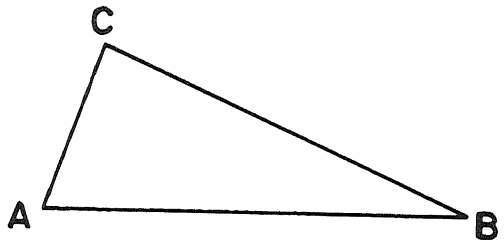
Your answers to Part I should be recorded on this answer sheet.

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

10 TENTH YEAR MATHEMATICS

Friday, April 5, 1974 — 9:15 a.m. to 12:15 p.m., only

Just before the start of the examination period, distribute one examination booklet, face up, to each pupil. Instruct the pupils to read the directions on the cover of the examination booklets, detach the answer sheet and reference tables, and fill in the heading on their answer sheet. When each pupil has received a booklet and finished filling in the heading of the answer sheet, instruct the pupils to open their examination booklets and begin work.

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.

SCORING KEY

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 numeral 1, 2, 3, or 4.

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

(2) 140

(3) 25

(4) 4

(5) 6

(6) 40

(7) 39

(8) $5\sqrt{2}$ *or* $\sqrt{50}$

(9) 28

(10) 12

(11) 80

(12) 48

(13) (1,1.5) *or* $(1,\frac{3}{2})$

(14) 55

(15) 13

(16) 3

(17) 4

(18) 4

(19) 1

(20) 4

(21) 3

(22) 3

(23) 2

(24) 3

(25) 2

(26) 1

(27) 3

(28) 3

(29) 1

[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) *a* 54 [2]

b 5.5 [3]

c 7 [3]

d $\frac{49\pi}{5}$ [2]

(36) *b* (1) a circle with center A and radius of length 3 [2]

(2) $x^2 + y^2 = 9$ [2]

c (1) the perpendicular bisector of $\overline{AB}$ [2]

(2) $x = 3$ [1]

(37) *a* $\frac{2}{3}$ [2]

b 9 [3]

c $y - 7 = -\frac{3}{2}(x - 1)$ [5]

DO YOU KNOW —

. . . that you can help prepare Regents examinations? You can do so by completing the Regents Examination Evaluation Form that is enclosed in each Regents examination envelope.

Classroom teachers returned almost 5,000 Regents Examination Evaluation Forms to the Education Department following last June's Regents examinations. Their comments were carefully reviewed by the Department subject-matter and testing specialists and the committees of teachers who prepared this year's examinations.

Remember, your comments are important! Be sure to complete the Evaluation Form and give it to your principal for return in the Regents box.