The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, April 11, 1975—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.

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

40,

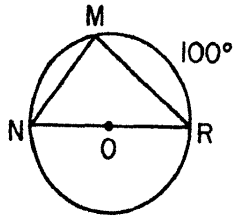
Part I

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 Given $\triangle ABC \sim \triangle DEF$. The lengths of corresponding sides $\overline{AC}$ and $\overline{DF}$ measure 2 and 3, respectively. What is the ratio of the perimeter of $\triangle ABC$ to the perimeter of $\triangle DEF$?

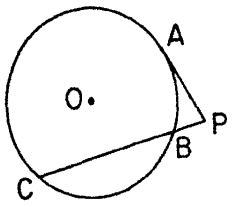
2 A circle is inscribed in a square. If the diameter of the circle is 4, what is the perimeter of the square?

3 In the accompanying figure, $\overline{NR}$ is a diameter of circle O. If $m\overset{\frown}{MR} = 100$, find $m\angle NRM$.



4 Find the length of the line segment connecting the points whose coordinates are $(4,-1)$ and $(0,2)$.

5 In the accompanying figure, $\overline{PA}$ is a tangent segment and $\overline{PBC}$ is a secant segment. If $PA = 8$ and $PC = 16$, find PB.



6 In triangle ABC, $m\angle B = 32$ and the measure of an exterior angle at A is 110°. Which is the *longest* side of the triangle?

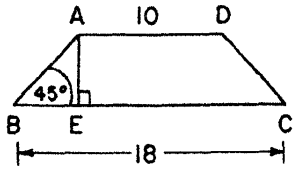
7 The coordinates of three vertices of rectangle $ABCD$ are $A(0,0)$, $B(a,0)$, and $C(a,b)$. What are the coordinates of vertex D?

8 How many sides does a regular polygon have if the measure of each exterior angle is 18°?

9 Quadrilateral $ABCD$ is inscribed in circle O. If angle B is a right angle, $AB = 6$, and $BC = 8$, find the length of the diameter of circle O.

10 In $\square ABCD$, the ratio of the measure of angle A to the measure of angle B is 5:13. Find the number of degrees in the measure of angle A.

11 In isosceles trapezoid $ABCD$, $AD = 10$, $BC = 18$, and $m\angle B = 45$, as shown in the accompanying figure



What is the length of the altitude $\overline{AE}$?

12 A rhombus is equal in area to a rectangle having dimensions 3 and 15. If the length of one diagonal of the rhombus is 10, find the length of its other diagonal.

13 Points $M(-2,6)$ and $N(4,10)$ lie on circle O. A diameter of circle O is perpendicular to chord $\overline{MN}$. Find the coordinates of the point of intersection of this diameter and chord $\overline{MN}$.

14 What is the slope of the line segment which connects the points $(2,3)$ and $(-4,5)$?

Directions (15–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

15 If $m\angle A + m\angle B + m\angle C + m\angle D = 360$ and $m\angle B + m\angle D = 180$, then $\angle A$ and $\angle C$ are always

(1) congruent
(2) acute
(3) complementary
(4) supplementary

16 In scalene triangle ABC, altitude $\overline{AD}$ intersects side $\overline{BC}$ at D. It may be concluded that

(1) $\overline{BD} \cong \overline{DC}$
(2) $\overline{AD} \perp \overline{BC}$
(3) $\overline{AD}$ bisects $\angle BAC$
(4) $\overline{AD} \cong \overline{AB}$

17 Two parallel lines are cut by a transversal and the two interior angles on the same side of the transversal are bisected. What kind of angle is formed where the two angle bisectors meet?

(1) right
(2) obtuse
(3) acute
(4) straight

If a polygon is a re
the polygon must h
(1) the diagonals,
(2) the sides, onl
(3) the angles, or
(4) both the sides

Point C is the mid
that $PA = PB$,
$\angle PCA$
(1) continually d
(2) continually in
(3) remains the
(4) sometimes in

The lengths of tv
The length of the
(1) less than 3
(2) equal to 3
(3) greater than
(4) greater than

Two secants to a
that the measure
80°, respectively
formed by the
(1) 20°
(2) 40°

The ratio of the
is the ratio of t
(1) 256:625
(2) 16:25

Which set of n
the sides of a r
(1) {1,2,3}
(2) {1,$\sqrt{3}$,2}

A quadrilatera
(1) one of its
angles
(2) its diagon
(3) its diagon
(4) its diagon

18 If a polygon is a regular polygon, then which parts of the polygon must be congruent?
(1) the diagonals, only
(2) the sides, only
(3) the angles, only
(4) both the sides and the angles

19 Point C is the midpoint of $\overline{AB}$. For all points P such that $PA = PB$, as PC increases, the measure of $\angle PCA$
(1) continually decreases
(2) continually increases
(3) remains the same
(4) sometimes increases, sometimes decreases

20 The lengths of two sides of a triangle are 5 and 8. The length of the third side is
(1) less than 3
(2) equal to 3
(3) greater than 3 but less than 13
(4) greater than 13

21 Two secants to a circle intersect outside the circle so that the measures of the intercepted arcs are 40° and 80°, respectively. The measure of the acute angle formed by the two secants is equal to
(1) 20°
(2) 40°
(3) 60°
(4) 80°

22 The ratio of the areas of two circles is 16:25. What is the ratio of the circumferences of the two circles?
(1) 256:625
(2) 16:25
(3) 9:41
(4) 4:5

23 Which set of numbers may represent the lengths of the sides of a right triangle?
(1) {1,2,3}
(2) $\{1,\sqrt{3},2\}$
(3) {5,7,8}
(4) {5,12,15}

24 A quadrilateral must be a parallelogram if
(1) one of its diagonals bisects one pair of opposite angles
(2) its diagonals bisect each other
(3) its diagonals are perpendicular to each other
(4) its diagonals are congruent

25 If the area of an equilateral triangle is $16\sqrt{3}$, what is the length of an altitude of the triangle?
(1) $8\sqrt{3}$
(2) 8
(3) $4\sqrt{3}$
(4) 4

26 The circle circumscribed about $\triangle ABC$ has the same center as the circle inscribed in $\triangle ABC$. What is the measure of the *largest* angle in $\triangle ABC$?
(1) 60°
(2) 75°
(3) 90°
(4) 120°

27 The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments whose lengths are 16 and 4, respectively. The length of this altitude is
(1) 16
(2) 10
(3) 8
(4) 4

28 In isosceles triangle ABC, sides $\overline{AB}$ and $\overline{BC}$ are congruent. If side $\overline{AC}$ is extended through C to D and $\overline{BD}$ is drawn, then which must be true?
(1) $AD > BC$
(2) $BD > BC$
(3) $BD > AD$
(4) $BC > CD$

29 In order to prove $R > S$, a student demonstrates that each of the statements $R < S$ and $R = S$ leads to a contradiction of the original hypothesis. Which type of reasoning is the student using?
(1) indirect reasoning
(2) circular reasoning
(3) reasoning by induction
(4) reasoning from the inverse

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

30 *On the answer sheet,* construct an isosceles triangle, given $\overline{AC}$ as the base (side opposite the vertex angle) and angle x as one of the congruent base angles.

☞ GO RIGHT ON TO THE NEXT PAGE.

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]

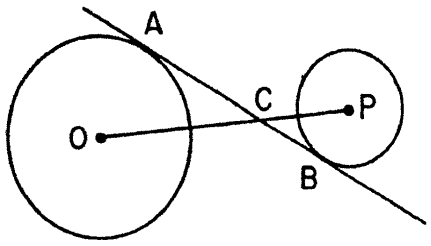
a If two angles of a triangle are congruent, the sides opposite these angles are congruent.

OR

b A diameter perpendicular to a chord of a circle bisects the chord and its arcs.

32 In rectangle $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E, and $\overline{EF} \perp \overline{AB}$ at F. Prove that $\angle AEF \cong \angle BEF$. [10]

33 Given: $\overline{AB}$ is a common internal tangent of circles O and P with points of tangency A and B, respectively. $\overline{OP}$ intersects $\overline{AB}$ at C.



Prove: $CP \times AC = OC \times CB$ [10]

34 The coordinates of the center of circle O are (0,0). Diameter $\overline{AB}$ intersects circle O at points A and B and the coordinates of point A are (—3,4). Point P with coordinates (7,—1) is an exterior point of the circle.

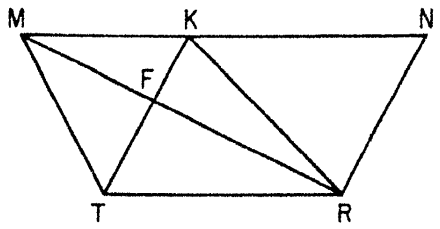
a Find the coordinates of B. [2]

b Find the length of the radius of the circle. [2]

c Show that $\triangle OPB$ is a right triangle. [4]

d Write the equation of circle O. [2]

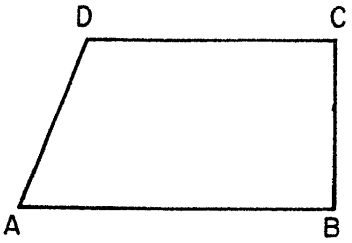
35 Given: $\overline{MKN}$, $\square KNRT$ with diagonal $\overline{KR}$. $\overline{MR}$ and $\overline{KT}$ intersect at F.



Prove: *a* area $\triangle KTR$ = area $\triangle MTR$ [7]

b area $\triangle MFT$ = area $\triangle KFR$ [3]

36 In the accompanying diagram, quadrilateral $ABCD$ is a trapezoid with $\overline{AB} \parallel \overline{CD}$, $m\angle A = 67$, $m\angle B = 90$. $DC = 12$, and $AD = 8$.



a Find, to the *nearest tenth*, the length of an altitude of the trapezoid. [3]

b Find, to the *nearest integer*, the length of $\overline{AB}$. [5]

c Find, to the *nearest integer*, the area of the trapezoid. [2]

*37 The vertices of $\triangle RST$ are $R(-2a,0)$, $S(0,6a)$, and $T(2a,0)$.

a Show, by means of coordinate geometry, that the two medians drawn from R and from T of $\triangle RST$ are perpendicular. [7]

b If $a = 5$, write the equation of the median from T to $\overline{RS}$. [3]

* 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	

Pupil.....

School.....

Name and autho

1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

9.....

10.....

Part I Score:.....

Rater's Initials:

.....

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, April 11, 1975—9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

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

School.....

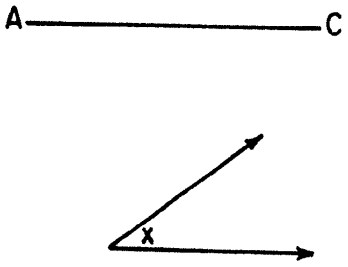
Name and author of textbook used.....

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.



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

Friday, April 11, 1975—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. Remind the pupils to sign the declaration printed at the end of the answer paper when they have finished the examination. 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 *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 15–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) $\frac{2}{3}$ *or* 2:3

(2) 16

(3) 40

(4) 5

(5) 4

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

(7) $(0,b)$ or $\begin{matrix} x = 0 \\ y = b \end{matrix}$

(8) 20

(9) 10

(10) 50

(11) 4

(12) 9

(13) (1,8) *or* $\begin{matrix} x = 1 \\ y = 8 \end{matrix}$

(14) $-\frac{1}{3}$

(15) 4

(16) 2

(17) 1

(18) 4

(19) 3

(20) 3

(21) 1

(22) 4

(23) 2

(24) 2

(25) 3

(26) 1

(27) 3

(28) 2

(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* (3, −4) [2]

b 5 [2]

d $x^2 + y^2 = 25$ [2]

(36) *a* 7.4 [3]

b 15 [5]

c 100 [2]

(37) *b* $y = -1(x - 10)$

OR [3]

$x + y = 10$