The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, August 17, 1993 – 8:30 to 11:30 a.m., only

Notice . . .

Calculators must be available to all students taking this examination.

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

On page 9 you will find the "Tables of Natural Trigonometric Functions" which you may need to ans some questions in this examination. Fold this page along the perforations, and tear it off also slowly carefully.

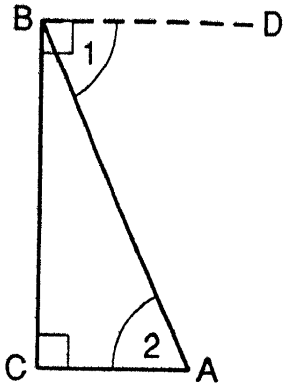
When you have completed the examination, you must sign the statement printed at the end of the ans paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examin and that you have neither given nor received assistance in answering any of the questions during examination.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

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

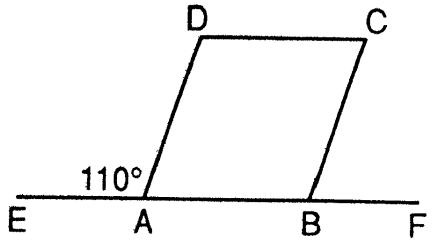
Part I

Answer 30 questions from this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet. Where applicable, answers may be left in terms of π or in radical form. [60]

1 In the accompanying diagram of $\triangle ABC$, line BD is drawn. The measure of $\angle 1$ (the angle of depression) is 65°. Find the measure, in degrees, of $\angle 2$ (the angle of elevation).

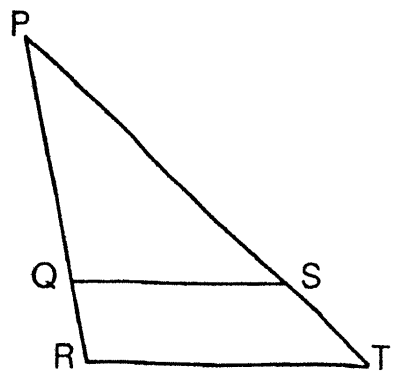


2 In the accompanying diagram, $ABCD$ is a rhombus and $m\angle EAD = 110$. Find $m\angle CBF$.



3 The sides of a triangle have lengths 7, 8, and 10. What is the length of the *shortest* side of a similar triangle whose perimeter is 75?

4 In the accompanying diagram of $\triangle PRT$, $\overline{QS}$ is parallel to $\overline{RT}$. If $PR = 8$, $QR = 2$, and $PS = 9$, what is ST?



5 Two supplementary angles have measures in the ratio 5:4. What is the measure of the *smaller* angle?

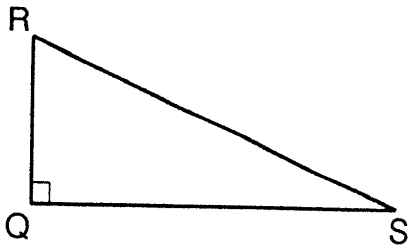
6 In $\triangle RST$, $m\angle R = 75$ and $m\angle S = 20$. Which is the longest side of the triangle?

7 If the coordinates of A are $(-2,4)$ and the coordinates of B are $(2,-2)$, what are the coordinates of the midpoint of $\overline{AB}$?

8 Based on the table below, what is the inverse of r?

*	r	s	t
r	s	t	r
s	t	r	s
t	r	s	t

9 In right triangle QRS, $m\angle Q = 90$, $RS = 13$, and $RQ = 5$. Find the area of $\triangle QRS$.



10 If a club has 10 members, how many different committees of 3 persons may be formed?

11 Find the slope of the line that passes through points (5,10) and (-2,13).

12 How many distinct four-digit numbers can be formed from the digits in 1993?

Directions (13–34): For *each* question chosen, write on the separate answer sheet the *numeral* preceding the word or expression that best completes the statement or answers the question.

13 A translation moves $A(2,3)$ onto $A'(4,8)$. What are the coordinates of B', the image of $B(4,6)$ under the same translation?

(1) (12,18) (3) (8,12)
(2) (6,8) (4) (6,11)

14 Which equation has equal roots?

(1) $x^2 - 2x - 10 = 0$
(2) $x^2 - 10x + 25 = 0$
(3) $2x^2 + 7x - 1 = 0$
(4) $x^2 - 7x + 10 = 0$

15 Two angles of a triangle measure 65° and 75°. Which is *not* the measure of an exterior angle of the triangle?

(1) 105° (3) 130°
(2) 115° (4) 140°

16 Which statement about figure *ABCD* is *always* true?

(1) If *ABCD* is a parallelogram, then it must be a trapezoid.
(2) If *ABCD* is a rectangle, then it must be a square.
(3) If *ABCD* is a parallelogram, then it must be a quadrilateral.
(4) If *ABCD* is a quadrilateral, then it must be a parallelogram.

17 The graph of the equation $y = \frac{1}{3}x + 2$ is perpendicular to the graph of the equation

(1) $y = \frac{1}{3}x + 5$ (3) $y = 3x + 5$
(2) $3y = x + 2$ (4) $y = -3x + 2$

18 If $r \vee t$ and $\sim t$ are true statements, then which statement is true?

(1) $\sim r$ (3) t
(2) r (4) $r \rightarrow t$

19 The statement $\sim(\sim r \vee s)$ is logically equivalent to

(1) $\sim r \vee \sim s$ (3) $r \wedge s$
(2) $r \vee \sim s$ (4) $r \wedge \sim s$

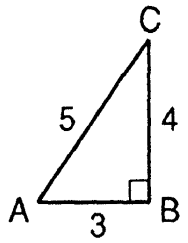
20 Which is an equation of the axis of symme the parabola whose equation is $y = 2x^2 - 3x + 4$?

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

21 The image of the point (4,–2) under a rel in the origin is

(1) (–2,4) (3) (–4,–2)
(2) (–2,–4) (4) (–4,2)

22 In the accompanying diagram, the legs triangle *ABC* are 4 and 3, and the hyp is 5.



What is the value of tan *A*?

(1) $\frac{4}{3}$ (3) $\frac{4}{5}$
(2) $\frac{3}{5}$ (4) $\frac{3}{4}$

23 What is the sum of the measures of the angles of a regular pentagon?

(1) 180° (3) 540°
(2) 360° (4) 720°

24 In $\triangle ABC$, $m\angle C = 90$ and $\overline{CD}$ is the al $\overline{AB}$. If $AD = 1$ and $DB = 3$, then CD e

(1) 1 (3) $\sqrt{3}$
(2) 2 (4) $2\sqrt{3}$

25 An equation of the locus of points 5 u the origin is

(1) $x = 5$ (3) $x^2 + y^2$
(2) $y = 5$ (4) $x + y =$

26 If median $\overline{AD}$ is perpendicular to si $\triangle ABC$, then $\triangle ABC$ must be

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

27 Which statement is the inverse of "If it rains, then I do not go fishing"?

(1) If it rains, then I go fishing.
(2) If I do not go fishing, then it rains.
(3) If it does not rain, then I go fishing.
(4) If I go fishing, then it does not rain.

28 Given four distinct quadrilaterals: a parallelogram, an isosceles trapezoid, a rhombus, and a square. If one of these quadrilaterals is picked at random, what is the probability that two consecutive angles are always supplementary?

(1) 1
(2) $\frac{1}{2}$
(3) $\frac{3}{4}$
(4) 0

29 What are the center and the radius of a circle whose equation is $x^2 + (y - 2)^2 = 5$?

(1) center (0,2), radius $\sqrt{5}$
(2) center (0,2), radius 5
(3) center (0,–2), radius $\sqrt{5}$
(4) center (2,0), radius 5

30 Which set of numbers could represent the lengths of the sides of an isosceles triangle?

(1) {3,4,5}
(2) {6,6,5}
(3) {1,1,3}
(4) {5,5,10}

31 The graphs of the equations $y = x^2 - 5x + 6$ and $x + y = 6$ are drawn on the same set of axes. At which point do the graphs intersect?

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

32 For which operation is the set of integers *not* closed?

(1) addition
(2) subtraction
(3) multiplication
(4) division

33 Which set contains all values of x for which the fraction $\frac{x + 2}{x^2 - 49}$ is undefined?

(1) {0}
(2) {–2}
(3) {7}
(4) {7,–7}

34 The expression ${}_{15}C_1 + {}_{15}C_{15}$ is equivalent to

(1) 16
(2) 2
(3) 3
(4) 15

Directions (35): Leave all construction lines on the answer sheet.

35 *On the answer sheet*, construct the altitude of $\triangle LMN$ from M to $\overline{LN}$.

Answers to the following questions are to be written on paper provided by the school.

Part II

Answer three questions from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [30]

36 Triangle ABC has coordinates $A(3,4)$, $B(1,7)$, and $C(3,7)$.

a On graph paper, draw and label $\triangle ABC$. [1]

b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection in the y-axis. [3]

c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after a reflection in the line $y = x$. [3]

d Graph and state the coordinates of $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after the translation which moves (x,y) to $(x + 5, y - 1)$. [3]

37 The vertices of $\triangle ABC$ are $A(5,8)$, $B(-3,4)$, and $C(0,-2)$.

a Using coordinate geometry, show that $\triangle ABC$ is

(1) *not* isosceles [4]
(2) a right triangle [3]

b Find the area of $\triangle ABC$. [3]

38 Answer both *a* and *b* for all values of x for which these expressions are defined.

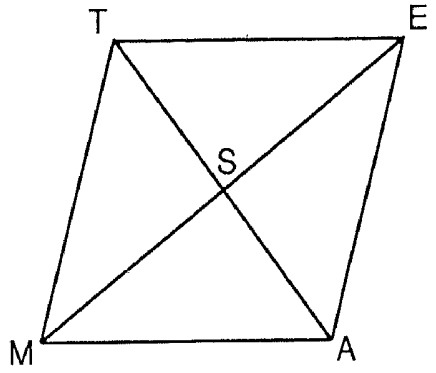
a Express the quotient in simplest form:

$$\frac{x^2 - 36}{x^2 + 3x - 18} \div \frac{x^2 - 12x + 36}{x^2 - 6x}$$ [6]

b Solve algebraically for x and check:

$$\frac{4}{x} - 1 = \frac{x + 2}{x}$$ [3,1]

39 In the accompanying diagram, diagonals $\overline{TA}$ and $\overline{EM}$ of rhombus $TEAM$ intersect at point S. The length of diagonal $\overline{TA}$ is 30 and $m\angle SAM = 53$.



a Find the length of side $\overline{MA}$ to the *nearest integer*. [5]

b Find the length of diagonal $\overline{EM}$ to the *nearest integer*. [3]

c Find the perimeter of $\triangle EMA$ to the *nearest integer*. [2]

40 In a given plane, points A and B are 6 units apart.

a Describe fully the locus of points equidistant from points A and B. [3]

b Describe fully the locus of points d units away from point B. [3]

c How many points simultaneously satisfy the conditions described in parts *a* and *b* for the following values of d?

(1) $d = 6$ [2]
(2) $d = 3$ [2]

Answers to the following questions are to be written on paper provided by the school.

Part III

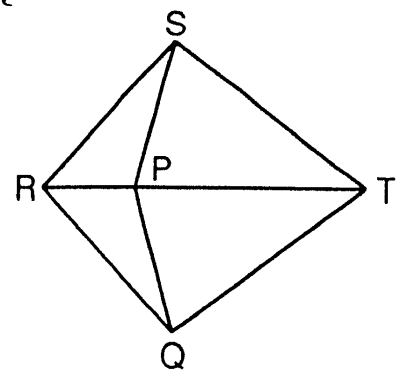
Answer one question from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [10]

41 Given: If the figure is a rhombus, then it is a parallelogram.
If the figure is a quadrilateral and a parallelogram, then it is a square.
The figure is not a square.
The figure is a quadrilateral.

Let R represent: "The figure is a rhombus."
Let P represent: "The figure is a parallelogram."
Let Q represent: "The figure is a quadrilateral."
Let S represent: "The figure is a square."

Prove: The figure is *not* a rhombus. [10]

42 Given: $\overleftrightarrow{RPT}$ is a straight line, $\overline{RS} \cong \overline{RQ}$, and $\overline{ST} \cong \overline{QT}$.



Prove: $\angle SPT \cong \angle QPT$ [10]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF EDUCATIONAL TESTING

Tables of Natural Trigonometric Functions

(For use with Sequential Math – Course II 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

SEQUENTIAL MATH — COURSE II

Tuesday, August 17, 1993 — 8:30 to 11:30 a.m., only

Part I Score	
Part II Score	
Part III Score	
Total Score	
Rater's Initials:	

ANSWER SHEET

Pupil ..... Sex: ☐ Male ☐ Female Grade .....

Teacher ..... School .....

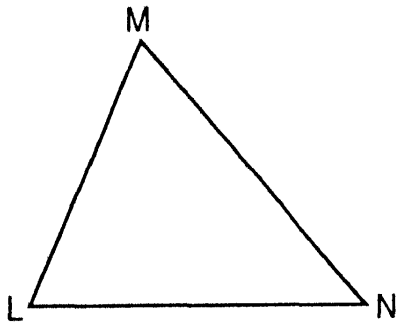
Your answers to Part I should be recorded on this answer sheet.

Part I

Answer 30 questions from this part.

1	11	21	31 .....
2	12	22	32 .....
3	13	23	33 .....
4	14	24	34 .....
5	15	25	35 Answer quest on the other s of this sheet.
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

35



Your answers for Part II and Part III 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

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, August 17, 1993 — 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 student's work by making insertions or changes of any kind. Use checkmarks to indicate student 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 a total of 60 credits, 2 credits for each of 30 of the following. [If more than 30 are answered, only the first 30 answered should be considered.] Allow no partial credit. For questions 13–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 65

(2) 70

(3) 21

(4) 3

(5) 80°

(6) $\overline{RS}$

(7) (0,1)

(8) s

(9) 30

(10) 120

(11) $-\frac{3}{7}$

(12) 12

(13) 4

(14) 2

(15) 3

(16) 3

(17) 4

(18) 2

(19) 4

(20) 1

(21) 4

(22) 1

(23) 2

(24) 3

(25) 3

(26) 4

(27) 3

(28) 3

(29) 1

(30) 2

(31) 1

(32) 4

(33) 4

(34) 1

(35) construction

[OVER]

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics* and its supplement. 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.

(36) *b* $A'(-3,4)$, $B'(-1,7)$, $C'(-3,7)$ [3]

c $A''(4,-3)$, $B''(7,-1)$, $C''(7,-3)$ [3]

d $A'''(9,-4)$, $B'''(12,-2)$, $C'''(12,-4)$ [3]

(37) *b* 30 [3]

(38) *a* $\frac{x}{x-3}$ [6]

b 1 [3,1]

(39) *a* 25 [5]

b 40 [3]

c 90 [2]

(40) *a* the perpendicular bisector of $\overline{AB}$ [3]

b a circle with center at B and radius d [3]

c (1) 2 [2]

(2) 1 [2]