The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Wednesday, January 25, 1995 — 9:15 a.m. to 12:15 p.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, slowly 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 answer some questions in this examination. Fold this page along the perforations, and tear it off also slowly and carefully.

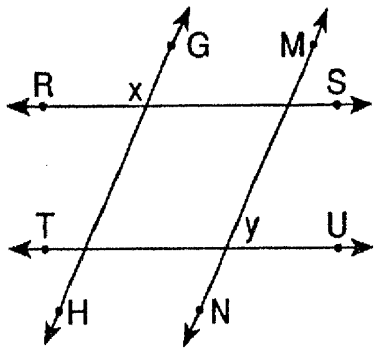
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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

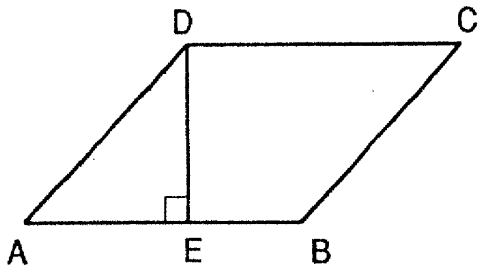
Part I

Answer 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, $\overleftrightarrow{RS} \parallel \overleftrightarrow{TU}$ and $\overleftrightarrow{GH} \parallel \overleftrightarrow{MN}$. If $m\angle x = 115$, find $m\angle y$.



2 In the accompanying diagram, $ABCD$ is a parallelogram with altitude $\overline{DE}$ drawn to side $\overline{AB}$. If $DE = AE$, find the measure of $\angle A$.



3 The sides of $\triangle ABC$ are 6.8, 6.8, and 8.4 meters. Find the perimeter of the triangle that is formed by joining the midpoints of the sides of $\triangle ABC$.

4 Point $A(6,3)$ is reflected in the x-axis. Find the coordinates of A', its image.

5 If $a \spadesuit b$ is defined as $\frac{a-b}{a+b}$, find the value of $-3 \spadesuit 1$.

6 In $\triangle ABC$, side $\overline{AC}$ is extended through C to D and $m\angle DCB = 60$. Which is the longest side of $\triangle ABC$?

7 What is the length of a diagonal of a rectangle whose sides are 3 and 7?

8 Two sides of an isosceles triangle have lengths 2 and 12, respectively. Find the length of the third side.

9 The sides of a triangle have lengths 3, 5, and 7. In a similar triangle, the shortest side has length $x - 3$, and the longest side has length $x + 5$. Find the value of x.

10 Find the number of square units in the area of a triangle whose vertices are $A(2,0)$, $B(6,0)$, and $C(4,5)$.

11 Find, in radical form, the distance between points $(-1,-2)$ and $(5,0)$.

12 What are the coordinates of the center of a circle if the endpoints of a diameter are $(-6,2)$ and $(4,6)$?

13 In equilateral triangle ABC, $AB = 3x$ and $BC = 2x + 12$. Find the numerical value of the perimeter of $\triangle ABC$.

Directions (14–35): 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.

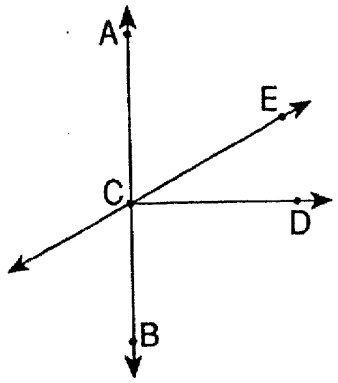
14 Which coordinate pair is a solution for the following system of equations?

$$x^2 + y^2 = 8$$
$$x = 2$$

(1) $(2,4)$
(2) $(2,2)$
(3) $(2,\sqrt{8})$
(4) $(4,2)$

15 In parallelogram $ABCD$, diagonal $\overline{BD}$ is drawn. Which statement must be true?
(1) $\triangle ABD$ must be an obtuse triangle.
(2) $\triangle CDB$ must be an acute triangle.
(3) $\triangle ABD$ must be an isosceles triangle.
(4) $\triangle ABD$ must be congruent to $\triangle CDB$.

16 In the accompanying diagram, AB intersects $\overleftrightarrow{CE}$ and $\overrightarrow{CD} \perp \overleftrightarrow{AB}$.



Which statement is true?

(1) $\angle ACE \cong \angle BCD$.
(2) B, C, and D are collinear.
(3) $\angle ACE$ and $\angle ECD$ are complementary.
(4) $\angle ACE$ and $\angle ECD$ are supplementary.

17 Which property is illustrated by $\square(\triangle + O) = \square\triangle + \square O$?

(1) distributive
(2) associative
(3) commutative
(4) transitive

18 From a deck of 52 cards, two cards are randomly drawn without replacement. What is the probability of drawing two hearts?

(1) $\frac{2}{52}$
(2) $\frac{13}{52} \cdot \frac{13}{51}$
(3) $\frac{13}{52} \cdot \frac{12}{51}$
(4) $\frac{13}{52} \cdot \frac{13}{52}$

19 Which is logically equivalent to $\sim(\sim p \vee q)$?

(1) $p \wedge \sim q$
(2) $\sim p \wedge \sim q$
(3) $\sim p \vee \sim q$
(4) $p \vee \sim q$

20 Which is an equation of the circle whose center is the origin and whose radius is 4?

(1) $y = x^2 + 8$
(2) $x^2 + y^2 = 4$
(3) $x^2 + y^2 = 16$
(4) $x + y = 8$

21 Expressed in simplest form, $\frac{x}{2} - \frac{x}{3} + \frac{x}{4}$ is equivalent to

(1) $\frac{x}{3}$
(2) $\frac{x}{24}$
(3) $\frac{3x}{24}$
(4) $\frac{5x}{12}$

22 If a translation maps point $A(-3,1)$ to point $A'(5,5)$, the translation can be represented by

(1) $(x + 8, y + 4)$
(2) $(x + 8, y + 6)$
(3) $(x + 2, y + 6)$
(4) $(x + 2, y + 4)$

23 When the statement "If A, then B" is true, which statement must also be true?

(1) If B, then A.
(2) If not A, then B.
(3) If not B, then A.
(4) If not B, then not A.

24 In right triangle ABC, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. If $AD = 5$ and $DB = 24$, what is the length of $\overline{CD}$?

(1) 120
(2) $\sqrt{30}$
(3) $2\sqrt{30}$
(4) $4\sqrt{30}$

25 The graph of which equation has a *negative* slope?

(1) $y = 5x - 3$
(2) $x + y = 5$
(3) $y - 2 = 4x$
(4) $y = 0$

26 What is the equation of the locus of points passing through point (3,–2) and 3 units from the y-axis?

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

27 Which expression is a perfect square?

(1) $x^2 - 4x + 4$
(2) $x^2 - 4x - 4$
(3) $x^2 - 9x + 9$
(4) $x^2 - 9x - 9$

28 The roots of the equation $2x^2 + 5x - 2 = 0$ are

(1) $\frac{5 \pm \sqrt{41}}{2}$
(2) $-\frac{1}{2}, -2$
(3) $2, \frac{1}{2}$
(4) $\frac{-5 \pm \sqrt{41}}{4}$

29 How many different 13-letter permutations can be formed from the letters of the word "QUADRILATERAL"?

(1) $13!$
(2) $\frac{13!}{7!}$
(3) $\frac{13!}{3!2!2!}$
(4) $\frac{13!}{6!}$

30 The hypotenuse of right triangle ABC is 10 and $m\angle A = 60$. What is the measure, to the *nearest tenth*, of the leg opposite $\angle A$?

(1) 5.0
(2) 5.8
(3) 7.1
(4) 8.7

31 Which equation represents a line parallel to the line whose equation is $y = 2x - 7$?

(1) $y = 2x$
(2) $y = \frac{1}{2}x - 7$
(3) $y = -7$
(4) $y = -\frac{1}{2}x + 7$

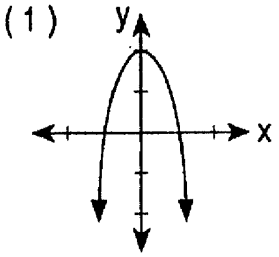
32 Expressed in simplest form, $\frac{2x^2}{x^2 - 1} \cdot \frac{x - 1}{x}$, $x \neq 1,0,-1$, is equivalent to

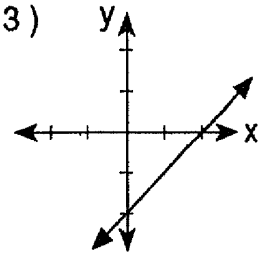
(1) $\frac{2x}{x - 1}$
(2) 2
(3) $\frac{2}{x}$
(4) $\frac{2x}{x + 1}$

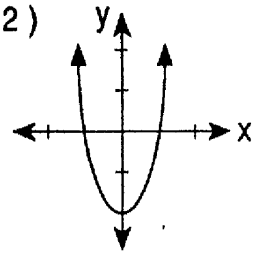
33 A set contains five isosceles trapezoids, three squares, and a rhombus that is not a square. A figure is chosen at random. What is the probability that its diagonals will be congruent?

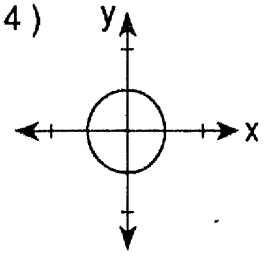
(1) 1
(2) $\frac{8}{9}$
(3) $\frac{5}{9}$
(4) $\frac{3}{9}$

34 Which graph could represent the equation $y = x^2 - 4$?

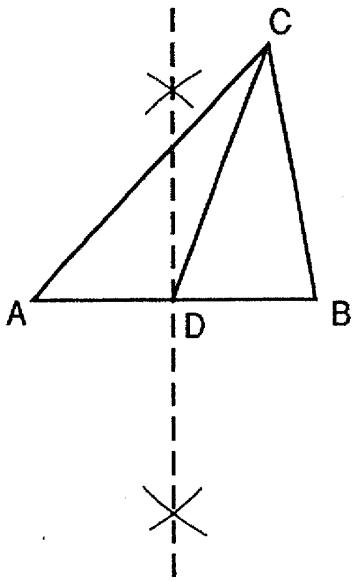
(1)


(3)


(2)


(4)


35 In the accompanying diagram, $\triangle ABC$ is scalene.



The construction on this triangle shows that $\overline{CD}$ is the

(1) median to side $\overline{AB}$
(2) bisector of angle C
(3) altitude to side $\overline{AB}$
(4) perpendicular bisector of side $\overline{AB}$

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

a Solve for x: $\frac{x+3}{3x} = \frac{x}{12}$ [5]

b Express the product as a single fraction in lowest terms:

$$\frac{x}{3x+15} \cdot \frac{2x^2+11x+5}{2x^2+x}$$ [5]

37 *a* On graph paper, draw the graph of the equation $y = -x^2 + 4x - 1$, including all values of x in the interval $-1 \leq x \leq 5$. [5]

b On the same set of axes, draw the graph of the equation $x - y = 5$. [3]

c From the graphs drawn in parts *a* and *b*, determine the solution(s) of this system of equations:

$$\begin{aligned} y &= -x^2 + 4x - 1 \\ x - y &= 5 \end{aligned}$$ [2]

38 There are seven boys and three girls on a school tennis team. The coach must select four people from this group to participate in a county championship.

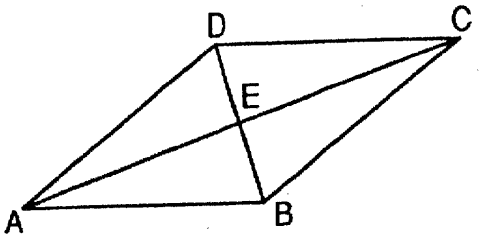
a How many four-person teams can be formed from the group of ten students? [3]

b In how many ways can two boys and two girls be chosen to participate in the county championship? [3]

c What is the probability that two boys and two girls are chosen for the team? [2]

d What is the probability that a four-member team will contain at least one boy? [2]

39 In the accompanying diagram of rhombus $ABCD$, $m\angle BAD = 36$ and the length of diagonal $\overline{AEC} = 16$.



a Find the length of diagonal $\overline{BD}$ to the *nearest tenth.* [4]

b Find the perimeter of rhombus $ABCD$ to the *nearest integer.* [6]

40 The endpoints of $\overline{AB}$ are $A(1,4)$ and $B(5,1)$.

a On graph paper, draw and label $\overline{AB}$. [1]

b Graph and state the coordinates of $\overline{A'B'}$, the image of $\overline{AB}$ under a reflection in the y-axis. [2]

c Graph and state the coordinates of $\overline{A''B''}$, the image of $\overline{AB}$ under a dilation of 2 with respect to the origin. [2]

d Using coordinate geometry, show that a line segment and its image are congruent under a line reflection and are *not* congruent under a dilation. [5]

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: $B \rightarrow D$
$D \rightarrow \sim E$
$(\sim A \wedge \sim B) \rightarrow C$
$\sim F \rightarrow E$
$\sim A$
$\sim C$

Prove: F [10]

42 Prove: In an isosceles triangle, the line segment that bisects the vertex angle bisects the base. [10]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

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

Wednesday, January 25, 1995 — 9:15 a.m. to 12:15 p.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 .....
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

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

Wednesday, January 25, 1995 — 9:15 a.m. to 12:15 p.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 14–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 65

(2) 45°

(3) 11

(4) (6,–3)

(5) 2

(6) $\overline{AB}$

(7) $\sqrt{58}$

(8) 12

(9) 9

(10) 10

(11) $2\sqrt{10}$

(12) (–1,4)

(13) 108

(14) 2

(15) 4

(16) 3

(17) 1

(18) 3

(19) 1

(20) 3

(21) 4

(22) 1

(23) 4

(24) 3

(25) 2

(26) 3

(27) 1

(28) 4

(29) 3

(30) 4

(31) 1

(32) 4

(33) 2

(34) 2

(35) 1

[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) *a* 6 and −2 [5]

b $\frac{1}{3}$ [5]

(37) *c* (−1,−6) and (4,−1) [2]

(38) *a* 210 [3]

b 63 [3]

c $\frac{63}{210}$ [2]

d 1 [2]

(39) *a* 5.2 [4]

b 34 [6]

(40) *b* $A'(-1,4)$, $B'(-5,1)$ [2]

c $A''(2,8)$, $B''(10,2)$ [2]