The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, January 26, 1988 - 1:15 to 4:15 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.

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

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 radical form. [60]

- 1 If the measures of the angles of a triangle are represented by x, 3x + 6, and 2x 6, find the value of x.
- 2 In the system defined in the accompanying table, what is the inverse element of 2?

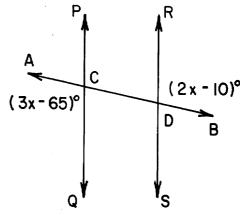
	1	2	3	4
1	1	2	3	4
2	2	4	1	3
3	3	1	4	2
4	4	3	2	1

- 3 If * is a binary operation defined by $a * b = \frac{5a + b}{2}$, find the value of 3 * 4.
- 4 The sides of a triangle have lengths 2, 3, and 4. The perimeter of a similar triangle is 36. Find the length of the *longest* side of the larger triangle.
- 5 In parallelogram *ABCD*, $m \angle A = 2x$ and $m \angle B = 2x 20$. Find x.
- 6 What is the positive root of the equation $x^2 + 5x 14 = 0$?
- 7 Solve the equation d * (x * a) = c for x in the system defined below.

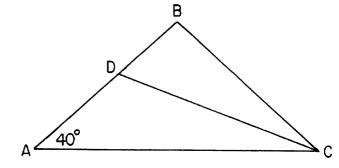
*	a	b	c	d	e
a	c d b e a	d	b	e	а
b	d	a	e	c	b
c	b	e	d	a	c
d	e	c	a	b	d
e	a	b	c	d	e

8 In $\triangle ABC$, an exterior angle at C measures 85. What is the longest side of $\triangle ABC$?

9 In the accompanying diagram, \overrightarrow{AB} intersects \overrightarrow{PQ} and \overrightarrow{RS} at C and D, respectively. If $\overrightarrow{PQ} \parallel \overrightarrow{RS}$, $m \angle RDB = 2x - 10$, and $m \angle QCA = 3x - 65$, find x.



- 10 What is the slope of a line parallel to the line whose equation is $y = \frac{2}{5}x 3$?
- 11 How many different 5-letter permutations can be formed from the letters in the word "JELLO"?
- 12 Find the coordinates of the midpoint of the line segment whose endpoints are (2,-6) and (10,4).
- 13 The point (2,-3) is on a circle whose center is at (6,0). Find the length of the radius of the circle.
- 14 In the accompanying figure, $\overline{AB} \cong \overline{BC}$, $m \angle A = 40$, and \overline{CD} bisects $\angle ACB$. Find $m \angle CDB$.



- 15 The equation of the axis of symmetry of a parabola is x = 2. If the parabola intersects the x-axis at the points whose coordinates are (-1,0) and (k,0), find k.
- 16 The bases of a trapezoid have lengths 10 and 18. If the height of the trapezoid is 6, what is the area of the trapezoid?
- 17 If the sides of a rectangle are 8 and 5, find the length of a diagonal of the rectangle.
- 18 Evaluate: $_{15}C_{13}$

Directions (19-35): 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.

- 19 The negation of $\sim p \vee \sim q$ is

- 20 Given the true statements: "If Janet does not pass the Chemistry examination, she will take Chemistry again next year," and "Janet will not take Chemistry next year." Which statement must be true?
 - (1) Janet does not pass the Chemistry examina-
 - (2) Janet passes the Chemistry examination.
 - (3) Janet takes Physics next year.
 - (4) No conclusion is possible.
- 21 What is the total number of points equidistant from two intersecting lines and 1 centimeter from their point of intersection?
 - (1) 1

(2) 2

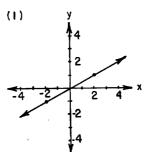
- 22 What is the negation of the statement, "Some groups are not commutative"?
 - (1) Some groups are commutative.
 - (2) All groups are not commutative.
 - (3) All groups are commutative.
 - (4) No groups are commutative.

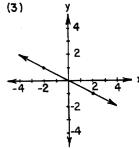
- 23 In $\triangle ABC$, if an exterior angle drawn at vertex Cmeasures 45, then angle B
 - (1) must be an acute angle
 - (2) must be a right angle
 - (3) must be an obtuse angle
 - (4) may be either an obtuse angle or an acute angle
- 24 If the diagonals of a parallelogram are perpendicular and not congruent, then the parallelogram is
 - (1) a rectangle
 - (2) a rhombus
 - (3) a square
 - (4) an isosceles trapezoid
- 25 Which is an equation of the line that is parallel to the x-axis and that passes through the point (5,3)?
 - (1) x = 5
- (2) y = 5
- 26 In right triangle ABC, $m \angle C = 90$, D is a point on \overline{AB} , and $\overline{CD} \perp \overline{AB}$. If AB = 20 and AD = 5, the length of \overline{AC} is
 - (1) 10

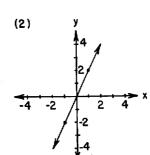
 $(3) \sqrt{300}$ (4) 4

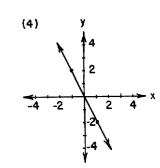
(2) 25

- 27 Which line has a slope of $-\frac{1}{2}$?









- 28 Which set of numbers could represent the lengths of the sides of a triangle?
 - (1) $\{6,8,9\}$
- (3) {2,2,5}
- (2) {1,2,3}
- (4) {2,6,9}
- 29 If $\sim a \rightarrow \sim b$ and $\sim c \rightarrow b$, which statement is a valid conclusion?
 - (1) $a \rightarrow c$
- $(3) \sim b \rightarrow a$
- (2) $b \rightarrow \sim c$
- (4) $\sim a \rightarrow c$
- 30 The solution to the quadratic equation $2x^2 + 5x 1 = 0$ is
 - (1) $\frac{5 \pm \sqrt{17}}{4}$
- (3) $\frac{5 \pm \sqrt{33}}{4}$
- (2) $\frac{-5 \pm \sqrt{17}}{4}$
- $(4) \frac{-5 \pm \sqrt{33}}{4}$
- 31 Which is true of the graph of the parabola whose equation is $y = x^2 2x 8$?
 - (1) The x-intercepts are at x = 2 and x = -4.
 - (2) The only x-intercept is at x = 4.
 - (3) The x-intercepts are at x = 4 and x = -2.
 - (4) There are no x-intercepts.

- 32 Under which operation is the set of all odd integers closed?
 - (1) division
- (3) addition
- (2) multiplication
- (4) subtraction
- 33 A student wants to take 3 pens and 4 notebooks from a desk on which there are 6 pens and 8 notebooks. How many choices does the student have?
 - (1) 1400
- (3) 48

(2) 90

- (4) 12
- 34 What are the coordinates of the turning point of the parabola whose equation is $y = x^2 2x 4$?
 - (1) (-2,4)
- (3) (-1,-1)
- (2) (1,-5)
- (4) (2,-4)
- 35 The center of the circle that can be circumscribed about a scalene triangle is located by constructing the
 - (1) medians of the triangle
 - (2) altitudes of the triangle
 - (3) perpendicular bisectors of the sides of the triangle
 - (4) angle bisectors of the triangle

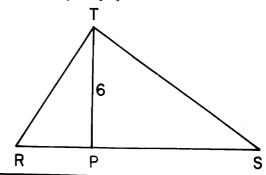
Answers to the following questions are to be written on paper provided by the school.

Part II

Answer three questions from this part. Show all work unless otherwise directed. [30]

- 36 Quadrilateral MATH has vertices M(-4,2), A(0,5), T(3,3), and H(1,-5). Find the area of quadrilateral MATH. [10]
- 37 *a* Draw the graph of the equation $y = -x^2 + 4x + 3$ for all values of *x* from x = -1 to x = 5. [6]
 - b Write an equation of the axis of symmetry of the graph drawn in part a. [2]
 - Write an equation of a circle whose radius is 5 and whose center is at the y-intercept of the graph drawn in part a. [2]
- 38 A committee of 5 is to be chosen from 4 men and 3 women.
 - a What is the probability that the committee will consist of 2 men and 3 women? [6]
 - b What is the probability that the committee will include all 4 men? [2]
 - c What is the probability that the committee will consist of men only? [2]

- 39 The coordinates of the vertices of $\triangle ABC$ are A(2,3), B(9,-2), and C(5,10). Median \overline{AE} is drawn.
 - a Find the length of \overline{AE} . [Answer may be left in radical form.] [4]
 - b Find the slope of \overline{BD} , the altitude from vertex B. [4]
 - c Write an equation of \overrightarrow{BD} . [2]
- 40 In the accompanying diagram of right triangle RST, altitude \overline{TP} is drawn to hypotenuse \overline{RS} . If TP = 6 and RP is 5 less than PS, find the length of hypotenuse \overline{RS} . [Only an algebraic solution will be accepted.] [4,6]



GO RIGHT ON TO THE NEXT PAGE.

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

Part III

Answer one question from this part. Show all work unless otherwise directed. $\qquad \qquad [10]$

41 Given: If the sun is shining, I will go to the ball game.

If it rains, I will not go to the ball game. Either the sun is shining or I will need an umbrella.

I will not need an umbrella.

Let S represent: "The sun is shining."

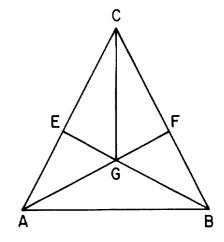
Let B represent: "I will go to the ball game."

Let R represent: "It rains."

Let *U* represent: "I will need an umbrella."

Prove: It will not rain. [10]

42 Given: \overline{AEC} , \overline{BFC} , \overline{EGB} , \overline{FGA} , $\overline{FG} \cong \overline{EG}$, and $\angle EGC \cong \angle FGC$.



Prove: $\overline{AC} \cong \overline{BC}$

[10]

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REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Tuesday, January 26, 1988 — 1:15 to 4:15 p.m., only

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

ANSWER SHEET

••••••	.Teacher	•••••
		Grade
answers to Part I should b	oe recorded on this answer s	heet.
Pa	rt I	
Answer 30 questi	ons from this part.	
11	21	31
12	22	32
13	23	33
14	24	34
15	25	35
16	26	
17	27	
18	28	
19	29	
20	30	
	Pa Answer 30 question 11	12 22 13 23 14 24 15 25 16 26 17 27

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.

C.		
Sign	o fri	ma

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, January 26, 1988-1:15 to 4:15 p.m., only

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.

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 19–35, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 30	(11) 60	(21) 4	(31) 3
(2) 3	(12) (6,-1)	(22) 3	(32) 2
(3) $\frac{19}{2}$ or 9.5	(13) 5	(23) 1	(33) 1
(4) 16	(14) 60	(24) 2	(34) 2
(5) 50	(15) 5	(25) 4	(35) 3
(6) 2	(16) 84	(26) 1	
(7) c	$(17) \sqrt{89}$	(27) 3	
(8) \overrightarrow{AB} or AB or c	(18) 105	(28) 1	
(9) 55	(19) 1	(29) 4	
$(10) \frac{2}{5}$	(20) 2	(30) 4	

SEQUENTIAL MATH—COURSE II — concluded Part II

Please refer to the Department publication Guide for Rating Regents Examinations 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.

(36) 35.5 [10] (39)
$$a \sqrt{26}$$
 [4] $b - \frac{3}{7}$ [4] $c y + 2 = -\frac{3}{7}(x - 9)$ or [2] (38) $a \frac{6}{21}$ [6] $b \frac{3}{21}$ [2] (40) Analysis [4] $c 0$ [2]

[2]