The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, August 17, 1989 — 8:30 to 11:30 a.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 terms of π or in radical form.   [60]

1 In the accompanying diagram, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at E, and $m\angle AEC = 57$.
If $m\angle DEB = 3x + 15$, find the value of x.
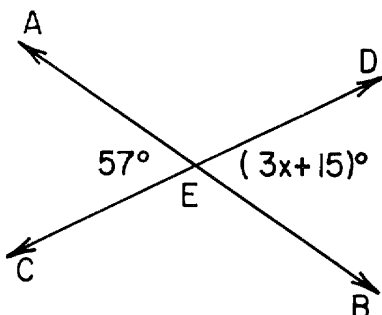
2 In a school, there are six staircases connecting the first floor to the second. There are four staircases connecting the second floor to the third. What is the total number of ways a student who uses the stairs can go from the first floor to the third floor?

3 Solve for y: $6 - 3y = -9 + 2y$

4 The mean of 10, 12, 14, and x is 13. Find the value of x.

5 Solve for x: $3.2x - 1.8 = 11$

6 In the accompanying diagram, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $\overline{EF}$ intersects $\overleftrightarrow{AB}$ at E and $\overleftrightarrow{CD}$ at F, and $\overline{GH}$ intersects $\overleftrightarrow{AB}$ at G and $\overline{EF}$ at H. If $m\angle EGH = 40$, $m\angle GHE = 80$, and $m\angle EFD = x$, what is the value of x?
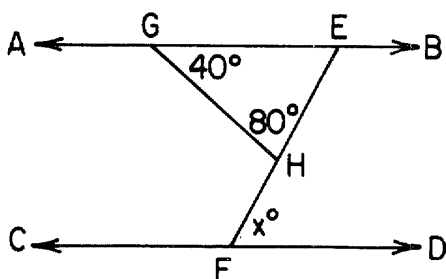
7 What is the slope of the line whose equation is $y = -x + 2$?

8 Let p represent "It is Saturday" and let q represent "I go to school today." Express, in terms of p and q, "If it is Saturday, I do not go to school today."

9 Express $\dfrac{3x}{4} - \dfrac{x}{2}$ as a single fraction in lowest terms.

10 Factor: $4x^2 - 9$

11 Solve for r in terms of d and t:
$$d = rt$$

12 Find the value of $2x^2 y$ if $x = 3$ and $y = -1$.

13 A regular hexagon has a perimeter of $12x - 30$. Express the length of one side of the hexagon as a binomial in terms of x.

14 The accompanying table shows the number of arithmetic problems completed correctly by students on a recent test. What is the mode of the distribution?

Number Correct	Frequency
20	1
19	2
18	5
17	8
16	4

15 The ratio of the measures of two supplementary angles is 5:1. Find the measure of the smaller angle.

16 The probability of drawing a red card from a standard deck of 52 cards is $\frac{1}{2}$. The probability of throwing a 4 on a die is $\frac{1}{6}$. What is the probability of drawing a red card and throwing a 4?

17 Solve $\frac{4}{3x} = \frac{x}{12}$, $x \neq 0$, for the positive value of x.

18 Express the product of $2x - 3$ and $x + 4$ as a trinomial.

19 If 0.00037 is expressed as 3.7×10^n, what is the value of n?

Directions (20–35): 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.

20 The statement "The sum of twice a number and 18 is greater than 25" can be expressed as
(1) $2n + 18 = 25$ (3) $2(n + 18) > 50$
(2) $2(n + 18) > 25$ (4) $2n + 18 > 25$

21 An urn contains five red marbles, four green marbles, and three blue marbles. If one marble is drawn at random, what is the probability that it is either a green marble or a blue marble?
(1) $\frac{5}{12}$ (3) $\frac{7}{12}$
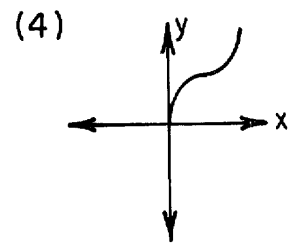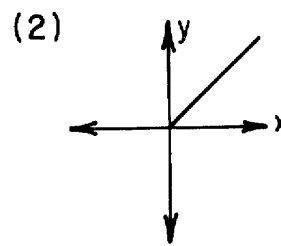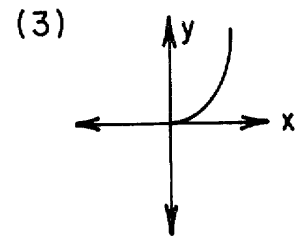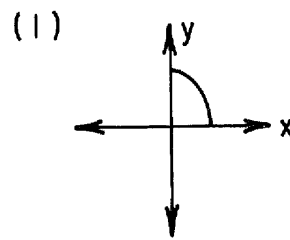(2) $\frac{3}{12}$ (4) $\frac{4}{12}$

22 The product of $3x^2$ and $5x^4$ is equivalent to
(1) $15x^6$ (3) $8x^6$
(2) $15x^8$ (4) $8x^8$

23 Which value of y will make the sentence $(y^2 > 9) \wedge (y < 0)$ true?
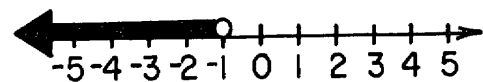(1) –4   (3) 3
(2) –3   (4) 4

24 Which graph illustrates the relationship x varies directly as y?

25 Which expression is the simplest form of $\frac{25x^4y^2 - 15x^2y}{5xy}$ if $x \neq 0$ and $y \neq 0$?
(1) $5x^3y - 15x^2y$ (3) $5x^4y^2 - 3x^2y$
(2) $5x^3y - 3x$ (4) $2x$

26 Which inequality is represented by the graph below?

(1) $x > -1$ (3) $x < -1$
(2) $x \leq -1$ (4) $x \geq -1$
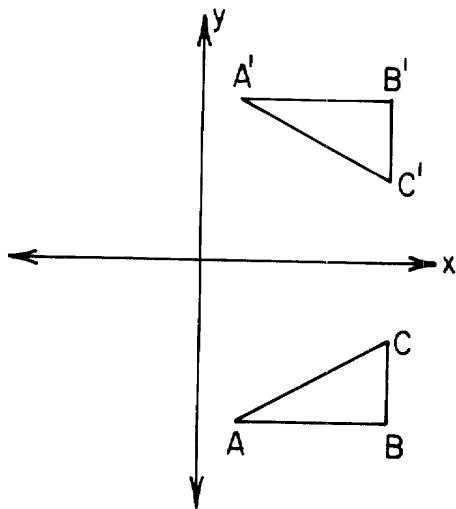
27 The graphs of the equations $4x - y = 6$ and $x + y = 4$ intersect at the point whose coordinates are
(1) (2,-2)   (3) (1,3)
(2) (5,-1)   (4) (2,2)

28 If the length of one leg of a right triangle is 5 and the length of the hypotenuse is 6, then the length of the other leg is
(1) $\sqrt{61}$ (3) 3
(2) $\sqrt{11}$ (4) 4

29 In the diagram below, $\triangle ABC \cong \triangle A'B'C'$. Under which type of transformation is $\triangle A'B'C'$ the image of $\triangle ABC$?


(1) a line reflection   (3) a translation
(2) a rotation   (4) a dilation

30 The length and the width of rectangle $ABCD$ are double those of rectangle $EFGH$. What is the area of rectangle $ABCD$ as compared to the area of rectangle $EFGH$?

(1) eight times as great
(2) twice as great
(3) three times as great
(4) four times as great

31 The area of a circle is 16π. What is the circumference of the circle?

(1) 4π (3) 64π
(2) 8π (4) 256π

32 The graph of which inequality is shown in the accompanying diagram?
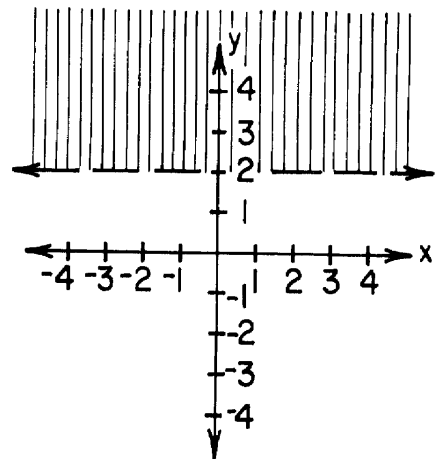
(1) $y > 2$ (3) $y \geq 2$
(2) $x > 2$ (4) $x \geq 2$

33 Which letter has point symmetry?

(1) A   (3) S
(2) C   (4) R

34 When the statement "If a quadrilateral is a square, then it is a rectangle" is true, which statement *must* also be true?

(1) If a quadrilateral is a rectangle, then it is a square.
(2) If a quadrilateral is not a square, then it is not a rectangle.
(3) If a quadrilateral is not a rectangle, then it is a square.
(4) If a quadrilateral is not a rectangle, then it is not a square.

35 The sum of $\sqrt{27}$ and $6\sqrt{3}$ is

(1) $7\sqrt{30}$ (3) $9\sqrt{6}$
(2) $9\sqrt{3}$ (4) $15\sqrt{3}$

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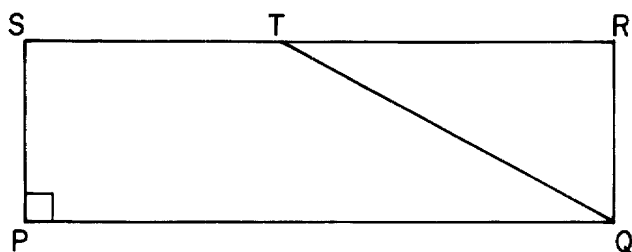
Part II

Answer four questions from this part. Show all work unless otherwise directed. [40]

36 Solve the following system of equations graphically and check:

$$y = 3x - 7$$
$$2x + 3y = 12$$

[8,2]

37 In the accompanying diagram, $PQRS$ is a rectangle. The measure of $\overline{RQ}$ is represented by x, and the ratio of RQ to RT is 1:2. The length of $\overline{ST}$ exceeds the length of $\overline{RQ}$ by 4.

a Express the length of $\overline{RT}$ in terms of x. [1]

b Express the length of $\overline{PQ}$ as a binomial in terms of x. [2]

c If the area of rectangle $PQRS$ is 39, find the value of x. [7]

38 Sue has three pairs of pants: one blue, one yellow, and one red; and four blouses: one yellow, one white, one tan, and one green.

a Draw a tree diagram or list the sample space showing all possible outfits that consist of one pair of pants and one blouse. [3]

b If Sue chooses an outfit consisting of one pair of pants and one blouse, find the probability that:

(1) only one article of clothing is yellow [2]

(2) at least one article of clothing is yellow [2]

(3) both articles of clothing are yellow [2]

(4) at least one article of clothing is black [1]

39 The table below shows the distribution of bowling scores for students on the high school bowling team.

Interval	Frequency	Cumulative Frequency
91–110	2	2
111–130	7	
131–150	4	
151–170	3	
171–190	1	
191–210	2	
211–230	1	

a On your answer paper, copy the table and complete the cumulative frequency column. [2]

b Using the data in the cumulative frequency column, draw a cumulative frequency histogram. [4]

c In which interval does the median lie? [2]

d What percent of the students scored in the interval 111–130? [2]

40 Lois rented a car for $74.00 a week plus $0.14 for each mile the car is driven. What is the greatest number of miles Lois can drive the car if she wishes to spend at most $130.00? *[Only an algebraic solution will be accepted.]* [6,4]

41 Find three consecutive integers such that the product of the second and the third is 16 less than the square of the first. *[Only an algebraic solution will be accepted.]* [5,5]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

42 *a* *On your answer paper*, copy and complete the truth table for the statement $(q \to \sim p) \leftrightarrow (\sim q \lor p)$. [8]

p	q	$\sim p$	$q \to \sim p$	$\sim q$	$\sim q \lor p$	$(q \to \sim p) \leftrightarrow (\sim q \lor p)$
T	T					
T	F					
F	T					
F	F					

b Is $(q \to \sim p) \leftrightarrow (\sim q \lor p)$ a tautology?　　[1]

c Justify the answer given in part *b*.　　[1]

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REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE I

Thursday, August 17, 1989 — 8:30 to 11:30 a.m., only

Part I Score............

Part II Score...........

Total Score............

Rater's Initials:...........

ANSWER SHEET

Pupil...Teacher...

School...Grade..........

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 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 I

Thursday, August 17, 1989 — 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 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 20–35, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 14	(11) $\frac{d}{t}$	(21) 3	(31) 2
(2) 24	(12) –18	(22) 1	(32) 1
(3) 3	(13) $2x - 5$	(23) 1	(33) 3
(4) 16	(14) 17	(24) 2	(34) 4
(5) 4	(15) 30	(25) 2	(35) 2
(6) 60	(16) $\frac{1}{12}$	(26) 3	
(7) –1	(17) 4	(27) 4	
(8) $p \rightarrow \sim q$	(18) $2x^2 + 5x - 12$	(28) 2	
(9) $\frac{x}{4}$	(19) –4	(29) 1	
(10) $(2x + 3)(2x - 3)$	(20) 4	(30) 4	

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.

(37) *a* $2x$ [1]

    b $3x + 4$ [2]

    c 3   [7]

(38) *b* (1) $\frac{5}{12}$ [2]

      (2) $\frac{6}{12}$ [2]

      (3) $\frac{1}{12}$ [2]

      (4) 0   [1]

(39) *c* 131–150   [2]

    d 35   [2]

(40) Analysis   [6]

     400   [4]

(41) Analysis   [5]

     –6, –5, –4   [5]

(42) *b* No   [1]

    c The last column is not always true.   [1]