The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, June 15, 1989 — 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.

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 Find the measure of a base angle of an isosceles triangle if the measure of the vertex angle is 100.

2 If 0.000023 is expressed in the form 2.3×10^n, what is the value of n?

3 If a letter is selected at random from the word "PARALLEL," what is the probability that the letter selected will *not* be an L?
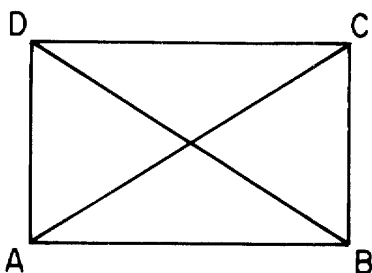
4 In the accompanying diagram, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are parallel and $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AB}$ at G and $\overleftrightarrow{CD}$ at H. If $m\angle AGH = 80$, what is $m\angle CHG$?
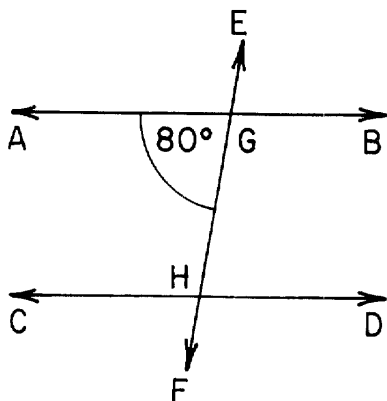
5 If y varies directly as x and $y = 32$ when $x = 4$, find the value of y when $x = 5$.

6 Find the value of $3(ab)^2$ if $a = 2$ and $b = -1$.

7 In rectangle $ABCD$, diagonal $AC = x + 10$ and diagonal $BD = 2x - 30$. Find the value of x.


8 Solve for h: $2.3h - 1.9 = 5$

9 Solve for x: $\dfrac{x - 5}{4} = \dfrac{1}{2}$

10 Let p represent "I will play golf" and let q represent "The sun is shining." Using p and q, write in symbolic form: "I will play golf if and only if the sun is shining."

11 Express $x^2 - 5x - 14$ as a product of two binomials.

12 Two angles are complementary. The measure of one angle is twice the measure of the other angle. What is the measure of the *smaller* of the two angles?

13 In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$. If $m\angle A = 60$ and $m\angle B = 50$, find $m\angle ACD$.
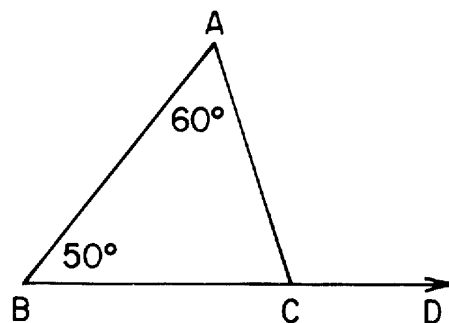
14 Solve for x in terms of b: $2x + b = 3$

15 How many different two-digit numbers greater than 50 can be formed from the digits 3, 6, 7, and 9 if repetition of digits is allowed?

16 Find the area of the square whose vertices are (0,0), (3,0), (3,3), and (0,3).

17 The probability of a particular manufactured product being defective is $\frac{1}{100}$. How many defective products would be expected in a random sample of 1500 products?

18 Express the sum $\frac{1}{2x} + \frac{3}{8x}$, $x \neq 0$, as a single fraction in lowest terms.

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 length of each side of regular pentagon *ABCDE* is represented by $(3x + 1)$. Which expression represents the perimeter of the pentagon?
(1) $15x + 5$
(2) $18x + 6$
(3) $3x + 5$
(4) $15x + 1$

20 The fraction $\frac{-12x^3y^5}{3xy^2}$, $x \neq 0$, $y \neq 0$, is equivalent to
(1) $-4x^4y^7$
(2) $\frac{-4x^2}{y^3}$
(3) $4x^2y^3$
(4) $-4x^2y^3$

21 The product of $3a^2$ and $2a^4$ is
(1) $5a^8$
(2) $6a^8$
(3) $6a^6$
(4) $5a^6$

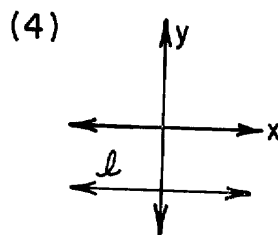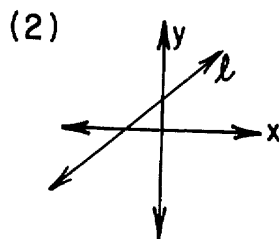22 Which is the *smallest* integer that makes the inequality $2x + 3 > 5$ true?
(1) 1
(2) 2
(3) 5
(4) –4

23 Which binomial is equivalent to $3(x - 1) - 2(x - 3)$?
(1) $x - 7$
(2) $5x - 7$
(3) $x + 5$
(4) $x + 3$

24 In which graph does the slope of line ℓ equal zero?

(1)
(3)
(2)
(4)
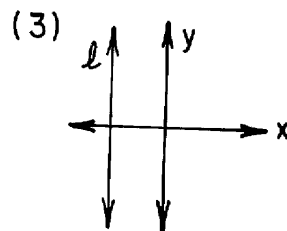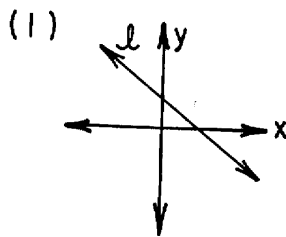
25 Triangle *ABC* is a right triangle with legs that measure 7 and 8. The length of the hypotenuse is
(1) $\sqrt{15}$
(2) $\sqrt{113}$
(3) 9
(4) 15

26 What is the solution set of the equation $(x - a)(x + b) = 0$?
(1) $\{a,-b\}$
(2) $\{-a,b\}$
(3) $\{-a,-b\}$
(4) ϕ

27 Which statement would be a correct heading for the last column in the table below?

p	q	?
T	T	F
T	F	F
F	T	T
F	F	F

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

28 In the accompanying diagram, which point may be the image of point A after a line reflection in the x-axis?

(1) B (3) D

(2) C (4) E

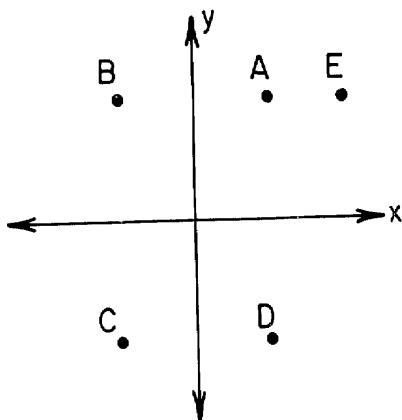29 Let p represent "The number is an even integer" and let q represent "Three times the number is 12." Which statement is true if the number is 6?

(1) $p \wedge q$ (3) q

(2) $p \vee q$ (4) $p \rightarrow q$

30 Larry has 7 more dimes than nickels, for a total value of $1.45. If n represents the number of nickels, which equation could be used to find the number of nickels Larry has?

(1) $n + (n + 7) = 145$
(2) $5n + 5(n + 7) = 145$
(3) $5n + 10(n + 7) = 145$
(4) $15(n + n + 7) = 145$

31 Which fraction would be undefined if $x = -3$?

(1) $\dfrac{3}{2x + 6}$ (3) $\dfrac{x + 3}{x - 3}$

(2) $\dfrac{2x + 6}{3}$ (4) $\dfrac{3 + x}{3 - x}$

32 The sum of two consecutive integers is -1. The smaller integer is

(1) 1   (3) -1
(2) -2 (4) 0

33 Which letter has both vertical and horizontal line symmetry?

(1) E   (3) T

(2) M   (4) X

34 The scores on a test were 70, 75, 75, 85, and 90. Which statement about these scores is true?

(1) The mean, median, and mode have the same value.
(2) Only the mean and the median have the same value.
(3) Only the mode and the median have the same value.
(4) The mean, median, and mode have different values.

35 The expression $2\sqrt{5}$ is equivalent to

(1) $\sqrt{10}$ (3) $\sqrt{50}$

(2) $\sqrt{20}$ (4) $\sqrt{100}$

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 *a* On the same set of coordinate axes, graph the lines of the following equations:

(1) $x + y = 8$　　　[3]
(2) $x = 1$　　　　　[2]
(3) $y = 3$　　　　　[2]

b Find the area of the triangle formed by the three lines graphed in part *a*.　　[3]

37 If five times the square of a certain positive number is decreased by twice the number, the result is 16. Find the number. [*Only an algebraic solution will be accepted.*]　　[5,5]

38 A bag contains only red, blue, and white marbles. The ratio of red marbles to white marbles is 3:1. There are 8 more blue marbles than white marbles.

a If *x* represents the number of white marbles, express, in terms of *x*:

(1) the number of red marbles　　[1]
(2) the number of blue marbles　　[1]

b Express, as a binomial in terms of *x*, the total number of marbles in the bag.　　[2]

c If there are 38 marbles in the bag,

(1) how many of them are red?　　[4]
(2) what is the probability that a marble, selected at random, is *not* blue?　　[2]

39 In $\triangle ABC$, the measure of $\angle B$ is 13 more than the measure of $\angle A$, and the measure of $\angle C$ is 9 less than twice the measure of $\angle A$. Find the measure of each angle in $\triangle ABC$. [*Only an algebraic solution will be accepted.*]　　[5,5]

40 Solve the following system of equations algebraically and check:

$$2x + 5y = -1$$
$$-3x + y = 10$$　　[8,2]

41 The table below represents the distribution of the SAT scores of 60 students at State High School.

Scores	Frequency	Cumulative Frequency
710–800	4	
610–700	10	
510–600	15	
410–500	18	
310–400	11	
210–300	2	2

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

b Using the table completed in part *a*, draw a cumulative frequency histogram.　　[4]

c Which interval contains the upper quartile?　　[2]

d If a student is selected at random, what is the probability of choosing a student who scored higher than 500?　　[2]

☞ GO RIGHT ON TO THE NEXT PAGE.

42 Answer *both a* and *b*.

   a In each diagram below, quadrilateral $A'B'C'D'$ is the image of quadrilateral $ABCD$ under a transformation in the plane. *On your answer paper*, write the numerals 1 through 3, and after each numeral, identify the type of transformation as a dilation, a translation, a rotation, or a line reflection.   [3]

(1)   (2)   (3)
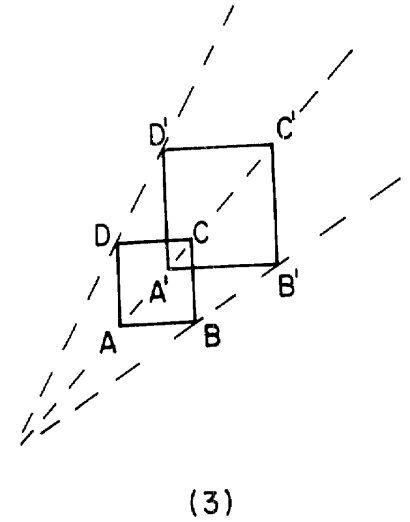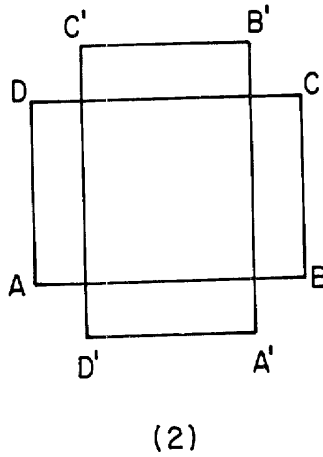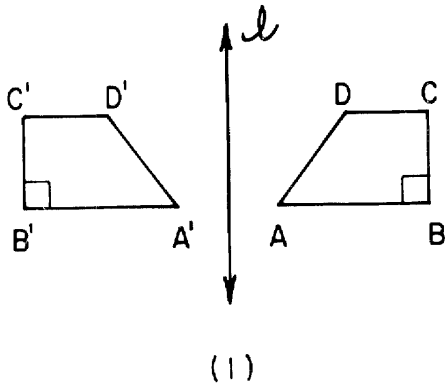
   b (1) *On your answer paper*, copy and complete the truth table for the statement $[p \wedge (p \to q)] \to q$.   [6]

p	q	$p \to q$	$p \wedge (p \to q)$	$[p \wedge (p \to q)] \to q$
T	T			
T	F			
F	T			
F	F			

   (2) Is $[p \wedge (p \to q)] \to q$ a tautology?   [1]

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REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE I

Thursday, June 15, 1989 — 9:15 a.m. to 12:15 p.m., only

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.

Math.–Course I–June '89

[7]

Signature

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, June 15, 1989 — 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 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) 40

(2) –5

(3) $\frac{5}{8}$

(4) 100

(5) 40

(6) 12

(7) 40

(8) 3

(9) 7

(10) $p \to q$

(11) $(x - 7)(x + 2)$

(12) 30

(13) 110

(14) $\frac{3 - b}{2}$

(15) 12

(16) 9

(17) 15

(18) $\frac{7}{8x}$

(19) 1

(20) 4

(21) 3

(22) 2

(23) 4

(24) 4

(25) 2

(26) 1

(27) 3

(28) 3

(29) 2

(30) 3

(31) 1

(32) 3

(33) 4

(34) 3

(35) 2

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) *b* 8   [3]

(37) Analysis   [5]
     2   [5]

(38) *a* (1) $3x$ [1]
       (2) $x + 8$ [1]
    b $5x + 8$ [2]
    c (1) 18   [4]
       (2) $\frac{24}{38}$ [2]

(39) Analysis   [5]
     44, 57, 79   [5]

(40) $(-3,1)$ *or* $\begin{matrix} x = -3 \\ y = 1 \end{matrix}$ [8]
     Check   [2]

(41) *c* 510–600   [2]
    d $\frac{29}{60}$ [2]

(42) *a* (1) line reflection   [1]
       (2) rotation   [1]
       (3) dilation   [1]
    b (2) Yes   [1]