The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Monday, January 26, 1987 — 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.
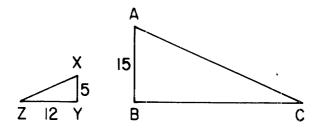
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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 terms of π or in radical form. [60]

1 Solve for x: $\quad 4x - 2 = x + 7$

2 A cookie jar contains 3 vanilla, 2 chocolate chip, and 7 gingersnap cookies. If one cookie is taken at random from the jar, what is the probability that it will be a vanilla cookie?

3 In the accompanying diagram of triangle XYZ and triangle ABC, $\angle X \cong \angle A$ and $\angle Y \cong \angle B$. If $XY = 5$, $YZ = 12$, and $AB = 15$, what is BC?
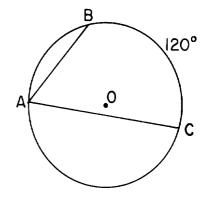

4 Solve the following system of equations for x:
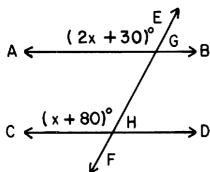$$2x + 3y = 5$$
$$4x - 3y = 1$$

5 Solve for x: $\quad 0.4x + 3 = 15$

6 Solve for x: $\quad 4(x - 2) - 3 = 9$

7 In a scale drawing of New York State, 2.5 centimeters represents 10 kilometers. How many kilometers are represented by 10 centimeters?

8 If the product of $4x$ and $5x$ is ax^2, find the value of a.

9 If $y + 1$ is an even integer, what is the next consecutive even integer?

10 The measures of the angles of a triangle are represented by $4x$, $x + 40$, and $2x$. Find the value of x.

11 When a fair die is tossed, what is the probability of getting a number divisible by both 2 and 3?

12 Evaluate the expression $3x^2 + y$ if $x = 1$ and $y = -3$.

13 In the accompanying diagram, $m\overset{\frown}{BC} = 120$. Find the measure of inscribed angle BAC.

14 If job A can be done in 5 ways and job B can be done in 6 ways, in how many different ways may the two jobs be completed?

15 Solve for D in terms of C and π: $\quad C = \pi D$

16 Factor: $\quad x^2 - 6x - 7$

17 Solve for y: $\quad \dfrac{y}{12} = \dfrac{3}{8}$

18 Find the positive root of the equation $4x^2 - 36 = 0$.

19 Express in simplest form:
$(5a^2 - 3a + 8) + (-4a^2 - 1) + (15a + 11)$

20 In the accompanying diagram, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$, and $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are cut by transversal $\overleftrightarrow{EF}$ at points G and H, respectively. If $m\angle EGA = (2x + 30)$ and $m\angle EHC = (x + 80)$, find x.

Directions (21–34): 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.

21 Let p represent "Jane is a librarian," and let q represent "Jane is a lawyer." Which statement represents "If Jane is not a librarian, then Jane is a lawyer"?
(1) $\sim p \wedge q$ (3) $\sim p \vee q$
(2) $\sim p \rightarrow q$ (4) $\sim(p \rightarrow q)$

22 Pat's grades on Course I tests were 90, 75, 98, 82, 90, and 87. The mode of her grades is
(1) 90   (3) 87
(2) 89   (4) 82

23 The greatest common factor of the numbers 12, 40, and 60 is
(1) 480   (3) 5
(2) 2   (4) 4

24 If $15x^6y$ is divided by $-3x^3$, the quotient is
(1) $-5x^2$ (3) $5x^2$
(2) $-5x^3y$ (4) $5x^3y$

25 Which point satisfies the inequality $2x + y > 10$?
(1) (2,3)   (3) (3,2)
(2) (3,4)   (4) (4,3)

26 What is the median of the following group of numbers?
5, 6, 6, 10, 10, 17
(1) 6   (3) 9
(2) 8   (4) 10

27 In the accompanying truth table, which statement should be the heading for column 4?

Column 1	Column 2	Column 3	Column 4
p	q	$\sim q$	?
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

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

28 The length of a rectangle is represented by $(x + 4)$ and the width is represented by $(x - 2)$. Which expression represents the area of the rectangle?
(1) $x^2 - 8$ (3) $x^2 + 2x - 8$
(2) $2x + 2$ (4) $4x + 4$

29 What is the perimeter of a square whose area is 64?
(1) 16   (3) 64
(2) 32   (4) 256
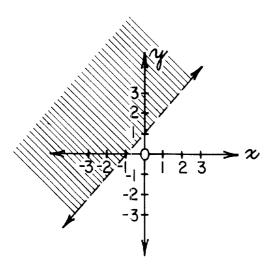
30 The graph of the line passing through the points (6,7) and (4,2) has a slope of
(1) $\frac{2}{5}$ (3) $\frac{5}{2}$
(2) $-\frac{5}{2}$ (4) $-\frac{1}{2}$

31 Which is an irrational number?
(1) 0   (3) $-\frac{1}{3}$
(2) π (4) $\sqrt{9}$

32 If the lengths of the legs of a right triangle are 5 and 12, what is the length of the hypotenuse?
(1) $\sqrt{119}$ (3) 17
(2) $\sqrt{17}$ (4) 13

33 The accompanying diagram shows the graph of which inequality?

(1) $y < x + 1$
(2) $y > x + 1$
(3) $y \leq x + 1$
(4) $y \geq x + 1$

34 The probability of team A beating team B is $\frac{3}{5}$. What is the probability that team A will win two consecutive games from team B?

(1) $\frac{9}{25}$
(3) $\frac{6}{25}$
(2) $\frac{4}{25}$
(4) $\frac{16}{25}$

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

35 *On the answer sheet,* using point A as an endpoint, construct a line segment $\overline{AB}$ whose length is twice the length of line segment $\overline{CD}$.

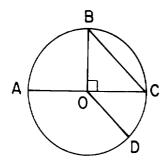Answers to the following questions are to be written on paper provided by the school.

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:

$$3x + y = 3$$
$$y = 2x - 7 \qquad [8,2]$$

37 In the accompanying diagram of circle O, diameter $AC = 8$, $m\overparen{CD}$ and $m\overparen{BC}$ are in a ratio of 1:2, and $\overline{BO} \perp \overline{CO}$.

a Find AO. [1]
b Find $m\angle BCA$. [2]
c Find $m\overparen{CD}$. [2]
d Find $m\angle AOD$. [2]
e Find BC. [Answer may be left in radical form.] [3]

38 One positive number is 8 more than another. The sum of their squares is 130. Find both numbers. [Only an algebraic solution will be accepted.] [4,6]

39 Solve the following system of equations algebraically and check:

$$x - \tfrac{1}{2}y = 4$$
$$x + y = 7 \qquad [8,2]$$

40 Ace Construction built five less than twice the number of houses that Ben's Construction built. If the total number of houses built by both firms was 115, how many did each build? [Only an algebraic solution will be accepted.] [5,5]

41 A fair die and a fair coin are tossed.
a Draw a tree diagram or list the sample space of all possible pairs of outcomes. [4]
b What is the probability of obtaining a 5 on the die and a tail on the coin? [2]
c What is the probability of obtaining an even number on the die and a head on the coin? [2]
d What is the probability of obtaining an 8 on the die and a head on the coin? [2]

☞ GO RIGHT ON TO THE NEXT PAGE.

42 *On your answer paper,* copy and complete the truth table for the statement
$(p \land q) \to [(p \lor q) \leftrightarrow (p \to q)]$.   [10]

p	q	$(p \land q)$	$(p \lor q)$	$(p \to q)$	$[(p \lor q) \leftrightarrow (p \to q)]$	$(p \land q) \to [(p \lor q) \leftrightarrow (p \to q)]$
T	T					
T	F					
F	T					
F	F					

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE I

Monday, January 26, 1987 — 1:15 to 4:15 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 Answer question 35 on the other side of this sheet.
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

35

C • —————— • D   A • ——————————————————————→

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

Monday, January 26, 1987 — 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 21–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 3	(11) $\frac{1}{6}$	(21) 2	(31) 2
(2) $\frac{3}{12}$	(12) 0	(22) 1	(32) 4
(3) 36	(13) 60	(23) 4	(33) 2
(4) 1	(14) 30	(24) 2	(34) 1
(5) 30	(15) $\frac{C}{\pi}$	(25) 4	(35) construction
(6) 5	(16) $(x-7)(x+1)$	(26) 2	
(7) 40	(17) $4\frac{1}{2}$	(27) 1	
(8) 20	(18) 3	(28) 3	
(9) $y+3$	(19) $a^2 + 12a + 18$	(29) 2	
(10) 20	(20) 50	(30) 3	

[OVER]

Part II

Please refer to the Department's pamphlet *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* 4   [1]

     b 45   [2]

     c 45   [2]

     d 135   [2]

     e $4\sqrt{2}$ *or* $\sqrt{32}$ [3]

(38) Analysis   [4]

     3, 11   [6]

(39) $x = 5$

     $y = 2$ [8]

     Check   [2]

(40) Analysis   [5]

     Ace — 75

     Ben's — 40   [5]

(41) *b* $\dfrac{1}{12}$ [2]

     c $\dfrac{3}{12}$ [2]

     d 0   [2]