THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Friday, June 14, 1996 – 9:15 a.m. to 12:15 p.m., only

Notice . . .

Scientific calculators must be available to all students taking this examination.
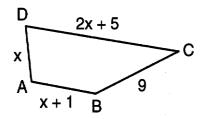
The last page of the booklet is the answer sheet. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

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.
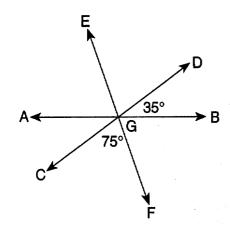
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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]
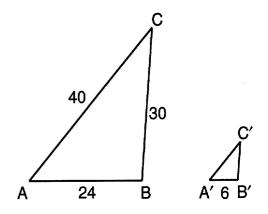
1 Let p represent "The Yankees won last night" and let q represent "The Yankees stayed in first place." Using p and q, write in symbolic form the statement: "If the Yankees did not win last night, then they did not stay in first place."

2 What is the mode of the set of values 25, 35, 35, 35, 45, 55, 85, and 95?

3 In the accompanying diagram, $ABCD$ is a quadrilateral, $AD = x$, $AB = x + 1$, $BC = 9$, and $DC = 2x + 5$. Find the value of x if the perimeter of quadrilateral $ABCD$ is 35.
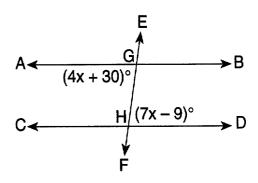

4 In the accompanying diagram, lines $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$, and $\overleftrightarrow{EF}$ intersect at G. If $m\angle DGB = 35$ and $m\angle CGF = 75$, find $m\angle AGE$.

5 In the accompanying diagram, $\triangle ABC$ is similar to $\triangle A'B'C'$, $AB = 24$, $BC = 30$, and $CA = 40$. If the shortest side of $\triangle A'B'C'$ is 6, find the length of the longest side of $\triangle A'B'C'$.
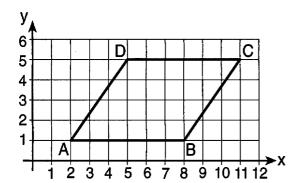

6 In the accompanying diagram, parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are intersected by transversal $\overleftrightarrow{EF}$ at G and H, respectively. If $m\angle AGH = 4x + 30$ and $m\angle GHD = 7x - 9$, what is the value of x?

7 Solve for x:　　$0.4x - 3 = 1.4$

8 Solve for x:　　$3x + 4 = 5(x - 8)$

9 Express as a trinomial:
$$(2x - 3)(x + 7)$$

10 Write, in symbolic form, the inverse of $\sim p \rightarrow \sim q$.

11 In the accompanying diagram, parallelogram $ABCD$ has vertices $A(2,1)$, $B(8,1)$, $C(11,5)$, and $D(5,5)$. What is the area of parallelogram $ABCD$?

12 What is the slope of the line whose equation is $y = 3x - 5$?

13 If x varies directly as y and $x = 3$ when $y = 8$, find the value of y when $x = 9$.

14 If the legs of a right triangle have measures of 9 and 12, what is the length of the hypotenuse?

15 Express $x^2 - 5x - 24$ as the product of two binomials.

Directions (16–35): 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.

16 Let p represent "It is cold" and let q represent "It is snowing." Which expression can be used to represent "It is cold and it is not snowing"?
(1) $\sim p \wedge q$ (3) $p \vee \sim q$
(2) $p \wedge \sim q$ (4) $\sim p \vee q$

17 If Manuel has five different shirts and seven different ties, how many different choices of a shirt and a tie does he have?
(1) 5   (3) 12
(2) 7   (4) 35

18 A bag has five green marbles and four blue marbles. If one marble is drawn at random, what is the probability that it is *not* green?
(1) $\frac{1}{9}$ (3) $\frac{5}{9}$
(2) $\frac{4}{9}$ (4) $\frac{5}{20}$

19 If one side of a regular octagon is represented by $2x - 1$, the perimeter of the octagon can be represented by
(1) $12x - 1$ (3) $12x - 6$
(2) $16x - 1$ (4) $16x - 8$

20 The product $\left(\dfrac{2a^3}{5b}\right)\left(\dfrac{3a^2}{7b}\right)$ is
(1) $\dfrac{5a^5}{12b^2}$ (3) $\dfrac{6a^5}{35b^2}$
(2) $\dfrac{5a^6}{12b}$ (4) $\dfrac{6a^6}{35b}$

21 What is the additive inverse of $-4a$?
(1) $\dfrac{a}{4}$ (3) $-\dfrac{4}{a}$
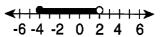(2) $4a$ (4) $-\dfrac{1}{4a}$

22 Which inequality is represented in the accompanying graph?

(1) $-4 \le x \le 2$ (3) $-4 < x \le 2$
(2) $-4 < x < 2$ (4) $-4 \le x < 2$

23 The sum of $3\sqrt{5}$ and $6\sqrt{5}$ is
(1) $18\sqrt{5}$ (3) $9\sqrt{10}$
(2) 45 (4) $9\sqrt{5}$

24 For which value of x will the fraction $\dfrac{7}{2x - 6}$ be undefined?
(1) 0   (3) 3
(2) -3 (4) 6

25 Which pair of angles x and y are supplementary?

(1) $m\angle x = 113$
    $m\angle y = 67$

(3) $m\angle x = 140$
    $m\angle y = 190$

(2) $m\angle x = 76$
    $m\angle y = 14$

(4) $m\angle x = 180$
    $m\angle y = 180$

26 The numerical value of the expression $\frac{5!}{3!}$ is

(1) 9   (3) 20
(2) 10   (4) 40

27 If $x = 0.6$ and $y = 5$, the value of $2(xy)^3$ is

(1) 5.4   (3) 54
(2) 21.6   (4) 216

28 What is the mean (average) of $4y + 3$ and $2y - 1$?

(1) $3y + 1$ (3) $3y + 4$
(2) $3y + 2$ (4) $y + 1$

29 Which letter has *only* horizontal line symmetry?

(1) A   (3) H
(2) D   (4) F

30 If $x + ay = b$, then y equals

(1) $\dfrac{b - x}{a}$ (3) $b - x - a$

(2) $\dfrac{b}{x + a}$ (4) $\dfrac{b - a}{x}$

31 If $28x^3 - 36x^2 + 4x$ is divided by $4x$, the quotient will be

(1) $7x^2 - 9x$ (3) $7x^2 - 9x + 1$
(2) $28x^3 - 36x^2$ (4) $28x^3 - 36x^2 + 1$

32 What is the length of the radius of a circle whose area is 100π?

(1) 5   (3) 20
(2) 10   (4) 25

33 Expressed as a fraction, the sum of $\frac{4y}{5}$ and $\frac{3y}{4}$ is equivalent to

(1) $\dfrac{31y}{20}$ (3) $\dfrac{7y}{20}$

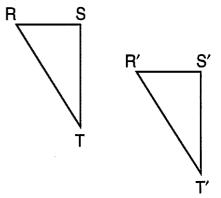(2) $\dfrac{7y}{9}$ (4) $\dfrac{31y}{9}$

34 What is the *negative* value of x that satisfies the equation $2x^2 + 5x - 3 = 0$?

(1) -1 (3) -3

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

35 In the accompanying diagram, $\triangle R'S'T'$ is the image of $\triangle RST$.

Which type of transformation is shown in this diagram?

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

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

Part II

Answer four 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. [40]

36 The frequency table below shows the distribution of time, in minutes, in which 36 students finished the 5K Firecracker Run.

Interval (minutes)	Frequency
14–16	2
17–19	6
20–22	9
23–25	8
26–28	7
29–31	4

a How many students finished the race in less than 23 minutes? [2]

b Based on the frequency table, which interval contains the median? [2]

c *On your answer paper*, copy and complete the cumulative frequency table below. [2]
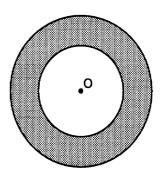
Interval	Cumulative Frequency
14–16	2
14–19	
14–22	
14–25	
14–28	
14–31	

d *On graph paper*, using the cumulative frequency table completed in part *c*, construct a cumulative frequency histogram. [4]

37 Let *p* represent: "The stove is hot."
Let *q* represent: "The water is boiling."
Let *r* represent: "The food is cooking."

a Write in symbolic form the converse of the statement: "If the stove is not hot, then the water is not boiling." [2]

b Write in sentence form: $\sim r \rightarrow \sim q$ [2]

c Write in sentence form: $p \lor \sim r$ [2]

d *On your answer paper*, construct a truth table for the statement $p \land \sim q$. [4]

38 In the accompanying diagram, both circles have the same center *O*. The radii of the circles are 3 and 5.

a Find, in terms of π, the area of the shaded region. [4]

b What percent of the diagram is unshaded? [2]

c A dart is thrown and lands on the diagram. Find the probability that the dart will land on the

(1) shaded area [2]
(2) unshaded area [2]

39 Solve algebraically for the positive value of x, $x \neq 0$, and check:

$$\frac{2x + 5}{7} = \frac{1}{x} \qquad [8,2]$$

40 The ages of three children in a family can be expressed as consecutive integers. The square of the age of the youngest child is 4 more than 8 times the age of the oldest child. Find the ages of the three children. [10]

41 Solve the following system of equations algebraically or graphically and check:

$$3y = 2x - 6$$
$$x + y = 8 \qquad [8,2]$$

42 In $\triangle ABC$, AB is $\frac{3}{5}$ of the length of $\overline{BC}$, and AC is $\frac{4}{5}$ of the length of $\overline{BC}$. If the perimeter of $\triangle ABC$ is 24, find the lengths of $\overline{AB}, \overline{AC},$ and $\overline{BC}$. [*Only an algebraic solution will be accepted.*] [5,5]

SEQUENTIAL MATH – COURSE I

Friday, June 14, 1996 – 9:15 a.m. to 12:15 p.m., only

Part I Score	. . . .
Part II 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 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

[8]

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Friday, June 14, 1996 — 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 16–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) $\sim p \rightarrow \sim q$	(11) 24	(21) 2	(31) 3
(2) 35	(12) 3	(22) 4	(32) 2
(3) 5	(13) 24	(23) 4	(33) 1
(4) 70	(14) 15	(24) 3	(34) 3
(5) 10	(15) $(x - 8)(x + 3)$	(25) 1	(35) 4
(6) 13	(16) 2	(26) 3	
(7) 11	(17) 4	(27) 3	
(8) 22	(18) 2	(28) 1	
(9) $2x^2 + 11x - 21$	(19) 4	(29) 2	
(10) $p \rightarrow q$	(20) 3	(30) 1	

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics*, 1996 Edition. 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* 17   [2]

    b 23–25   [2]

(37) *a* $\sim q \rightarrow \sim p$ [2]

    b If the food is not cooking, then the water

       is not boiling.   [2]

    c The stove is hot or the food is not cooking.

       [2]

(38) *a* 16π [4]

    b 36   [2]

    c (1) $\frac{16}{25}$ [2]

       (2) $\frac{9}{25}$ [2]

(39) 1   [8]

(40) 10, 11, 12   [10]

(41) (6,2)   [8]

(42) Analysis   [5]

    $AB = 6$

    $AC = 8$ [5]

    $BC = 10$