THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Monday, June 17, 1985 — 1:15 p.m. 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.
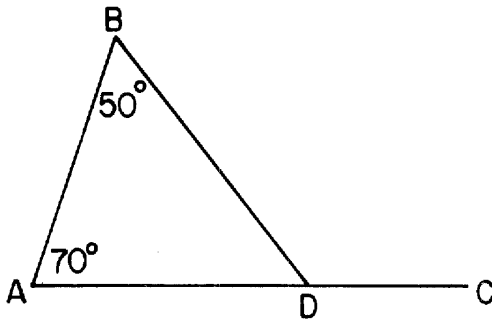
1 If $\Diamond$ is a binary operation defined as

$r \Diamond s = \dfrac{r^2}{s}$, evaluate $6 \Diamond 3$.

2 In the accompanying diagram, $\overline{ABC}$, $m\angle DBC = 138$, and $\overline{AE} \parallel \overline{DB}$. Find $m\angle EAB$.
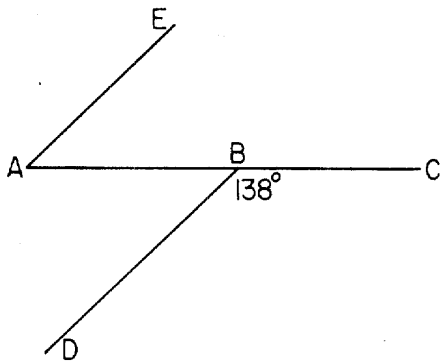
3 In the accompanying diagram of $\triangle ABD$, $m\angle A = 70$ and $m\angle B = 50$. Find the measure of exterior angle BDC.

4 Using the accompanying tables, find the value of $(C \triangle A) * (A \triangle C)$.

$\triangle$	A	C	T
A	C	A	T
C	T	A	C
T	A	C	T

$*$	A	C	T
A	A	A	A
C	A	C	T
T	T	T	T

5 Rectangle $ABCD$ has vertices $A(5,2)$, $B(5,-3)$, and $C(-2,-3)$. Find the coordinates of vertex D.

6 In $\triangle ABC$, $m\angle A = 74$ and $m\angle B = 58$. Which is the longest side of the triangle?

7 How many different 4-letter arrangements can be formed from the letters in the word "AREA"?

8 The sides of a triangle measure 3, 4, and 5. Find the length of the *smallest* side of a similar triangle whose perimeter is 8.

9 The measures of the acute angles of a right triangle are in the ratio 3:2. Find the measure of the *smallest* angle of the triangle.

10 Find, in radical form, the distance between the points $A(4,7)$ and $B(-2,3)$.

11 The coordinates of the vertices of parallelogram $ABCD$ are $A(1,2)$, $B(10,5)$, $C(9,8)$, and $D(0,5)$. Find the coordinates of the point of intersection of the diagonals.

12 Evaluate: $_{12}C_{10}$

13 In the accompanying diagram of trapezoid $ABCD$, $CB = 6$, $m\angle A = 45$, $m\angle B = 90$, and base $DC = 2$. Find the length of base $\overline{AB}$.
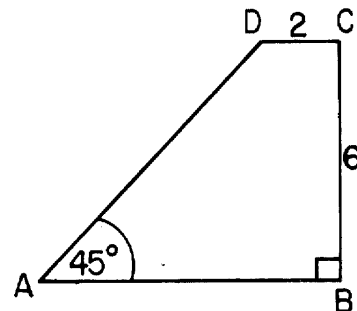
14 From a menu of 5 sandwiches and 5 beverages, how many different lunches consisting of 2 different sandwiches and 1 beverage can be selected?

15 The points $(k, 10)$, $(2, 7)$, and $(1, 4)$ lie on a straight line. Find k.

16 In $\triangle ABC$, $\angle C \cong \angle A$, $BC = 2x - 5$, $AB = x + 5$, and $AC = x + 10$. Find x.

Directions (17–34): 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.

17 If two angles of a triangle measure 48 and 42, the triangle is
(1) acute
(2) isosceles
(3) obtuse
(4) right

18 Which statement is logically equivalent to $\sim(p \land \sim q)$?
(1) $\sim p \land q$
(2) $\sim p \lor q$
(3) $p \lor \sim q$
(4) $\sim p \lor \sim q$

19 Which system below forms a group?

(1)

Φ	T	E	A	M
T	T	E	A	M
E	E	A	M	T
A	A	M	T	E
M	M	T	E	A

(3)

Φ	T	E	A	M
T	T	E	A	M
E	E	A	T	M
A	A	T	A	T
M	M	M	T	M

(2)

Φ	T	E	A	M
T	T	E	A	M
E	A	T	E	M
A	E	A	E	M
M	M	M	M	M

(4)

Φ	T	E	A	M
T	M	E	A	T
E	E	M	T	E
A	A	T	M	E
M	T	E	E	M

20 The length of a side of a rhombus whose diagonals are 6 and 8 is
(1) 5
(2) 6
(3) 8
(4) 9

21 What are the roots of the equation $2x^2 + 5x - 2 = 0$?
(1) $-\frac{1}{2}, -2$
(2) $\frac{1}{2}, 2$
(3) $\frac{-5 \pm \sqrt{41}}{4}$
(4) $\frac{5 \pm \sqrt{41}}{4}$

22 What are the coordinates of the center of a circle whose equation is $(x - 1)^2 + (y + 5)^2 = 7$?
(1) $(-1, 5)$
(2) $(1, -5)$
(3) $(-5, 1)$
(4) $(5, -1)$

23 In equilateral triangle ABC, the length of $\overline{AB}$ is 8 centimeters. How many points are 1 centimeter from vertex A and 4 centimeters from $\overline{BC}$?
(1) 1
(2) 2
(3) 3
(4) 0

24 If $a \to b$ and $b \to c$ are true statements, which *must* also be true?
(1) $a \to c$
(2) $b \to a$
(3) $c \to b$
(4) $c \to a$

25 The graph of which equation is perpendicular to the graph of $y = \frac{1}{2}x + 3$?
(1) $y = -\frac{1}{2}x + 5$
(2) $2y = x + 3$
(3) $y = 2x + 5$
(4) $y = -2x + 3$

26 Given the true statements, "If it is Friday, then I stay up late," and "I do not stay up late." Which statement *must* be true?
(1) It is Friday.
(2) It is Thursday.
(3) It is not Friday.
(4) If I stay up late, then it is Friday.

27 An equation of the line that passes through the point $(-2,3)$ and is parallel to the y-axis is
(1) $x = 3$
(2) $x = -2$
(3) $y = 3$
(4) $y = -2$

28 Which is the negation of the statement, "All perpendicular lines form right angles"?
(1) All right angles form perpendicular lines.
(2) All perpendicular lines do not form right angles.
(3) Some perpendicular lines do not form right angles.
(4) Some perpendicular lines form right angles.

29 Two isosceles triangles with congruent vertex angles *must* be
(1) congruent
(2) equilateral
(3) right
(4) similar

30 An equation of the axis of symmetry of the graph $y = x^2 + 8x - 10$ is
(1) $x = 8$
(2) $x = -4$
(3) $x = -8$
(4) $y = -8$

31 Which set of integers can *not* represent the lengths of the sides of a triangle?
(1) $\{4,8,12\}$
(2) $\{4,7,9\}$
(3) $\{6,6,11\}$
(4) $\{9,10,11\}$

32 Which statement is logically equivalent to the statement, "If the choir does not cut a record, it does not sing well"?
(1) If the choir cuts a record, it sings well.
(2) If the choir sings well, it cuts a record.
(3) If the choir sings well, it does not cut a record.
(4) If the choir does not sing well, it does not cut a record.

33 In right triangle ABC, altitude $\overline{CD}$ is drawn to the hypotenuse $\overline{AB}$. If $AD = 4$ and $DB = 9$, then CD is
(1) $\sqrt{3}$
(2) 5
(3) 6
(4) 13

34 In a right triangle, the length of one leg is 2 and the length of the hypotenuse is $\sqrt{5}$. What is the length of the other leg?
(1) 1
(2) 2
(3) 3
(4) $\sqrt{3}$

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

35 *On the answer sheet*, construct the altitude from A to side $\overline{DC}$.

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.

36 *a* Draw the graph of the equation
$y = x^2 - 2x - 5$ including all values of x such that $-2 \leq x \leq 4$. [6]

b What are the coordinates of the turning point? [2]

c Write an equation of the line passing through the turning point and perpendicular to the axis of symmetry of the graph. [2]

37 In isosceles triangle ABC, $\overline{AB} \cong \overline{BC}$, and $\overline{BD}$ is the altitude to base $\overline{AC}$. If $BD = x$, $AB = 2x - 1$, and $AC = 2x + 2$, find the length of $\overline{BD}$. [*Only an algebraic solution will be accepted.*] [5,5]

38 Find the area of pentagon $ABCDE$ whose vertices are $A(-2,-5)$, $B(-2,2)$, $C(2,4)$, $D(5,2)$, and $E(4,-2)$. [10]

39 Given the table for operation # defined on the set $\{E,V,A,N\}$.

#	E	V	A	N
E	V	A	N	E
V	A	N	E	V
A	N	E	V	A
N	E	V	A	N

a What is the identity element? [2]
b What is the inverse of V? [2]
c What is the value of $A \# V \# A$? [2]
d Solve for x: $A \# x = E$ [2]
e Solve for y: $y \# y = V$ [1,1]

40 A committee of 4 is to be chosen from 3 boys (Jason, Carlos, and Bill), and 4 girls (Nancy, Lori, Keri, and Maria).

a How many different committees can be chosen? [2]

b What is the probability a committee will contain Jason? [3]

c How many different committees will contain 2 boys and 2 girls? [2]

d What is the probability a committee of 2 boys and 2 girls will contain Jason and Nancy? [3]

☞ 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.

41 Given: quadrilateral $ABCD$, diagonal $\overline{AEFC}$, $\overline{DE} \perp \overline{AC}$, $\overline{BF} \perp \overline{AC}$, $\overline{AE} \cong \overline{CF}$, and $\overline{DE} \cong \overline{BF}$.
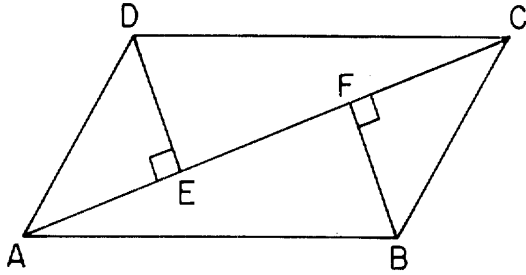
Prove: $ABCD$ is a parallelogram.   [10]

42 Given: $\triangle ABC$ with vertices $A(0,0)$, $B(0,32)$, and $C(8,6)$, the midpoints of $\overline{AB}$ and $\overline{BC}$ are M and N, respectively, and $\overline{MN}$ is drawn.

Prove by coordinate geometry:

a $\overline{MN} \parallel \overline{AC}$ [6]

b $MN = \frac{1}{2}AC$ [4]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Monday, June 17, 1985 — 1:15 p.m. to 4:15 p.m., only

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

ANSWER SHEET

Pupil . . . . Teacher . . . .

School . . . . Grade . . . .
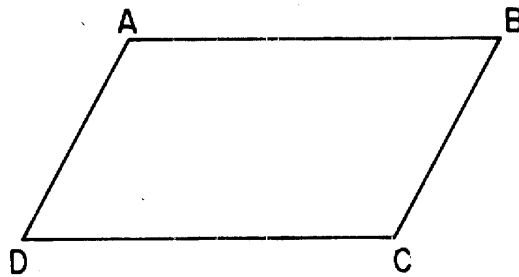
Your answers to Part I should be recorded on this answer sheet.

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 Answer question
6	16	26	35 on the other side of this sheet.
7	17	27	
8	18	28	
9	19	29	
10	20	30	

A — B
D — C

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.

_____
Signature

FOR TEACHERS ONLY

SCORING KEY
THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS
COURSE II

Monday, June 17, 1985 — 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 17–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 12	(11) $(5,5)$ or $\begin{array}{l}x = 5 \\ y = 5\end{array}$	(21) 3	(31) 1
(2) 42	(12) 66	(22) 2	(32) 2
(3) 120	(13) 8	(23) 4	(33) 3
(4) T	(14) 50	(24) 1	(34) 1
(5) $(-2,2)$ or $\begin{array}{l}x = -2 \\ y = 2\end{array}$	(15) 3	(25) 4	(35) construction
(6) $\overline{BC}$ or BC or a	(16) 10	(26) 3	
(7) 12	(17) 4	(27) 2	
(8) 2	(18) 2	(28) 3	
(9) 36	(19) 1	(29) 4	
(10) $\sqrt{52}$ or $2\sqrt{13}$	(20) 1	(30) 2	

[OVER]

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers 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* $(1, -6)$ *or* $\begin{array}{l} x = 1 \\ y = -6 \end{array}$ [2]

    c $y = -6$ [2]

(37) Analysis   [5]
    3   [5]

(38) 42   [10]

(39) *a* N   [2]

    b V   [2]

    c N   [2]

    d V   [2]

    e E, A   [1,1]

(40) *a* 35   [2]

    b $\frac{20}{35}$ [3]

    c 18   [2]

    d $\frac{6}{18}$ [3]