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
Part I

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

2. In the accompanying diagram, $\triangle ABC$, $m\angle DBC = 138$, and $AE \parallel DB$. 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 $(C \triangle A) \ast (A \triangle C)$.

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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: $12 \cdot C_{10}$

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 $AB$.

Math.—Course II—June ’85 [2]
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 \(\triangle ABC, \angle C \equiv \angle A, BC = 2x - 5,\) \(AB = x + 5,\) 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?

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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) \(1, 2\)
   (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 \(\overline{BC}\)?
   (1) 1
   (2) 2
   (3) 3
   (4) 0

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

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 \(CD\) is drawn to the hypotenuse \(AB\). 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 \(-2 \leq x \leq 4\). \hspace{1cm} [6]

    b What are the coordinates of the turning point? \hspace{1cm} [2]

    c Write an equation of the line passing through
    the turning point and perpendicular to the axis
    of symmetry of the graph. \hspace{1cm} [2]

37  In isosceles triangle \( ABC \), \( \overline{AB} \equiv \overline{BC} \), and
    \( \overline{BD} \) is the altitude to base \( \overline{AC} \). If \( BD = x \),
    \( AB = 2x - 1 \), and \( AC = 2x + 2 \), find the length
    of \( \overline{BD} \). \text{ [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 \( E(4,-2) \). \hspace{1cm} [10]

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

    \[
    \begin{array}{c|cccc}
    \# & E & V & A & N \\
    \hline
    E & V & A & N & E \\
    V & A & N & E & V \\
    A & N & E & V & A \\
    N & E & V & A & N \\
    \end{array}
    \]

    a What is the identity element? \hspace{1cm} [2]

    b What is the inverse of \( V \)? \hspace{1cm} [2]

    c What is the value of \( A \# V \# A \)? \hspace{1cm} [2]

    d Solve for \( x \): \hspace{1cm} \( A \# x = E \) \hspace{1cm} [2]

    e Solve for \( y \): \hspace{1cm} \( y \# y = V \) \hspace{1cm} [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? \hspace{1cm} [2]

    b What is the probability a committee will con-
    tain Jason? \hspace{1cm} [3]

    c How many different committees will contain
    2 boys and 2 girls? \hspace{1cm} [2]

    d What is the probability a committee of 2 boys
    and 2 girls will contain Jason and Nancy? \hspace{1cm} [3]
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 $AEFC$, $DE \perp AC$, $BF \perp AC$, $AE = CF$, and $DE = BF$.

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

Prove by coordinate geometry:

a $MN \parallel AC$ [6]

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

Prove: $ABCD$ is a parallelogram. [10]
**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

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**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.

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<td>Answer question 35 on the other side of this sheet.</td>
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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

Math. - Course II - June '85
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.

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<td>(1) 12</td>
<td>(11) (5,5) or ( x = 5 )</td>
<td>(21) 3</td>
<td>(31) 1</td>
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<td>(2) 42</td>
<td>(12) 66</td>
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<td>(3) 120</td>
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<td>(23) 4</td>
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<td>(4) ( T )</td>
<td>(14) 50</td>
<td>(24) 1</td>
<td>(34) 1</td>
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<td>(5) ((-2,2)) or ( x = -2 ) ( y = 2 )</td>
<td>(15) 3</td>
<td>(25) 4</td>
<td>(35) construction</td>
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<td>(6) ( BC ) or ( BC ) or ( a )</td>
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<td>(9) 36</td>
<td>(19) 1</td>
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<td>(10) ( \sqrt{52} ) or ( 2\sqrt{13} )</td>
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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.

\[(36) \quad b \quad 1, -6 \quad or \quad x = 1 \quad \quad y = -6 \quad \quad [2]
\]
\[(37) \quad Analysis \quad 3 \quad [5]
\]
\[(38) \quad 42 \quad [10]
\]
\[(39) \quad a \quad N \quad [2]
\quad b \quad V \quad [2]
\quad c \quad N \quad [2]
\quad d \quad V \quad [2]
\quad e \quad E, A \quad [1, 1]
\]
\[(40) \quad a \quad 35 \quad [2]
\quad b \quad \frac{20}{35} \quad [3]
\quad c \quad 18 \quad [2]
\quad d \quad \frac{6}{18} \quad [3]
\]