

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Wednesday, August 17, 1983 — 8:30 to 11:30 a.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

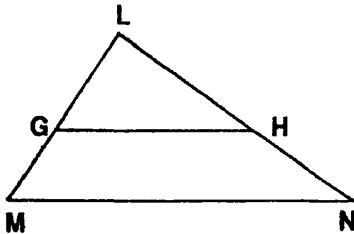
Part I

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.

- The measures of three angles of a quadrilateral are 80, 50, and 130. What is the measure of the fourth angle?
- Determine the value of $(T \neq O) \neq S$ in the system defined below.

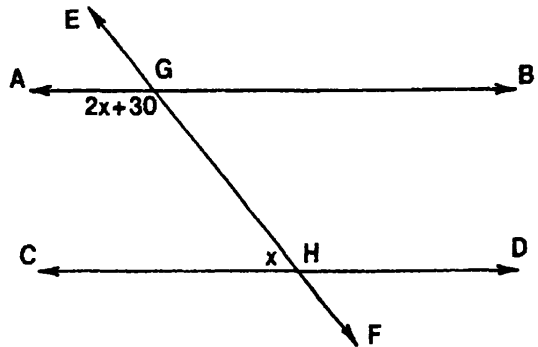
\neq	S	T	O	P
S	P	O	T	S
T	O	S	P	T
O	T	P	S	O
P	S	T	O	P

- The sides of a triangle have lengths 4, 5, and 8. If the length of the shortest side of a similar triangle is 12, find the perimeter of the larger triangle.
- In the accompanying figure, $\overline{GH} \parallel \overline{MN}$. If $LG = 14$, $LM = 24$, and $LN = 36$, find LH .



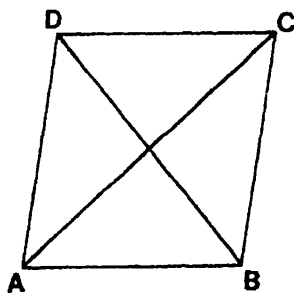
- The measures of the angles of a triangle are in the ratio 5:3:1. What is the measure of the *smallest* angle of the triangle?
- Lines \overleftrightarrow{AB} and \overleftrightarrow{CD} intersect at E . How many points are 3 units from E and also equidistant from \overleftrightarrow{AB} and \overleftrightarrow{CD} ?
- How many different four-letter arrangements can be formed from the letters in the word "BOOK"?

- In the accompanying figure, \overleftrightarrow{EF} intersects \overleftrightarrow{AB} and \overleftrightarrow{CD} at G and H , respectively. If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $m\angle CHG = x$ and $m\angle AGH = 2x + 30$, find x .



- The endpoints of a diameter of a circle are $(2, 5)$ and $(12, -7)$. Find the coordinates of the center of the circle.
- In $\triangle ABC$, $m\angle A = 70$ and $m\angle C = 50$. If D is a point on \overline{AB} such that \overline{CD} bisects $\angle ACB$, find $m\angle CDB$.
- The length of a side of an equilateral triangle is 12. Express in radical form the length of an altitude of the triangle.
- Two marbles are selected at random, without replacement, from a bag containing 7 red and 3 blue marbles. What is the probability that the two marbles selected will both be blue?
- If $x = 2$ is an equation of the axis of symmetry of the graph of $y = x^2 - 4x + 13$, what is the y -coordinate of the turning point?
- The bases of a trapezoid have lengths of 4 and 7, and the height is 6. What is the area of the trapezoid?

- 15 In the accompanying diagram, figure $ABCD$ is a rhombus and $m\angle CAB = 42$. Find $m\angle ABC$.



- 16 If $*$ is an operation defined by $a * b = a^b$, find the value of $5 * 2$.
- 17 Find the distance between the points $A(7,0)$ and $B(1,8)$.

Directions (18–34): 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.

- 18 Which is an example of a valid argument?
- (1) All girls are brave.
Robin is not a girl.
Therefore, Robin is not brave.
 - (2) All girls are brave.
Robin is brave.
Therefore, Robin is a girl.
 - (3) All girls are brave.
Robin is a girl.
Therefore, Robin is brave.
 - (4) All girls are brave.
Robin is a boy.
Therefore, Robin is not brave.
- 19 In quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$. Which statement *must* be true?
- (1) The diagonals bisect the angles of the quadrilateral.
 - (2) The quadrilateral is a parallelogram.
 - (3) The diagonals are equal in length.
 - (4) The diagonals are perpendicular.
- 20 Given the set $\{0,1,2,3,4\}$ in the clock 5 (mod 5) system of arithmetic, what is the value of x in the equation $x + 3 = 2$?
- (1) 1
 - (2) 2
 - (3) 3
 - (4) 4

- 21 Which equation represents the locus of all points 5 units below the x -axis?

- (1) $y = -5$
- (2) $y = 5$
- (3) $x = -5$
- (4) $x = 5$

- 22 If the equation of the axis of symmetry of a parabola is $x = 1$, which could be an equation of the parabola?

- (1) $y = x^2 + 2x + 1$
- (2) $y = x^2 - 2x + 1$
- (3) $y = 2x^2 + x - 2$
- (4) $y = 3x^2 + 6x + 2$

- 23 Given: $m \rightarrow \sim n$ and $\sim m \rightarrow t$
Which statement is a logically valid conclusion?

- (1) $t \rightarrow m$
- (2) $t \rightarrow \sim m$
- (3) $\sim n \rightarrow \sim m$
- (4) $n \rightarrow t$

- 24 From a group of 3 teachers and 5 students, how many committees of 3 people can be formed?

- (1) 336
- (2) 56
- (3) 3
- (4) 10

- 25 Given the true statement $[(p \vee q) \wedge (\sim q)]$. Which statement must also be true?

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

- 26 The roots of the equation $2x^2 - 5x + 1 = 0$ are

- (1) $\frac{5 \pm \sqrt{17}}{4}$
- (2) $\frac{-5 \pm \sqrt{17}}{4}$
- (3) $\frac{5 \pm \sqrt{33}}{4}$
- (4) $\frac{-5 \pm \sqrt{33}}{4}$

- 27 Which is a solution for the system of equations $y = x - 2$ and $y = x^2 - 4x - 8$?

- (1) $(1, -1)$
- (2) $(-1, -3)$
- (3) $(-1, -1)$
- (4) $(3, 1)$

- 28 The statement $\sim(p \vee \sim q)$ is logically equivalent to

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

29 Which set of numbers could represent the lengths of the sides of a right triangle?

- (1) {5,7,8} (3) {7,9,11}
(2) {7,8,12} (4) {8,15,17}

30 The coordinates of the endpoints of \overline{PQ} are $P(3a,4b)$ and $Q(2a,3b)$. The length of \overline{PQ} must equal

- (1) $a + b$ (3) $\sqrt{a^2 + b^2}$
(2) $a^2 + b^2$ (4) $\sqrt{25a^2 + 49b^2}$

31 Which is true for the set of integers?

- (1) It is commutative under addition and commutative under multiplication.
(2) It is closed under division.
(3) It contains a multiplicative inverse for each member.
(4) It is not closed under subtraction.

32 In a right triangle, the altitude drawn to the hypotenuse divides the hypotenuse into two segments whose lengths are 8 and 2. What is the length of the altitude?

- (1) 16 (3) 10
(2) 2 (4) 4

33 The graphs of the equations $x^2 + y^2 = 64$ and $x + y = 2$ are drawn on the same set of axes. What is the total number of points common to both graphs?

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

34 What is the slope of the line $2y - 3x = 4$?

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

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

35 *On the answer sheet,* construct the perpendicular bisector of side \overline{AB} .

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 In the accompanying table, the operation $*$ is defined as $a * b = \text{minimum of } \{a, b\}$. For example, $6 * 4 = 4$, the minimum of 6 and 4.

$*$	1	3	5	7
1	1	1		
3		3	3	
5			5	5
7				7

- a On your answer paper, copy and complete the table. [2]
 b What is the identity element in this set for operation $*$? [2]
 c Solve for all x : $5 * x = 5$ [1,1]
 d Find the value of $(1 * 5) * 3$. [2]
 e Which property of a group is not found in this set with operation $*$? [2]
- 37 A pet shop owner bought 3 parakeets, 5 canaries, and 4 doves. He selects 8 birds at random to display in his front window.
- a How many different 8-bird selections could he make? [2]
 b How many 8-bird selections will contain 3 parakeets, 2 canaries, and 3 doves? [4]
 c What is the probability the 8-bird selection will contain 3 parakeets, 2 canaries, and 3 doves? [2]
 d What is the probability the 8-bird selection will contain *no* doves? [2]

- 38 Given the equation: $y = x^2 + 2x - 3$

- a Write an equation for the axis of symmetry. [2]
 b Draw the graph of the equation, using all values of x such that $-4 \leq x \leq 2$. [6]
 c What are the roots of $x^2 + 2x - 3 = 0$? [1,1]

- 39 a On the same set of axes, graph the three lines whose equations are:

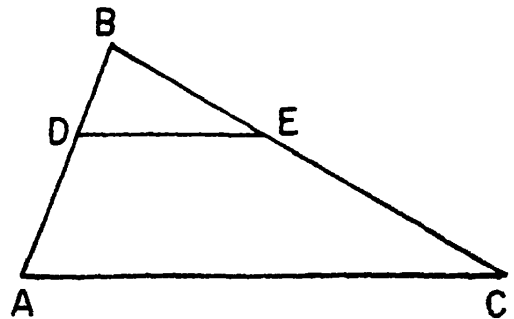
$$y = -x$$

$$y = x + 8$$

$$x = 5 \quad [2,2,1]$$

- b Find the area of the triangle formed in part a. [5]

- 40 In the accompanying diagram of $\triangle ABC$, D is a point on \overline{AB} , E is a point on \overline{BC} , and $\overline{DE} \parallel \overline{AC}$. If $BD = 5$, $DA = x + 2$, $BE = x + 4$, and $EC = 2x + 4$, find x . [Only an algebraic solution will be accepted.] [4,6]



➡ 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 Triangle ABC has vertices $A(1,2)$, $B(7,0)$, and $C(3,-2)$.
a Prove triangle ABC is an isosceles triangle. [5]
b Prove triangle ABC is a right triangle. [5]

42 Given:

- If Dana goes to camp then she will sleep in a tent.
If Dana's family does not take a vacation then she will learn to swim.
Either Dana's family does not take a vacation or Dana goes to camp.
She does not sleep in a tent.
Let C represent: "Dana goes to camp."
Let T represent: "She sleeps in a tent."
Let F represent: "Dana's family takes a vacation."
Let S represent: "She learns to swim."
a Using C , T , F , S , and proper connectives, express each sentence in symbolic form. [2]
b Prove: She learns to swim. [8]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

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Part I Score:
Rater's Initials:

ANSWER SHEET

Pupil.....Teacher.....

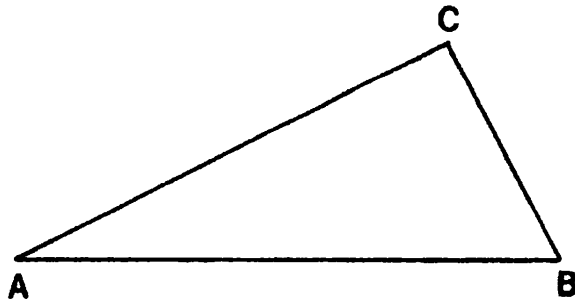
School.....Grade.....

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



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

Wednesday, August 17, 1983 — 8:30 to 11:30 a.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 18–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 100	(11) $6\sqrt{3}$ or $\sqrt{108}$	(21) 1	(31) 1
(2) 5	(12) $\frac{1}{15}$	(22) 2	(32) 4
(3) 51	(13) 9	(23) 4	(33) 2
(4) 21	(14) 33	(24) 2	(34) 3
(5) 20	(15) 96	(25) 1	
(6) 4	(16) 25	(26) 1	
(7) 12	(17) 10	(27) 2	
(8) 50	(18) 3	(28) 3	
(9) $(7, -1)$ or $\begin{matrix} x = 7 \\ y = -1 \end{matrix}$	(19) 2	(29) 4	
(10) 95	(20) 4	(30) 3	

[OVER]

SEQUENTIAL MATH—COURSE II — *concluded*

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.

Part II

$$(36) \begin{array}{l|cccc} a * & 1 & 3 & 5 & 7 \\ \hline 1 & 1 & 1 & 1 & 1 \\ 3 & 1 & 3 & 3 & 3 \\ 5 & 1 & 3 & 5 & 5 \\ 7 & 1 & 3 & 5 & 7 \end{array} \quad [2]$$

$$(38) \begin{array}{l} a \ x = -1 \quad [2] \\ c \ -3, 1 \quad [1,1] \end{array}$$

$$(39) \ b \ 81 \quad [5]$$

$$b \ 7 \quad [2]$$

$$(40) \ 6 \quad [4,6]$$

$$c \ 5,7 \quad [1,1]$$

$$d \ 1 \quad [2]$$

$$e \ \text{All elements do not have inverses.} \quad [2]$$

$$(37) \ a \ 495 \quad [2]$$

$$b \ 40 \quad [4]$$

$$c \ \frac{40}{495} \quad [2]$$

$$d \ \frac{1}{495} \quad [2]$$

Part III

$$(42) \ a \ C \rightarrow T$$

$$\sim F \rightarrow S$$

$$\sim F \vee C$$

$$\sim T \quad [2]$$