

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, August 18, 1981 — 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

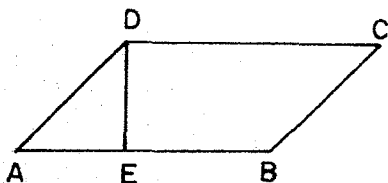
Part I

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.

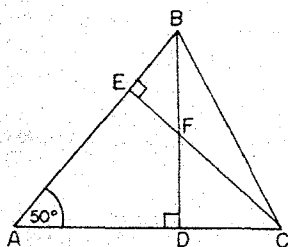
- 1 In rhombus $ABCD$, $AB = 5x - 10$ and $BC = 2x + 50$. Find x .

- 2 The lengths of the three sides of a triangle are 8, 20, and 24. The length of the longest side of a similar triangle is 12. Find the perimeter of the *smaller* triangle.

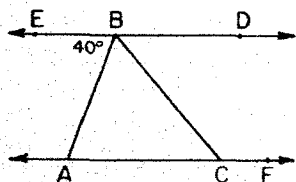
- 3 In the accompanying diagram, $ABCD$ is a parallelogram with altitude \overline{DE} drawn to side \overline{AB} . If $DE = AE$, find $m\angle A$.



- 4 In the accompanying diagram of triangle ABC , $\overline{BD} \perp \overline{AC}$, $\overline{CE} \perp \overline{AB}$, and \overline{CE} intersects \overline{BD} at F . If $m\angle EAD = 50$, find $m\angle BFE$.

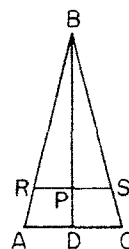


- 5 In the accompanying diagram, $\overleftrightarrow{EBD} \parallel \overleftrightarrow{ACF}$, \overline{BC} bisects $\angle ABD$, and $m\angle EBA = 40$. Find $m\angle BCF$.



- 6 In parallelogram $ABCD$, the measure of angle A is 30 more than twice the measure of angle B . Find $m\angle B$.

- 7 In the accompanying diagram, $\overline{RPS} \parallel \overline{ADC}$, altitude \overline{BPD} has length 10, $RS = 4$, and $AC = 5$. Find BP .



- 8 In right triangle ABC , hypotenuse $AB = 10$. The altitude drawn from C to \overline{AB} intersects \overline{AB} at D . If $AD = 2$, find CD .

- 9 In triangle ABC , $m\angle C = 55$ and $m\angle C > m\angle B$. What is the *longest* side of the triangle?

- 10 Find the coordinates of the midpoint of the line segment connecting the points $(-2, 6)$ and $(10, -4)$.

- 11 Write an equation of the axis of symmetry of the graph whose equation is $y = x^2 - 6x$.

- 12 What are the coordinates of the center of the circle whose equation is $(x + 5)^2 + (y - 2)^2 = 9$?

- 13 If $\#$ is a binary operation defined by $a \# b = a^2 + b$, find the value of $4 \# 1$.

- 14 Write an equation in the form $ax^2 + bx + c = 0$ whose roots are -2 and 5 .

- 15 Given the set $\{a, b, c, d\}$ and the operation $*$ as shown in the accompanying table. What is the inverse of b ?

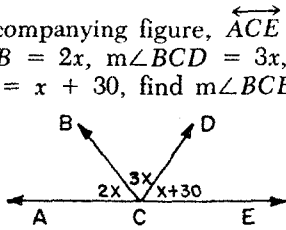
$*$	a	b	c	d
a	c	d	a	b
b	d	a	b	c
c	a	b	c	d
d	b	c	d	a

16 A box contains 8 different cookies. If only 3 of them are selected, how many different combinations can be made?

17 How many different arrangements of 6 letters can be made using the letters in the word "DEGREE"?

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 In the accompanying figure, \overline{ACE} is a straight line. If $m\angle ACB = 2x$, $m\angle BCD = 3x$, and $m\angle DCE = x + 30$, find $m\angle BCE$.



- (1) 50
(2) 55
(3) 125
(4) 130

19 If the lengths of the legs of a right triangle are 2 and 5, what is the length of the hypotenuse of the triangle?

- (1) 29
(2) $\sqrt{29}$
(3) $\sqrt{21}$
(4) 7

20 Which statement is true?

- (1) All parallelograms are quadrilaterals.
(2) All parallelograms are rectangles.
(3) All quadrilaterals are trapezoids.
(4) All trapezoids are parallelograms.

21 A circle whose center is at the point (1,2) passes through the point (4,-2). What is the length of the radius of the circle?

- (1) 7
(2) 2
(3) 3
(4) 5

22 The coordinates of three of the vertices of parallelogram $EFGH$ are $E(2,3)$, $F(0,0)$, and $G(6,0)$. The coordinates of H are

- (1) (8,3)
(2) (7,3)
(3) (6,3)
(4) (5,3)

23 Given that "All skates are not cheap" is true, which statement *must* be false?

- (1) No skates are cheap.
(2) Some skates are not cheap.
(3) Some skates are cheap.
(4) No cheap items are skates.

24 An equation of a line which is always 5 units from the line $x = 3$ is

- (1) $y = -2$
(2) $x = -2$
(3) $y = 8$
(4) $x + y = 2$

25 A line which is perpendicular to the y -axis contains the point (3,4). This line also contains the point

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

26 Given the three premises $a \rightarrow \sim b$, $\sim b \rightarrow c$, and a , which conclusion *must* be true?

- (1) $\sim a$
(2) $\sim b$
(3) c
(4) $\sim c$

27 If $\sim p \rightarrow q$ is a true statement then

- (1) $\sim p$ must be a false statement
(2) q must be a true statement
(3) $p \rightarrow \sim q$ must be a true statement
(4) $\sim q \rightarrow p$ must be a true statement

28 Which argument is valid?

- (1) Given: $a \rightarrow b$
 $\sim b$
Conclusion: b
(2) Given: $\sim a \vee b$
 a
Conclusion: b
(3) Given: $\sim a \rightarrow \sim b$
 a
Conclusion: $\sim b$
(4) Given: $a \rightarrow b$
 b
Conclusion: a

29 Which statement about the graphs of the equations $2x + 3y = 5$ and $2x + 3y = -5$ is true?

- (1) They are parallel.
(2) They are perpendicular.
(3) They intersect.
(4) They coincide.

30 Which set is *not* closed under multiplication?

- (1) whole numbers
(2) counting numbers
(3) negative integers
(4) even integers

31 If two cards are drawn from a standard deck of 52 cards, without replacement, what is the probability of selecting two hearts?

- (1) $\frac{1}{2}$
(2) $\frac{1}{8}$
(3) $\frac{1}{16}$
(4) $\frac{1}{17}$

32 Given the set $\{2,4,6,8\}$ and the operation \diamond as shown in the accompanying table. What is the solution set for $4 \diamond y = 8$?

\diamond	2	4	6	8
2	2	8	4	6
4	8	8	2	4
6	4	2	6	8
8	4	4	2	6

- (1) $\{2\}$ (3) $\{2,4,6\}$
 (2) $\{2,4\}$ (4) $\{2,4,6,8\}$

33 The solution set of the equation $2x^2 + 5x - 3 = 0$ is

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

34 The statement $\sim(a \vee \sim b)$ is logically equivalent to

- (1) $\sim a \vee b$ (3) $\sim a \vee \sim b$
 (2) $\sim a \wedge b$ (4) $\sim a \wedge \sim b$

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

35 *On the answer sheet,* construct a triangle similar to triangle ABC , using the given line segment \overline{LM} as one side.

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

Part II

he
Answer three questions from this part. Show all work unless otherwise directed.

to
as
36 Triangle ABC has coordinates $A(2,5)$, $B(9,8)$, and $C(7,2)$. Find the area of triangle ABC . [10]

37 *a* Draw the graph of the equation $y = x^2 - 2x - 8$ for all values of x such that $-3 \leq x \leq 6$. [6]

b On the same set of axes used in part *a*, draw the graph of the equation $x - y + 2 = 0$. [3]

c Find the coordinates of one point which satisfies $[(y = x^2 - 2x - 8) \wedge (x - y + 2 = 0)]$. [1]

38 The length of a rectangle is 7 more than its width. If the diagonal has length 17, find the dimensions of the rectangle. [Only an algebraic solution will be accepted.] [5,5]

39 Given: Set $S = \{A, B, C, D, E, F\}$ and operation \odot defined by the accompanying table.

\odot	A	B	C	D	E	F
A	C	D	F	A	B	E
B	D	A	E	B	C	A
C	E	F	A	C	F	B
D	A	B	C	D	E	F
E	B	C	F	E	A	D
F	E	A	B	F	D	C

a What is the identity element? [2]

b Which member of S does *not* have an inverse? [2]

c Solve for x : $x \odot F = A \odot E$ [2]

d Give an example to show that S is *not* commutative under \odot . [2]

e State a reason why (S, \odot) is *not* a group. [2]

40 There are 4 boys and 6 girls in a class. A five-member committee is to be formed.

a How many 5-member committees can be formed? [2]

b How many of these committees consist of 3 boys and 2 girls? [4]

c What is the probability that the committee will consist of 3 boys and 2 girls? [2]

d What is the probability that the 5-member committee will consist of all boys? [2]

41 On your answer paper, write the letters *a* through *e*. After each letter state whether the corresponding argument is valid or invalid.

a Premises: The locus of points a given distance from a point is a circle or a straight line.

The locus is not a straight line.

Conclusion: The locus is a circle. [2]

b Premises: If you get a job, then you will be able to buy a car.

You cannot buy a car.

Conclusion: You did not get a job. [2]

c Premises: $a \rightarrow b$

$b \rightarrow c$

Conclusion: $a \rightarrow c$ [2]

d Premises: $\sim(a \wedge b)$

$\sim a$

Conclusion: $\sim b$ [2]

e Premises: If today is Monday, then tomorrow cows fly.

Tomorrow cows fly.

Conclusion: Today is Monday. [2]

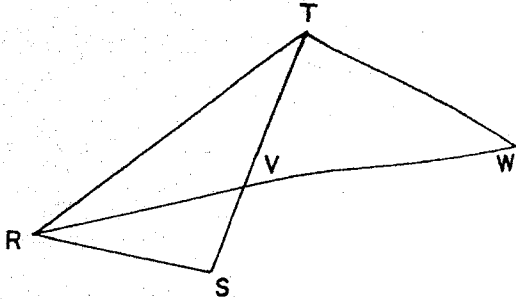
GO RIGHT ON TO THE NEXT PAGE.

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.

- 42 Given: V is a point on \overline{ST} such that \overline{RVW} bisects $\angle SRT$ and $\overline{TW} \cong \overline{TV}$.



Prove: $RW \times SV = RV \times TW$ [10]

- 43 In quadrilateral $ABCD$ whose vertices are $A(-9,8)$, $B(3,8)$, $C(9,-4)$, $D(-5,-4)$, L is the midpoint of \overline{AB} , M is the midpoint of \overline{BC} , N is the midpoint of \overline{CD} , and P is the midpoint of \overline{DA} . Prove, by means of coordinate geometry, that $LMNP$ is a rectangle. [10]

- 44 Given the following statements:

If Don plays the radio too loud, then his father will be angry.

If his father is angry, then Don won't go to the party.

Don goes to the party or he stays home.

Don did not stay home.

Let R represent: "Don plays the radio too loud."

Let A represent: "His father will be angry."

Let P represent: "Don goes to the party."

Let S represent: "Don stays home."

a Using R, A, P, S , and proper connectives, express each statement in symbolic form. [3]

b Prove that Don did not play the radio too loud. [7]

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Tuesday, August 18, 1981 — 8:30 to 11:30 a.m., only

Part I Score:
Rater's Initials:

ANSWER SHEET

Pupil Teacher.....

School Grade.....

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

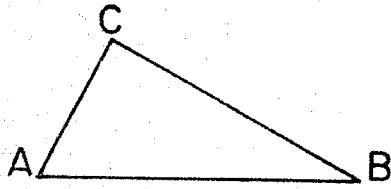
Part I

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 | |

57

Tear Here



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

Tuesday, August 18, 1981 — 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) 20	(11) $x = 3$	(21) 4	(31) 4
(2) 26	(12) $(-5, 2)$ or $\begin{matrix} x = -5 \\ y = 2 \end{matrix}$	(22) 1	(32) 2
(3) 45	(13) 17	(23) 3	(33) 1
(4) 50	(14) $x^2 - 3x - 10 = 0$	(24) 2	(34) 2
(5) 110	(15) d	(25) 2	(35) construction
(6) 50	(16) 56	(26) 3	
(7) 8	(17) 120	(27) 4	
(8) 4	(18) 4	(28) 2	
(9) a or \overline{BC} or BC	(19) 2	(29) 1	
(10) $(4, 1)$ or $\begin{matrix} x = 4 \\ y = 1 \end{matrix}$	(20) 1	(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) 18 [10]

(37) c (5,7) or (-2,0) [1]

(38) 8,15 [5,5]

(39) a D [2]

b C [2]

c C [2]

(40) a 252 [2]

b 60 [4]

c $\frac{60}{252}$ [2]

d 0 [2]

(41) a valid [2]

b valid [2]

c valid [2]

d invalid [2]

e invalid [2]

Part III

(44) a $R \rightarrow A$

$A \rightarrow \sim P$

$P \vee S$

$\sim S$ [3]