The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Monday, June 18, 1979 — 1:15 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

Part I

Answer 30 questions from this part. Each correct answer will receive 2 credits. Write your answers in the spaces provided on the separate answer sheet. Where applicable, answers may be left in radical form.

1 If the measures of the angles of a triangle are represented by x, $2x + 6$, and $3x - 6$, find the value of x.

2 In $\triangle ABC$, $m\angle A = 30$ and the measure of an exterior angle at B is 120°. Which is the *longest* side of the triangle?

3 Using the accompanying table, find the identity element.

*	2	4	6	8
2	4	8	2	6
4	8	6	4	2
6	2	4	6	8
8	6	2	8	4

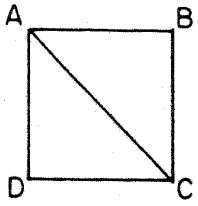
4 Find the midpoint of the segment whose endpoints are (3,2) and (−7,4).

5 If one root of the equation $x^2 - 12x + k = 0$ is 4, what is the value of k?

6 Given the premises: $p \vee q$ and $\sim q$.
Write a logical conclusion.

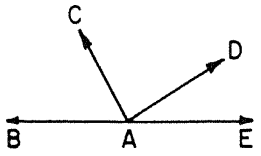
7 If $b \circledast c$ is a binary operation defined as b raised to the c power, find the value of $2 \circledast 3$.

8 In the accompanying diagram, the length of a side of square $ABCD$ is 3. Find, in radical form, the length of $\overline{AC}$.



9 Two points A and B are 6 units apart. How many points are equidistant from A and B and also 4 units from B?

10 In the accompanying diagram, $\overline{BAE}$ and $\overrightarrow{AC} \perp \overrightarrow{AD}$. If $m\angle BAC$ is twice as large as $m\angle DAE$, find $m\angle DAE$.

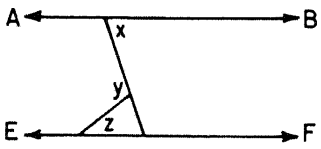


11 The length of the shorter diagonal $\overline{AC}$ of rhombus $ABCD$ is 8 and $m\angle ABC = 60$. Find the length of a side of the rhombus.

12 In $\triangle ABC$, D is on $\overline{AB}$, E is on $\overline{BC}$, $AD = DB$, and $\overline{DE} \parallel \overline{AC}$. If $DE = 8$, find AC.

13 What is the slope of the line $2y = 3x + 12$?

14 In the accompanying figure, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{EF}$, $m\angle x = 70$, and $m\angle y = 105$. Find $m\angle z$.



15 Write an equation of the form $ax^2 + bx + c = 0$ for which the solution set is $\{4,-1\}$.

16 How many different six-letter permutations are there from the word "SLEEVE"?

17 A box of candy has 6 different pieces of chocolate. If you can select only 3 of them, how many different combinations can be made?

18 If there are 5 girls and 4 boys on a committee, what is the probability that a subcommittee of 6 has a boy on it?

19 In right triangle ABC, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $AC = 6$ and $AB = 9$, find AD.

SCC

Directions (20–34): 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.

20 In the system defined below, what is the inverse element of 2?

X	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	0	2
3	0	3	2	1

(1) 1
(2) 2
(3) 0
(4) nonexistent

21 The length of the line segment that joins two points whose coordinates are $(4,-1)$ and $(7,5)$ is

(1) 5
(2) $\sqrt{13}$
(3) $\sqrt{29}$
(4) $\sqrt{45}$

22 Which set of numbers could be the lengths of the sides of a right triangle?

(1) $2,6,\sqrt{40}$
(2) 2,18,20
(3) $4,6,\sqrt{40}$
(4) 4,36,40

23 Which is the negation of the statement "Some rectangles are squares"?

(1) Some rectangles are not squares.
(2) All rectangles are not squares.
(3) All rectangles are squares.
(4) All squares are rectangles.

24 Which statement is logically equivalent to $\sim p \rightarrow q$?

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

25 Which is an equation of the axis of symmetry of the graph $y = x^2 - 4x + 1$?

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

26 An exterior angle at the base of an isosceles triangle is *always*

(1) obtuse
(2) acute
(3) right
(4) equal to the sum of the base angles

27 In $\triangle ABC$, $\overline{DE}$ joins points D and E on $\overline{AB}$ and $\overline{BC}$, respectively, $\overline{DE} \parallel \overline{AC}$, and DE is one-fourth as long as AC. The ratio of the perimeter of $\triangle DBE$ to the perimeter of $\triangle ABC$ is

(1) $\frac{1}{12}$
(2) $\frac{1}{2}$
(3) $\frac{1}{16}$
(4) $\frac{1}{4}$

28 Which is an equation of the straight line that passes through the point (3,2) and is parallel to the x-axis?

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

29 Given: $a \rightarrow b$ and $c \rightarrow \sim b$.
Which statement is a logically valid conclusion?

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

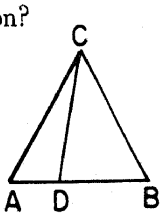
30 Which is an equation of a line whose slope is undefined?

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

31 Which set is closed under subtraction?

(1) counting numbers
(2) whole numbers
(3) odd integers
(4) even integers

32 In the accompanying diagram, $\triangle ABC$ is equilateral and D is any point on $\overline{AB}$. Which is *always* a correct conclusion?



(1) $m\angle A > m\angle ADC$
(2) $m\angle B > m\angle BDC$
(3) $CD > DB$
(4) $DB > CD$

33 The roots of $3x^2 - 5x - 1 = 0$ are

(1) $\frac{5 \pm \sqrt{13}}{6}$
(2) $\frac{-5 \pm \sqrt{13}}{6}$
(3) $\frac{5 \pm \sqrt{37}}{6}$
(4) $\frac{-5 \pm \sqrt{37}}{6}$

34 In a standard deck of 52 cards, what is the probability of picking a red card or a 5?

(1) $\frac{28}{52}$
(2) $\frac{2}{52}$
(3) $\frac{30}{52}$
(4) $\frac{4}{52}$

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

35 *On the answer sheet*, construct the median $\overline{DM}$ from D to $\overline{EF}$ in $\triangle DEF$.

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 The coordinates of the vertices of $\triangle ABC$ are $A(-2,-2)$, $B(8,-2)$, and $C(1,6)$.

a Find the coordinates of midpoint M of side $\overline{AB}$. [2]

b Find, in radical form, the length of median $\overline{CM}$. [2]

c Describe fully the locus of points two units from A. [3]

d Write an equation of the locus of points equidistant from A and B. [3]

37 *a* Draw the graph of the equation $y = x^2 - 8x + 15$, using all integral values of x from $x = 1$ to $x = 7$ inclusive. [5]

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

c Determine the coordinates of the points of intersection of the graphs in parts *a* and *b*. [2]

38 Given: $(Z, +)$, where $Z = \{0,1,2,3\}$ and $+$ is addition mod 4.

a Construct an addition table for Z as defined. [4]

b Use the table constructed in part *a* to answer the following:

(1) What is the identity element? [2]

(2) Calculate $(3 + 2) + 3$. [2]

(3) Find x, if $x + 3 = 2$. [2]

39 A bag of assorted cookies contains 5 lemon cookies, 2 coconut cookies, 3 chocolate cookies, and 4 sugar cookies. They are all alike in size, shape, and texture. A random selection of 5 cookies is made.

a How many of these 5-cookie selections could be made? [3]

b How many of these selections will contain 3 lemon, 1 chocolate, and 1 sugar cookie? [4]

c What is the probability that a 5-cookie selection will contain 3 lemon, 1 chocolate, and 1 sugar cookie? [2]

d What is the probability that a 5-cookie selection will contain all sugar cookies? [1]

40 *a* The side of a square is represented by $x + 2$. Express the area of the square in terms of x. [2]

b The dimensions of a rectangle are represented by $2x + 1$ and $2x - 4$. Express the area of the rectangle in terms of x. [2]

c If the area of the square in part *a* equals the area of the rectangle in part *b*, find x. [6]

41 On your answer paper, write the letters *a* through *e*. Next to each letter write the *number* of the valid conclusion, *chosen from the list below*, which can be deduced from each statement.

Valid Conclusions

(1) $\sim r$
(2) r
(3) $\sim s$
(4) s
(5) $t \rightarrow r$
(6) $t \rightarrow \sim r$

a $r \rightarrow s$, $\sim s$ [2]

b $r \rightarrow s$, r [2]

c $r \vee s$, $\sim s$ [2]

d $t \rightarrow \sim s$, $\sim r \rightarrow s$ [2]

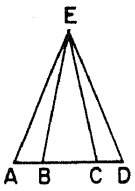
e $\sim(s \wedge \sim r)$, $\sim r$ [2]

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: $\overline{ABCD}$, $\overline{AB} \cong \overline{CD}$, $\angle EBC \cong \angle ECB$



Prove: $\triangle EAD$ is an isosceles triangle. [10]

43 The points $A(-2,1)$, $B(2,5)$, $C(6,-1)$, and $D(4,-7)$ form a quadrilateral. The points P, Q, R, and S are the midpoints of the sides $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$, respectively. Prove that $PQRS$ is a parallelogram. [10]

44 Given the following sentences:

Either I buy a car or join a fraternity.

If I join a fraternity, then I will feel secure.

If I feel secure, then I will try out for the baseball team.

I did not try out for the baseball team.

Let C represent: "I buy a car."

Let F represent: "I join a fraternity."

Let S represent: "I feel secure."

Let B represent: "I try out for the baseball team."

a Using C, F, S, B, and proper connectives, express each sentence in symbolic form. [4]

b Using laws of inference, show that I will buy a car. [6]

503

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Monday, June 18, 1979 — 1:15 to 4:15 p.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.

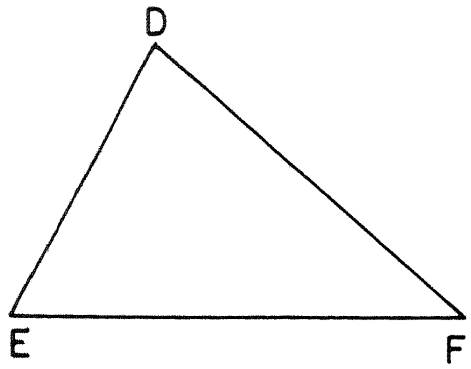
Part I

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.....	

505

35



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, a that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

576

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Monday, June 18, 1979 — 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.] For questions 20–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 30

(2) $\overline{AB}$ *or* c

(3) 6

(4) $(-2,3)$ *or* $\begin{matrix} x = -2 \\ y = 3 \end{matrix}$

(5) 32

(6) p

(7) 8

(8) $3\sqrt{2}$ *or* $\sqrt{18}$

(9) 2

(10) 30

(11) 8

(12) 16

(13) $\frac{3}{2}$ *or* 1.5

(14) 35

(15) $x^2 - 3x - 4 = 0$

(16) 120

(17) 20

(18) 1

(19) 4

(20) 4

(21) 4

(22) 1

(23) 2

(24) 3

(25) 2

(26) 1

(27) 4

(28) 4

(29) 2

(30) 1

(31) 4

(32) 3

(33) 3

(34) 1

(35) construction

[OVER]

507

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) *a* $(3,-2)$ *or* $\begin{matrix} x = 3 \\ y = -2 \end{matrix}$ [2]

b $2\sqrt{17}$ *or* $\sqrt{68}$ [2]

c a circle with $A(-2,-2)$ as center and radius 2

or [3]

$(x + 2)^2 + (y + 2)^2 = 4$

d $x = 3$ [3]

(37) *c* $(6,3)$ *or* $\begin{matrix} x = 6 \\ y = 3 \end{matrix}$

$(3,0)$ *or* $\begin{matrix} x = 3 \\ y = 0 \end{matrix}$ [2]

(38) *a*

+	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

[4]

b (1) 0 [2]

(2) 0 [2]

(3) 3 [2]

(39) *a* 2,002 [3]

b 120 [4]

c $\frac{120}{2,002}$ [2]

d 0 [1]

(40) *a* $x^2 + 4x + 4$ [2]

b $4x^2 - 6x - 4$ [2]

c 4 [6]

(41) *a* 1 [2]

b 4 [2]

c 2 [2]

d 5 [2]

e 3 [2]

Part III

(44) *a* $C \vee F$

$F \rightarrow S$

$S \rightarrow B$

$\sim B$ [4]