New York State Education Department

Three-year Sequence for High School Mathematics

Course II

Final Examination

In Lieu of the Tenth Year Mathematics Regents Examination

Wednesday, August 15, 1979, a.m.

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.

Part I

Answer only 30 of the 35 questions in 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 two consecutive angles of a parallelogram are represented by $(x + 40)$ and $(2x - 10)$, find x.

2 In ΔABC, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$ such that $\overline{DE} \parallel \overline{BC}$. If $AD = 4$, $DB = 2$, and $AC = 9$, find AE.

3 What is the slope of a line parallel to the line whose equation is $y - 2x = 7$?

4 Find the side of a rhombus whose diagonals are 6 and 8.

5 If a committee consists of 3 men and 2 women, what is the probability of selecting a subcommittee of 3 women?

6 How many different 5-letter permutations are there from the word "SEEDS"?

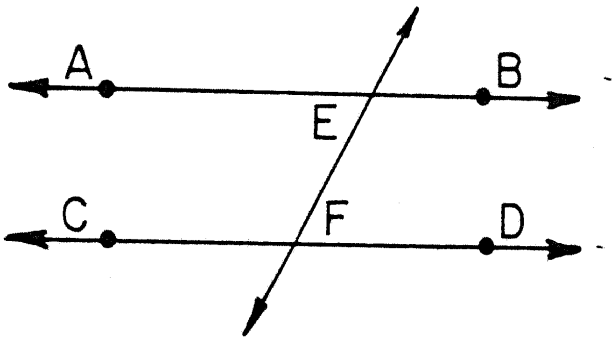
7 Given right triangle ABC with altitude $\overline{CD}$ drawn to hypotenuse $\overline{AB}$. If $AC = 6$ and $AD = 3$, find AB.

8 What is the midpoint of the segment whose endpoints are $(-3,8)$ and $(-7,-10)$?

9 If 3 is a root of $x^2 - 4x + k = 0$, find k.

10 In ΔABC, $\overline{AB} \cong \overline{AC}$. If the measure of $\angle A = 40$, find the measure of $\angle B$.

11 In the diagram, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$. If the measure of $\angle AEF = x + 50$ and the measure of $\angle DFE = 3x + 30$, find x.



12 Write the equation of a line in the form $x^2 + bx + c = 0$ for which the solution set is $\{3,-5\}$.

13 Write the equation of a circle with center (2,-3) and radius 5.

14 What is the altitude of an equilateral triangle with a side of 4?

15 In ΔABC the measure of $\angle A$ is 40 and the measure of the exterior angle at vertex B is 120. Which is the longest side of the triangle?

16 What is the area of a trapezoid with bases 8 and 12, and an altitude of 5?

17 What is the length of a side of a square whose diagonal measures $3\sqrt{2}$?

18 If the letters of the word "PARALLEL" are rearranged at random, what is the probability that an "L" will be in the first position?

Base your answers to questions 19 through 21 on the systems below.

#	q	r	s	t
q	t	q	r	s
r	q	r	s	t
s	r	s	t	q
t	s	t	q	r

ϕ	q	r	s	t
q	s	t	q	r
r	t	q	r	s
s	q	r	s	t
t	r	s	t	q

19 What is the identity element under the operation ϕ?

20 What is the inverse of t under the operation #?

21 Solve: q # (r ϕ t)

Directions (22-34): 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.

22 What is the negation of $\sim p \vee q$?

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

23 What is the value of x in the equation $2x^2 + 5x - 1 = 0$?

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

24 Which is logically equivalent to the statement, "If it is cold, then I will go skiing"?

(1) If it is not cold, then I will not go skiing.
(2) If I go skiing, then it is cold.
(3) If I do not go skiing, then it is not cold.
(4) If I go skiing, then it is not cold.

25 Which is logically concluded from the true statements, "If I drive a smaller car, I will use less gas," and "If I use less gas, the President will be happy"?

(1) If I drive a smaller car, the President will be happy.
(2) If I use less gas, I will drive a smaller car.
(3) If the President will be happy, I will drive a smaller car.
(4) If I do not drive a smaller car, I will not use less gas.

26 Which of the following may be the lengths of the sides of an isosceles triangle?

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

27 What is the negation of the statement, "All math is fun"?

(1) No math is fun.
(2) Some math is fun.
(3) Some math is not fun.
(4) All math is not fun.

28 If AB = 6, how many points are equidistant from the points A and B and also 4 units from A?

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

29 Which is an equation of a line that has a y-intercept of 5 and has a slope of -3?

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

30 Under which operation is the set of odd integers closed?

(1) addition
(2) subtraction
(3) multiplication
(4) division

31 If the vertex angles of two isosceles triangles are congruent, then the two triangles must be

(1) acute
(2) right
(3) congruent
(4) similar

32 If the areas of two similar triangles are in the ratio 4:9, the corresponding sides of the triangles are in the ratio

(1) 2:3
(2) 2:4.5
(3) 4:9
(4) 16:81

33 Which is the equation of the axis of symmetry for the graph of $y = x^2 + 10x - 6$?

(1) $x = 5$
(2) $x = -5$
(3) $x = 10$
(4) $x = -10$

34 What is the sum of the roots of the equation $x^2 + 2x - 3 = 0$?

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

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

35 On the answer sheet, construct the altitude from vertex B to $\overline{AC}$.

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 Given the equation: $y = x^2 - 6x + 8$

a Draw the graph of the equation using all integral values from $x = 0$ to $x = 6$ inclusive. [4]

b Write the equation for the axis of symmetry. [2]

c Write the coordinates of the turning point. [2]

d What are the roots of the equation $x^2 - 6x + 8 = 0$? [2]

37 In rectangle ABCD, AB = x, BC = x + 7, and diagonal BD = x + 8. Find BD. [Only an algebraic solution will be accepted.] [10]

38 Al, Bob, Chris, Dave, Ed, and Frank are all members of a junior class committee. A 4-person subcommittee is to be selected from these boys at random.

a How many different 4-person subcommittees could be formed? [3]

b How many of these subcommittees will include Dave? [3]

c What is the probability that Dave will be selected? [2]

d What is the probability that Bob will <u>not</u> be selected? [2]

39 Given the points A(k,4), B(3,1), C(2k,6), and D(7,1).

a Express the slope of $\overleftrightarrow{AB}$ in terms of k. [2]

b Express the slope of $\overleftrightarrow{CD}$ in terms of k. [2]

c If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, write an equation that could be used to find k. [2]

d Using your answer from part c, find k. [2]

e Write an equation of $\overleftrightarrow{BD}$. [2]

40 Given the following system:

+	J	K	L	M
J	L	M	J	K
K	M	J	K	L
L	J	K	L	M
M	K	L	M	J

a What is the identity element? [2]

b What is the inverse of K? [2]

c What is the value of L + L + L? [2]

d Find y such that J + (M + K) = y. [2]

e Find x such that J + x = M. [2]

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

Valid Conclusions

(1) q
(2) $\sim q$
(3) p
(4) $\sim p$
(5) $p \rightarrow r$
(6) $p \rightarrow \sim r$
(7) $r \rightarrow p$
(8) $\sim r \rightarrow p$

a $p \rightarrow \sim q$
p [2]

b $\sim p \vee q$
$\sim q$ [2]

c $p \rightarrow q$
$r \rightarrow \sim q$ [2]

d $\sim p \rightarrow q$
$\sim q$ [2]

e $r \rightarrow q$
$q \rightarrow p$ [2]

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

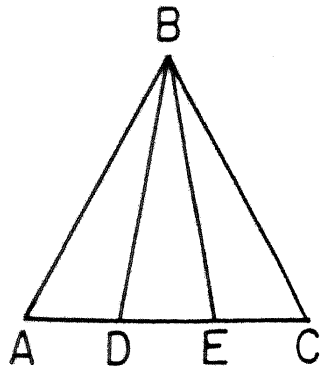
Part III

Answer one question from this part. Show all work unless otherwise directed.

42 Given quadrilateral ABCD with coordinates A(3,4), B(0,0), C(4,-3), and D(7,1).

By means of coordinate geometry, determine whether or not ABCD is a rhombus and give an explanation for your answer. [10]

43 Given: $\triangle ABC$ with $\overline{AB} \cong \overline{BC}$, points D and E on $\overline{AC}$ such that $\overline{AD} \cong \overline{EC}$.



Prove: $\angle BDE \cong \angle BED$ [10]

44 Given the following sentences:

Either Al went to college or he joined the army.
If he joined the army, then his hair was cut short.
If his hair was cut short, then it does not cover his ears.
Al's hair covers his ears.

Let C represent: "Al went to college."
Let A represent: "He joined the army."
Let H represent: "His hair was cut short."
Let E represent: "His hair covers his ears."

a Using C, A, H, E, and proper connectives, express each sentence in symbolic form. [4]

b Using laws of inference, show that Al went to college. [6]

Part I

Score_____

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

School.....

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

Part I

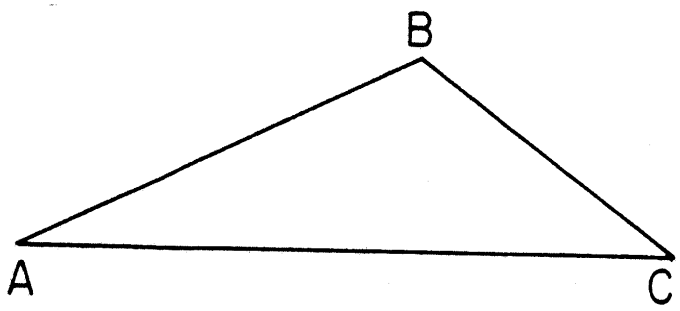
Answer only 30 questions in this part.

1_____	13_____	25_____
2_____	14_____	26_____
3_____	15_____	27_____
4_____	16_____	28_____
5_____	17_____	29_____
6_____	18_____	30_____
7_____	19_____	31_____
8_____	20_____	32_____
9_____	21_____	33_____
10_____	22_____	34_____
11_____	23_____	35 Answer question 35 on the other side of this sheet.
12_____	24_____	

[OVER]

55

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

_____

Signature

For Teachers Only

Scoring Key

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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 22-34, allow credit if the pupil has written the correct answer instead of the numeral 1,2,3 or 4.

(1) 50

(2) 6

(3) 2

(4) 5

(5) 0

(6) 30

(7) 12

(8) (-5,-1) or $\begin{matrix} x = -5 \\ y = -1 \end{matrix}$

(9) 3

(10) 70

(11) 10

(12) $x^2 + 2x - 15 = 0$

(13) $(x - 2)^2 + (y + 3)^2 = 25$

(14) $2\sqrt{3}$

(15) $\overline{AB}$ or c or AB

(16) 50

(17) 3

(18) $\frac{3}{8}$

(19) s

(20) t

(21) r

(22) 2

(23) 4

(24) 3

(25) 1

(26) 2

(27) 3

(28) 2

(29) 3

(30) 3

(31) 4

(32) 1

(33) 2

(34) 1

(35) construction

[OVER]

General Directions - Parts II and III

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) b $x = 3$ [2]

c $(3,-1)$ or $\begin{matrix} x = 3 \\ y = -1 \end{matrix}$ [2]

d $\begin{matrix} x = 4 \\ x = 2 \end{matrix}$ or $\{2,4\}$ [2]

(37) Analysis [5]
13 [5]

(38) a 15 [3]

b 10 [3]

c $\frac{10}{15}$ or $\frac{2}{3}$ [2]

d $\frac{5}{15}$ or $\frac{1}{3}$ [2]

(39) a $\frac{3}{k-3}$ [2]

b $\frac{5}{2k-7}$ [2]

c $\frac{3}{k-3} = \frac{5}{2k-7}$ [2]

d 6 [2]

e $y = 1$ or $\frac{y-1}{x-7} = \frac{0}{4}$ [2]

(40) a L [2]

b M [2]

c L [2]

d J [2]

e K [2]

(41) a 2 [2]

b 4 [2]

c 6 [2]

d 3 [2]

e 7 [2]

Part III

(44) a $C \vee A$
$A \rightarrow H$
$H \rightarrow \sim E$
E
[4]