

New York State Education Department  
Three-year Sequence for High School Mathematics  
Course II  
Final Examination

Thursday, August 14, 1980 - a.m.

In Lieu of the Tenth Year Mathematics Regents Examination

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 Determine the value of  $(p * s) * t$  within the following system.

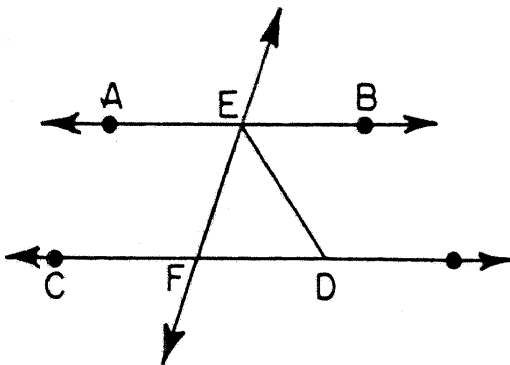
*	p	r	s	t
p	s	p	t	r
r	p	r	s	t
s	t	s	r	p
t	r	t	p	s

- 2 The vertex angle of an isosceles triangle measures  $70^\circ$ . What is the measure in degrees of an exterior angle at the base of the triangle?
- 3 What is the length in radical form of a line segment whose endpoints are  $(-1,3)$  and  $(6,1)$ ?
- 4 How many committees of 3 students can be chosen from a group of 8 students?
- 5 How many different 5-letter permutations are there from the word "DRESS"?
- 6 Two consecutive angles of a parallelogram measure  $3x + 20$  and  $7x - 40$ . Find  $x$ .
- 7 The vertices of  $\triangle ABC$  are  $A(12,0)$ ,  $B(0,5)$ , and  $C(0,0)$ . Find the area of the triangle.

- 8 Using the accompanying table, find  $x$  if  $x \oplus 4 = 3$ .

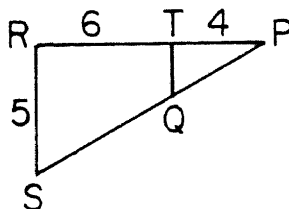
$\oplus$	1	2	3	4
1	2	3	4	1
2	3	4	1	2
3	4	1	2	3
4	1	2	3	4

- 9 The lengths of the two bases of an isosceles trapezoid are 8 and 14. If the length of an altitude of the trapezoid is 4, find the length of a leg.
- 10 The lengths of two sides of an isosceles triangle are 3 and 7. Find the length of the third side.
- 11 In right triangle  $ABC$ ,  $\overline{CD}$  is the altitude to the hypotenuse. If  $AC = 10$  and  $AB = 20$ , find  $AD$ .
- 12 The midpoint of  $\overline{AB}$  has coordinates  $(-2, 1)$ . If the coordinates of  $A$  are  $(3, -3)$ , find the coordinates of  $B$ .
- 13 Find the slope of a line perpendicular to the line whose equation is  $y = 2x + 6$ .
- 14 What is the negative root of  $2x^2 + x - 6 = 0$ ?
- 15 A candy dish contains 10 candies. Three candies are covered in red foil and seven in green foil. If two candies are chosen at random, what is the probability that both will be covered in the same color foil?
- 16 In right triangle  $EFG$ , hypotenuse  $\overline{EF}$  is extended through  $F$  to  $H$ . If  $m\angle GFH = 140$ , which is the shortest side of the triangle?
- 17 In the accompanying figure,  $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ ,  $\overleftrightarrow{EF}$  intersects  $\overleftrightarrow{AB}$  at  $E$  and  $\overleftrightarrow{CD}$  at  $F$ . If  $\overline{ED}$  bisects  $\angle BEF$  and  $m\angle AEF = 70$ , find  $m\angle EDF$ .



18 Point P is 3 inches from line m. How many points are 5 inches from point P and also 2 inches from line m?

19 In the accompanying figure,  $\overline{SR} \perp \overline{RP}$  and  $\overline{QT} \perp \overline{RP}$ . If  $RT = 6$ ,  $TP = 4$ , and  $SR = 5$ , find  $QT$ .



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 Which equation has an irrational root?

(1)  $x^2 - 4 = 0$   
 (2)  $x - 4 = 0$

(3)  $x^2 - 5 = 0$   
 (4)  $x + 5 = 0$

21 Which is an equation of a circle whose center has coordinates  $(4, -3)$  and whose radius has length 6?

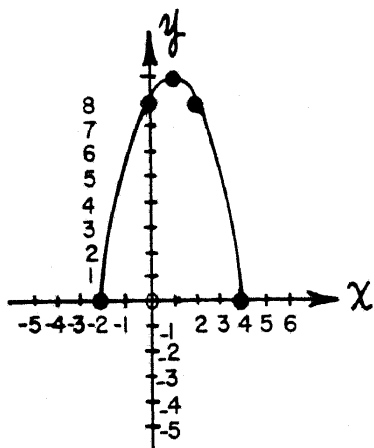
(1)  $(x + 4)^2 + (y - 3)^2 = 36$       (3)  $(x + 4)^2 + (y - 3)^2 = 6$   
 (2)  $(x - 4)^2 + (y + 3)^2 = 36$       (4)  $(x - 4)^2 + (y + 3)^2 = 6$

22 Which value of  $x$  is a counterexample of  $\forall_x x^2 > 0$ ?

(1) 1  
 (2) 2

(3) 3  
 (4) 0

23 Which is an equation of the axis of symmetry of the accompanying graph?



(1)  $x = 1$   
 (2)  $x = 0$

(3)  $y = 1$   
 (4)  $y = 8$

- 24 Given the set  $\{0,1,2,3\}$  and the accompanying table for the operation  $\otimes$ . Which is true of the operation?

$\otimes$	0	1	2	3
0	0	1	2	3
1	1	2	3	4
2	4	5	6	7
3	9	10	11	12

- (1) The operation is commutative.  
 (2) The identity element is 0.  
 (3) The operation  $\otimes$  is not a binary operation.  
 (4) The set is not closed for the operation  $\otimes$ .
- 25 What is the length of the altitude of an equilateral triangle whose side has length 12?
- (1) 6  
 (2)  $6\sqrt{2}$   
 (3)  $6\sqrt{3}$   
 (4) 12
- 26 What are the coordinates of the y-intercept of the parabola whose equation is  $y = x^2 + 5x - 6$ ?
- (1) (1,0)  
 (2) (0,1)  
 (3) (0,-6)  
 (4) (-6,0)
- 27 Which is an equation of the locus of points equidistant from (3,2) and (3,-4)?
- (1)  $y = 1$   
 (2)  $y = -1$   
 (3)  $x = 3$   
 (4)  $x = 1$
- 28 If  $\sim A \rightarrow B$  and  $A \rightarrow C$ , which is a true conclusion?
- (1)  $B \rightarrow C$   
 (2)  $\sim C \rightarrow B$   
 (3)  $C \rightarrow B$   
 (4)  $C \rightarrow \sim B$
- 29 Given the set  $\{w,x,y,z\}$  and the operation  $\#$  as shown in the table. Which statement is not true?

$\#$	w	x	y	z
w	x	z	w	x
x	z	y	x	w
y	w	x	y	z
z	x	w	z	y

- (1) The identity for the set is y.  
 (2) The set is closed under  $\#$ .  
 (3) The set is commutative under  $\#$ .  
 (4) Every element of the set has an inverse.

30 Which is logically equivalent to the statement, "If I watch TV, then I will not do my homework"?

- (1) If I do not watch TV, then I will do my homework.
- (2) If I do my homework, then I will not watch TV.
- (3) If I do not do my homework, then I will watch TV.
- (4) If I do my homework, then I will watch TV.

31 If  $F \rightarrow \sim G$  and  $G$ , then which is true?

- (1)  $\sim F$
- (2)  $\sim G$
- (3)  $F$
- (4) No conclusion is possible.

32 Which is the negation of the statement, "I like hamburgers and I do not like hot dogs"?

- (1) I like hamburgers or I do not like hot dogs.
- (2) I do not like hamburgers and I like hot dogs.
- (3) I do not like hamburgers or I like hot dogs.
- (4) I do not like hamburgers and I do not like hot dogs.

33 Which is an equation of the line passing through  $(2, -5)$  and parallel to the line whose equation is  $y - 3x = 2$ ?

- (1)  $y = 3x - 11$
- (2)  $y = 3x - 5$
- (3)  $y = x - 7$
- (4)  $y = 3x - 1$

34 Which quadrilateral must have perpendicular diagonals?

- (1) isosceles trapezoid
- (2) rectangle
- (3) rhombus
- (4) parallelogram

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

35 On the answer sheet, construct a triangle DEF that is congruent to triangle ABC.

---

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 vertices of  $\triangle ABC$  are  $A(-2,1)$ ,  $B(4,5)$ , and  $C(6,3)$ .

- a Using graph paper, plot these vertices and draw the triangle. [2]  
 b Find the area of  $\triangle ABC$ . [8]

37 Given the mod 4 (clock 4) operations  $\oplus$  and  $\otimes$  as defined in the table below:

$\oplus$	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

$\otimes$	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	0	2
3	0	3	2	1

- a What is the identity element for  $\otimes$ ? [2]  
 b What is the inverse of element 2 under the operation  $\otimes$ ? [2]  
 c Find the value of  $3 \oplus (1 \otimes 2)$ . [2]  
 d Find  $x$ , if  $3 \oplus x = 1$ . [2]  
 e Find all  $x$ , if  $x \otimes x = 1$ . [2]
- 38 On your answer paper, write the letters a through e. Next to each letter write a conclusion which can be deduced from each set of statements. [NO CONCLUSION is a possible answer.]
- a If this test is difficult, I will not pass it.  
 I will pass this test. [2]
- b The show is great or I am wrong.  
 I am not wrong. [2]
- c All Nifty candies are good to eat.  
 Crunchies is a Nifty candy. [2]
- d If the book is not expensive, then I can afford it.  
 If I can afford the book, then I will buy it. [2]
- e If  $\angle A$  and  $\angle B$  are right angles, then  $\angle A \cong \angle B$ .  
 $\angle A \cong \angle B$  [2]

39 The student government at Central High School consists of 4 seniors, 3 juniors, 3 sophomores, and 2 freshmen.

- How many committees of 4 students can be formed? [3]
- How many committees of 4 students will have exactly one student from each grade? [3]
- What is the probability that a committee of 4 students will have exactly one student from each grade? [2]
- Nine students will be chosen from the student government to go to a convention. What is the probability that no senior will be chosen to go? [2]

40 Given the equation:  $y = x^2 - 4x - 5$

- Draw the graph of the equation using all integral values of  $x$  in the interval  $-2 < x < 6$ . [6]
- Write an equation of the axis of symmetry. [2]
- What are the roots of  $x^2 - 4x - 5 = 0$ ? [2]

41 Solve for  $x$ . [Answer may be left in radical form.]

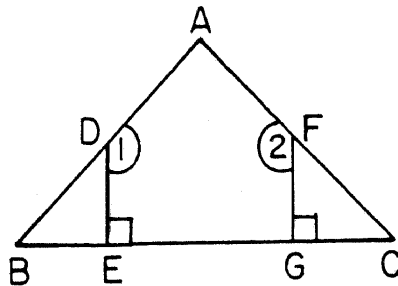
$$\frac{2x}{x+2} = \frac{x-3}{x-5} \quad [10]$$

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:  $\overline{BEGC}$ ,  $\overline{BDA}$ ,  $\overline{AFC}$ ,  $\overline{DE} \perp \overline{BC}$ ,  $\overline{FG} \perp \overline{BC}$ ,  $\angle 1 \cong \angle 2$ , and  $\overline{DE} \cong \overline{FG}$



Prove:  $\triangle ABC$  is isosceles. [10]

43 The vertices of  $\triangle ABC$  are  $A(5,8)$ ,  $B(1,-2)$ , and  $C(7,6)$ . Points F and G are the midpoints of sides  $\overline{AB}$  and  $\overline{AC}$ , respectively. Prove by means of coordinate geometry that:

a  $\overline{FG} \parallel \overline{BC}$  [6]

b  $FG = \frac{1}{2}BC$  [4]

44 Given the following sentences:

If James is happy, then he is not in a rush.

If James is not happy, then he did not take the train.

James takes the train.

However, James is in a rush or he arrives on time.

Let T represent: "James takes the train."

Let H represent: "James is happy."

Let R represent: "He is in a rush."

Let A represent: "He arrives on time."

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

b Using laws of inference, show that James does arrive on time. [6]



Part I  
Score \_\_\_\_\_

New York State Education Department  
Three-year Sequence for High School Mathematics  
Course II  
Final Examination  
Thursday, August 14, 1980 - a.m.

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

School.....

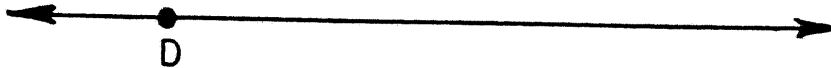
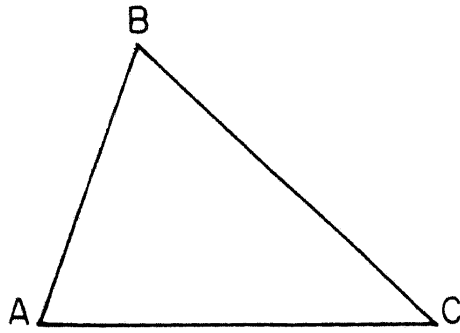
Your answers to Part I should be recorded on this answer sheet.

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<br>on the other side<br>of this sheet. |
| 12 _____ | 24 _____ |  |

[OVER]



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

Thursday, August 14, 1980 - a.m.

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) s  | (13) $-\frac{1}{2}$                    | (25) 3            |
| (2) 125  | (14) -2                                | (26) 3            |
| (3) $\sqrt{53}$  | (15) $\frac{8}{15}$ or $\frac{24}{45}$ | (27) 2            |
| (4) 56   | (16) $\overline{EG}$ or f or EG        | (28) 2            |
| (5) 60   | (17) 55                                | (29) 4            |
| (6) 20   | (18) 3                                 | (30) 2            |
| (7) 30   | (19) 2                                 | (31) 1            |
| (8) 3  | (20) 3                                 | (32) 3            |
| (9) 5  | (21) 2                                 | (33) 1            |
| (10) 7   | (22) 4                                 | (34) 3            |
| (11) 5   | (23) 1                                 | (35) construction |
| (12) (-7,5) or $\begin{matrix} x = -7 \\ y = 5 \end{matrix}$ | (24) 4                                 |                   |

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 10 [8]
- (37) a 1 [2]  
b 2 [2]  
c 1 [2]  
d 2 [2]  
e 1,3 [1,1]
- (38) a This test is not difficult. [2]  
b The show is great. [2]  
c Crunchies is good to eat. [2]  
d If the book is not expensive, then I will buy it. (or If I do not buy the book, then it is expensive.) [2]  
e no conclusion [2]
- (39) a 495 [3]  
b 72 [3]  
c  $\frac{8}{55}$  or  $\frac{72}{495}$  [2]  
d 0 [2]
- (40) b  $x = 2$  [2]  
c -1,5 [1,1]
- (41)  $\frac{9 \pm \sqrt{57}}{2}$  [10]

Part III

- (44)  $H \rightarrow \sim R$  [1]  
 $\sim H \rightarrow \sim T$  [1]  
T [1]  
 $R \vee A$  [1]