

New York State Education Department
Integrated Sequence for High School Mathematics

Course II

Final Examination

In Lieu of the Tenth Year Mathematics Regents Examination

Friday, June 17, 1977 p.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.

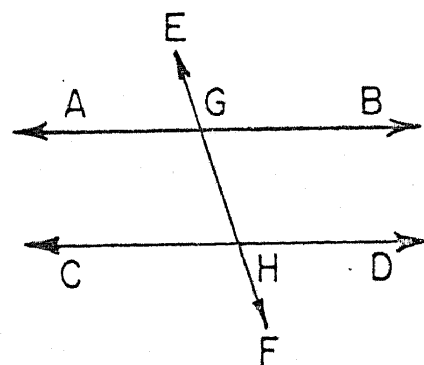
Part I

Answer 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 In $\triangle PQR$, $\angle Q \cong \angle R$. If $PQ = 5x - 7$ and $PR = x + 25$, find x .

2 What are the coordinates of the center of the circle whose equation is $(x + 2)^2 + (y - 5)^2 = 6$?

3 In the accompanying figure, transversal \overleftrightarrow{EF} intersects \overleftrightarrow{AB} and \overleftrightarrow{CD} at G and H , respectively. If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $m\angle BGH = 3x - 20$, and $m\angle GHC = 2x + 10$, find x .



4 Find the slope of a line that is parallel to the line whose equation is $3x + 2y = 5$.

5 Three vertices of rectangle ABCD are $A(5,2)$, $B(5,-3)$, and $C(-2,-3)$. Find the coordinates of D .

6 How many different 5-letter permutations are there of the letters in the word "PROOF"?

7 Determine the value of $a*(b*d)$ within the following system.

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

8 Negate: $p \vee \sim q$

9 The altitude to the hypotenuse of a right triangle is 8 and one of the segments of the hypotenuse made by the altitude has length 4. Find the length of the other segment.

10 Solve the equation $x \oplus b = a$ for x within the following system.

\oplus	a	b	c	d
a	c	d	a	b
b	d	c	b	a
c	a	b	c	d
d	b	a	d	c

11 How many different committees of three people may be chosen from a group of six people?

12 The length of a diagonal of a square is $6\sqrt{2}$. Find the length of a side of this square.

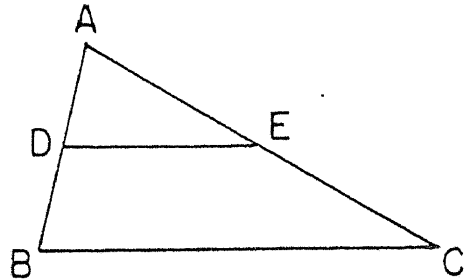
13 There are 7 different points on a circle. How many straight lines can be drawn using pairs of these 7 points?

14 If the probability of an event happening is 0.7, what is the probability that the event will not happen?

15 Find the length of a side of a rhombus whose diagonals are 12 and 16.

16 Hypotenuse \overline{AB} of right $\triangle ABC$ is extended through B to D. If $m\angle CBD = 130$, what is the shortest side of the triangle?

17 In the accompanying figure, $\overline{DE} \parallel \overline{BC}$.
If $AD = 4$, $BD = 3$, and $AC = 21$, find AE .



18 If the following group is commutative under the given operation \odot , find the value of $d \odot b$.

\odot	a	b	c	d
a	a	b	c	d
b	b	d	a	c
c	c	a	d	b
d				

Directions (19-34): 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.

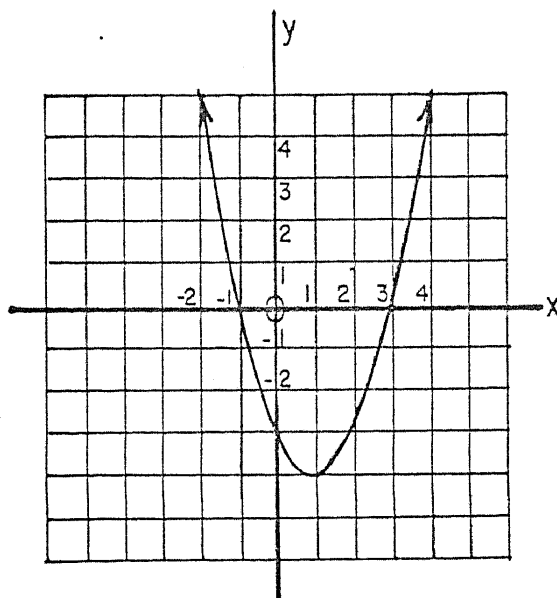
19 What is the number of points in a plane at a given distance from a given line and also equally distant from two points on the given line?

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

- 20 For the equation $5x^2 - 7x - 1 = 0$, x is equal to
- (1) $\frac{7 \pm \sqrt{69}}{10}$ (3) $\frac{7 \pm \sqrt{29}}{10}$
 (2) $\frac{-7 \pm \sqrt{69}}{10}$ (4) $\frac{-7 \pm \sqrt{29}}{10}$
- 21 If a card is drawn from a deck of 52 playing cards, the probability that it is a king or a diamond is
- (1) $\frac{1}{52}$ (3) $\frac{16}{52}$
 (2) $\frac{14}{52}$ (4) $\frac{17}{52}$
- 22 Given the set $\{2, 4, 6, 8\}$. Under the operation \otimes , the identity element is 6. Which statement is illustrated by the sentence $2 \otimes 8 = 6$?
- (1) The set is closed under the operation \otimes .
 (2) The numbers 2 and 6 are inverses for \otimes .
 (3) The operation \otimes is commutative.
 (4) The numbers 2 and 8 are inverses for \otimes .
- 23 The equation for the axis of symmetry of the graph $y = x^2 - 10x + 16$ is
- (1) $x = -5$ (3) $x = 5$
 (2) $y = -5$ (4) $x = 10$
- 24 Given the premises $a \rightarrow b$ and a , which is a logical conclusion?
- (1) a (3) b
 (2) $\sim a$ (4) $\sim b$

25 For the parabola shown, a value of x when $y = 0$ is

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



26 Which is logically equivalent to the statement, "If I live in Albany, then I live in New York"?

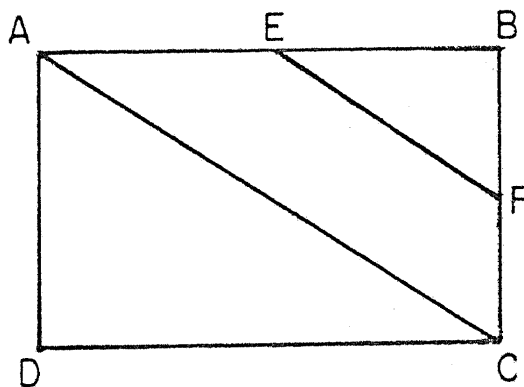
- (1) If I live in New York, then I live in Albany.
- (2) If I do not live in New York, then I do not live in Albany.
- (3) If I do not live in New York, then I live in Albany.
- (4) If I do not live in Albany, then I do not live in New York.

27 Which statement about $3x^2 + 12x - 15 = 0$ is true?

- (1) The sum of the roots is 4.
- (2) The product of the roots is -4.
- (3) The sum of the roots is -12.
- (4) The product of the roots is -5.

28 In rectangle ABCD, diagonal $AC = 20$. Line segment \overline{EF} joins the midpoints of \overline{AB} and \overline{BC} , respectively. The length of \overline{EF} is

- (1) 8
- (2) 10
- (3) 12
- (4) 16



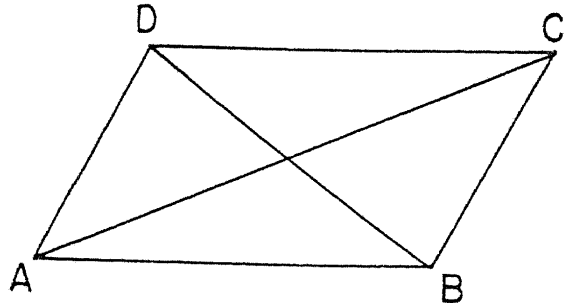
29 Which conclusion logically follows from the true statements, "If we do not save fuel, there will be an energy crisis," and "If there is an energy crisis, schools will close"?

- (1) If we save fuel, there will not be an energy crisis.
- (2) If we do not save fuel, schools will close.
- (3) If the schools close, there is an energy crisis.
- (4) If we save fuel, there is an energy crisis.

30 What is the negation of the statement, "Some numbers are prime"?

- (1) Some numbers are not prime numbers.
- (2) All numbers are prime numbers.
- (3) No numbers are prime numbers.
- (4) There exists a number which is not prime.

31 In the accompanying figure, parallelogram ABCD has diagonals AC and BD. Which statement is always true?



- (1) $\overline{AC} \cong \overline{BD}$
- (2) $\overline{AC} \perp \overline{DB}$
- (3) $\angle DAC \cong \angle CAB$
- (4) $\triangle ABC \cong \triangle CDA$

32 Two isosceles triangles with equal vertex angles are always

- | | |
|-----------------|-------------|
| (1) congruent | (3) right |
| (2) equilateral | (4) similar |

33 Which quadratic equation has roots of -3 and 7?

- | | |
|-------------------------|--------------------------|
| (1) $x^2 - 4x - 21 = 0$ | (3) $x^2 + 4x + 21 = 0$ |
| (2) $x^2 + 4x - 21 = 0$ | (4) $-x^2 - 4x + 21 = 0$ |

34 If statement r is true and statement s is false, then which would be true?

- | | |
|-----------------------|---------------------------------|
| (1) $r \rightarrow s$ | (3) $\sim s \rightarrow \sim r$ |
| (2) $r \wedge s$ | (4) $r \vee s$ |

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

On the answer sheet, construct the altitude from vertex A to \overline{BC} in $\triangle ABC$.

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

- a Write the equation for the axis of symmetry. [2]
- b Draw the graph of the equation, using all integral values of x from $x = -4$ to $x = 2$ inclusive. [4]
- c Write the coordinates of the turning point. [2]
- d What are the roots of $x^2 + 2x - 3 = 0$? [2]

37 Given: quadrilateral ABCD with A(-2,2), B(3,-2), C(8,2), and D(5,4)

- a Using graph paper, plot these vertices and draw the quadrilateral. [2]
- b Find the area of quadrilateral ABCD. [8]

GO RIGHT ON TO THE NEXT PAGE.

38 The table below represents addition modulo 5.

+	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	0
2	2	3	4	0	1
3	3	4	0	1	2
4	4	0	1	2	3

On your answer paper, write the letters a through e. After each letter write the answer to the corresponding question below.

- a What is the identity element? [2]
- b What is the value of $4 + 3$? [2]
- c What is the value of $4 + 4 + 4$? [2]
- d What is the inverse of 3? [2]
- e Solve for x : $4 + x = 1 + 2$ [2]

39 The length of a rectangle is 7 more than its width. If a diagonal of the rectangle measures 9 more than the width, find the width. [Only an algebraic solution will be accepted.] [5,5]

40 A track team consists of 6 athletes.

- a For a relay race, four runners will participate. How many different relay teams can be selected from the 6 athletes? [4]
- b The relay team has been chosen.
 - (1) In how many orders can the four athletes run the race? [3]
 - (2) What is the probability that a particular athlete will lead off the relay? [3]

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

a Perpendicular lines form right angles. [2]
 $\angle ABC$ is an obtuse angle.
 Conclusion: \overline{AB} is not perpendicular to \overline{BC} .

b $x > z$ [2]
 $y > z$
 Conclusion: $x > y$

c If a number is an integer, then it is a real number. [2]
 x is a real number.
 Conclusion: x is an integer.

d A diagonal of a parallelogram separates the parallelogram into two congruent triangles. [2]
 A square is a parallelogram.
 Conclusion: The diagonal of a square separates the square into two congruent triangles.

e Either Mary or Sue will win the award.
 Mary will not win the award.
 Conclusion: Sue will win the award.

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

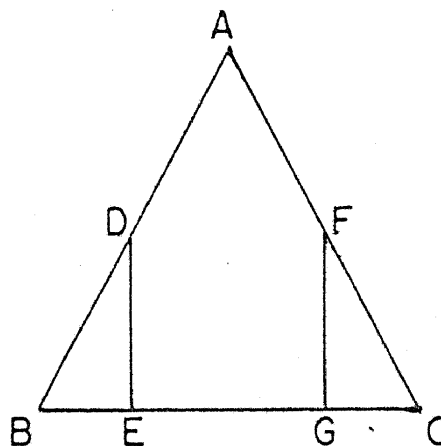
Part III

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

42 Given: isosceles $\triangle ABC$ with $\overline{AB} \cong \overline{AC}$,

$\overline{DE} \perp \overline{BC}$, $\overline{FG} \perp \overline{BC}$, and $\overline{BE} \cong \overline{GC}$

Prove: $\overline{BD} \cong \overline{FC}$



43 Given the following sentences:

If the programmer is skilled, the computer will be accurate.
 Either the programmer is skilled or the employees are lazy.
 If the employees are lazy, John will be fired.
 If the computer is accurate, Harry will get a raise.
 John did not get fired.

Let P represent "The programmer is skilled."

Let C represent "The computer is accurate."

Let E represent "The employees are lazy."

Let J represent "John will be fired."

Let H represent "Harry will get a raise."

- a Using P,C,E,J, and H and proper connectives, express each sentence in symbolic form. [5]
- b Using laws of inference, show that Harry will get his raise. [5]

44 Given: $\triangle RST$ with vertices $R(1,2)$, $S(7,0)$, and $T(3,-2)$

Show by coordinate geometry that

- a $\triangle RST$ is a right triangle and state a valid reason for your conclusion [6]
- b the length of \overline{TM} , the median to \overline{RS} , is equal to SM [4]

Part I
Score _____

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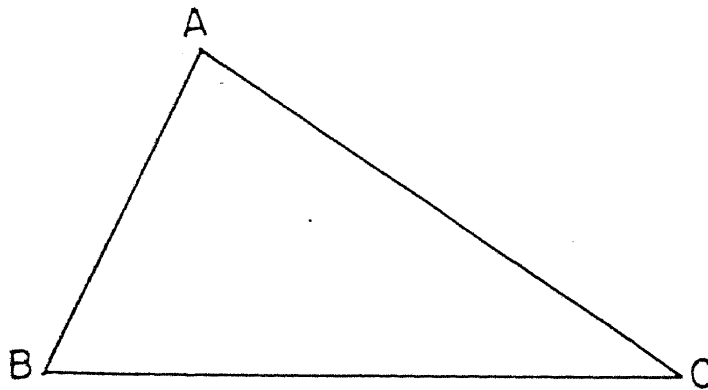
Pupil..... Teacher.....
 School.....

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

Part I

Answer 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 _____ | |



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

Integrated Sequence for High School Mathematics

Course II

June 17, 1977

Part I

- | | | |
|---|---------------------------|-------------------|
| (1) 8 | (13) 21 | (25) 3 |
| (2) (-2,5) or $\begin{matrix} x = -2 \\ y = 5 \end{matrix}$ | (14) 0.3 | (26) 2 |
| (3) 30 | (15) 10 | (27) 4 |
| (4) $\frac{-3}{2}$ | (16) \overline{CB} or a | (28) 2 |
| (5) (-2,2) or $\begin{matrix} x = -2 \\ y = 2 \end{matrix}$ | (17) 12 | (29) 2 |
| (6) 60 | (18) c | (30) 3 |
| (7) c | (19) 2 | (31) 4 |
| (8) $\sim p \wedge q$ | (20) 1 | (32) 4 |
| (9) 16 | (21) 3 | (33) 1 |
| (10) d | (22) 4 | (34) 4 |
| (11) 20 | (23) 3 | (35) construction |
| (12) 6 | (24) 3 | |

Part II

- (36) a $x = -1$ [2]
 c (-1,-4) [2]
 d {1,-3} [2]
- (37) b 30 [8]
- (38) a 0 [2]
 b 2 [2]
 c 2 [2]
 d 2 [2]
 e 4 [2]

- (39) Analysis [5]
 8 [5]
- (40) a 15 [4]
 b (1) 24 [3]
 (2) 1/4 [3]
- (41) a valid [2]
 b invalid [2]
 c invalid [2]
 d valid [2]
 e valid [2]

Part III

- (43) a $P \rightarrow C$
 $P \vee E$
 $E \rightarrow J$ [5]
 $C \rightarrow H$
 $\sim J$