

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

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Thursday, January 24, 1985 — 9:15 a.m. to 12:15 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.

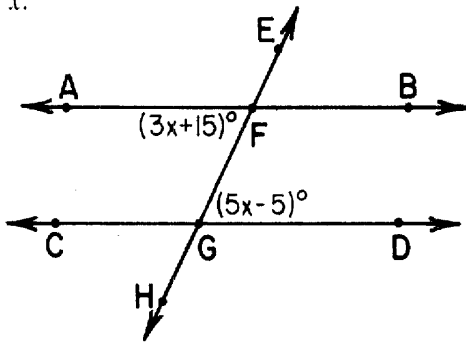
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

Part I

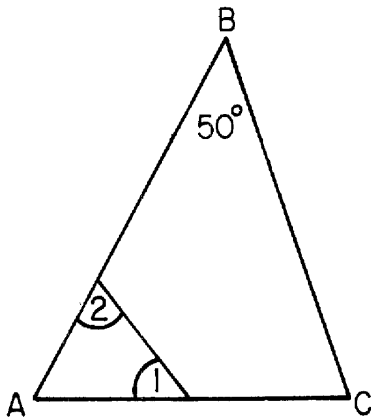
Answer 30 questions from this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet. Where applicable, answers may be left in radical form.

- 1 If $x \# y$ is a binary operation defined as $\frac{x + y}{x - y}$, evaluate $10 \# 5$.

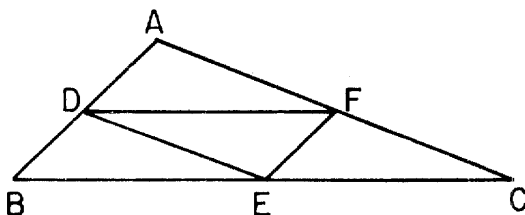
- 2 In the accompanying figure, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and \overleftrightarrow{EH} is a transversal intersecting \overleftrightarrow{AB} at F and \overleftrightarrow{CD} at G . If $m\angle AFG = 3x + 15$ and $m\angle FGD = 5x - 5$, find x .



- 3 In the accompanying diagram, if $m\angle 1 = 50$, $m\angle 2 = 70$, and $m\angle B = 50$, find $m\angle C$.



- 4 In the accompanying diagram of $\triangle ABC$, $AB = 5$, $AC = 10$, and $BC = 13$. Triangle DEF is formed by connecting the midpoints of the sides of $\triangle ABC$. Find the perimeter of $\triangle DEF$.



- 5 The measures of two opposite angles of a parallelogram are represented by $3x + 40$ and $x + 50$. Find x .

- 6 In $\triangle ABC$, median \overline{CD} meets side \overline{AB} at point D . If the coordinates of point A are $(4, 8)$ and of point B are $(10, -2)$, find the coordinates of point D .

- 7 Find the length of a side of the rhombus whose diagonals have lengths of 12 and 16.

- 8 The lengths of the bases of a trapezoid are 4 and 8. If the length of an altitude of the trapezoid is 3, find the area of the trapezoid.

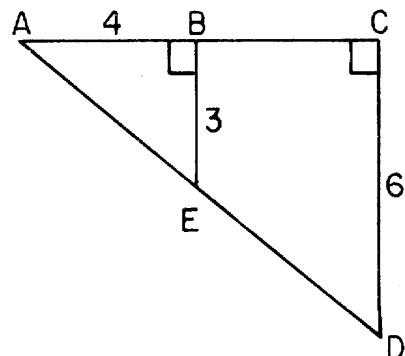
- 9 In right triangle ABC , angle C is a right angle. Altitude \overline{CD} bisects hypotenuse \overline{AB} at D . If $AB = 10$, find CD .

- 10 How many different 6-letter permutations are possible from the letters in the word "WAFFLE"?

- 11 What is the slope of the line that passes through the points $(4, 9)$ and $(-1, 12)$?

- 12 How many different committees of 3 students can be chosen from 8 students?

- 13 In the accompanying figure, $\overline{AB} \perp \overline{BE}$, $\overline{AC} \perp \overline{CD}$, $AB = 4$, $BE = 3$, and $CD = 6$. Find the length of \overline{AC} .



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

Directions (15–34): 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.

- 15 Using the accompanying table, what is the value of $(2 * 3) * 4$?

| * | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 |
| 2 | 2 | 4 | 1 | 3 |
| 3 | 3 | 1 | 4 | 2 |
| 4 | 4 | 3 | 2 | 1 |

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

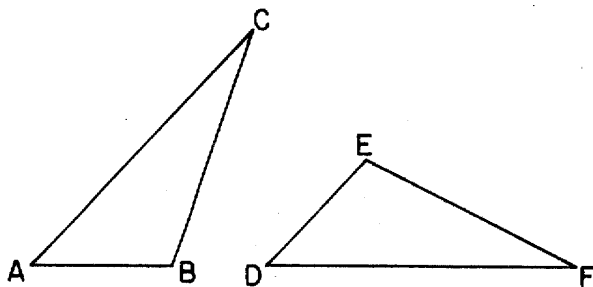
- 16 Which statement is the negation of $a \wedge \sim b$?

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

- 17 Which is logically equivalent to the statement, "If Jeff passes math, then he will be happy"?

- (1) Jeff passes math and he is happy.
(2) If Jeff does not pass math, then he will be happy.
(3) If Jeff passes math, then he will not be happy.
(4) If Jeff is not happy, then Jeff did not pass math.

- 18 In the accompanying diagram, ABC and DEF are triangles with $\angle A \cong \angle D$, and $\overline{AC} \cong \overline{DF}$. Which statement is sufficient to prove $\triangle ABC \cong \triangle DEF$?



- (1) $\angle C \cong \angle F$
(2) $\angle C \cong \angle E$
(3) $\overline{CB} \cong \overline{EF}$
(4) $\overline{AC} \parallel \overline{DE}$

- 19 Which is a solution for the following system of equations?

$$\begin{aligned} y &= x + 1 \\ y &= x^2 - 5x + 9 \end{aligned}$$

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

- 20 Let set $Q = \{M, A, T, H\}$. If set Q is closed under the operation $*$, with T as the identity element, then how should row T appear in the accompanying table?

| * | M | A | T | H |
|---|---|---|---|---|
| M | M | M | M | M |
| A | A | A | A | A |
| T | | | | |
| H | H | H | H | H |

- (1) T T T T
(2) A A A A
(3) H H H H
(4) M A T H

- 21 In $\triangle ABC$, side \overline{AC} is extended through point C forming an exterior angle whose measure is 120. If the measure of $\angle B$ is 40, then $\triangle ABC$ must be

- (1) scalene
(2) isosceles
(3) equilateral
(4) obtuse

- 22 In a plane, the locus of points a given distance from a straight line is

- (1) one straight line
(2) two straight lines
(3) one circle
(4) two points

- 23 Which is the negation of the statement, "Some chickens do not lay eggs"?

- (1) All chickens lay eggs.
(2) Some chickens lay eggs.
(3) All chickens do not lay eggs.
(4) No chicken lays eggs.

- 24 If $\overline{AB} \parallel \overline{CD}$ and $\overline{CD} \parallel \overline{MN}$, then which must be true?

- (1) $\overline{AB} \cong \overline{MN}$
(2) $\overline{AB} \perp \overline{MN}$
(3) $\overline{AB} \parallel \overline{MN}$
(4) $\overline{AC} \parallel \overline{MN}$

- 25 If the statement $a \rightarrow b$ is true and a is true, which must also be true?

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

- 26 The table below defines the operation \otimes for the set $S = \{0, 1, 2, 3\}$. Why is the system (S, \otimes) not a group?

| \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 |

- (1) S is not closed under \otimes .
 (2) There is no identity element.
 (3) Operation \otimes is not commutative.
 (4) Each element of S does not have an inverse.
- 27 The equation of the locus of points equidistant from the graphs of $x = 3$ and $x = -5$ is
 (1) $y = 1$ (3) $x = 1$
 (2) $y = -1$ (4) $x = -1$
- 28 Two angles of a triangle have measures of 70 and 85. Which is *not* the measure of an exterior angle of the triangle?
 (1) 155 (3) 105
 (2) 110 (4) 95
- 29 Which is an equation of the axis of symmetry of the graph $y = 2x^2 - 6x - 14$?
 (1) $x = 6$ (3) $x = -3$
 (2) $x = \frac{3}{2}$ (4) $x = -6$

- 30 Given a parallelogram, a rhombus, a rectangle, and a square. If one of these quadrilaterals is picked at random, what is the probability that its diagonals bisect each other?

- (1) 1 (3) $\frac{1}{4}$
 (2) $\frac{3}{4}$ (4) 0

- 31 The roots of the equation $x^2 - 6x - 2 = 0$ are

- (1) $\frac{6 \pm \sqrt{28}}{2}$ (3) $\frac{6 \pm \sqrt{44}}{2}$
 (2) $\frac{-6 \pm \sqrt{28}}{2}$ (4) $\frac{-6 \pm \sqrt{44}}{2}$

- 32 Which is an equation of the line whose slope is 3 and which passes through the point $(10, 5)$?

- (1) $y = -3x + 5$ (3) $y = -3x + 25$
 (2) $y = 3x - 5$ (4) $y = 3x - 25$

- 33 Which is a point on the circle whose center is $(0, 0)$ and whose radius is 5?

- (1) $(2, 3)$ (3) $(4, 5)$
 (2) $(3, 4)$ (4) $(0, 0)$

- 34 If the lengths of two sides of a triangle are 4 and 10, which could be the length of the third side?

- (1) 6 (3) 14
 (2) 8 (4) 16

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

- 35 *On the answer sheet, construct the bisector of angle B 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 *a* Draw the graph of the equation $y = x^2 - 6x$ including all values of x such that $-1 \leq x \leq 7$. [6]

b On the same set of axes, draw the graph of the equation $y + x = -4$. [2]

c Using the graphs drawn in parts *a* and *b*, determine the solution of the system:

$$\begin{aligned} y &= x^2 - 6x \\ y + x &= -4 \end{aligned} \quad [2]$$

37 A village council of 5 people is to be elected from a group of 4 Democrats and 4 Republicans. The candidates are all well qualified and each has an equal probability of being elected.

a How many different 5-person councils can be elected? [2]

b How many different ways can 3 Democrats and 2 Republicans be elected to the council? [2]

c How many different ways can 4 Democrats and 1 Republican be elected to the council? [2]

d How many different ways can the Democrats have a majority? [2]

e What is the probability that the Democrats will have a majority? [2]

38 The vertices of $\triangle ABC$ are $A(-4, -2)$, $B(2, 6)$, and $C(2, -2)$.

a Write an equation of the locus of points equidistant from vertex B and vertex C . [2]

b Write an equation of the line parallel to \overline{BC} and passing through vertex A . [2]

c Find the coordinates of the point of intersection of the locus in part *a* and the line determined in part *b*. [2]


d Write an equation of the locus of points which is 4 units from vertex C . [2]

e What is the total number of points that satisfy the loci described in parts *a* and *d*? [2]

39 In right triangle ABC , altitude \overline{CD} is drawn to hypotenuse \overline{AB} . If $AC = 4$ and DB is 4 more than the length of \overline{AD} , find AD . [Only an algebraic solution will be accepted.] [4,6]

40 Solve the following system of equations and check.

$$\begin{aligned} y &= 2x^2 - 5x + 5 \\ y - x &= 5 \end{aligned} \quad [8,2]$$

 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.

41 Given:

Jason is smart.

If Jason is smart and has a job, then he will earn a good income.

If Jason works hard, then he will have a job.

If Jason does not work hard, then he will be unhappy.

Jason does not have a good income.

Let S represent: "Jason is smart."

Let W represent: "Jason works hard."

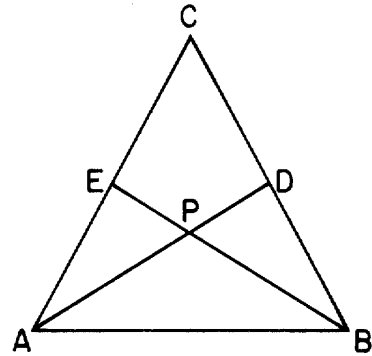
Let J represent: "He has a job."

Let I represent: "He will earn a good income."

Let U represent: "He will be unhappy."

Prove: Jason will be unhappy. [10]

42 Given: $\triangle ABC$, $\overline{CEA} \cong \overline{CDB}$, \overline{AD} and \overline{BE} intersect at P , and $\angle PAB \cong \angle PBA$.



Prove: $\overline{PE} \cong \overline{PD}$ [10]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Thursday, January 24, 1985 — 9:15 a.m. to 12:15 p.m., only

| |
|-------------------------|
| Part I Score |
| Part II Score |
| Part III Score |
| Total Score |
| Rater's Initials: |

ANSWER SHEET

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

School.....Grade.....

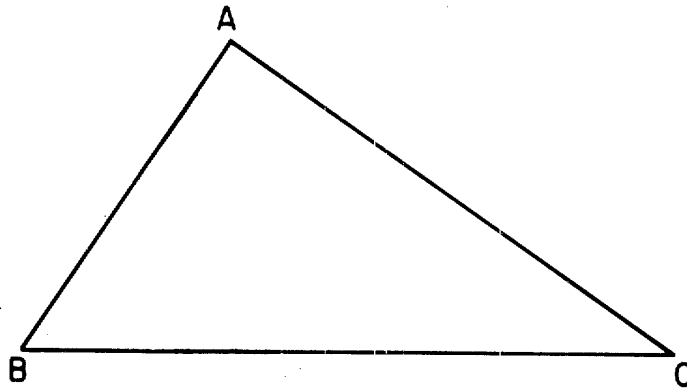
Your answers to Part I should be recorded on this answer sheet.

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 | |

rear 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

Thursday, January 24, 1985 — 9:15 a.m. to 12:15 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.] Allow no partial credit. For questions 15–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

- | | | | |
|---|-------------------------------------|--------|-------------------|
| (1) 3 | (11) $-\frac{3}{5}$ | (21) 1 | (31) 3 |
| (2) 10 | (12) 56 | (22) 2 | (32) 4 |
| (3) 70 | (13) 8 | (23) 1 | (33) 2 |
| (4) 14 | (14) \overline{AB} or AB or c | (24) 3 | (34) 2 |
| (5) 5 | (15) 4 | (25) 1 | (35) construction |
| (6) $(7,3)$ or $\begin{matrix} x = 7 \\ y = 3 \end{matrix}$ | (16) 3 | (26) 4 | |
| (7) 10 | (17) 4 | (27) 4 | |
| (8) 18 | (18) 1 | (28) 3 | |
| (9) 5 | (19) 2 | (29) 2 | |
| (10) 360 | (20) 4 | (30) 1 | |

[OVER]

Part II

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.

(36) c $(1, -5)$ and $(4, -8)$

or [1,1]

$$\begin{array}{l} x = 1 \\ y = -5 \end{array} \quad \text{and} \quad \begin{array}{l} x = 4 \\ y = -8 \end{array}$$

(37) a 56 [2]

b 24 [2]

c 4 [2]

d 28 [2]

e $\frac{28}{56}$ [2]

(39) Analysis [4]

2 [6]

(40) $(0, 5)$ and $(3, 8)$

or

[8]

$x = 0$ and $x = 3$

$y = 5$ and $y = 8$

(38) a $y = 2$ [2]

b $x = -4$ [2]

c $(-4, 2)$ [2]

d $(x - 2)^2 + (y + 2)^2 = 16$ [2]

e 1 [2]