The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, June 19, 1998 — 1:15 to 4:15 p.m., only

Notice . . .

Scientific calculators must be available to all students taking this examination.

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.

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 terms of π or in radical form.   [60]

1 What is the image of $(6,-1)$ after a reflection in the x-axis?

2 In the accompanying diagram, $\overline{AB}$ intersects $\overline{CD}$ at E, $\overline{AC}$ and $\overline{BD}$ are drawn, m$\angle A$ = 85, m$\angle C$ = 45, and m$\angle D$ = 110. Find m$\angle B$.
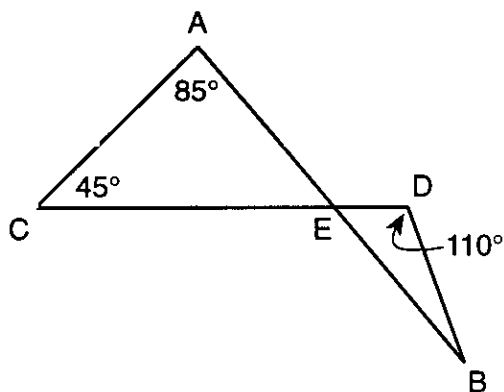

3 In the accompanying diagram, line k is parallel to line n, and line ℓ is a transversal that intersects lines k and n. If m$\angle 1 = x + 25$ and m$\angle 2 = 5x - 25$, find x.
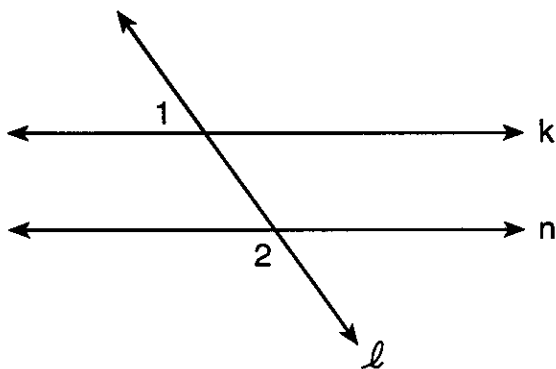
4 A translation maps (x,y) to $(x - 4, y + 5)$. What are the coordinates of A', the image of point $A(5,-3)$ under this translation?

5 In $\triangle ABC$, m$\angle A$ = 62 and m$\angle B$ = 54. Which is the longest side of the triangle?

6 In the accompanying diagram, m$\angle ABD$ = 72 and $\overrightarrow{FBE}$ bisects $\angle ABD$. Find m$\angle ABF$.
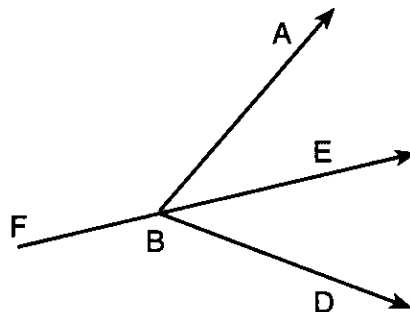
7 The operation $*$ for the set $\{M,A,T,H\}$ is defined in the table below. What is the identity element for $*$?

$*$	M	A	T	H
M	H	M	A	T
A	M	A	T	H
T	A	T	H	M
H	T	H	M	A

8 For the binary operation $a \odot b = \dfrac{\sqrt{a}}{\sqrt{b}}$, find the value of $8 \odot 2$ in simplest form.

9 In rectangle $DATE$, diagonals $\overline{DT}$ and $\overline{AE}$ intersect at S. If $AE = 40$ and $ST = x + 5$, find the value of x.

10 If point P has coordinates $(-8,6)$, what is the distance from the origin to point P?

11 Line j is perpendicular to line k. If the slope of line j is $\dfrac{5}{2}$, find the slope of line k.

12 If the ratio of the areas of two squares is 4:9, what is the ratio of the perimeter of the smaller square to the perimeter of the larger square?

13 If $_nC_2 = 28$, what is the value of n?

14 Solve for x: $\dfrac{1}{3x} + 1 = \dfrac{7}{6}$

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 In the accompanying diagram, $\overline{AC} \parallel \overline{DE}$, $AB = 4$, $BC = 6$, and $BD = 3$.
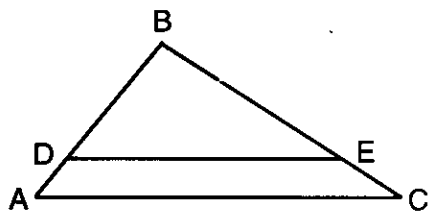
What is the length of $\overline{BE}$?

(1) 1   (3) 4.5

(2) 1.5   (4) 5

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

(1) ${\sim}a \vee b$ (3) ${\sim}a \wedge b$

(2) ${\sim}a \vee {\sim}b$ (4) ${\sim}a \wedge {\sim}b$

17 The greatest number of different 5-letter arrangements can be made from the letters in the word
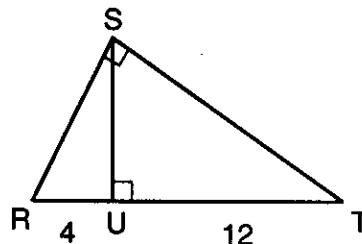
(1) ANGLE   (3) DADDY

(2) ORDER   (4) ADAPT

18 If M is the midpoint of $\overline{AB}$, then which statement is *false*?

(1) $\dfrac{AB}{2} = MB$ (3) $AB - MB = AM$

(2) $AM = MB$ (4) $AM + AB = MB$

19 Which transformation represents a dilation?

(1) $A(-3,5) \to A'(-6,10)$
(2) $A(-3,5) \to A'(5,-3)$
(3) $A(-3,5) \to A'(1,9)$
(4) $A(-3,5) \to A'(-3,-5)$

20 In the accompanying diagram, $\triangle RST$ is a right triangle, $\overline{SU}$ is the altitude to hypotenuse $\overline{RT}$, $RU = 4$, and $UT = 12$.

What is the length of $\overline{RS}$?

(1) 8   (3) $\sqrt{160}$

(2) $\sqrt{48}$ (4) 24

21 If $(2x - 3)$ and $(x + 5)$ are multiplied to form the trinomial $ax^2 + bx + c$, what is the value of b?

(1) -15 (3) 7
(2) 2   (4) 4

22 If $A \to {\sim}B$ and B are both true statements, then which conclusion must be true?

(1) ${\sim}B$ (3) A
(2) ${\sim}A$ (4) ${\sim}A \to {\sim}B$

23 The coordinates of the midpoint of $\overline{AB}$ are $(-7,6)$. If the coordinates of A are $(2,-4)$ and the coordinates of B are $(-16,y)$, what is the value of y?

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

24 The equation of the locus of points 5 units from the origin is

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

25 If side $\overline{AB}$ of $\triangle ABC$ is extended from point B to point D, then $m\angle DBC$ is always

(1) smaller than $(m\angle A + m\angle BCA)$
(2) greater than $(m\angle A + m\angle BCA)$
(3) equal to $2m\angle A$
(4) greater than $m\angle BCA$

26 What is the slope of a line that passes through points $(-4,2)$ and $(6,8)$?

(1) $-\frac{3}{5}$

(2) $\frac{3}{5}$

(3) $\frac{5}{3}$

(4) $-\frac{5}{3}$

27 What are the coordinates of the turning point for the graph of the parabola whose equation is $y = x^2 - 4$?

(1) $(0,-2)$

(2) $(0,2)$

(3) $(0,-4)$

(4) $(0,4)$

28 The vertices of $\triangle ABC$ are $A(0,0)$, $B(0,k)$, and $C(k,0)$. The area of this triangle can be expressed as

(1) $\frac{k^2}{2}$

(2) $\frac{k^2}{4}$

(3) k^2

(4) $2k$

29 The roots of the equation $x^2 + 8x + 3 = 0$ are

(1) $4 \pm \sqrt{13}$

(2) $-4 \pm \sqrt{13}$

(3) $4 \pm \sqrt{19}$

(4) $-4 \pm \sqrt{19}$

30 Which statement is the inverse of "If a quadrilateral is a square, then it has four right angles"?

(1) If a quadrilateral has four right angles, then it is a square.
(2) If a quadrilateral is not a square, then it has four right angles.
(3) If a quadrilateral does not have four right angles, then it is not a square.
(4) If a quadrilateral is not a square, then it does not have four right angles.

31 An intersection of the graphs of the equations $y = -x$ and $y = x^2 - 2$ is

(1) $(-1,-1)$

(2) $(-2,2)$

(3) $(2,2)$

(4) $(1,1)$

32 A parallelogram must be a rectangle if its diagonals

(1) bisect each other
(2) bisect the angles to which they are drawn
(3) are perpendicular to each other
(4) are congruent

33 The sum of the measures of the interior angles of a regular pentagon is

(1) $180°$

(2) $360°$

(3) $540°$

(4) $720°$

34 In right triangle ABC, $m\angle C = 90$, $m\angle A = 55$, and $CA = 10$. What is the length of $\overline{AB}$ to the *nearest integer*?

(1) 6

(2) 14

(3) 17

(4) 24

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

35 *On the answer sheet,* construct an equilateral triangle with sides of length $\overline{CD}$.

Part II

Answer three questions from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown.   [30]

36 Answer both a and b.

  a Simplify for all values of x for which this expression is defined:

$$\frac{x^2 - x - 20}{x^2 + 7x + 12} \cdot \frac{2x^2 + 6x}{x^2 - 25} \quad [5]$$

  b Solve for the positive value of y:

$$\frac{3+y}{2y} = \frac{y-1}{y} \quad [5]$$

37 Solve the following system of equations algebraically and check:

$$x^2 + y^2 = 52 \quad [8,2]$$
$$x - y = -2$$

38 From a vase containing 4 yellow roses, 3 pink roses, and 5 red roses, a combination of 3 roses is randomly selected.

  a How many combinations of 3 roses are possible? [2]

 b What is the probability of choosing 3 roses that are all the same color? [4]

  c What is the probability of choosing *exactly* one rose of each color in the 3-rose selection? [4]

39 a On graph paper, draw the graph of the equation $y = -x^2 + 4x + 3$ for all values of x in the interval $-1 \le x \le 5$. [6]

  b On the same set of axes, draw the image of the graph drawn in part a after a reflection in the y-axis and label it b. [2]

  c Write an equation for the axis of symmetry for the parabola drawn in part b. [2]

40 In the accompanying diagram of square *MARY*, $\overline{ME}$ is drawn to side $\overline{YR}$, $m\angle EMY = 40$, and $YE = 12$.
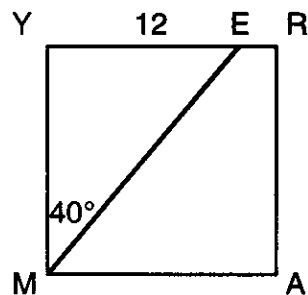
  a Find the area of polygon *MARE* to the *nearest integer*. [7]

  b If diagonal $\overline{AY}$ is drawn, will $\overline{AY}$ be perpendicular to $\overline{ME}$? Explain your answer. [3]

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

Part III

Answer one question from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown.   [10]

41 Given: Beta is not true.
  Alpha is true or beta is true.
  If gamma is not true, then alpha is not true.
  If sigma is not true, then delta is true.
  If gamma is true, then delta is not true or epsilon is not true.
  Epsilon is true.

  Let *A* represent: "Alpha is true."
  Let *B* represent: "Beta is true."
  Let *G* represent: "Gamma is true."
  Let *D* represent: "Delta is true."
  Let *E* represent: "Epsilon is true."
  Let *S* represent: "Sigma is true."

  Prove: Sigma is true.   [10]

42 Quadrilateral *DRAW* has vertices $D(-3,6)$, $R(6,3)$, $A(6,-2)$, and $W(-6,2)$. Using coordinate geometry, prove that quadrilateral *DRAW* is an isosceles trapezoid.   [10]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE II

Friday, June 19, 1998 — 1:15 to 4:15 p.m., only

ANSWER SHEET

Pupil . . . .   Sex: ☐ Male ☐ Female   Grade . . . .

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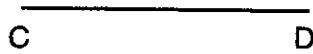
Your answers to Part I should be recorded on this answer sheet.

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	

35

C   D

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

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS
COURSE II

Friday, June 19, 1998 — 1:15 to 4:15 p.m., only

SCORING KEY

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind. Use checkmarks to indicate student 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 student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) (6,1)	(11) $-\frac{2}{5}$	(21) 3	(31) 2
(2) 20	(12) 2:3	(22) 2	(32) 4
(3) 30	(13) 8	(23) 4	(33) 3
(4) (1,2)	(14) 2	(24) 2	(34) 3
(5) $\overline{AB}$	(15) 3	(25) 4	(35) construction
(6) 144	(16) 1	(26) 2	
(7) A	(17) 1	(27) 3	
(8) 2	(18) 4	(28) 1	
(9) 15	(19) 1	(29) 2	
(10) 10	(20) 1	(30) 4	

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics*, 1996 Edition. 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) *a* $\dfrac{2x}{x+5}$ [5]

    b 5 [5]

(37) (–6,–4), (4,6) [8]

    Check [2]

(38) *a* 220 [2]

    b $\dfrac{15}{220}$ [4]

    c $\dfrac{60}{220}$ [4]

(39) *c* $x = -2$ [2]

(40) *a* 119 [7]

    b No.

    Explanations will vary. [3]