The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, June 14, 1996 – 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.

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 terms of π or in radical form. [60]

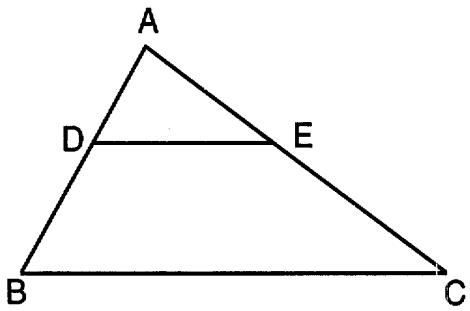
1 If $a * b$ is defined as $a^2 - 2b$, find the value of $5 * 7$.

2 If $\tan A = 1.3400$, find the measure of $\angle A$ to the *nearest degree*.

3 What is the identity element in the system defined by the table below?

★	2	4	6	8
2	4	8	2	6
4	8	6	4	2
6	2	4	6	8
8	6	2	8	4

4 In the accompanying figure, $\overline{DE} \parallel \overline{BC}$, $AD = 10$, $AB = 24$, and $AC = 36$. Find AE.



5 Evaluate: ${}_7C_3$

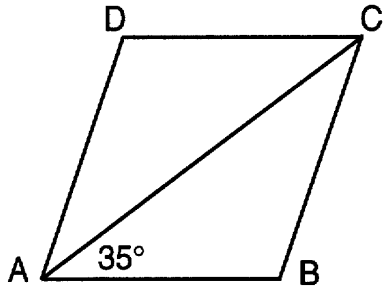
6 If one of the roots of the equation $x^2 + kx = 6$ is 2, what is the value of k?

7 Solve for the positive value of y: $\frac{16}{y} = \frac{y}{4}$

8 How many different 4-letter arrangements can be formed from the letters in the word "NINE"?

9 In $\triangle ABC$, $m\angle B > m\angle C$ and $m\angle C > m\angle A$. Which side of $\triangle ABC$ is the longest?

10 In the accompanying diagram of rhombus $ABCD$, diagonal $\overline{AC}$ is drawn. If $m\angle CAB = 35$, find $m\angle ADC$.



11 What is the slope of the line whose equation is $3x + y = 4$?

12 The graph of the equation $x^2 + y^2 = 9$ represents the locus of points at a given distance, d, from the origin. Find the value of d.

13 Find the area of the parallelogram whose vertices are (2,1), (7,1), (9,5), and (4,5).

14 Express $\frac{5x}{6} - \frac{x}{3}$ in simplest form.

15 The line that passes through points (1,3) and $(2,y)$ has a slope of 2. What is the value of y?

16 What is the length of a side of a square whose diagonal measures $4\sqrt{2}$?

Directions (17–35): 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.

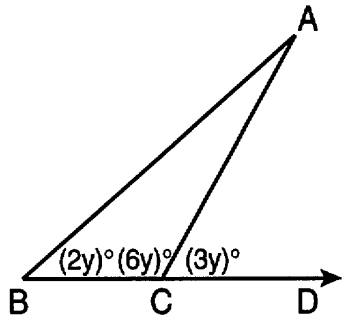
17 When factored completely, $x^3 - 9x$ is equivalent to

(1) $x(x-3)$ (3) $(x+3)(x-3)$
(2) $x(x+3)(x-3)$ (4) $x(x+3)$

18 If $(x+2)^2 + (y-3)^2 = 25$ is an equation of a circle whose center is $(-2,k)$, then k equals

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

19 In the accompanying diagram of $\triangle ABC$, side $\overline{BC}$ is extended to D, $m\angle B = 2y$, $m\angle BCA = 6y$, and $m\angle ACD = 3y$.



What is $m\angle A$?

(1) 15 (3) 20
(2) 17 (4) 24

20 The coordinates of $\triangle ABC$ are $A(0,0)$, $B(6,0)$, and $C(0,4)$. What are the coordinates of the point at which the median from vertex A intersects side $\overline{BC}$?

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

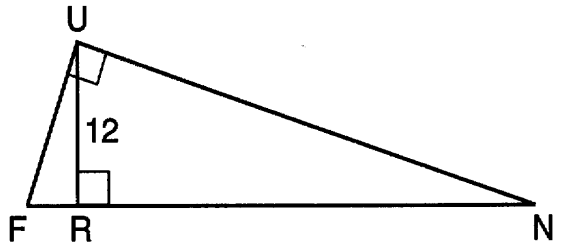
21 Which statement is the equivalent of $\sim(\sim m \wedge n)$?

(1) $m \wedge n$ (3) $m \vee \sim n$
(2) $m \wedge \sim n$ (4) $\sim m \vee \sim n$

22 The translation $(x,y) \rightarrow (x-2, y+3)$ maps the point (7,2) onto the point whose coordinates are

(1) (9,5) (3) (5,–1)
(2) (5,5) (4) (–14,6)

23 In the accompanying diagram, $\triangle FUN$ is a right triangle, $\overline{UR}$ is the altitude to hypotenuse $\overline{FN}$, $UR = 12$, and the lengths of $\overline{FR}$ and $\overline{RN}$ are in the ratio 1:9.



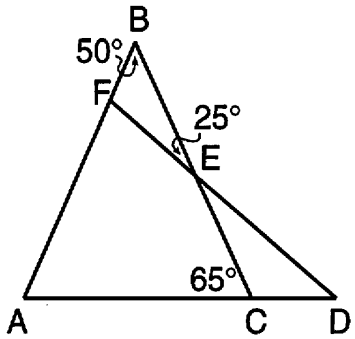
What is the length of $\overline{FR}$?

(1) 1 (3) 36
(2) $1\frac{1}{3}$ (4) 4

24 Lines ℓ and m are perpendicular. The slope of ℓ is $\frac{3}{5}$. What is the slope of m?

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

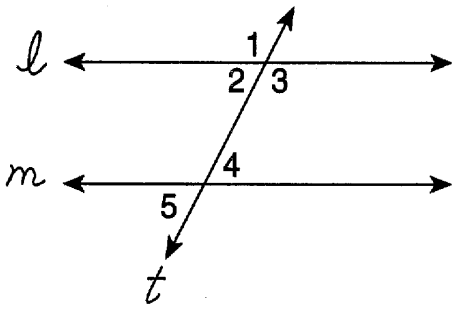
25 In the accompanying diagram of $\triangle ABC$, $\overline{AC}$ is extended to D, $\overline{DEF}$, $\overline{BEC}$, $\overline{AFB}$, $m\angle B = 50$, $m\angle BEF = 25$, and $m\angle ACB = 65$.



What is $m\angle D$?

(1) 40 (3) 50
(2) 45 (4) 55

26 In the accompanying diagram, parallel lines ℓ and m are cut by transversal t.



Which statement is true?

(1) $m\angle 1 + m\angle 2 + m\angle 5 = 360$
(2) $m\angle 1 + m\angle 2 + m\angle 3 = 180$
(3) $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$
(4) $m\angle 1 + m\angle 3 = m\angle 4 + m\angle 5$

27 Which argument below is *not* valid?

(1) Given: $a \rightarrow b$
a
Conclusion: b

(2) Given: $a \vee b$
$\sim b$
Conclusion: $\sim a$

(3) Given: $a \rightarrow b$
$\sim b$
Conclusion: $\sim a$

(4) Given: $a \rightarrow b$
$b \rightarrow \sim c$
Conclusion: $a \rightarrow \sim c$

28 The measure of a base angle of an isosceles triangle is 4 times the measure of the vertex angle. The number of degrees in the vertex angle is

(1) 20
(2) 30
(3) 36
(4) 135

29 What are the coordinates of R', the image of $R(-4,3)$ after a reflection in the line whose equation is $y = x$?

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

30 The equation $y = 4$ represents the locus of points that are equidistant from which two points?

(1) (0,0) and (0,8)
(2) (0,3) and (0,1)
(3) (4,0) and (0,4)
(4) (4,4) and (−4,4)

31 In equilateral triangle ABC, $\overline{AD}$ is drawn to $\overline{BC}$ such that $BD < DC$. Which inequality is true?

(1) $DC > AC$
(2) $BD > AD$
(3) $AD > AB$
(4) $AC > AD$

32 Which equation represents the axis of symmetry of the graph of the equation $y = 2x^2 + 7x - 5$?

(1) $x = -\frac{5}{4}$
(2) $x = \frac{5}{4}$
(3) $x = \frac{7}{4}$
(4) $x = -\frac{7}{4}$

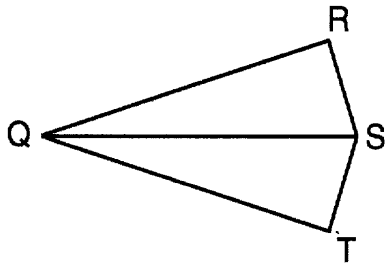
33 How many congruent triangles are formed by connecting the midpoints of the three sides of a scalene triangle?

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

34 What are the roots of the equation $2x^2 - 7x + 4 = 0$?

(1) $\frac{7 \pm \sqrt{17}}{4}$
(2) $\frac{-7 \pm \sqrt{17}}{4}$
(3) $4, -\frac{1}{2}$
(4) $-4, \frac{1}{2}$

35 In the accompanying diagram of quadrilateral $QRST$, $\overline{RS} \cong \overline{ST}$, $\overline{SR} \perp \overline{QR}$, and $\overline{ST} \perp \overline{QT}$.



Which method of proof may be used to prove $\triangle QRS \cong \triangle QTS$?

(1) HL
(2) SAS
(3) AAS
(4) ASA

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

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 a, b, and c for all values of x for which these expressions are defined.

a Find the value of $\frac{(x+1)^2}{x^2-1}$ if $x = 1.02$. [2]

b Find the positive value of x to the *nearest thousandth*:

$$\frac{1}{x} = \frac{x+1}{1}$$ [5]

c Solve for all values of x in simplest radical form:

$$\frac{x+2}{4} = \frac{2}{x-2}$$ [3]

37 Triangle ABC has coordinates $A(1,0)$, $B(7,4)$, and $C(5,7)$.

a On graph paper, draw and label $\triangle ABC$. [1]

b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection in the origin. [3]

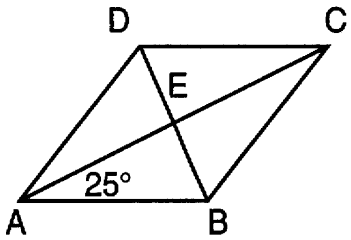
c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ under the translation $(x,y) \rightarrow (x+1, y+5)$. [3]

d Write an equation of the line containing $\overline{A''B''}$. [3]

38 Solve the following system of equations algebraically or graphically and check:

$$y = x^2 - 6x + 5$$
$$y + 7 = 2x$$ [8,2]

39 In the accompanying diagram of rhombus $ABCD$, $m\angle CAB = 25$ and $AC = 18$.



Find, to the *nearest tenth*, the

a perimeter of $ABCD$ [6]

b length of $\overline{BD}$ [4]

40 The vertices of $\triangle NYS$ are $N(-2,-1)$, $Y(0,10)$, and $S(10,5)$. The coordinates of point T are $(4,2)$.

a Prove that $\overline{YT}$ is a median. [2]

b Prove that $\overline{YT}$ is an altitude. [4]

c Find the area of $\triangle NYS$. [4]

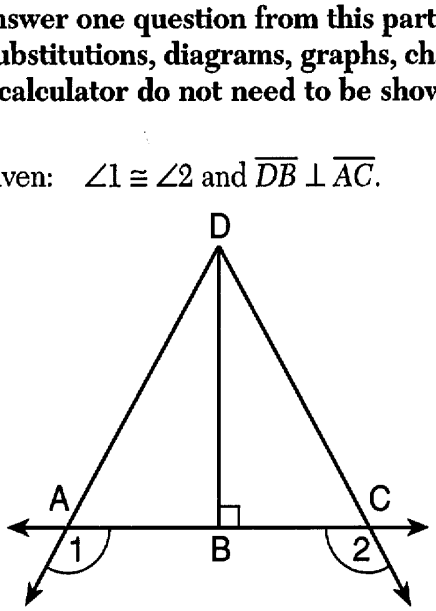
☞ GO RIGHT ON TO THE NEXT PAGE.

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

Part III

Answer one question from this part. 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: $\angle 1 \cong \angle 2$ and $\overline{DB} \perp \overline{AC}$.



Prove: $\triangle ABD \cong \triangle CBD$ [10]

42 Given: $\sim G \rightarrow F$
$\sim(E \wedge F)$
$\sim E \rightarrow \sim D$
A
$(B \wedge C) \rightarrow D$
$A \rightarrow (B \wedge C)$

Prove: G [10]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE II

Friday, June 14, 1996 – 1:15 to 4:15 p.m., only

Part I Score	.....
Part II Score	.....
Part III Score	.....
Total Score	.....
Rater's Initials:	.....

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 .....
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

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

Tear Here

Tear Here

Tear Here

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, June 14, 1996—1:15 to 4:15 p.m., only

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 17–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 11

(2) 53

(3) 6

(4) 15

(5) 35

(6) 1

(7) 8

(8) 12

(9) $\overline{AC}$

(10) 110

(11) –3

(12) 3

(13) 20

(14) $\frac{x}{2}$

(15) 5

(16) 4

(17) 2

(18) 3

(19) 3

(20) 4

(21) 3

(22) 2

(23) 4

(24) 2

(25) 1

(26) 3

(27) 2

(28) 1

(29) 2

(30) 1

(31) 4

(32) 4

(33) 4

(34) 1

(35) 1

[OVER]

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* 101 [2]
b 0.618 [5]
c $\pm 2\sqrt{3}$ [3]

(37) *b* $A'(-1,0)$, $B'(-7,-4)$, $C'(-5,-7)$ [3]

c $A''(0,5)$, $B''(-6,1)$, $C''(-4,-2)$ [3]

d $y = \frac{2}{3}x + 5$ [3]

(38) (2,–3) and (6,5) [8]

(39) *a* 39.7 [6]
b 8.4 [4]

(40) *c* 60 [4]