The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Wednesday, August 14, 1996 — 8:30 to 11:30 a.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.

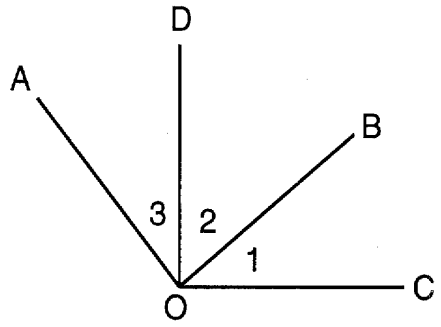
Part I

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 The table below defines the operation × for the set $F = \{1,-1,y,-y\}$. What is the value of $(-1) \times y$?

×	1	−1	y	$-y$
1	1	−1	y	$-y$
−1	−1	1	$-y$	y
y	y	$-y$	−1	1
$-y$	$-y$	y	1	−1

2 In the accompanying diagram, $\overline{OA} \perp \overline{OB}$ and $\overline{OD} \perp \overline{OC}$. If $m\angle 3 = 39$, what is $m\angle 1$?



3 Solve for x: $\frac{x-2}{2} = \frac{x-1}{3}$

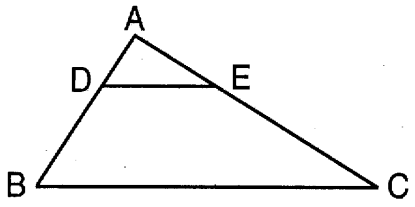
4 In rectangle $ABCD$, diagonal $AC = 20$ and segment $\overline{EF}$ joins the midpoints of $\overline{AB}$ and $\overline{BC}$, respectively. Find the length of $\overline{EF}$.

5 What is the total number of points equidistant from two intersecting lines and 2 centimeters from the point of intersection?

6 In $\triangle ABC$, $m\angle A = 40$ and the measure of an exterior angle at vertex B is 120°. Which side is the longest in $\triangle ABC$?

7 What is the negative root of the equation $x^2 - x - 2 = 0$?

8 In the accompanying diagram of $\triangle ABC$, $\overline{DE} \parallel \overline{BC}$, $AD = 3$, $AB = 9$, and $AE = 5$. Find EC.

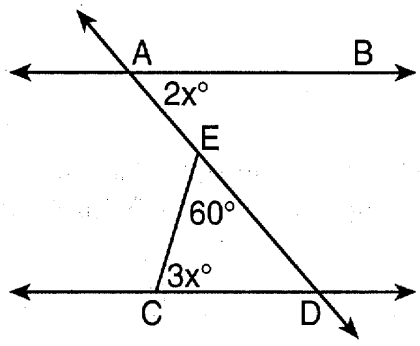


9 What is the image of (−2,5) after a reflection in the x-axis?

10 In rhombus $ABCD$, $AB = 2x - 2$ and $BC = x + 8$. Find the length of $\overline{BC}$.

11 Express $\frac{x+2}{3} + \frac{x-3}{4}$ as a single fraction in simplest form.

12 In the accompanying diagram, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$, $\overleftrightarrow{AED}$ is a transversal, and $\overline{CE}$ is drawn. If $m\angle CED = 60$, $m\angle DAB = 2x$, and $m\angle DCE = 3x$, find x.



13 Find the area of a triangle whose vertices are (−2,0), (−2,6), and (5,0).

14 If the endpoints of the diameter of a circle are (3,1) and (6,5), find the length of the diameter.

15 The coordinates of the midpoint of line segment $\overline{AB}$ are (–2,4). If the coordinates of point A are (7,10), find the coordinates of point B.

16 The sides of a triangle measure 5, 9, and 10. Find the perimeter of a similar triangle whose longest side measures 15.

Directions (17–34): 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.

17 The coordinates of point (x,y) after a reflection in the origin can be represented by

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

18 If the length of the hypotenuse of a right triangle is 4 and the length of one leg is 2, what is the length of the other leg?

(1) 12 (3) $\sqrt{12}$
(2) 20 (4) $\sqrt{20}$

19 Which equation represents the line whose slope is –2 and that passes through point (0,3)?

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

20 If the lengths of two sides of a triangle are 4 and 8, the length of the third side may *not* be

(1) 5 (3) 7
(2) 6 (4) 4

21 What is the length of an altitude of an equilateral triangle whose side measures 6?

(1) $3\sqrt{2}$ (3) 3
(2) $3\sqrt{3}$ (4) $6\sqrt{3}$

22 What is the slope of a line parallel to the line whose equation is $y = 5x + 4$?

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

23 What is the contrapositive of $c \rightarrow (d \vee e)$?

(1) $\sim c \rightarrow \sim(d \vee e)$ (3) $\sim(d \vee e) \rightarrow \sim c$
(2) $c \rightarrow \sim(d \vee e)$ (4) $(d \vee e) \rightarrow c$

24 What is an equation of the circle whose center is (–3,1) and whose radius is 10?

(1) $(x + 3)^2 + (y - 1)^2 = 10$
(2) $(x + 3)^2 + (y - 1)^2 = 100$
(3) $(x - 3)^2 + (y + 1)^2 = 10$
(4) $(x - 3)^2 + (y + 1)^2 = 100$

25 Given three premises: $A \rightarrow \sim C$, $\sim C \rightarrow R$, and $\sim R$. Which conclusion *must* be true?

(1) R (3) $A \wedge C$
(2) $\sim C$ (4) $\sim A$

26 In $\triangle ABC$, $m\angle A = 41$ and $m\angle B = 48$. What kind of triangle is $\triangle ABC$?

(1) right (3) isosceles
(2) obtuse (4) acute

27 If the altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are *always*

(1) congruent (3) isosceles
(2) equal in area (4) similar

28 The number of sides of a regular polygon whose interior angles each measure 108° is

(1) 5 (3) 7
(2) 6 (4) 4

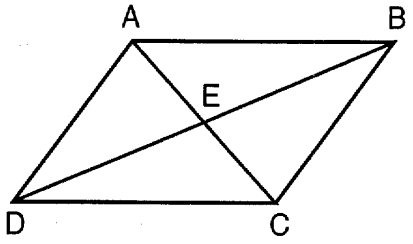
29 Two triangles have altitudes of equal length. If the areas of these triangles have the ratio 3:4, then the bases of these triangles have the ratio

(1) 3:4 (3) $\sqrt{3}:2$
(2) 9:16 (4) $\frac{3}{2}:2$

30 In isosceles triangle ABC, $AC = BC = 20$, $m\angle A = 68$, and $\overline{CD}$ is the altitude to side $\overline{AB}$. What is the length of $\overline{CD}$ to the *nearest tenth*?

(1) 49.5
(2) 18.5
(3) 10.6
(4) 7.5

31 If quadrilateral $ABCD$ is a parallelogram, which statement must be true?



(1) $\overline{AC} \perp \overline{BD}$
(2) $\overline{AC} \cong \overline{BD}$
(3) $\overline{AC}$ bisects $\angle DAB$ and $\angle BCD$.
(4) $\overline{AC}$ and $\overline{BD}$ bisect each other.

32 How many different seven-letter arrangements can be formed from the letters in the word "GENESIS"?

(1) 210
(2) 840
(3) 1260
(4) 5040

33 What is the turning point of the graph of the function $y = x^2 - 6x + 2$?

(1) (3,–7)
(2) (–3,–7)
(3) (3,11)
(4) (–3,11)

34 A biology class has eight students. How many different lab groups may be formed that will consist of three students?

(1) 56
(2) 336
(3) 6,720
(4) 40,320

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

35 *On the answer sheet*, construct a line through point P that is perpendicular to $\overline{AB}$.

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

b On the same set of axes, draw the reflection of the graph of the equation $y = 2x^2 - 4x - 3$ in the y–axis. [2]

c What is the equation of the axis of symmetry of the graph drawn in part *b*? [2]

37 Solve the following system of equations algebraically and check.

$$x^2 + y^2 + 4x = 0$$
$$y + x = 0$$

[8,2]

38 Given: $M \rightarrow N$
$\sim M \rightarrow P$
$(L \wedge N) \rightarrow R$
$\sim R$
L

Using the laws of inference, prove P. [10]

39 Answer both *a* and *b* for all values of x for which these expressions are defined.

a Solve for x to the *nearest hundredth*:

$$\frac{1}{x-1} = \frac{x+4}{5}$$

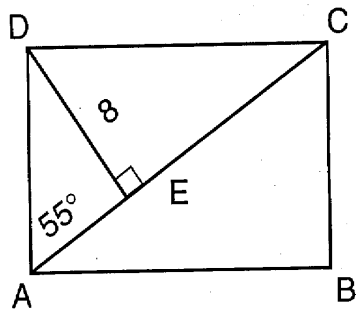
[6]

b Simplify:

$$\frac{x^2 - 4}{x^2 + 4x + 4} \cdot \frac{x^2 + 2x}{x^2}$$

[4]

40 In the accompanying diagram of rectangle $ABCD$, diagonal $\overline{AC}$ is drawn, $DE = 8$, $\overline{DE} \perp \overline{AC}$, and $m\angle DAC = 55$. Find the area of rectangle $ABCD$ to the *nearest integer*. [10]



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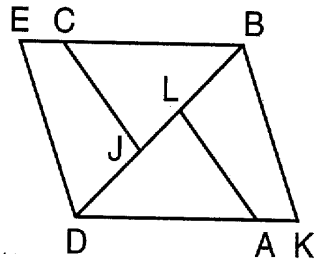
Answers to the following questions are to be written on paper provided by the school.

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: parallelogram $DEBK$, $\overline{BC} \cong \overline{DA}$, and $\overline{DJ} \cong \overline{BL}$.



Prove: $\overline{CJ} \cong \overline{AL}$ [10]

42 Quadrilateral $ABCD$ has coordinates $A(0,-6)$, $B(5,-1)$, $C(3,3)$, and $D(-1,1)$.

Using coordinate geometry, prove that

a *at least* two consecutive sides are *not* congruent [5]

b the diagonals, $\overline{AC}$ and $\overline{BD}$, are perpendicular [5]

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REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE II

Wednesday, August 14, 1996 — 8:30 to 11:30 a.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 .....

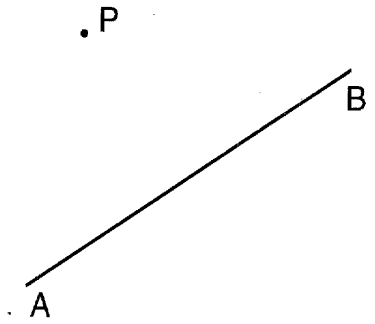
Your answers to Part I should be recorded on this answer sheet.

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 **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



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

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THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Wednesday, August 14, 1996 — 8:30 to 11:30 a.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 17–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) $-y$

(2) 39

(3) 4

(4) 10

(5) 4

(6) $\overline{AB}$

(7) –1

(8) 10

(9) (–2,–5)

(10) 18

(11) $\frac{7x-1}{12}$

(12) 24

(13) 21

(14) 5

(15) (–11,–2)

(16) 36

(17) 4

(18) 3

(19) 1

(20) 4

(21) 2

(22) 3

(23) 3

(24) 2

(25) 4

(26) 2

(27) 4

(28) 1

(29) 1

(30) 2

(31) 4

(32) 3

(33) 1

(34) 1

(35) construction

[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) *c* $x = -1$ [2]

(37) (0,0), (–2,2) [8]

check [2]

(39) *a* 1.85, – 4.85 [6]

b $\frac{x-2}{x}$ [4]

(40) 136 [10]