The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

# COURSE I

Wednesday, August 17, 1994 — 8:30 to 11:30 a.m., only

Notice . . .

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.

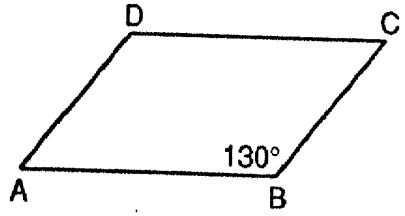
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

## 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 $\pi$ or in radical form.** [60]

1 Let $r$ represent "You may vote in the general election" and let $s$ represent "You are at least 18 years old." Using $r$ and $s$, write in symbolic form: "You may vote in the general election if and only if you are at least 18 years old."

2 In parallelogram $ABCD$, the measure of $\angle ABC$ is 130°. Find the measure, in degrees, of $\angle DAB$.




3 In the set of scores below, how many scores are less than the mean?

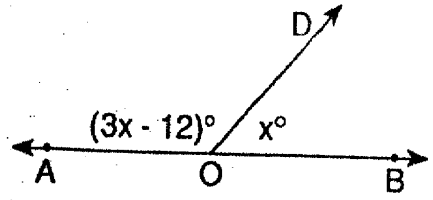
32, 40, 42, 52, 59

4 If $2x$ represents the width of a rectangle and $5x$ represents the length, express the perimeter of the rectangle as a monomial in terms of $x$.

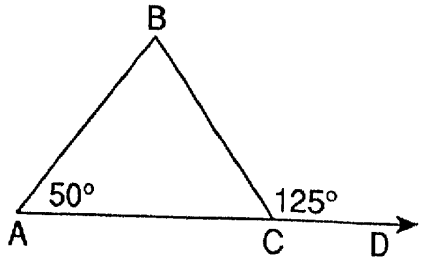
5 Find the numerical value of $4xy^2$ when $x = \frac{1}{2}$ and $y = -3$.

6 Solve for $x$: $\frac{2}{3}x - 2 = 16$

7 In the accompanying diagram, $\overleftrightarrow{AOB}$ is a straight line, $m\angle AOD = 3x - 12$, and $m\angle BOD = x$. What is the value of $x$?




8 In the accompanying diagram of $\triangle ABC$, $m\angle BCD = 125$ and $m\angle BAC = 50$. Find, in degrees, $m\angle ABC$.



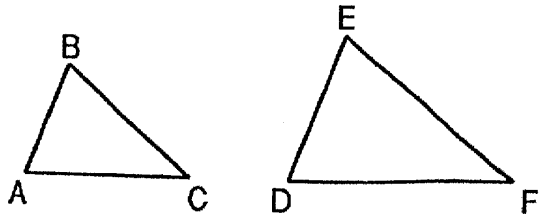

9 Solve the following system of equations for $x$:

$$x + 3y = 6$$
$$2x - 3y = 3$$

10 If $x$ varies directly as $y$ and $x = 2$ when $y = 12$, find $y$ when $x = -1$.

11 Solve for $t$: $3t + 5(6 - t) = 4$

12 In the accompanying diagram, $\triangle ABC$ is similar to $\triangle DEF$, $\angle A \cong \angle D$, and $\angle B \cong \angle E$. If $AB = 6$, $DE = 8$, and $DF = 12$, find $AC$.




13 Factor: $16y^2 - 9$

14 Using $p$ and $q$, write in symbolic form the converse of $\sim p \rightarrow q$.

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

16 Solve for $k$: $\frac{k-1}{15} = \frac{15}{9}$

17 Solve for the positive value of $x$:

$$x^2 + 4x - 21 = 0$$

18 Find the area of square $ABCD$ with vertices $A(-1,2)$, $B(3,2)$, $C(3,-2)$, and $D(-1,-2)$.

19 Evaluate: ${}_4P_2$

20 If two fair coins are tossed, what is the probability of getting two heads?

21 The length of the hypotenuse of a right triangle is 10 and the length of one leg is 5. Find, to the *nearest integer*, the length of the other leg.

*Directions* (22–35): 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.

22 The product $(2x^2)(-3x^3)$ is

(1) $-6x^6$
(2) $-6x^5$
(3) $-x^5$
(4) $-x^6$

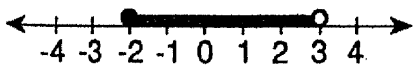
23 If the perimeter of a square is represented by $4x - 16$, the length of a side of this square can be expressed as

(1) $x$
(2) $4x - 4$
(3) $x - 16$
(4) $x - 4$

24 Which is the equation of a line whose slope is -2 and whose $y$-intercept is 3?

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

25 Which inequality is represented in the graph below?




(1) $-2 < x < 3$
(2) $-2 \leq x < 3$
(3) $-2 \leq x \leq 3$
(4) $-2 < x \leq 3$

26 Expressed in decimal form, the number $1.23 \times 10^{-3}$ is

(1) 1230
(2) 0.000123
(3) 0.00123
(4) 123,000

27 If $p \vee q$ is false, then which statement is true?

(1) $p$ and $q$ are both true.
(2) $p$ is false and $q$ is true.
(3) $p$ is true and $q$ is false.
(4) $p$ and $q$ are both false.

28 If $x > 0$ and $y = 0$, which statement is true?

(1) $x - y = 0$
(2) $xy = 0$
(3) $x + y < 0$
(4) $\frac{x+y}{x} = 0$

29 Which type of symmetry does the letter D have?

(1) line symmetry, only
(2) both point and line symmetry
(3) point symmetry, only
(4) neither point nor line symmetry

30 Under which transformation is size *not* preserved?

(1) translation
(2) reflection
(3) dilation
(4) rotation

31 On a mathematics test, Bob scored at the 80th percentile. Which statement is true?

(1) Bob scored 80% on his test.
(2) Bob answered 80 questions correctly.
(3) Eighty percent of the students who took the test had the same score as Bob did.
(4) Eighty percent of the students who took the test had a score equal to or less than Bob's score.

32 If the ratio of the corresponding sides of two similar triangles is 3:5, the ratio of the areas of these triangles is

(1) 3:5
(2) $\sqrt{3}:\sqrt{5}$
(3) 9:25
(4) 27:125

33 The expression $\frac{16y^3 + 4y^2 + 2y}{-2y}$, $y \neq 0$, is equivalent to

(1) $-8y^2 - 2y - 1$
(2) $-8y^2 - 2y$
(3) $-2y$
(4) $8y^2 - 2y - 1$

34 If $x$ represents the smallest of three consecutive odd integers, then the largest would be represented by

(1) $x + 2$
(2) $x + 3$
(3) $x + 4$
(4) $x + 5$

35 The expression $y^3 + y^3$ is equivalent to

(1) $2y^6$
(2) $2y^3$
(3) $y^9$
(4) $y^6$

# FOR TEACHERS ONLY

SCORING KEY

## THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

# COURSE I

**Wednesday**, August 17, 1994 — 8:30 to 11:30 a.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 22–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) $r \leftrightarrow s$

(2) 50

(3) 3

(4) $14x$

(5) 18

(6) 27

(7) 48

(8) 75

(9) 3

(10) $-6$

(11) 13

(12) 9

(13) $(4y - 3)(4y + 3)$

(14) $q \rightarrow \sim p$

(15) $\frac{11x}{12}$

(16) 26

(17) 3

(18) 16

(19) 12

(20) $\frac{1}{4}$

(21) 9

(22) 2

(23) 4

(24) 1

(25) 2

(26) 3

(27) 4

(28) 2

(29) 1

(30) 3

(31) 4

(32) 3

(33) 1

(34) 3

(35) 2

[OVE

## Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics* and its supplement. 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) 6 and 7 [10]

(37) *b* (1) $\frac{1}{12}$ [2]

(2) $\frac{2}{12}$ [2]

(3) $\frac{8}{12}$ [2]

(4) $\frac{4}{12}$ [2]

(38) *a* 103.6 [6]

*b* 4 [2]

*c* $14\pi$ [2]

(39) *c* 4 [2]

*d* 10 [2]

(40) *b* No [1]

(42) $x = 2$
$y = -2$ [8]

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

## Part II

**Answer four 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.** [40]

36 The sum of the squares of two consecutive positive integers is 85. Find the integers. [*Only an algebraic solution will be accepted.*] [10]

37 Jill picked a letter from the word "WIN" at random and then picked a letter from the word "GAME" at random.

*a* Draw a tree diagram or list the sample space showing all possible outcomes. [2]

*b* Find the probability that

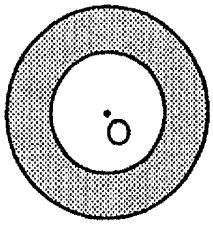
(1) one of the letters chosen was an "N" and the other was an "M" [2]

(2) one of the letters chosen was a "W" and the other was a vowel [The letters *a*, *e*, *i*, *o*, and *u* are vowels.] [2]

(3) *at least* one letter chosen was a vowel [2]

(4) neither letter chosen was a vowel [2]

38 In the accompanying diagram, both circles have the same center *O*. The radii of the circles are 4 and 7.




*a* Find, to the *nearest tenth*, the area of the shaded region. [Use $\pi = 3.14$.] [6]

*b* If the radius of the smaller circle is doubled, by which number will its area be multiplied? [2]

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

(2) 2 (4) 4

*c* Express, in terms of $\pi$, the circumference of the larger circle. [2]

39 The table below shows the distribution of scores that 100 students received on a standardized test.

| Scores | Frequency |
|---|---|
| 91–100 | 15 |
| 81–90 | 26 |
| 71–80 | 23 |
| 61–70 | 15 |
| 51–60 | 11 |
| 41–50 | 5 |
| 31–40 | 3 |
| 21–30 | 2 |

*a* *On your answer paper*, copy and complete the cumulative frequency table below. [2]

| Scores | Cumulative Frequency |
|---|---|
| 21–100 | |
| 21–90 | |
| 21–80 | |
| 21–70 | |
| 21–60 | |
| 21–50 | |
| 21–40 | |
| 21–30 | |

*b* Using the table completed in part *a*, draw a cumulative frequency histogram. [4]

*c* Based on the frequency table, which interval contains the upper quartile? [2]

(1) 31–40 (3) 71–80

(2) 61–70 (4) 81–90

*d* What percent of the students scored less than 51? [2]

40 *a* *On your answer paper*, copy and complete the truth table for the statement $[q \wedge (\sim p \vee q)] \leftrightarrow (p \rightarrow q)$. [9]

| $p$ | $q$ | $\sim p$ | $\sim p \vee q$ | $[q \wedge (\sim p \vee q)]$ | $p \rightarrow q$ | $[q \wedge (\sim p \vee q)] \leftrightarrow (p \rightarrow q)$ |
|---|---|---|---|---|---|---|
| T | T | | | | | |
| T | F | | | | | |
| F | T | | | | | |
| F | F | | | | | |

*b* Based on the truth table constructed in part *a*, is $[q \wedge (\sim p \vee q)] \leftrightarrow (p \rightarrow q)$ a tautology? [1]

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41 *a* On the same set of coordinate axes, graph the following system of inequalities:

$$y + x < 6$$
$$y \geq 2x + 3$$ [8]

*b* Using the graphs drawn in part *a*, write the coordinates of a point in the solution set of the system of inequalities. [2]

42 Solve the following system of equations and check:

$$3x + y = 4$$
$$2y = x - 6$$ [8,2]

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

# SEQUENTIAL MATH — COURSE I

Wednesday, August 17, 1994 — 8:30 to 11:30 a.m., only

| | |
|---|---|
| Part I Score | ..... |
| Part II 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 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 prio to the examination, and that I have neither given nor received assistance in answering any of the questions during th examination.

Signature