The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

# THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

# COURSE I

Thursday, January 30, 1997 — 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.**

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 If the probability of snow tomorrow is $\frac{2}{5}$, what is the probability of no snow tomorrow?

2 Let $p$ represent "Today is Monday" and let $q$ represent "I am tired." Using $p$ and $q$, write in symbolic form: "Today is Monday and I am not tired."

3 If a letter is chosen at random from the ten letters in the word "SEQUENTIAL," find the probability that the letter chosen is an "E."

4 In six computer games, Olga scored 122, 138, 130, 98, 102, and 124. What was the mean of her scores?

5 Solve for $x$:   $1.4x - 0.9 = 3.3$

6 Let $p$ represent "The triangle is equilateral," and let $q$ represent "The triangle is a right triangle." Using $p$ and $q$, write in symbolic form: "If the triangle is a right triangle, then it is not equilateral."

7 If 25% of a number is 12, find the number.

8 Solve for $x$:   $\frac{7}{10}x + 2 = 16$

9 In the accompanying diagram, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at $E$. If $m\angle AED = 2x + 11$ and $m\angle CEB = 5x - 19$, find the value of $x$.



10 The area of a circle is $25\pi$. What is the length of a radius of the circle?

11 A girl 5 feet tall casts a shadow of 2 feet. At the same time, a nearby tree casts a shadow of 24 feet. Find the number of feet in the height of the tree.

12 If $x$ varies directly as $y$ and $x = 8$ when $y = 4$, find $x$ when $y = 16$.

13 Find the value of $5xy^2$ if $x = -2$ and $y = -3$.

14 In the accompanying diagram, parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are intersected by transversal $\overleftrightarrow{EF}$ at $G$ and $H$, respectively. If $m\angle CHG = x + 20$ and $m\angle DHG = 3x$, find the value of $x$.



15 Expressed in radical form, what is the product of $2\sqrt{7}$ and $3\sqrt{5}$?

16 The larger angle of two supplementary angles has a measure of 20° more than the measure of the smaller angle. Find the number of degrees in the measure of the *smaller* angle.
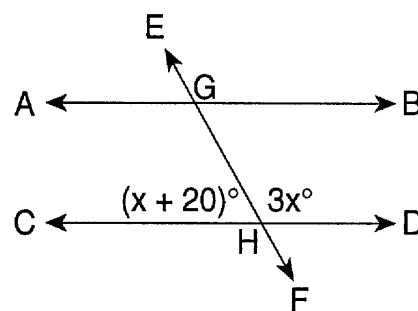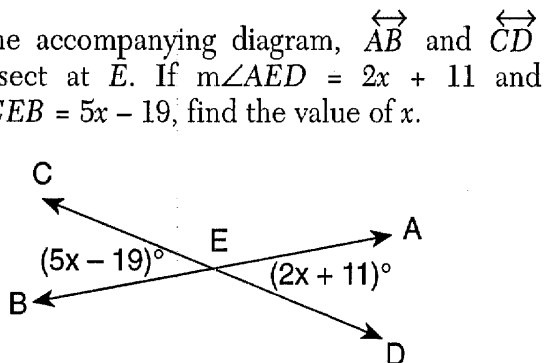
17 In the accompanying diagram, $m\angle A = x + 20$, $m\angle B = 3x$, $\angle BCD$ is an exterior angle formed by extending $\overline{AC}$ to point $D$, and $m\angle BCD = 120$. Find the value of $x$.

B

$3x°$

$(x + 20)°$     $120°$

A          C     D
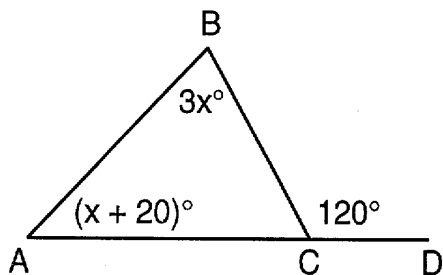
18 Solve for $x$:   $9x - 4(x - 3) = 72$

19 Solve the following system of equations for $y$:

$$2x + y = 12$$
$$-2x + 3y = -4$$

20 What is the additive inverse of $-\frac{a}{2}$?

21 The test scores for 20 students in a Spanish class are shown in the frequency table below. In which interval does the upper quartile lie?

| Interval | Frequency |
| --- | --- |
| 90–99 | 4 |
| 80–89 | 6 |
| 70–79 | 5 |
| 60–69 | 4 |
| 50–59 | 1 |

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 What is the quotient of $\frac{26x^4 y^2}{13xy}$, $x \neq 0$, $y \neq 0$?

(1) $2x^4 y^2$          (3) $2x^3 y$
(2) $13x^5 y^3$          (4) $13x^3 y$

23 The two acute angles in an isosceles right triangle must measure

(1) 30° and 60°          (3) 40° and 50°
(2) 35° and 55°          (4) 45° and 45°

24 What is the value of $_5P_1$?

(1) 1          (3) 24
(2) 5          (4) 120

25 The perimeter of a square is $20x - 4$. Which expression represents a side of the square in terms of $x$?

(1) $5x$          (3) $8x - 16$
(2) $10x - 2$          (4) $5x - 1$

26 Which number is not a member of the solution set of the inequality $4x \geq 18$?

(1) 4.4          (3) 4.6
(2) 4.5          (4) 4.7

27 What is the sum of $\frac{x - 1}{3}$ and $\frac{x + 3}{5}$?

(1) $\frac{x + 1}{4}$          (3) $\frac{8x + 4}{15}$

(2) $\frac{8x + 2}{15}$          (4) $\frac{x^2 + 2x - 3}{15}$

28 Which figure can not have both pairs of opposite sides parallel?

(1) parallelogram          (3) rhombus
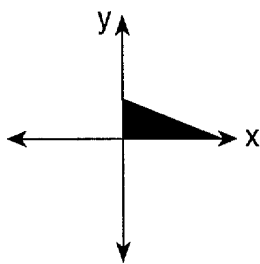(2) rectangle          (4) trapezoid

29 Which is a rational number?

(1) $\sqrt{7}$          (3) $\sqrt{49}$
(2) $\sqrt{18}$          (4) $\sqrt{20}$

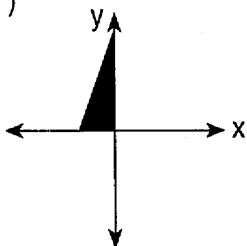30 If each side of a rectangle is doubled, the area of the rectangle will

(1) double
(2) be multiplied by 4
(3) be divided by 2
(4) remain the same
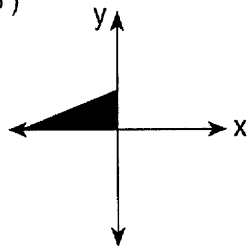
31 The accompanying diagram shows a right triangle.



If the triangle is rotated 90° counterclockwise about the origin, what will the image be?

( 1 )



( 3 )



( 2 )
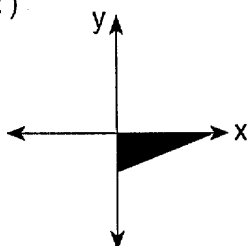


( 4 )
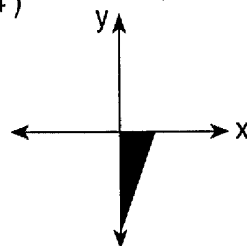


32 Which statement is true about the graph of the line whose equation is $y = 8$?

(1) The line is parallel to the $x$-axis.
(2) The line is parallel to the $y$-axis.
(3) The line passes through the origin.
(4) The line has a slope of 8.

33 The solution set of $x^2 - 5x + 6 = 0$ is

(1) {1,5}
(2) {−1,−5}
(3) {2,3}
(4) {−2,−3}

34 The length of the hypotenuse of a right triangle is 20 centimeters and the length of one leg is 12 centimeters. The length of the other leg is

(1) 8 cm
(2) 16 cm
(3) 32 cm
(4) $\sqrt{544}$ cm

35 Which sentence illustrates the associative property for multiplication?

(1) $ab = ba$
(2) $a(bc) = (ab)c$
(3) $a \cdot 1 = a$
(4) $a(b + c) = ab + ac$

**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 James is four years younger than Austin. If three times James' age is increased by the square of Austin's age, the result is 28. Find the ages of James and Austin. [*Only an algebraic solution will be accepted.*] [4,6]

37 Write an equation or a system of equations that can be used to solve *each* of the following problems. In *each* case, state what the variable or variables represent. [*Solution of the equations is not required.*]

a The sum of two numbers is 240. The larger number is 6 less than twice the smaller. Find the numbers. [5]

b In the accompanying diagram of isosceles trapezoid $ABCD$, $AB = CD$. The measure of $\angle B$ is 40° more than the measure of $\angle A$. Find $m\angle A$ and $m\angle B$. [5]
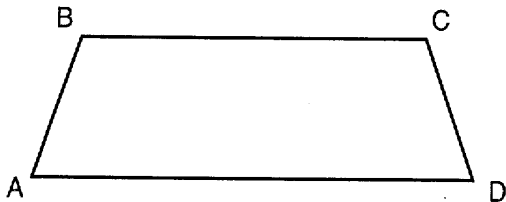


38 A jar contains four balls. Each ball has one letter printed on it. The letters are $A$, $E$, $D$, and $G$. One ball is drawn from the jar and its letter is noted. A second ball is then drawn without replacing the first and its letter is noted.

a Draw a tree diagram or list the sample space showing all possible outcomes. [4]

b Find the probability that the letters printed on the two balls drawn consist of

(1) *at least* one vowel [2]
(2) no vowels [2]
(3) the same letter [2]

39 Construct and complete the truth table for the statement $\sim(q \wedge \sim p) \leftrightarrow (p \vee q)$. [10]

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

$$y \leq -4x + 6$$
$$y > \tfrac{2}{5}x - 5 \qquad [8]$$

b Based on the graph drawn in part a, write the coordinates of a point in the solution set of this system. [2]

41 Use any method — algebraic, trial and error, making a table, etc. — to solve this problem. A written explanation of how you arrived at your answer is also acceptable. Show all work.

There are two pairs of integers that satisfy both of these conditions:

    The smaller integer is 10 less than the larger integer.
    The sum of the squares of the integers is 250.

a Find the two pairs of integers. [8]

b Show that one pair of integers found in part a satisfies both given conditions. [2]

42 Pentagon $RSTUV$ has coordinates $R(1,4)$, $S(5,0)$, $T(3,-4)$, $U(-1,-4)$, and $V(-3,0)$.

a *On graph paper*, plot pentagon $RSTUV$. [2]

b Draw the line of symmetry of pentagon $RSTUV$ and label the line $b$. [2]

c Find the area of

(1) triangle $RVS$ [2]
(2) trapezoid $STUV$ [3]
(3) pentagon $RSTUV$ [1]

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REGENTS HIGH SCHOOL EXAMINATION

# SEQUENTIAL MATH – COURSE I

**Thursday,** January 30, 1997 — 9:15 a.m. to 12:15 p.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 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 I

Thursday, January 30, 1997 — 9:15 a.m. to 12:15 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 22–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

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

(2) $p \wedge \sim q$

(3) $\frac{2}{10}$

(4) 119

(5) 3

(6) $q \rightarrow \sim p$

(7) 48

(8) 20

(9) 10

(10) 5

(11) 60

(12) 32

(13) –90

(14) 40

(15) $6\sqrt{35}$

(16) 80

(17) 25

(18) 12

(19) 2

(20) $\frac{a}{2}$

(21) 80–89

(22) 3

(23) 4

(24) 2

(25) 4

(26) 1

(27) 3

(28) 4

(29) 3

(30) 2

(31) 1

(32) 1

(33) 3

(34) 2

(35) 2

[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) Analysis [4]
     1 and 5 [6]

(37) *a* Larger number = $2x - 6$
     Smaller number = $x$ [5]
       $x + 2x - 6 = 240$

   *b* m$\angle A = x$
     m$\angle B = x + 40$ [5]
     $x + x + 40 = 180$

(38) *b* (1) $\frac{10}{12}$ [2]

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

     (3) 0 [2]

(41) *a* 5,15 and –15,–5 [8]

(42) *c* (1) 16 [2]
       (2) 24 [3]
       (3) 40 [1]