

The University of the State of New York  
REGENTS HIGH SCHOOL EXAMINATION

**THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS**

**COURSE I**

Thursday, August 13, 1998 — 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.

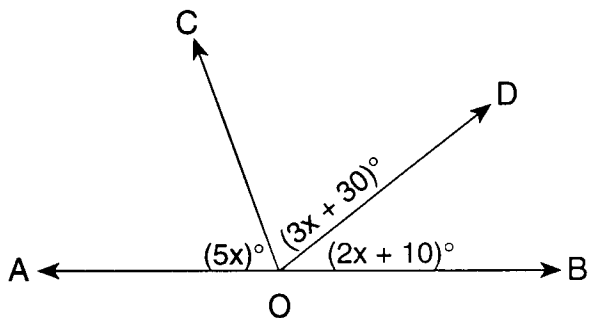
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

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

1 Solve for  $x$ :  $1.4x + 3 = 7.2$

2 In the accompanying diagram,  $\overleftrightarrow{AOB}$  is a straight line,  $m\angle AOC = 5x$ ,  $m\angle COD = 3x + 30$ , and  $m\angle DOB = 2x + 10$ . Find the value of  $x$ .



3 If  $y$  varies directly as  $x$  and  $y = 5$  when  $x = 6$ , find  $y$  when  $x = 18$ .

4 How many different two-digit numbers can be formed from the digits 1, 8, and 2 if each digit is used only once for each number?

5 In parallelogram  $ABCD$ ,  $m\angle A = 4x - 17$  and  $m\angle C = 2x - 5$ . Find the value of  $x$ .

6 Let  $p$  represent "It is cold outside" and let  $q$  represent "I will wear a coat." Using  $p$  and  $q$ , write in symbolic form: "It is cold outside or I will not wear a coat."

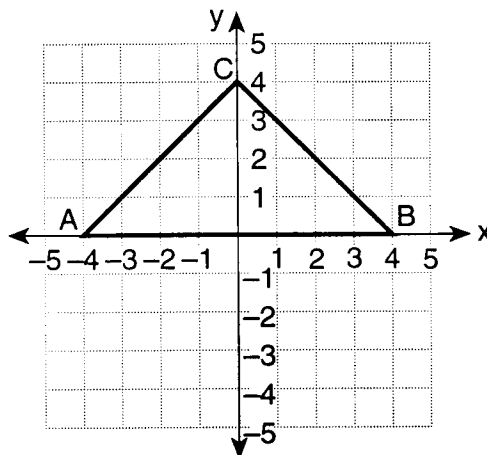
7 If the mean of the set of data below is 7.5, what is the value of  $n$ ?

5, 6,  $n$ , 7, 9, 8, 7, 10

8 If  $a = 1$  and  $b = -2$ , find the value of  $(a - b)^2$ .

9 Solve for  $x$ :  $\frac{2.3}{5} = \frac{x}{15}$

10 In the accompanying diagram, isosceles triangle  $ABC$  has coordinates  $A(-4,0)$ ,  $B(4,0)$ , and  $C(0,4)$ . Find the area of  $\triangle ABC$ .



11 If one base angle of an isosceles triangle is  $55^\circ$ , what is the number of degrees in the vertex angle?

12 For what value of  $x$  is the fraction  $\frac{1}{x-16}$  undefined?

13 Express the product  $(x + 5)(x - 3)$  as a trinomial.

14 If the replacement set for  $x$  is  $\{2, 3, 4, 5, 6\}$ , what is the probability that a number chosen at random from the replacement set will make the expression  $3x - 1$  an odd number?

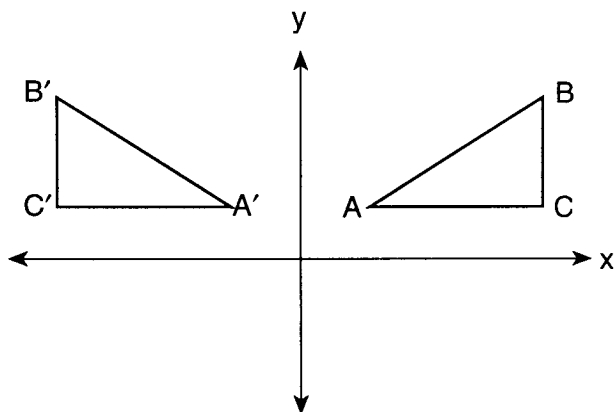
15 Express  $\sqrt{75}$  in simplest radical form.

*Directions (16–35):* 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.

16 The product of  $6s^2$  and  $-4s$  is

- (1)  $24s^2$  (3)  $-24s^3$   
 (2)  $-24s^2$  (4)  $-10s^3$

- 17 In the accompanying diagram,  $\triangle A'B'C'$  is the image of  $\triangle ABC$ .

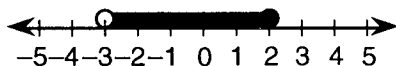


Which type of transformation is shown?

- (1) rotation (3) translation  
 (2) reflection (4) dilation
- 18 What is the total number of lines of symmetry for the letter **A**?
- (1) 1 (3) 3  
 (2) 2 (4) 0

- 19 Expressed in factored form, the binomial  $2x^2y - 4xy^3$  is equivalent to
- (1)  $2xy(x - 2y)$  (3)  $2xy(x - 2y^2)$   
 (2)  $2xy(xy - 4y)$  (4)  $2x^2y^3(y - 2)$

- 20 Which inequality is represented by the graph below?



- (1)  $-3 < x < 2$  (3)  $-3 < x \leq 2$   
 (2)  $-3 \leq x < 2$  (4)  $-3 \leq x \leq 2$
- 21 If one side of a regular octagon is represented by  $3x - 2$ , the perimeter is represented by
- (1)  $9x^2 + 4$  (3)  $24x - 2$   
 (2)  $24x^2 - 16$  (4)  $24x - 16$

- 22 What is the sum of  $3x^2 - x - 2$  and  $x^2 + 2x - 1$ ?
- (1)  $4x^4 + x^2 - 3$  (3)  $4x^2 + x - 3$   
 (2)  $3x^2 + x - 3$  (4)  $4x^2 - x - 3$

- 23 Which equation can be used to solve the problem below?

If four times a number is increased by 15, the result is three less than six times the number. Find the number.

- (1)  $4(x + 15) = 6x - 3$  (3)  $4x + 15 = 6x - 3$   
 (2)  $4x + 15 = 6(x - 3)$  (4)  $4x + 15 = 3 - 6x$

- 24 What is the quotient of  $\frac{18x^6 - 6x^4 - 2x^2}{-2x^2}$ ,  $x \neq 0$ ?

- (1)  $-9x^4 + 3x^2 + 1$  (3)  $-9x^8 + 3x^6$   
 (2)  $-9x^3 + 3x^2 + 1$  (4)  $16x^4 - 8x^2 - 4$

- 25 What is the additive inverse of  $3t$ ?

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

- 26 In the accompanying truth table, which statement should be the heading for the last column?

$p$	$q$	?
T	T	F
T	F	T
F	T	F
F	F	F

- (1)  $p \wedge \sim q$  (3)  $p \rightarrow \sim q$   
 (2)  $p \vee \sim q$  (4)  $\sim q \rightarrow p$

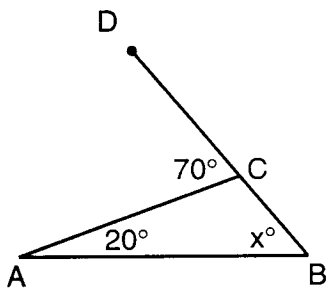
- 27 What is the contrapositive of the statement "If a number is even, then it is a multiple of four"?

- (1) If a number is not even, then it is a multiple of four.  
 (2) If a number is a multiple of four, then the number is even.  
 (3) If a number is not a multiple of four, then the number is not even.  
 (4) If a number is not even, then it is not a multiple of four.

- 28 If the legs of a right triangle are 4 and 7, what is the length of the hypotenuse?

- (1)  $\sqrt{3}$  (3)  $\sqrt{33}$   
 (2)  $\sqrt{11}$  (4)  $\sqrt{65}$

- 29 In the accompanying diagram of  $\triangle ABC$ ,  $\overline{BC}$  is extended to  $D$ ,  $m\angle A = 20$ ,  $m\angle ACD = 70$ , and  $m\angle B = x$ .



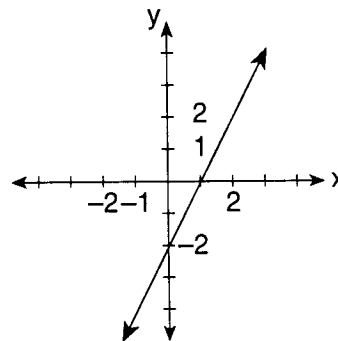
What is the value of  $x$ ?

- (1) 110 (3) 70  
 (2) 90 (4) 50
- 30 What is the solution set of the equation  $2x^2 + 5x - 3 = 0$ ?
- (1)  $\left\{\frac{1}{2}, -3\right\}$  (3)  $\left\{\frac{3}{2}, -1\right\}$   
 (2)  $\left\{-\frac{1}{2}, 3\right\}$  (4)  $\left\{-\frac{3}{2}, 1\right\}$
- 31 Which element is in the solution set for the inequality  $5x - 2 < 8$ ?
- (1) 0 (3) 3  
 (2) 2 (4) 5
- 32 If the radius of a circle is tripled, then the circumference of the circle is multiplied by
- (1) 9 (3) 3  
 (2) 27 (4) 6

- 33 What is the solution for  $x$  in the following system of equations?

$$\begin{aligned} -y &= 2x - 3 \\ y &= -x + 1 \end{aligned}$$

- (1)  $\frac{2}{3}$  (3)  $\frac{4}{3}$   
 (2) 2 (4) 4
- 34 What is the equation of the line in the accompanying graph?



- (1)  $2y = x - 2$  (3)  $y = -2x - 2$   
 (2)  $y = \frac{1}{2}x + 1$  (4)  $y = 2x - 2$
- 35 The difference of  $\frac{3x}{4}$  and  $\frac{x}{2}$  is
- (1)  $\frac{5x}{4}$  (3)  $x$   
 (2)  $\frac{x}{4}$  (4)  $\frac{x}{2}$

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

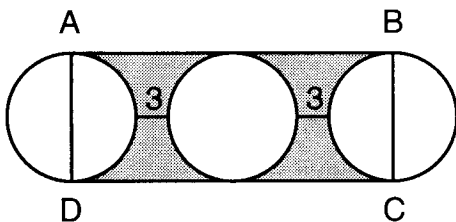
$$\begin{aligned} y &\leq 2x - 3 \\ 2x + y &< 2 \end{aligned} \quad [8]$$

*b* Write the coordinates of a point in the solution set of the system of inequalities graphed in part *a*. [2]

37 Solve the following system of equations algebraically and check.

$$\begin{aligned} 2x + 3y &= -6 \\ 5x + 2y &= 7 \end{aligned} \quad [8,2]$$

38 The accompanying diagram shows three congruent circles in a row.  $\overline{AD}$  and  $\overline{BC}$  are diameters of the outside circles,  $\overline{AB}$  and  $\overline{CD}$  are drawn to form rectangle  $ABCD$ , the radius of each circle is 5, and the distance between adjacent circles is 3.



- a* Find the area of
- (1) one of the circles in terms of  $\pi$  [2]
  - (2) rectangle  $ABCD$  [3]
  - (3) the shaded region to the nearest integer [3]
- b* What percent of the area of rectangle  $ABCD$  is shaded, to the nearest percent? [2]

39 The cost of a telephone call from Albany to Binghamton during peak time is \$0.32 for the first minute and \$0.24 for each additional minute or part of a minute. During off-peak time, a 3-minute call costs \$0.12 and each additional minute or part of a minute costs \$0.08.

- a* If a call between these two cities during peak time costs no more than \$3.00, what is the greatest number of whole minutes possible for this call? [Show or explain the procedure you used to obtain your answer.] [7]
- b* What is the cost of a 10-minute call during off-peak time? [3]

40 The scores on a mathematics test were 78, 83, 70, 84, 89, 67, 84, 78, 85, 77, 68, 80, 71, 78, 81, 75, 88, 90, 71, and 73.

Score	Tally	Frequency
67-70		
71-74		
75-78		
79-82		
83-86		
87-90		

- a* On your answer paper, copy and complete the frequency table for these scores. [4]
- b* Using the table completed in part *a*, construct a frequency histogram for these scores. [4]
- c* Which interval contains the upper quartile? [2]

GO RIGHT ON TO THE NEXT PAGE. ➡

41 A jar contains 13 marbles. Each marble is red, white, or blue. The number of white marbles is three times the number of red marbles, and the number of blue marbles is 1 more than twice the number of red marbles.

*a* Find the number of marbles of *each* color in the jar. [6]

*b* One marble is selected at random, its color is noted, and then it is replaced in the jar. A second marble is then selected at random.

Find the probability that

(1) both marbles selected are red [2]

(2) the first marble is white and the second one is red [2]

42 The length of the hypotenuse of a right triangle is 2 feet more than the longer leg. The length of the longer leg is 7 feet more than the length of the shorter leg. Find the number of feet in the length of each side of the right triangle. [*Only an algebraic solution will be accepted.*] [4.6]

SEQUENTIAL MATH – COURSE I

Thursday, August 13, 1998 — 8:30 to 11:30 a.m., only

Part I Score	.....
Part II Score	<u>.....</u>
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, August 13, 1998 — 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 16–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 3	(11) 70	(21) 4	(31) 1
(2) 14	(12) 16	(22) 3	(32) 3
(3) 15	(13) $x^2 + 2x - 15$	(23) 3	(33) 2
(4) 6	(14) $\frac{3}{5}$	(24) 1	(34) 4
(5) 6	(15) $5\sqrt{3}$	(25) 2	(35) 2
(6) $p \vee \sim q$	(16) 3	(26) 1	
(7) 8	(17) 2	(27) 3	
(8) 9	(18) 1	(28) 4	
(9) 6.9	(19) 3	(29) 4	
(10) 16	(20) 3	(30) 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.

(37) (3,-4) [8]  
 Check [2]

(38) *a* (1)  $25\pi$  [2]  
 (2) 260 [3]  
 (3) 103 [3]  
*b* 40 [2]

(39) *a* 12 [7]  
*b* \$0.68 [3]

(40) *c* 83-86 [2]

(41) *a* 2 red marbles  
 6 white marbles [6]  
 5 blue marbles

*b* (1)  $\frac{4}{169}$  [2]  
 (2)  $\frac{12}{169}$  [2]

(42) Analysis [4]  
 8, 15, 17 [6]