The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Tuesday, January 23, 1996 – 1:15 to 4:15 p.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

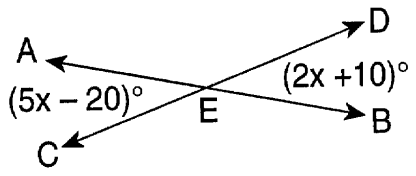
Answer 30 questions from this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet. Where applicable, answers may be left in terms of π or in radical form. [60]

1 What is the mode of the following set of numbers?

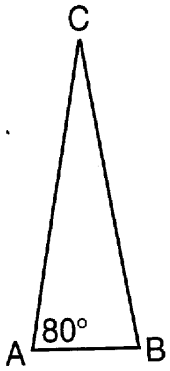
6, 7, 8, 3, 5, 8, 1

2 The probability that an event will occur is $\frac{4}{9}$. What is the probability that the event will *not* occur?

3 In the accompanying diagram, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at E, $m\angle AEC = 5x - 20$, and $m\angle DEB = 2x + 10$. Find the value of x.



4 In the accompanying diagram, $\overline{AC} \cong \overline{BC}$ and $m\angle A = 80$. Find $m\angle C$.



5 Express $(a + 3)(a - 4)$ as a trinomial.

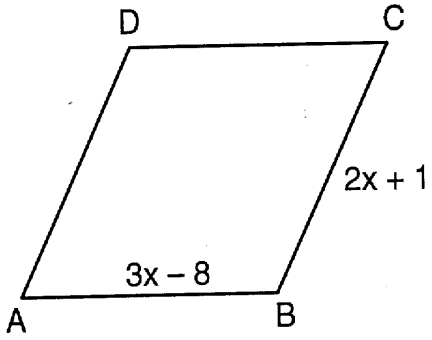
6 Let p represent "x is an even number" and let q represent "x is greater than 15." Using p and q, write in symbolic form: "x is an even number or x is not greater than 15."

7 What is the converse of $p \rightarrow q$?

8 Solve for the positive value of x:

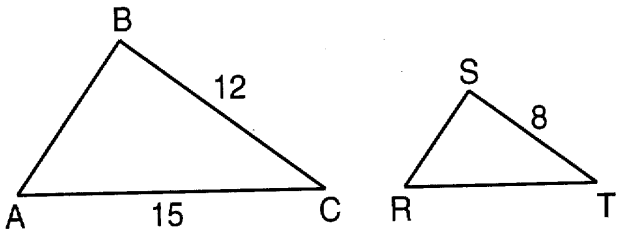
$3x^2 - 27 = 0$

9 In the accompanying diagram of rhombus $ABCD$, the lengths of sides $\overline{AB}$ and $\overline{BC}$ are represented by $3x - 8$ and $2x + 1$, respectively. Find the value of x.



10 Solve for x: $2(x + 1) = 3(4 - x)$

11 In the accompanying diagram, $\triangle ABC$ is similar to $\triangle RST$, $BC = 12$, $AC = 15$, and $ST = 8$. Find RT.

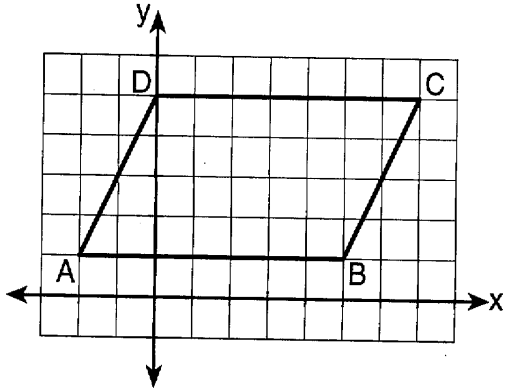


12 Solve for x: $\frac{x}{x + 2} = \frac{4}{5}$, $x \neq -2$

13 Factor: $2x^2 - 5x + 2$

14 If $(k,4)$ is a point on the graph of the equation $4x + 2y = 4$, what is the value of k?

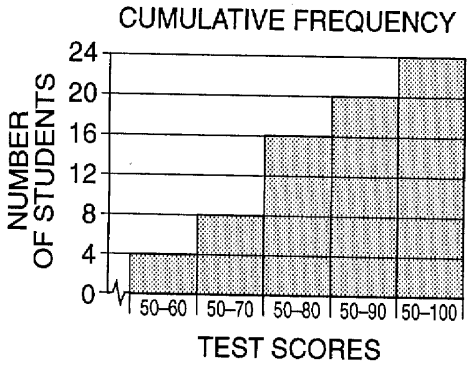
15 Find the number of square units in the area of parallelogram $ABCD$.



16 Solve for x: $0.5x + 1.8 = -0.7$

17 Two angles are complementary. If the measure of one angle is 20° more than the measure of the second angle, what is the number of degrees in the measure of the *smaller* angle?

18 The cumulative frequency histogram below shows the scores that 24 students received on an English test. How many students had scores between 71 and 80?

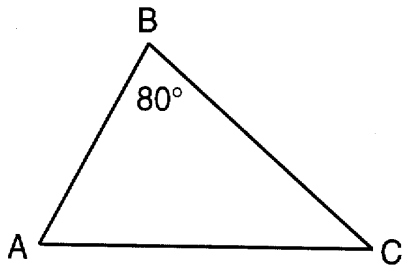


Directions (19–35): For *each* question chosen, write on the separate answer sheet the *numeral* preceding the word or expression that best completes the statement or answers the question.

19 Which letter has both point and line symmetry?

(1) **A**
(2) **H**
(3) **M**
(4) **S**

20 In the accompanying diagram of $\triangle ABC$, $m\angle B = 80$.



What is the value of $\frac{1}{2}(m\angle A + m\angle C)$?

(1) 40
(2) 50
(3) 100
(4) 140

21 If $4x + y = H$, then x is equal to

(1) $\frac{H}{4} - y$
(2) $\frac{H}{4} + y$
(3) $\frac{H + y}{4}$
(4) $\frac{H - y}{4}$

22 When a number is chosen at random from the set {1,2,3,4,5,6}, which event has the greatest probability of occurring?

(1) choosing an even number
(2) choosing a prime number
(3) choosing a number greater than 3
(4) *not* choosing either 1 or 6

23 Which equation could be used to solve the problem below?

If three times a number is increased by 24, the result is 4 less than seven times the number.

(1) $3(x + 24) = 7x - 4$
(2) $3x + 24 = 4 - 7x$
(3) $3x + 24 = 7x - 4$
(4) $27x = 7x - 4$

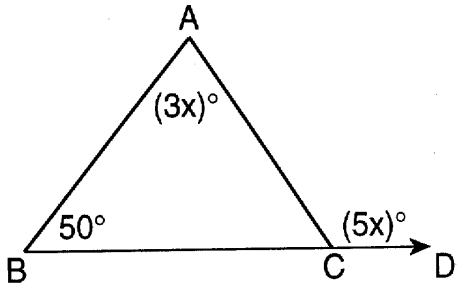
24 A member of the solution set of $-1 \leq x < 4$ is

(1) -1
(2) -2
(3) 5
(4) 4

25 The reciprocal of $-\frac{1}{x}$, $x \neq 0$, is

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

26 In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$, $m\angle A = 3x$, $m\angle ACD = 5x$, and $m\angle B = 50$.



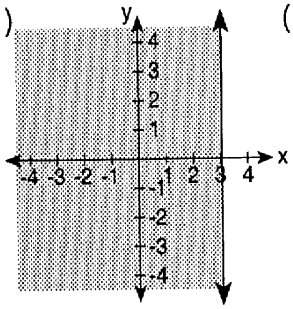
What is the value of x?

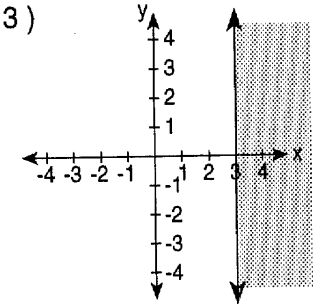
(1) 25
(2) 30
(3) 60
(4) 100

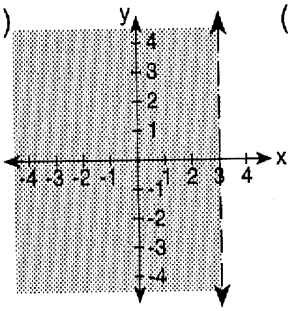
27 Expressed in scientific notation, 0.0000047 is equivalent to

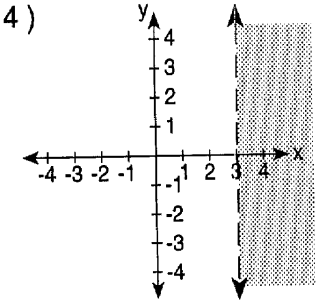
(1) 4.7×10^{-6}
(2) 0.47×10^{-5}
(3) 4.7×10^{6}
(4) 47×10^{6}

28 Which graph represents the inequality $x > 3$?

(1)


(3)


(2)


(4)


29 The expression $2\sqrt{2} + \sqrt{50}$ is equivalent to

(1) $2\sqrt{52}$
(2) $3\sqrt{52}$
(3) $7\sqrt{2}$
(4) $27\sqrt{2}$

30 In the domain {0,1,2,3,4,5,6}, what is the solution set for the inequality $(x < 3) \vee (x \geq 5)$?

(1) { }
(2) {0,1,2,5,6}
(3) {0,1,2,3,5,6}
(4) {4,5}

31 For which value of x is the fraction $\frac{x+5}{x-1}$ undefined?

(1) 1
(2) –1
(3) –5
(4) 5

32 What is the solution for the following system of equations?

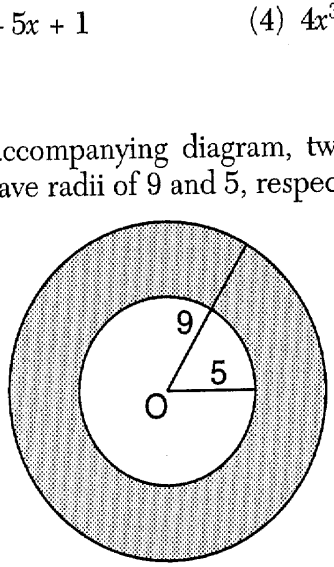
$$x = -y$$
$$x + 2y = 6$$

(1) (–2,2)
(2) (2,–2)
(3) (6,–6)
(4) (–6,6)

33 If $12x^3 - 15x^2 + 3x$ is divided by $3x$, the quotient is

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

34 In the accompanying diagram, two concentric circles have radii of 9 and 5, respectively.



In terms of π, the area of the shaded region is

(1) 56π
(2) 16π
(3) 8π
(4) 4π

35 If the length of the edge of a cube is $5x$, the volume of the cube is

(1) $5x^3$
(2) $15x^3$
(3) $125x^3$
(4) $625x^3$

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:

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

b Using the graphs drawn in part *a*, state the coordinates of a point that is in the solution of $y \geq 3x + 6$ but is not in the solution of $x + y < -2$. [2]

37 Angie has one penny, one nickel, one dime, and one quarter in her pocket. Angie picks one coin at random. Without replacing the coin, she picks a second coin.

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

b Find the probability that the two coins picked have a sum of

(1) *exactly* 15 cents [2]
(2) more than 25 cents [2]
(3) less than 40 cents [2]

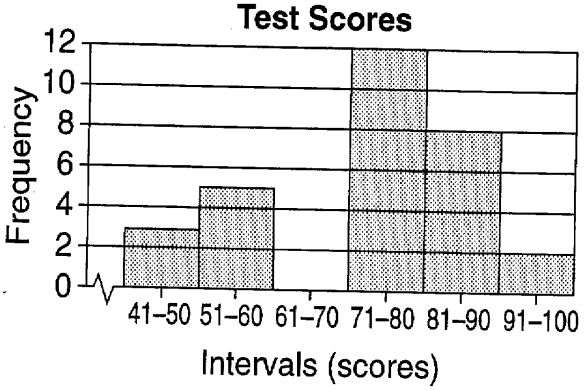
38 A movie theater charges \$7 for an adult's ticket and \$4 for a child's ticket. On a recent night, the sale of child's tickets was three times the sale of adult's tickets. If the total amount collected for ticket sales was not more than \$2,000, what is the greatest number of adults who could have purchased tickets? [*Show or explain the procedure used to obtain your answer.*] [10]

39 In a trapezoid, the smaller base is 3 more than the height, the larger base is 5 less than 3 times the height, and the area of the trapezoid is 45 square centimeters. Find, in centimeters, the height of the trapezoid. [*Only an algebraic solution will be accepted.*] [4,6]

40 Solve the following system of equations algebraically and check:

$$3x + y = 3$$
$$y = 2x - 7$$ [8,2]

41 The graph below shows the distribution of scores of 30 students on a mathematics test.



a *On your answer paper*, copy and complete the cumulative frequency table below, using the data in the frequency histogram above. [2]

Scores	Cumulative Frequency
41–100	
41–90	
41–80	
41–70	
41–60	
41–50	3

b Construct a cumulative frequency histogram using the table completed in part *a*. [4]

c Which interval contains the median score? [2]

(1) 51–60
(2) 61–70
(3) 71–80
(4) 81–90

d Which interval contains the lower quartile? [2]

(1) 41–50
(2) 51–60
(3) 71–80
(4) 81–90

42 *a* *On your answer sheet*, copy and complete the truth table for the statement $\sim(p \rightarrow q) \leftrightarrow (\sim p \vee q)$. [8]

p	q	$p \rightarrow q$	$\sim(p \rightarrow q)$	$\sim p$	$\sim p \vee q$	$\sim(p \rightarrow q) \leftrightarrow (\sim p \vee q)$
T	T					
T	F					
F	T					
F	F					

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

c Justify the answer given in part *b*. [1]

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REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE I

Tuesday, January 23, 1996 – 1:15 to 4:15 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

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Tuesday, January 23, 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 19–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 8

(2) $\frac{5}{9}$

(3) 10

(4) 20

(5) $a^2 - a - 12$

(6) $p \vee \sim q$

(7) $q \rightarrow p$

(8) 3

(9) 9

(10) 2

(11) 10

(12) 8

(13) $(2x - 1)(x - 2)$

(14) –1

(15) 28

(16) –5

(17) 35

(18) 8

(19) 2

(20) 2

(21) 4

(22) 4

(23) 3

(24) 1

(25) 3

(26) 1

(27) 1

(28) 4

(29) 3

(30) 2

(31) 1

(32) 4

(33) 2

(34) 1

(35) 3

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.

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

(2) $\frac{6}{12}$ [2]

(3) 1 [2]

(38) 105 [10]

(39) Analysis [4]

5 [6]

(40) (2,–3) [8]

Check [2]

(41) *c* 3 [2]

d 2 [2]

(42) *b* No [1]

Notice . . .
Beginning in June 1996, a **scientific** calculator must be available to all students taking **all** sequential mathematics examinations. The Course II examination booklet will **not** include the tables of trigonometric functions, and the Course III examination booklet will **not** include the reference tables for mathematics. However, the formula sheet for Course III will continue to be printed in the examination booklet.