The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, January 30, 1992 — 9:15 a.m. to 12:15 p.m., only

Notice . . .

   If your school allows the use of calculators for this examination, they may be used for checking purposes **only**. In Part II, all work, including calculations, must be shown on your answer paper.

   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.
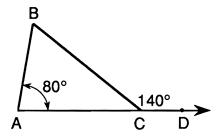
   When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer paper cannot be accepted if you fail to sign this declaration.

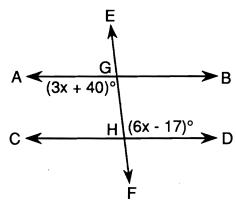**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN**

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 Thirteen students took a math test. The number of errors was 3, 7, 4, 0, 4, 1, 5, 4, 7, 3, 4, 5, and 7. What is the mode of this distribution?

2 Express the sum of $4x^2 - 7x + 6$ and $-3x^2 + 9x - 11$ as a trinomial.

3 The circumference of a circle is 12π. What is the radius of the circle?

4 In the diagram below, $m\angle BCD = 140$ and $m\angle BAC = 80$. Find $m\angle ABC$.

5 In the accompanying diagram, transversal $\overleftrightarrow{EF}$ intersects parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at G and H, respectively. If $m\angle AGH = 3x + 40$ and $m\angle GHD = 6x - 17$, what is the value of x?

6 Solve for x: $8x - 5(x - 1) = 20$

7 If 340,000 is expressed in the form 3.4×10^n, what is the value of n?

8 If $m = 3$ and $v = -4$, find the value of $\frac{1}{2}mv^2$.

9 Two angles are supplementary, and the measure of one angle is three times the measure of the other. Find the measure of the *smaller* angle.

10 Solve for x: $\dfrac{x - 3}{4} = \dfrac{x}{10}$

11 A school menu lists two soups, three main dishes, three desserts, and four drinks. How many different meals consisting of one soup, one main dish, one dessert, and one drink are possible?

12 If a number is picked at random from the set $\{-4,-3,-2,-1,0,1,2,3,4\}$, what is the probability that the number satisfies the equation $x^2 - 9 = 0$?

13 If $2x + 3)(x - 2)$ is written in the form $ax^2 - bx + c$, what is the value of c?

14 The number of chirps made by a cricket varies directly as the temperature. If at $12°$ a cricket chirps 30 times per minute, how many times per minute will the cricket chirp at $20°$?

15 A rectangular floor uses 50 tiles for its length and 20 tiles for its width. Ten of the tiles in this floor are cracked. In an inspection, one tile is selected at random. What is the probability that this tile is cracked?

16 The perimeter of a square is $4a + 12$. Express the length of a side of the square in terms of a.

17 Express as a single fraction in simplest form:

$$\frac{5x + 2}{6} + \frac{2x - 3}{3}$$

Directions (18–35): 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.

18 If p represents "It will rain" and q represents "We go to the movies," the statement "If we do not go to the movies, then it will rain" can be expressed by
(1) $p \rightarrow q$
(3) $\sim q \rightarrow p$
(2) $q \rightarrow \sim p$
(4) $\sim p \rightarrow \sim q$

19 Let p represent "x is an odd integer," and let q represent "x is a multiple of 3." For which value of x will $p \wedge q$ be true?
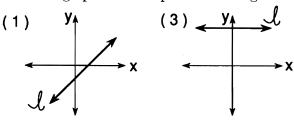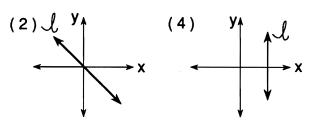(1) 1
(3) 9
(2) 6
(4) 12

20 The product of $-4a^2b^3$ and $5ab^4$ is
(1) a^2b^{12}
(3) $-20a^2b^{12}$
(2) $-20a^2b^7$
(4) $-20a^3b^7$

21 Maria is twice as old as Sue. If x represents Sue's age, which expression represents how old Maria will be in three years?
(1) $2x$
(3) $\frac{1}{2}x - 3$
(2) $x + 3$
(4) $2x + 3$

22 Which measure is *always* the same as the 50th percentile?
(1) mean
(3) mode
(2) median
(4) lower quartile

23 Which statement represents the inverse of the statement "If I do not study, then I will fail"?
(1) If I study, then I will not fail.
(2) If I fail, then I did not study.
(3) If I study, then I will fail.
(4) If I do not fail, then I did study.

24 The width and length of a rectangle are represented by x and $3x + 5$, respectively. If the area of the rectangle is 24, which equation can be used to find the dimensions of the rectangle?
(1) $x(3x + 5) = 24$
(2) $2x(3x + 5) = 24$
(3) $x + (3x + 5) = 24$
(4) $2x + 2(3x + 5) = 24$

25 In which graph is the slope of line ℓ negative?

26 Which figure has one and only one line of symmetry?
(1) rhombus
(3) square
(2) circle
(4) isosceles triangle

27 What are the coordinates of the point where the graph of the equation $x + 2y = 8$ crosses the y-axis?
(1) $(0,8)$
(3) $(0,4)$
(2) $(8,0)$
(4) $(4,0)$

28 Which inequality is equivalent to $2x + 6 > 2$?
(1) $x > -2$
(3) $x > 2$
(2) $x < -2$
(4) $x < 2$

29 If the legs of a right triangle are 4 and 7, the length of the hypotenuse is
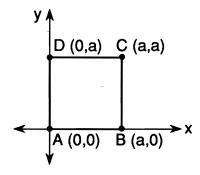(1) $\sqrt{3}$
(3) $\sqrt{33}$
(2) $\sqrt{11}$
(4) $\sqrt{65}$

30 Which is the additive inverse of $-\frac{a}{3}$?
(1) $\frac{a}{3}$
(3) $-\frac{3}{a}$
(2) $\frac{3}{a}$
(4) 0

31 Which is the solution set of the equation $2x^2 + 3x - 2 = 0$?
(1) $\left\{-\frac{1}{2}, 2\right\}$
(3) $\left\{\frac{1}{2}, 2\right\}$
(2) $\left\{\frac{1}{2}, -2\right\}$
(4) $\left\{-\frac{1}{2}, -2\right\}$

32 In the accompanying diagram, square *ABCD* has vertices *A*(0,0), *B*(*a*,0), *C*(*a*,*a*), and *D*(0,*a*).

What is the area of square *ABCD*?

(1) $4a$ (3) a^2

(2) $2a$ (4) $a\sqrt{2}$

33 Which property is *not* common to all parallelograms?

(1) Opposite sides are parallel.
(2) Opposite angles are congruent.
(3) Consecutive angles are supplementary.
(4) Diagonals are congruent.

34 Which expression could be used to change 8 kilometers per hour to meters per minute?

(1) $\dfrac{8 \text{ km}}{\text{hr}} \cdot \dfrac{\text{km}}{1000 \text{ m}} \cdot \dfrac{\text{hr}}{60 \text{ min}}$

(2) $\dfrac{8 \text{ km}}{\text{hr}} \cdot \dfrac{1000 \text{ m}}{\text{km}} \cdot \dfrac{60 \text{ min}}{\text{hr}}$

(3) $\dfrac{8 \text{ km}}{\text{hr}} \cdot \dfrac{1000 \text{ m}}{\text{km}} \cdot \dfrac{\text{hr}}{60 \text{ min}}$

(4) $\dfrac{8 \text{ km}}{\text{hr}} \cdot \dfrac{\text{km}}{1000 \text{ m}} \cdot \dfrac{60 \text{ min}}{\text{hr}}$

35 The value of 5^{-2} is

(1) $-\dfrac{1}{25}$ (3) -10

(2) $\dfrac{1}{25}$ (4) -25

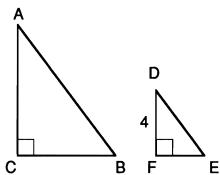**Answers to the following questions are to be written on paper provided by the school.**

Part II

Answer four questions from this part. All work, including calculations, must be shown on your answer paper. [40]

36 Solve the following system of equations graphically and check:

$$y = -x + 2$$
$$3y - 2x = -9$$ [8,2]

37 A jar contains one dime, two quarters, and three nickels. Without looking, Andrew picks one coin from the jar. Without replacing this coin, he picks another coin.

  a Draw a tree diagram or list the sample space of all possible outcomes. [3]

  b What is the probability Andrew picked a dime first and then a nickel? [2]

  c What is the probability he picked two dimes from the jar? [2]

  d What is the probability he picked two coins such that the sum of their values is greater than or equal to 35 cents? [3]

38 In the accompanying diagram, right triangle *DEF* is similar to right triangle *ABC*. The measure of $\overline{AC}$ is 2 more than the measure of $\overline{BC}$, the measure of $\overline{EF}$ is 3 less than the measure of $\overline{BC}$, and *DF* = 4.

  a Find the measure of $\overline{BC}$. [6]

  b Find the measure of $\overline{AB}$. [2]

  c What is the ratio of the area of △*ABC* to the area of △*DEF*? [2]

39 Brian has $78 and wants to purchase tapes through a music club. Each tape costs $7.50. The music club will add a total postage and handling charge of $3.50 to his order. What is the greatest number of tapes he can purchase? [*Only an algebraic solution will be accepted.*] [5,5]

40 The table below shows the distribution of scores that 20 math students received on a classroom test.

Interval	Frequency
90–99	3
80–89	8
70–79	6
60–69	2
50–59	1

  a In which interval does the median lie? [2]

  b In which interval is the upper quartile? [2]

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

Interval	Cumulative Frequency
50–99	
50–89	
50–79	
50–69	
50–59	1

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

☞ **GO RIGHT ON TO THE NEXT PAGE.**

41 Each part below consists of a set of three statements. The truth values for two statements in each set are given. Based on this information, determine the truth value of the remaining statement. *On your answer paper,* write the letters *a* through *e*, and next to each letter, write the missing truth value (TRUE or FALSE). If the truth value cannot be determined from the information given, write "CANNOT BE DETERMINED."

	Statements	Truth Value	
a	(1) $p \lor q$	TRUE	
	(2) q	?	[2]
	(3) p	FALSE	
b	(1) p	?	
	(2) q	FALSE	[2]
	(3) $p \to q$	TRUE	
c	(1) $p \land q$	FALSE	
	(2) p	FALSE	[2]
	(3) q	?	
d	(1) $q \to p$	TRUE	
	(2) p	FALSE	[2]
	(3) $\sim q$	?	
e	(1) $p \lor q$	TRUE	
	(2) $p \to q$	TRUE	[2]
	(3) q	?	

42 Answer *both a* and *b*.

a The measure of the vertex angle of an isosceles triangle exceeds 3 times the measure of a base angle by 20. Write an equation or system of equations that could be used to find the measure of *each* angle of the triangle. State what the variable(s) represents. [*Solution of the equation(s) is not required.*] [5]

b Write an equation that could be used to find three consecutive positive even integers such that the product of the first and third is six more than nine times the second. State what the variable represents. [*Solution of the equation is not required.*] [5]

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, January 30, 1992 — 9:15 a.m. to 12:15 p.m., only

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use checkmarks to indicate pupil 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 18–35, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 4

(2) $x^2 + 2x - 5$

(3) 6

(4) 60

(5) 19

(6) 5

(7) 5

(8) 24

(9) 45

(10) 5

(11) 72

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

(13) –6

(14) 50

(15) $\frac{1}{100}$

(16) $a + 3$

(17) $\frac{9x - 4}{6}$

(18) 3

(19) 3

(20) 4

(21) 4

(22) 2

(23) 1

(24) 1

(25) 2

(26) 4

(27) 3

(28) 1

(29) 4

(30) 1

(31) 2

(32) 3

(33) 4

(34) 3

(35) 2

[OVER]

Part II

Please refer to the Department's pamphlet *Guide for Rating Regents Examinations in Mathematics.* 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* $\frac{3}{30}$ [2]

    c 0   [2]

    d $\frac{6}{30}$ [3]

(38) *a* 6   [6]

    b 10   [2]

    c 4:1   [2]

(39) 9   [5,5]

(40) *a* 80–89   [2]

    b 80–89   [2]

(41) *a* TRUE   [2]

    b FALSE   [2]

    c CANNOT BE DETERMINED   [2]

    d TRUE   [2]

    e TRUE   [2]

(42) *a* let x = the measure of a base angle

       $x + x + 3x + 20 = 180$ [5]

    b let x = the smallest integer

       $x(x + 4) = 9(x + 2) + 6$ [5]

Notice . . .

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