The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

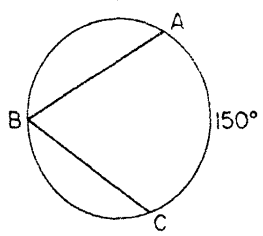# THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Monday, June 19, 1978 — 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. 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.

1 Solve for x: $8x = 2(x + 15)$

2 If student heights are 176 cm, 172 cm, 160 cm, and 160 cm, what is the mean height of these students?

3 Find the area of the triangle whose vertices are $(0,0)$, $(0,4)$, and $(5,0)$.

4 If two angles of a triangle are complementary, find the number of degrees in the third angle of the triangle.

5 Factor completely: $x^2 - 49$

6 The lengths of the sides of a triangle are 24, 20, and 12. If the longest side of a similar triangle is 6, what is the length of its *shortest* side?

7 The perimeter of a square is represented by $12x - 4$. Express the length of one side of the square in terms of x.

8 Subtract $4m - h$ from $4m + h$.

9 The lengths of the legs of a right triangle are 2 and 5. Find, in radical form, the length of the hypotenuse.

10 The angles of a triangle are in the ratio of 1:2:3. Find the measure of the *smallest* angle.

11 Solve for a: $\dfrac{a}{2} + \dfrac{a}{6} = 2$

12 Find the value of $6b^2 - 4a^2$ when $b = 2$ and $a = 1$.

13 A box contains 4 nickels, 3 dimes, and 2 quarters. One coin is drawn, put aside, and then another coin is drawn. What is the probability that the two coins total 9¢?

14 In how many different ways can 4 students be arranged in a row?

15 The probability of the Bears beating the Eagles is $\frac{1}{2}$. The probability of the Bears beating the Cubs is $\frac{3}{5}$. What is the probability of the Bears winning both games?

16 If p represents "He is tall," and q represents "He is handsome," write in symbolic form using p and q: "He is *not* tall, and he is handsome."

17 In the accompanying figure, arc AC measures 150°. Find the number of degrees in inscribed angle ABC.

18 What is the slope of the line whose equation is $4y = 3x + 16$?

19 If a boy has 5 shirts and 3 pairs of pants, how many possible outfits consisting of one shirt and one pair of pants can be chosen?

20 If 19 is subtracted from three times a certain number, the difference is 110. What is the number?

Directions (21–35): For each of those chosen, write on the separate answer sheet the *numeral* preceding the word or expression that best completes the statement or answers the question.

21 The inequality $2x > x + 3$ is equivalent to
(1) $x > 1$ (3) $x = 3$
(2) $x > \frac{3}{2}$ (4) $x > 3$

22 Which ordered pair is the solution to the following system of equations?
$$3x + 2y = 4$$
$$-2x + 2y = 24$$
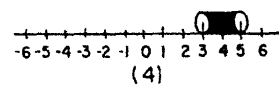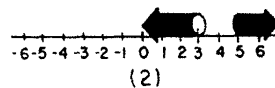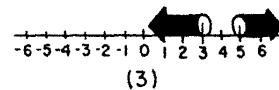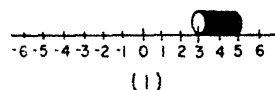(1) $(2,-1)$ (3) $(-4,-8)$
(2) $(-4,8)$ (4) $(2,-5)$

24

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23 Which is the inverse of $\sim p \to q$?

(1) $p \to \sim q$ (3) $\sim p \to \sim q$

(2) $q \to \sim p$ (4) $\sim q \to \sim p$

24 Which is the contrapositive of the statement, "If today is Monday, then tomorrow will be Tuesday"?

(1) Tomorrow is Tuesday if today is Monday.

(2) If tomorrow is Tuesday, then today is Monday.

(3) If today is not Monday, then tomorrow is not Tuesday.

(4) If tomorrow is not Tuesday, then today is not Monday.

25 If the radius of a circle is tripled, then the area of the circle is multiplied by

(1) 27   (3) 3

(2) 9   (4) 6

26 The product of $7y^3$ and $4y^5$ is

(1) $11y^8$ (3) $28y^8$

(2) $11y^{15}$ (4) $28y^{15}$

27 What is 2.5% of 1,000?

(1) 2,500   (3) 25

(2) 250   (4) 2.50

28 This sentence is true: "If it is raining, then the ground gets wet." Which sentence must be true?

(1) If the ground gets wet, then it is raining.

(2) If it is not raining, then the ground does not get wet.

(3) If the ground gets wet, then it is not raining.

(4) If the ground does not get wet, then it is not raining.

29 A point on the graph of $x + 3y = 13$ is

(1) (4,4)   (3) (−5,6)

(2) (−2,3)   (4) (4,−3)

30 The graph of $y = 3x − 4$ is parallel to the graph of

(1) $y = 4x − 3$ (3) $y = −3x + 4$

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

31 The solution set of the equation $x^2 − 3x = 0$ is

(1) $\{3\}$ (3) $\{3,−3\}$

(2) $\{−3\}$ (4) $\{0,3\}$

32 Which represents an irrational number?

(1) $−\frac{4}{5}$ (3) $\sqrt{9}$

(2) π (4) 0

33 From an ordinary deck of 52 cards, one card is drawn. What is the probability that the card drawn is either a king or a seven?

(1) $\frac{26}{52}$ (3) $\frac{8}{52}$

(2) $\frac{13}{52}$ (4) $\frac{2}{52}$

34 The expression $\sqrt{27} + \sqrt{12}$ is equivalent to

(1) $\sqrt{39}$ (3) $5\sqrt{6}$

(2) $13\sqrt{3}$ (4) $5\sqrt{3}$

35 Which graph shows the solution to $(x < 3) \lor (x \geq 5)$?

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

Part II

Answer four questions from this part. Show all work unless otherwise directed.

36 Answer *either a or b but not* both:

a Solve graphically and check:

$$x + y = 6 \qquad [8,2]$$
$$2x - y = 0$$

OR

b (1) On the same set of coordinate axes, graph the following system of inequalities:

$$y > x + 4$$
$$x + y \le 2 \qquad [8]$$

(2) Which point is in the solution set of the graph drawn in answer to *a*?

   (1) (2,3)   (3) (0,6)
   (2) (−5,2)   (4) (−1,0)   [2]

37 The length of a rectangle is 1 centimeter less than twice the width. If the perimeter of the rectangle is 76 centimeters, find the number of centimeters in *each* dimension of the rectangle. [*Only an algebraic solution will be accepted.*]   [5,5]

38 The sum of the squares of two positive consecutive odd integers is 74. What are the integers? [*Only an algebraic solution will be accepted.*]   [5,5]

39 The following data represent the heights of 14 students in a certain class: 65, 63, 68, 59, 74, 59, 68, 61, 64, 60, 69, 72, 55, 64.

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

Interval	Number (frequency)
55 — 58	
59 — 62	
63 — 66	
67 — 70	
71 — 74	

b On graph paper, construct a frequency histogram based on the data.   [6]

c The median is contained in which interval?   [2]

40 A die and a coin are tossed simultaneously. The die is fair and has six faces.

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

b What is the probability of obtaining a 6 on the die and a head on the coin?   [2]

c What is the probability of obtaining an odd number on the die and a tail on the coin?   [2]

d What is the probability of obtaining a head on the coin?   [2]

41 a On your answer paper, copy and complete the truth table for the statement
$(\sim p \to q) \leftrightarrow (p \vee q)$.   [7]

p	q	$\sim p$	$\sim p \to q$	$p \vee q$	$(\sim p \to q) \leftrightarrow (p \vee q)$

b Is $(\sim p \to q) \leftrightarrow (p \vee q)$ a tautology?   [1]

c Let *p* represent: "I do my homework."
Let *q* represent: "I get into trouble."
Which sentence is equivalent to $(p \vee q)$?

(1) If I do not do my homework, I will get into trouble.
(2) I do my homework or I do not get into trouble.
(3) If I do my homework, I get into trouble.
(4) I do my homework and I get into trouble.   [2]

42 Solve algebraically for *x* and *y* and check:

$$2x + y = 6 \qquad [8,2]$$
$$x = 3y + 10$$

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SEQUENTIAL MATH — COURSE I

Monday, June 19, 1978 — 9:15 a.m. to 12:15 p.m., only

Part I Score: ....

Rater's Initials:

....

ANSWER SHEET

Pupil......... ....Teacher..

School ....Grade........................

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

Monday, June 19, 1978 — 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.] For questions 21–35, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 5	(11) 3	(21) 4	(31) 4
(2) 167 cm *or* 167	(12) 20	(22) 2	(32) 2
(3) 10	(13) 0	(23) 1	(33) 3
(4) 90	(14) 24	(24) 4	(34) 4
(5) $(x + 7)(x - 7)$	(15) $\frac{3}{10}$	(25) 2	(35) 2
(6) 3	(16) $\sim p \wedge q$	(26) 3	
(7) $3x - 1$	(17) 75	(27) 3	
(8) $2h$	(18) $\frac{3}{4}$	(28) 4	
(9) $\sqrt{29}$	(19) 15	(29) 3	
(10) 30° *or* 30	(20) 43	(30) 2	

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers 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.

(36) b (2) 2   [2]

(37) Analysis   [5]
    13, 25   [5]

(38) Analysis   [5]
    5, 7   [5]

(39) a

Interval	Number
55–58	1
59–62	4
63–66	4
67–70	3
71–74	2 [2]

   c 63–66   [2]

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

   c $\frac{3}{12}$ [2]

   d $\frac{6}{12}$ [2]

(41) b yes   [1]

   c 1   [2]

(42) $x = 4$
   $y = -2$ [8]
   Check   [2]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

B

Monday, June 26, 1978 — 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.

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DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

Answer 30 questions from this part. Each correct answer will receive 2 credits. 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.

1 Solve for x: $7x + 8 = 22$

2 Solve for x: $\dfrac{1}{x} = \dfrac{1}{4}$

3 Solve for x: $4(x - 2) = 8x - 12$

4 The lengths of the sides of a rectangle are 2 and 7. Find, in radical form, the length of the diagonal of the rectangle.

5 Express as a trinomial the product of $(2x + 7)$ and $(x - 4)$.

6 Find the sum of $3x^2 + 2x - 5$ and $5x^2 - 3x + 6$.

7 Solve for x: $\dfrac{x}{3} - \dfrac{x}{7} = 4$

8 Solve for x:
$$2x + y = 5$$
$$x + y = 3$$

9 If p represents "He is happy" and q represents "He is rich," write in symbolic form using p and q: "He is happy and he is *not* rich."

10 Find the value of $3x^2yz$ if $x = -1$, $y = 4$, and $z = 2$.

11 What is the probability of drawing a black card from an ordinary deck of cards on a single draw?

12 In a single toss of two dice, what is the probability of obtaining the same number on each die?

13 The perimeter of a square is represented by $8x - 4$. Express the length of one side in terms of x.

14 The area of a rectangle is 364 square centimeters and its width is 14 centimeters. Find the number of centimeters in its length.

15 Factor: $x^2 - a^2$

16 Find the area of the triangle whose vertices are $(0,0)$, $(0,5)$, and $(5,0)$.

17 In the accompanying figure, inscribed angle ABC measures 40°. What is the number of degrees in the measure of minor arc AC?
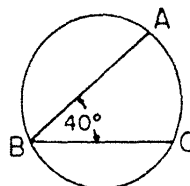
18 What is the total number of possible 4-letter arrangements of the letters M, A, T, and H if each letter is used only once in each arrangement?

19 If p represents "Today is Monday" and q represents "I am tired," write in symbolic form using p and q: "If today is Monday, then I am tired."

20 If the measure of a base angle of an isosceles triangle is 50°, find the number of degrees in the vertex angle of the triangle.

21 A set of data consists of the numbers 4, 4, 5, 6, and 12. What is the median of these data?

22 On a shelf there are 3 cans of corn, 4 cans of peas, and 2 cans of beans. If one can is chosen without looking, what is the probability that it will be a can of beans?

Directions (23–35): For *each* of those chosen, write on the separate answer sheet the *numeral* preceding the word or expression that best completes the statement or answers the question.

23 Given the true statement: "If two angles are right angles, then they are congruent." Which statement must also be true?
  (1) If two angles are not right angles, then they are not congruent.
  (2) If two angles are congruent, then they are right angles.
  (3) If two angles are not right angles, then they are congruent.
  (4) If two angles are not congruent, then they are not right angles.

24 Which is true of the graph of $y = -2$?

(1) It is parallel to y-axis.
(2) It is parallel to x-axis.
(3) It has a slope of -2.
(4) Its slope is undefined.

25 The product of $(3a^3)$ and $(5a^5)$ is

(1) $8a^8$
(2) $8a^{15}$
(3) $15a^8$
(4) $15a^{15}$

26 What is the slope of the line whose equation is $2y = 3x - 7$?

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

27 The sum of $\sqrt{27}$ and $\sqrt{48}$ is

(1) $\sqrt{75}$
(2) $25\sqrt{3}$
(3) $\sqrt{3}$
(4) $7\sqrt{3}$

28 The inverse of $p \rightarrow q$ is

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

29 The roots of the equation $x^2 + 4x - 12 = 0$ are

(1) $6, -2$
(2) $2, -6$
(3) $3, -4$
(4) $4, -3$

30 If each edge of a cube is doubled, then the *volume* of the cube is multiplied by

(1) 16
(2) 2
(3) 8
(4) 4

31 Which is the smallest member of the solution set of $2x - 1 \geq 3$?

(1) 1
(2) 2
(3) 3
(4) 4

32 The measures in degrees of the three angles of a triangle are represented by x, $2x$, and $3x$, respectively. The number of degrees in the *smallest* angle of the triangle is

(1) 30
(2) 36
(3) 60
(4) 90

33 One of the accompanying figures is selected at random. What is the probability that the figure chosen will be a quadrilateral?
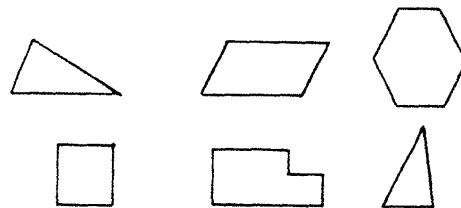

(1) $\frac{1}{6}$
(2) $\frac{2}{6}$
(3) $\frac{3}{6}$
(4) $\frac{6}{6}$

34 If p represents "I will get a good job" and q represents "I studied hard," then which statement is represented by $p \leftrightarrow q$?

(1) If I get a good job, then I studied hard.
(2) I will get a good job, and I studied hard.
(3) If I studied hard, then I will get a good job.
(4) I will get a good job, if and only if I studied hard.

35 The shaded half-plane in the accompanying figure is a graph of which inequality?
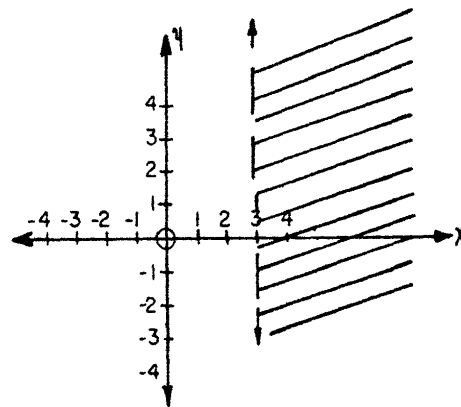
(1) $x > 3$
(2) $y > 3$
(3) $x < 3$
(4) $y \geq 3$

☞ GO RIGHT ON TO THE NEXT PAGE.

Part II

Answer four questions from this part. Show all work unless otherwise directed.

36 Answer *either a* or *b* but *not* both:

a Solve graphically and check:

$$x - 4y = 0$$
$$x + y = 5 \quad \text{[8,2]}$$

OR

*b* On the same set of coordinate axes, graph the following set of inequalities and label the solution set A:

$$x + y > 2$$
$$y \le x - 1 \quad \text{[8,2]}$$

37 Find two consecutive odd integers such that twice the larger is 29 less than five times the smaller. [*Only an algebraic solution will be accepted.*]   [5,5]

38 The accompanying diagram represents an arrow attached to the center of a cardboard disc. The arrow is free to spin and it is equally likely to land on each of the three numbered sections.

An experiment is conducted where the arrow is spun *twice* and the number recorded each time. If the arrow lands on a line, it is not counted and the arrow is spun again.
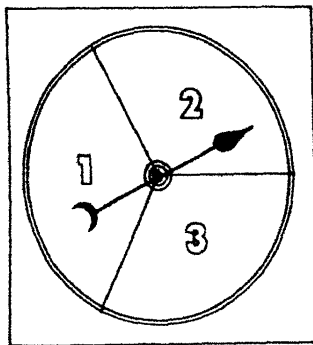
a Draw a tree diagram or list the sample space of all possible pairs of outcomes for spinning the arrow twice.   [3]

b What is the probability of obtaining a 2 followed by a 1?   [2]

c What is the probability of obtaining the same number on both spins?   [2]

d What is the probability of obtaining an *even sum* when the two numbers are added?   [3]

39 The following data represent the heights of 15 students in a certain class. 63, 59, 64, 61, 62, 60, 58, 60, 62, 60, 67, 65, 68, 61, 60.

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

| Height	Number (frequency)
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	

b Find the mean.   [4]

c Find the median.   [2]

d Find the mode.   [2]

40 *a* On your answer paper, copy and complete the truth table for the statement
$(p \to q) \leftrightarrow (\sim q \to \sim p)$.   [7]

p	q					
T	T					
T	F					
F	T					
F	F					

b Is $(p \to q) \leftrightarrow (\sim q \to \sim p)$ a tautology?   [1]

c The statement $(p \to q) \leftrightarrow (\sim q \to \sim p)$ states the equivalence of an implication and its

(1) converse   (3) contrapositive
(2) inverse   (4) conjunction   [2]

41 The accompanying figure shows two circles with the same center. The radii of the circles are 3 and 5, respectively. [Answers may be left in terms of π.]
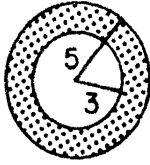
a Find the area of the larger circle.   [2]

b Find the area of the smaller circle.   [2]

c Find the area of the shaded portion.   [2]

d Find the circumference of the smaller circle.   [2]

e If the radius of a circle is doubled, the circumference of the circle is

    (1) squared   (3) multiplied by 8

    (2) doubled   (4) multiplied by 4   [2]

42 The legs of a right triangle are represented by x and $x + 2$. The hypotenuse is 10.

a Find x. [*Only an algebraic solution will be accepted.*] [3,5]

b Find the area of the triangle.   [2]

[6]

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE I

Monday, June 26, 1978 — 9:15 a.m. to 12:15 p.m., only

B

ANSWER SHEET

Pupil..Teacher...

School ....Grade.......................

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.

Math.–Course I–June '78B

Signature

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS B

COURSE I

Monday, June 26, 1978 — 9:15 a.m. to 12:15 p.m., only

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(1) 2	(11) $\frac{1}{2}$	(21) 5	(31) 2
(2) 4	(12) $\frac{1}{6}$	(22) $\frac{2}{9}$	(32) 1
(3) 1	(13) $2x - 1$	(23) 4	(33) 2
(4) $\sqrt{53}$	(14) 26	(24) 2	(34) 4
(5) $2x^2 - x - 28$	(15) $(x - a)(x + a)$	(25) 3	(35) 1
(6) $8x^2 - x + 1$	(16) $\frac{25}{2}$	(26) 4	
(7) 21	(17) 80	(27) 4	
(8) 2	(18) 24	(28) 1	
(9) $p \wedge \sim q$	(19) $p \rightarrow q$	(29) 2	
(10) 24	(20) 80	(30) 3	

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers 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) Analysis   [5]
       11,13   [5]

(38) b $\frac{1}{9}$ [2]

     c $\frac{3}{9}$ [2]

     d $\frac{5}{9}$ [3]

(39) b 62   [4]

     c 61   [2]

     d 60   [2]

(40) b yes   [1]

     c 3   [2]

(41) a 25π [2]

     b 9π [2]

     c 16π [2]

     d 6π [2]

     e 2   [2]

(42) a Analysis   [3]
         6   [5]
     b 24   [2]