New York State Education Department
Three-year Sequence for High School Mathematics
Course I
Final Examination
In Lieu of the Ninth Year Mathematics Regents Examination
Thursday, January 25, 1979—1:15 to 4:15 p.m., only

When you have completed the examination, you must sign the statement printed on the back of the answer sheet, 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.

Part I

Answer only 30 of the 35 questions in 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: \(4x = x + 21\)

2 Solve for B in terms of V and h: \(V = \frac{1}{3}Bh\)

3 Express as a product of two binomials: \(36 - x^2\)

4 Two complementary angles are in the ratio of 1:4. Find the measure of the smaller angle.

5 Express in radical form the length of the diagonal of a square whose sides are each 2.

6 Solve the following system of equations for x:
   \[
   \begin{align*}
   2x + y &= 7 \\
   x - y &= 2
   \end{align*}
   \]

7 If the perimeter of a square is 36, find the area of the square.

8 The expression \(\sqrt{50} + 3\sqrt{2}\) can be written in the form \(x\sqrt{2}\). Find x.

9 If p represents "I have studied" and q represents "I will pass this test," write in symbolic form using p and q: "I have studied, or I will not pass this test."

10 Find the sum of \(2x^2 + 3x - 1\) and \(3x^2 - 2x + 4\).

11 A jar contains 5 white marbles, 3 blue marbles, and 2 green marbles. If one marble is drawn at random, what is the probability that it will be blue?
12 The lengths of the sides of a triangle are 12, 8, and 6. If the shortest side of a similar triangle is 12, what is the length of its longest side?

13 If $x = 3$ and $y = -1$, find the value of $2x + y^2$.

14 If the area of a circle is $16\pi$, what is the length of the radius of the circle?

15 How many four-digit numbers can be formed from the digits 3, 4, 5, and 6 if no repetition is allowed?

16 Find the area of a triangle whose vertices are $(4,0)$, $(0,6)$, and $(0,0)$.

17 If the base angles of an isosceles triangle each measure $40^\circ$, find the number of degrees in the measure of the vertex angle.

18 What is the slope of the line whose equation is $3y = 2x - 1$?

19 Solve for $n$: \[ \frac{n}{2} + \frac{n}{4} = 6 \]

20 A single die is thrown once. What is the probability of obtaining a 1 or a 2?

21 The edge of a cube has length 3. What is the volume of the cube?

Directions (22-35): 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.

22 If each side of a square is doubled, then its perimeter

(1) remains the same
(2) is multiplied by 2
(3) is multiplied by 4
(4) is increased by 4

23 When $p + q$ is true, which related conditional is also true?

(1) $q + p$
(2) $-p + -q$
(3) $-q + -p$
(4) $p + -q$

24 Which is an irrational number?

(1) 0
(2) $\frac{1}{2}$
(3) $\sqrt{3}$
(4) $\sqrt{4}$

25 A magazine has 40 pages. If 16 of the 40 pages are advertising, what percent of the magazine is advertising?

(1) $\frac{2}{5}$
(2) 16%
(3) 24%
(4) 40%
26 The y-intercept of line $y = 3x - 4$ is 

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

27 When $p + q$ is false, then 

(1) $p$ is true and $q$ is false  
(2) $p$ is false and $q$ is true  
(3) $p$ and $q$ are both true  
(4) $p$ and $q$ are both false

28 If a girl has 6 shirts and 4 pairs of slacks, how many different outfits of a shirt and slacks does she have? 

(1) 24  
(2) 10  
(3) 6  
(4) 4

29 When $4x^3y^3$ is multiplied by $8xy^2$, the product is 

(1) $12x^3y^6$  
(2) $12x^3y^6$  
(3) $32x^3y^5$  
(4) $32x^3y^5$

30 What is the mean score for the test results of 60, 60, 70, 75, and 80? 

(1) 60  
(2) 69  
(3) 70  
(4) 75

31 There are 3 red marbles and 2 green marbles in an urn. One marble is drawn, its color noted and returned. A second marble is drawn and its color noted. What is the probability that both marbles are red? 

(1) $\frac{9}{25}$  
(2) $\frac{6}{25}$  
(3) $\frac{6}{20}$  
(4) $\frac{4}{25}$

32 From an ordinary deck of 52 cards, one card is drawn. What is the probability that it will either be a spade or a club? 

(1) $\frac{8}{52}$  
(2) $\frac{2}{52}$  
(3) $\frac{13}{52}$  
(4) $\frac{26}{52}$

33 Which inequality is represented by the accompanying graph? 

(1) $3 \leq x < -4$  
(2) $-4 \leq x \leq 3$  
(3) $-4 < x \leq 3$  
(4) $-4 \leq x < 3$
34 If each side of regular pentagon ABCDE is represented by \((3x + 2)\), which expression represents the perimeter of the pentagon?

(1) \(15x + 10\)  
(2) \(15x + 2\)  
(3) \(8x + 7\)  
(4) \(25x\)

35 The solution set of \(x^2 - 2x = 0\) is

(1) \(\{0\}\)  
(2) \(\{2\}\)  
(3) \(\{0, 2\}\)  
(4) \(\{0, -2\}\)

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:
\[
\begin{align*}
x + y &= 4 \quad [8, 2] \\
x - 2y &= 1
\end{align*}
\]

OR

b On the same set of coordinate axes, graph the following system of inequalities and label the solution set A:
\[
\begin{align*}
y &> x \quad [8, 2] \\
x + y &\leq 5
\end{align*}
\]

37 Find the smallest of three consecutive positive integers such that the product of the two smaller integers is 2 more than twice the largest integer. [Only an algebraic solution will be accepted.] [5,5]

38 The base of an isosceles triangle is 2 less than the sum of the lengths of the two legs. If the perimeter of the triangle is 22, find the length of the base of the triangle. [Only an algebraic solution will be accepted.] [5,5]
39 a On your answer paper, copy and complete the truth table for the statement \([p \land (p \lor q)] \lor q\). [9]

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p \lor q</th>
<th>p \land (p \lor q)</th>
<th>[p \land (p \lor q)] \lor q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b Is \([p \land (p \lor q)] \lor q\) a tautology? [1]

40 Three coins are tossed simultaneously.

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

b What is the probability that all three coins will come up heads? [2]

c In how many ways can a head and two tails appear? [2]

d What is the probability of obtaining a head and two tails? [2]

41 The following data represent the examination marks of 10 students in a certain class: 87, 71, 80, 84, 83, 81, 86, 90, 99, 89.

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

<table>
<thead>
<tr>
<th>Interval</th>
<th>Number (frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>69-76</td>
<td></td>
</tr>
<tr>
<td>77-84</td>
<td></td>
</tr>
<tr>
<td>85-92</td>
<td></td>
</tr>
<tr>
<td>93-100</td>
<td></td>
</tr>
</tbody>
</table>

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

c The median is contained in which interval? [2]
In the accompanying figure, square ABCD is circumscribed about circle O. The length of a side of the square and the diameter of the circle are both 10. [Answers may be left in terms of \( \pi \).]

a. What is the circumference of the circle? [2]

b. What is the perimeter of the square? [2]

c. What is the area of the square? [2]

d. What is the area of the circle? [2]

e. What is the area of the shaded portion of the diagram? [2]
New York State Education Department
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Course I
Final Examination
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Pupil........................................ Teacher....................
School...........................................

Your answers to Part I should be recorded on this answer sheet.

Part I
Answer 30 questions in this part.

1 ______________________________ 13 ______________________________ 25 ______________________________
2 ______________________________ 14 ______________________________ 26 ______________________________
3 ______________________________ 15 ______________________________ 27 ______________________________
4 ______________________________ 16 ______________________________ 28 ______________________________
5 ______________________________ 17 ______________________________ 29 ______________________________
6 ______________________________ 18 ______________________________ 30 ______________________________
7 ______________________________ 19 ______________________________ 31 ______________________________
8 ______________________________ 20 ______________________________ 32 ______________________________
9 ______________________________ 21 ______________________________ 33 ______________________________
10 ______________________________ 22 ______________________________ 34 ______________________________
11 ______________________________ 23 ______________________________ 35 ______________________________
12 ______________________________ 24 ______________________________

[OVER]
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
Thursday, January 25, 1979 — 1:15 to 4:15 p.m., only

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 the 30 of the
following: [If more than 30 are answered, only the first 30
answered should be considered.] For questions 22-35, allow credit if
the pupil has written the correct answer instead of the numeral 1, 2, 3,
or 4.

(1) 7
(2) \( \frac{3V}{h} \)
(3) \( (6 - x)(6 + x) \)
(4) 18
(5) \( 2\sqrt{2} \) or \( \sqrt{8} \)
(6) 3
(7) 81
(8) 8
(9) \( p \lor \neg q \)
(10) \( 5x^2 + x + 3 \)
(11) \( \frac{3}{10} \)
(12) 24
(13) 7
(14) 4
(15) 24
(16) 12
(17) 100
(18) \( \frac{2}{3} \)
(19) 8
(20) \( \frac{1}{3} \)
(21) 27
(22) 2
(23) 3
(24) 3
(25) 4
(26) 2
(27) 1
(28) 1
(29) 4
(30) 2
(31) 1
(32) 4
(33) 4
(34) 1
(35) 3

[OVER]
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]
     3 [5]

(38) Analysis [5]
     10 [5]

(39) b yes [1]

(40) b \( \frac{1}{8} \) [2]
     c 3 [2]
     d \( \frac{3}{8} \) [2]

(41) a Number
     \[
     \begin{array}{c}
     1 \\
     4 \\
     4 [2] \\
     1 \\
     \end{array}
     \]

(c 85-92 [2]

(42) a 10\( \pi \) [2]
     b 40 [2]
     c 100 [2]
     d 25\( \pi \) [2]
     e 100 - 25\( \pi \) [2]