The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Note that diagrams are not necessarily drawn to scale.

Utilize the information provided for each question to determine your answer. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

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The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION
ALGEBRA I
2002
Large-Type Edition

Student Name __________________________________________________________

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ALGEBRA I
RECENTS HIGH SCHOOL EXAMINATION
The University of the State of New York
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Notice …

Taking this examination, A graphing calculator and a straightedge (ruler) must be available for you to use while

...
Use this space for computations.

A high school club is researching a tour package offered by the Island Kayak Company. The company charges $35 per person and $245 for the tour guide. Which function represents the total cost, $C(x)$, of this kayak tour package for $x$ club members?

\[
C(x) = 35x + 245 \quad (1) \\
C(x) = 35x + 245 \quad (2) \\
C(x) = 35x + 245 \quad (3) \\
C(x) = 35x + 245 \quad (4)
\]

Kayak tour package for $x$ club members?

The expression \(3(x + 4) + 2(2x + 7)\) is equivalent to

\[
(1) \quad 2x + 11 \\
(2) \quad 2x + 10 \\
(3) \quad 2x + 11 \\
(4)
\]

3 A function is defined as $K(x) = \frac{2x + 3}{x - 9}$. The value of $K(3)$ is

\[
(1) \quad \frac{9}{7} \\
(2) \quad \frac{9}{7} \\
(3) \quad \frac{9}{7} \\
(4) \quad \frac{9}{7}
\]

1 A high school club is researching a tour package offered by the Island Kayak Company. The company charges $35 per person and $245 per person and $245 for the tour guide. Which function represents the total cost, $C(x)$, of this kayak tour package for $x$ club members?

Use this space for your separate answer sheet. Record your answers on your separate answer sheet. Choose the word or expression that, of those given, best completes the statement or answers the question. Note that diagrams are not necessarily drawn to scale. For each statement or question, answer. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.
5 Which relation is not a function?

A  B  C
1  2  3
4  5  6
7  8  9

6 The solution to $3x - 8 + 4x + 4 = 8x + 4$ is

A  B  C
1  2  3
4  5  6
7  8  9

The value of Tony's investment was $1140 on January 1st. On this date three years later, his investment was worth $1824. The average rate of change for this investment was $19 per

(1) day (2) month (3) quarter (4) year

2 The value of Tony's investment was $1140 on January 1st. On this date three years later, his investment was worth $1824. The average rate of change for this investment was $19 per

(1) day (2) month (3) quarter (4) year

Use this space for

4 Which relation is not a function?
An ice cream shop sells ice cream cones, \( c \), and milkshakes, \( m \). Each ice cream cone costs $1.50 and each milkshake costs $2.00. Donna has $19.00 to spend on ice cream cones and milkshakes. If she must buy 5 ice cream cones, which inequality could be used to determine the maximum number of milkshakes she can buy?

(1) \( 1.50(5) + 2.00m \leq 19 \)

(2) \( 1.50(5) + 2.00m = 19 \)

(3) \( 1.50(5) + 2.00m \geq 19 \)

(4) \( 1.50(5) + 2.00m \) is not a valid expression.

When written in standard form, the product of \( \left( \frac{3}{10}x \right) \) and \( \left( \frac{2}{5}x \right) \) is

(1) \( \frac{3}{10}x \cdot \frac{2}{5}x = \frac{6}{50}x^2 \)

(2) \( \frac{3}{10}x \cdot \frac{2}{5}x = \frac{6}{25}x^2 \)

(3) \( \frac{3}{10}x \cdot \frac{2}{5}x = \frac{6}{25}x^2 \)

(4) \( \frac{3}{10}x \cdot \frac{2}{5}x = \frac{6}{25}x^2 \)

If \( x = 2 \), \( y = 3 \), and \( w = 2 \), which expression results in a rational number?

(1) \( x + y \)

(2) \( yw \)

(3) \( (w)(y) \)

(4) \( yx \)
Given:

\[ f(x) = \frac{2}{3}x \quad \text{and} \quad g(x) = \frac{4}{1}x \]

Four statements about this system are written below.

I. \[ f(4) \leq g(4) \]

II. When \( x = 12 \), \( f(x) < g(x) \).

III. The graphs of \( f(x) \) and \( g(x) \) intersect at \( (12, 4) \).

IV. The graphs of \( f(x) \) and \( g(x) \) intersect at \( (4, 12) \).

Which statement(s) are true?

(1) II, only (3) I and IV
(2) IV, only (4) II and III

Which product is equivalent to \( \frac{4x^2}{3} \)?

(1) \( (2x^2)(3) \) (2) \( (2x^2)(9) \) (3) \( (4x)(3) \) (4) \( (4x)(9) \)

Given:

\[ x + 1 = (x)(\frac{3}{2}) \quad \text{and} \quad x - \frac{3}{2} = (x) \]

\( (3 + x)(6 - 3x) \) (4) \( (3 + x)(3 - 3x) \)

\( (3 - x)(6 + 3x) \) (3) \( (3 - x)(3 + 3x) \) (1)

Which product is equivalent to \( 4x^2 - 3x - 3x^2 \)?

\[ (3)(4x^2 - 3x - 3x^2) \]

Use this space for computations.
Which sketch represents the polynomial function $f(x) = (3 + x)(6 + x)x$?
If the parent function of \( f(x) \) is \( p(x) \), then the graph of the function \( f(x) = (x/k)^2 + 5 \), where \( k > 0 \), would be a shift of \( k \) units to the left and a move of 5 units up.

Which expression is equivalent to \( (4x^2)^3 \)?

1. \( \frac{1}{2} x^6 \)  
2. \( \frac{1}{2} x^5 \)  
3. \( 64 x^6 \)  
4. \( 64 x^5 \)  

IF the parent function of the graph of the function \( f(x) = x^2 \), then the graph of the function \( f(x) = \frac{1}{2} (x + 2)^2 \) is a shift of 2 units to the left and a move of 5 units down.
10. Use this space for computations.

15. Which function has the smallest y-intercept?

16. Which domain would be the most appropriate to use for a function that compares the number of emails sent (x) to the amount of data used for a cell phone plan (y)?

(1) integers
(2) whole numbers
(3) rational numbers
(4) irrational numbers
Eric deposits $500 in a bank account that pays 3.5% interest, compounded yearly. Which type of function should he use to determine how much money he will have in the account at the end of 10 years?

(1) linear (3) absolute value
(2) quadratic (4) exponential

Use this space for computations.
Below are two representations of data.

A: 2, 3, 5, 6, 6, 7, 8, 9

B: 2, 5, 5, 6, 6, 6, 7, 8

Which statement about A and B is true?

(1) median of A > median of B
(2) range of A < range of B
(3) upper quartile of A > upper quartile of B
(4) lower quartile of A < lower quartile of B
Which system has the same solution as the system below?

\[
\begin{align*}
 20 &= h_9 + x_7 \\
 70 &= h_9 + x_7 \\
 02 &= h_6 + x_3 \\
 03 &= h_6 + x_3 \\
 20 &= h_7 - x_5 - \\
 01 &= h_5 + x \\
\end{align*}
\]
Use this space for computations.

Students were asked to write an expression which had a leading coefficient of 3 and a constant term of \( \frac{4}{11} \). Which response is correct?

1. \( 3 \cdot \frac{4}{11} \cdot x^3 \)
2. \( \frac{4}{11} \cdot 7 \cdot x^3 \)
3. \( \frac{4}{11} \cdot 7 \cdot x^3 \)
4. \( \frac{4}{11} \cdot 2 \cdot x^3 \)

Sarah travels on her bicycle at a speed of 22.7 miles per hour. What is Sarah's approximate speed, in kilometers per minute?

1. 0.2  
2. 0.6  
3. 36.5  
4. 36.6

Which ordered pair does not fall on the line formed by the other three?

1. (16, 18)  
2. (12, 12)  
3. (9, 10)  
4. (3, 6)
Solve algebraically for \( y \):

\[
\frac{4}{11002} y + \frac{4}{11002} \geq \frac{4}{11001} y - \frac{4}{11001}
\]
Graph the function \( f(x) = \frac{x}{1} \) over the interval \( -8 \leq x \leq 0 \).
The table below shows the height in feet, \( h(t) \), of a hot-air balloon and the number of minutes, \( t \), the balloon is in the air.

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Height (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>369</td>
</tr>
<tr>
<td>10</td>
<td>168</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

The function \( h(t) = 30.5t + 8.7 \) can be used to model this data table.

Explain the meaning of the slope in the context of the problem.

Explain the meaning of the \( y \)-intercept in the context of the problem.

The balloon is in the air.
Question 27 continued
Work space for question 28 is continued on the next page.

Factor $x^4 - 16$ completely.
Mike knows that (3, 6.5) and (4, 17.55) are points on the graph of an exponential function, \( g(x) \), and he wants to find another point on the graph of this function.

First, he subtracts 6.5 from 17.55 to get 11.05. Next, he adds 11.05 and 17.55 to get 28.6. He states that (5, 28.6) is a point on \( g(x) \).

Is he correct? Explain your reasoning.

He states that (5, 28.6) is a point on \( g(x) \).

Next, he adds 11.05 and 17.55 to get 28.6.

First, he subtracts 6.5 from 17.55 to get 11.05.

Work space for question 29 is continued on the next page.
Work space for question 30 is continued on the next page.

30 Use the method of completing the square to determine the vertex of 

\[ f(x) = x^2 - 14x - 15. \]

State the coordinates of the vertex.
Work space for question 31 is continued on the next page.

Solve the formula: \[ \frac{9}{5} (F - 32) = \frac{6}{5} \] for \( F \) so that Josh can convert Celsius to Fahrenheit.

How cold it is in degrees Fahrenheit, \( F \),

The temperature inside a cooling unit is measured in degrees Celsius, \( C \). Josh wants to find out.
Solve algebraically for \(w\), to the nearest hundredth.
Joey recorded his heart rate, in beats per minute (bpm), after doing different numbers of jumping jacks. His results are shown in the table below.

<table>
<thead>
<tr>
<th>Number of Jumping Jacks</th>
<th>Heart Rate (bpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>84</td>
</tr>
<tr>
<td>20</td>
<td>104</td>
</tr>
<tr>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>120</td>
</tr>
</tbody>
</table>

33 Joey recorded his heart rate, in beats per minute (bpm), after doing different numbers of jumping jacks. His results are shown in the table below.
State the linear regression equation that estimates the heart rate per number of jumping jacks.

State the correlation coefficient of the linear regression equation, rounded to the nearest hundredth.

Explain what the correlation coefficient suggests in the context of this problem.
Hannah went to the school store to buy supplies and spent $16. She bought four more pencils than pens and two fewer erasers than pens. Pens cost $1.25 each, pencils cost $0.55 each, and erasers cost $0.75 each.

If \( x \) represents the number of pens Hannah bought, write an equation in terms of \( x \) that can be used to find how many of each item she bought.

Use your equation to determine algebraically how many pens Hannah bought.
35. Graph the system of inequalities on the set of axes on the next page.

\[ y \leq \frac{x}{2} - 2 \]
\[ z + \frac{x}{3} \geq 4 \]
Is (6,3) a solution to the system of inequalities? Explain your answer.
A ball is projected up into the air from the surface of a platform to the ground below. The height of the ball above the ground, in feet, is modeled by the function \( f(t) = -16t^2 + 96t + 112 \), where \( t \) is the time, in seconds, after the ball is projected.

State the coordinates of the vertex. Explain what it means in the context of the problem.

State the height of the platform, in feet.
State the entire interval over which the ball's height is decreasing.
Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. A correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil.

At a local garden shop, the price of plants includes sales tax. If $l$ is the cost of a large plant and $m$ is the cost of a medium plant, write a system of equations that models this situation.

The cost of 4 large plants and 6 medium plants is $40. The cost of 5 large plants and 2 medium plants is $28.

Question 37 is continued on the next page.
Could the cost of one large plant be $5.50 and the cost of one medium plant be $2.25? Justify your answer.

Determine algebraically both the cost of a large plant and the cost of a medium plant.
Scrap Graph Paper — this sheet will *not* be scored.
Scrap Graph Paper — this sheet will not be scored.
# High School Math Reference Sheet

## Triangle

\[ A = \frac{1}{2} bh \]

## Parallelogram

\[ A = bh \]

## Circle

\[ A = \pi r^2 \]

\[ C = \pi d \] or \[ C = 2\pi r \]

## General Prisms

\[ V = Bh \]

## Pythagorean Theorem

\[ a^2 + b^2 = c^2 \]

## Quadratic Formula

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

## Arithmetic Sequence

\[ a_n = a_1 + (n-1)d \]

## Geometric Sequence

\[ a_n = a_1 r^{n-1} \]

## Geometric Series

\[ S_n = \frac{a_1 (1 - r^n)}{1 - r} \] where \( r \neq 1 \)

\[ S = \frac{u_1}{u_d^1 p - 1} \]

## Conversion Factors

- 1 inch = 2.54 centimeters
- 1 mile = 1.609 kilometers
- 1 gallon = 3.785 liters
- 1 pound = 0.454 kilograms
- 1 quart = 2 pints
- 1 pound = 16 ounces
- 1 mile = 5280 feet
- 1 meter = 39.37 inches
- 1 cup = 8 fluid ounces

[The Reference Sheet is continued on the next page.]
### Cylinder

- Volume: $V = \pi r^2 h$

### Sphere

- Volume: $V = \frac{4}{3} \pi r^3$

### Cone

- Volume: $V = \frac{1}{3} \pi r^2 h$

### Pyramid

- Volume: $V = \frac{1}{3} B h$

### Exponential Growth/Decay

- $A(t) = A_0 e^{kt}$

### Reference Sheet — concluded