

# INTEGRATED ALGEBRA

The University of the State of New York  
REGENTS HIGH SCHOOL EXAMINATION

# INTEGRATED ALGEBRA

Thursday, January 29, 2009 – 1:15 to 4:15 p.m., only

Print Your Name:

Print Your School's Name:

Print your name and the name of your school in the boxes above. Then turn to the last page of this booklet, which is the answer sheet for Part I. 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.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored. All work should be written in pen, except graphs and drawings, which should be done in pencil.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Write your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc.

When you have completed the examination, you must sign the statement printed at the end 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 sheet cannot be accepted if you fail to sign this declaration.

Notice...

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

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

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

## Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for  
computations.

- 1 On a certain day in Toronto, Canada, the temperature was  $15^\circ$  Celsius (C). Using the formula  $F = \frac{9}{5}C + 32$ , Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents  $15^\circ\text{C}$  in degrees Fahrenheit?

(1) -9  
(2) 35  
(3) 59  
(4) 85

- 2 What is the speed, in meters per second, of a paper airplane that flies 24 meters in 6 seconds?

(1) 144  
(2) 30  
(3) 18  
(4) 4

- 3 The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is *least* likely to occur?

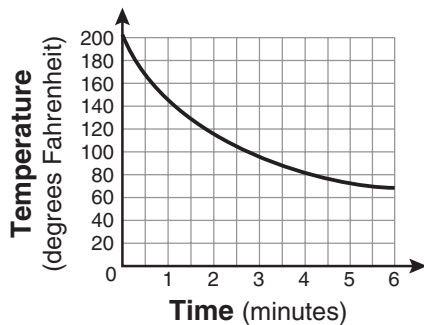
(1) rolling an odd number  
(2) rolling an even number  
(3) rolling a number less than 6  
(4) rolling a number greater than 4

Use this space for computations.

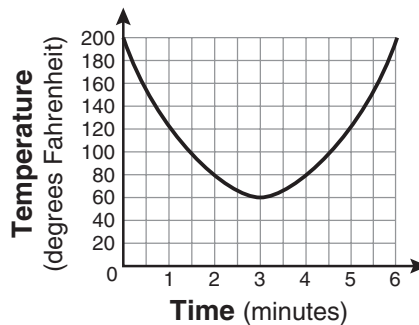
4 Tamara has a cell phone plan that charges \$0.07 per minute plus a monthly fee of \$19.00. She budgets \$29.50 per month for total cell phone expenses without taxes. What is the maximum number of minutes Tamara could use her phone each month in order to stay within her budget?

- (1) 150
- (2) 271
- (3) 421
- (4) 692

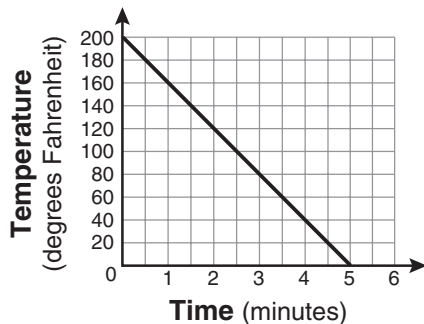
5 Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?



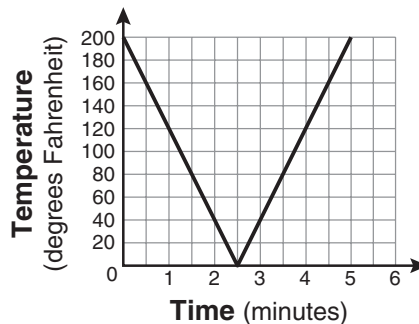
(1)



(3)



(2)



(4)

6 What is the solution of  $\frac{k+4}{2} = \frac{k+9}{3}$ ?

- (1) 1
- (2) 5
- (3) 6
- (4) 14

**Use this space for  
computations.**

**7** Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

- (1) median < mode < mean      (3) mode < median < mean  
(2) mean < mode < median      (4) mean < median < mode

**8** The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams,  $t$ , that remained in the tournament after  $r$  rounds?

- (1)  $t = 64(r)^{0.5}$                       (3)  $t = 64(1.5)^r$   
(2)  $t = 64(-0.5)^r$                       (4)  $t = 64(0.5)^r$

**9** The expression  $9x^2 - 100$  is equivalent to

- (1)  $(9x - 10)(x + 10)$                   (3)  $(3x - 100)(3x - 1)$   
(2)  $(3x - 10)(3x + 10)$                   (4)  $(9x - 100)(x + 1)$

**10** What is an equation of the line that passes through the points  $(3, -3)$  and  $(-3, -3)$ ?

- (1)  $y = 3$                                   (3)  $y = -3$   
(2)  $x = -3$                                   (4)  $x = y$

Use this space for  
computations.

11 If the formula for the perimeter of a rectangle is  $P = 2l + 2w$ , then  $w$  can be expressed as

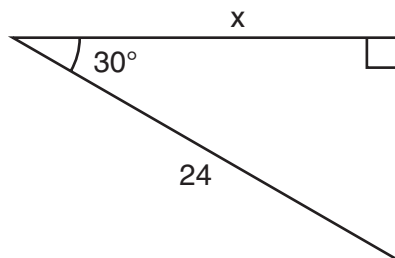
(1)  $w = \frac{2l - P}{2}$

(3)  $w = \frac{P - l}{2}$

(2)  $w = \frac{P - 2l}{2}$

(4)  $w = \frac{P - 2w}{2l}$

12 In the right triangle shown in the diagram below, what is the value of  $x$  to the nearest whole number?



(1) 12

(3) 21

(2) 14

(4) 28

13 What is the slope of the line that passes through the points  $(2,5)$  and  $(7,3)$ ?

(1)  $-\frac{5}{2}$

(3)  $\frac{8}{9}$

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

(4)  $\frac{9}{8}$

Use this space for computations.

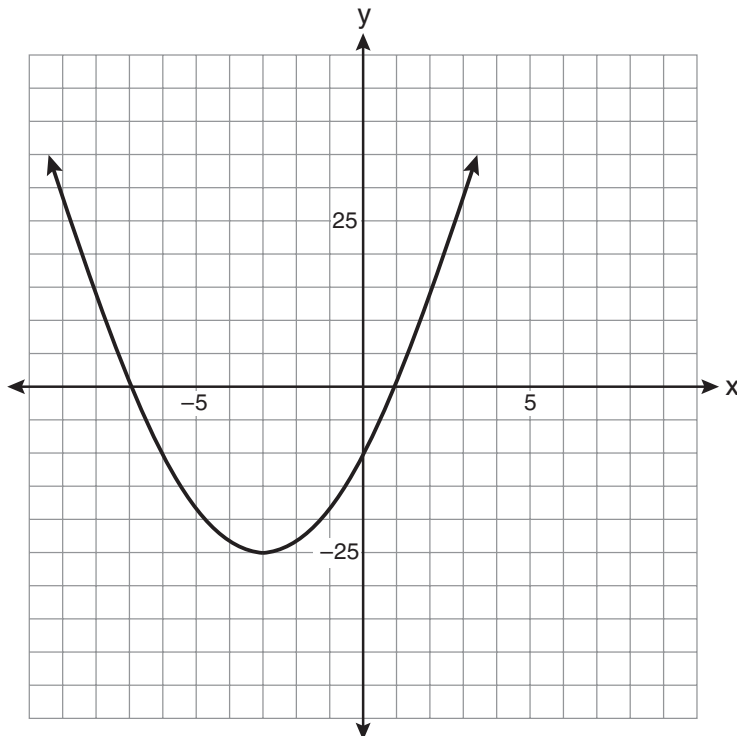
14 What are the roots of the equation  $x^2 - 10x + 21 = 0$ ?

- (1) 1 and 21
- (2) -5 and -5
- (3) 3 and 7
- (4) -3 and -7

15 Rhonda has \$1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine  $x$ , the number of nickels she has?

- (1)  $0.05(x + 6) + 0.10x = 1.35$
- (2)  $0.05x + 0.10(x + 6) = 1.35$
- (3)  $0.05 + 0.10(6x) = 1.35$
- (4)  $0.15(x + 6) = 1.35$

16 Which equation represents the axis of symmetry of the graph of the parabola below?



- (1)  $y = -3$
- (2)  $x = -3$
- (3)  $y = -25$
- (4)  $x = -25$

Use this space for  
computations.

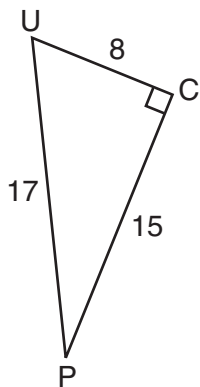
17 The set  $\{1,2,3,4\}$  is equivalent to

- (1)  $\{x \mid 1 < x < 4, \text{where } x \text{ is a whole number}\}$
- (2)  $\{x \mid 0 < x < 4, \text{where } x \text{ is a whole number}\}$
- (3)  $\{x \mid 0 < x \leq 4, \text{where } x \text{ is a whole number}\}$
- (4)  $\{x \mid 1 < x \leq 4, \text{where } x \text{ is a whole number}\}$

18 What is the value of  $x$  in the equation  $\frac{2}{x} - 3 = \frac{26}{x}$ ?

- (1)  $-8$
- (2)  $-\frac{1}{8}$
- (3)  $\frac{1}{8}$
- (4)  $8$

19 The diagram below shows right triangle  $UPC$ .



Which ratio represents the sine of  $\angle U$ ?

- (1)  $\frac{15}{8}$
- (2)  $\frac{15}{17}$
- (3)  $\frac{8}{15}$
- (4)  $\frac{8}{17}$

**Use this space for  
computations.**

**20** What is  $\sqrt{72}$  expressed in simplest radical form?

(1)  $2\sqrt{18}$

(3)  $6\sqrt{2}$

(2)  $3\sqrt{8}$

(4)  $8\sqrt{3}$

**21** What is  $\frac{6}{5x} - \frac{2}{3x}$  in simplest form?

(1)  $\frac{8}{15x^2}$

(3)  $\frac{4}{15x}$

(2)  $\frac{8}{15x}$

(4)  $\frac{4}{2x}$

**22** Which ordered pair is a solution of the system of equations  $y = x^2 - x - 20$  and  $y = 3x - 15$ ?

(1)  $(-5, -30)$

(3)  $(0, 5)$

(2)  $(-1, -18)$

(4)  $(5, -1)$

**23** A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?

(1) surveying 10 people who work in a sporting goods store

(2) surveying the first 25 people who enter a grocery store

(3) randomly surveying 50 people during the day in a mall

(4) randomly surveying 75 people during the day in a clothing store



**Use this space for  
computations.**

**24** The length of a rectangular room is 7 less than three times the width,  $w$ , of the room. Which expression represents the area of the room?

(1)  $3w - 4$

(3)  $3w^2 - 4w$

(2)  $3w - 7$

(4)  $3w^2 - 7w$

**25** The function  $y = \frac{x}{x^2 - 9}$  is undefined when the value of  $x$  is

(1) 0 or 3

(3) 3, only

(2) 3 or -3

(4) -3, only

**26** Which equation represents a line that is parallel to the line  $y = 3 - 2x$ ?

(1)  $4x + 2y = 5$

(3)  $y = 3 - 4x$

(2)  $2x + 4y = 1$

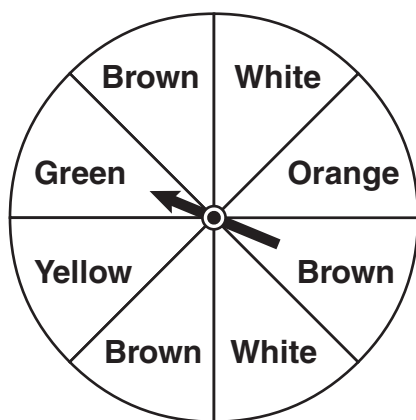
(4)  $y = 4x - 2$

**Use this space for computations.**

**27** What is the product of  $8.4 \times 10^8$  and  $4.2 \times 10^3$  written in scientific notation?

- (1)  $2.0 \times 10^5$                       (3)  $35.28 \times 10^{11}$   
(2)  $12.6 \times 10^{11}$                     (4)  $3.528 \times 10^{12}$

**28** Keisha is playing a game using a wheel divided into eight equal sectors, as shown in the diagram below. Each time the spinner lands on orange, she will win a prize.

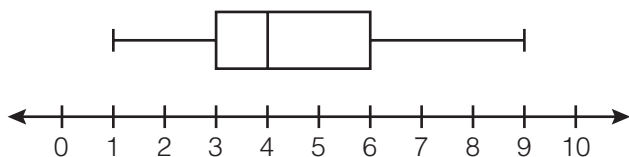


If Keisha spins this wheel twice, what is the probability she will win a prize on *both* spins?

- (1)  $\frac{1}{64}$                                   (3)  $\frac{1}{16}$   
(2)  $\frac{1}{56}$                                   (4)  $\frac{1}{4}$

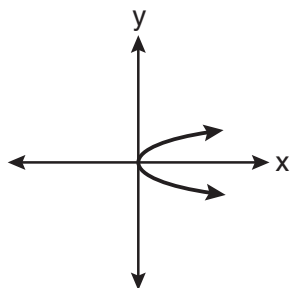
Use this space for  
computations.

- 29 A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.

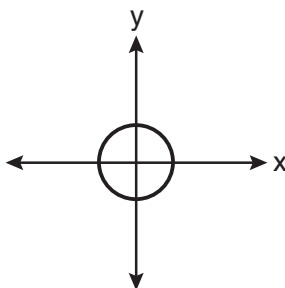


Which conclusion can be made using this plot?

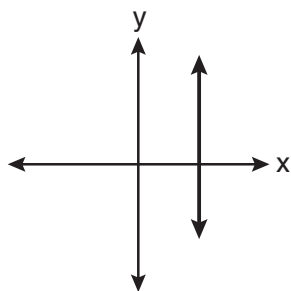
- (1) The second quartile is 600.
  - (2) The mean of the attendance is 400.
  - (3) The range of the attendance is 300 to 600.
  - (4) Twenty-five percent of the attendance is between 300 and 400.
- 30 Which graph represents a function?



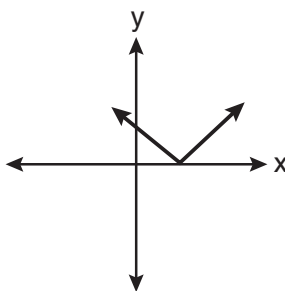
(1)



(3)



(2)

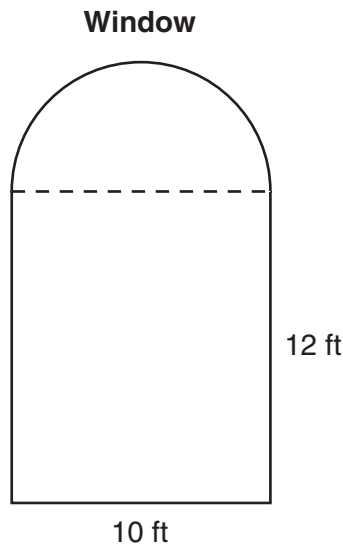


(4)

## Part II

Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [6]

- 31 A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.



To the *nearest foot*, what is the length of the string of lights that Tess will need to decorate the window?

32 Simplify:  $\frac{27k^5m^8}{(4k^3)(9m^2)}$

**33** The table below represents the number of hours a student worked and the amount of money the student earned.

<b>Number of Hours</b> <i>(h)</i>	<b>Dollars Earned</b> <i>(d)</i>
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars,  $d$ , earned in terms of the number of hours,  $h$ , worked.

Using this equation, determine the number of dollars the student would earn for working 40 hours.

### Part III

Answer all questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [9]

34 Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches and 42.5 inches.

Using the measurements that Sarah took, determine the number of square inches in the area of the window.

Determine the number of square inches in the actual area of the window.

Determine the relative error in calculating the area. Express your answer as a decimal to the nearest *thousandth*.

**35** Perform the indicated operation and simplify:  $\frac{3x + 6}{4x + 12} \div \frac{x^2 - 4}{x + 3}$



**36** A soup can is in the shape of a cylinder. The can has a volume of  $342 \text{ cm}^3$  and a diameter of 6 cm. Express the height of the can in terms of  $\pi$ .

Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

## Part IV

Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

37 Solve the following system of equations algebraically:

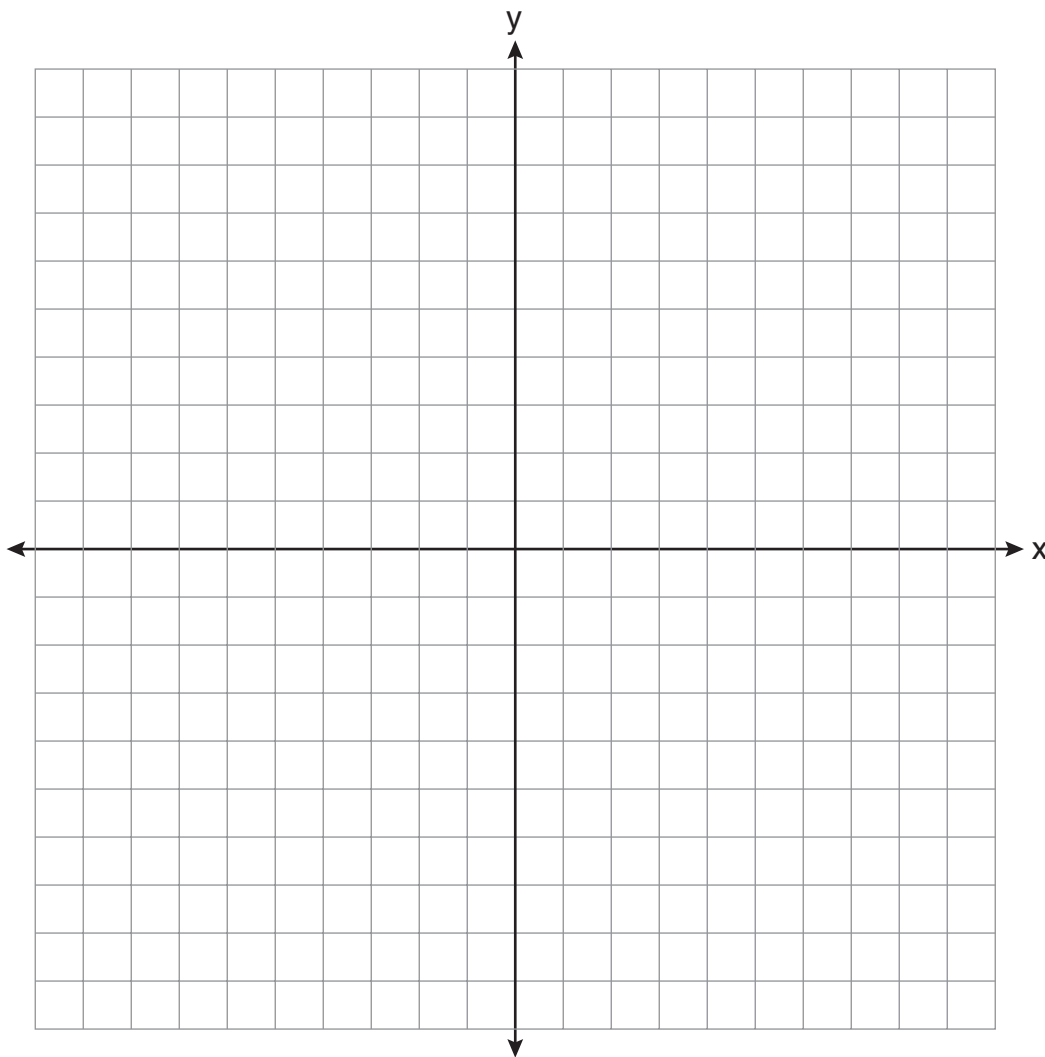
$$3x + 2y = 4$$

$$4x + 3y = 7$$

[Only an algebraic solution can receive full credit.]

**38** On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

$$\begin{aligned} 2x - y &\geq 6 \\ x &> 2 \end{aligned}$$



39 A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

**Kids' Meal Choices**

Main Course	Side Dish	Drink
hamburger	French fries	milk
chicken nuggets	applesauce	juice
turkey sandwich		soda

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order?

José does not drink juice. Determine the number of different kids' meals that do *not* include juice.

José's sister will eat *only* chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.





## Reference Sheet

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Trigonometric Ratios

$$\sin A = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos A = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}}$$

Area

trapezoid  $A = \frac{1}{2}h(b_1 + b_2)$

Volume

cylinder  $V = \pi r^2 h$

Surface Area

rectangular prism  $SA = 2lw + 2hw + 2lh$

cylinder  $SA = 2\pi r^2 + 2\pi rh$

Coordinate Geometry

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

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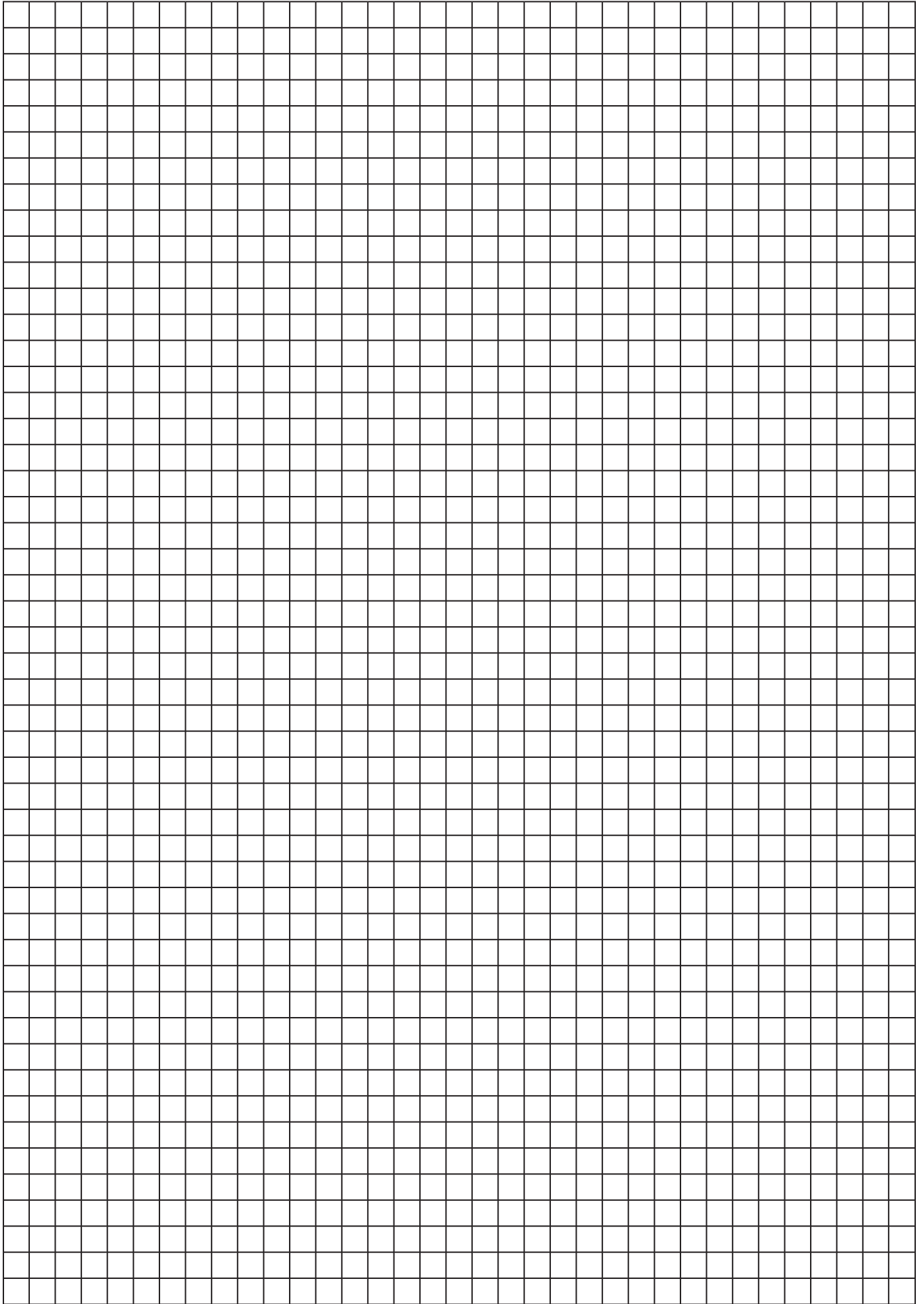
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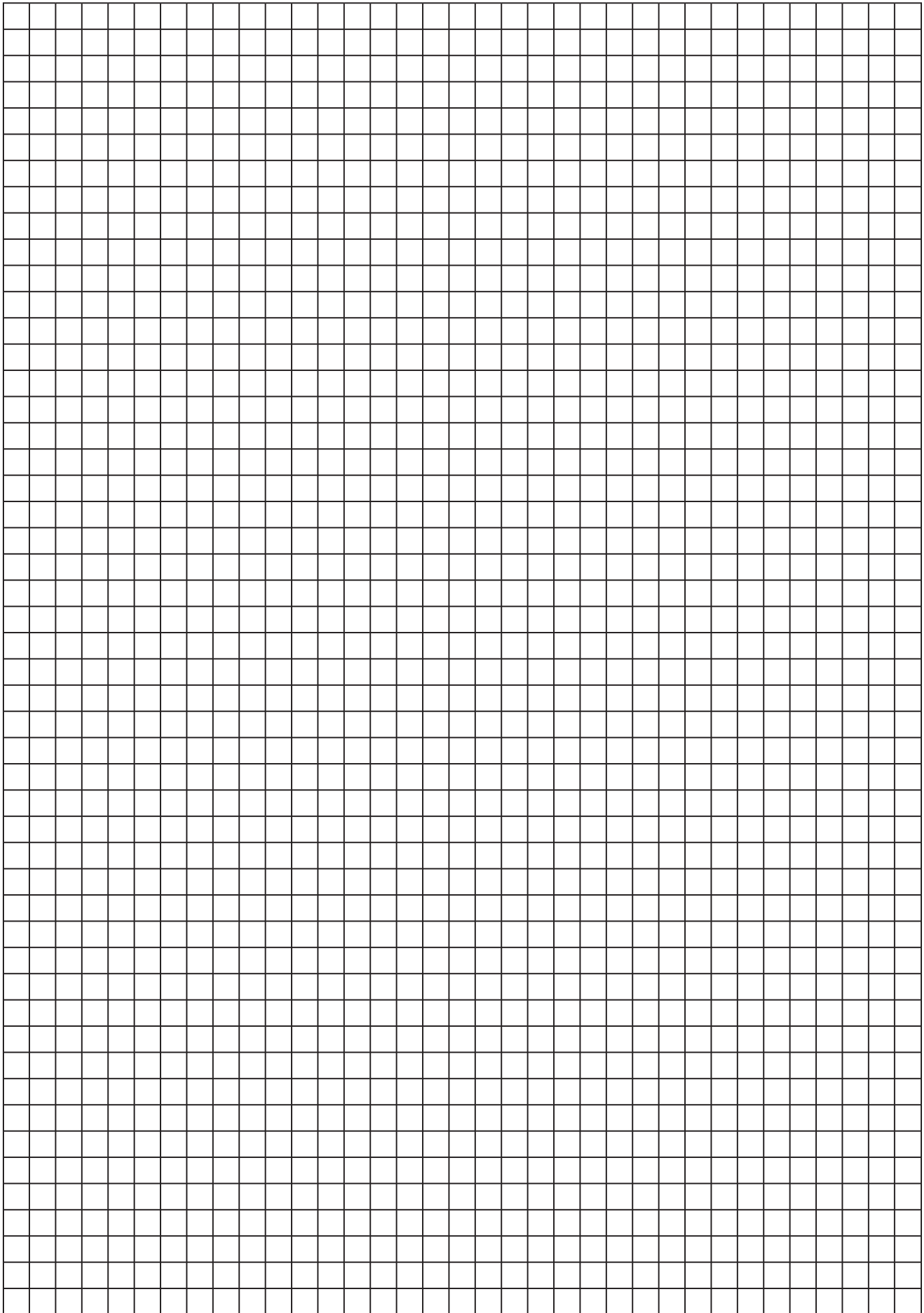
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REGENTS HIGH SCHOOL EXAMINATION

**INTEGRATED ALGEBRA**

Thursday, January 29, 2009 – 1:15 to 4:15 p.m., only

**ANSWER SHEET**

Student ..... Sex:  Male  Female Grade .....

Teacher ..... School .....

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

**Part I**

**Answer all 30 questions in this part.**

- |         |          |          |          |
|---------|----------|----------|----------|
| 1 ..... | 9 .....  | 17 ..... | 25 ..... |
| 2 ..... | 10 ..... | 18 ..... | 26 ..... |
| 3 ..... | 11 ..... | 19 ..... | 27 ..... |
| 4 ..... | 12 ..... | 20 ..... | 28 ..... |
| 5 ..... | 13 ..... | 21 ..... | 29 ..... |
| 6 ..... | 14 ..... | 22 ..... | 30 ..... |
| 7 ..... | 15 ..... | 23 ..... |          |
| 8 ..... | 16 ..... | 24 ..... |          |

**Your answers for Parts II, III, and IV should be written in the test booklet.**

**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

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**INTEGRATED ALGEBRA**

<b>INTEGRATED ALGEBRA</b>			
<b>Question</b>	<b>Maximum Credit</b>	<b>Credits Earned</b>	<b>Rater's/Scorer's Initials</b>
<b>Part I 1–30</b>	<b>60</b>		
<b>Part II 31</b>	<b>2</b>		
<b>32</b>	<b>2</b>		
<b>33</b>	<b>2</b>		
<b>Part III 34</b>	<b>3</b>		
<b>35</b>	<b>3</b>		
<b>36</b>	<b>3</b>		
<b>Part IV 37</b>	<b>4</b>		
<b>38</b>	<b>4</b>		
<b>39</b>	<b>4</b>		
<b>Maximum Total</b>	<b>87</b>		

<b>Rater's/Scorer's Name</b> (minimum of three)

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**Total Raw Score**

**Checked by**

**Scaled Score**  
(from conversion chart)

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