

# MATHEMATICS A

Thursday, January 25, 2007 — 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.

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 minimum of a scientific calculator, a straightedge (ruler), and a compass 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]

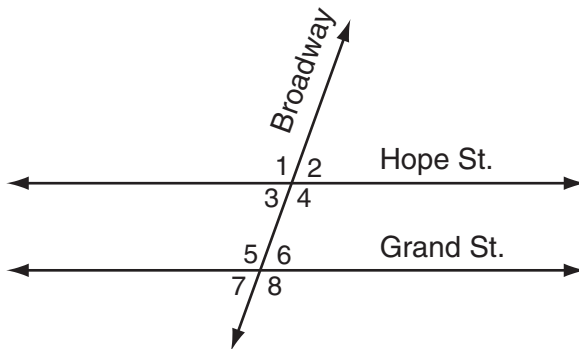
Use this space for  
computations.

1 Which image represents a line reflection?

(1) P Q      (3) P P

(2) P P      (4) P P

2 The accompanying diagram shows two parallel roads, Hope Street and Grand Street, crossed by a transversal road, Broadway.

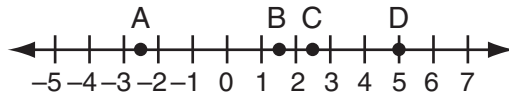


If  $m\angle 1 = 110$ , what is the measure of  $\angle 7$ ?

- (1)  $40^\circ$                       (3)  $110^\circ$   
(2)  $70^\circ$                       (4)  $180^\circ$

Use this space for  
computations.

- 3 Which point on the accompanying number line best represents the position of  $\sqrt{5}$ ?



- (1) A  
(2) B  
(3) C  
(4) D
- 4 The base of an isosceles triangle is 5 and its perimeter is 11. The base of a similar isosceles triangle is 10. What is the perimeter of the larger triangle?
- (1) 15  
(2) 21  
(3) 22  
(4) 110
- 5 What is the value of  $n$  in the equation  $3n - 8 = 32 - n$ ?
- (1) -10  
(2) -6  
(3) 6  
(4) 10
- 6 The statement " $x \geq 4$  and  $2x - 4 < 6$ " is true when  $x$  is equal to
- (1) 1  
(2) 10  
(3) 5  
(4) 4
- 7 The expression  $(2x^2 + 6x + 5) - (6x^2 + 3x + 5)$  is equivalent to
- (1)  $-4x^2 + 3x$   
(2)  $4x^2 - 3x$   
(3)  $-4x^2 - 3x + 10$   
(4)  $4x^2 + 3x - 10$

8 Which equation represents the direct variation relationship of the equation  $\frac{x}{y} = \frac{1}{2}$ ?

(1)  $y = x + \frac{1}{2}$

(3)  $y = 3x$

(2)  $y = 2x$

(4)  $x = 2y$

9 Seth tossed a fair coin five times and got five heads. The probability that the next toss will be a tail is

(1) 0

(3)  $\frac{5}{6}$

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

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

10 The formula for potential energy is  $P = mgh$ , where  $P$  is potential energy,  $m$  is mass,  $g$  is gravity, and  $h$  is height. Which expression can be used to represent  $g$ ?

(1)  $P - m - h$

(3)  $\frac{P}{m} - h$

(2)  $P - mh$

(4)  $\frac{P}{mh}$

11 A planned building was going to be 100 feet long, 75 feet deep, and 30 feet high. The owner decides to increase the volume of the building by 10% without changing the dimensions of the depth and the height. What will be the new length of this building?

(1) 106 ft

(3) 110 ft

(2) 108 ft

(4) 112 ft

12 Which expression represents the product of two consecutive odd integers, where  $n$  is an odd integer?

- (1)  $n(n + 1)$                       (3)  $n(n + 3)$   
(2)  $n(n + 2)$                       (4)  $2n + 1$

13 Which value is equivalent to  ${}_3P_3$ ?

- (1) 1                                      (3) 3!  
(2) 9                                      (4) 27

14 The graph of the equation  $x^2 + y^2 = r^2$  forms

- (1) a circle                              (3) a straight line  
(2) a parabola                          (4) two intersecting lines

15 What is the inverse of the statement “If Bob gets hurt, then the team loses the game”?

- (1) If the team loses the game, then Bob gets hurt.  
(2) Bob gets hurt if the team loses the game.  
(3) If the team does not lose the game, then Bob does not get hurt.  
(4) If Bob does not get hurt, then the team does not lose the game.

16 Which expression is undefined when  $w = 3$ ?

- (1)  $\frac{w - 3}{w + 1}$                           (3)  $\frac{w + 1}{w^2 - 3w}$   
(2)  $\frac{w^2 + 2w}{5w}$                           (4)  $\frac{3w}{3w^2}$

**Use this space for computations.**

**17** A circular garden has a diameter of 12 feet. How many bags of topsoil must Linda buy to cover the garden if one bag covers an area of 3 square feet?

- (1) 13                                      (3) 40  
(2) 38                                      (4) 151

**18** The midpoint of  $\overline{AB}$  is  $(-1,5)$  and the coordinates of point A are  $(-3,2)$ . What are the coordinates of point B?

- (1)  $(1,8)$                                       (3)  $(0,7)$   
(2)  $(1,10)$                                       (4)  $(-5,8)$

**19** What is the value of  $x$  in the equation  $\frac{x}{2} + \frac{x}{6} = 2$ ?

- (1) 12                                      (3) 3  
(2) 8                                      (4)  $\frac{1}{4}$

**20** If  $M$  and  $A$  represent integers,  $M + A = A + M$  is an example of which property?

- (1) commutative                                      (3) distributive  
(2) associative                                      (4) closure

**21** A set of five quadrilaterals consists of a square, a rhombus, a rectangle, an isosceles trapezoid, and a parallelogram. Lu selects one of these figures at random. What is the probability that both pairs of the figure's opposite sides are parallel?

- (1) 1                                      (3)  $\frac{3}{4}$   
(2)  $\frac{4}{5}$                                       (4)  $\frac{2}{5}$

**Use this space for  
computations.**

**22** If the measures of the angles of a triangle are represented by  $2x$ ,  $3x - 15$ , and  $7x + 15$ , the triangle is

- (1) an isosceles triangle      (3) an acute triangle  
(2) a right triangle          (4) an equiangular triangle

**23** What is the value of  $3^0 + 3^{-2}$ ?

- (1) 0                              (3)  $1\frac{1}{9}$   
(2)  $\frac{1}{9}$                               (4) 6

**24** The expression  $(50x^3 - 60x^2 + 10x) \div 10x$  is equivalent to

- (1)  $5x^2 - 6x + 1$               (3)  $5x^2 - 60x^2 + 10x$   
(2)  $5x^3 - 6x^2 + x$               (4)  $5x^2 - 6x$

**25** The image of point A after a dilation of 3 is (6,15). What was the original location of point A?

- (1) (2,5)                          (3) (9,18)  
(2) (3,12)                          (4) (18,45)

**26** Mario paid \$44.25 in taxi fare from the hotel to the airport. The cab charged \$2.25 for the first mile plus \$3.50 for each additional mile. How many miles was it from the hotel to the airport?

- (1) 10                              (3) 12  
(2) 11                              (4) 13

**Use this space for  
computations.**

**27** What is the solution set of the equation  $x^2 - 5x = 0$ ?

- (1)  $\{0, -5\}$                       (3)  $\{0\}$   
(2)  $\{0, 5\}$                         (4)  $\{5\}$

**28** The expression  $(6x^3y^6)^2$  is equivalent to

- (1)  $36x^6y^{12}$                       (3)  $12x^6y^{12}$   
(2)  $36x^5y^8$                         (4)  $6x^6y^{12}$

**29** If the Math Olympiad Club consists of eighteen students, how many different teams of four students can be formed for competitions?

- (1) 66                                  (3) 3,060  
(2) 72                                  (4) 73,440

**30** The multiplicative inverse of  $-\frac{1}{3}$  is

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



## 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. [10]

31 Kimberly has three pair of pants: one black, one red, and one tan. She also has four shirts: one pink, one white, one yellow, and one green.

Draw a tree diagram or list the sample space showing all possible outfits that she could wear, if an outfit consists of one pair of pants and one shirt.

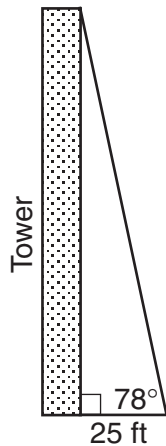
How many different outfits can Kimberly wear?

**32** A 14-gram serving of mayonnaise contains 11 grams of fat. What percent of the mayonnaise, to the *nearest tenth of a percent*, is fat?

**33** Every month, Omar buys pizzas to serve at a party for his friends. In May, he bought three more than twice the number of pizzas he bought in April. If Omar bought 15 pizzas in May, how many pizzas did he buy in April?

- 34 The formula  $C = \frac{5}{9}(F - 32)$  is used to convert Fahrenheit temperature,  $F$ , to Celsius temperature,  $C$ . What temperature, in degrees Fahrenheit, is equivalent to a temperature of  $10^\circ$  Celsius?

- 35 From a point on level ground 25 feet from the base of a tower, the angle of elevation to the top of the tower is  $78^\circ$ , as shown in the accompanying diagram. Find the height of the tower, to the *nearest tenth of a foot*.



### 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. [6]

36 The perimeter of a square is 56. Express the length of a diagonal of the square in simplest radical form.

37 The Eye Surgery Institute just purchased a new laser machine for \$500,000 to use during eye surgery. The Institute must pay the inventor \$550 each time the machine is used. If the Institute charges \$2,000 for each laser surgery, what is the *minimum* number of surgeries that must be performed in order for the Institute to make a profit?

**Part IV**

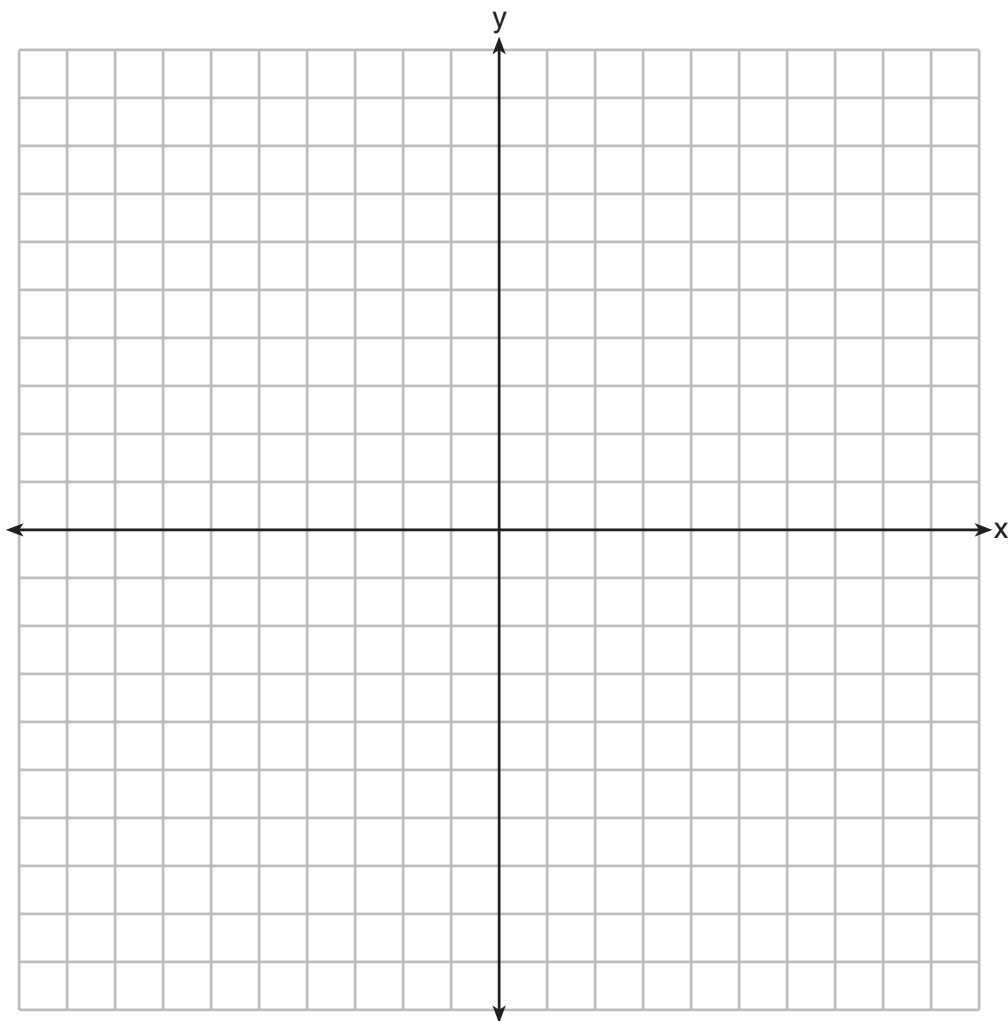
**Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [8]**

**38** Graph the following systems of inequalities on the accompanying set of axes and label the solution set  $S$ :

$$y > x - 4$$

$$y + x \geq 2$$

[Only a graphic solution can receive full credit.]

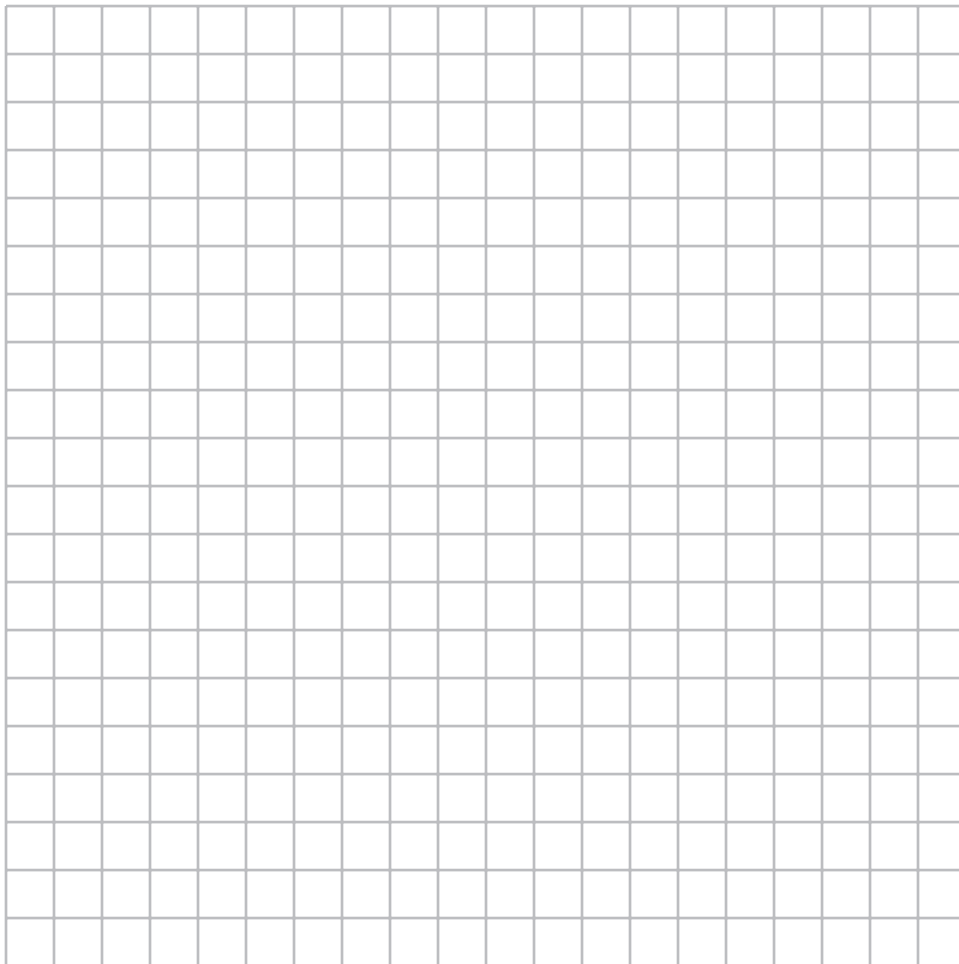


**39** The accompanying table shows the weights, in pounds, for the students in an algebra class.

Using the data, complete the cumulative frequency table below and construct a cumulative frequency histogram on the grid on the next page.

<b>Interval</b>	<b>Frequency</b>	<b>Cumulative Frequency</b>
91–100	6	
101–110	3	
111–120	0	
121–130	3	
131–140	0	
141–150	2	
151–160	2	

**Question 39 continued**



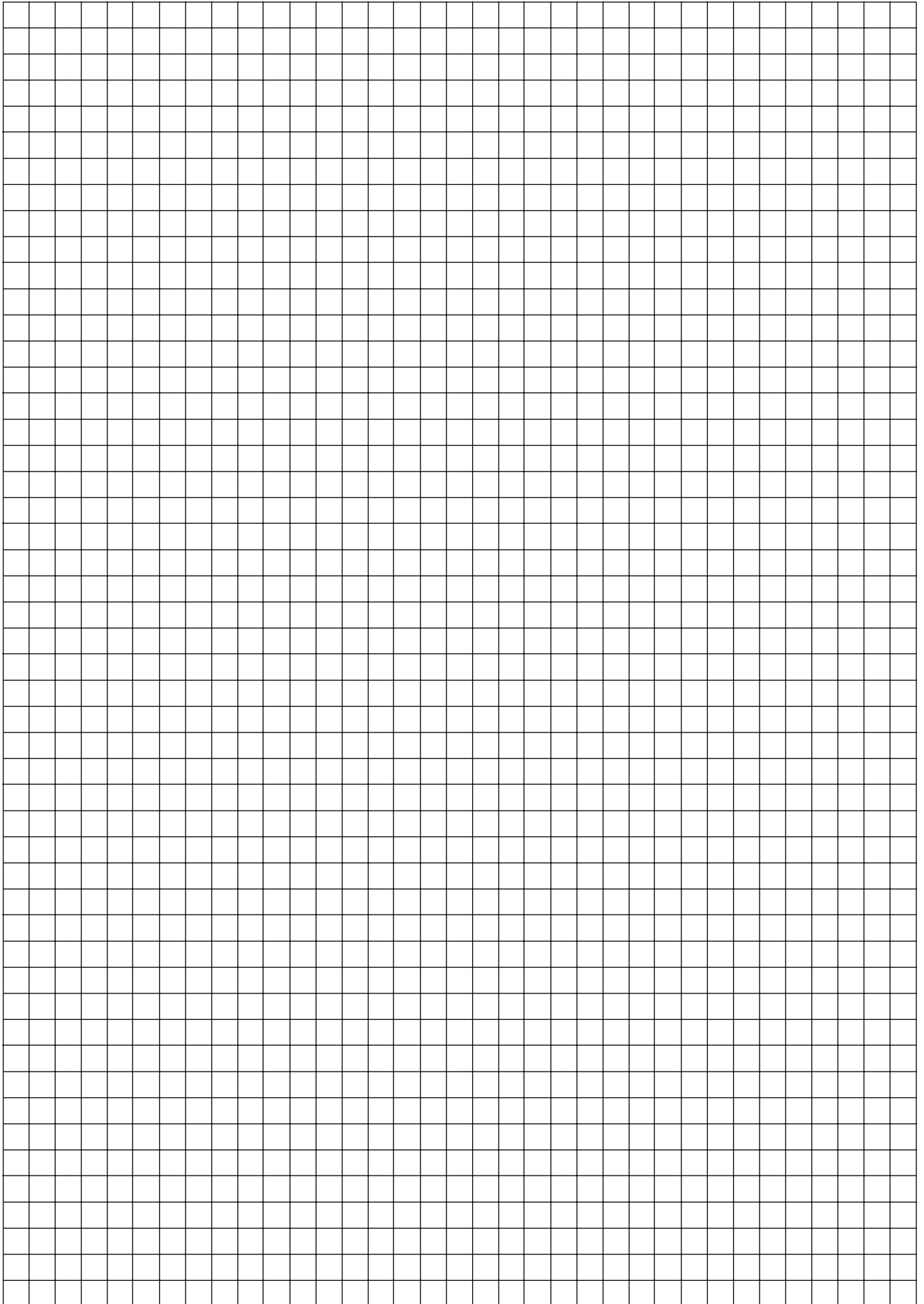




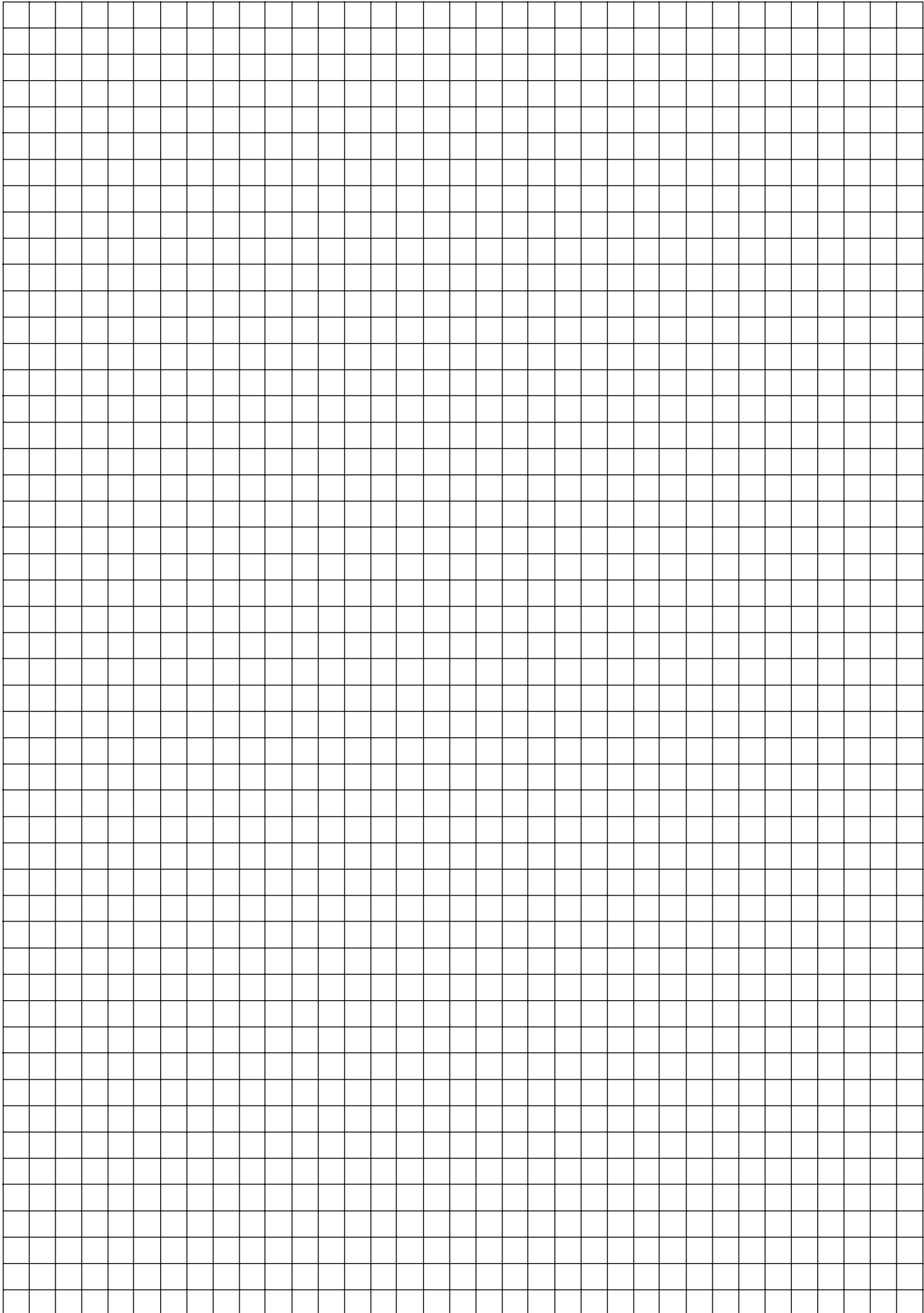
Scrap Graph Paper — This sheet will *not* be scored.

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Thursday, January 25, 2007 — 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

Tear Here

