The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Wednesday, August 16, 2000 — 8:30 to 11:30 a.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. 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 35 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 for the questions in Parts II, III, and IV directly in this booklet. Clearly indicate the necessary steps you take, 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 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.

Notice...

A minimum of a scientific calculator, a straightedge (ruler), and a compass must be available for your use while taking this examination.

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. Record your answers in the spaces provided on the separate answer sheet.   [40]

Use this space for computations.

1 The product of $2x^3$ and $6x^5$ is

(1) $10x^8$ (3) $10x^{15}$

(2) $12x^8$ (4) $12x^{15}$

2 A hockey team played n games, losing four of them and winning the rest. The ratio of games won to games lost is

(1) $\dfrac{n-4}{4}$ (3) $\dfrac{4}{n}$

(2) $\dfrac{4}{n-4}$ (4) $\dfrac{n}{4}$

3 In the coordinate plane, what is the total number of points 5 units from the origin and equidistant from both the x- and y-axes?

(1) 1   (3) 0

(2) 2   (4) 4

4 Expressed in decimal notation, 4.726×10^{-3} is

(1) 0.004726   (3) 472.6

(2) 0.04726   (4) 4,726

5 Which table does *not* show an example of direct variation?

(1)

x	y
1	4
2	8
3	12
4	16

(3)

x	y
1	$\frac{1}{2}$
2	1
3	$\frac{3}{2}$
4	2

(2)

x	y
2	24
4	12
6	8
8	6

(4)

x	y
−4	−20
−3	−15
−2	−10
−1	−5

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6 If $a < b$, $c < d$, and a, b, c, and d are all greater than 0, which expression is always true?

(1) $a - c + b - d = 0$ (3) $\dfrac{a}{d} > \dfrac{b}{c}$

(2) $a + c > b + d$ (4) $ac < bd$

7 The volume of a cube is 64 cubic inches. Its total surface area, in square inches, is

(1) 16   (3) 96

(2) 48   (4) 576

8 On an English examination, two students received scores of 90, five students received 85, seven students received 75, and one student received 55. The average score on this examination was

(1) 75   (3) 77

(2) 76   (4) 79

9 Which equation represents a line parallel to the line $y = 2x - 5$?

(1) $y = 2x + 5$ (3) $y = 5x - 2$

(2) $y = -\frac{1}{2}x - 5$ (4) $y = -2x - 5$

10 The operation $*$ for the set $\{p,r,s,v\}$ is defined in the accompanying table. What is the inverse element of r under the operation $*$?

$*$	p	r	s	v
p	s	v	p	r
r	v	p	r	s
s	p	r	s	v
v	r	s	v	p

(1) p (3) s

(2) r (4) v

11 A box contains six black balls and four white balls. What is the probability of selecting a black ball at random from the box?

(1) $\frac{1}{10}$ (3) $\frac{4}{6}$

(2) $\frac{6}{10}$ (4) $\frac{6}{4}$

12 The solution set for the equation $x^2 - 2x - 15 = 0$ is

(1) $\{5,3\}$ (3) $\{-5,3\}$

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

13 What is the value of y in the following system of equations?

$$2x + 3y = 6$$
$$2x + y = -2$$

(1) 1   (3) −3

(2) 2   (4) 4

14 What is the converse of the statement "If it is sunny, I will go swimming"?

(1) If it is not sunny, I will not go swimming.

(2) If I do not go swimming, then it is not sunny.

(3) If I go swimming, it is sunny.

(4) I will go swimming if and only if it is sunny.

15 Solve for x: $15x − 3(3x + 4) = 6$

(1) 1   (3) 3

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

16 The expression $2\sqrt{50} - \sqrt{2}$ is equivalent to

(1) $2\sqrt{48}$ (3) $9\sqrt{2}$

(2) 10   (4) $49\sqrt{2}$

17 Which is an equation of the parabola shown in the accompanying diagram?
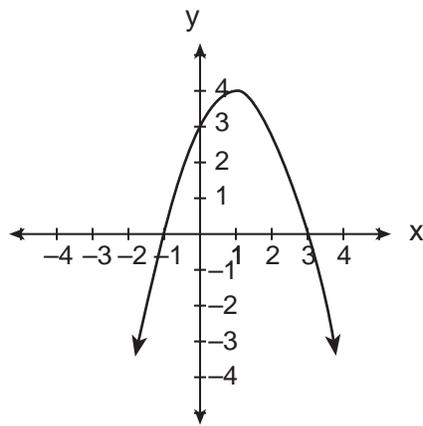
(1) $y = -x^2 + 2x + 3$ (3) $y = x^2 + 2x + 3$

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

Use this space for computations.

18 If two sides of a triangle are 1 and 3, the third side may be

  (1) 5   (3) 3

  (2) 2   (4) 4

19 A girl can ski down a hill five times as fast as she can climb up the same hill. If she can climb up the hill and ski down in a total of 9 minutes, how many minutes does it take her to climb up the hill?

  (1) 1.8   (3) 7.2

  (2) 4.5   (4) 7.5

20 When $3x^2 - 2x + 1$ is subtracted from $2x^2 + 7x + 5$, the result will be

  (1) $-x^2 + 9x + 4$ (3) $-x^2 + 5x + 6$

  (2) $x^2 - 9x - 4$ (4) $x^2 + 5x + 6$

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]

21 The accompanying diagram shows a section of the city of Tacoma. High Road, State Street, and Main Street are parallel and 5 miles apart. Ridge Road is perpendicular to the three parallel streets. The distance between the intersection of Ridge Road and State Street and where the railroad tracks cross State Street is 12 miles. What is the distance between the intersection of Ridge Road and Main Street and where the railroad tracks cross Main Street?

Tacoma

High Rd.

State St.

Railroad tracks

Main St.

5 mi   5 mi

Ridge Rd.
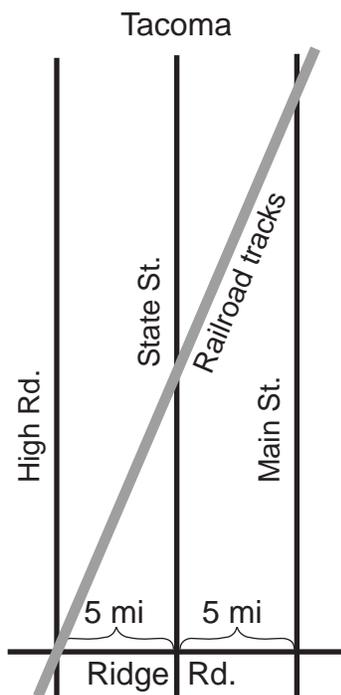
22 Perform the indicated operation and express the result in simplest terms:

$$\frac{x}{x+3} \div \frac{3x}{x^2-9}$$

23 Kerry is planning a rectangular garden that has dimensions of 4 feet by 6 feet. Kerry wants one-half of the garden to have roses, and she says that the rose plot will have dimensions of 2 feet by 3 feet. Is she correct? Explain.

24 The sum of the ages of the three Romano brothers is 63. If their ages can be represented as consecutive integers, what is the age of the middle brother?

25 Alan, Becky, Jesus, and Mariah are four students in the chess club. If two of these students will be selected to represent the school at a national convention, how many combinations of two students are possible?

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.   [15]

26 John, Dan, Karen, and Beth went to a costume ball. They chose to go as Anthony and Cleopatra, and Romeo and Juliet. John got the costumes for Romeo and Cleopatra, but not his own costume. Dan saw the costumes for Juliet and himself. Karen went as Anthony. Beth drove two of her friends, who were dressed as Anthony and Cleopatra, to the ball. What costume did John wear?

27 To measure the length of a hiking trail, a worker uses a device with a 2-foot-diameter wheel that counts the number of revolutions the wheel makes. If the device reads 1,100.5 revolutions at the end of the trail, how many miles long is the trail, to the *nearest tenth of a mile?*

28 The coordinates of the endpoints of $\overline{AB}$ are $A(2,6)$ and $B(4,2)$. Is the image $\overline{A''B''}$ the same if it is reflected in the x-axis, then dilated by $\frac{1}{2}$ as the image is if it is dilated by $\frac{1}{2}$, then reflected in the x-axis? Justify your answer. [*The use of the accompanying grid is optional.*]
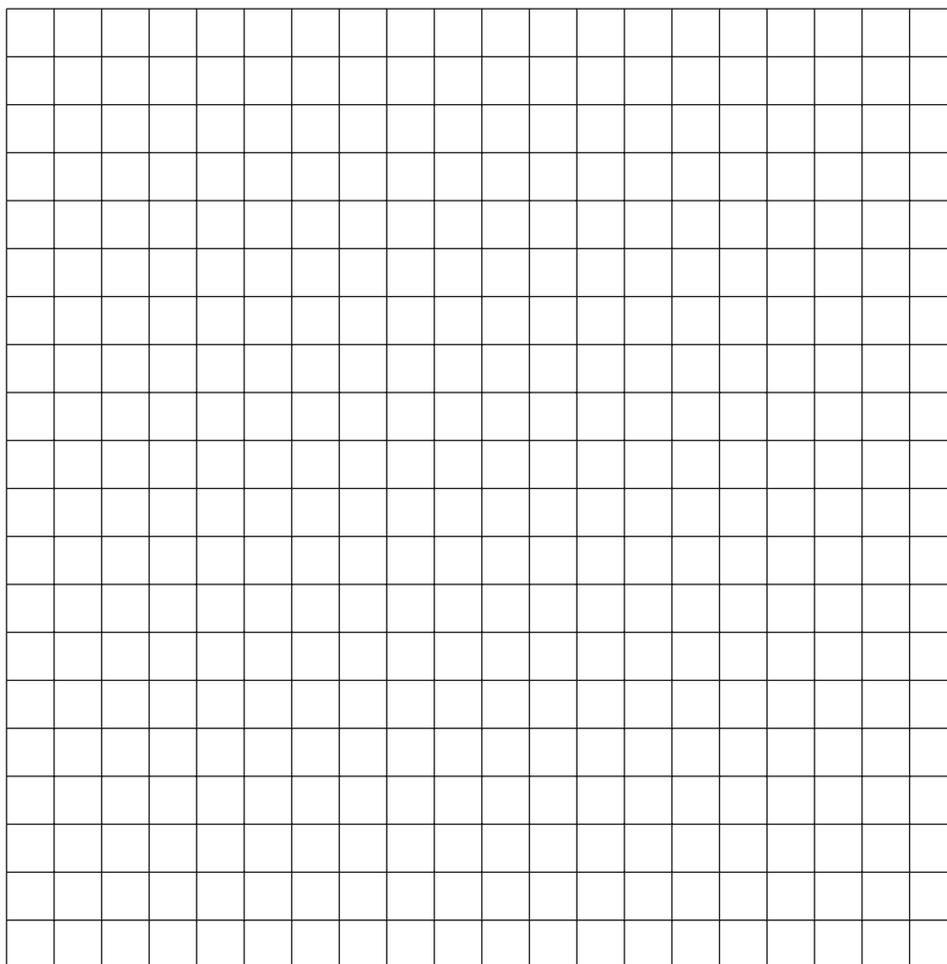
29 After an ice storm, the following headlines were reported in the *Glacier County Times:*

Monday: Ice Storm Devastates County — 8 out of every 10 homes lose electrical power

Tuesday: Restoration Begins — Power restored to $\frac{1}{2}$ of affected homes

Wednesday: More Freezing Rain — Power lost by 20% of homes that had power on Tuesday

Based on these headlines, what fractional portion of homes in Glacier County had electrical power on Wednesday?

30 Katrina hikes 5 miles north, 7 miles east, and then 3 miles north again. To the *nearest tenth of a mile,* how far, in a straight line, is Katrina from her starting point?

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. [20]

31 Mr. Santana wants to carpet exactly half of his rectangular living room. He knows that the perimeter of the room is 96 feet and that the length of the room is 6 feet longer than the width. How many square feet of carpeting does Mr. Santana need?

32 Ashanti is surveying for a new parking lot shaped like a parallelogram. She knows that three of the vertices of parallelogram *ABCD* are *A*(0,0), *B*(5,2), and *C*(6,5). Find the coordinates of point *D* and sketch parallelogram *ABCD* on the accompanying set of axes. Justify mathematically that the figure you have drawn is a parallelogram.
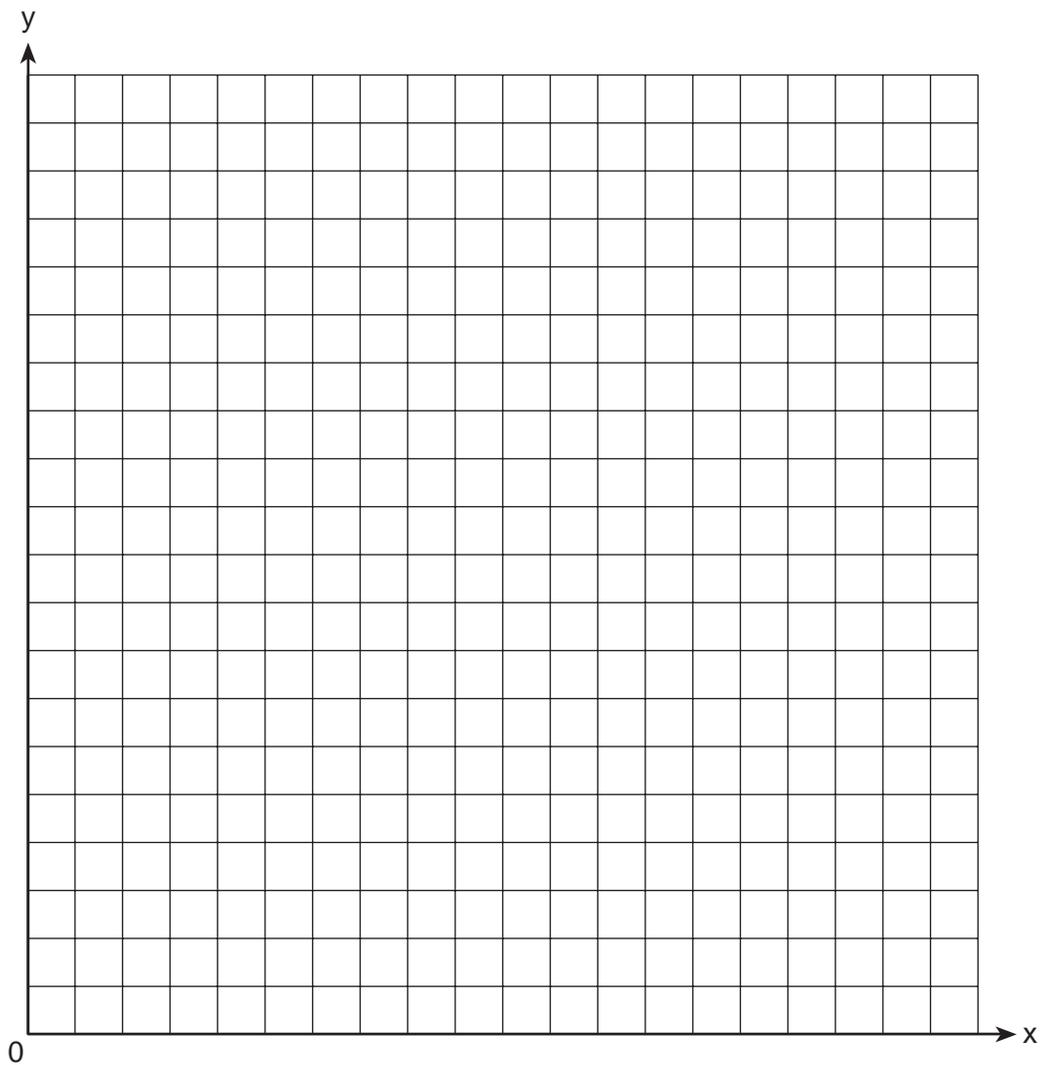
33 A 10-foot ladder is to be placed against the side of a building. The base of the ladder must be placed at an angle of 72° with the level ground for a secure footing. Find, to the *nearest inch,* how far the base of the ladder should be from the side of the building *and* how far up the side of the building the ladder will reach.

34 The telephone company has run out of seven-digit telephone numbers for an area code. To fix this problem, the telephone company will introduce a new area code. Find the number of new seven-digit telephone numbers that will be generated for the new area code if both of the following conditions must be met:

- The first digit cannot be a zero or a one.
- The first three digits cannot be the emergency number (911) or the number used for information (411).

35 Jack is building a rectangular dog pen that he wishes to enclose. The width of the pen is 2 yards less than the length. If the area of the dog pen is 15 square yards, how many yards of fencing would he need to completely enclose the pen?

ANSWER SHEET

Pupil . . . .   Sex: ☐ Male ☐ Female   Grade . . . .

Teacher . . . .   School . . . .

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

Part I

Answer all 20 questions in this part.

1	6	11	16 . . . .
2	7	12	17 . . . .
3	8	13	18 . . . .
4	9	14	19 . . . .
5	10	15	20 . . . .

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

Tear Here

Tear Here

MATHEMATICS A			
Question	Maximum Credit	Credits Earned	Rater/Scorer's Initials
Part I 1–20	40		
Part II 21	2		
22	2		
23	2		
24	2		
25	2		
Part III 26	3		
27	3		
28	3		
29	3		
30	3		
Part IV 31	4		
32	4		
33	4		
34	4		
35	4		
Maximum Total	85		

| | Total Raw Score | Checked by | Scaled Score |

Rater/Scorer's Name (minimum of three)

Notes to raters. . .

- **Each paper should be scored by a minimum of three raters.**
- **The table for converting the total raw score to the scaled score is provided in the scoring key for this examination.**
- **The scaled score is the student's final examination score.**

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[20]