

MATHEMATICS A

Wednesday, August 16, 2006 — 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. 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 While solving the equation $4(x + 2) = 28$, Becca wrote $4x + 8 = 28$. Which property did she use?

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

2 What is the value of p in the equation $2(3p - 4) = 10$?

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

3 Jordan and Missy are standing together in the schoolyard. Jordan, who is 6 feet tall, casts a shadow that is 54 inches long. At the same time, Missy casts a shadow that is 45 inches long. How tall is Missy?

- (1) 38 in (3) 5 ft
(2) 86.4 in (4) 5 ft 6 in

4 The faces of a cube are numbered from 1 to 6. What is the probability of *not* rolling a 5 on a single toss of this cube?

- (1) $\frac{1}{6}$ (3) $\frac{1}{5}$
(2) $\frac{5}{6}$ (4) $\frac{4}{5}$

5 What is the product of $10x^4y^2$ and $3xy^3$?

- (1) $30x^4y^5$ (3) $30x^5y^5$
(2) $30x^4y^6$ (4) $30x^5y^6$

Use this space for
computations.

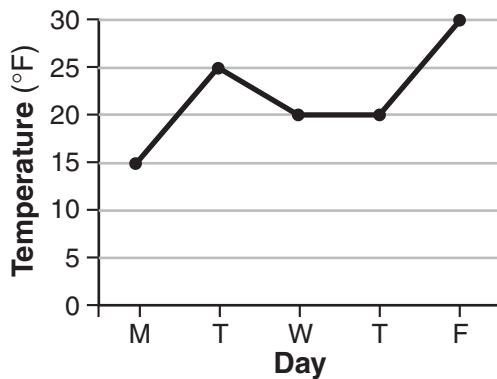
- 6 Sal keeps quarters, nickels, and dimes in his change jar. He has a total of 52 coins. He has three more quarters than dimes and five fewer nickels than dimes. How many dimes does Sal have?

- (1) 13 (3) 20
(2) 18 (4) 21

- 7 A micron is a unit used to measure specimens viewed with a microscope. One micron is equivalent to 0.00003937 inch. How is this number expressed in scientific notation?

- (1) 3.937×10^{-5} (3) 3937×10^{-8}
(2) 3.937×10^5 (4) 3937×10^8

- 8 The accompanying graph shows the high temperatures in Elmira, New York, for a 5-day period in January.



Which statement describes the data?

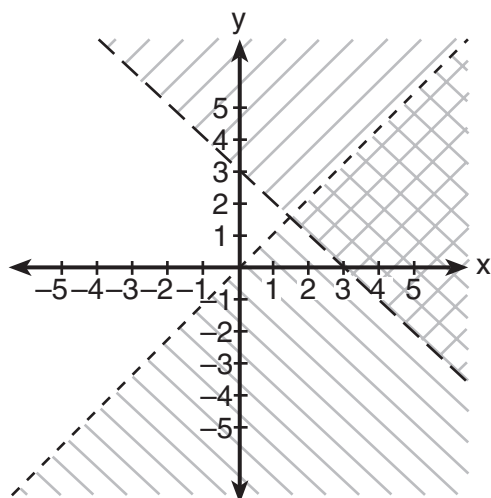
- (1) median = mode (3) mean < mode
(2) median = mean (4) mean = mode

- 9 What is the image of point $(-3,4)$ under the translation that shifts (x,y) to $(x - 3, y + 2)$?

- (1) $(0,6)$ (3) $(-6,8)$
(2) $(6,6)$ (4) $(-6,6)$

Use this space for
computations.

- 15 Which ordered pair is in the solution set of the system of inequalities shown in the accompanying graph?



- (1) (0,0) (3) (1,5)
(2) (0,1) (4) (3,2)
- 16 Julia has four different flags that she wants to hang on the wall of her room. How many different ways can the flags be arranged in a row?

- (1) 1 (3) 16
(2) 10 (4) 24

- 17 If $x = 4$ and $y = -2$, the value of $\frac{1}{2}xy^2$ is

- (1) 32 (3) -4
(2) 8 (4) -8

- 18 The measures of two consecutive angles of a parallelogram are in the ratio 5:4. What is the measure of an obtuse angle of the parallelogram?

- (1) 20° (3) 100°
(2) 80° (4) 160°

Use this space for
computations.

19 The graph of the equation $x + 3y = 6$ intersects the y -axis at the point whose coordinates are

- (1) (0,2) (3) (0,18)
(2) (0,6) (4) (6,0)

20 What is the value of w in the equation $\frac{3}{4}w + 8 = \frac{1}{3}w - 7$?

- (1) 2.4 (3) -13.846
(2) -0.2 (4) -36

21 Which list shows the numbers $|-0.12|$, $\sqrt{\frac{1}{82}}$, $\frac{1}{8}$, and $\frac{1}{9}$ in order from smallest to largest?

- (1) $|-0.12|$, $\frac{1}{8}$, $\frac{1}{9}$, $\sqrt{\frac{1}{82}}$ (3) $\sqrt{\frac{1}{82}}$, $|-0.12|$, $\frac{1}{9}$, $\frac{1}{8}$
(2) $\frac{1}{8}$, $\frac{1}{9}$, $\sqrt{\frac{1}{82}}$, $|-0.12|$ (4) $\sqrt{\frac{1}{82}}$, $\frac{1}{9}$, $|-0.12|$, $\frac{1}{8}$

22 One of the roots of the equation $x^2 + 3x - 18 = 0$ is 3. What is the other root?

- (1) 15 (3) -6
(2) 6 (4) -21

23 The expression $2x^2 - x^2$ is equivalent to

- (1) x^0 (3) x^2
(2) 2 (4) $-2x^4$

**Use this space for
computations.**

24 The coordinates of A are $(-9,2)$ and the coordinates of G are $(3,14)$.
What are the coordinates of the midpoint of \overline{AG} ?

- (1) $(-3,8)$ (3) $(-6,16)$
(2) $(-6,6)$ (4) $(-21,-10)$

25 What is the total number of points of intersection of the graphs of the equations $x^2 + y^2 = 16$ and $y = x$?

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

26 In the next Olympics, the United States can enter four athletes in the diving competition. How many different teams of four divers can be selected from a group of nine divers?

- (1) 36 (3) 3,024
(2) 126 (4) 6,561

27 When Albert flips open his mathematics textbook, he notices that the product of the page numbers of the two facing pages that he sees is 156. Which equation could be used to find the page numbers that Albert is looking at?

- (1) $x + (x + 1) = 156$ (3) $(x + 1)(x + 3) = 156$
(2) $(x + 1) + (x + 2) = 156$ (4) $x(x + 1) = 156$

28 Point $(k,-3)$ lies on the line whose equation is $x - 2y = -2$. What is the value of k ?

- (1) -8 (3) 6
(2) -6 (4) 8

**Use this space for
computations.**

29 Which statement is logically equivalent to the statement “If Corey worked last summer, he buys a car”?

- (1) If Corey does not buy a car, he did not work last summer.
- (2) If Corey buys a car, he worked last summer.
- (3) If Corey did not work last summer, he does not buy a car.
- (4) If Corey buys a car, he did not work last summer.

30 Which line is perpendicular to the line whose equation is $5y + 6 = -3x$?

- (1) $y = -\frac{5}{3}x + 7$
 - (2) $y = \frac{5}{3}x + 7$
 - (3) $y = -\frac{3}{5}x + 7$
 - (4) $y = \frac{3}{5}x + 7$
-

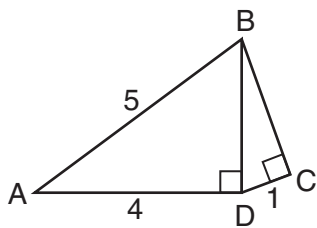
Part II

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]

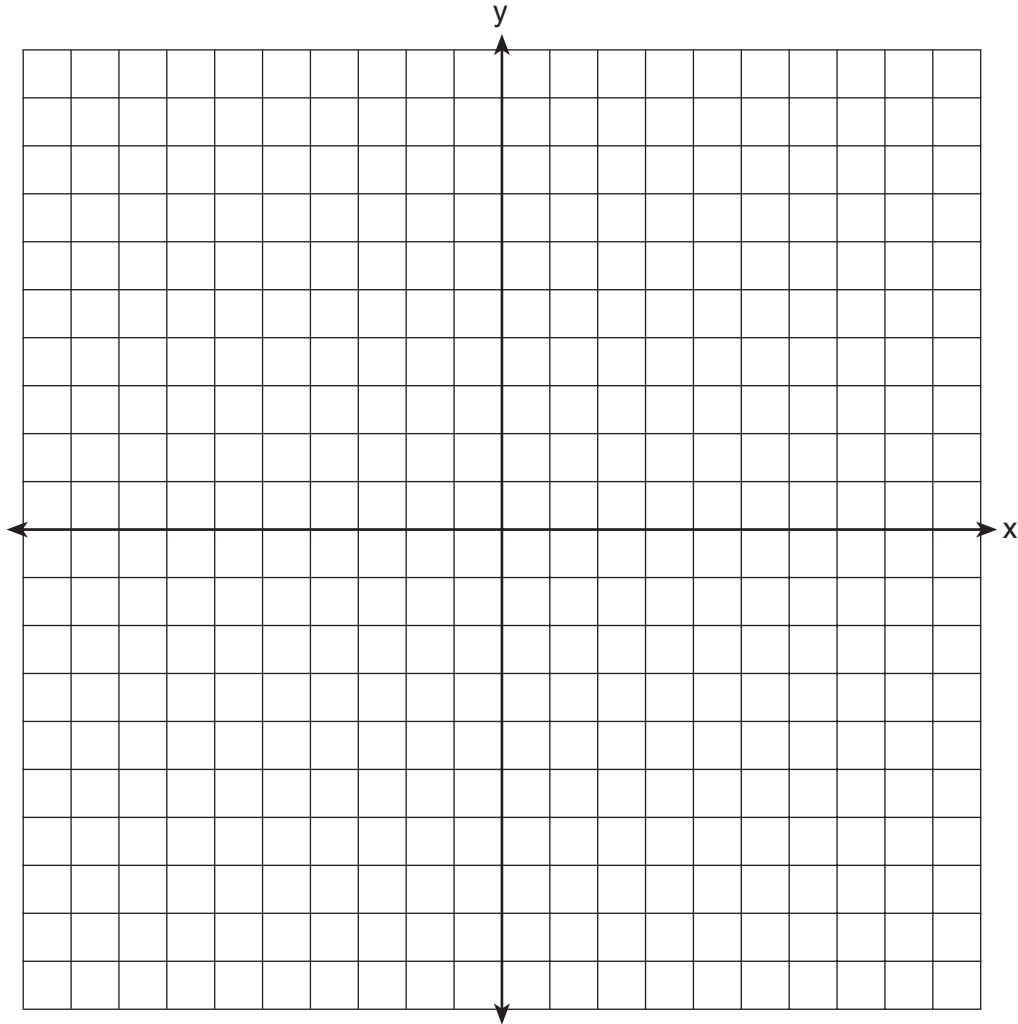
- 31 In Clark Middle School, there are 60 students in seventh grade. If 25 of these students take art only, 18 take music only, and 9 do not take either art or music, how many take both art and music?

- 32 Running at a constant speed, Andrea covers 15 miles in $2\frac{1}{2}$ hours.
At this speed, how many *minutes* will it take her to run 2 miles?

- 33 In the accompanying diagram of right triangles ABD and DBC , $AB = 5$, $AD = 4$, and $CD = 1$. Find the length of \overline{BC} , to the *nearest tenth*.



34 Dan is sketching a map of the location of his house and his friend Matthew's house on a set of coordinate axes. Dan locates his house at point $D(0,0)$ and locates Matthew's house, which is 6 miles east of Dan's house, at point $M(6,0)$. On the accompanying set of coordinate axes, graph the locus of points equidistant from the two houses. Then write the equation of the locus.



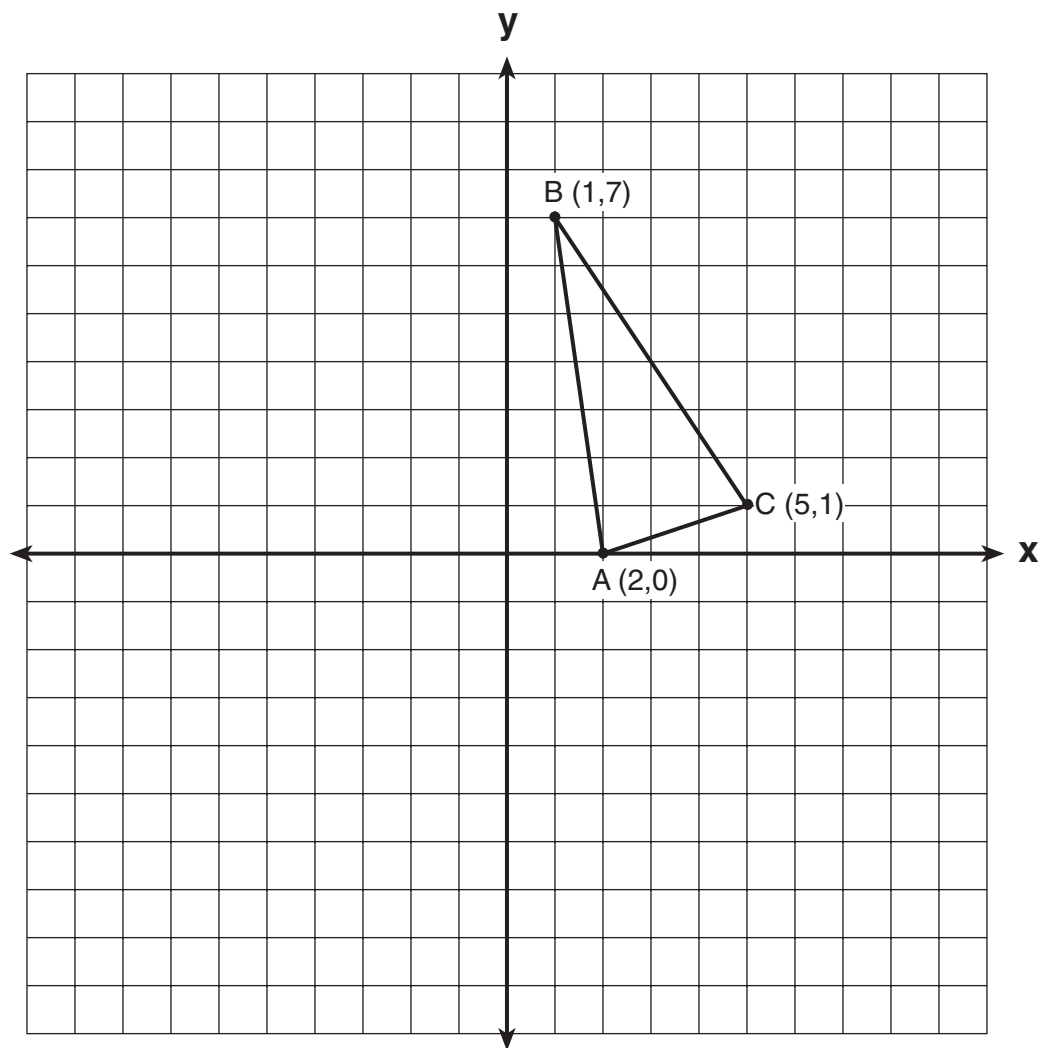
35 A recent survey shows that the average man will spend 141,288 hours sleeping, 85,725 hours working, 81,681 hours watching television, 9,945 hours commuting, 1,662 hours kissing, and 363,447 hours on other tasks during his lifetime. What percent of his life, to the *nearest tenth of a percent*, does he spend sleeping?

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 Debbie goes to a diner famous for its express lunch menu. The menu has five appetizers, three soups, seven entrées, six vegetables, and four desserts. How many different meals consisting of either an appetizer *or* a soup, one entrée, one vegetable, and one dessert can Debbie order?

37 Triangle ABC has coordinates $A(2,0)$, $B(1,7)$, and $C(5,1)$. On the accompanying set of axes, graph, label, and state the coordinates of $\Delta A'B'C'$, the reflection of ΔABC in the y -axis.



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]

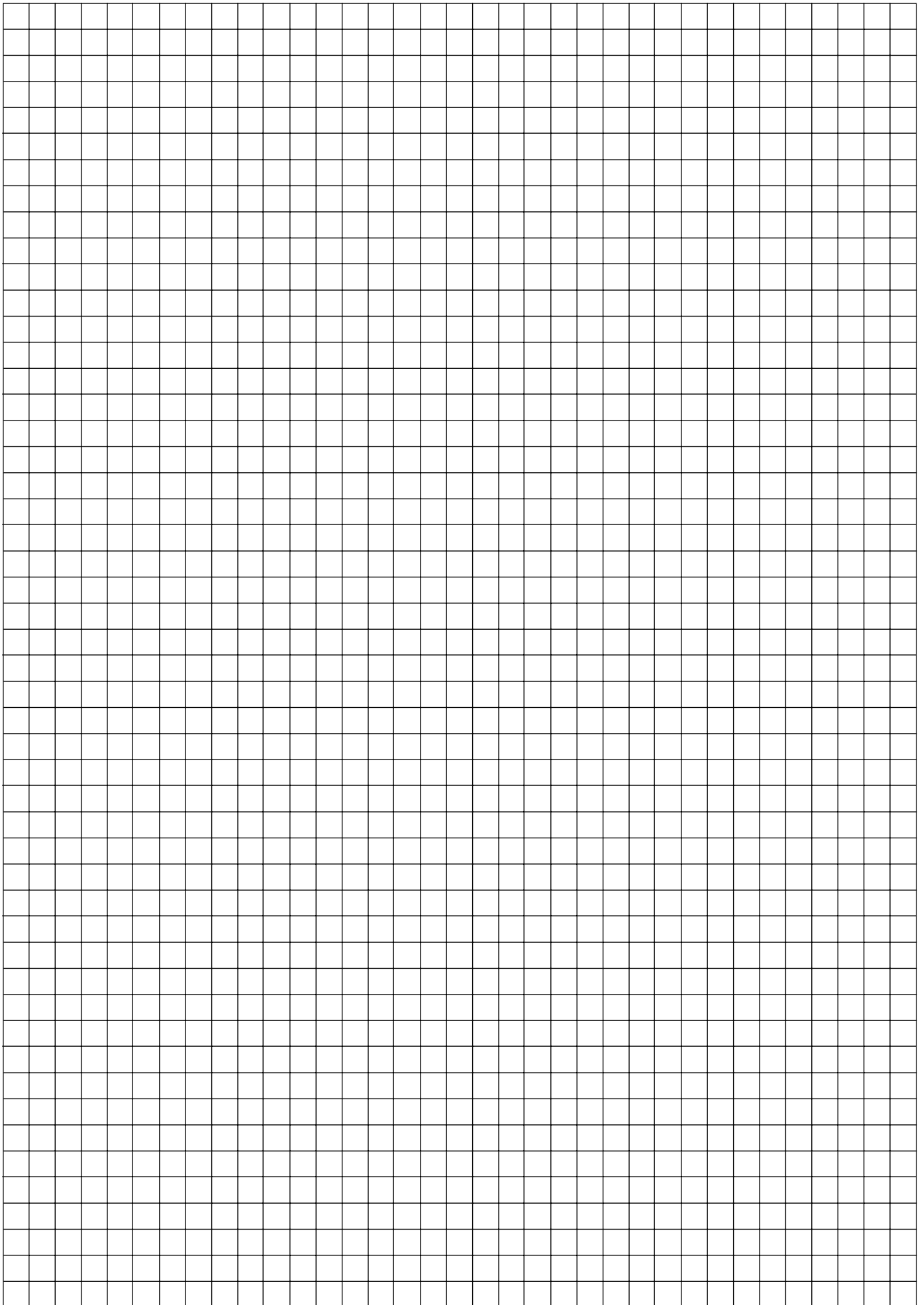
- 38 \overleftrightarrow{AB} and \overleftrightarrow{CD} intersect at E . If $m\angle AEC = 5x - 20$ and $m\angle BED = x + 50$, find, in degrees, $m\angle CEB$.

39 Manuel plans to install a fence around the perimeter of his yard. His yard is shaped like a square and has an area of 40,000 square feet. The company that he hires charges \$2.50 per foot for the fencing and \$50.00 for the installation fee. What will be the cost of the fence, in dollars?

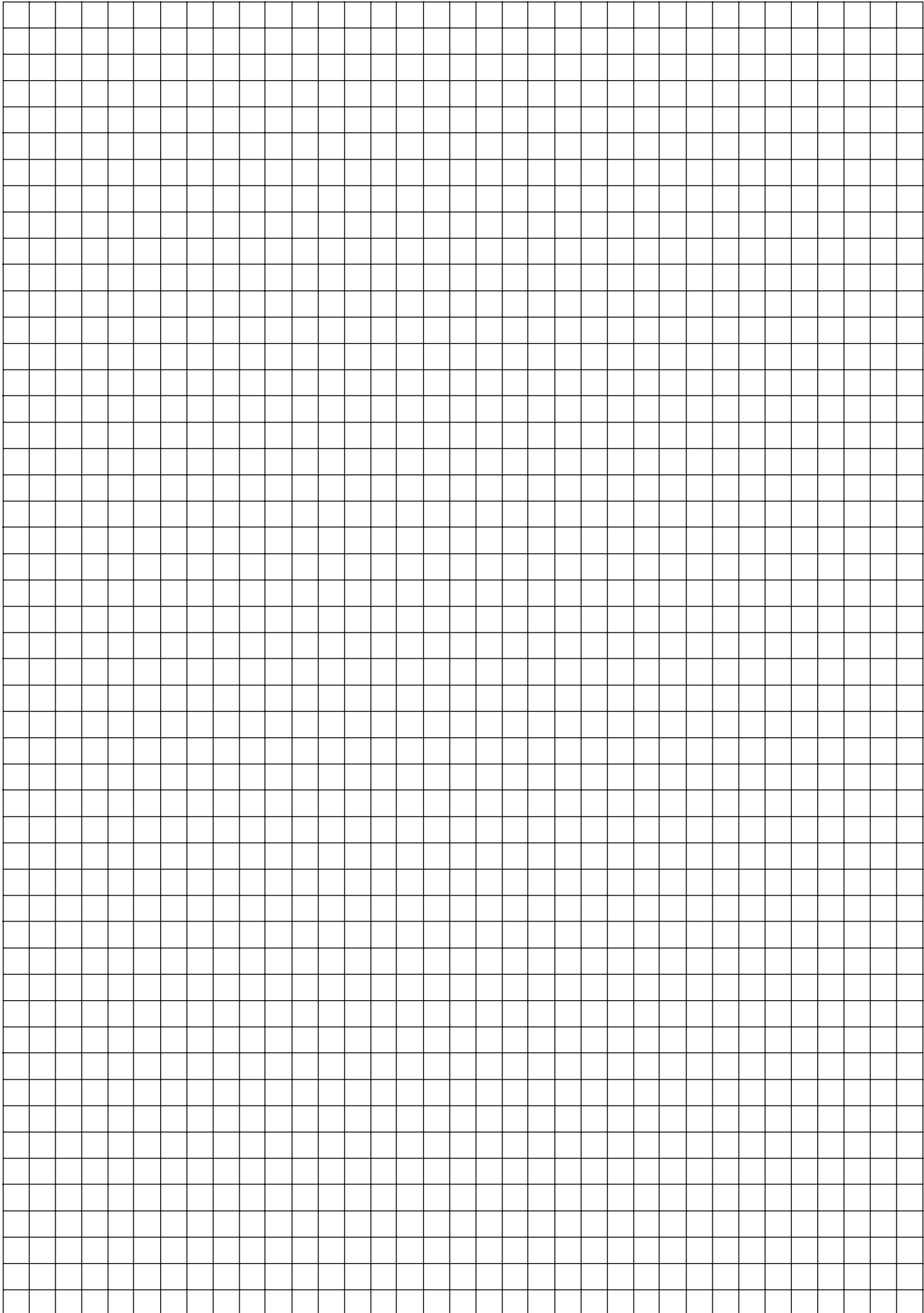
Scrap Graph Paper — This sheet will *not* be scored.

Tear Here

Tear Here



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



Tear Here

Tear Here

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Wednesday, August 16, 2006 — 8:30 to 11:30 a.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

FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Wednesday, August 16, 2006 — 8:30 to 11:30 a.m., only

SCORING KEY

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Mathematics A examination. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics A and Mathematics B*.

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* attempt to correct the student's work by making insertions or changes of any kind. Use checkmarks to indicate student errors.

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.

Each student's answer paper is to be scored by a minimum of three mathematics teachers. On the back of the student's detachable answer sheet, raters must enter their initials in the boxes next to the questions they have scored and also write their name in the box under the heading "Rater's/Scorer's Name."

Raters should record the student's scores for all questions and the total raw score on the student's detachable answer sheet. Then the student's total raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, August 16, 2006. The student's scaled score should be entered in the box provided on the student's detachable answer sheet. The scaled score is the student's final examination score.

Part I

Allow a total of 60 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

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

Updated information regarding the rating of this examination may be posted on the New York State Education Department’s web site during the rating period. Check this web site <http://www.emsc.nysed.gov/osa/> and select the link “Examination Scoring Information” for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examinations in Mathematics A and Mathematics B are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher’s professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics A and Mathematics B*, use their own professional judgment, confer with other mathematics teachers, and/or contact the consultants at the State Education Department for guidance. During each Regents examination administration period, rating questions may be referred directly to the Education Department. The contact numbers are sent to all schools before each administration period.

II. Full-Credit Responses

A full-credit response provides a complete and correct answer to all parts of the question. Sufficient work is shown to enable the rater to determine how the student arrived at the correct answer.

When the rubric for the full-credit response includes one or more examples of an acceptable method for solving the question (usually introduced by the phrase “such as”), it does **not** mean that there are no additional acceptable methods of arriving at the correct answer. Unless otherwise specified, mathematically correct alternative solutions should be awarded credit. The only exceptions are those questions that specify the type of solution that must be used; e.g., an algebraic solution or a graphic solution. A correct solution using a method other than the one specified is awarded half the credit of a correct solution using the specified method.

III. Appropriate Work

Full-Credit Responses: The directions in the examination booklet for all the constructed-response questions state: “Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, charts, etc.” The student has the responsibility of providing the correct answer **and** showing how that answer was obtained. The student must “construct” the response; the teacher should not have to search through a group of seemingly random calculations scribbled on the student paper to ascertain what method the student may have used.

Responses With Errors: Rubrics that state “Appropriate work is shown, but ...” are intended to be used with solutions that show an essentially complete response to the question but contain certain types of errors, whether computational, rounding, graphing, or conceptual. If the response is incomplete, i.e., an equation is written but not solved or an equation is solved but not all of the parts of the question are answered, appropriate work has **not** been shown. Other rubrics address incomplete responses.

IV. Multiple Errors

Computational Errors, Graphing Errors, and Rounding Errors: Each of these types of errors results in a 1-credit deduction. Any combination of two of these types of errors results in a 2-credit deduction. No more than 2 credits should be deducted for such mechanical errors in any response. The teacher must carefully review the student’s work to determine what errors were made and what type of errors they were.

Conceptual Errors: A conceptual error involves a more serious lack of knowledge or procedure. Examples of conceptual errors include using the incorrect formula for the area of a figure, choosing the incorrect trigonometric function, or multiplying the exponents instead of adding them when multiplying terms with exponents. A response with one conceptual error can receive no more than half credit.

If a response shows repeated occurrences of the same conceptual error, the student should not be penalized twice. If the same conceptual error is repeated in responses to other questions, credit should be deducted in each response.

If a response shows two (or more) different major conceptual errors, it should be considered completely incorrect and receive no credit.

If a response shows one conceptual error and one computational, graphing, or rounding error, the teacher must award credit that takes into account both errors: i.e., awarding half credit for the conceptual error and deducting 1 credit for each mechanical error (maximum of two deductions for mechanical errors).

Part II

For each question, use the specific criteria to award a maximum of two credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(31) [2] 8, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] 8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(32) [2] 20, and appropriate work is shown, such as $\frac{15}{150} = \frac{2}{x}$.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made, such as expressing the answer as $\frac{1}{3}$ hour.

or

[1] 20, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

MATHEMATICS A – *continued*

- (33) [2] 2.8, and appropriate work is shown, such as $3^2 = 1^2 + (BC)^2$.
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [1] Appropriate work is shown, but one conceptual error is made.
- or**
- [1] The length of \overline{BD} is found to be 3, but no further correct work is shown.
- or**
- [1] 2.8, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (34) [2] The points D and M are plotted, the graph of the line $x = 3$ is drawn, and its equation is stated.
- [1] One graphing error is made, but an appropriate equation is stated for the locus of points.
- or**
- [1] A correct graph is drawn, but the equation is not stated or is stated incorrectly.
- or**
- [1] $x = 3$, but no graph is drawn.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

MATHEMATICS A – *continued*

(35) [2] 20.7, and appropriate work is shown, such as $\frac{141288}{683748} = \frac{x}{100}$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] 20.7, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Part III

For each question, use the specific criteria to award a maximum of three credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (36) [3] 1,344, and appropriate work is shown, such as $8 \cdot 7 \cdot 6 \cdot 4$.
- [2] Appropriate work is shown, but one computational error is made.
- [1] Appropriate work is shown, but two or more computational errors are made.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, such as basing the answer on ordering an appetizer and a soup, using $5 \cdot 3 \cdot 7 \cdot 6 \cdot 4$.
- or*
- [1] 1,344, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (37) [3] $A'(-2,0)$, $B'(-1,7)$, and $C'(-5,1)$ are graphed, labeled, and stated correctly.
- [2] Appropriate work is shown, but one graphing or labeling error is made.
- or*
- [2] $A'(-2,0)$, $B'(-1,7)$, and $C'(-5,1)$, but no graph is drawn.
- [1] Appropriate work is shown, but two or more graphing or labeling errors are made.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, such as reflecting over the x -axis.
- or*
- [1] The three points are plotted correctly, but the coordinates A' , B' , and C' are not stated.
- [0] $(-2,0)$, $(-1,7)$, and $(-5,1)$, but no further correct work is shown.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Part IV

For each question, use the specific criteria to award a maximum of four credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(38) [4] 112.5, and appropriate work is shown, such as solving the equation $5x - 20 = x + 50$.

[3] Appropriate work is shown, but one computational error is made.

or

[3] $m\angle BED = 67.5$ or $m\angle AEC = 67.5$, but no further correct work is shown.

[2] Appropriate work is shown, but two or more computational errors are made.

or

[2] Appropriate work is shown, but one conceptual error is made, but an appropriate measure for $\angle CEB$ is found.

or

[2] A correct equation is written and solved for x , but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or

[1] 112.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

MATHEMATICS A – *continued*

- (39) [4] 2,050, and appropriate work is shown, such as finding the length of one side of the field, finding the perimeter, and calculating $(2.50 \cdot 800) + 50$.
- [3] Appropriate work is shown, but one computational error is made.
- or*
- [3] Appropriate work is shown, but the installation fee is not added to the cost of the fencing.
- [2] Appropriate work is shown, but two or more computational errors are made.
- or*
- [2] Appropriate work is shown, but one conceptual error is made.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or*
- [1] 2,050, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

Map to Learning Standards

Key Ideas	Item Numbers
Mathematical Reasoning	29, 31
Number and Numeration	1, 10, 21
Operations	5, 7, 11, 12, 14, 17, 23
Modeling/Multiple Representation	3, 9, 13, 18, 34, 37, 38
Measurement	8, 19, 24, 30, 32, 33, 35, 39
Uncertainty	4, 16, 26, 36
Patterns/Functions	2, 6, 15, 20, 22, 25, 27, 28

Regents Examination in Mathematics A

August 2006

**Chart for Converting Total Test Raw Scores to
Final Examination Scores (Scaled Scores)**

The Chart for Determining the Final Examination Score for the August 2006 Regents Examination in Mathematics A will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Wednesday, August 16, 2006. Conversion charts provided for previous administrations of the Mathematics A examination must NOT be used to determine students’ final scores for this administration.

Submitting Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to www.emsc.nysed.gov/osa/exameval.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

