

MATHEMATICS A

Thursday, January 24, 2008 — 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 Robin spent \$17 at an amusement park for admission and rides. If she paid \$5 for admission, and rides cost \$3 each, what is the total number of rides that she went on?

(1) 12 (3) 9
(2) 2 (4) 4

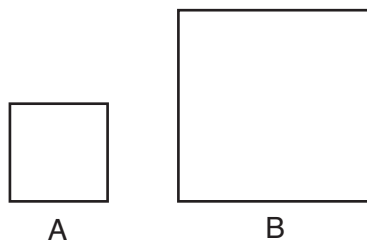
- 2 A block of wood is 5 inches long, 2 inches wide, and 3 inches high. What is the volume of this block of wood?

(1) 10 in^3 (3) 30 in^3
(2) 25 in^3 (4) 38 in^3

- 3 The statement " $a > 2$ and $a < 5$ " is true when a is equal to

(1) 10 (3) 3
(2) 2 (4) 5

- 4 In the accompanying diagram, figure B is the image of figure A .



Which type of transformation was performed?

(1) dilation (3) rotation
(2) translation (4) reflection

**Use this space for
computations.**

5 A box contains 6 dimes, 8 nickels, 12 pennies, and 3 quarters. What is the probability that a coin drawn at random is *not* a dime?

- (1) $\frac{6}{29}$ (3) $\frac{12}{29}$
(2) $\frac{8}{29}$ (4) $\frac{23}{29}$

6 If x varies directly as y , and $x = 8$ when $y = 24$, what is the value of x when $y = 6$?

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

7 What is the value of p in the equation $8p + 2 = 4p - 10$?

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

8 A solution of the equation $\frac{x^2}{4} = 9$ is

- (1) 12 (3) 3
(2) 6 (4) $\frac{3}{2}$

9 Which transformation produces a figure that is always the mirror image of the original figure?

- (1) line reflection (3) translation
(2) dilation (4) rotation

Use this space for computations.

10 If the measures, in degrees, of the three angles of a triangle are x , $x + 10$, and $2x - 6$, the triangle must be

- (1) isosceles
- (2) equilateral
- (3) right
- (4) scalene

11 Which event has a probability of zero?

- (1) choosing a letter from the alphabet that has line symmetry
- (2) choosing a number that is greater than 6 and is even
- (3) choosing a pair of parallel lines that have unequal slopes
- (4) choosing a triangle that is both isosceles and right

12 Which property is represented by the statement $\frac{1}{2}(6a + 4b) = 3a + 2b$?

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

13 Which equation expresses the relationship between x and y , as shown in the accompanying table?

x	0	1	2	3	4
y	2	5	8	11	14

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

Use this space for
computations.

14 What are the factors of $x^2 - 5x + 6$?

- (1) $(x + 2)$ and $(x + 3)$ (3) $(x + 6)$ and $(x - 1)$
(2) $(x - 2)$ and $(x - 3)$ (4) $(x - 6)$ and $(x + 1)$

15 A school newspaper took a survey of 100 students. The results of the survey showed that 43 students are fans of the Buffalo Bills, 27 students are fans of the New York Jets, and 48 students do not like either team. How many of the students surveyed are fans of *both* the Buffalo Bills and the New York Jets?

- (1) 16 (3) 52
(2) 18 (4) 70

16 In which group are the numbers arranged in order from smallest value to largest value?

- (1) $\pi, 3.14, \sqrt{9.86}, \frac{22}{7}$ (3) $\frac{22}{7}, 3.14, \pi, \sqrt{9.86}$
(2) $\sqrt{9.86}, \frac{22}{7}, 3.14, \pi$ (4) $3.14, \sqrt{9.86}, \pi, \frac{22}{7}$

17 The expression $\frac{4x^2y^3}{2xy^4}$ is equivalent to

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

**Use this space for
computations.**

23 Two angles are complementary. The measure of one angle is 15° more than twice the other. What is the measure of the *smaller* angle?

- (1) 25° (3) 55°
(2) 35° (4) 65°

24 The larger of two consecutive integers is represented by $x + 4$. Which expression represents the *smaller* integer?

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

25 If $\frac{5}{n} - \frac{1}{2} = \frac{3}{6n}$, what is the value of n ?

- (1) -2 (3) 9
(2) 2 (4) $\frac{2}{7}$

26 The expression $\sqrt{28} - \sqrt{7}$ is equivalent to

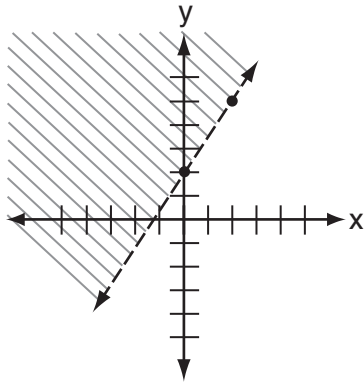
- (1) $\sqrt{7}$ (3) $3\sqrt{7}$
(2) 2 (4) 4

27 Which set of numbers could be the lengths of the sides of a right triangle?

- (1) $\{10,24,26\}$ (3) $\{3,4,6\}$
(2) $\{12,16,30\}$ (4) $\{4,7,8\}$

Use this space for
computations.

28 Which inequality is shown in the accompanying diagram?



(1) $y > \frac{3}{2}x + 2$

(3) $y \geq \frac{3}{2}x + 2$

(2) $y < \frac{3}{2}x + 2$

(4) $y \leq \frac{3}{2}x + 2$

29 What is the total number of different seven-letter arrangements that can be formed using the letters in the word “MILLION”?

(1) 30

(3) 1,260

(2) 210

(4) 2,520

30 The locus of points equidistant from the points $(4, -5)$ and $(4, 7)$ is the line whose equation is

(1) $y = 1$

(3) $x = 1$

(2) $y = 2$

(4) $x = 4$

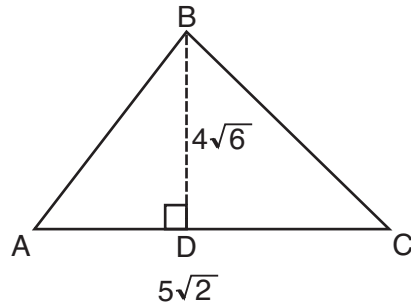
Part II

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. [10]

31 The circumference of a circle measures 22π units. Find the number of square units in the area of the circle. Express your answer in terms of π .

32 As captain of his football team, Jamal gets to call heads or tails for the toss of a fair coin at the beginning of each game. At the last three games, the coin has landed with heads up. What is the probability that the coin will land with heads up at the next game? Explain your answer.

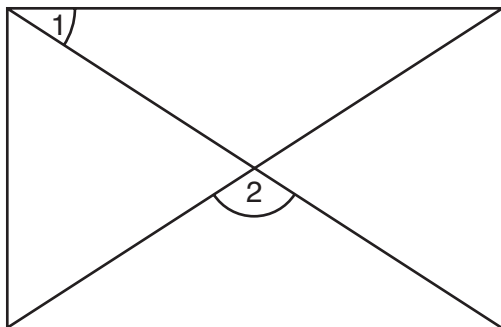
- 33** In the accompanying diagram of $\triangle ABC$, altitude $BD = 4\sqrt{6}$ and $AC = 5\sqrt{2}$. Find the area of the triangle to the *nearest tenth* of a square unit.



(Not drawn to scale)

34 Write an equation of a line that is perpendicular to the line $y = \frac{2}{3}x + 5$ and that passes through the point $(0,4)$.

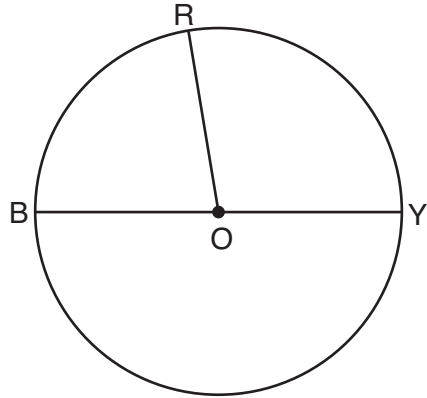
35 As shown in the accompanying diagram, a rectangular gate has two diagonal supports. If $m\angle 1 = 42$, what is $m\angle 2$?



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** In the accompanying diagram, \overline{BY} is a diameter of circle O , the measure of central angle ROY is $(x + 60)^\circ$, and the measure of central angle ROB is $(3x - 20)^\circ$. Find the number of degrees in the measure of central angle ROY .



37 In the spaces provided below, write the converse, the inverse, and the contrapositive of the statement “If I run, then I am tired.”

Converse: _____

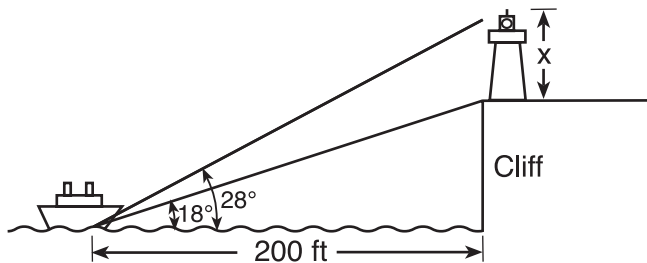
Inverse: _____

Contrapositive: _____

Part IV

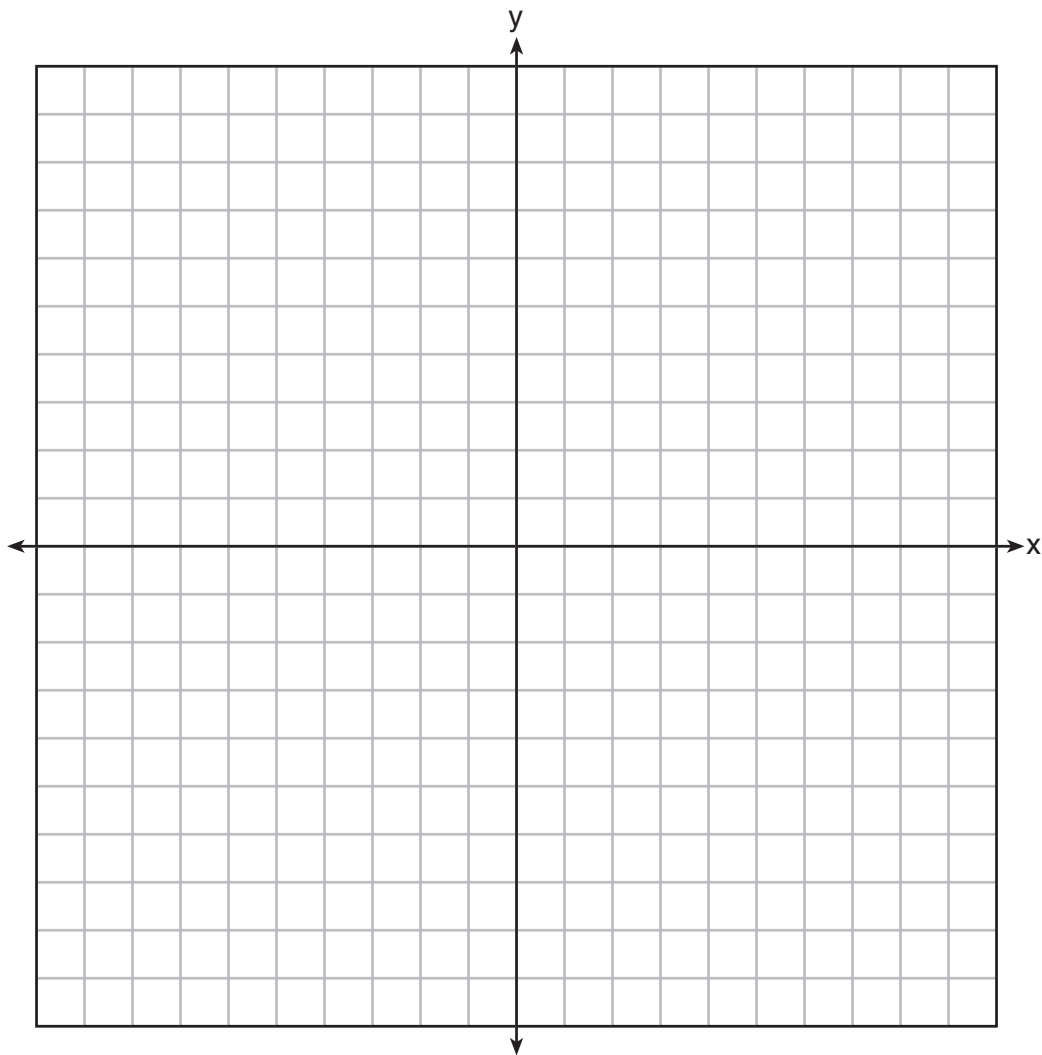
Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [8]

- 38 A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28° . What is the height of the lighthouse, x , to the nearest tenth of a foot?



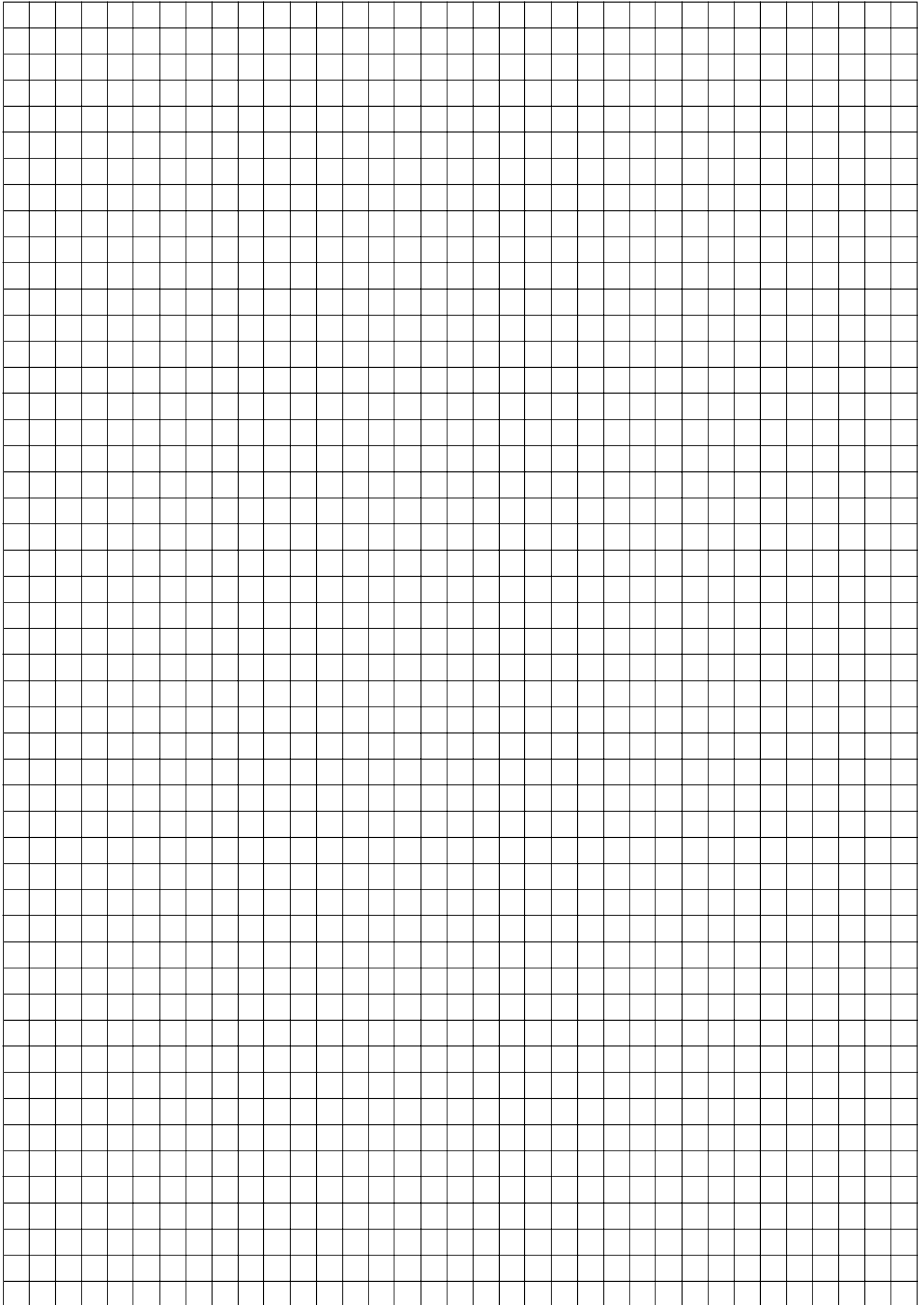
39 On the accompanying set of axes, graph the parabola whose equation is $y = x^2 - 2x - 8$ over the interval $-3 \leq x \leq 5$ and graph the circle whose center is at $(1, -5)$ and whose radius is 4.

Using your graphs, determine how many points of intersection the two graphs have.



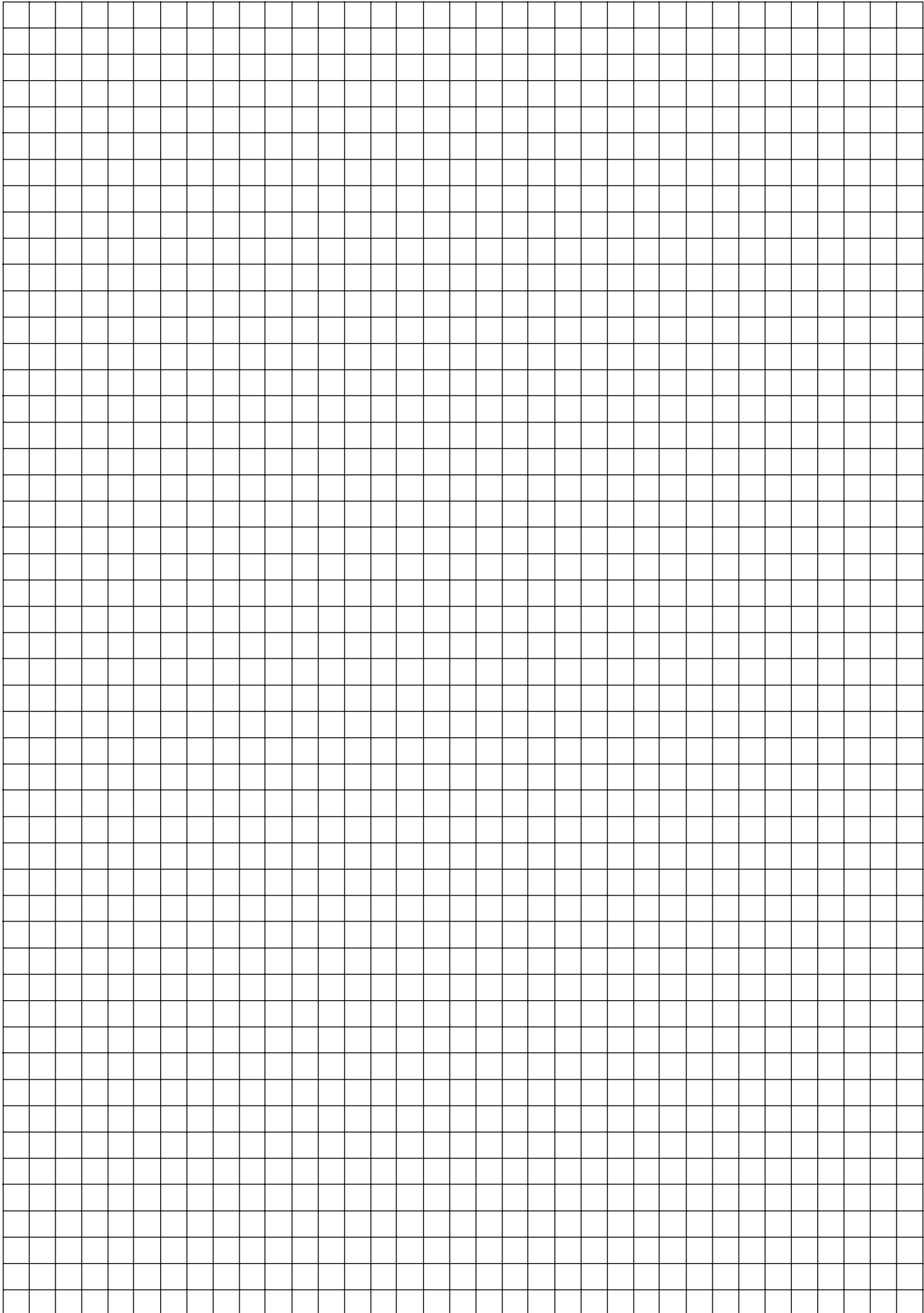
Scrap Graph Paper — This sheet will *not* be scored.

Tear Here



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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 24, 2008 — 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

Tear Here

FOR TEACHERS ONLY

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

MATHEMATICS A

Thursday, January 24, 2008 — 1:15 to 4:15 p.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 check marks 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 Thursday, January 24, 2008. 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) 4	(6) 2	(11) 3	(16) 4	(21) 1	(26) 1
(2) 3	(7) 4	(12) 2	(17) 1	(22) 1	(27) 1
(3) 3	(8) 2	(13) 3	(18) 4	(23) 1	(28) 1
(4) 1	(9) 1	(14) 2	(19) 1	(24) 2	(29) 3
(5) 4	(10) 4	(15) 2	(20) 3	(25) 3	(30) 1

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] 121π , 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] Appropriate work is shown, but the answer is expressed as a decimal.

or

[1] The radius of the circle is found, but no further correct work is shown.

or

[1] 121π , 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] $\frac{1}{2}$ or an equivalent answer, and an appropriate explanation is written.

[1] A correct explanation is written, but the probability is not stated.

or

[1] $\frac{1}{2}$ or an equivalent answer, but no explanation is written.

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

- (33) [2] 34.6, and appropriate work is shown.
- [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, such as using an incorrect area formula.
- or**
- [1] Appropriate work is shown, but the answer is left in radical form.
- or**
- [1] 34.6, 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] A correct equation is written, such as $y = -\frac{3}{2}x + 4$ or $(y - 4) = -\frac{3}{2}(x - 0)$.
- [1] An appropriate equation is written, but one computational error is made or one incorrect substitution is made.
- or**
- [1] An appropriate equation is written, but one conceptual error is made, such as writing an equation for a parallel line going through (0,4) or for a perpendicular line that does not go through (0,4).
- or**
- [1] The slope is identified correctly as $-\frac{3}{2}$ or the y -intercept as 4, but no equation or an incorrect equation is written.
- [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] 96, and appropriate work is shown, such as an algebraic solution or a correctly labeled diagram.

[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] 96, 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] 95, and appropriate work is shown, such as $3x - 20 + x + 60 = 180$.
- [2] Appropriate work is shown, but one computational error is made.
- or*
- [2] A correct equation is written and solved for x , but $m\angle ROY$ is not found.
- [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 writing the equation $x + 60 = 3x - 20$, but an appropriate answer is found.
- or*
- [1] A correct equation is written, but no further correct work is shown.
- or*
- [1] 95, 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] Three correct statements are written for the converse, the inverse, and the contrapositive.
- [2] Two correct statements are written.
- [1] One correct statement is written.
- [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] 41.4, and appropriate work is shown, such as $200 \tan 28^\circ - 200 \tan 18^\circ$.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or*
- [3] Appropriate work is shown to find the correct height of the cliff and the correct combined height of the lighthouse and the cliff, but they are not subtracted.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or*
- [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.
- or*
- [2] Appropriate work is shown to find the correct height of the cliff or the correct combined height of the lighthouse and the cliff, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or*
- [1] A correct equation is written to find the height of the lighthouse, but no further correct work is shown.
- or*
- [1] 41.4, but no work is shown.
- [0] The correct height of the cliff *or* the correct combined height of the lighthouse and cliff is found, but no 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.

MATHEMATICS A – *continued*

(39) [4] Both the parabola and the circle are graphed correctly and the number of points of intersection is stated as three.

[3] Appropriate work is shown, but one graphing error is made, but an appropriate number of points of intersection is stated.

or

[3] Both graphs are drawn correctly, but the number of points of intersection is missing or is incorrect.

[2] Appropriate work is shown, but two or more graphing errors are made, but an appropriate number of points of intersection is stated.

[1] Both graphs are drawn incorrectly, but an appropriate number of points of intersection is stated.

or

[1] Either the parabola or the circle is graphed correctly, but no further correct work is shown.

or

[1] Three points of intersection, but no work is shown and no graphs are drawn.

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

Regents Examination in Mathematics A

January 2008

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

The Chart for Determining the Final Examination Score for the January 2008 Regents Examination in Mathematics A will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Thursday, January 24, 2008. 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.

