FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Thursday, June 23, 2005 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Mathematics B examination. More detailed information about scoring is provided in the publication *Information Booklet for Administering and 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 Thursday, June 23, 2005. 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 40 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) 3	(11) 1	(16) 3
(2) 3	(7) 3	(12) 1	(17) 4
(3) 1	(8) 1	(13) 4	(18) 3
(4) 2	(9) 3	(14) 2	(19) 4
(5) 2	(10) 4	(15) 1	(20) 4

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. Visit the site http://www.emsc.nysed.gov/osa/ and select the link "Latest Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and at least one more time before the final scores for the examination are recorded.

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 Administering and Scoring 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.

(21) **[2]** A graph is sketched that maps (–3,5) to (–6,10), (0,1) to (0,2), and (1,3) to (2,6).

[1] One graphing or computational error is made, but an appropriate graph is sketched.

[0] A graph is sketched that represents a dilation of only x or y.

or

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

(22) **[2]** 2, 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] 2, 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.

(23) **[2]** 4, 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] 4, 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.

(24) **[2]** $\frac{2x+3}{x(x+3)}$ or $\frac{2x+3}{x^2+3x}$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made or the answer is not simplified completely.

or

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

or

[1] $\frac{2x+3}{x(x+3)}$ or $\frac{2x+3}{x^2+3x}$, 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.

(25) **[2]** 67, and appropriate work is shown, such as $A = \frac{1}{2}(11)(13)\sin 70°$.

[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] 67, 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.

(26) **[2]** 95, 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 calculating $g(h(4))$.

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.

Part III

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.

(27) **[4]** 234, and appropriate work is shown, such as using the Law of Sines.

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

or

[3] Appropriate work is shown, but one substitution error is made, such as using 42 as m$\angle FAB$.

or

[3] Appropriate work is shown, but the correct distance to station B (180 miles) is found.

[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.

or

[2] Correct substitution is made into the Law of Sines, but no further correct work is shown.

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

or

[1] 234, 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.

(28) **[4]** –2 and –1, and appropriate work is shown.

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

or

[3] Appropriate work is shown, but only one value of q is found.

[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, such as squaring only the left side of the equation.

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

or

[1] –2 and –1, but no work is shown.

[0] –2 *or* –1, 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.

(29) **[4]** .7564 or an equivalent answer, and appropriate work is shown, such as finding the sum of the exact probabilities that five, six, or seven seeds will sprout.

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

or

[3] The probability that *at most* five seeds will sprout is calculated correctly, and appropriate work is shown.

[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.

or

[2] The three *exact* probabilities are found correctly, but they are not added.

or

[2] The sum of only two of the three probabilities is found correctly, such as *exactly* six plus *exactly* seven, and appropriate work is shown.

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

or

[1] The probability that *exactly* five seeds will sprout is determined appropriately.

or

[1] The substitution for the sum of the three probabilities is indicated, but no further correct work is shown.

or

[1] .7564 or an equivalent answer, 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.

(30) **[4]** 42, 138, 210, and 330, and appropriate work is shown, such as substituting for $\cos 2\theta$ and solving the resulting quadratic equation.

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

or

[3] Incorrect substitution is made for $\cos 2\theta$, such as $1 - \sin^2 \theta$, but all further work is appropriate.

[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.

or

[2] Correct substitution is made, and appropriate work is shown to obtain the values of $\sin \theta$, but the values of θ are not found.

or

[2] A quadratic equation in terms of $\sin \theta$ is written in standard form, but no further correct work is shown.

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

or

[1] Correct substitution is made for $\cos 2\theta$, but no further correct work is shown.

or

[1] 42, 138, 210, and 330, but no work is shown. [All four answers must be identified to receive this credit.]

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

(31) **[4]** 94, and appropriate work is shown.

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

[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.

or

[2] Appropriate work is shown, and the correct radian value is found for θ, but it is not converted to degrees.

or

[2] Both formulas are set up correctly, but no further correct work is shown.

or

[2] An incorrect radian value is found for θ, but it is converted correctly to degrees.

[1] Only one formula is set up correctly, and no further correct work is shown.

or

[1] 94, 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) **[4]** $3.8 \leq x \leq 15.2$, and appropriate work is shown, such as using the quadratic formula or sketching the graph of the parabola and the line.

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

or

[3] $3.8 < x < 15.2$, and appropriate work is shown.

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

or

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

or

[2] The graph of the parabola and the line are sketched correctly, but no further correct work is shown.

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

or

[1] Correct substitution is made into the quadratic formula, but no further correct work is shown.

or

[1] The graph of the parabola is sketched correctly, but no further correct work is shown.

or

[1] $3.8 \leq x \leq 15.2$, but no work is shown.

[0] $3.8 < x < 15.2$, 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.

Part IV

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

(33) **[6]** A complete and correct proof is written.

[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.

[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.

[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.

[1] Only one correct statement and reason are written.

[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or

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

(34) **[6]** m∠*ACB* = 36 and *DOE* = 39, and appropriate work is shown. [If trigonometry is used to find that m∠*ACB* = 35.98138002, allow full credit for the full display of the calculator or any correctly rounded response.]

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

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

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

or

[3] m∠*ACB* = 36, and appropriate work is shown, but no further correct work is shown.

or

[3] *DOE* = 39, and appropriate work is shown, but no further correct work is shown.

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

or

[2] m∠*ACB* = 36 and *DOE* = 39, but no work is shown.

[1] The measures of the arcs are found correctly, but no further correct work is shown.

or

[1] m∠*ACB* = 36 *or DOE* = 39, but no work is shown.

[0] 36 and 39, but no work is shown and the answers are not labeled.

or

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

Regents Examination in Mathematics B

June 2005

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

The *Chart for Determining the Final Examination Score for the June 2005 Regents Examination in Mathematics B*, normally located on this page, will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Thursday, June 23, 2005. Conversion charts provided for previous administrations of the Mathematics B examination must NOT be used to determine students' final scores for this administration.