FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Thursday, June 14, 2007 — 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 B 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, June 14, 2007. 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) 1	(6) 3	(11) 1	(16) 3
(2) 2	(7) 2	(12) 2	(17) 3
(3) 4	(8) 1	(13) 2	(18) 2
(4) 4	(9) 3	(14) 4	(19) 2
(5) 4	(10) 1	(15) 2	(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. 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.

(21) **[2]** 65, and appropriate work is shown, such as $P(10) = 80(0.98)^{10}$.

[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] 65, 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.

(22) **[2]** $y = 1.08x - 2125$ or an equivalent equation is written.

[1] One conceptual error is made, such as writing a regression equation that is not linear.

or

[1] The expression $1.08x - 2125$ is written, but no equation is written.

or

[1] The correct values are identified for a and b, but no 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.

(23) **[2]** 6, 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 negative root is not rejected.

or

[1] A correct equation is written, but no further correct work is shown.

or

[1] An incorrect equation of equal difficulty is solved appropriately.

or

[1] 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.

(24) **[2]** 2.6, and appropriate work is shown, such as solving the equation $(10 + x)^3 = 2000$.

[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 equation $(10 + x)^3 = 2000$ is written, but no further correct work is shown.

or

[1] An incorrect equation of equal difficulty is solved appropriately.

or

[1] 2.6, 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.

(25) **[2]** 6, 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, such as evaluating $(g \circ f)(5)$, resulting in an answer of 24.78270016.

or

[1] 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.

(26) **[2]** $18 - 4i$, and appropriate work is shown, such as $(8 + 8i) + (10 - 12i)$.

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

or

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

or

[1] A graphic solution is drawn, but the sum is not expressed in $a + bi$ form.

or

[1] $18 - 4i$, 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]** $\frac{x+3}{2}$, and appropriate work is shown.

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

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

or

[2] Appropriate work is shown, but one conceptual error is made, such as failing to multiply by the reciprocal of $g(x)$ or trying to solve for x.

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

or

[1] $\frac{x+3}{2}$, 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.

(28) **[4]** 12, and appropriate work is shown, such as using the Law of Sines twice or the Law of Sines and the Law of Cosines.

[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.

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

or

[1] 12, but no work is shown.

[0] The Pythagorean theorem is used to solve the problem.

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]** 16.2 and 10, and appropriate work is shown.

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

or

[3] Appropriate work is shown, but the sample standard deviation (s) is used, resulting in answers of 16.7 and 10.

[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.

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

or

[1] 16.2 and 10, but no work is shown.

[0] 16.2 *or* 10, 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.

(30) **[4]** $(x - 20)^2 + (y - 8)^2 = 16$ and the ellipse is sketched correctly.

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

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

or

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

or

[2] The equation of the circle is written correctly or the ellipse is sketched correctly, but no further correct work is shown.

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

[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]** 10 and 1975, 1985, and 1995, and appropriate work is shown or an appropriate explanation is written.

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

or

[3] 10, and appropriate work is shown, but only two of the years are found.

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

or

[2] Appropriate work is shown, but one conceptual error is made, such as graphing an incorrect function.

or

[2] An incorrect equation of equal difficulty is solved appropriately.

or

[2] 1975, 1985, and 1995, and appropriate work is shown or an appropriate explanation is written, but the minimum snowfall is not found.

or

[2] 10, and appropriate work is shown, but only one of the years is found.

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

or

[1] 10, and appropriate work is shown or an appropriate explanation is written, but the years are not found.

or

[1] 10 and 1975, 1985, and 1995, but no work is shown.

[0] 10 *or* 1975, 1985, and 1995, 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.

(32) **[4]** Maximum height = 64 and time = 4, and appropriate work is shown.

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

or

[3] The correct time is found, and appropriate work is shown, but the maximum height is not found.

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

or

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

or

[2] The maximum height is found correctly, and appropriate work is shown, but an incorrect value is found for t.

or

[2] Appropriate work is shown, but only the time that the maximum height occurs is found, and the quadratic equation $64t - 16t^2 = 0$ is factored, but no further correct work is shown.

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

or

[1] Appropriate work is shown, but only the time that the maximum height occurs is found, or the quadratic equation $64t - 16t^2 = 0$ is factored.

or

[1] Maximum height = 64 and time = 4, but no work is shown.

[0] Maximum height = 64 *or* time = 4, 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]** The vertices $A'(-1,1)$, $B'(4,-2)$, $C'(3,-5)$, and $D'(-2,-2)$ are stated and a complete and correct proof that includes a conclusion is written.

[5] The vertices are stated, and a proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect.

or

[5] A complete proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but the vertices of $A'B'C'D'$ are not stated.

[4] The vertices are stated, and a proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

[3] The vertices are stated, and a proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two reasons are missing or are incorrect.

[2] The vertices are stated, and some correct relevant statements about the proof are made, but three or four statements or reasons are missing or are incorrect.

[1] The vertices $A'(-1,1)$, $B'(4,-2)$, $C'(3,-5)$, and $D'(-2,-2)$ are stated, but no proof is 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]** 561.3 and 43.3, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.

[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.

or

[4] The resultant speed is found correctly, but no further correct work is shown.

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

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

[1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.

or

[1] 561.3 and 43.3, but no work is shown.

[0] 561.3 *or* 43.3, 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.

Map to Learning Standards

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

Regents Examination in Mathematics B

June 2007

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

The *Chart for Determining the Final Examination Score for the June 2007 Regents Examination in Mathematics B* will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Thursday, June 14, 2007. Conversion charts provided for the previous administrations of the Regents Examination in Mathematics B 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 http://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.