FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, August 17, 2004 — 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 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 Tuesday, August 17, 2004. 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) 2	(6) 4	(11) 1	(16) 3
(2) 3	(7) 3	(12) 3	(17) 2
(3) 1	(8) 3	(13) 4	(18) 4
(4) 1	(9) 1	(14) 2	(19) 4
(5) 2	(10) 4	(15) 2	(20) 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. 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]** 1.15, and appropriate work is shown, such as $\frac{x}{\sin 130} = \frac{0.75}{\sin 30}$.

[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 trigonometric function.

or

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

or

[1] 1.15, 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]** $8.5 + 7i\sqrt{3}$, 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] $8.5 + 7i\sqrt{3}$, 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]** $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, 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] $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, 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]** $20 < x < 100$, and appropriate work is shown.

[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] Appropriate work is shown to solve for 20 and 100, but the solution is not expressed as a correct inequality or interval.

or

[1] $20 < x < 100$, 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]** $-\frac{s}{r(r+s)}$ or $-\frac{s}{r^2+rs}$, 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 not expressed in simplest form.

or

[1] $-\frac{s}{r(r+s)}$ or $-\frac{s}{r^2+rs}$, 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]** 621.1, 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.

or

[1] A correct formula is written, but incorrect substitutions are made.

or

[1] An incorrect proportion is written, but an appropriate solution is found.

or

[1] The correct circumference is found, but no further correct work is shown.

or

[1] 621.1, 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]** 590.5 and 652.6, and appropriate work is shown, such as $|d - 620| \leq 0.05d$.

[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] 590.5 *or* 652.6, and appropriate work is shown.

[1] 590.5 and 652.6, but no work is shown.

[0] 590.5 *or* 652.6, 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.

(28) **[4]** 32.8, and appropriate work is shown.

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

or

[3] An incorrect substitution is made, but appropriate work is shown and an appropriate solution is found.

[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, such as incorrect application of a logarithm rule.

[1] Correct substitutions are made, but no further correct work is shown.

or

[1] 32.8, 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.

(29) **[4]** $y = 1{,}018.2839(0.5969)^x$ and 16, and appropriate work is shown.

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

or

[3] $y = 1{,}018.2839(0.5969)^x$ and 16, but the substitution is not 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] An appropriate regression equation is written, but the number of coins returned after the eighth trial is not found.

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

or

[1] An incorrect regression equation is written, but the number of coins returned after the eighth trial is found appropriately.

or

[1] $y = 1{,}018.2839(0.5969)^x$ and 16, but no work is shown.

[0] $y = 1{,}018.2839(0.5969)^x$ *or* 16, 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]** .00046 or $\frac{46}{100,000}$ or an equivalent answer, and appropriate work is shown.

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

or

[3] Appropriate work is shown, but the probability of hitting *at most* four home runs 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.

or

[2] The probabilities of hitting *exactly* four and *exactly* five home runs are found, but the probabilities are not added.

[1] Appropriate work is shown, but the probability of hitting *exactly* four home runs is found.

or

[1] Correct substitution into the Bernoulli equation for *exactly* four and *exactly* five home runs is made, but no further correct work is shown.

or

[1] .00046 or $\frac{46}{100,000}$ 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.

(31) **[4]** 21 by 23, and appropriate work is shown, such as solving the equation $765 = 3(x - 4)(x - 6)$.

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

or

[3] Appropriate work is shown, but only one dimension 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.

or

[2] An incorrect equation of equal difficulty is solved appropriately, and appropriate dimensions are found.

or

[2] A correct quadratic equation 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] An incorrect equation of equal difficulty is written, and one computational error is made, but appropriate dimensions are found.

or

[1] An incorrect equation of equal difficulty is solved appropriately, but one computational error is made when finding the length.

or

[1] 21 by 23, but no work is shown.

[0] 21 *or* 23, 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]** 90 and 270, and appropriate work is shown, such as solving $\sin^2 \theta = 1 + \cos \theta$.

[3] Appropriate work is shown, but one computational error is made or the answers are expressed in radians.

or

[3] Appropriate work is shown, but 180 is not rejected as a solution.

or

[3] Appropriate work is shown, but only one solution 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.

or

[2] An incorrect trigonometric substitution is made, but the equation is solved appropriately.

or

[2] A trigonometric equation set equal to zero is written, but no further correct work is shown.

or

[2] 90 and 270, but a graphic solution is provided.

[1] The equation $\sin^2 \theta - \cos \theta - 1 = 0$ is found, but no further correct work is shown.

or

[1] A graphic solution is provided, and one computational or graphing error is made.

or

[1] 90 and 270, but no work is shown.

[0] 90 *or* 270, but no work is shown.

or

[0] 90, 180, and 270, 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]** 8, and appropriate work is shown, such as a correctly labeled graph, a table of values, or an algebraic solution.

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

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

or

[4] Appropriate work is shown, and the correct values of t where the height of the tide is 7 are identified (2 and 10), but the correct number of hours is not stated.

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

or

[3] A correct table or graph is constructed, but no further correct work is shown.

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

or

[2] The correct values of t (2 and 10) and 8 are written, but no work is shown.

[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.

(34) **[6]** $\overline{JK} \parallel \overline{ML}, \overline{MJ} \nparallel \overline{KL}$, and $\overline{MJ} \neq \overline{KL}$, and appropriate work is shown or a complete and correct proof is written, and a concluding statement is written.

[5] Appropriate work is shown and a correct concluding statement is written, but one computational error is made in determining the slopes or the lengths of the legs.

or

[5] Appropriate work is shown, but the concluding statement is missing or is incomplete.

[4] Appropriate work is shown and a correct concluding statement is written, but two or more computational errors are made.

or

[4] The quadrilateral is proved to be a trapezoid, but the two nonparallel sides are not proved to be unequal.

or

[4] A proof is written that shows that $\overline{JK} \parallel \overline{ML}$ and $\overline{MJ} \neq \overline{KL}$, but the difference between a quadrilateral and a trapezoid is not addressed.

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

[2] The quadrilateral is proved to be a trapezoid, but one conceptual error is made, and the two nonparallel sides are not proved to be unequal.

or

[2] The lengths of all four sides are found correctly, but no further correct work is shown.

or

[2] The two nonparallel sides are proved to be unequal, but no further correct work is shown.

[1] The proof shows that the first set of sides is parallel, but no further correct work is shown.

or

[1] *JKLM* is graphed correctly and the definition of an isosceles trapezoid is written, but no proof 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.

Map to Learning Standards

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

Regents Examination in Mathematics B

August 2004

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

The *Chart for Determining the Final Examination Score for the August 2004 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 Tuesday, August 17, 2004. Conversion charts provided for previous administrations of the Mathematics B examination must NOT be used to determine students' final scores for this administration.