

# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## MATHEMATICS B

Tuesday, June 15, 2010 — 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 Scoring the Regents Examination in 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 scale score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, June 15, 2010. The student's scale score should be entered in the box provided on the student's detachable answer sheet. The scale 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) 3	(6) 4	(11) 2	(16) 4
(2) 1	(7) 1	(12) 2	(17) 3
(3) 1	(8) 3	(13) 4	(18) 3
(4) 3	(9) 3	(14) 3	(19) 4
(5) 2	(10) 3	(15) 3	(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. 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 Examination in 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 Examination in 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]  $\frac{x+1}{x+4}$ , and appropriate work is shown.

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

*or*

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

*or*

[1]  $\frac{x+1}{x+4}$ , 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.

(22) [2] 117.6, 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.

*or*

[1] 117.6, 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.

MATHEMATICS B – *continued*

(23) [2] 19,683, 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] 19,683, 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]  $2 < x < 5$  or an equivalent expression, and appropriate work is shown.

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

***or***

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

***or***

[1]  $2 < x < 5$  or an equivalent expression, 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 B – *continued*

(25) [2] .83.

[1] One rounding error is made.

*or*

[1] One conceptual error is made, such as finding .88, the sample standard deviation.

[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] 24, 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] 24, 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.

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**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]  $y = -0.112x + 23.448$  and  $-5$ , and appropriate work is shown, such as substituting 255 into the regression equation.

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

*or*

[3] The expression  $-0.112x + 23.448$  is written and  $-5$ , and appropriate work is shown.

*or*

[3]  $y = -0.112x + 23.448$  and  $-5$ , but no 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] An incorrect regression equation is written, but an appropriate temperature is found.

*or*

[2]  $y = -0.112x + 23.448$ , but no further correct work is shown.

*or*

[2] The expression  $-0.112x + 23.448$  is written and  $-5$ , but no work is shown.

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

*or*

[1] The expression  $-0.112x + 23.448$  is written, but no further correct work is shown.

*or*

[1]  $-5$ , 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 B – *continued*

- (28) [4] -1, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational, factoring, or simplification error is made.
- or*
- [3] Appropriate work is shown to find  $\frac{7x - 1}{1 - 7x}$ , but no further correct work is shown.
- [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.
- or*
- [2] All numerators and denominators are factored correctly, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.
- or*
- [1] -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.

MATHEMATICS B – *continued*

(29) [4] Both the circle and its image are drawn and labeled correctly, and the equation  $(x + 2)^2 + (y - 1)^2 = 4$  is written.

[3] The circle and its image are drawn and labeled, but one graphing error is made, but an appropriate equation is written.

**or**

[3] The circle and its image are drawn and labeled correctly, but the equation is not written or is written incorrectly.

[2] The circle and its image are drawn and labeled, but two or more graphing errors are made, but an appropriate equation is written.

**or**

[2] The circle is drawn and labeled correctly, but one conceptual error is made in the composition, such as performing the translation before the reflection, but an appropriate equation is written.

**or**

[2] The circle is drawn incorrectly, but an appropriate image is drawn, and both are labeled, but the equation is not written or is written incorrectly.

[1] The circle and its image are drawn and labeled, but one conceptual error and one graphing error are made, but an appropriate equation is written.

**or**

[1] The circle is drawn and labeled correctly, but no further correct 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 B – *continued*

- (30) [4] 3.71 and 4.71, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or***
- [3] The correct equation is solved for  $x$ , but the negative root is not rejected or the second leg is not 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] The correct equation is solved for  $x$ , but the negative root is not rejected, and the second leg is not found.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or***
- [1]  $2x^2 + 2x - 35 = 0$  is written, but no further correct work is shown.
- or***
- [1] 3.71 and 4.71, but no work is shown.
- [0] 3.71 or 4.71, 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 B – *continued*

- (31) [4] A complete and correct proof that includes a concluding statement that  $ABCD$  is a parallelogram and not a rhombus is written.
- [3] Appropriate work is shown, but one computational or graphing error is made, but an appropriate conclusion is written.
- [2] Appropriate work is shown, but two or more computational or graphing errors are made, but an appropriate conclusion is written.
- or***
- [2] Appropriate work is shown, but one conceptual error is made, but an appropriate conclusion is written.
- or***
- [2]  $ABCD$  is proven to be a parallelogram, but no further correct work is shown.
- or***
- [2]  $ABCD$  is proven not to be a rhombus, but no further correct work is shown.
- or***
- [2] The correct calculations necessary to prove that  $ABCD$  is a parallelogram and  $ABCD$  is not a rhombus are performed, but a concluding statement is not written or is written incorrectly.
- [1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made, but an appropriate conclusion is written.
- or***
- [1] The correct calculations necessary to prove that  $ABCD$  is a parallelogram are performed, but no further correct work is shown.
- or***
- [1] The correct calculations necessary to prove that  $ABCD$  is not a rhombus are performed, but no further correct 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 B – *continued*

(32) [4]  $x = 5$ ,  $y = -1$ , and  $x = -19$ ,  $y = -13$  or  $(5,-1)$  and  $(-19,-13)$ , and appropriate algebraic work is shown.

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

***or***

[3] Appropriate work is shown, but the solutions are not labeled or are labeled incorrectly.

***or***

[3] Appropriate work is shown, but only one correct solution is found or only the  $x$ - or the  $y$ -values are found correctly.

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

***or***

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

***or***

[2] The correct answers are stated, but a method other than algebraic is used.

***or***

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

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

***or***

[1] A correct quadratic equation in one variable is written, but no further correct work is shown.

***or***

[1]  $x = 5$ ,  $y = -1$ , and  $x = -19$ ,  $y = -13$ , but no work is shown.

[0]  $x = 5$ ,  $y = -1$ , or  $x = -19$ ,  $y = -13$ , 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.

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**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] 42.8 and 77, and appropriate work is shown.

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

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

*or*

[3] Appropriate work is shown to find 42.8, but no further correct work is shown.

[2] Appropriate work is shown, but two conceptual errors are made.

*or*

[2] 42.8 and 77, but no work is shown.

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

*or*

[1] A correct substitution is made into the Law of Cosines, but no further correct work is shown.

*or*

[1] 42.8, 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] 19, 90, and 161, and appropriate algebraic work is shown.
- [5] Appropriate work is shown, but one computational error is made.
- or***
- [5] Appropriate work is shown, but only two answers are found.
- [4] Appropriate work is shown, but two or more computational errors are made.
- or***
- [4] Appropriate work is shown to find either 19 or 90, but no further correct work is shown.
- [3] Appropriate work is shown, but one conceptual error is made.
- or***
- [3] Appropriate work is shown to find  $(\sin \theta - 1)(3 \sin \theta - 1) = 0$ , but no further correct work is shown.
- or***
- [3] 19, 90, and 161, but a method other than algebraic is used.
- [2] Appropriate work is shown, but one conceptual error and one computational error are made.
- or***
- [2] A correct quadratic equation in standard form (set equal to zero) in terms of sine is written, but no further correct work is shown.
- [1] A correct quadratic equation in terms of sine is written, but no further correct work is shown.
- or***
- [1] 19, 90, and 161, but no work is shown.
- [0] 19 or 90 or 161, 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.
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**Map to Learning Standards**

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

**Regents Examination in Mathematics B**

**June 2010**

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

**The Chart for Determining the Final Examination Score for the June 2010 Regents Examination in Mathematics B will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Tuesday, June 15, 2010. 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.**

**Online Submission of 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.

**As a reminder . . .**

**Regents examinations based on the Mathematics B syllabus will not be offered after June 2010.**



