

# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## MATHEMATICS B

Wednesday, August 16, 2006 — 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 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 Wednesday, August 16, 2006. 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) 3	(6) 2	(11) 1	(16) 4
(2) 1	(7) 2	(12) 4	(17) 3
(3) 4	(8) 3	(13) 4	(18) 4
(4) 2	(9) 3	(14) 2	(19) 2
(5) 1	(10) 4	(15) 3	(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] 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] The expression  $3 + 4i$  is found, but  $c$  is not identified.

*or*

[1] 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.

(22) [2]  $r = \sqrt[3]{\frac{3V}{4\pi}}$  or  $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$  or an equivalent answer, 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]  $\sqrt[3]{\frac{3V}{4\pi}}$  or  $\left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$  or an equivalent answer is found, and appropriate work is shown, but an equation is not written.

*or*

[1]  $r = \sqrt[3]{\frac{3V}{4\pi}}$  or  $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$  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.

MATHEMATICS B – *continued*

(23) [2] 105, and appropriate work is shown, such as  $\frac{7\pi}{12} \bullet \frac{180}{\pi}$ .

[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] 105, 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] 18, 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] The equation  $\log_b \frac{36}{2} = \log_b x$  is written, but the value of  $x$  is not found.

**or**

[1] 18, 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] 5, and appropriate work is shown, such as stating the mean and the standard deviation.

[1] Appropriate work is shown, but one computational error is made, but an appropriate number of scores is found.

*or*

[1] Appropriate work is shown, but one conceptual error is made, such as using the sample standard deviation.

*or*

[1] The mean and standard deviation are found correctly, but the number of scores is missing or is incorrect.

*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.

(26) [2]  $(-5,-7)$ , and appropriate work is shown, such as stating the coordinates of each transformation or graphing each transformation.

[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, such as performing the translation before the reflection.

*or*

[1] Only one of the transformations is performed correctly.

*or*

[1]  $(-5,-7)$ , 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] A complete and correct proof that includes a concluding statement is written.
- [3] 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 the concluding statement is missing.
- or*
- [3] Two pairs of angles are proven congruent, but the triangles are not proven similar.
- [2] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.
- or*
- [2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made, such as using an incorrect method to prove that two angles are congruent.
- or*
- [2]  $\angle E$  and  $\angle ABC$  are proven congruent, but the remainder of the proof is missing or is incorrect.
- [1] Some correct relevant statements about the proof are made, such as showing that  $\angle CAB$  and  $\angle ABE$  are congruent, but the remainder of the proof is missing or is incorrect.
- [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] 2, and appropriate work is shown, such as determining that the area is 108 square feet and the new length of  $AB$  is 16 feet.

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

*or*

[3] The area of the original triangle and the new length of side  $AB$  are found correctly, but the length is not subtracted to find the difference.

[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] Appropriate work is shown, but one computational error is made, and the length is not subtracted to find the difference.

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

*or*

[1] The area of the original triangle is found correctly, but no further correct work is shown.

*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.

MATHEMATICS B – *continued*

(29) [4] 6.8, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines or right triangle trigonometry.

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

*or*

[3] 3.4, and appropriate work is shown, such as  $\cos 70 = \frac{x}{10}$  or  $\sin 20 = \frac{x}{10}$ .

[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, such as using an incorrect trigonometric function.

*or*

[2] Correct substitution is made into the Law of Sines or the Law of Cosines, 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] The measures of  $\widehat{EA}$  and  $\widehat{SA}$  are found correctly, but no further correct work is shown.

*or*

[1] The measures of the three angles of triangle  $SEA$  are found correctly, but no further correct work is shown.

*or*

[1] 6.8, 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.

MATHEMATICS B – *continued*

(30) [4]  $\frac{51}{243}$  or an equivalent answer, 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, such as finding the probability for *at most* three times.

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

**or**

[1] An incorrect expression of a lesser degree of difficulty is evaluated appropriately, such as finding the probability for *exactly* three times.

**or**

[1]  $\frac{51}{243}$  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.

MATHEMATICS B – *continued*

- (31) [4]  $y = 379.92(1.04)^x$  and 562, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [3]  $y = 379.92(1.04)^x$  and 562, but the substitution is not shown to find the value of the stock.
- or**
- [3] The expression  $379.92(1.04)^x$  is written and 562, and appropriate work is shown, but the equation is not written.
- [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 expression  $379.92(1.04)^x$  is written and 562, but no work is shown.
- or**
- [2] A correct regression equation is written, but no further correct work is shown.
- or**
- [2] An incorrect exponential regression equation of equal difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or**
- [1] An incorrect regression equation of a lesser degree of difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.
- or**
- [1] The expression  $379.92(1.04)^x$  is written, but no further correct work is shown.
- or**
- [1] 562, 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*

- (32) [4] 11, and appropriate work is shown, such as a logarithmic equation or a graph.
- [3] Appropriate work is shown, but one computational, rounding, or graphing error is made.
- [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] A correct logarithmic equation is written, but no further correct work is shown.
- or***
- [2] A correct graph is drawn, but the solution is not found or is found incorrectly.
- [1] Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.
- or***
- [1] 11, 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 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]  $m\widehat{GF}=30$ ,  $m\angle BHD=65$ ,  $m\angle BDG=75$ ,  $m\angle GDE=55$ ,  $m\angle C=35$ , and  $m\angle BOD=100$ , and appropriate work is shown.

[5]  $m\widehat{GF}$  is determined correctly, but  $m\widehat{BD}$  is determined incorrectly, but all five of the angle measures are determined appropriately.

**or**

[5]  $m\widehat{GF}$  is determined incorrectly, but all five of the angle measures are determined appropriately, based on the incorrect arc measure.

**or**

[5]  $m\widehat{GF}$  is determined correctly, but only four of the angle measures are determined correctly.

[4]  $m\widehat{GF}$  is determined incorrectly, and only four of the angle measures are determined appropriately, based on the incorrect arc measure.

**or**

[4]  $m\widehat{GF}$  is determined correctly, but only three of the angle measures are determined correctly.

[3]  $m\widehat{GF}$  is determined incorrectly, and only three of the angle measures are determined appropriately, based on the incorrect arc measure.

**or**

[3]  $m\widehat{GF}$  is determined correctly, but only two of the angle measures are determined correctly.

[2]  $m\widehat{GF}$  is determined incorrectly, and only two of the angle measures are determined appropriately, based on the incorrect arc measure.

**or**

[2]  $m\widehat{GF}$  is determined correctly, but only one angle measure is determined correctly.

[1]  $m\widehat{GF}$  is determined incorrectly, and only one angle measure is determined appropriately.

**or**

[1]  $m\widehat{GF}$  is determined 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.

(34) [6] 120 and 4.2, and appropriate work is shown, such as substituting  $t = 0$  into the equation and solving the equation  $-5t^2 - 8t + 120 = 0$ .

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

***or***

[5] 120 and 4.2, but no work is shown to find the amount of water, but appropriate work is shown to find the amount of time.

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

***or***

[4] Appropriate work is shown, and the amount of water is found correctly, but one conceptual error is made in finding the amount of time.

***or***

[4] The amount of time is found correctly, and appropriate work is shown, but the amount of water is not found.

***or***

[4] The amount of water is found correctly, and appropriate work is shown, and a correct substitution into the quadratic formula is made, but the amount of time is not found.

[3] Appropriate work is shown, but one conceptual error is made in finding the amount of time, and one computational error is made in finding the amount of water.

[2] The amount of water is found correctly, and appropriate work is shown, but no further correct work is shown.

***or***

[2] 120 and 4.2, but no work is shown.

[1] 120 *or* 4.2, 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.

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**Map to Learning Standards**

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

**Regents Examination in Mathematics B**

**August 2006**

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

**The *Chart for Determining the Final Examination Score for the August 2006 Regents Examination in Mathematics B* will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Wednesday, August 16, 2006. 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.



