

# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## GEOMETRY

Thursday, January 24, 2013 — 9:15 a.m. to 12:15 p.m., only

### SCORING KEY AND RATING GUIDE

#### Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Regents Examination in Geometry. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics*.

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the open-ended questions, 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. No one teacher is to score more than approximately one-third of the open-ended questions on a student's paper. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

Raters should record the student's scores for all questions and the total raw score on the student's separate 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 at: <http://www.p12.nysed.gov/assessment/> on Thursday, January 24, 2013. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

If the student’s responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

### Part I

Allow a maximum of 56 credits, 2 credits for each of the following.

|                           |                            |                            |                            |
|---------------------------|----------------------------|----------------------------|----------------------------|
| (1) . . . . . 1 . . . . . | (8) . . . . . 1 . . . . .  | (15) . . . . . 4 . . . . . | (22) . . . . . 3 . . . . . |
| (2) . . . . . 2 . . . . . | (9) . . . . . 3 . . . . .  | (16) . . . . . 2 . . . . . | (23) . . . . . 4 . . . . . |
| (3) . . . . . 1 . . . . . | (10) . . . . . 2 . . . . . | (17) . . . . . 2 . . . . . | (24) . . . . . 3 . . . . . |
| (4) . . . . . 3 . . . . . | (11) . . . . . 3 . . . . . | (18) . . . . . 4 . . . . . | (25) . . . . . 1 . . . . . |
| (5) . . . . . 3 . . . . . | (12) . . . . . 3 . . . . . | (19) . . . . . 4 . . . . . | (26) . . . . . 2 . . . . . |
| (6) . . . . . 4 . . . . . | (13) . . . . . 2 . . . . . | (20) . . . . . 1 . . . . . | (27) . . . . . 4 . . . . . |
| (7) . . . . . 2 . . . . . | (14) . . . . . 1 . . . . . | (21) . . . . . 3 . . . . . | (28) . . . . . 3 . . . . . |

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 at: <http://www.p12.nysed.gov/assessment/> and select the link “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 Geometry 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*, use their own professional judgment, confer with other mathematics teachers, and/or contact 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, graphs, 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 2 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (29) [2] 3, and appropriate work is shown.
- [1] Appropriate work is shown, but one computational error is made, but an appropriate value of  $x$  is found.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, but an appropriate value of  $x$  is found.
- 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.
- (30) [2] All three common tangent lines are sketched correctly.
- [1] Only one or two common tangent lines are sketched correctly.
- or*
- [1] All three common tangent lines are sketched correctly, but additional tangent lines are also sketched.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (31) [2] Both loci are graphed correctly, and the point  $(0,-3)$  is labeled with an **X**.
- [1] Both loci are graphed, but one graphing error is made, but appropriate points are labeled with an **X**.
- or*
- [1] Both loci are graphed, but one conceptual error is made, but appropriate points are labeled with an **X**.
- or*
- [1] Both loci are graphed correctly, but no points are labeled with an **X**.
- or*
- [1] Both loci are graphed correctly, and  $(0,-3)$  is labeled with an **X**, but additional points are labeled with an **X**.
- or*
- [1] Only one locus is graphed 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.
- (32) [2]  $(x + 3)^2 + (y - 2)^2 = 25$  or an equivalent equation.
- [1] One computational error is made, but an appropriate equation is written.
- or*
- [1] One conceptual error is made, but an appropriate 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.
- (33) [2] A correct construction is drawn showing all appropriate arcs.
- [1] Appropriate work is shown, but one construction error is made, such as not drawing the perpendicular line.
- [0] A drawing that is not an appropriate construction 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.

(34) [2]  $y = 2$ .

[1] One computational or graphing error is made, but an appropriate equation is written.

*or*

[1] One conceptual error is made, such as writing the equation  $x = 2$ .

*or*

[1] The midpoint (3,2) is found, but no further correct work is shown.

*or*

[1] A slope of zero is stated for the perpendicular bisector line, 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.

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### Part III

For each question, use the specific criteria to award a maximum of 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (35) [4] 94.25 and 141.37, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made, but appropriate values are found.
- [2] Appropriate work is shown, but one conceptual error is made, but appropriate values are found.
- or*
- [2] Appropriate work is shown, but two or more computational or rounding errors are made, but appropriate values are found.
- or*
- [2] Appropriate work is shown to find either 94.25 or 141.37, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual and one computational or rounding error are made, but appropriate values are found.
- or*
- [1] 94.25 and 141.37, 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.

- (36) [4]  $A''(11,1)$ ,  $B''(3,7)$ , and  $C''(3,1)$ .
- [3] Appropriate work is shown, but one computational or graphing error is made, but appropriate coordinates are stated and labeled.
- or*
- [3]  $(11,1)$ ,  $(3,7)$  and  $(3,1)$  are stated, and appropriate work is shown, but the coordinates are not labeled or are labeled incorrectly.
- or*
- [3] Triangle  $A''B''C''$  is graphed and labeled correctly, but the coordinates are not stated or are stated incorrectly.
- [2] Appropriate work is shown, but one computational or graphing error is made, but appropriate coordinates are stated, but the coordinates are not labeled or are labeled incorrectly.
- or*
- [2] Appropriate work is shown, but two or more computational or graphing errors are made, but appropriate coordinates for  $A''B''C''$  are stated and labeled.
- or*
- [2] Appropriate work is shown, but one conceptual error is made, such as performing a translation before the dilation, but appropriate coordinates for  $A''B''C''$  are stated and labeled.
- [1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made, but appropriate coordinates for  $A''B''C''$  are stated and labeled.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, but appropriate coordinates for  $A''B''C''$  are stated, but the coordinates are not labeled or are labeled incorrectly.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, but appropriate coordinates for  $A''B''C''$  are graphed and labeled, but the coordinates are not stated or are stated incorrectly.
- or*
- [1]  $A'(10,2)$ ,  $B'(2,8)$ , and  $C'(2,2)$ , but no further correct work is shown.
- [0]  $(11,1)$ ,  $(3,7)$ , and  $(3,1)$ , 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.



- (37) [4]  $\overline{AC}$ , and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or factoring error is made, but appropriate angles are found, and an appropriate side is stated.
- or**
- [3] Appropriate work is shown to find  $m\angle A = 48$ ,  $m\angle B = 71$ , and  $m\angle C = 61$ , but no side or an incorrect side is stated.
- [2] Appropriate work is shown, but two or more computational or factoring errors are made, but appropriate angles are found, and an appropriate side is stated.
- or**
- [2] Appropriate work is shown, but one conceptual error is made, but appropriate angles are found, and an appropriate side is stated.
- or**
- [2] Appropriate work is shown to find  $x = 6$ , but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made, but appropriate angles are found, and an appropriate side is stated.
- or**
- [1] A correct quadratic equation in standard form (set equal to 0) is written, but no further correct work is shown.
- [0]  $\overline{AC}$ , 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 this question, use the specific criteria to award a maximum of 6 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (38) [6] A complete and correct proof that includes a conclusion 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 or reason is missing or is incorrect, or the concluding statement is missing.
- [4] 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.
- [3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
- or*
- [3] A proof is written that shows  $\triangle ADF \cong \triangle BCE$ , but no further correct work is shown.
- [2] Some correct relevant statements about the proof are made, but three or four statements 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 written, 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.
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## Map to Core Curriculum

| Content Band               | Item Numbers  |
|----------------------------|---|
| Geometric Relationships    | 6, 15, 35   |
| Constructions              | 9, 33   |
| Locus                      | 17, 31  |
| Informal and Formal Proofs | 1, 2, 3, 7, 8, 11, 14, 16, 20, 21, 22, 25, 26, 27, 30, 37, 38 |
| Transformational Geometry  | 4, 29, 36   |
| Coordinate Geometry        | 5, 10, 12, 13, 18, 19, 23, 24, 28, 32, 34                     |

### Regents Examination in Geometry

January 2013

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

**The Chart for Determining the Final Examination Score for the January 2013 Regents Examination in Geometry will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, January 24, 2013. Conversion charts provided for previous administrations of the Regents Examination in Geometry 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.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
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.