

# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## GEOMETRY

Tuesday, January 23, 2018 — 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 Examination in Geometry*.

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. Teachers may not score their own students' answer papers. 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 Tuesday, January 23, 2018. 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 total of 48 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 . . . . .	(9) . . . . . 3 . . . . .	(17) . . . . . 4 . . . . .
(2) . . . . . 2 . . . . .	(10) . . . . . 4 . . . . .	(18) . . . . . 2 . . . . .
(3) . . . . . 4 . . . . .	(11) . . . . . 1 . . . . .	(19) . . . . . 4 . . . . .
(4) . . . . . 1 . . . . .	(12) . . . . . 2 . . . . .	(20) . . . . . 1 . . . . .
(5) . . . . . 2 . . . . .	(13) . . . . . 3 . . . . .	(21) . . . . . 4 . . . . .
(6) . . . . . 1 . . . . .	(14) . . . . . 1 . . . . .	(22) . . . . . 2 . . . . .
(7) . . . . . 3 . . . . .	(15) . . . . . 3 . . . . .	(23) . . . . . 2 . . . . .
(8) . . . . . 4 . . . . .	(16) . . . . . 4 . . . . .	(24) . . . . . 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.

The Department is providing supplemental scoring guidance, the “Model Response Set,” for the Regents Examination in Geometry. This guidance is intended to be part of the scorer training. Schools should use the Model Response Set along with the rubrics in the Scoring Key and Rating Guide to help guide scoring of student work. While not reflective of all scenarios, the Model Response Set illustrates how less common student responses to constructed-response questions may be scored. The Model Response Set will be available on the Department’s web site at: <http://www.nysedregents.org/geometryre/>.

# 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 Examination in Geometry*, 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 a 4-credit question and no more than 3 credits should be deducted in a 6-credit question. 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.

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.

For 4- and 6-credit questions, 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. Refer to the rubric for specific scoring guidelines.

## 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.

- (25) [2] A complete and correct proof that includes a concluding statement is written.
- [1] A proof is written that demonstrates a good understanding of the method of proof, but one statement and/or reason is missing or incorrect.
- or*
- [1] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
- [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.
- (26) [2] A correct construction is drawn showing all appropriate arcs, and the square is drawn.
- [1] An appropriate method of construction is shown, but one construction error is made.
- [0] A drawing that is not an appropriate construction is made.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (27) [2] Increases, and a correct explanation is written.
- [1] Increases, but the explanation is incomplete or partially correct.
- [0] Increases, but no explanation or an incorrect explanation is 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.

(28) [2] 72, and correct 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 to find 288, the central angle of the unshaded area, or to find  $125\pi$ , the area of the shaded sector, but no further correct work is shown.

*or*

[1] 72, 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) [2] 1170, and correct 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] Appropriate work is shown to find the correct mass of one steel part, but no further correct work is shown.

*or*

[1] 1170, 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] No, and a complete and correct explanation is written.
- [1] An appropriate explanation is written, but one conceptual error is made.
- or*
- [1] No, and an explanation is written, but it is incomplete or partially correct.
- or*
- [1] No, but an explanation that does not use the properties of rigid motions is written.
- [0] No, and the explanation is missing or incorrect.
- 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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- (31) [2] 71, and correct 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 trigonometric equation is written, but no further correct work is shown.
- or*
- [1] 71, 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 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (32) [4] A correct transformation is described. A correct explanation is written.
- [3] A correct transformation is described, but the explanation is incomplete.
- or*
- [3] A correct explanation is written, but the description of the transformation is incomplete.
- [2] A correct transformation is described, but no further correct work is shown.
- or*
- [2] A correct explanation is written, but no further correct work is shown.
- [1] An appropriate transformation is written, but it is incomplete. No further correct work is shown.
- or*
- [1] An appropriate explanation is written, but it is incomplete. 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.

- (33) [4] 586, and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made. An appropriate volume is stated.
- or*
- [3] The volumes of both the cylinder and hemisphere are found correctly, but the volumes are not added.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made. An appropriate volume is stated.
- or*
- [2] Appropriate work is shown, but one conceptual error is made. An appropriate volume is stated.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made. An appropriate volume is stated.
- or*
- [1] Appropriate work is shown to find the volume of the cylinder, but no further correct work is shown.
- or*
- [1] Appropriate work is shown to find the volume of a sphere, but no further correct work is shown.
- or*
- [1] 586, 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) [4] 7.7 and 6.2, and appropriate work is shown. \*\*
- [3] Appropriate work is shown, but one computational or rounding error is made. Appropriate solutions are found.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made. Appropriate solutions are found.
- or***
- [2] Appropriate work is shown to find either 7.7 or 6.2, but no further work is shown.
- or***
- [2] Two correct equations are written to find the required distances, but no further correct work is shown.
- [1] Only one correct equation is written to find a required distance, but no further correct work is shown.
- or***
- [1] 7.7 and 6.2, 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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\*\* If there is no indication in the exam booklet that the typographical error in the label of the length of line segment  $HM$  was corrected, and the student's work clearly shows an attempt to convert 4.5 meters to miles, the student should be awarded full credit for this question.

## 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.

(35) [6] Correct work is shown to prove  $\triangle PAT$  is an isosceles triangle. Point  $R(2,9)$  is stated, and correct work is shown to prove  $PART$  is a parallelogram.

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

**or**

[5] Appropriate work is shown, but one concluding statement is missing or incorrect.

**or**

[5] Correct proofs are written, but the coordinates of point  $R$  are not stated or are stated incorrectly.

**or**

[5] Correct proofs are written to prove  $PAT$  is an isosceles triangle, and either parallelogram  $PRAT$  or  $PRTA$  is proven.

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

**or**

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

**or**

[4] Correct work is shown to find  $R(2,9)$  and prove quadrilateral  $PART$  is a parallelogram.

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

**or**

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

**or**

[3] Correct work is shown to prove  $PART$  is a parallelogram. No further correct work is shown.

**or**

[3] Correct work is shown to prove  $\triangle PAT$  is an isosceles triangle, and point  $R(2,9)$  is stated. No further correct work is shown.

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

*or*

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

*or*

[2] Correct work is shown to prove  $\triangle PAT$  is an isosceles triangle, but no further correct work is shown.

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

*or*

[1] Appropriate work is shown to find the slopes and/or lengths of all four sides and/or the midpoint of the diagonals of quadrilateral  $PART$ , but no further correct work is shown.

*or*

[1] Appropriate work is shown to find the lengths of  $\overline{PA}$  and  $\overline{AT}$ , but no further correct work is shown.

*or*

[1] Point  $R(2,9)$  is stated, 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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**Map to the Learning Standards  
Geometry  
January 2018**

<b>Question</b>	<b>Type</b>	<b>Credits</b>	<b>Cluster</b>
1	Multiple Choice	2	G-CO.B
2	Multiple Choice	2	G-CO.C
3	Multiple Choice	2	G-CO.B
4	Multiple Choice	2	G-SRT.C
5	Multiple Choice	2	G-GMD.B
6	Multiple Choice	2	G-GPE.B
7	Multiple Choice	2	G-MG.A
8	Multiple Choice	2	G-CO.B
9	Multiple Choice	2	G-CO.C
10	Multiple Choice	2	G-GMD.B
11	Multiple Choice	2	G-SRT.A
12	Multiple Choice	2	G-GPE.A
13	Multiple Choice	2	G-SRT.B
14	Multiple Choice	2	G-SRT.A
15	Multiple Choice	2	G-CO.A
16	Multiple Choice	2	G-C.A
17	Multiple Choice	2	G-SRT.B
18	Multiple Choice	2	G-CO.C
19	Multiple Choice	2	G-CO.C
20	Multiple Choice	2	G-GPE.B
21	Multiple Choice	2	G-C.A
22	Multiple Choice	2	G-GMD.A
23	Multiple Choice	2	G-SRT.B
24	Multiple Choice	2	G-SRT.A
25	Constructed Response	2	G-CO.C
26	Constructed Response	2	G-CO.D
27	Constructed Response	2	G-SRT.C
28	Constructed Response	2	G-C.B
29	Constructed Response	2	G-MG.A
30	Constructed Response	2	G-CO.B
31	Constructed Response	2	G-SRT.C
32	Constructed Response	4	G-SRT.A
33	Constructed Response	4	G-MG.A
34	Constructed Response	4	G-SRT.C
35	Constructed Response	6	G-GPE.B

**Regents Examination in Geometry**  
**January 2018**  
**Chart for Converting Total Test Raw Scores to**  
**Final Examination Scores (Scale Scores)**

***The Chart for Determining the Final Examination Score for the January 2018 Regents Examination in Geometry will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, January 23, 2018. 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.