FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING/EARTH SCIENCE

Friday, June 17, 2016 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

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.

Part A and Part B–1
Allow 1 credit for each correct response.

Part A

1 . . . . . **1**	10 . . . . . **3**	19 . . . . . **3**	28 . . . . . **4** . . . . .
2 . . . . . **2**	11 . . . . . **1**	20 . . . . . **1**	29 . . . . . **4** . . . . .
3 . . . . . **3**	12 . . . . . **4**	21 . . . . . **3**	30 . . . . . **2** . . . . .
4 . . . . . **2**	13 . . . . . **2**	22 . . . . . **1**	31 . . . . . **3** . . . . .
5 . . . . . **1**	14 . . . . . **1**	23 . . . . . **2**	32 . . . . . **4** . . . . .
6 . . . . . **3**	15 . . . . . **4**	24 . . . . . **2**	33 . . . . . **4** . . . . .
7 . . . . . **4**	16 . . . . . **2**	25 . . . . . **2**	34 . . . . . **1** . . . . .
8 . . . . . **3**	17 . . . . . **3**	26 . . . . . **3**	35 . . . . . **4** . . . . .
9 . . . . . **3**	18 . . . . . **2**	27 . . . . . **2**	

Part B–1

36 . . . . . **2**	40 . . . . . **3**	44 . . . . . **2**	48 . . . . . **1** . . . . .
37 . . . . . **1**	41 . . . . . **1**	45 . . . . . **4**	49 . . . . . **3** . . . . .
38 . . . . . **4**	42 . . . . . **3**	46 . . . . . **1**	50 . . . . . **4** . . . . .
39 . . . . . **3**	43 . . . . . **2**	47 . . . . . **4**	

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Regents Examination in Physical Setting/Earth Science. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences*.

Do not attempt to correct the student's work by making insertions or changes of any kind. 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.

Allow 1 credit for each correct response.

At least two science teachers must participate in the scoring of the Part B–2 and Part C open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student's answer paper. Teachers may not score their own students' answer papers.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the space provided. The student's score for the Earth Science Performance Test should be recorded in the space provided. Then the student's raw scores on the written test and the performance test 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 Friday, June 17, 2016. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

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.

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.

Part B–2

Allow a maximum of 15 credits for this part.

To ensure the accuracy of overlays, select a printer setting such as *full*, *actual size* or *100%* when printing this document. Do ***not*** select the *fit to page* setting.

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The wavelengths are shifting toward the red end of the spectrum.

— The farther a star cluster is from Earth, the more the redshift.

— redshift of light

— The wavelengths of light are getting longer or increasing.

Note: Do *not* allow credit for "the more red in color a star is, the more it is moving away" because star color alone does not indicate motion.

52 [1] Allow 1 credit for Ca.

53 [1] Allow 1 credit for fusion *or* nuclear fusion.

54 [1] Allow 1 credit for *both* circling solar eclipse and providing an acceptable explanation. Acceptable responses include, but are not limited to:

— The shadow of the Moon falls on Earth during a solar eclipse.

— The Moon blocks some sunlight from reaching Earth.

— The Moon is aligned between the Sun and Earth.

— Solar eclipses occur only during the New Moon phase.

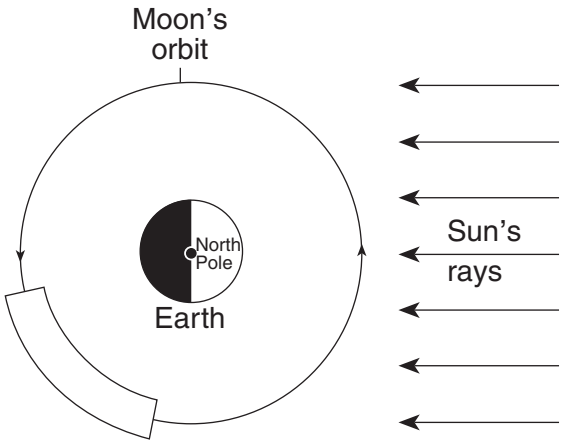
Note: Allow credit if neither eclipse is circled, but "solar eclipse" is correctly used in the explanation.

Do *not* allow "alignment" or 'lined up" alone because this occurs in both types of eclipses. Students must indicate the correct sequence of celestial objects in a solar eclipse (ex., "Sun, Moon, Earth" or "Moon in the middle").

55 [1] Allow 1 credit if the center of the student's **X** is within or touches the clear band shown below.

Note: Allow credit if a symbol other than an **X** is used.

It is recommended that an overlay of the same scale as the student answer sheet be used to ensure reliability in rating.



56 [1] Allow 1 credit for any value from 29 to 30 days.

57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The Moon's period of rotation equals the Moon's period of revolution.

— The Moon rotates at the same rate that it revolves around Earth.

— The Moon spins once during each revolution.

— Both motions are completed in 27.3 days.

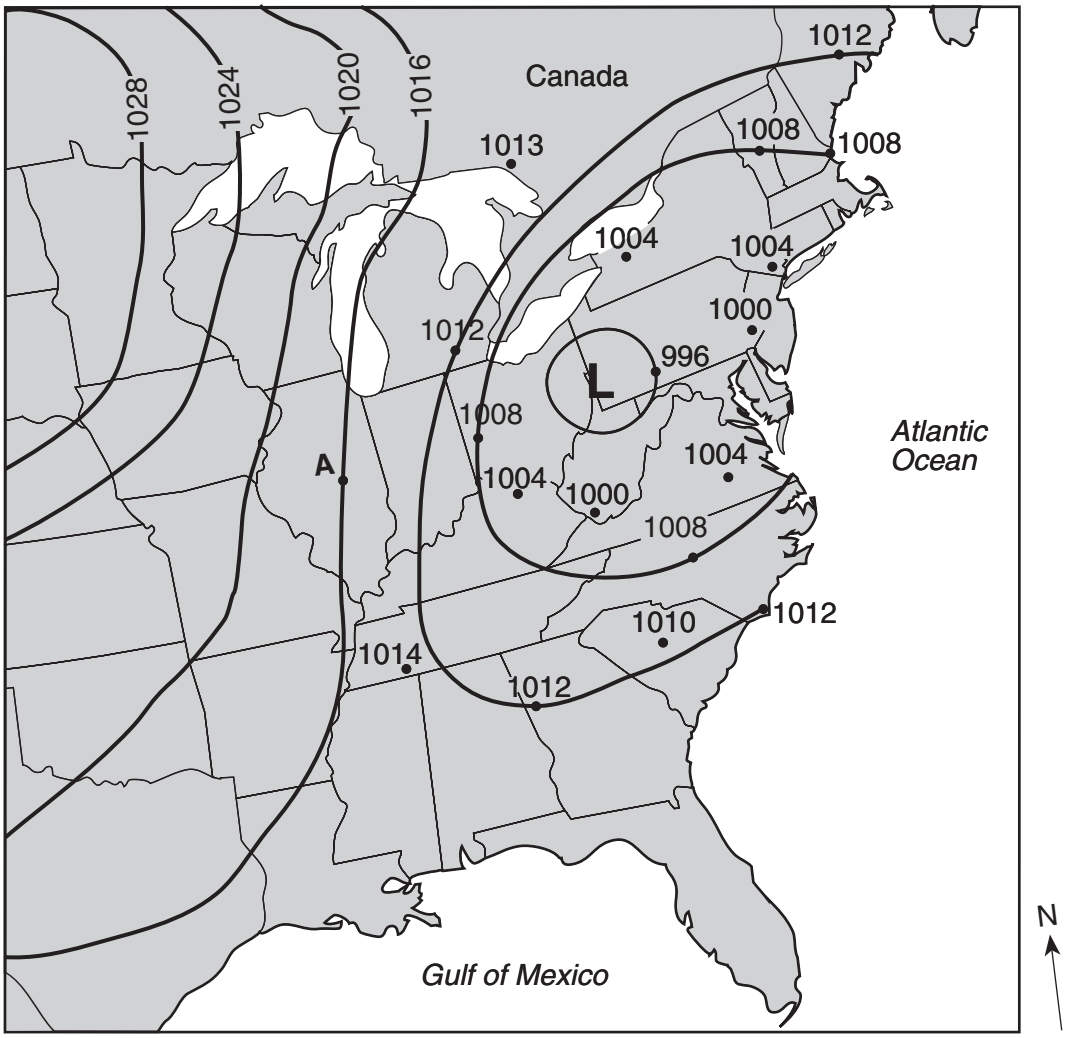
58 [1] Allow 1 credit if *both* isobars are correctly drawn to the east coast of the United States or to the edge of the map.

Note: If additional isobars are drawn, all must be correct to receive credit.

Isobars may be extended into the ocean and/or form closed loops.

Do *not* allow credit if student-drawn isobars do *not* pass through or touch the 1012 and 1008 data points.

Example of a 1-credit response:



59 [1] Allow 1 credit for barometer *or* barograph.

60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— NE

— northeast

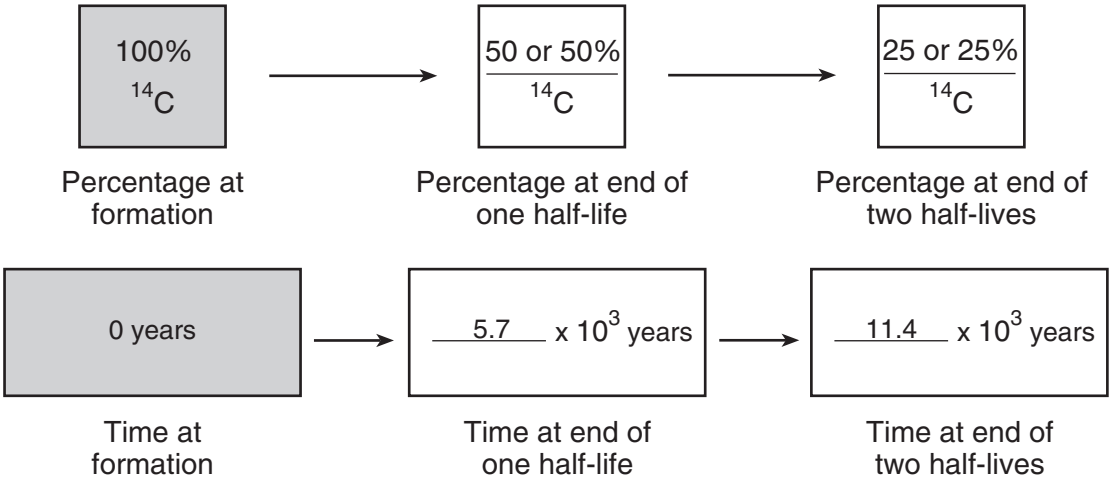
— east

— ENE

61 [1] Allow 1 credit for any value from 30.00 to 30.01 in of Hg.

Note: Also allow credit for 30 *or* 30.0 in of Hg.

62 [1] Allow 1 credit if all of the percentages and ages are correct, as shown below.



Note: Allow credit if the student shades the second box 50% and the third box 25% in the first row of boxes.

63 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— ^{14}N

— nitrogen-14

— N-14

— nitrogen/N

— $^{14}C \rightarrow {}^{14}N$

64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Carbon-14 has a short half-life.

— After 1,000,000 years, there would not be enough C-14.

— ^{14}C decays quickly.

— The organic remains are too old to be dated with C-14.

— Too little of the original radioactive sample would remain.

65 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Uranium-238

— ^{238}U

— U-238

— uranium/U

Part C

Allow a maximum of 20 credits for this part.

66 [1] Allow 1 credit for any value from 8.0 h to 9.5 h.

67 [1] Allow 1 credit for a latitude of 60° N.

68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Earth's North Pole is not tilted toward or away from the Sun on those dates.

— Earth's axis is perpendicular to sunlight on those two dates.

— The Sun's direct rays at noon are over the equator.

— The Sun rises directly east and sets directly west on those dates.

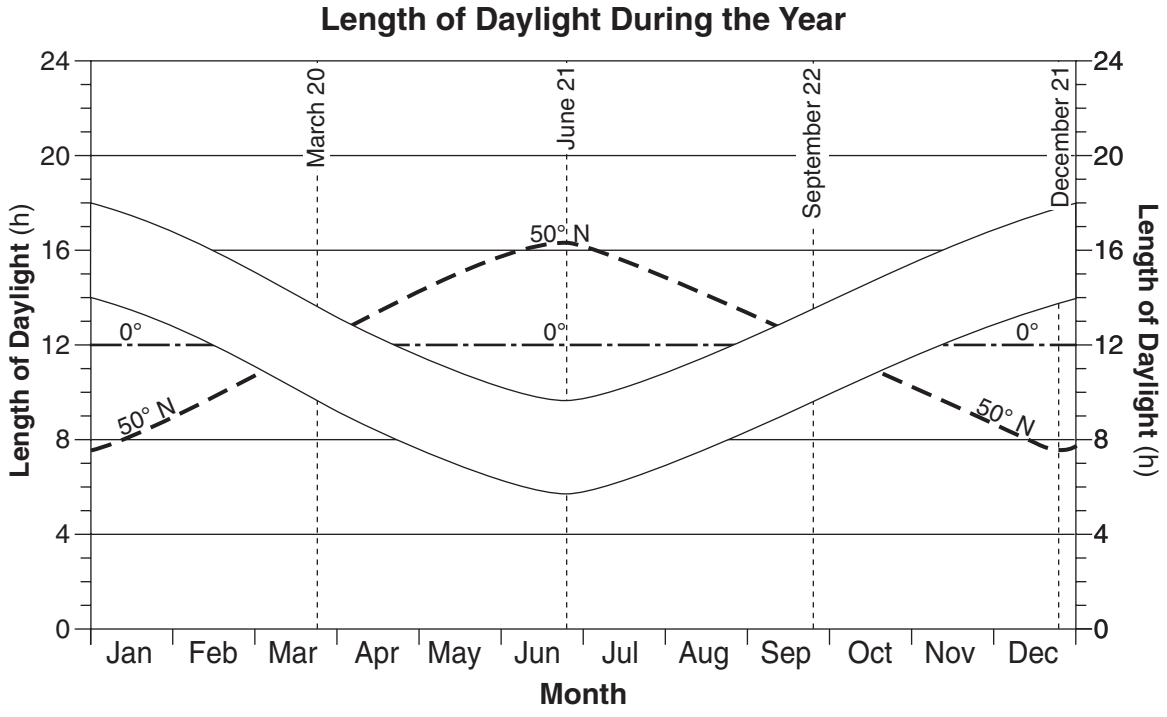
— These dates are equinoxes.

— These dates are the first day of spring and the first day of fall.

Note: Do *not* accept "Earth is not tilted" alone, because Earth is always tilted on its axis with respect to its orbital plane.

69 [1] Allow 1 credit for any line that extends from the beginning of January to the end of December, and is completely within the clear band shown below.

Note: It is recommended that an overlay of the same scale as the student answer sheet be used to ensure reliability in rating.

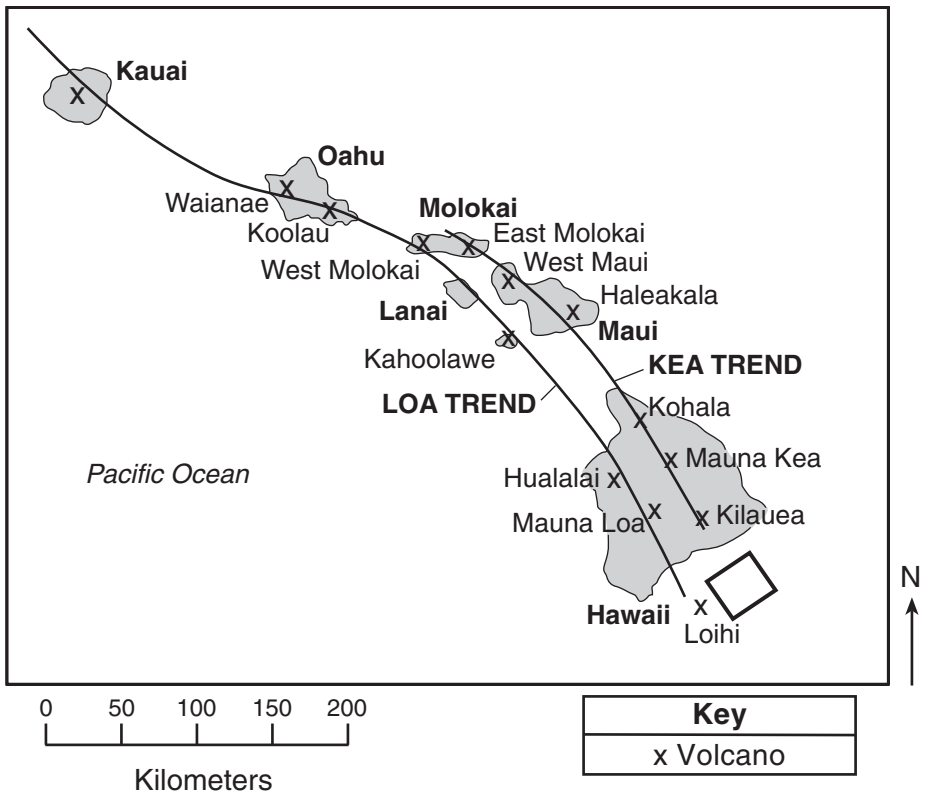


70 [1] Allow 1 credit if the center of the student's **X** is within or touches the box shown below.

Note: Allow credit if a symbol other than an **X** is used.

It is recommended that an overlay of the same scale as the student answer sheet be used to ensure reliability in rating.

Volcanoes and Islands of Hawaii



71 [1] Allow 1 credit for *both* West Molokai and East Molokai.

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— As distance increases, age increases.

— direct relationship

— The oldest volcanoes are farthest from Loihi.

— The younger the volcano, the closer it is to Loihi.

— They both increase.

73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Hawaii Hot Spot

— mantle plume

— hot spot

— rising magma

Note: Do *not* accept "convection", because this is a process, not a tectonic feature.

74 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— to the northwest

— NW

— from the SE toward the NW

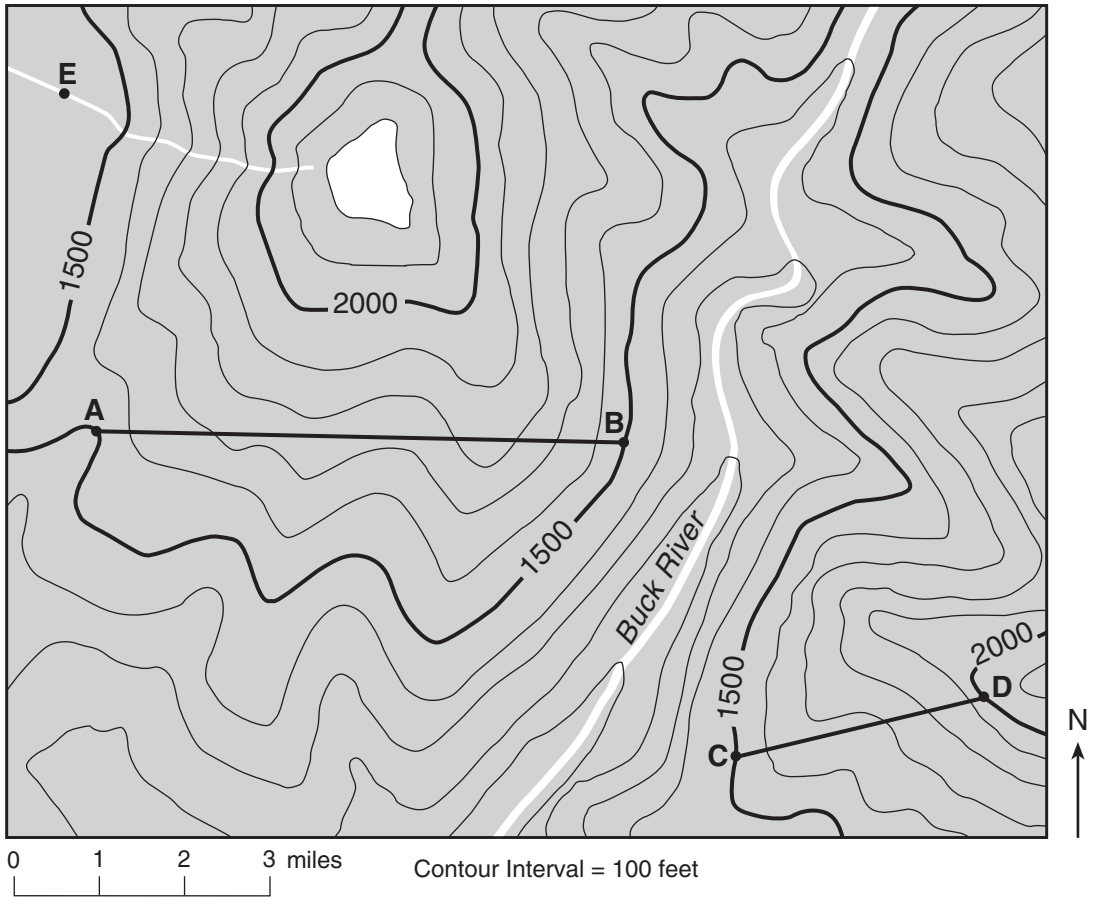
— NNW

— west northwest

75 [1] Allow 1 credit if the center of the student's **X** is within the clear area inside the 2200-foot contour line shown on the map below.

Note: Allow credit if a symbol other than an **X** is used.

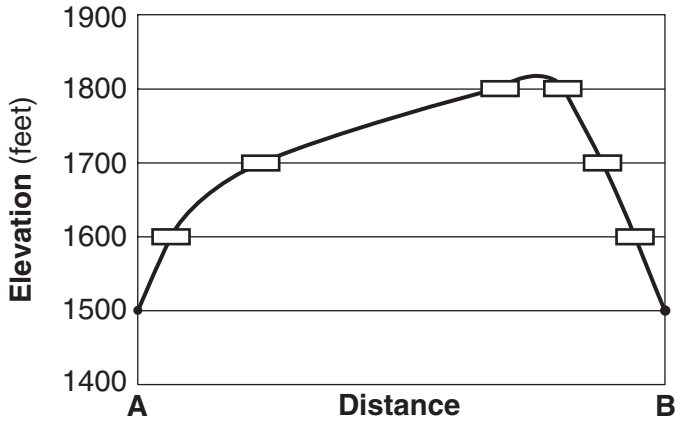
Do *not* allow credit if the center of the **X** touches the 2200-foot contour line.



76 [1] Allow 1 credit if the centers of *all six* plots are within or touch the rectangles shown below and are connected with a line from *A* to *B* that passes within or touches the rectangles. The line must extend above 1800 ft but below 1900 ft.

Note: Allow credit if the line does not pass through the student plots, but is within or touches the boxes shown below.

It is recommended that an overlay of the same scale as the student answer sheet be used to ensure reliability in rating.



77 [1] Allow 1 credit for any value from 161 to 173 ft/mi.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Contour lines that cross a river form "V" shapes that point to the source of the stream.

— The elevations of the contour lines decrease from north to south, indicating that the river is flowing in a southerly direction.

— The contour lines point upstream.

— The contour lines bend upstream when they cross a stream.

— The V shapes of the contour lines point upstream toward higher elevations.

— The contour lines bend in the opposite direction that the stream flows.

Note: Do *not* allow credit for "water flows downhill" because this does not indicate how contour lines show the direction of streamflow.

79 [1] Allow 1 credit for any value from 150 cm/s to 250 cm/s.

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Large crystals form from slow cooling deep underground.

— The crystals in syenite formed in an intrusion or an intrusive environment.

— The texture is coarse.

— Syenite formed by solidification of magma.

— large interlocking crystals

— Syenite formed inside of Earth.

Note: Do *not* allow credit for "texture", "crystal", or "interlocking crystals" alone because these terms also describe volcanic igneous rock.

81 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Anorthosite is made of plagioclase feldspar, which is white to gray in color.

— Anorthosite is made of light-colored minerals.

— Plagioclase feldspar is white to gray.

— because of anorthosite's mineral composition

Note: Do *not* allow credit for "anorthosite is felsic rich" because plagioclase feldspar is contained in both felsic-rich and mafic-rich igneous rocks.

82 [1] Allow 1 credit if *both* the density and composition of gabbro are correct. Acceptable responses include, but are not limited to:

Density of gabbro:

— higher

— greater

Composition of gabbro:

— mafic

— rich in Fe and Mg

— presence of pyroxene and/or olivine

— absence of quartz and/or potassium feldspar

Note: Do *not* allow credit if the student lists all of the minerals in gabbro because the question asks how the composition of gabbro is different from granite.

83 [1] Allow 1 credit for limestone *or* marble.

84 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The higher elevation at *A* has a cooler temperature.

— Location *A* is at a higher elevation.

— Location *A* is in the mountains.

— Location *B* is not as high in elevation.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Location *D* has air that is rising, expanding, and cooling to the dewpoint.

— Location *D* is on the windward side of the mountain.

— Location *D* is closer to the ocean.

— Location *C* is on the leeward side of the mountain.

Regents Examination in Physical Setting/Earth Science

June 2016

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

The *Chart for Determining the Final Examination Score for the June 2016 Regents Examination in Physical Setting/Earth Science* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Friday, June 17, 2016. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Earth Science 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.

Map to Core Curriculum

June 2016 Physical Setting/Earth Science			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1	1	40	68, 70, 76, 77
Math Key Idea 2	3, 30		66, 67, 72, 79
Math Key Idea 3		58, 62	75
Science Inquiry Key Idea 1	2, 4, 5, 12, 16, 24, 29, 31, 32	36, 37, 38, 39, 46, 59, 64	
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3	3, 11, 13, 17, 19, 20, 21, 25, 33, 35	38, 42, 45, 47, 50, 52, 61, 63, 65	68, 73, 74, 77, 80, 81, 82, 83
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1		60	
Key Idea 2			
Key Idea 3			
Standard 6			
Key Idea 1	16, 23, 26, 28, 29, 34	39, 43, 49, 53, 54, 60, 64	80, 85
Key Idea 2	6, 8, 9, 15, 17, 26, 28, 31, 32, 34, 35	37, 40, 42, 43, 44, 45, 46, 48, 49, 51, 54, 55, 58, 60, 62	70, 71, 73, 74, 76, 78, 79, 84, 85
Key Idea 3		50	70, 75
Key Idea 4		57	
Key Idea 5	34	41, 47, 55, 56	67, 68, 69, 72, 78, 84
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4			
Key Idea 1	1, 2, 3, 4, 5, 6, 7, 8, 16, 17, 18, 19, 30, 32	40, 41, 42, 43, 44, 45, 48, 49, 51, 52, 53, 54, 55, 56, 57, 62, 63, 64, 65	67, 68, 69
Key Idea 2	9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 26, 28, 29, 31, 33, 34, 35	36, 37, 38, 39, 46, 47, 58, 59, 60, 61	66, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 84, 85
Key Idea 3	25, 26	50	80, 81, 82, 83
Reference Tables			
ESRT 2011 Edition (Revised)	3, 9, 10, 11, 13, 17, 19, 20, 21, 25, 27, 33, 35	36, 37, 38, 43, 45, 50, 52, 61, 62, 63, 65	73, 74, 77, 79, 80, 81, 82, 83