FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA 2/TRIGONOMETRY

Tuesday, June 21, 2011 — 1:15 to 4:15 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 Algebra 2/Trigonometry. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics*.

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. No one teacher is to score more than approximately one-third of the open-ended questions on a student's paper. 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."

Beginning in June 2011, schools are no longer 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 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 at: http://www.p12.nysed.gov/apda/ on Tuesday, June 21, 2011. Because scale scores corresponding to raw scores in the conversion chart may change from one examination 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 detachable answer sheet. The scale score is the student's final examination score.

Part I

Allow a total of 54 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) 4	(8) 2	(15) 2	(22) 2
(2) 2	(9) 1	(16) 1 *or* 3*	(23) 3
(3) 4	(10) 1	(17) 3	(24) 4
(4) 2	(11) 2	(18) 1	(25) 3
(5) 2	(12) 4	(19) 3	(26) 1
(6) 3	(13) 1	(20) 4	(27) 3
(7) 1	(14) 3	(21) 3	

*Allow credit for 1 *or* 3 as an acceptable response for question 16.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Algebra 2/Trigonometry 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 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, 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 two credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(28)   **[2]** $6y^3 - \dfrac{37}{10}y^2 - \dfrac{1}{5}y$ or an equivalent trinomial, 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] $6y^3 - \dfrac{37}{10}y^2 - \dfrac{1}{5}y$, 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]** No, and an appropriate justification is given.

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

or

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

[0] No, 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.

(30) **[2]** $x^2 - 6x - 27 = 0$ or an equivalent equation.

[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 $x^2 - 6x - 27$ is written.

or

[1] The equation $y = x^2 - 6x - 27$ 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.

(31) **[2]** 8, and appropriate work is shown, such as a substitution for x and y.

[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] 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.

(32)   **[2]** $\pm\sqrt{x+6}$, and appropriate work is shown.

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

<p align="center">***or***</p>

    [1] Appropriate work is shown, but one conceptual error is made, such as not writing ± with the radical.

<p align="center">***or***</p>

    [1] $\pm\sqrt{x+6}$, 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.

(33)   **[2]** $3t^4(2t^2+5)(2t^2-5)$, or $3t^4(2t^2+5)(\sqrt{2}t-\sqrt{5})(\sqrt{2}t+\sqrt{5})$, and appropriate work is shown.

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

<p align="center">***or***</p>

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

<p align="center">***or***</p>

    [1] $3t^4(2t^2+5)(2t^2-5)$, 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.

(34) **[2]** $\dfrac{12x^2}{y^9}$, 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] Appropriate work is shown, but the answer is expressed as $12x^2 y^{-9}$.

or

[1] $\dfrac{12x^2}{y^9}$, 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.

(35) **[2]** 7, 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, such as finding $(f \circ g)(-3)$.

or

[1] 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.

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.

(36) **[4]** $\dfrac{\sqrt{2}+\sqrt{6}}{4}$ or $\sqrt{\dfrac{1+\frac{\sqrt{3}}{2}}{2}}$ if the half-angle formula is used, and appropriate work is shown.

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

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

or

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

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

or

[1] sin 30 cos 45 + cos 30 sin 45 or $\sqrt{\dfrac{1-\cos 150}{2}}$ is written, but no further correct work is shown.

or

[1] $\dfrac{\sqrt{2}+\sqrt{6}}{4}$, but no work is shown.

[0] 0.9659258263, 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]** "$x < 1$ or $x > 11$" or an equivalent interval notation, and a correct graph is drawn, and appropriate work is shown.

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

or

[3] Appropriate work is shown, but the answer is not expressed as a disjunction.

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

or

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

or

[2] Appropriate work is shown to find and graph $x > 11$, but no further correct work is shown.

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

or

[1] Appropriate work is shown to find and graph $x < 1$, but no further correct work is shown.

or

[1] "$x < 1$ or $x > 11$", 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.

(38) **[4]** $\dfrac{51}{243}$ or an equivalent fraction, and appropriate work is shown.

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

or

[3] Appropriate work is shown to find $\dfrac{40}{243}$, $\dfrac{10}{243}$, and $\dfrac{1}{243}$, but the values are not added.

or

[3] Appropriate work is shown, but the answer is expressed as a decimal.

[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, such as finding the probability of *at most* 3 hits.

or

[2] A correct expression, such as $_5C_3\left(\dfrac{1}{3}\right)^3\left(\dfrac{2}{3}\right)^2 + {}_5C_4\left(\dfrac{1}{3}\right)^4\left(\dfrac{2}{3}\right)^1 + {}_5C_5\left(\dfrac{1}{3}\right)^5\left(\dfrac{2}{3}\right)^0$ is written, but no further correct work is shown.

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

or

[1] Appropriate work is shown to find $\dfrac{40}{243}$, the probability of exactly 3 hits, but no further correct work is shown.

or

[1] $\dfrac{51}{243}$, 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.

Part IV

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

(39)   **[6]** $\left(-\dfrac{9}{2}, \dfrac{1}{2}\right)$ and $\left(\dfrac{1}{2}, \dfrac{11}{2}\right)$ or an equivalent answer, and appropriate algebraic work is shown.

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

or

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

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

or

[4] Appropriate work is shown to find $(2x-1)(2x+9) = 0$ or $(2y-11)(2y-1) = 0$, but no further correct work is shown.

or

[4] A correct substitution is made into the quadratic formula, but no further correct work is shown.

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

or

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

or

[3] A correct quadratic equation in standard form is written, but no further correct work is shown.

or

[3] $\left(-\dfrac{9}{2}, \dfrac{1}{2}\right)$ and $\left(\dfrac{1}{2}, \dfrac{11}{2}\right)$ or an equivalent answer, but a method other than algebraic is used.

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

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

or

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

or

[1] $\left(-\dfrac{9}{2}, \dfrac{1}{2}\right)$ and $\left(\dfrac{1}{2}, \dfrac{11}{2}\right)$, 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.

Map to Core Curriculum

Content Strand	Item Numbers
Number Sense and Operations	16, 18, 28
Algebra	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17, 19, 20, 21, 22, 23, 26, 30, 31, 32, 33, 34, 35, 36, 37, 39
Measurement	25
Statistics and Probability	1, 13, 24, 27, 29, 38

Regents Examination in Algebra 2/Trigonometry
June 2011
Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the June 2011 Regents Examination in Algebra 2/Trigonometry* will be posted on the Department's web site at: http://www.p12.nysed.gov/apda/ on Tuesday, June 21, 2011. Conversion charts provided for previous administrations of the Algebra 2/ Trigonometry examination 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.

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA 2/TRIGONOMETRY

Tuesday, June 21, 2011—1:15 to 4:15 p.m., only

Student Name: _____

School Name: _____

Print your name and the name of your school on the lines above. Then turn to the last page of this booklet, which is the answer sheet for Part I. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Write your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice…

A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.

The use of any communications device is strictly prohibited when taking this examination. If you use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

Answer all 27 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [54]

1 A doctor wants to test the effectiveness of a new drug on her patients. She separates her sample of patients into two groups and administers the drug to only one of these groups. She then compares the results. Which type of study *best* describes this situation?

(1) census   (3) observation

(2) survey   (4) controlled experiment

2 If $f(x) = \dfrac{x}{x^2 - 16}$, what is the value of $f(-10)$?

(1) $-\dfrac{5}{2}$ (3) $\dfrac{5}{58}$

(2) $-\dfrac{5}{42}$ (4) $\dfrac{5}{18}$

3 An auditorium has 21 rows of seats. The first row has 18 seats, and each succeeding row has two more seats than the previous row. How many seats are in the auditorium?

(1) 540   (3) 760

(2) 567   (4) 798

4 Expressed as a function of a positive acute angle, $\cos(-305°)$ is equal to

(1) $-\cos 55°$ (3) $-\sin 55°$

(2) $\cos 55°$ (4) $\sin 55°$

5 The value of x in the equation $4^{2x+5} = 8^{3x}$ is

(1) 1   (3) 5

(2) 2   (4) -10

6 What is the value of x in the equation $\log_5 x = 4$?

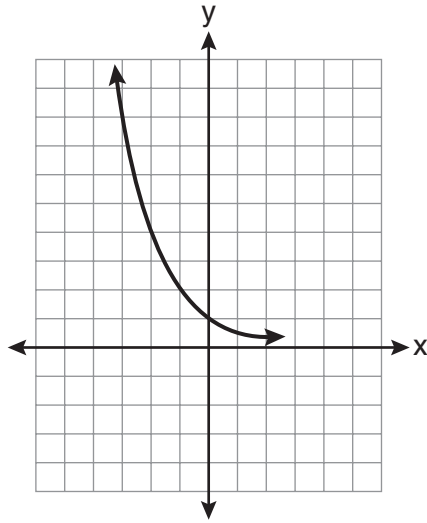(1) 1.16   (3) 625

(2) 20   (4) 1,024

7 The expression $\sqrt[4]{16x^2y^7}$ is equivalent to

(1) $2x^{\frac{1}{2}}y^{\frac{7}{4}}$ (3) $4x^{\frac{1}{2}}y^{\frac{7}{4}}$

(2) $2x^8y^{28}$ (4) $4x^8y^{28}$

8 Which equation is represented by the graph below?

(1) $y = 5^x$ (3) $y = 5^{-x}$

(2) $y = 0.5^x$ (4) $y = 0.5^{-x}$

9 What is the fifteenth term of the geometric sequence $-\sqrt{5}$, $\sqrt{10}$, $-2\sqrt{5}, \ldots$?
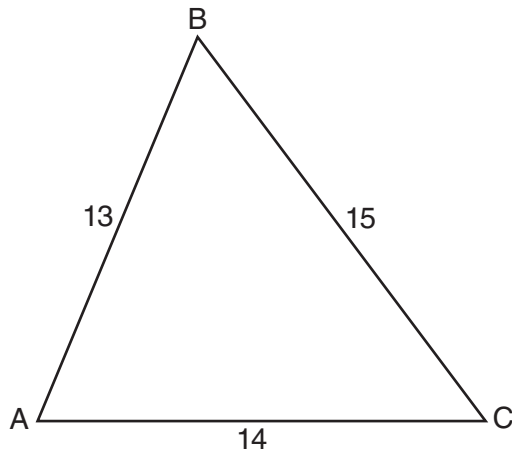
(1) $-128\sqrt{5}$ (3) $-16384\sqrt{5}$

(2) $128\sqrt{10}$ (4) $16384\sqrt{10}$

10 In $\triangle ABC$, $a = 15$, $b = 14$, and $c = 13$, as shown in the diagram below. What is the m$\angle C$, to the *nearest degree*?

(1) 53   (3) 67

(2) 59   (4) 127

11 What is the period of the function $f(\theta) = -2\cos 3\theta$?

(1) π (3) $\frac{3\pi}{2}$

(2) $\frac{2\pi}{3}$ (4) 2π

12 What is the range of $f(x) = (x + 4)^2 + 7$?

(1) $y \geq -4$ (3) $y = 7$

(2) $y \geq 4$ (4) $y \geq 7$

13 Ms. Bell's mathematics class consists of 4 sophomores, 10 juniors, and 5 seniors. How many different ways can Ms. Bell create a four-member committee of juniors if each junior has an equal chance of being selected?
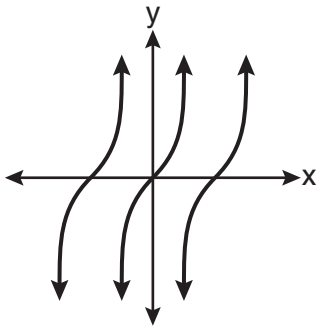
(1) 210

(3) 5,040

(2) 3,876

(4) 93,024

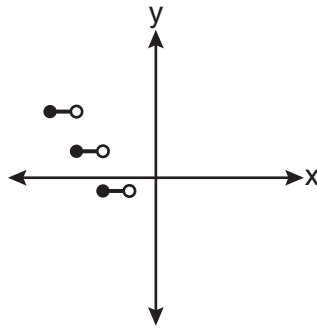**14** Which graph represents a relation that is *not* a function?

(1)

(3)

(2)

(4)
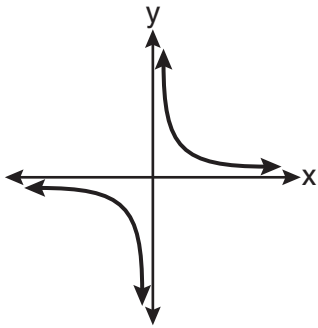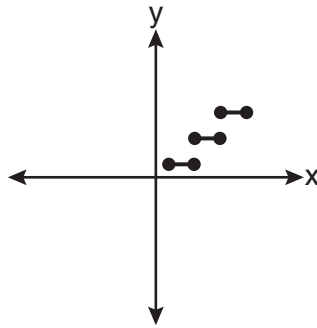
15 The value of tan 126°43′ to the *nearest ten-thousandth* is

(1) −1.3407

(3) −1.3548

(2) −1.3408

(4) −1.3549

16 The expression $\dfrac{4}{5 - \sqrt{13}}$ is equivalent to

(1) $\dfrac{4\sqrt{13}}{5\sqrt{13} - 13}$

(3) $\dfrac{5 + \sqrt{13}}{3}$

(2) $\dfrac{4(5 - \sqrt{13})}{38}$

(4) $\dfrac{4(5 + \sqrt{13})}{38}$

17 Akeem invests \$25,000 in an account that pays 4.75% annual interest compounded continuously. Using the formula $A = Pe^{rt}$, where $A =$ the amount in the account after t years, $P =$ principal invested, and $r =$ the annual interest rate, how many years, to the *nearest tenth*, will it take for Akeem's investment to triple?
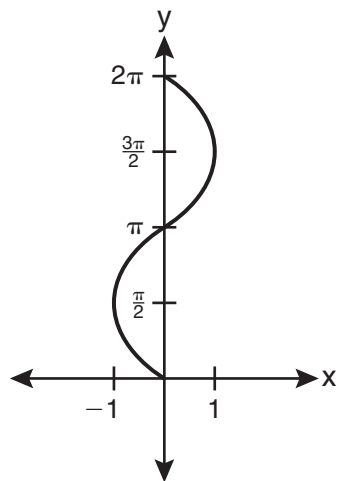
(1) 10.0

(3) 23.1

(2) 14.6

(4) 24.0

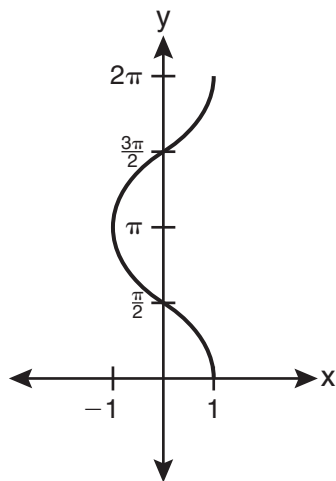**18** The value of the expression $\displaystyle\sum_{r=3}^{5}(-r^2 + r)$ is

(1) −38

(3) 26

(2) −12

(4) 62

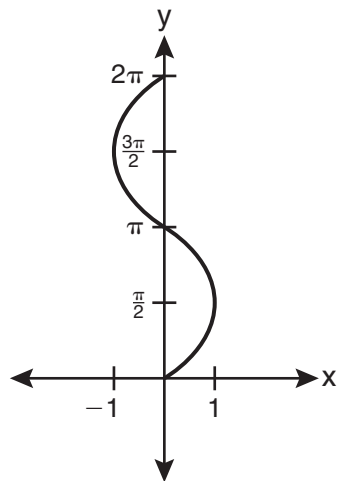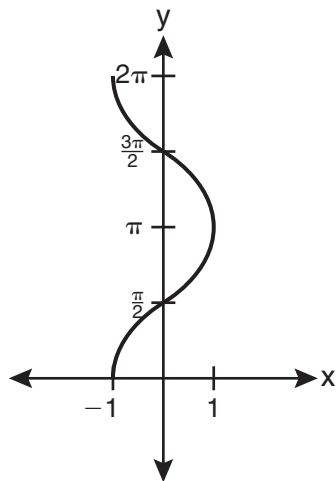**19** Which graph shows $y = \cos^{-1} x$?

(1)

(3)

(2)

(4)

20 If $r = \sqrt[3]{\dfrac{A^2B}{C}}$, then $\log r$ can be represented by

(1) $\dfrac{1}{6}\log A + \dfrac{1}{3}\log B - \log C$

(2) $3(\log A^2 + \log B - \log C)$

(3) $\dfrac{1}{3}\log(A^2 + B) - C$

(4) $\dfrac{2}{3}\log A + \dfrac{1}{3}\log B - \dfrac{1}{3}\log C$

21 The solution set of $\sqrt{3x + 16} = x + 2$ is

(1) $\{-3, 4\}$ (3) $\{3\}$

(2) $\{-4, 3\}$ (4) $\{-4\}$

22 Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?

(1) $\dfrac{7}{2}$ (3) $\dfrac{49}{2}$

(2) $\dfrac{49}{4}$ (4) 49

23 The expression $\dfrac{\sin^2\theta + \cos^2\theta}{1 - \sin^2\theta}$ is equivalent to

(1) $\cos^2\theta$ (3) $\sec^2\theta$

(2) $\sin^2\theta$ (4) $\csc^2\theta$

24 The number of minutes students took to complete a quiz is summarized in the table below.

Minutes	14	15	16	17	18	19	20
Number of Students	5	3	x	5	2	10	1

If the mean number of minutes was 17, which equation could be used to calculate the value of x?

(1) $17 = \dfrac{119 + x}{x}$ (3) $17 = \dfrac{446 + x}{26 + x}$

(2) $17 = \dfrac{119 + 16x}{x}$ (4) $17 = \dfrac{446 + 16x}{26 + x}$

25 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

(1) $\dfrac{\pi}{2}$ (3) $\dfrac{5\pi}{6}$

(2) $\dfrac{2\pi}{3}$ (4) $\dfrac{7\pi}{6}$

26 What is the coefficient of the fourth term in the expansion of $(a - 4b)^9$?

(1) $-5{,}376$ (3) 336

(2) -336 (4) $5{,}376$

27 Samantha constructs the scatter plot below from a set of data.
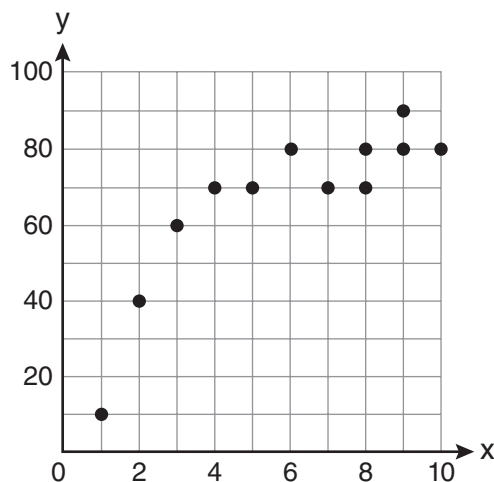
Based on her scatter plot, which regression model would be most appropriate?

(1) exponential   (3) logarithmic

(2) linear   (4) power

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

28 Express the product of $\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)$ and $\left(12y + \frac{3}{5}\right)$ as a trinomial.

29 In a study of 82 video game players, the researchers found that the ages of these players were normally distributed, with a mean age of 17 years and a standard deviation of 3 years. Determine if there were 15 video game players in this study over the age of 20. Justify your answer.

30 Write a quadratic equation such that the sum of its roots is 6 and the product of its roots is -27.

31 Evaluate $e^{x\ln y}$ when $x = 3$ and $y = 2$.

32 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

33 Factor the expression $12t^8 - 75t^4$ completely.

34 Simplify the expression $\dfrac{3x^{-4}y^5}{(2x^3y^{-7})^{-2}}$ and write the answer using only positive exponents.

35 If $f(x) = x^2 - 6$ and $g(x) = 2^x - 1$, determine the value of $(g \circ f)(-3)$.

Part III

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

36 Express as a single fraction the exact value of sin 75°.

37 Solve the inequality $-3|6 - x| < -15$ for x. Graph the solution on the line below.

$$\longleftrightarrow$$

38 The probability that a professional baseball player will get a hit is $\frac{1}{3}$. Calculate the exact probability that he will get *at least* 3 hits in 5 attempts.

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. A correct numerical answer with no work shown will receive only 1 credit. The answer should be written in pen. [6]

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39 Solve the following system of equations algebraically:

$$5 = y - x$$
$$4x^2 = -17x + y + 4$$

Reference Sheet

Area of a Triangle

$K = \dfrac{1}{2}\, ab \sin C$

Law of Cosines

$a^2 = b^2 + c^2 - 2bc \cos A$

Functions of the Sum of Two Angles

$\sin (A + B) = \sin A \cos B + \cos A \sin B$

$\cos (A + B) = \cos A \cos B - \sin A \sin B$

$\tan (A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$

Functions of the Double Angle

$\sin 2A = 2 \sin A \cos A$

$\cos 2A = \cos^2 A - \sin^2 A$

$\cos 2A = 2 \cos^2 A - 1$

$\cos 2A = 1 - 2 \sin^2 A$

$\tan 2A = \dfrac{2 \tan A}{1 - \tan^2 A}$

Functions of the Difference of Two Angles

$\sin (A - B) = \sin A \cos B - \cos A \sin B$

$\cos (A - B) = \cos A \cos B + \sin A \sin B$

$\tan (A - B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}$

Functions of the Half Angle

$\sin \dfrac{1}{2} A = \pm \sqrt{\dfrac{1 - \cos A}{2}}$

$\cos \dfrac{1}{2} A = \pm \sqrt{\dfrac{1 + \cos A}{2}}$

$\tan \dfrac{1}{2} A = \pm \sqrt{\dfrac{1 - \cos A}{1 + \cos A}}$

Law of Sines

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Sum of a Finite Arithmetic Series

$S_n = \dfrac{n(a_1 + a_n)}{2}$

Sum of a Finite Geometric Series

$S_n = \dfrac{a_1(1 - r^{\,n})}{1 - r}$

Binomial Theorem

$(a + b)^n = {}_nC_0 a^n b^0 + {}_nC_1 a^{n-1} b^1 + {}_nC_2 a^{n-2} b^2 + \dots + {}_nC_n a^0 b^n$

$(a + b)^n = \displaystyle\sum_{r=0}^{n} {}_nC_r \, a^{n-r} b^r$

Normal Curve
Standard Deviation
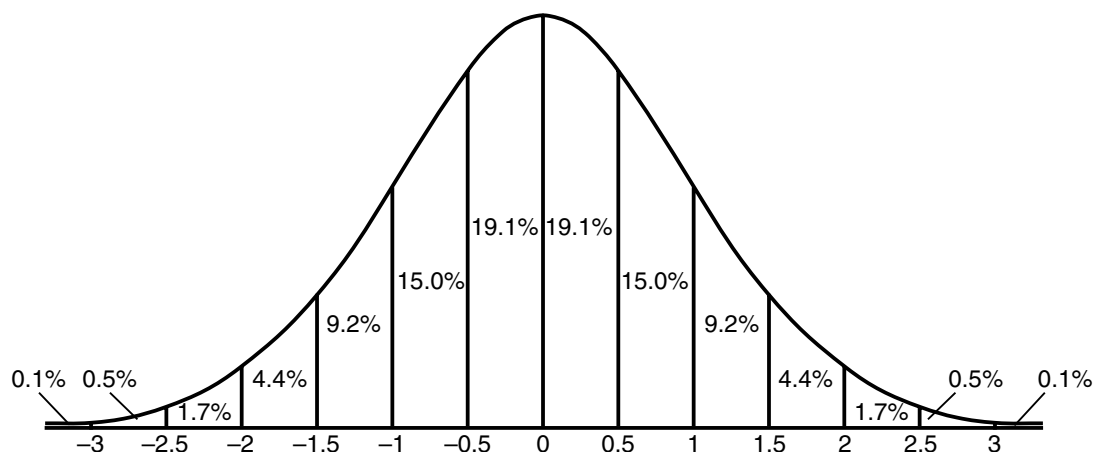
Scrap Graph Paper — This sheet will *not* be scored.
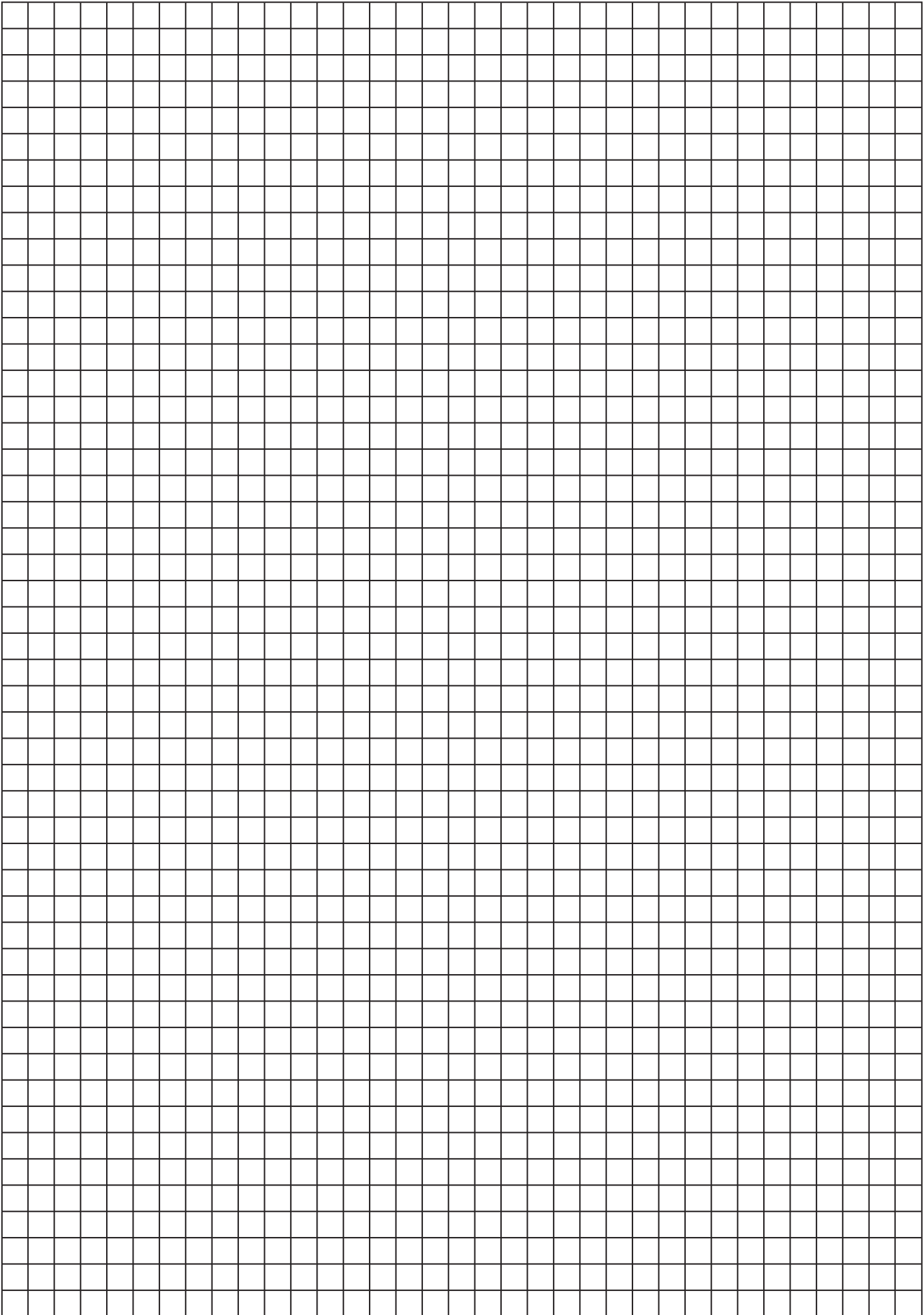
The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA 2/TRIGONOMETRY

Tuesday, June 21, 2011—1:15 to 4:15 p.m., only

ANSWER SHEET

Student . . . .   Sex: ❏ Male   ❏ Female   Grade . . . . . .

Teacher . . . .   School . . . .

Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all 27 questions in this part.

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

Your answers for Parts II, III, and IV should be written in the test booklet.

The declaration below must be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

_____

Signature

ALGEBRA 2/TRIGONOMETRY			
Question	Maximum Credit	Credits Earned	Rater's/Scorer's Initials
Part I 1–27	54		
Part II 28	2		
29	2		
30	2		
31	2		
32	2		
33	2		
34	2		
35	2		
Part III 36	4		
37	4		
38	4		
Part IV 39	6		
Maximum Total	88		

Total Raw Score   Checked by   Scale Score (from conversion chart)

Tear Here

Tear Here