

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

# ALGEBRA 2/TRIGONOMETRY

Tuesday, January 25, 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.

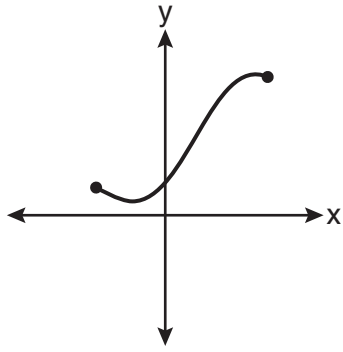
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

## Part I

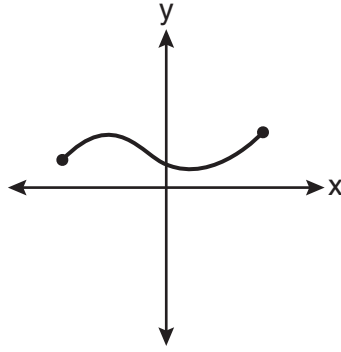
Answer all 27 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [54]

Use this space for computations.

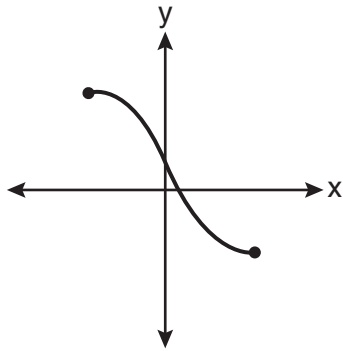
1 Which graph does *not* represent a function?



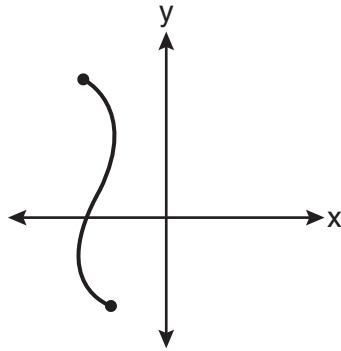
(1)



(3)



(2)



(4)

2 The roots of the equation  $x^2 - 10x + 25 = 0$  are

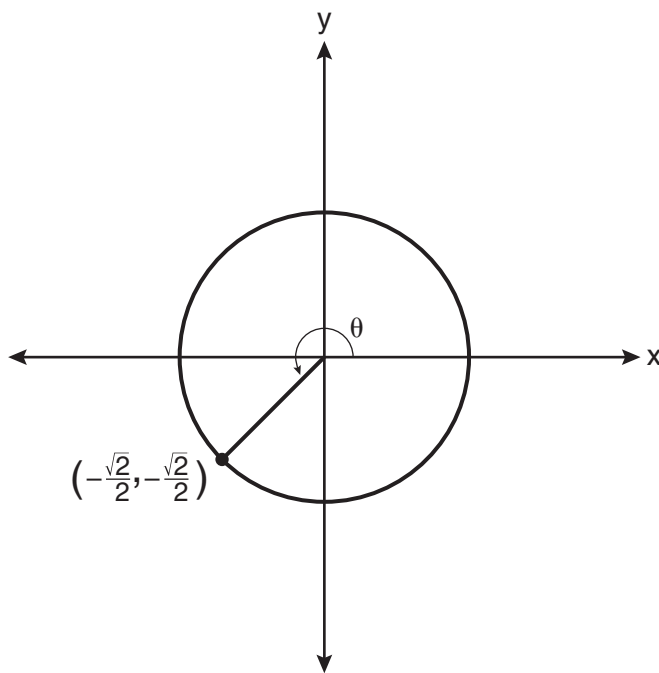
- (1) imaginary
- (2) real and irrational
- (3) real, rational, and equal
- (4) real, rational, and unequal

**Use this space for  
computations.**

3 Which values of  $x$  are solutions of the equation  $x^3 + x^2 - 2x = 0$ ?

- (1) 0, 1, 2                                      (3) 0, -1, 2  
(2) 0, 1, -2                                    (4) 0, -1, -2

4 In the diagram below of a unit circle, the ordered pair  $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$  represents the point where the terminal side of  $\theta$  intersects the unit circle.



What is  $m\angle\theta$ ?

- (1) 45    (3) 225  
(2) 135    (4) 240

**Use this space for  
computations.**

**5** What is the fifteenth term of the sequence  $5, -10, 20, -40, 80, \dots$ ?

- (1)  $-163,840$                       (3)  $81,920$   
(2)  $-81,920$                       (4)  $327,680$

**6** What is the solution set of the equation  $|4a + 6| - 4a = -10$ ?

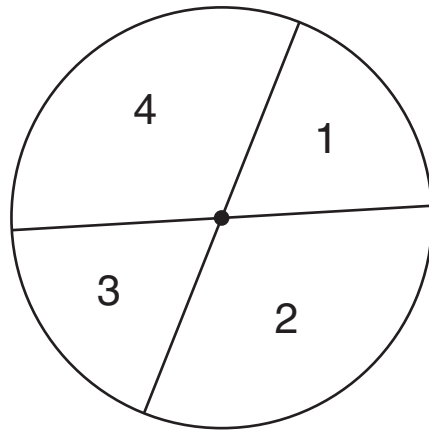
- (1)  $\emptyset$                               (3)  $\left\{\frac{1}{2}\right\}$   
(2)  $\{0\}$                             (4)  $\left\{0, \frac{1}{2}\right\}$

**7** If  $\sin A = \frac{2}{3}$  where  $0^\circ < A < 90^\circ$ , what is the value of  $\sin 2A$ ?

- (1)  $\frac{2\sqrt{5}}{3}$                             (3)  $\frac{4\sqrt{5}}{9}$   
(2)  $\frac{2\sqrt{5}}{9}$                             (4)  $-\frac{4\sqrt{5}}{9}$

Use this space for computations.

- 8 A dartboard is shown in the diagram below. The two lines intersect at the center of the circle, and the central angle in sector 2 measures  $\frac{2\pi}{3}$ .



If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

- (1)  $\frac{1}{6}$                       (3)  $\frac{1}{2}$   
(2)  $\frac{1}{3}$                       (4)  $\frac{2}{3}$
- 9 If  $f(x) = x^2 - 5$  and  $g(x) = 6x$ , then  $g(f(x))$  is equal to
- (1)  $6x^3 - 30x$                       (3)  $36x^2 - 5$   
(2)  $6x^2 - 30$                       (4)  $x^2 + 6x - 5$

- 10 Which arithmetic sequence has a common difference of 4?
- (1)  $\{0, 4n, 8n, 12n, \dots\}$   
(2)  $\{n, 4n, 16n, 64n, \dots\}$   
(3)  $\{n + 1, n + 5, n + 9, n + 13, \dots\}$   
(4)  $\{n + 4, n + 16, n + 64, n + 256, \dots\}$

**Use this space for  
computations.**

**11** The conjugate of  $7 - 5i$  is

(1)  $-7 - 5i$

(3)  $7 - 5i$

(2)  $-7 + 5i$

(4)  $7 + 5i$

**12** If  $\sin^{-1}\left(\frac{5}{8}\right) = A$ , then

(1)  $\sin A = \frac{5}{8}$

(3)  $\cos A = \frac{5}{8}$

(2)  $\sin A = \frac{8}{5}$

(4)  $\cos A = \frac{8}{5}$

**13** How many distinct triangles can be formed if  $m\angle A = 35$ ,  $a = 10$ , and  $b = 13$ ?

(1) 1

(3) 3

(2) 2

(4) 0

Use this space for  
computations.

14 When  $\frac{3}{2}x^2 - \frac{1}{4}x - 4$  is subtracted from  $\frac{5}{2}x^2 - \frac{3}{4}x + 1$ ,  
the difference is

- (1)  $-x^2 + \frac{1}{2}x - 5$                       (3)  $-x^2 - x - 3$   
(2)  $x^2 - \frac{1}{2}x + 5$                       (4)  $x^2 - x - 3$

15 The solution set of the inequality  $x^2 - 3x > 10$  is

- (1)  $\{x \mid -2 < x < 5\}$                       (3)  $\{x \mid x < -2 \text{ or } x > 5\}$   
(2)  $\{x \mid 0 < x < 3\}$                       (4)  $\{x \mid x < -5 \text{ or } x > 2\}$

16 If  $x^2 + 2 = 6x$  is solved by completing the square, an intermediate  
step would be

- (1)  $(x + 3)^2 = 7$                       (3)  $(x - 3)^2 = 11$   
(2)  $(x - 3)^2 = 7$                       (4)  $(x - 6)^2 = 34$

17 Three marbles are to be drawn at random, without replacement, from  
a bag containing 15 red marbles, 10 blue marbles, and 5 white marbles.  
Which expression can be used to calculate the probability of drawing  
2 red marbles and 1 white marble from the bag?

- (1)  $\frac{15C_2 \cdot 5C_1}{30C_3}$                       (3)  $\frac{15C_2 \cdot 5C_1}{30P_3}$   
(2)  $\frac{15P_2 \cdot 5P_1}{30C_3}$                       (4)  $\frac{15P_2 \cdot 5P_1}{30P_3}$

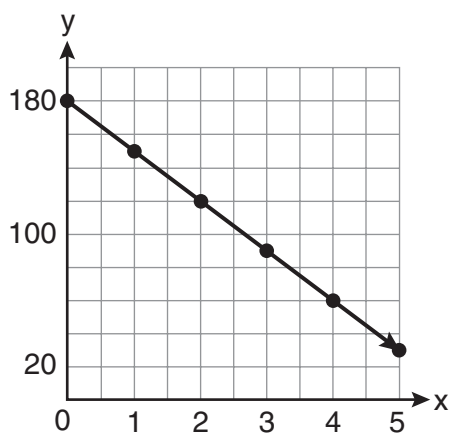
Use this space for computations.

18 The expression  $x^{-\frac{2}{5}}$  is equivalent to

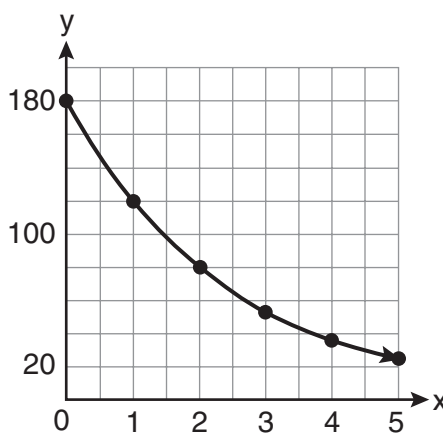
(1)  $-\sqrt[2]{x^5}$                       (3)  $\frac{1}{\sqrt[2]{x^5}}$

(2)  $-\sqrt[5]{x^2}$                       (4)  $\frac{1}{\sqrt[5]{x^2}}$

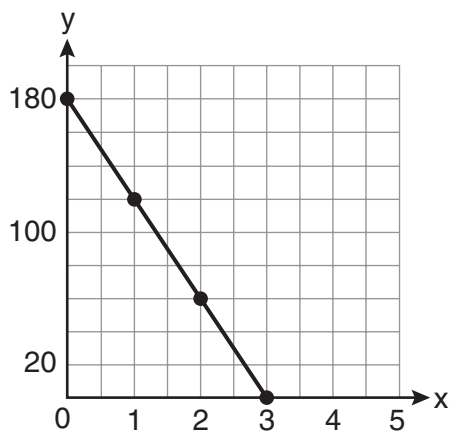
19 On January 1, a share of a certain stock cost \$180. Each month thereafter, the cost of a share of this stock decreased by one-third. If  $x$  represents the time, in months, and  $y$  represents the cost of the stock, in dollars, which graph best represents the cost of a share over the following 5 months?



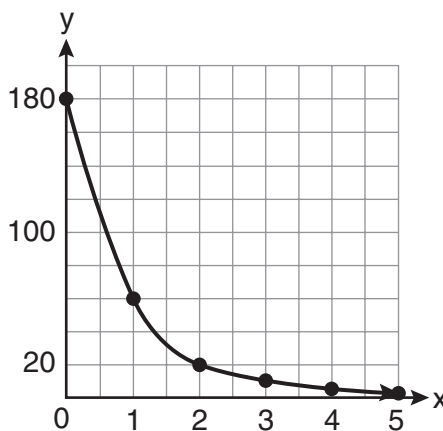
(1)



(3)



(2)

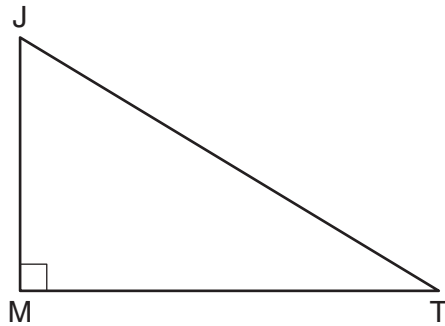


(4)



Use this space for  
computations.

- 20 In the diagram below of right triangle  $JTM$ ,  $JT = 12$ ,  $JM = 6$ , and  $m\angle JMT = 90$ .



What is the value of  $\cot J$ ?

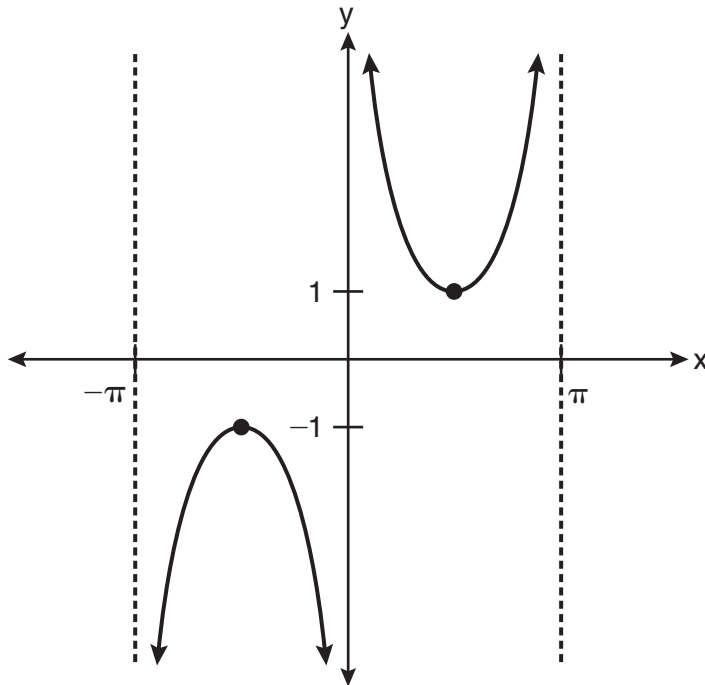
- (1)  $\frac{\sqrt{3}}{3}$  (3)  $\sqrt{3}$   
(2) 2 (4)  $\frac{2\sqrt{3}}{3}$
- 21 For which equation does the sum of the roots equal  $-3$  and the product of the roots equal  $2$ ?
- (1)  $x^2 + 2x - 3 = 0$  (3)  $2x^2 + 6x + 4 = 0$   
(2)  $x^2 - 3x + 2 = 0$  (4)  $2x^2 - 6x + 4 = 0$

- 22 The expression  $\frac{2x + 4}{\sqrt{x + 2}}$  is equivalent to

- (1)  $\frac{(2x + 4)\sqrt{x - 2}}{x - 2}$  (3)  $2\sqrt{x - 2}$   
(2)  $\frac{(2x + 4)\sqrt{x - 2}}{x - 4}$  (4)  $2\sqrt{x + 2}$

Use this space for  
computations.

23 Which equation is sketched in the diagram below?



- (1)  $y = \csc x$                       (3)  $y = \cot x$   
(2)  $y = \sec x$                       (4)  $y = \tan x$

24 The expression  $\log_5 \left( \frac{1}{25} \right)$  is equivalent to

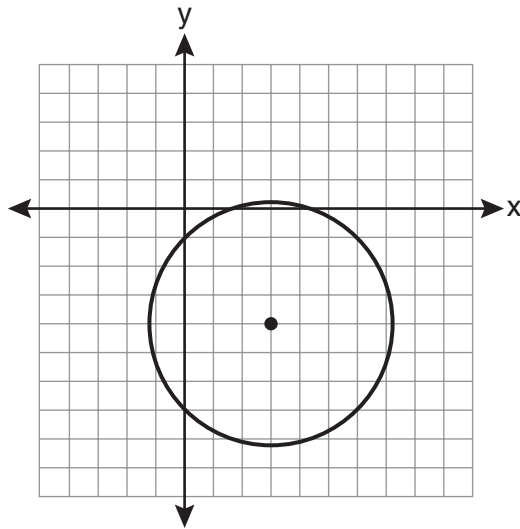
- (1)  $\frac{1}{2}$                                   (3)  $-\frac{1}{2}$   
(2) 2                                      (4) -2

25 A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can *not* be the first digit, no digit may be repeated, and the last digit must be 5?

- (1) 448                                    (3) 2,240  
(2) 504                                    (4) 2,520

Use this space for  
computations.

- 26 Which equation represents the circle shown in the graph below that passes through the point  $(0, -1)$ ?



- (1)  $(x - 3)^2 + (y + 4)^2 = 16$   
(2)  $(x - 3)^2 + (y + 4)^2 = 18$   
(3)  $(x + 3)^2 + (y - 4)^2 = 16$   
(4)  $(x + 3)^2 + (y - 4)^2 = 18$
- 27 Which task is *not* a component of an observational study?
- (1) The researcher decides who will make up the sample.  
(2) The researcher analyzes the data received from the sample.  
(3) The researcher gathers data from the sample, using surveys or taking measurements.  
(4) The researcher divides the sample into two groups, with one group acting as a control group.
-

## Part II

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]

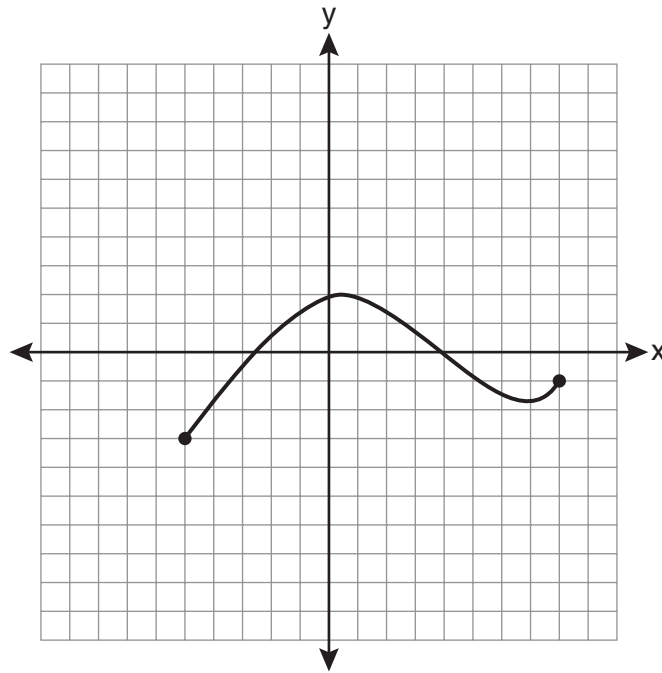
28 Solve algebraically for  $x$ :  $16^{2x+3} = 64^{x+2}$

**29** Find, to the *nearest tenth of a degree*, the angle whose measure is 2.5 radians.

**30** For a given set of rectangles, the length is inversely proportional to the width. In one of these rectangles, the length is 12 and the width is 6. For this set of rectangles, calculate the width of a rectangle whose length is 9.

**31** Evaluate:  $10 + \sum_{n=1}^5 (n^3 - 1)$

32 The graph below represents the function  $y = f(x)$ .



State the domain and range of this function.

**33** Express  $\frac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}}$  in simplest radical form.



**34** Assume that the ages of first-year college students are normally distributed with a mean of 19 years and standard deviation of 1 year.

To the *nearest integer*, find the percentage of first-year college students who are between the ages of 18 years and 20 years, inclusive.

To the *nearest integer*, find the percentage of first-year college students who are 20 years old or older.

**35** Starting with  $\sin^2 A + \cos^2 A = 1$ , derive the formula  $\tan^2 A + 1 = \sec^2 A$ .

### 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 Write the binomial expansion of  $(2x - 1)^5$  as a polynomial in simplest form.

**37** In  $\triangle ABC$ ,  $m\angle A = 32$ ,  $a = 12$ , and  $b = 10$ . Find the measures of the missing angles and side of  $\triangle ABC$ . Round each measure to the *nearest tenth*.

**38** The probability that the Stormville Sluggers will win a baseball game is  $\frac{2}{3}$ . Determine the probability, to the *nearest thousandth*, that the Stormville Sluggers will win *at least* 6 of their next 8 games.

## 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]

- 39 The temperature,  $T$ , of a given cup of hot chocolate after it has been cooling for  $t$  minutes can best be modeled by the function below, where  $T_0$  is the temperature of the room and  $k$  is a constant.

$$\ln(T - T_0) = -kt + 4.718$$

A cup of hot chocolate is placed in a room that has a temperature of  $68^\circ$ . After 3 minutes, the temperature of the hot chocolate is  $150^\circ$ . Compute the value of  $k$  to the *nearest thousandth*. [Only an algebraic solution can receive full credit.]

Using this value of  $k$ , find the temperature,  $T$ , of this cup of hot chocolate if it has been sitting in this room for a total of 10 minutes. Express your answer to the *nearest degree*. [Only an algebraic solution can receive full credit.]

## Reference Sheet

### Area of a Triangle

$$K = \frac{1}{2} ab \sin C$$

### Functions of the Sum of Two Angles

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

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

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

### Functions of the Difference of Two Angles

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

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

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

### Law of Sines

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

### Sum of a Finite Arithmetic Series

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

### Binomial Theorem

$$(a + b)^n = {}_n C_0 a^n b^0 + {}_n C_1 a^{n-1} b^1 + {}_n C_2 a^{n-2} b^2 + \dots + {}_n C_n a^0 b^n$$

$$(a + b)^n = \sum_{r=0}^n {}_n C_r a^{n-r} b^r$$

### Law of Cosines

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

### Functions of the Double Angle

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

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

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

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

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

### Functions of the Half Angle

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

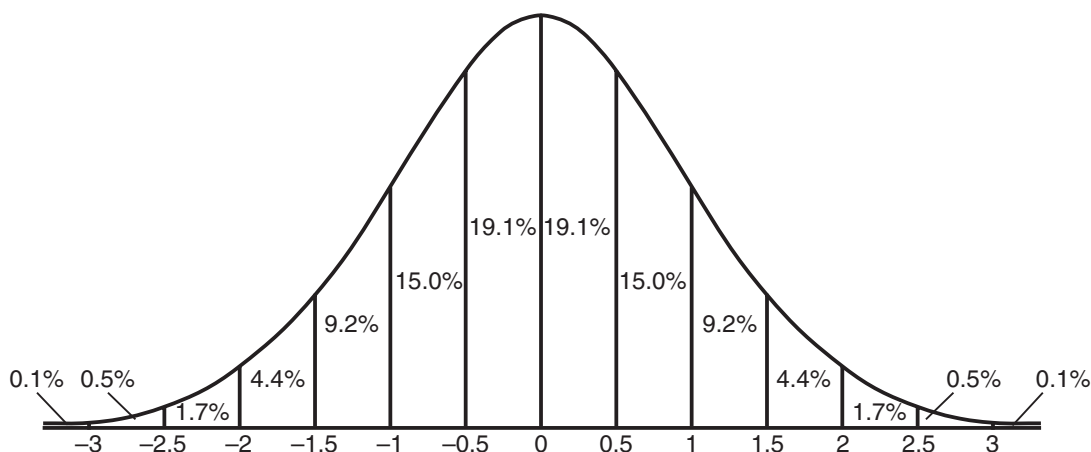
$$\cos \frac{1}{2} A = \pm \sqrt{\frac{1 + \cos A}{2}}$$

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

### Sum of a Finite Geometric Series

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

### Normal Curve Standard Deviation



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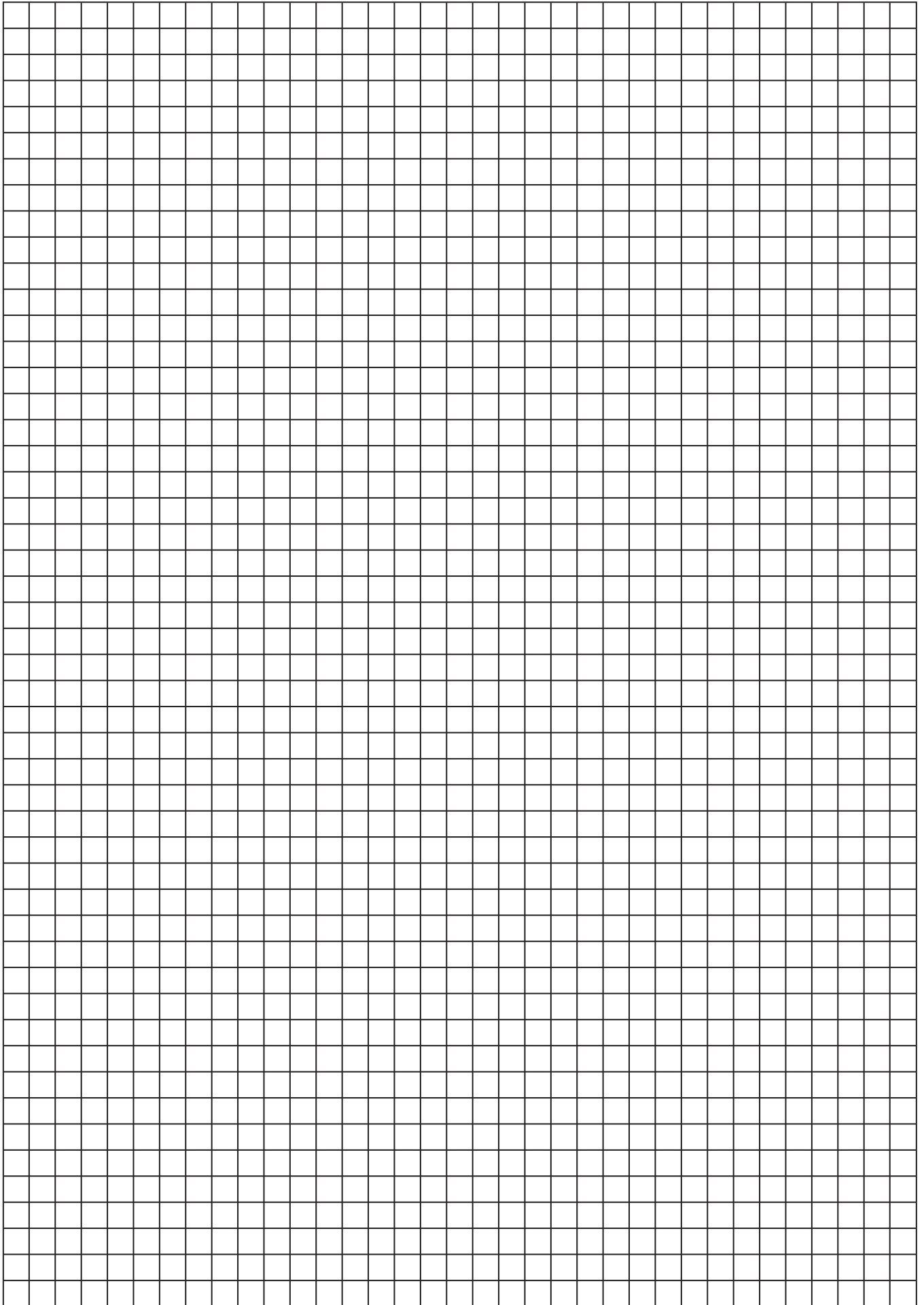
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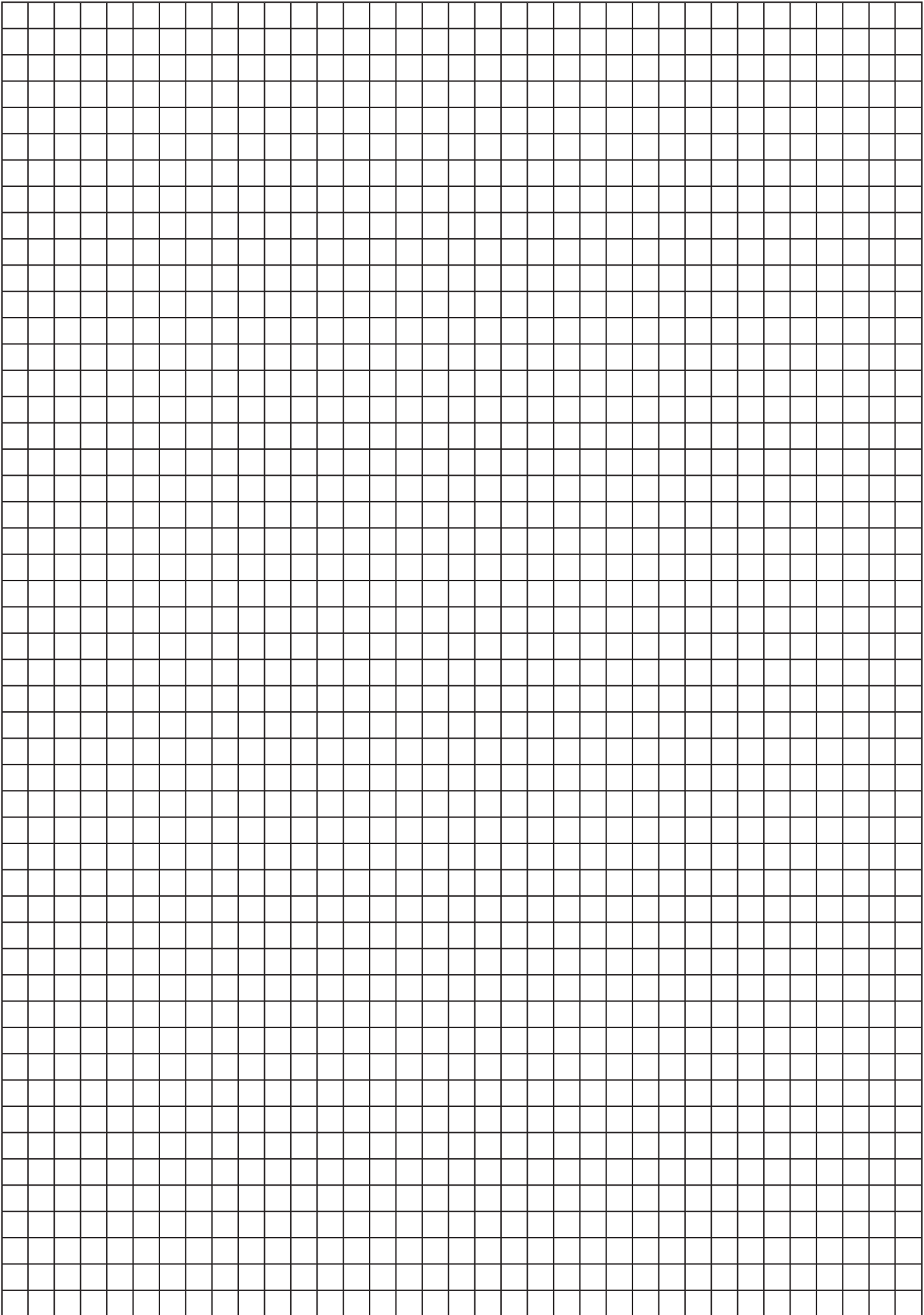
Scrap Graph Paper — This sheet will *not* be scored.

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REGENTS HIGH SCHOOL EXAMINATION

**ALGEBRA 2/TRIGONOMETRY**

Tuesday, January 25, 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



# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## ALGEBRA 2/TRIGONOMETRY

Tuesday, January 25, 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. On the back of the student's detachable answer sheet, raters must enter their initials in the boxes next to the questions they have scored and also write their name in the box under the heading "Rater's/Scorer's Name."

Raters should record the student's scores for all questions and the total raw score on the student's detachable answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site <http://www.p12.nysed.gov/osa/> on Tuesday, January 25, 2011. 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) 3 | (22) 4 |
| (2) 3 | (9) 2  | (16) 2 | (23) 1 |
| (3) 2 | (10) 3 | (17) 1 | (24) 4 |
| (4) 3 | (11) 4 | (18) 4 | (25) 1 |
| (5) 3 | (12) 1 | (19) 3 | (26) 2 |
| (6) 1 | (13) 2 | (20) 1 | (27) 4 |
| (7) 3 | (14) 2 | (21) 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 <http://www.p12.nysed.gov/osa/> and select the link "Examination Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

## General Rules for Applying Mathematics Rubrics

### I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents 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] 0, and appropriate algebraic 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] 0, but a method other than algebraic is used.

*or*

[1] 0, 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] 143.2, and appropriate 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] 143.2, 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.



(30) [2] 8, and appropriate work is shown.

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

*or*

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

*or*

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

*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.

(31) [2] 230, and appropriate work is shown.

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

*or*

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

*or*

[1] 230, but no work is shown.

[0] 220, 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.

(32) [2]  $-5 \leq x \leq 8$ , and  $-3 \leq y \leq 2$ , or Domain:  $[-5, 8]$  and Range:  $[-3, 2]$ , or an equivalent answer is stated.

[1] One conceptual error is made.

*or*

[1] Either the domain or the range is stated correctly

*or*

[1]  $[-5, 8]$  and  $[-3, 2]$  are stated, but neither is labeled.

[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]  $3x^2y\sqrt{2y}$ , 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]  $3x^2y\sqrt{2y}$ , 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] 68 and 16, and appropriate 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] 68 and 16, 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] Appropriate work is shown, such as dividing each term by  $\cos^2 A$ .

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

*or*

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

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

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### Part III

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

(36) [4]  $32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$ , and appropriate work is shown.

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

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

*or*

[1] A correct substitution is made into the binomial expansion formula, but no further correct work is shown.

*or*

[1]  $32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$ , 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.

(37) [4]  $m\angle B = 26.2$ , and  $m\angle C = 121.8$ ,  $c = 19.2$ , and appropriate work is shown.

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

*or*

[3] Appropriate work is shown, but only the measures of one angle and one side are found and labeled correctly.

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

*or*

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

*or*

[2] Appropriate work is shown, but only the measures of  $\angle B$  and  $\angle C$  are found and labeled correctly.

*or*

[2] Appropriate work is shown, but only the measure of side  $c$  is found.

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

*or*

[1] Appropriate work is shown to find  $m\angle B = 26.2$ , but no further correct work is shown.

*or*

[1]  $m\angle B = 26.2$ ,  $m\angle C = 121.8$ , and  $c = 19.2$ , 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.

(38) [4] 0.468, and appropriate work is shown.

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

*or*

[3] Appropriate work is shown to find  $\frac{3072}{6561}$  or an equivalent fraction, but no further correct work is shown.

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

*or*

[2] Appropriate work is shown, but one conceptual error is made, such as finding  $P(\text{at most 6 games})$ .

*or*

[2]  ${}_8C_6\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^2 + {}_8C_7\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^1 + {}_8C_8\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^0$ , but no further correct work is shown.

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

*or*

[1] The probability of winning *exactly* 6 baseball games is calculated correctly.

*or*

[1] 0.468, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

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## Part IV

For 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]  $k = 0.104$  and  $T = 108$ , and appropriate algebraic work is shown.
- [5] Appropriate work is shown, but one computational or rounding error is made.
- [4] Appropriate work is shown, but two computational or rounding errors are made.
- [3] Appropriate work is shown, but three or more computational or rounding errors are made.
- or*
- [3] Appropriate work is shown, but one conceptual error is made.
- or*
- [3]  $k = 0.104$  and  $T = 108$ , but a method other than algebraic is used.
- [2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or*
- [2]  $k = 0.104$ , and appropriate work is shown, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and two or more computational or rounding errors are made.
- or*
- [1]  $k = 0.104$  and  $T = 108$ , but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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## Map to Core Curriculum

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

### Regents Examination in Algebra 2/Trigonometry

January 2011

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

**The Chart for Determining the Final Examination Score for the January 2011 Regents Examination in Algebra 2/Trigonometry will be posted on the Department's web site <http://www.p12.nysed.gov/osa/> on Tuesday, January 25, 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 [www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm](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.



## Regents Examination in Algebra 2/Trigonometry January 2011

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

| Raw Score | Scale Score | Raw Score | Scale Score | Raw Score | Scale Score | Raw Score | Scale Score |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 88        | 100         | 65        | 84          | 42        | 59          | 19        | 31          |
| 87        | 99          | 64        | 83          | 41        | 58          | 18        | 29          |
| 86        | 99          | 63        | 82          | 40        | 57          | 17        | 28          |
| 85        | 98          | 62        | 81          | 39        | 56          | 16        | 26          |
| 84        | 98          | 61        | 80          | 38        | 55          | 15        | 25          |
| 83        | 97          | 60        | 79          | 37        | 54          | 14        | 23          |
| 82        | 97          | 59        | 78          | 36        | 52          | 13        | 22          |
| 81        | 96          | 58        | 77          | 35        | 51          | 12        | 20          |
| 80        | 95          | 57        | 76          | 34        | 50          | 11        | 19          |
| 79        | 95          | 56        | 75          | 33        | 49          | 10        | 17          |
| 78        | 94          | 55        | 74          | 32        | 48          | 9         | 16          |
| 77        | 93          | 54        | 73          | 31        | 46          | 8         | 14          |
| 76        | 93          | 53        | 72          | 30        | 45          | 7         | 12          |
| 75        | 92          | 52        | 71          | 29        | 44          | 6         | 11          |
| 74        | 91          | 51        | 70          | 28        | 43          | 5         | 9           |
| 73        | 91          | 50        | 69          | 27        | 41          | 4         | 7           |
| 72        | 90          | 49        | 68          | 26        | 40          | 3         | 6           |
| 71        | 89          | 48        | 66          | 25        | 39          | 2         | 4           |
| 70        | 88          | 47        | 65          | 24        | 37          | 1         | 2           |
| 69        | 88          | 46        | 64          | 23        | 36          | 0         | 0           |
| 68        | 87          | 45        | 63          | 22        | 35          |           |             |
| 67        | 86          | 44        | 62          | 21        | 33          |           |             |
| 66        | 85          | 43        | 61          | 20        | 32          |           |             |

To determine the student's final examination score, find the student's total test raw score in the column labeled "Raw Score" and then locate the scale score that corresponds to that raw score. The scale score is the student's final examination score. Enter this score in the space labeled "Scale Score" on the student's answer sheet.

All student answer papers that receive a scale score of 60 through 64 **must** be scored a second time to ensure the accuracy of the score. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper.

Because scale scores corresponding to raw scores in the conversion chart 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 chart above is usable only for this administration of the Regents Examination in Algebra 2/Trigonometry.