The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, June 23, 2009 — 1:15 to 4:15 p.m., only

Print Your Name:

Print Your School's Name:

Print your name and the name of your school in the boxes 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.

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. Write all your work in pen, except graphs and drawings, which should be done in pencil.

The formulas that you may need to answer some questions in this examination are found on page 23. This sheet is perforated so you may remove it from this booklet.

This examination has four parts, with a total of 34 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. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc.

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, a straightedge (ruler), and a compass 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 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.   [40]

Use this space for computations.

1 The number of degrees equal to $\frac{5}{9}\pi$ radians is

(1) 45   (3) 100
(2) 90   (4) 900

2 The accompanying graph shows the curves of best fit for data points comparing temperature to altitude in four different regions, represented by the relations A, B, C, and D.
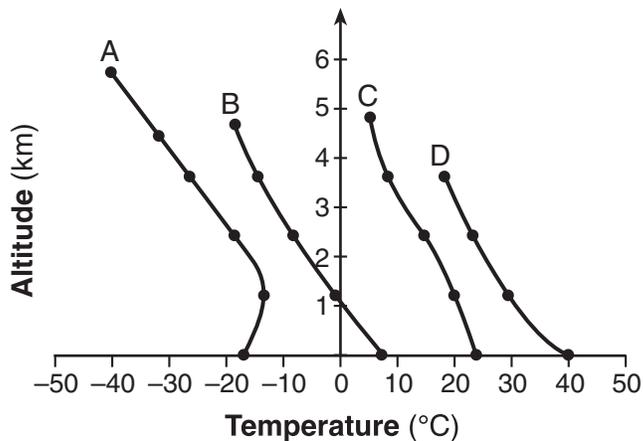
Which relation is *not* a function?

(1) A (3) C
(2) B (4) D

3 What is the value of $\displaystyle\sum_{k=1}^{3} (2 - k)^2$?

(1) 1   (3) 3
(2) 2   (4) 0

Math. B – June '09

[2]

4 If $\sin x = \dfrac{1}{a}$, $a \neq 0$, which statement must be true?

(1) $\csc x = a$ (3) $\sec x = a$

(2) $\csc x = -\dfrac{1}{a}$ (4) $\sec x = -\dfrac{1}{a}$

5 The expression $\dfrac{5 + \sqrt{7}}{5 - \sqrt{7}}$ is equivalent to

(1) $\dfrac{16 + 5\sqrt{7}}{16}$ (3) $\dfrac{16 - 5\sqrt{7}}{16}$

(2) $\dfrac{16 + 5\sqrt{7}}{9}$ (4) $\dfrac{16 - 5\sqrt{7}}{9}$

6 When the sum of $-4 + 8i$ and $2 - 9i$ is graphed, in which quadrant does it lie?

(1) I   (3) III
(2) II   (4) IV

7 What is the solution of the inequality $|2x - 5| < 1$?

(1) $x < 3$ (3) $x > -3$
(2) $2 < x < 3$ (4) $x \leq 2$ or $x \geq 3$

8 Point $A(1,0)$ is a point on the graph of the equation $y = x^2 - 4x + 3$. When point A is reflected across the axis of symmetry, what are the coordinates of its image, point A'?

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

9 The accompanying diagram represents the biological process of cell division.

If this process continues, which expression best represents the number of cells at any time, t?

(1) $t + 2$ (3) t^2

(2) $2t$ (4) 2^t

10 The roots of the equation $x^2 - 5x + 1 = 0$ are

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

11 Using a drawing program, a computer graphics designer constructs a circle on a coordinate plane on her computer screen. She determines that the equation of the circle's graph is $(x - 3)^2 + (y + 2)^2 = 36$. She then dilates the circle with the transformation D_3. After this transformation, what is the center of the new circle?

(1) (6,–5)   (3) (9,–6)

(2) (–6,5)   (4) (–9,6)

12 Which expression is equivalent to $\left(\sqrt{a^2 b^{\frac{1}{2}}} \right)^{-1}$?

(1) $a^{-2} b^{-\frac{1}{2}}$ (3) $-ab^2$

(2) $-ab^{\frac{1}{4}}$ (4) $\dfrac{1}{ab^{\frac{1}{4}}}$

13 The accompanying graph shows the average daily readership, in thousands, of the newspaper "El Diario La Prensa."
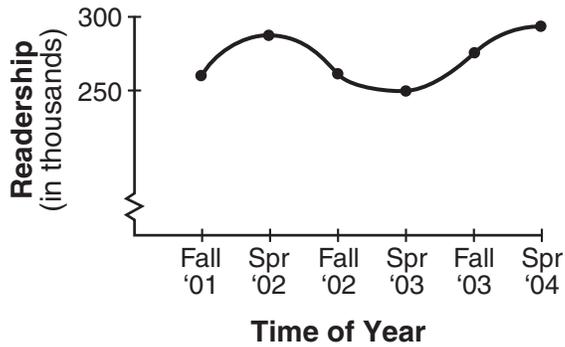
Which type of function best represents this graph?

(1) exponential   (3) trigonometric
(2) logarithmic   (4) quadratic

14 The expression $\dfrac{\sin 2A}{2 \cos A}$ is equivalent to

(1) $\cos A$ (3) $\sin A$

(2) $\tan A$ (4) $\dfrac{1}{2} \sin A$

15 What is the solution set of the equation $y = 2 + \sqrt{y^2 - 12}$?

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

16 What is the third term in the expansion of $(2x - 3)^5$?

(1) $-1080x^2$ (3) $720x^3$
(2) $-720x^3$ (4) $1080x^3$

17 The accompanying table shows the scores on a classroom test.

x_i	f_i
100	7
90	10
80	4
70	4

What is the population standard deviation for this set of scores?

(1) 10.2   (3) 25
(2) 10.4   (4) 88

18 The manager of Stuart Siding Company found that the number of workers used to side a house varies inversely with the number of hours needed to finish the job. If four workers can side the house in 48 hours, how many hours will it take six workers working at the same speed to do the same job?

(1) 32   (3) 42
(2) 36   (4) 72

19 The expression $\dfrac{1 - \dfrac{x}{x-y}}{\dfrac{1}{x-y}}$ is equivalent to

(1) $1 - x$ (3) y
(2) $x - y$ (4) $-y$

20 The Sea Dragon, a pendulum ride at an amusement park, moves from its central position at rest according to the trigonometric function $P(t) = -10 \sin\left(\frac{\pi}{3}t\right)$, where t represents time, in seconds. How many seconds does it take the pendulum to complete one full cycle?

(1) 5

(3) 3

(2) 6

(4) 10

Part II

Answer all 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. [12]

21 If $f(x) = x^2 + 4$ and $g(x) = 2x + 3$, find $f(g(-2))$.

22 In $\triangle ABC$, $\sin A = 0.6$, $a = 10$, and $b = 7$. Find $\sin B$.

23 Solve algebraically for x: $9^{3x} = 3^{3x + 1}$

24 The accompanying diagram shows two lengths of wire attached to a wheel, so that $\overline{AB}$ and $\overline{AC}$ are tangent to the wheel. If the major arc $\overset{\frown}{BC}$ has a measure of 220°, find the number of degrees in m∠A.
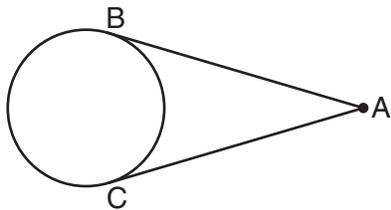
25 Solve for x: $\log_8 (x + 1) = \dfrac{2}{3}$

26 The accompanying graph shows the relationship between the cooling time of magma and the size of the crystals produced after a volcanic eruption. On the same graph, sketch the inverse of this function.
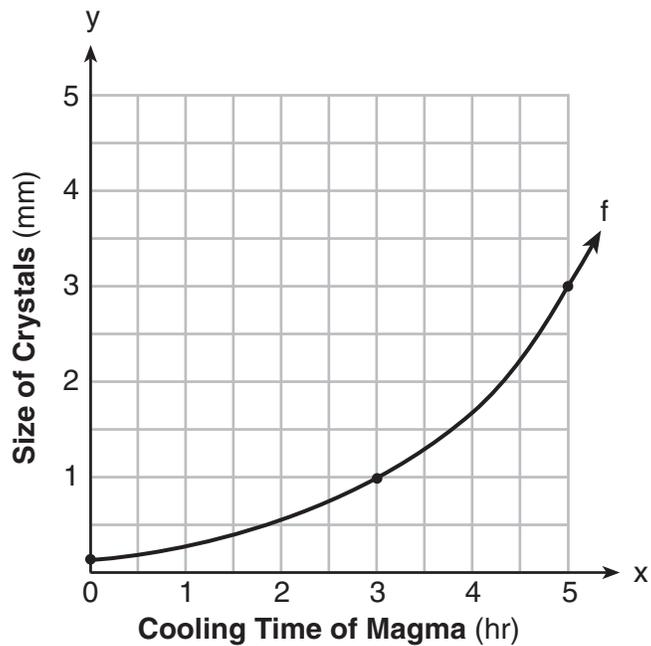
Part III

Answer all 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. [24]

27 The number of newly reported crime cases in a county in New York State is shown in the accompanying table. Write the linear regression equation that represents this set of data. (Let $x = 0$ represent 1999.)

Using this equation, find the projected number of new cases for 2009, rounded to the *nearest whole number*.

Year (x)	New Cases (y)
1999	440
2000	457
2001	369
2002	351

28 On the accompanying grid, graph and label $\triangle ABC$ with vertices $A(3,1)$, $B(0,4)$, and $C(-5,3)$. On the same grid, graph and label $\triangle A''B''C''$, the image of $\triangle ABC$ after the transformation $r_{x\text{-axis}} \circ r_{y\,=\,x}$.
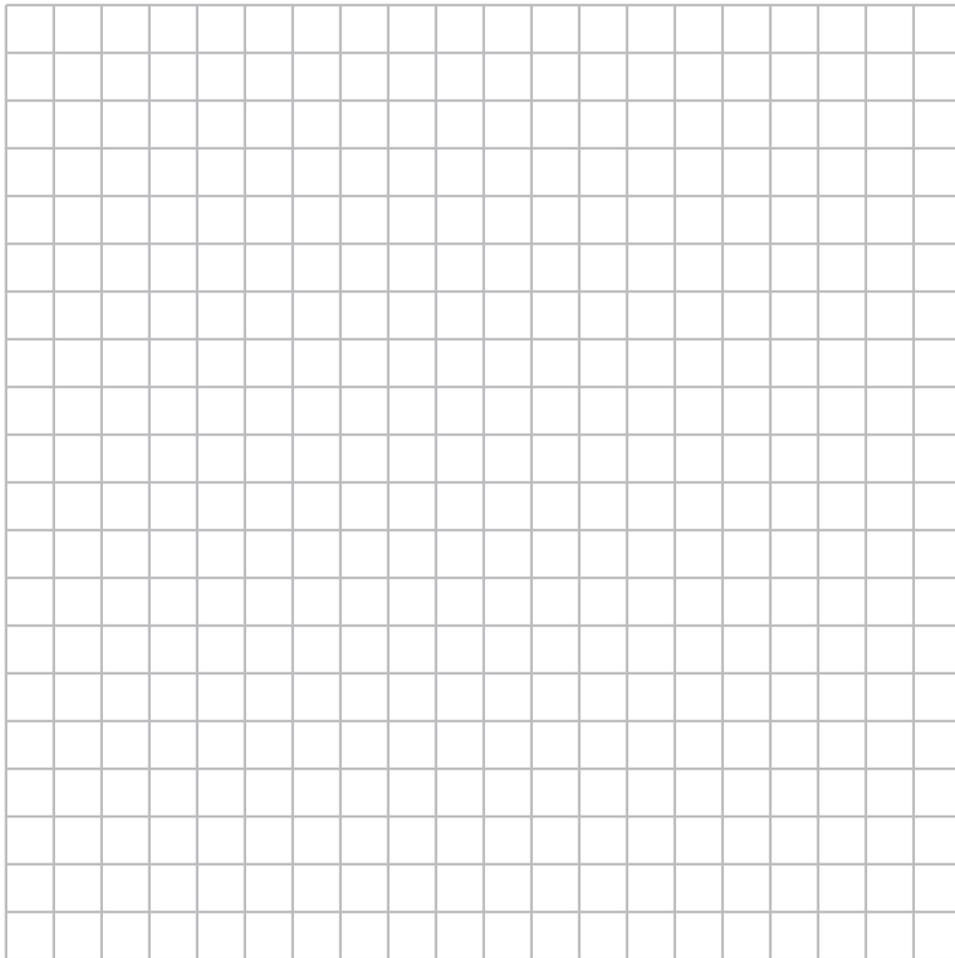
29 Express in simplest form: $\dfrac{3x}{2x - 6} + \dfrac{9}{6 - 2x}$

30 Dave does *not* tell the truth $\frac{3}{4}$ of the time. Find the probability that
he will tell the truth *at most* twice out of the next five times.

31 In the accompanying diagram, $\overline{CD}$ is an altitude of $\triangle ABC$. If $CD = 8$, m$\angle A = 45$, and m$\angle B = 30$, find the perimeter of $\triangle ABC$ in simplest radical form.
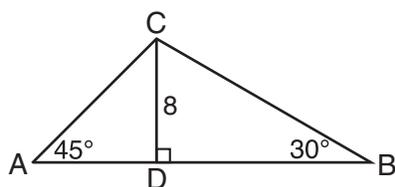
32 Solve the equation $\cos \theta = 2 + 3 \cos 2\theta$ for all values of θ, to the *nearest tenth of a degree*, in the interval $0° \le \theta < 360°$.

Part IV

Answer all questions in this part. Each correct answer will receive 6 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. [12]

33 The accompanying diagram shows a triangular plot of land located in Moira's garden.
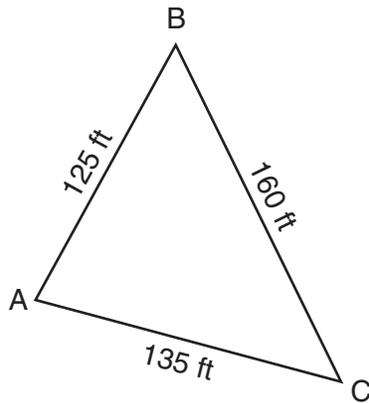
Find the area of the plot of land, and round your answer to the *nearest hundred square feet*.

34 In the accompanying diagram of circle O, $\overline{AD}$ is a diameter with $\overline{AD}$ parallel to chord $\overline{BC}$, chords $\overline{AB}$ and $\overline{CD}$ are drawn, and chords $\overline{BD}$ and $\overline{AC}$ intersect at E.

Prove: $\overline{BE} \cong \overline{CE}$
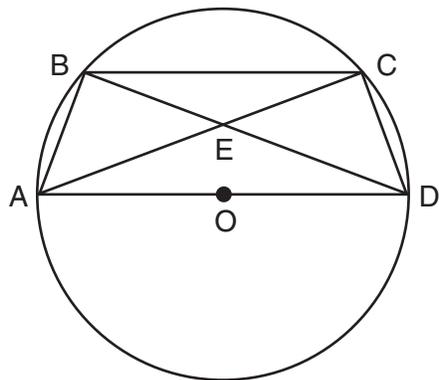
Formulas

Area of Triangle

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

Law of Cosines

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

Functions of the Sum of Two Angles

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

Functions of the Double Angle

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

Functions of the Difference of Two Angles

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

Functions of the Half Angle

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

Law of Sines

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

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

Normal Curve

Standard Deviation
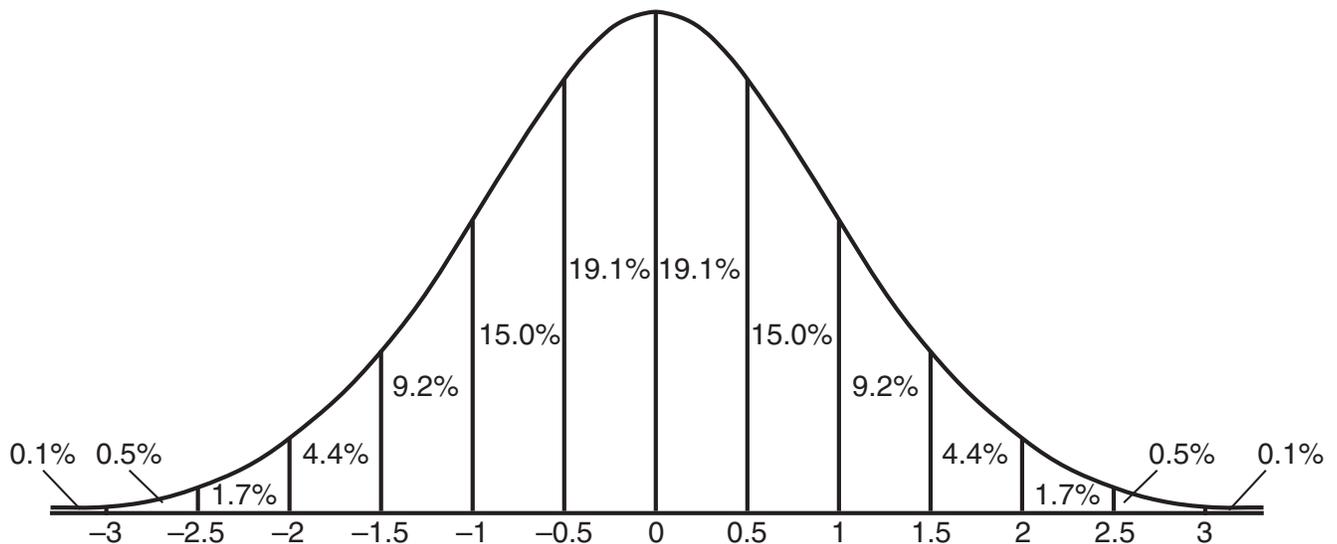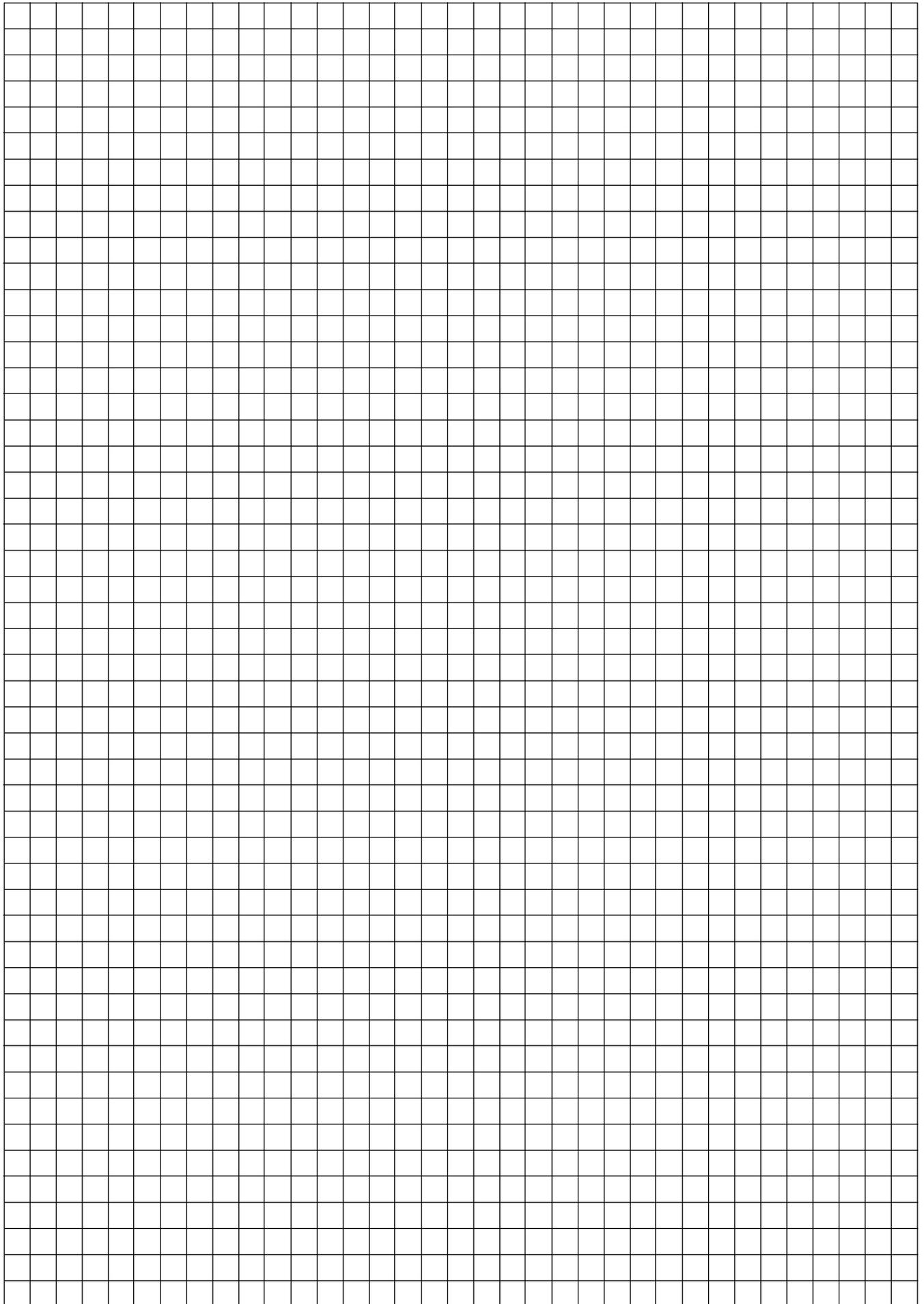
[23]
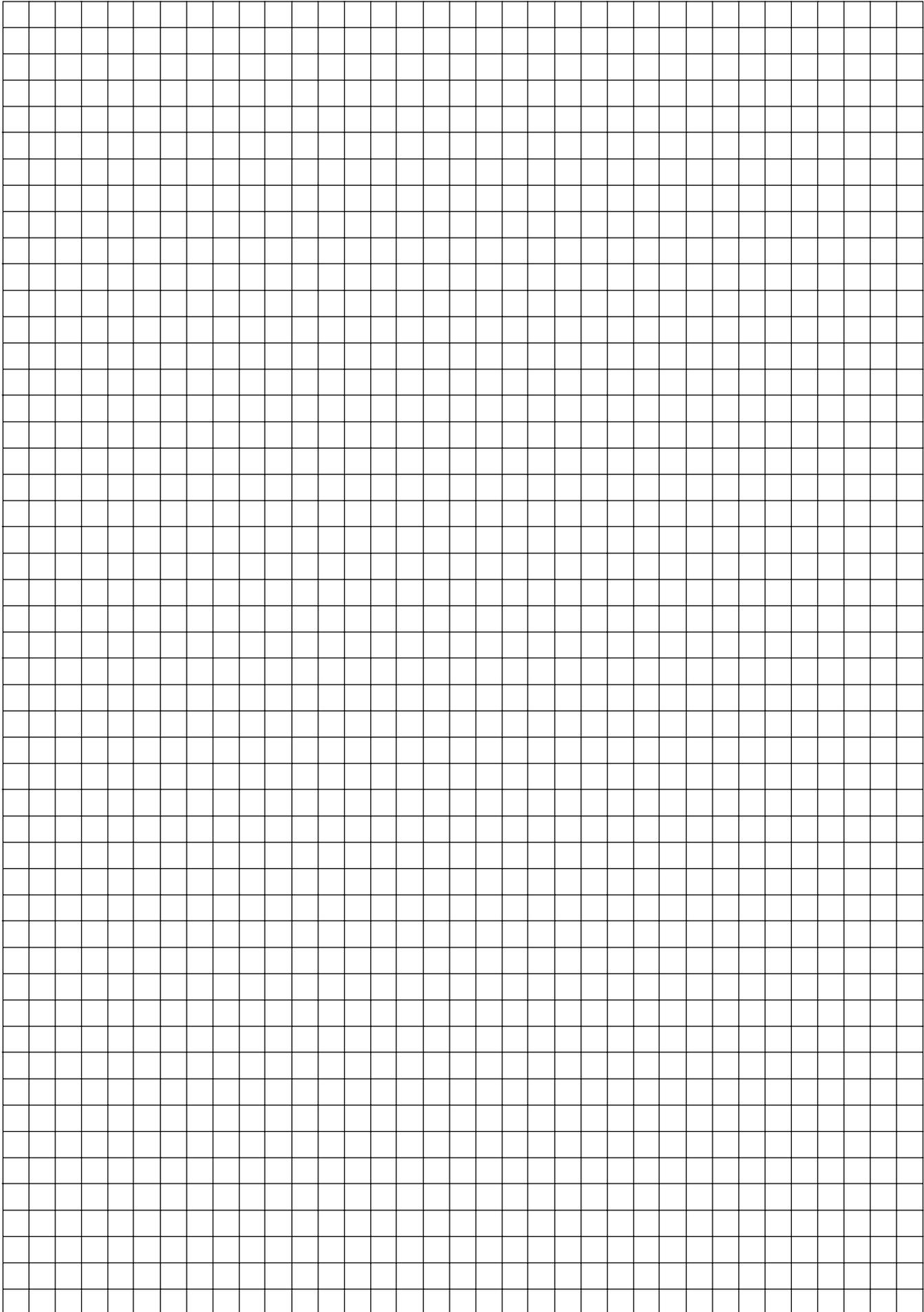
The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, June 23, 2009 — 1:15 to 4:15 p.m., only

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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 20 questions in this part.

1	6	11	16 . . . .
2	7	12	17 . . . .
3	8	13	18 . . . .
4	9	14	19 . . . .
5	10	15	20 . . . .

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

The declaration below should 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

MATHEMATICS B

MATHEMATICS B			
Question	Maximum Credit	Credits Earned	Rater's/Scorer's Initials
Part I 1–20	40		
Part II 21	2		
22	2		
23	2		
24	2		
25	2		
26	2		
Part III 27	4		
28	4		
29	4		
30	4		
31	4		
32	4		
Part IV 33	6		
34	6		
Maximum Total	88		

Rater's/Scorer's Name (minimum of three)

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

MATHEMATICS B

FOR TEACHERS ONLY

MATHEMATICS B

Tuesday, June 23, 2009 — 1:15 to 4:15 p.m., only

SCORING KEY

Mechanics of Rating

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

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 scaled score by using the conversion chart that will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Tuesday, June 23, 2009. The student's scaled score should be entered in the box provided on the student's detachable answer sheet. The scaled score is the student's final examination score.

Part I

Allow a total of 40 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) 3	(6) 3	(11) 3	(16) 3
(2) 1	(7) 2	(12) 4	(17) 1
(3) 2	(8) 4	(13) 3	(18) 1
(4) 1	(9) 4	(14) 3	(19) 4
(5) 2	(10) 3	(15) 4	(20) 2

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.emsc.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 Mathematics B are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher's professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examination in Mathematics B*, 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, 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.

(21) **[2]** 5, 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 $g\big(f(-2)\big)$.

                                or

    [1] 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.

(22) **[2]** 0.42, 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 $\sin B$ is not found.

                                or

    [1] 0.42, 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.

(23)   **[2]** $\frac{1}{3}$, 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] The equation $(3^2)^{3x} = 3^{3x+1}$ or an equivalent equation is written, but no further correct work is shown.

   or

   [1] $\frac{1}{3}$, but a method other than algebraic is used.

   or

   [1] $\frac{1}{3}$, but no work is shown.

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

(24)   **[2]** 40, 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] 40, 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.

(25)   **[2]** 3, 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] $8^{\frac{2}{3}}$ = x + 1, but no further correct work is shown.

                                   or

   [1] 3, but no work is shown.

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

(26)   **[2]** The inverse function is graphed correctly.

   [1] One graphing 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.

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.

(27)   **[4]** $y = -35.5x + 457.5$ and 103, and appropriate work is shown, such as substituting 10 into the regression equation.

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

or

[3] The expression $-35.5x + 457.5$ is written and 103, and appropriate substitution is shown, but no equation is written.

or

[3] $y = -35.5x + 457.5$ and 103, but no substitution is shown.

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

or

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

or

[2] An incorrect linear regression equation is written, but an appropriate number of new cases is found.

or

[2] $y = -35.5x + 457.5$, but no further correct work is shown.

or

[2] The expression $-35.5x + 457.5$ is written and 103, but no substitution is shown.

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

or

[1] The expression $-35.5x + 457.5$ is written or 103, but no substitution 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.

(28) **[4]** Both $\triangle ABC$ and $\triangle A''B''C''$ are graphed and labeled correctly.

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

or

[3] Appropriate work is shown, but only $\triangle A''B''C''$ is graphed and labeled correctly.

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

or

[2] Appropriate work is shown, but one conceptual error is made, such as reflecting over the x-axis before reflecting over the line $y = x$.

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

or

[1] $A''(1,-3)$, $B''(4,0)$, and $C''(3,5)$ are stated, but no work is shown.

or

[1] $\triangle ABC$ is graphed and labeled correctly, but only $r_{y\ =\ x}$ or $r_{x\text{-axis}}$ is graphed correctly.

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

(29)   **[4]** $\frac{3}{2}$, and appropriate work is shown.

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

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

or

[2] Appropriate work is shown, but one conceptual error is made, such as not factoring out –1.

or

[2] Appropriate work is shown, but the answer is left as $\dfrac{3x - 9}{2(x - 3)}$ or as an equivalent expression.

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

or

[1] Appropriate work is shown, but the answer is left as $\dfrac{3x}{2(x - 3)} + \dfrac{9}{2(3 - x)}$.

or

[1] $\frac{3}{2}$, 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) **[4]** $\dfrac{918}{1024}$ or an equivalent answer, and appropriate work is shown, such as

$$_5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5 + {}_5C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^4 + {}_5C_2\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3 .$$

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

or

[3] $_5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5$, $_5C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^4$, and $_5C_2\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3$ are evaluated, but the values are not added.

[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 the probability of "*not* telling the truth at most twice" or the probability of "telling the truth at least twice."

or

[2] $_5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5 + {}_5C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^4 + {}_5C_2\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3$, 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] Appropriate work is shown to find $\dfrac{270}{1024}$, the probability of telling the truth exactly twice out of five times.

or

[1] $\dfrac{918}{1024}$ or an equivalent answer, 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.

MATHEMATICS B – *continued*

(31) **[4]** $24 + 8\sqrt{2} + 8\sqrt{3}$, and appropriate work is shown, such as labeling the diagram using special right triangle rules or right triangle trigonometry.

[3] Appropriate work is shown, but one computational error is made or the answer is not in simplest radical form.

or

[3] The measures of the four segments are found correctly, but the perimeter is not found or is found incorrectly.

[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.

or

[2] The measures of three segments are found correctly, but no further correct work is shown.

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

or

[1] The measures of two segments are found correctly, but no further correct work is shown.

or

[1] $24 + 8\sqrt{2} + 8\sqrt{3}$, but no work is shown.

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

(32) **[4]** 60, 109.5, 250.5, 300, and appropriate work is shown algebraically or graphically.

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

or

[3] Appropriate work is shown, but only three correct values of θ are found.

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

or

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

or

[2] Appropriate work is shown, but only two correct values of θ are found.

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

or

[1] Appropriate substitutions are made and the equation is written in standard form, but no further correct work is shown.

or

[1] 60, 109.5, 250.5, 300, but no work is shown.

[0] 60 or 109.5 or 250.5 or 300, 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.

[OVER]

Part IV

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

(33) **[6]** 8,200, and appropriate work is shown, such as using the Law of Cosines or Hero(n)'s formula.

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

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

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

or

[3] The Law of Cosines is used to find an angle, but no further correct work is shown.

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

[1] A correct substitution is made into the Law of Cosines, but no further correct work is shown.

or

[1] 8,200, 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)   **[6]** A complete and correct proof that includes a conclusion is written.

    [5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.

<div align="center">

or

</div>

    [5] $\triangle BEA = \triangle CED$ is proven or $\triangle BEC$ is proven to be isosceles, but no further correct work is shown.

    [4] A proof is written that demonstrates a good understanding of the method of proof, but two statements and/or reasons are missing or are incorrect.

    [3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

    [2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.

<div align="center">

or

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    [2] A proof is written that demonstrates understanding of the method of proof, but one conceptual error is made, and one statement or reason is missing or is incorrect.

    [1] Only one correct relevant statement and reason are written.

    [0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

<div align="center">

or

</div>

    [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 Learning Standards

Key Ideas	Item Numbers
Mathematical Reasoning	34
Number and Numeration	5, 10, 19
Operations	28, 29
Modeling/Multiple Representation	6, 8, 9, 11, 12, 13, 18, 20, 25
Measurement	1, 4, 22, 24, 31, 33
Uncertainty	3, 16, 27, 30
Patterns/Functions	2, 7, 14, 15, 17, 21, 23, 26, 32

Regents Examination in Mathematics B

June 2009

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

The *Chart for Determining the Final Examination Score for the June 2009 Regents Examination in Mathematics B* will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Tuesday, June 23, 2009. Conversion charts provided for the previous administrations of the Regents Examination in Mathematics B 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.emsc.nysed.gov/osa/exameval.

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.

As a reminder . . .
   Regents examinations based on the Mathematics B syllabus will not be offered after June 2010.

Regents Examination in Mathematics B
June 2009

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

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 Mathematics B.