The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, June 22, 2004 — 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. 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.

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. The formulas that you may need to answer some questions in this examination are found on page 19.

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 your use while taking this examination.

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 What is the sum of $2 - \sqrt{-4}$ and $-3 + \sqrt{-16}$ expressed in $a + bi$ form?

(1) $-1 + 2i$
(2) $-1 + i\sqrt{20}$
(3) $-1 + 12i$
(4) $-14 + i$

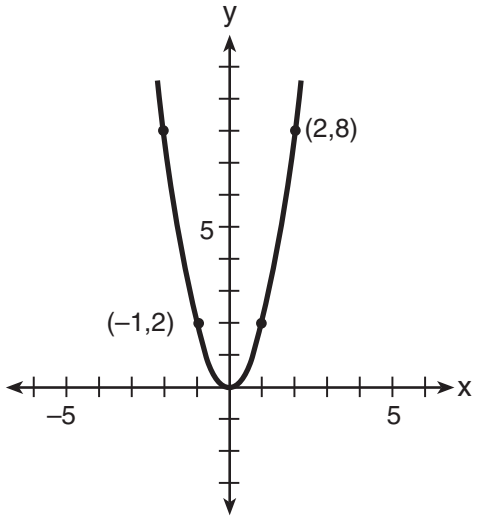
2 The Hiking Club plans to go camping in a State park where the probability of rain on any given day is 0.7. Which expression can be used to find the probability that it will rain on *exactly* three of the seven days they are there?

(1) ${}_7C_3(0.7)^3(0.3)^4$
(2) ${}_7C_3(0.3)^3(0.7)^4$
(3) ${}_4C_3(0.7)^3(0.7)^4$
(4) ${}_4C_3(0.4)^4(0.3)^3$

3 What is the amplitude of the function $y = \frac{2}{3} \sin 4x$?

(1) $\frac{\pi}{2}$
(2) $\frac{2}{3}$
(3) 3π
(4) 4

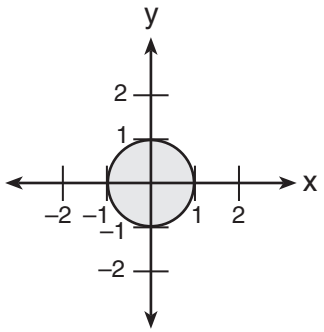
4 Which quadratic function is shown in the accompanying graph?



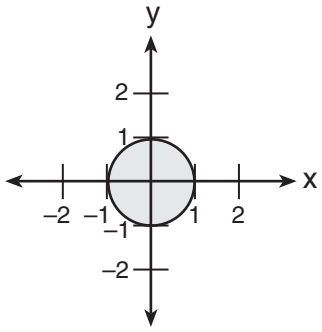
(1) $y = -2x^2$
(2) $y = 2x^2$
(3) $y = -\frac{1}{2}x^2$
(4) $y = \frac{1}{2}x^2$

5 In the accompanying graph, the shaded region represents set A of all points (x,y) such that $x^2 + y^2 \leq 1$. The transformation T maps point (x,y) to point $(2x,4y)$.

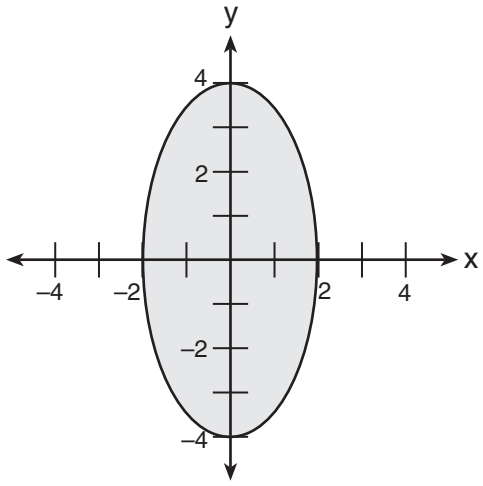
Use this space for computations.



Which graph shows the mapping of set A by the transformation T?



(1)



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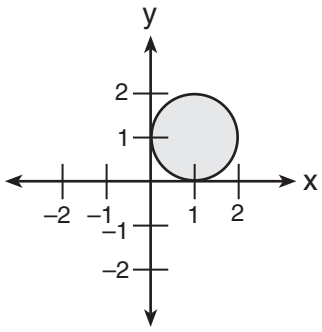

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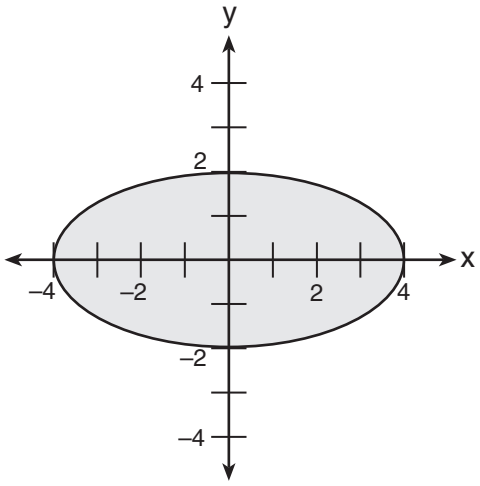


(4)

6 If $f(x) = 4x^0 + (4x)^{-1}$, what is the value of $f(4)$?

(1) -12

(2) 0

(3) $1\frac{1}{16}$

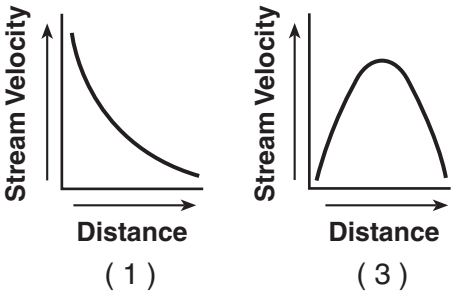
(4) $4\frac{1}{16}$

Use this space for computations.

7 What is the domain of the function $f(x) = \frac{2x^2}{x^2 - 9}$?

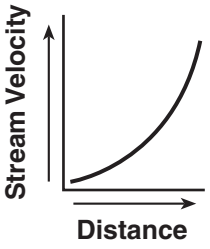
(1) all real numbers except 0
(2) all real numbers except 3
(3) all real numbers except 3 and –3
(4) all real numbers

8 Which graph represents an inverse variation between stream velocity and the distance from the center of the stream?

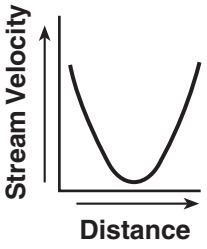


(1)

(3)



(2)



(4)

9 If $\log_b x = y$, then x equals

(1) $y \bullet b$

(2) $\frac{y}{b}$

(3) y^b

(4) b^y

10 The expression $i^0 \bullet i^1 \bullet i^2 \bullet i^3 \bullet i^4$ is equal to

(1) 1

(2) –1

(3) i

(4) $-i$

11 Which equation models the data in the accompanying table?

Use this space for computations.

Time in hours, *x*	0	1	2	3	4	5	6
Population, *y*	5	10	20	40	80	160	320

(1) $y = 2x + 5$
(2) $y = 2^x$
(3) $y = 2x$
(4) $y = 5(2^x)$

12 The amount of juice dispensed from a machine is normally distributed with a mean of 10.50 ounces and a standard deviation of 0.75 ounce. Which interval represents the amount of juice dispensed about 68.2% of the time?

(1) 9.00–12.00
(2) 9.75–10.50
(3) 9.75–11.25
(4) 10.50–11.25

13 If θ is an acute angle such that $\sin \theta = \frac{5}{13}$, what is the value of $\sin 2\theta$?

(1) $\frac{12}{13}$
(2) $\frac{10}{26}$
(3) $\frac{60}{169}$
(4) $\frac{120}{169}$

14 Which function is symmetrical with respect to the origin?

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

15 The expression $\dfrac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{x^2} - \frac{1}{y^2}}$ is equivalent to

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

Use this space for computations.

16 Sam is designing a triangular piece for a metal sculpture. He tells Martha that two of the sides of the piece are 40 inches and 15 inches, and the angle opposite the 40-inch side measures 120°. Martha decides to sketch the piece that Sam described. How many different triangles can she sketch that match Sam's description?

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

17 If $f(x) = x + 1$ and $g(x) = x^2 - 1$, the expression $(g \circ f)(x)$ equals 0 when x is equal to

(1) 1 and –1
(2) 0, only
(3) –2, only
(4) 0 and –2

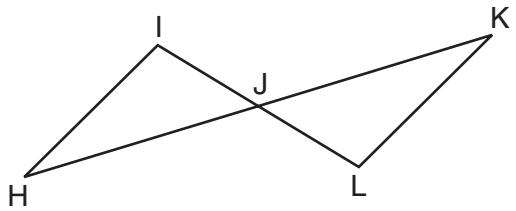
18 If θ is a positive acute angle and $\sin \theta = a$, which expression represents $\cos \theta$ in terms of a?

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

19 The expression $\sqrt[4]{16a^6b^4}$ is equivalent to

(1) $2a^2b$
(2) $2a^{\frac{3}{2}}b$
(3) $4a^2b$
(4) $4a^{\frac{3}{2}}b$

20 In the accompanying diagram, $\overline{HK}$ bisects $\overline{IL}$ and $\angle H \cong \angle K$.



What is the most direct method of proof that could be used to prove $\triangle HIJ \cong \triangle KLJ$?

(1) HL ≅ HL
(2) SAS ≅ SAS
(3) AAS ≅ AAS
(4) ASA ≅ ASA

Part II

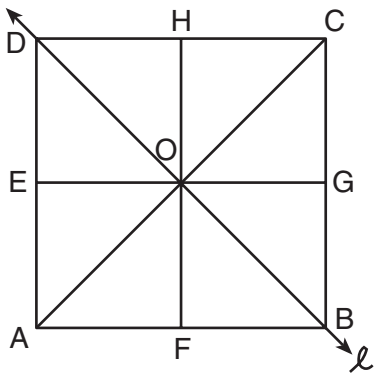
Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

21 The projected total annual profits, in dollars, for the Nutyme Clothing Company from 2002 to 2004 can be approximated by the model $\sum_{n=0}^{2} (13{,}567n + 294)$, where n is the year and $n = 0$ represents 2002. Use this model to find the company's projected total annual profits, in dollars, for the period 2002 to 2004.

22 Solve algebraically for x: $27^{2x+1} = 9^{4x}$

23 Find all values of k such that the equation $3x^2 - 2x + k = 0$ has imaginary roots.

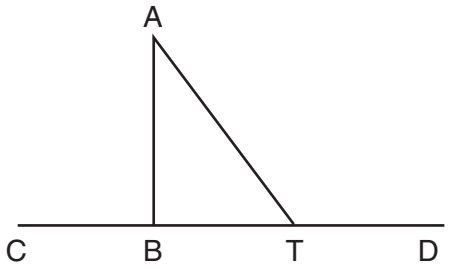
24 In the accompanying diagram of square $ABCD$, F is the midpoint of $\overline{AB}$, G is the midpoint of $\overline{BC}$, H is the midpoint of $\overline{CD}$, and E is the midpoint of $\overline{DA}$.



Find the image of $\triangle EOA$ after it is reflected in line ℓ.

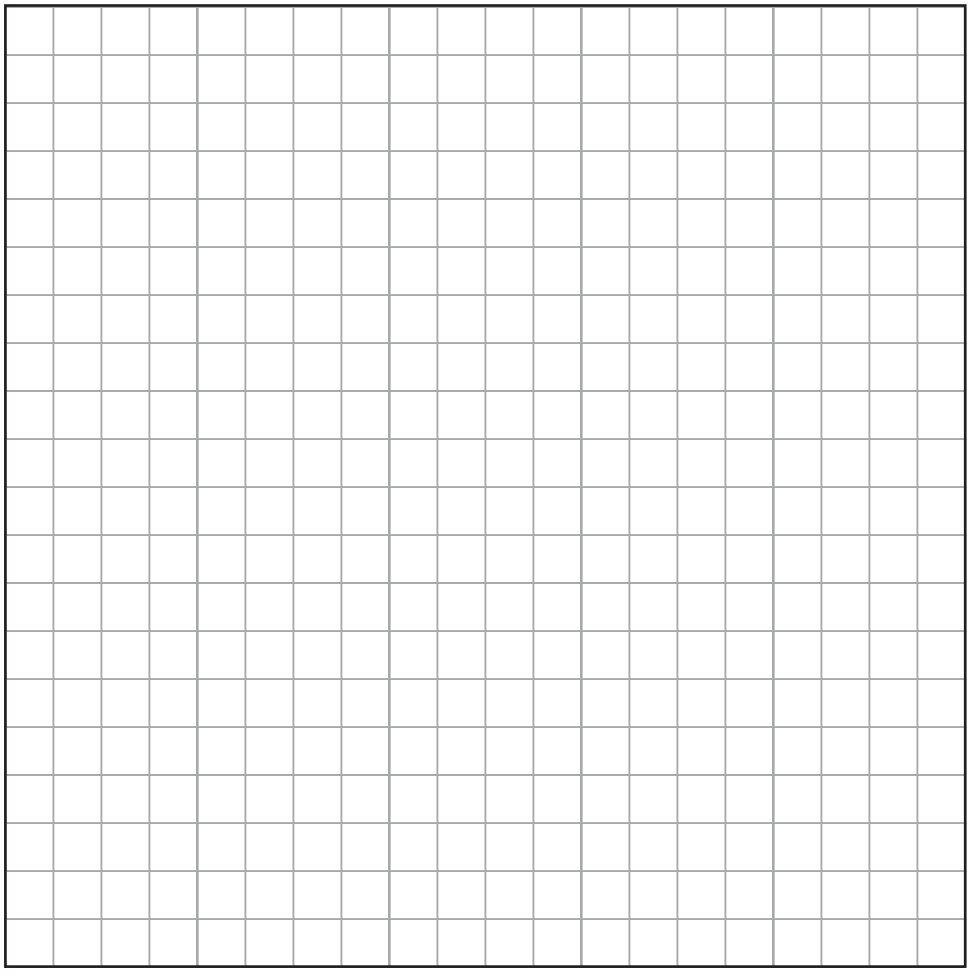
Is this isometry direct or opposite? Explain your answer.

25 Given: $\triangle ABT$, $\overline{CBTD}$, and $\overline{AB} \perp \overline{CD}$



Write an indirect proof to show that $\overline{AT}$ is *not* perpendicular to $\overline{CD}$.

26 The equation $V = 20\sqrt{C + 273}$ relates speed of sound, V, in meters per second, to air temperature, C, in degrees Celsius. What is the temperature, in degrees Celsius, when the speed of sound is 320 meters per second? [The use of the accompanying grid is optional.]



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 Navigators aboard ships and airplanes use nautical miles to measure distance. The length of a nautical mile varies with latitude. The length of a nautical mile, L, in feet, on the latitude line θ is given by the formula $L = 6{,}077 - 31 \cos 2\theta$.

Find, to the *nearest degree*, the angle θ, $0° \leq \theta \leq 90°$, at which the length of a nautical mile is approximately 6,076 feet.

28 Two equal forces act on a body at an angle of 80°. If the resultant force is 100 newtons, find the value of one of the two equal forces, to the *nearest hundredth of a newton*.

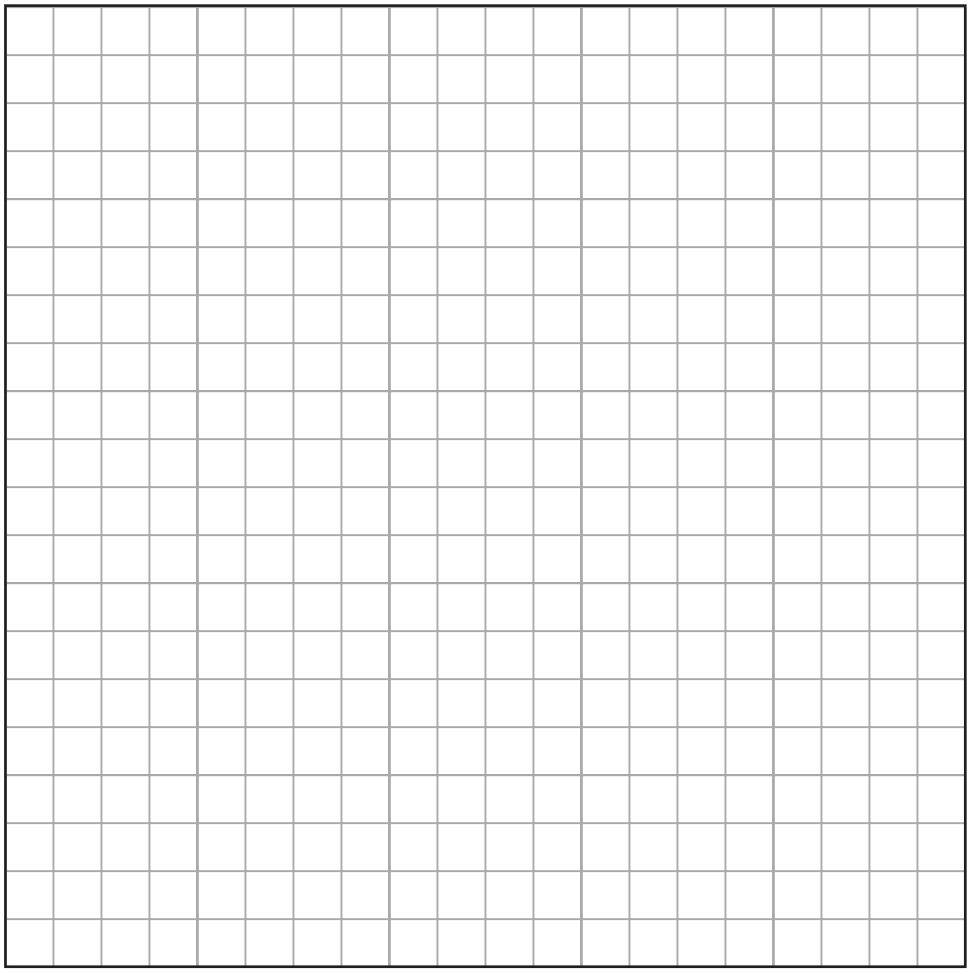
29 Solve for x and express your answer in simplest radical form:

$$\frac{4}{x} - \frac{3}{x + 1} = 7$$

30 A baseball player throws a ball from the outfield toward home plate. The ball's height above the ground is modeled by the equation $y = -16x^2 + 48x + 6$, where y represents height, in feet, and x represents time, in seconds. The ball is initially thrown from a height of 6 feet.

How many seconds after the ball is thrown will it again be 6 feet above the ground?

What is the maximum height, in feet, that the ball reaches? [The use of the accompanying grid is optional.]



31 An archaeologist can determine the approximate age of certain ancient specimens by measuring the amount of carbon-14, a radioactive substance, contained in the specimen. The formula used to determine the age of a specimen is $A = A_0 2^{\frac{-t}{5760}}$, where A is the amount of carbon-14 that a specimen contains, A_0 is the original amount of carbon-14, t is time, in years, and 5760 is the half-life of carbon-14.

A specimen that originally contained 120 milligrams of carbon-14 now contains 100 milligrams of this substance. What is the age of the specimen, to the *nearest hundred years*?

32 Mrs. Ramírez is a real estate broker. Last month, the sale prices of homes in her area approximated a normal distribution with a mean of $150,000 and a standard deviation of $25,000.

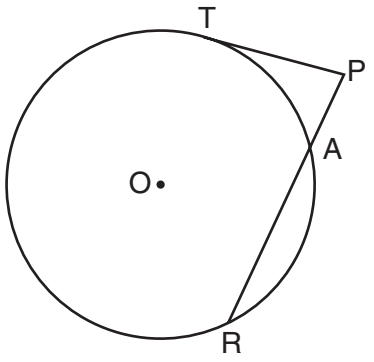
A house had a sale price of $175,000. What is the percentile rank of its sale price, to the *nearest whole number*? Explain what that percentile means.

Mrs. Ramírez told a customer that most of the houses sold last month had selling prices between $125,000 and $175,000. Explain why she is correct.

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 circular machine part that has rods $\overline{PT}$ and $\overline{PAR}$ attached at points *T*, *A*, and *R*, which are located on the circle; $m\widehat{TA}:m\widehat{AR}:m\widehat{RT} = 1:3:5$; $RA = 12$ centimeters; and $PA = 5$ centimeters.



Find the measure of $\angle P$, in degrees, and find the length of rod $\overline{PT}$, to the *nearest tenth of a centimeter.*

34 A surveyor is mapping a triangular plot of land. He measures two of the sides and the angle formed by these two sides and finds that the lengths are 400 yards and 200 yards and the included angle is 50°.

What is the measure of the third side of the plot of land, to the *nearest yard*?

What is the area of this plot of land, to the *nearest square yard*?

Formulas

Area of Triangle

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

Functions of the Sum of Two Angles

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

Functions of the Difference of Two Angles

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

Law of Sines

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

Law of Cosines

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

Functions of the Double Angle

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

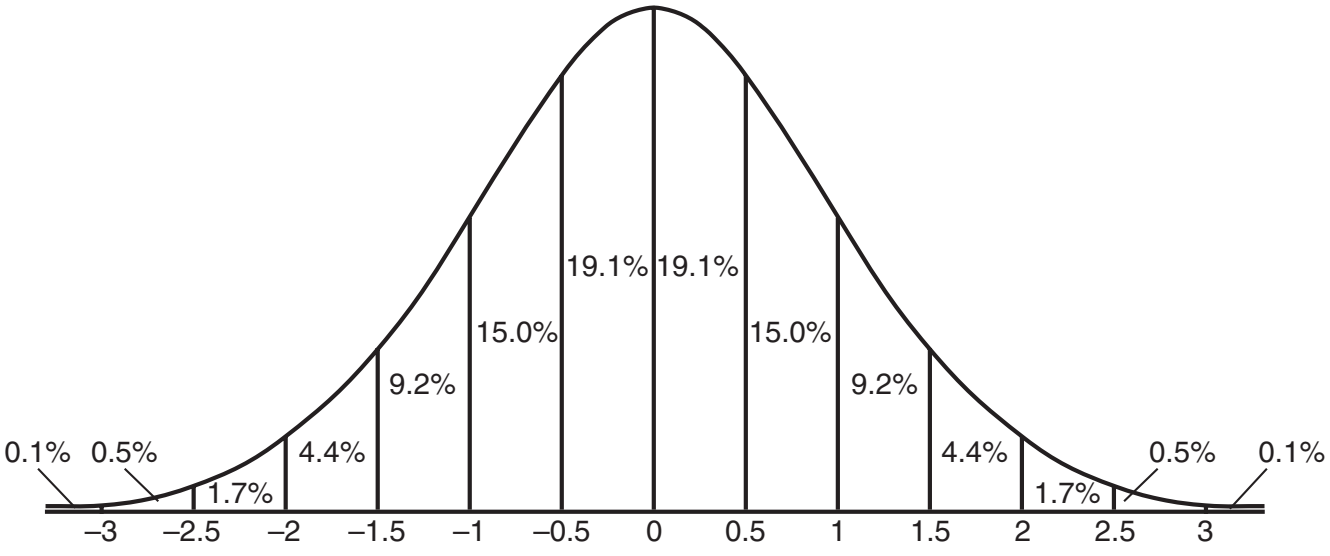
Functions of the Half Angle

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

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

Normal Curve

Standard Deviation



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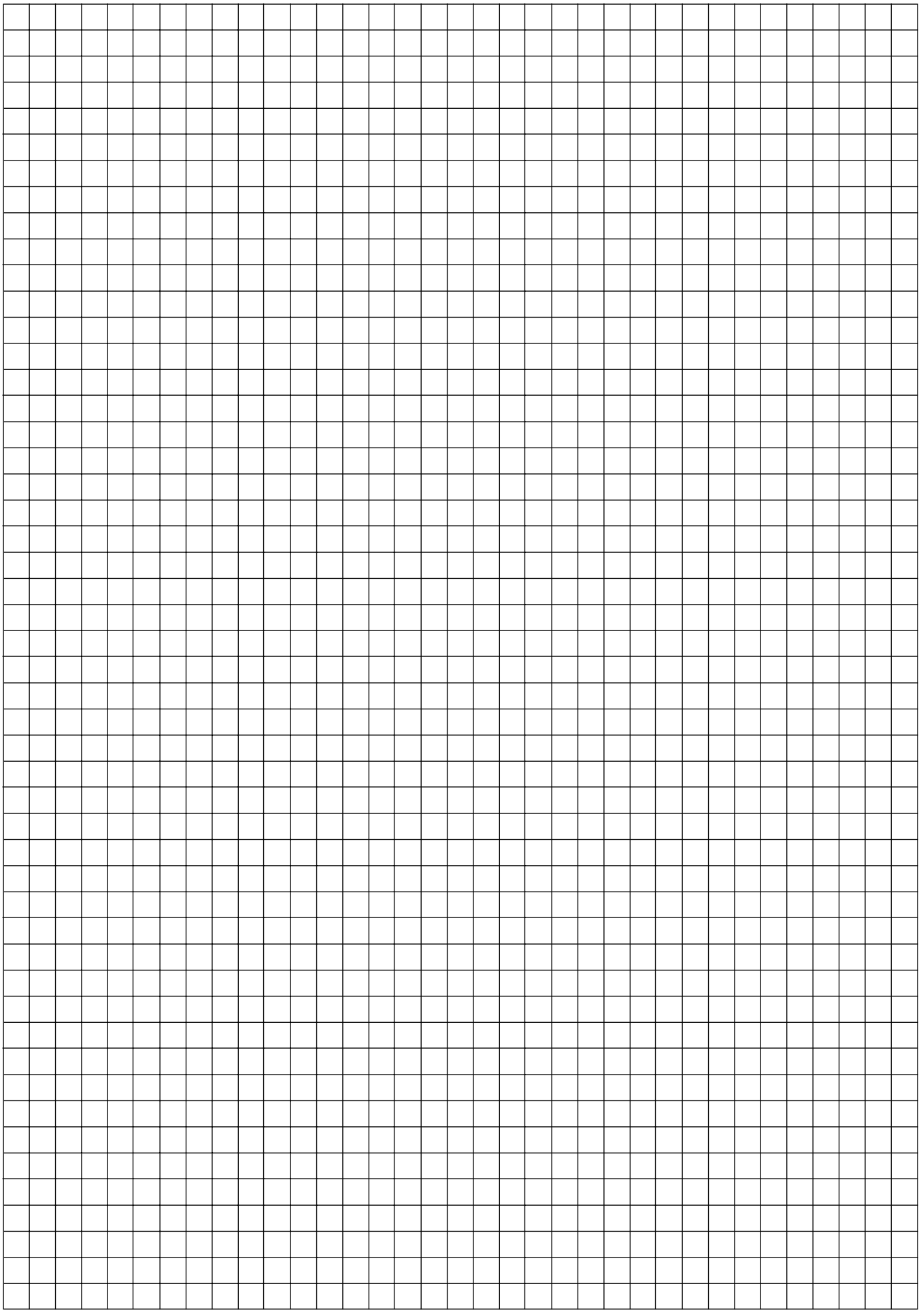
Scrap Graph Paper — This sheet will *not* be scored.



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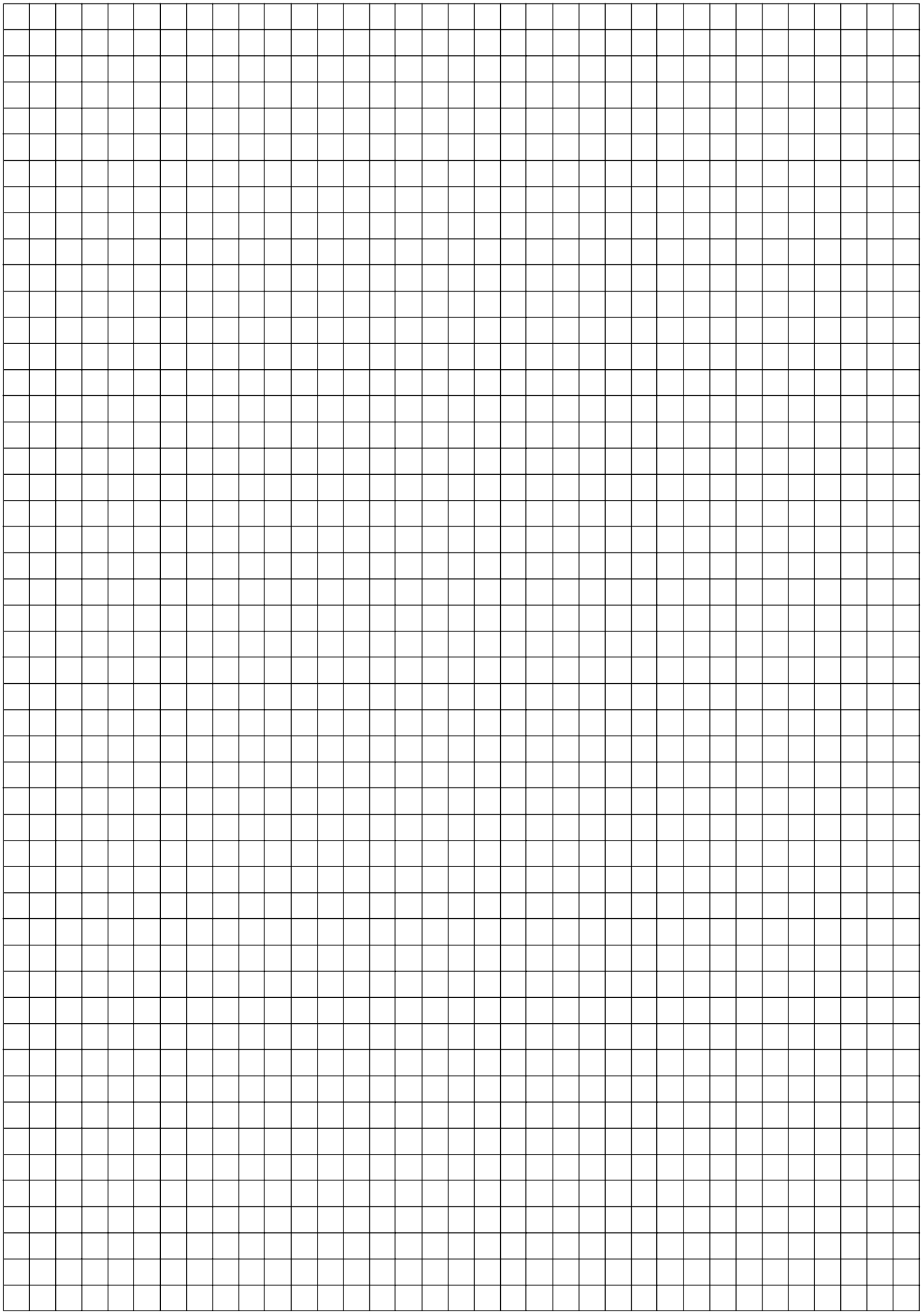

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, June 22, 2004 — 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 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

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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

Notes to raters. . .

- **Each paper should be scored by a minimum of three raters.**
- **The table for converting the total raw score to the scaled score is provided in the scoring key for this examination.**
- **The scaled score is the student's final examination score.**

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FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Tuesday, June 22, 2004 — 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 Administering and Scoring the Regents Examinations in Mathematics A and 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 checkmarks 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 22, 2004. 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) 1	(6) 4	(11) 4	(16) 1
(2) 1	(7) 3	(12) 3	(17) 4
(3) 2	(8) 1	(13) 4	(18) 2
(4) 2	(9) 4	(14) 3	(19) 2
(5) 3	(10) 2	(15) 1	(20) 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. Visit the site http://www.emsc.nysed.gov/osa/ and select the link "Latest Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and at least one more time before the final scores for the examination are recorded.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examinations in Mathematics A and 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 Administering and Scoring Examinations in Mathematics A and 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]** 41,583, and appropriate work is shown.

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

or

[1] 41,583, 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]** $\frac{3}{2}$, and appropriate work is shown.

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

or

[1] $\frac{3}{2}$, but a graphic solution is provided.

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.

(23) **[2]** $k > \frac{1}{3}$, and appropriate work is shown, such as the solution of $4 - 4(3)(k) < 0$.

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

or

[1] Appropriate work is shown, but the answer is written as $k < \frac{1}{3}$.

or

[1] $k > \frac{1}{3}$, 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]** $\triangle HOC$ and opposite, and an appropriate explanation is written.

[1] The image of $\triangle EOA$ is identified incorrectly, but the type of isometry is appropriate, and an appropriate explanation is written.

or

[1] The difference between a direct and opposite isometry is explained correctly, but no further correct work is shown.

or

[1] $\triangle HOC$, but no explanation or an incorrect explanation is written.

[0] Opposite, but no further correct 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.

(25) **[2]** A correct indirect proof is written with appropriate statements and reasons.

[1] The assumption that $\overline{AT}$ is perpendicular to $\overline{CD}$ is written, but no further correct work is shown.

or

[1] A method other than an indirect proof is used to show that $\overline{AT}$ is not perpendicular to $\overline{CD}$.

[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]** –17, and appropriate work is shown.

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

or

[1] –17, 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.

(27) **[4]** 44, and appropriate work is shown, such as solving the equation $6{,}076 = 6{,}077 - 31 \cos 2\theta$.

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

[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.

or

[2] An incorrect equation of equal difficulty is solved appropriately.

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

or

[1] 44, 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.

(28) **[4]** 65.27, and appropriate work is shown, such as $\frac{100}{\sin 100} = \frac{x}{\sin 40}$.

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

or

[3] Appropriate work is shown, but calculations are performed in radians, resulting in an answer of –147.15.

[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 the use of an incorrect trigonometric function.

or

[2] An incorrect diagram is drawn, but appropriate work is shown, and an appropriate answer is found.

[1] A correctly labeled diagram is drawn, but no further correct work is shown.

or

[1] 65.27, 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) **[4]** $\frac{-3 \pm \sqrt{37}}{7}$ or an equivalent answer, and appropriate work is shown.

[3] A correct quadratic equation is written and appropriate work is shown, but one computational or simplification error is made.

or

[3] An incorrect quadratic equation of equal difficulty is solved appropriately.

[2] A correct quadratic equation is written and 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.

or

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

[1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or

[1] $\frac{-3 \pm \sqrt{37}}{7}$ 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.

(30) **[4]** 3 and 42, and appropriate work is shown, such as a graph, substitution, or a table of values.

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

[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] The number of seconds is found correctly, and appropriate work is shown, but the height is not found or is found incorrectly.

or

[2] The height is found correctly, and appropriate work is shown, but the number of seconds is not found or is found incorrectly.

[1] 3 and 42, but no work is shown.

[0] 3 *or* 42, 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.

(31) **[4]** 1,500, and appropriate work is shown.

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

[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.

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

or

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

or

[1] 1,500, 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]** 84, and appropriate work is shown, and correct explanations are written.

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

or

[3] 84, but only one of the explanations is correct.

[2] 84, but both explanations are only partially correct.

[1] 84, but both explanations are missing or are incorrect.

or

[1] One correct explanation is written, but no further correct work is shown.

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

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]** 80 and 9.2, and appropriate work is shown.

[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.

or

[4] Appropriate work is shown, but one conceptual error is made in solving for one of the values.

or

[4] 80, and appropriate work is shown, but the length of $\overline{PT}$ is not found or is found incorrectly.

or

[4] The measure of all three arcs and the length of $\overline{PT}$ are found correctly, but the measure of $\angle P$ is not found or is found incorrectly.

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

[2] Appropriate work is shown, but one conceptual error is made in solving for each value.

or

[2] 80 and 9.2, but no work is shown.

or

[2] 9.2, and appropriate work is shown, but no further correct work is shown.

or

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

[1] 80 *or* 9.2, 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.

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Office of State Assessment
Albany, New York 12234

IMPORTANT NOTICE

Notice to Teachers

Mathematics B
Scoring Key

Tuesday, June 22, 2004—1:15 p.m.

Please refer to the following additional guidance when rating Question 33:

1. Students who assumed that $m\overset{\frown}{RT}$ referred to the minor arc should be awarded 2 credits for writing the equation $x + 3x = 5x$.

2. You may accept multiple solutions when students solve for *PT*.

- Students who use a mean proportion to solve for *PT* will find the answer 9.2, as specified in the rubric.

  Example of response using a mean proportion:

  $\frac{17}{x} = \frac{x}{5}$
  $x^2 = 85$
  $x = 9.2$

- Students who use the Law of Sines or the Law of Cosines will find different measures for $\overline{PT}$, based on whether $\triangle TRP$ or $\triangle TAP$ is constructed.

  Example of response using Law of Cosines and $\triangle TRP$:

  $x^2 = 17^2 + 17^2 - 2(17)(17)\cos 20$
  $x^2 = 289 + 289 - 543.1423348$
  $x^2 = 34.85766519$
  $x = 5.9$

  Example of response using Law of Sines and $\triangle TAP$:

  $\frac{\sin 20}{5} = \frac{\sin 80}{x}$
  $x = 14.4$

- Apply the rubric as written to the student's method of response, whether it is a method described here or another mathematically appropriate method.

(34) **[6]** 312 and 30,642, and appropriate work is shown, such as using the Law of Cosines and the area 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.

or

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

or

[4] Appropriate work is shown, but the square root is not computed to find the length of the third side, but an appropriate area is found.

or

[4] The length of the third side is found correctly, but no further correct work is shown.

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

[2] The area of the triangle is found correctly, but no further correct work is shown.

or

[2] 312 and 30,642, but no work is shown.

[1] Appropriate work is shown to find the area of the triangle, but one computational or rounding error is made, and no further correct work is shown.

or

[1] 312 *or* 30,642, 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 Learning Standards

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

Regents Examination in Mathematics B

June 2004

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

The *Chart for Determining the Final Examination Score for the June 2004 Regents Examination in Mathematics B*, normally located on this page, will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Tuesday, June 22, 2004. Conversion charts provided for previous administrations of the Mathematics B examination must NOT be used to determine students' final scores for this administration.

Regents Examination in Mathematics B
June 2004

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

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

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 scaled score that corresponds to that raw score. The scaled score is the student's final examination score. Enter this score in the space labeled "Scaled Score" on the student's answer sheet.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. 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 scaled 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 chart above is usable only for this administration of the Mathematics B examination.