

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

MATHEMATICS B

Wednesday, August 16, 2006 — 8:30 to 11:30 a.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 expression $4^{\frac{1}{2}} \cdot 2^3$ is equal to

- (1) $4^{\frac{3}{2}}$ (3) 16
(2) $8^{\frac{3}{2}}$ (4) 4

2 What is the solution of the equation $\sqrt{2x-3} - 3 = 6$?

- (1) 42 (3) 3
(2) 39 (4) 6

3 What is the minimum point of the graph of the equation
 $y = 2x^2 + 8x + 9$?

- (1) (2,33) (3) (-2,-15)
(2) (2,17) (4) (-2,1)

4 If x is a positive acute angle and $\cos x = \frac{\sqrt{3}}{4}$, what is the exact value of $\sin x$?

- (1) $\frac{\sqrt{3}}{5}$ (3) $\frac{3}{5}$
(2) $\frac{\sqrt{13}}{4}$ (4) $\frac{4}{5}$

5 Which equation does *not* represent a function?

- (1) $x = \pi$ (3) $y = |x|$
(2) $y = 4$ (4) $y = x^2 + 5x$

Use this space for
computations.

6 The expression $\frac{12}{3 + \sqrt{3}}$ is equivalent to

- (1) $12 - \sqrt{3}$ (3) $4 - 2\sqrt{3}$
(2) $6 - 2\sqrt{3}$ (4) $2 + \sqrt{3}$

7 The function $y = 2^x$ is equivalent to

- (1) $x = y \log 2$ (3) $y = x \log 2$
(2) $x = \log_2 y$ (4) $y = \log_2 x$

8 In $\triangle ABC$, D is a point on \overline{AC} such that \overline{BD} is a median. Which statement must be true?

- (1) $\triangle ABD \cong \triangle CBD$ (3) $\overline{AD} \cong \overline{CD}$
(2) $\angle ABD \cong \angle CBD$ (4) $\overline{BD} \perp \overline{AC}$

9 A designer who is planning to install an elliptical mirror is laying out the design on a coordinate grid. Which equation could represent the elliptical mirror?

- (1) $x^2 = 144 + 36y^2$ (3) $x^2 + 4y^2 = 144$
(2) $x^2 + y^2 = 144$ (4) $y = 4y^2 + 144$

10 A solution set of the equation $5 \sin \theta + 3 = 3$ contains all multiples of

- (1) 45° (3) 135°
(2) 90° (4) 180°

Use this space for computations.

11 What is the total number of points of intersection for the graphs of the equations $y = x^2$ and $y = -x^2$?

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

12 For which equation is the sum of the roots equal to the product of the roots?

- (1) $x^2 + x + 1 = 0$ (3) $x^2 - 8x - 4 = 0$
(2) $x^2 + 3x - 6 = 0$ (4) $x^2 - 4x + 4 = 0$

13 If the perimeter of an equilateral triangle is 18, the length of the altitude of this triangle is

- (1) 6 (3) 3
(2) $6\sqrt{3}$ (4) $3\sqrt{3}$

14 Jonathan's teacher required him to express the sum $\frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} + \frac{6}{7}$ using sigma notation. Jonathan proposed four possible answers. Which of these four answers is *not* correct?

- (1) $\sum_{k=3}^7 \frac{k-1}{k}$ (3) $\sum_{k=1}^5 \frac{k+1}{k+2}$
(2) $\sum_{k=1}^5 \frac{k}{k+1}$ (4) $\sum_{k=2}^6 \frac{k}{k+1}$

15 What is the period of the graph of the equation $y = 2 \sin \frac{1}{3}x$?

- (1) $\frac{2}{3}\pi$ (3) 6π
(2) 2π (4) $\frac{3\pi}{2}$

Use this space for computations.

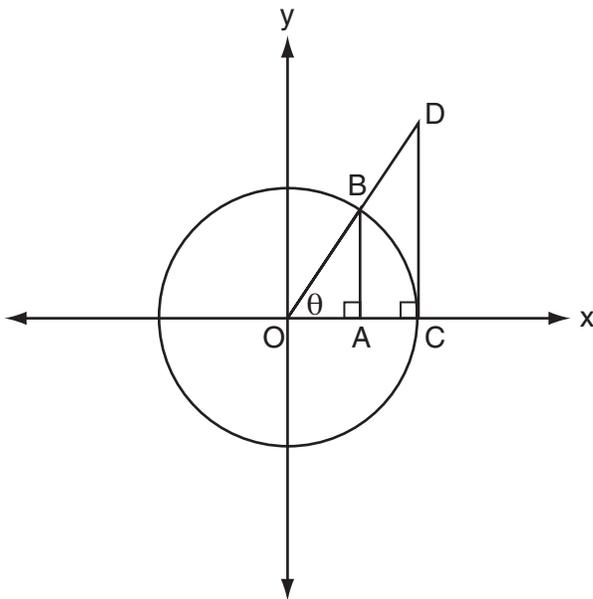
16 What is the solution set of the equation $|x^2 - 2x| = 3x - 6$?

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

17 The expression $\frac{\sin 2\theta}{\sin^2 \theta}$ is equivalent to

- (1) $\frac{2}{\sin \theta}$ (3) $2 \cot \theta$
(2) $2 \cos \theta$ (4) $2 \tan \theta$

18 The accompanying diagram shows unit circle O , with radius $OB = 1$.



Which line segment has a length equivalent to $\cos \theta$?

- (1) \overline{AB} (3) \overline{OC}
(2) \overline{CD} (4) \overline{OA}

19 The expression $\frac{3y^2 - 12y}{4y^2 - y^3}$ is equivalent to

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

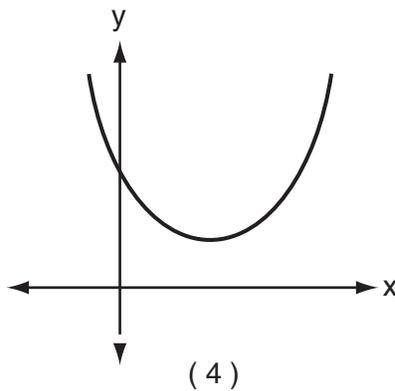
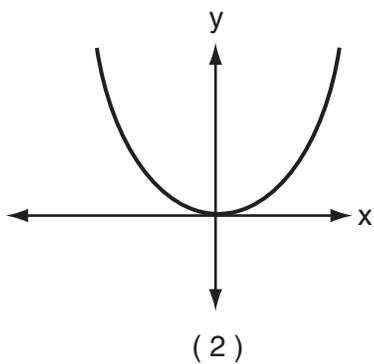
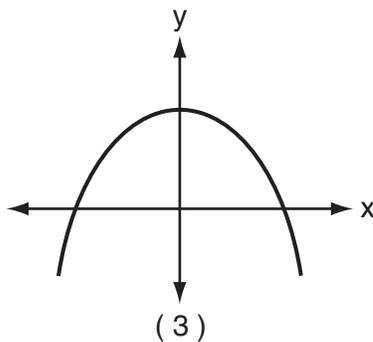
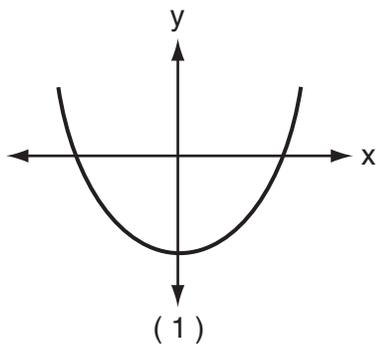
(3) $-\frac{9}{4}$

(2) $-\frac{3}{y}$

(4) $\frac{3}{4} - \frac{12}{y^2}$

Use this space for computations.

20 Which graph represents a quadratic function with a negative discriminant?



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 complex number $c + di$ is equal to $(2 + i)^2$. What is the value of c ?

22 The volume of any spherical balloon can be found by using the formula $V = \frac{4}{3}\pi r^3$.

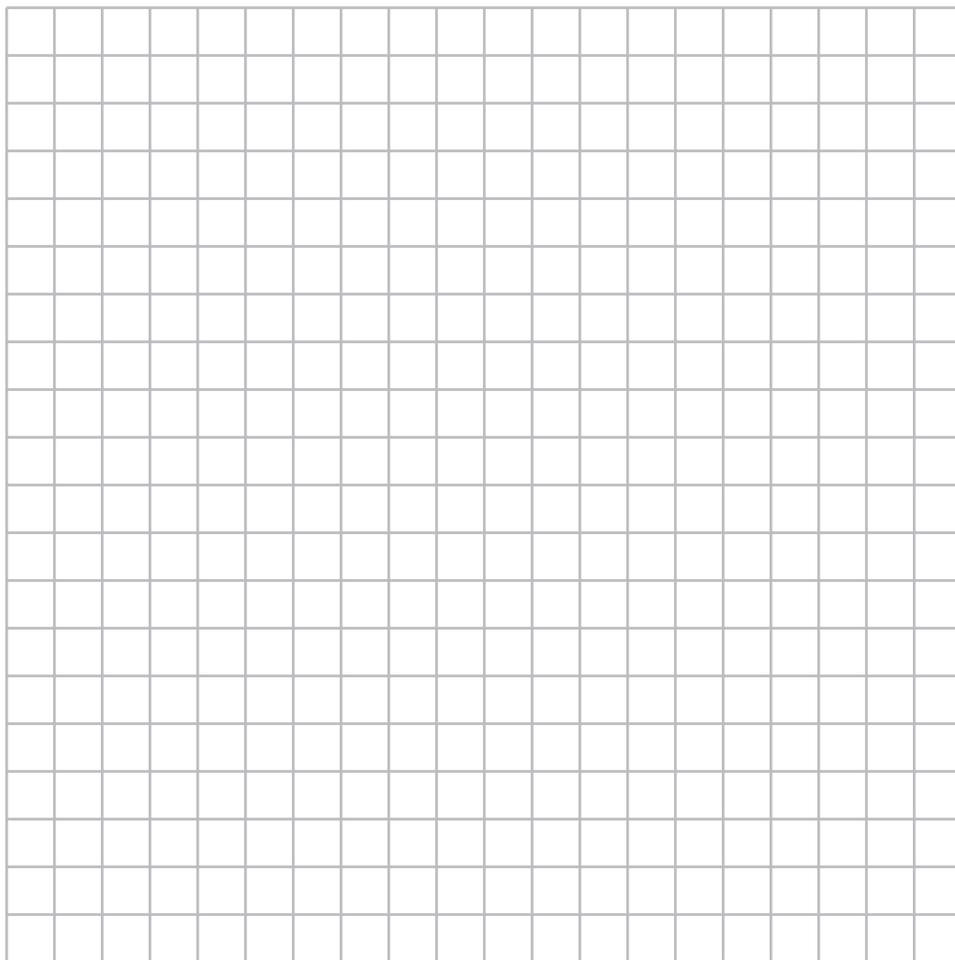
Write an equation for r in terms of V and π .

23 What is the number of degrees in an angle whose radian measure is $\frac{7\pi}{12}$?

24 Solve for x : $\log_b 36 - \log_b 2 = \log_b x$

25 Beth's scores on the six Earth science tests she took this semester are 100, 95, 55, 85, 75, and 100. For this population, how many scores are within one standard deviation of the mean?

26 Given point $A(-2,3)$. State the coordinates of the image of A under the composition $T_{-3,-4} \circ r_{x\text{-axis}}$. [The use of the accompanying grid is optional.]

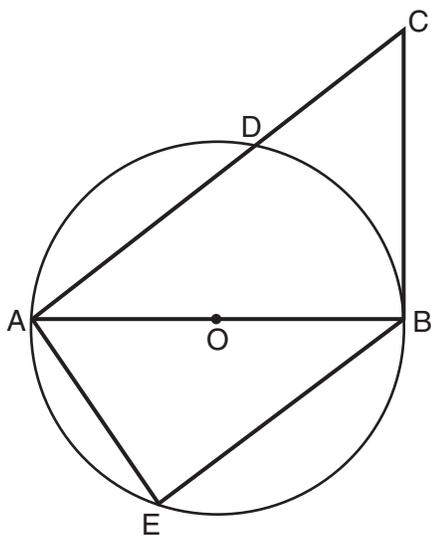


Part III

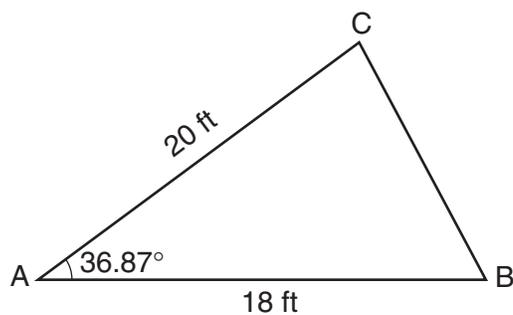
Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [24]

- 27 In the accompanying diagram of circle O , diameter \overline{AOB} is drawn, tangent \overline{CB} is drawn to the circle at B , E is a point on the circle, and $\overline{BE} \parallel \overline{ADC}$.

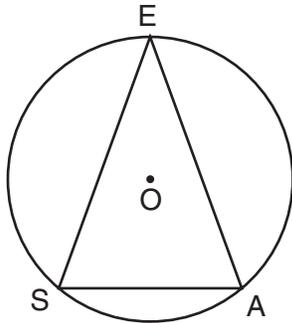
Prove: $\triangle ABE \sim \triangle CAB$



- 28 The accompanying diagram shows a triangular plot of land that is part of Fran's garden. She needs to change the dimensions of this part of the garden, but she wants the area to stay the same. She increases the length of side AC to 22.5 feet. If angle A remains the same, by how many feet should side AB be *decreased* to make the area of the new triangular plot of land the same as the current one?



- 29 A machine part consists of a circular wheel with an inscribed triangular plate, as shown in the accompanying diagram. If $\overline{SE} \cong \overline{EA}$, $SE = 10$, and $m\widehat{SE} = 140$, find the length of \overline{SA} to the nearest tenth.



30 On mornings when school is in session in January, Sara notices that her school bus is late one-third of the time. What is the probability that during a 5-day school week in January her bus will be late *at least* three times?

- 31 Jean invested \$380 in stocks. Over the next 5 years, the value of her investment grew, as shown in the accompanying table.

Years Since Investment (x)	Value of Stock, in Dollars (y)
0	380
1	395
2	411
3	427
4	445
5	462

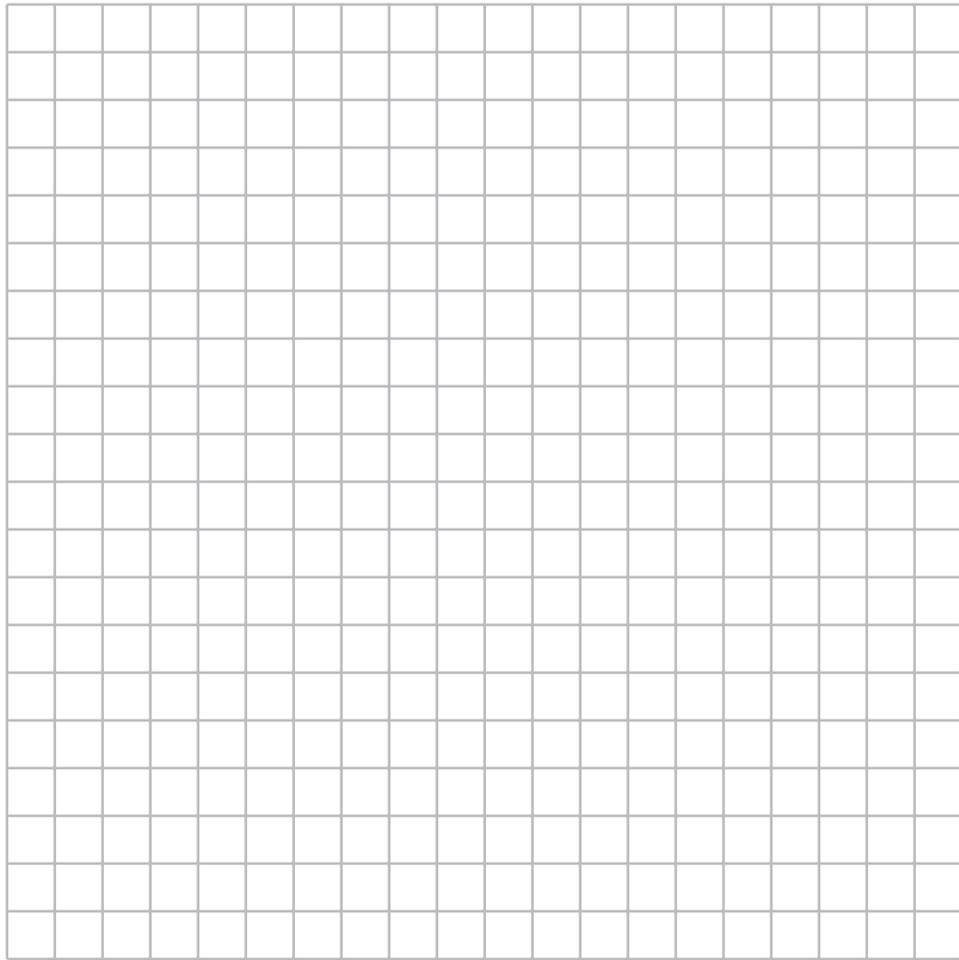
Write the exponential regression equation for this set of data, rounding all values to *two decimal places*.

Using this equation, find the value of her stock, to the *nearest dollar*, 10 years after her initial purchase.

32 After an oven is turned on, its temperature, T , is represented by the equation $T = 400 - 350(3.2)^{-0.1m}$, where m represents the number of minutes after the oven is turned on and T represents the temperature of the oven, in degrees Fahrenheit.

How many minutes does it take for the oven's temperature to reach 300°F ? Round your answer to the *nearest minute*. [The use of the grid on the next page is optional.]

Question 32 continued

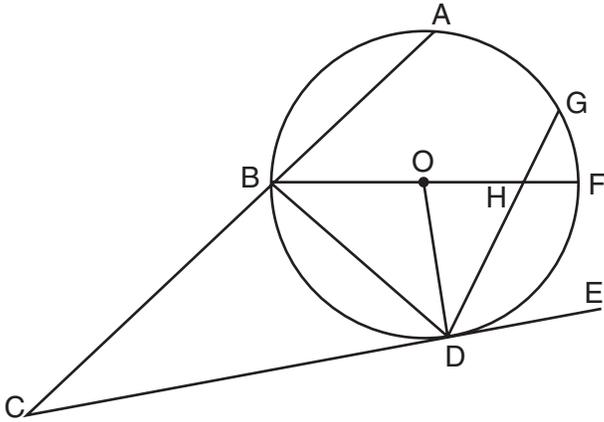


Part IV

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 In the accompanying diagram, circle O has radius \overline{OD} , diameter \overline{BOHF} , secant \overline{CBA} , and chords \overline{DHG} and \overline{BD} ; \overline{CE} is tangent to circle O at D ; $m\widehat{DF} = 80$; and $m\widehat{BA} : m\widehat{AG} : m\widehat{GF} = 3 : 2 : 1$.

Find $m\widehat{GF}$, $m\angle BHD$, $m\angle BDG$, $m\angle GDE$, $m\angle C$, and $m\angle BOD$.



34 Barb pulled the plug in her bathtub and it started to drain. The amount of water in the bathtub as it drains is represented by the equation $L = -5t^2 - 8t + 120$, where L represents the number of liters of water in the bathtub and t represents the amount of time, in minutes, since the plug was pulled.

How many liters of water were in the bathtub when Barb pulled the plug? Show your reasoning.

Determine, to the *nearest tenth of a minute*, the amount of time it takes for all the water in the bathtub to drain.

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

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

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

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

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

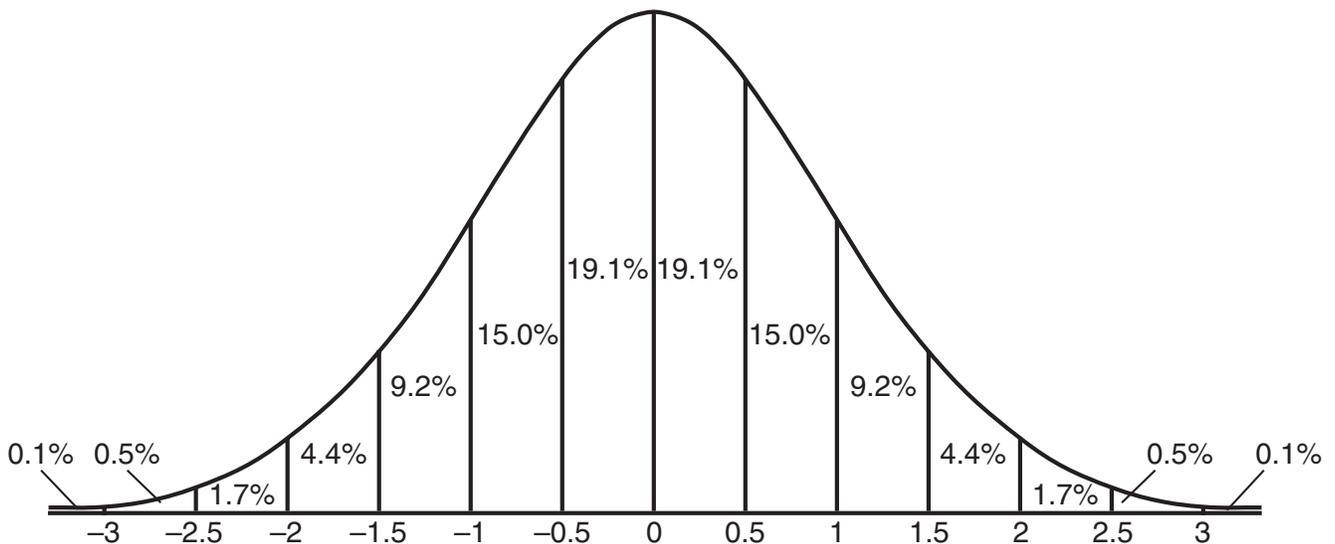
Functions of the Half Angle

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

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

Normal Curve

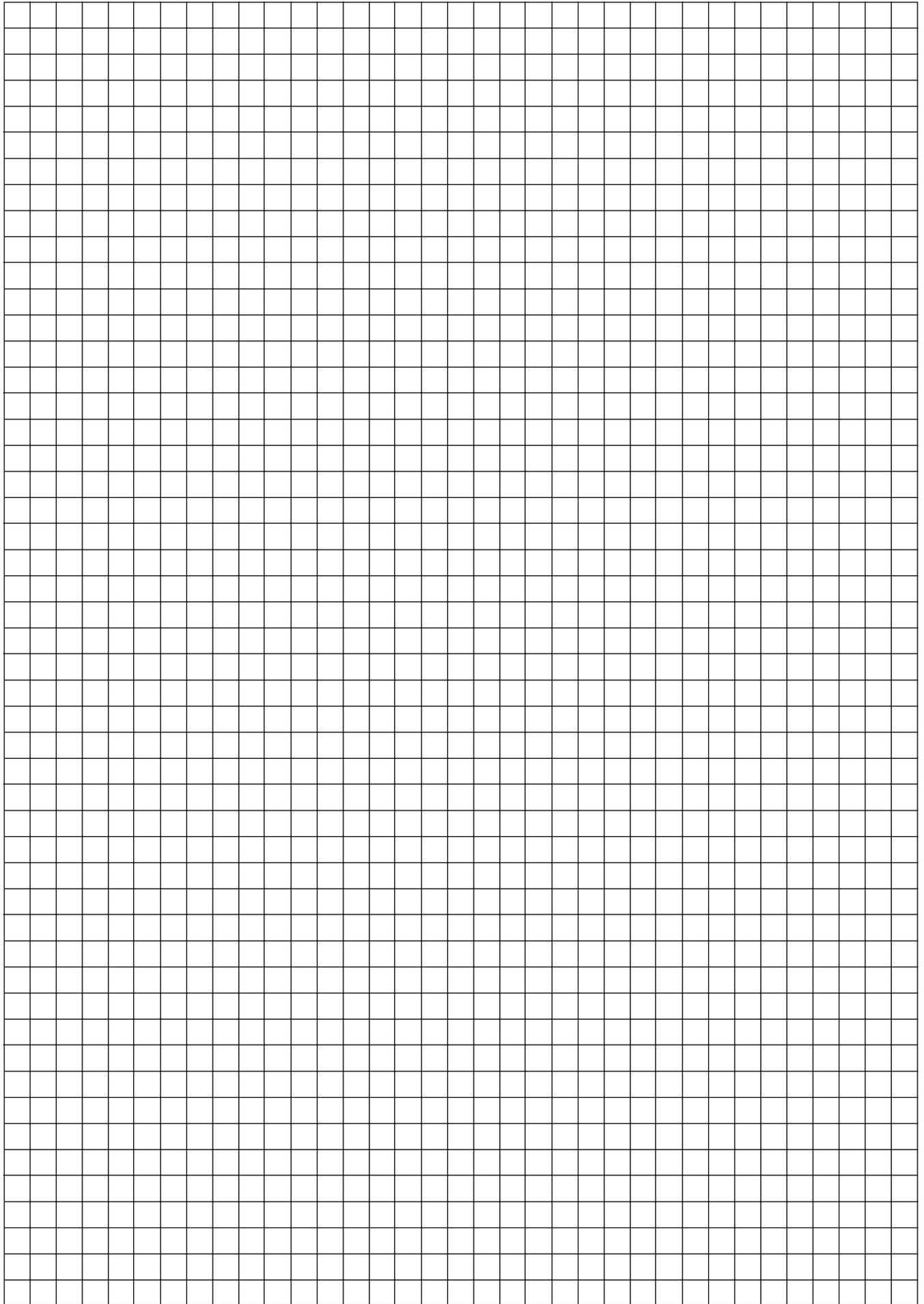
Standard Deviation



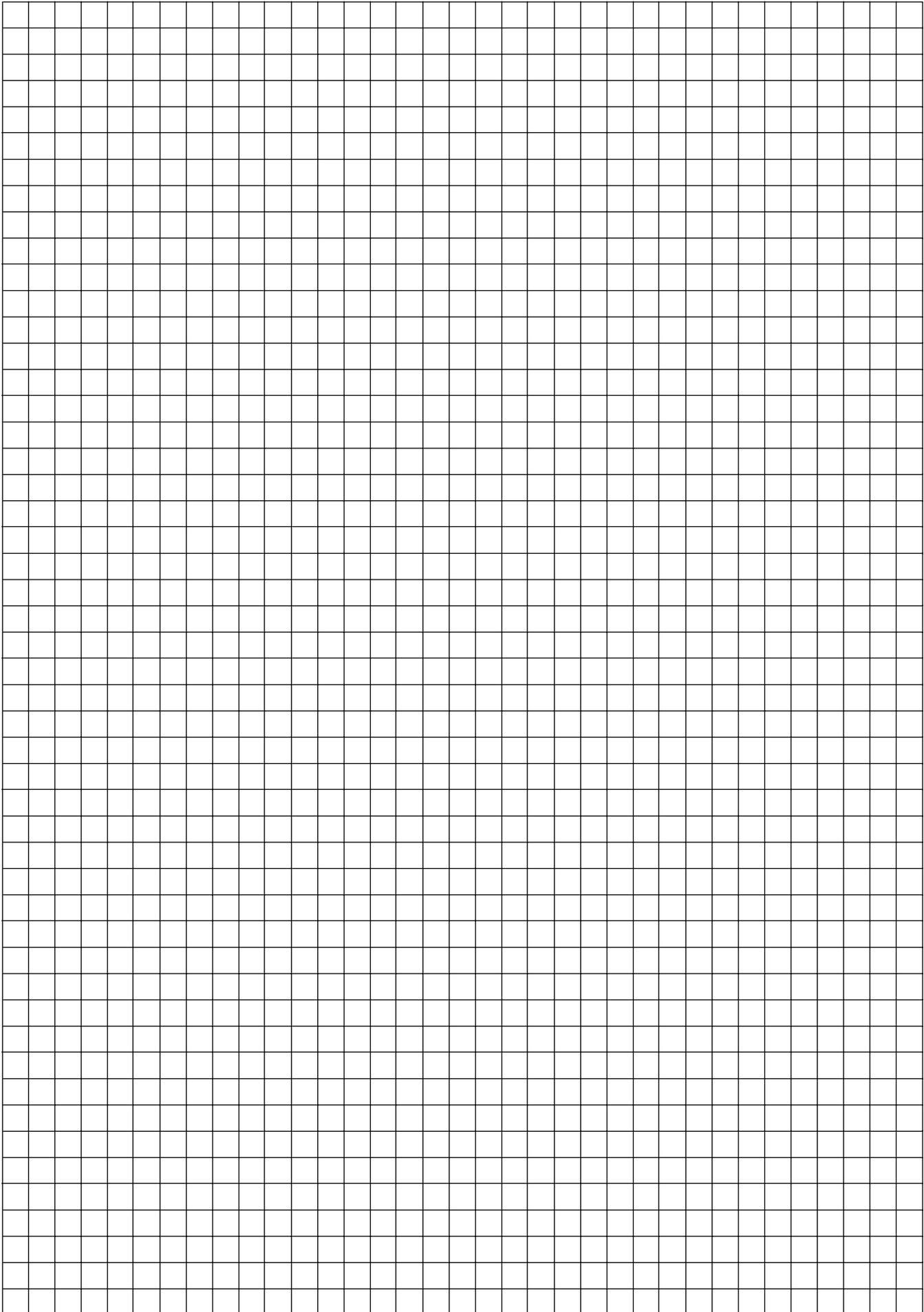
Scrap Graph Paper — This sheet will *not* be scored.

Tear Here

Tear Here



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



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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Wednesday, August 16, 2006 — 8:30 to 11:30 a.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

Tear Here

FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Wednesday, August 16, 2006 — 8:30 to 11:30 a.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 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 Wednesday, August 16, 2006. 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) 2	(11) 1	(16) 4
(2) 1	(7) 2	(12) 4	(17) 3
(3) 4	(8) 3	(13) 4	(18) 4
(4) 2	(9) 3	(14) 2	(19) 2
(5) 1	(10) 4	(15) 3	(20) 4

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 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 Scoring the Regents 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] 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] The expression $3 + 4i$ is found, but c is not identified.

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.

(22) [2] $r = \sqrt[3]{\frac{3V}{4\pi}}$ or $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ or an equivalent answer, 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] $\sqrt[3]{\frac{3V}{4\pi}}$ or $\left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ or an equivalent answer is found, and appropriate work is shown, but an equation is not written.

or

[1] $r = \sqrt[3]{\frac{3V}{4\pi}}$ or $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ 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*

(23) [2] 105, and appropriate work is shown, such as $\frac{7\pi}{12} \bullet \frac{180}{\pi}$.

[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] 105, 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] 18, 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] The equation $\log_b \frac{36}{2} = \log_b x$ is written, but the value of x is not found.

or

[1] 18, 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*

(25) [2] 5, and appropriate work is shown, such as stating the mean and the standard deviation.

[1] Appropriate work is shown, but one computational error is made, but an appropriate number of scores is found.

or

[1] Appropriate work is shown, but one conceptual error is made, such as using the sample standard deviation.

or

[1] The mean and standard deviation are found correctly, but the number of scores is missing or is incorrect.

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.

(26) [2] $(-5,-7)$, and appropriate work is shown, such as stating the coordinates of each transformation or graphing each transformation.

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

or

[1] Appropriate work is shown, but one conceptual error is made, such as performing the translation before the reflection.

or

[1] Only one of the transformations is performed correctly.

or

[1] $(-5,-7)$, but no work is shown.

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

Part III

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

- (27) [4] A complete and correct proof that includes a concluding statement is written.
- [3] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect or the concluding statement is missing.
- or*
- [3] Two pairs of angles are proven congruent, but the triangles are not proven similar.
- [2] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.
- or*
- [2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made, such as using an incorrect method to prove that two angles are congruent.
- or*
- [2] $\angle E$ and $\angle ABC$ are proven congruent, but the remainder of the proof is missing or is incorrect.
- [1] Some correct relevant statements about the proof are made, such as showing that $\angle CAB$ and $\angle ABE$ are congruent, but the remainder of the proof is missing or is incorrect.
- [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*

(28) [4] 2, and appropriate work is shown, such as determining that the area is 108 square feet and the new length of AB is 16 feet.

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

or

[3] The area of the original triangle and the new length of side AB are found correctly, but the length is not subtracted to find the difference.

[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] Appropriate work is shown, but one computational error is made, and the length is not subtracted to find the difference.

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

or

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

or

[1] 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.

MATHEMATICS B – *continued*

- (29) [4] 6.8, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines or right triangle trigonometry.

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

or

[3] 3.4, and appropriate work is shown, such as $\cos 70 = \frac{x}{10}$ or $\sin 20 = \frac{x}{10}$.

[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 using an incorrect trigonometric function.

or

[2] Correct substitution is made into the Law of Sines or the Law of Cosines, 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 measures of \widehat{EA} and \widehat{SA} are found correctly, but no further correct work is shown.

or

[1] The measures of the three angles of triangle SEA are found correctly, but no further correct work is shown.

or

[1] 6.8, 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.

MATHEMATICS B – *continued*

(30) [4] $\frac{51}{243}$ or an equivalent answer, 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, such as finding the probability for *at most* three times.

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

or

[1] An incorrect expression of a lesser degree of difficulty is evaluated appropriately, such as finding the probability for *exactly* three times.

or

[1] $\frac{51}{243}$ 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] $y = 379.92(1.04)^x$ and 562, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [3] $y = 379.92(1.04)^x$ and 562, but the substitution is not shown to find the value of the stock.
- or**
- [3] The expression $379.92(1.04)^x$ is written and 562, and appropriate work is shown, but the equation is not written.
- [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] The expression $379.92(1.04)^x$ is written and 562, but no work is shown.
- or**
- [2] A correct regression equation is written, but no further correct work is shown.
- or**
- [2] An incorrect exponential regression equation of equal difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or**
- [1] An incorrect regression equation of a lesser degree of difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.
- or**
- [1] The expression $379.92(1.04)^x$ is written, but no further correct work is shown.
- or**
- [1] 562, 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*

- (32) [4] 11, and appropriate work is shown, such as a logarithmic equation or a graph.
- [3] Appropriate work is shown, but one computational, rounding, or graphing error is made.
- [2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.
- or***
- [2] Appropriate work is shown, but one conceptual error is made.
- or***
- [2] A correct logarithmic equation is written, but no further correct work is shown.
- or***
- [2] A correct graph is drawn, but the solution is not found or is found incorrectly.
- [1] Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.
- or***
- [1] 11, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

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] $m\widehat{GF}=30$, $m\angle BHD=65$, $m\angle BDG=75$, $m\angle GDE=55$, $m\angle C=35$, and $m\angle BOD=100$, and appropriate work is shown.

[5] $m\widehat{GF}$ is determined correctly, but $m\widehat{BD}$ is determined incorrectly, but all five of the angle measures are determined appropriately.

or

[5] $m\widehat{GF}$ is determined incorrectly, but all five of the angle measures are determined appropriately, based on the incorrect arc measure.

or

[5] $m\widehat{GF}$ is determined correctly, but only four of the angle measures are determined correctly.

[4] $m\widehat{GF}$ is determined incorrectly, and only four of the angle measures are determined appropriately, based on the incorrect arc measure.

or

[4] $m\widehat{GF}$ is determined correctly, but only three of the angle measures are determined correctly.

[3] $m\widehat{GF}$ is determined incorrectly, and only three of the angle measures are determined appropriately, based on the incorrect arc measure.

or

[3] $m\widehat{GF}$ is determined correctly, but only two of the angle measures are determined correctly.

[2] $m\widehat{GF}$ is determined incorrectly, and only two of the angle measures are determined appropriately, based on the incorrect arc measure.

or

[2] $m\widehat{GF}$ is determined correctly, but only one angle measure is determined correctly.

[1] $m\widehat{GF}$ is determined incorrectly, and only one angle measure is determined appropriately.

or

[1] $m\widehat{GF}$ is determined correctly, 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.

(34) [6] 120 and 4.2, and appropriate work is shown, such as substituting $t = 0$ into the equation and solving the equation $-5t^2 - 8t + 120 = 0$.

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

or

[5] 120 and 4.2, but no work is shown to find the amount of water, but appropriate work is shown to find the amount of time.

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

or

[4] Appropriate work is shown, and the amount of water is found correctly, but one conceptual error is made in finding the amount of time.

or

[4] The amount of time is found correctly, and appropriate work is shown, but the amount of water is not found.

or

[4] The amount of water is found correctly, and appropriate work is shown, and a correct substitution into the quadratic formula is made, but the amount of time is not found.

[3] Appropriate work is shown, but one conceptual error is made in finding the amount of time, and one computational error is made in finding the amount of water.

[2] The amount of water is found correctly, and appropriate work is shown, but no further correct work is shown.

or

[2] 120 and 4.2, but no work is shown.

[1] 120 *or* 4.2, 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.

Map to Learning Standards

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

Regents Examination in Mathematics B

August 2006

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

The *Chart for Determining the Final Examination Score for the August 2006 Regents Examination in Mathematics B* will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Wednesday, August 16, 2006. 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.

Submitting 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.



Regents Examination in Mathematics B August 2006

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