

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

# MATHEMATICS B

**Friday, January 26, 2007 — 9:15 a.m. to 12:15 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.

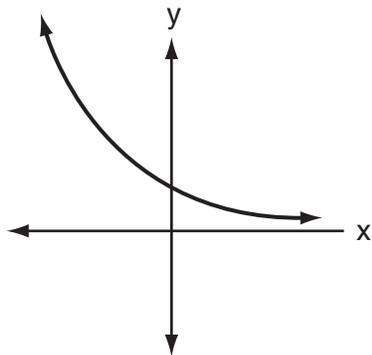
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

## 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 Which equation best represents the accompanying graph?



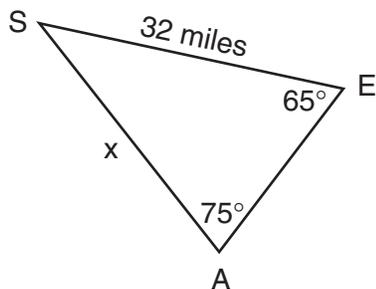
(1)  $y = 2^x$

(2)  $y = x^2 + 2$

(3)  $y = 2^{-x}$

(4)  $y = -2^x$

2 The accompanying diagram shows the approximate linear distances traveled by a sailboat during a race. The sailboat started at point S, traveled to points E and A, respectively, and ended at point S.



Based on the measures shown in the diagram, which equation can be used to find  $x$ , the distance from point A to point S?

(1)  $\frac{x}{\sin 65^\circ} = \frac{\sin 75^\circ}{32}$

(3)  $\frac{x}{65} = \frac{32}{75}$

(2)  $\frac{\sin 65^\circ}{x} = \frac{\sin 75^\circ}{32}$

(4)  $\frac{65}{x} = \frac{32}{75}$

Use this space for  
computations.

3 If  $\sqrt{x-a} = b$ ,  $x > a$ , which expression is equivalent to  $x$ ?

(1)  $b^2 - a$

(3)  $b - a$

(2)  $b^2 + a$

(4)  $b + a$

4 What is the total number of points of intersection of the graphs of the equations  $xy = 12$  and  $y = -x^2 + 3$ ?

(1) 1

(3) 3

(2) 2

(4) 4

5 The expression  $i^{25}$  is equivalent to

(1) 1

(3)  $i$

(2)  $-1$

(4)  $-i$

6 The expression  $\frac{\frac{1}{3} + \frac{1}{3x}}{\frac{1}{x} + \frac{1}{3}}$  is equivalent to

(1)  $\frac{x+1}{x+3}$

(3)  $\frac{3x+3}{x+3}$

(2) 2

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

7 The term “snowstorms of note” applies to all snowfalls over 6 inches. The snowfall amounts for snowstorms of note in Utica, New York, over a four-year period are as follows: 7.1, 9.2, 8.0, 6.1, 14.4, 8.5, 6.1, 6.8, 7.7, 21.5, 6.7, 9.0, 8.4, 7.0, 11.5, 14.1, 9.5, 8.6

What are the mean and population standard deviation for these data, to the *nearest hundredth*?

(1) mean = 9.46; standard deviation = 3.74

(2) mean = 9.46; standard deviation = 3.85

(3) mean = 9.45; standard deviation = 3.74

(4) mean = 9.45; standard deviation = 3.85

**Use this space for  
computations.**

**8** The expression  $\frac{4}{5-\sqrt{13}}$  is equivalent to

(1)  $\frac{5+\sqrt{13}}{3}$

(3)  $\frac{2(5+\sqrt{13})}{19}$

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

(4)  $\frac{2(5-\sqrt{13})}{19}$

**9** What is the value of  $b$  in the equation  $4^{2b-3} = 8^{1-b}$ ?

(1)  $\frac{-3}{7}$

(3)  $\frac{9}{7}$

(2)  $\frac{7}{9}$

(4)  $\frac{10}{7}$

**10** What is the solution set of the inequality  $|2x - 1| < 9$ ?

(1)  $\{x \mid -4 < x < 5\}$

(3)  $\{x \mid x < 5\}$

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

(4)  $\{x \mid x < -4\}$

**11** Which transformation could be used to make the graph of the equation  $y = \sin x$  coincide with the graph of the equation  $y = \cos x$ ?

(1) translation

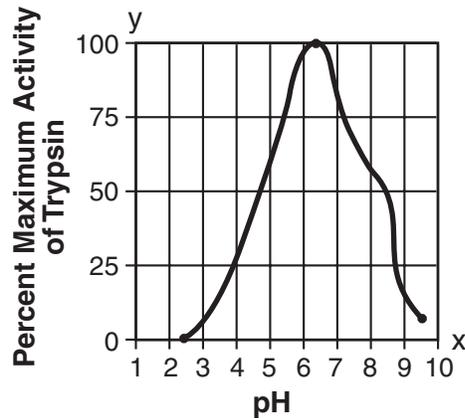
(3) dilation

(2) rotation

(4) point reflection

Use this space for  
computations.

- 12 Data collected during an experiment are shown in the accompanying graph.



What is the range of this set of data?

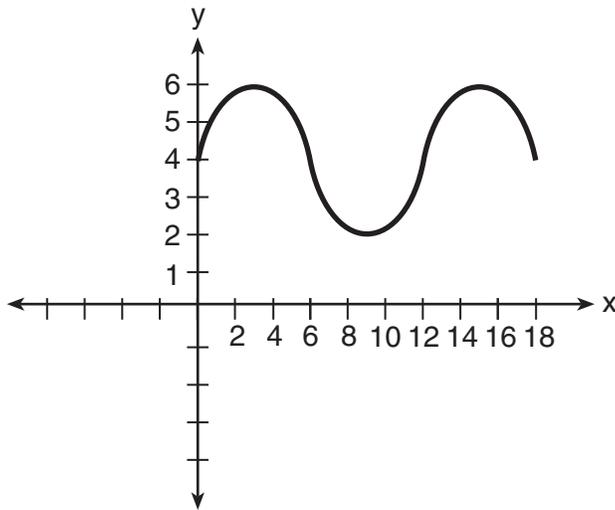
- (1)  $2.5 \leq y \leq 9.5$                       (3)  $0 \leq y \leq 100$   
(2)  $2.5 \leq x \leq 9.5$                       (4)  $1 \leq x \leq 10$
- 13 Which is a true statement about the graph of the equation  $y = x^2 - 7x - 60$ ?
- (1) It is tangent to the  $x$ -axis.  
(2) It does not intersect the  $x$ -axis.  
(3) It intersects the  $x$ -axis in two distinct points that have irrational coordinates.  
(4) It intersects the  $x$ -axis in two distinct points that have rational coordinates.

- 14 Which quadratic equation has the roots  $3 + i$  and  $3 - i$ ?

- (1)  $x^2 + 6x - 10 = 0$                       (3)  $x^2 - 6x + 10 = 0$   
(2)  $x^2 + 6x + 8 = 0$                       (4)  $x^2 - 6x - 8 = 0$

Use this space for  
computations.

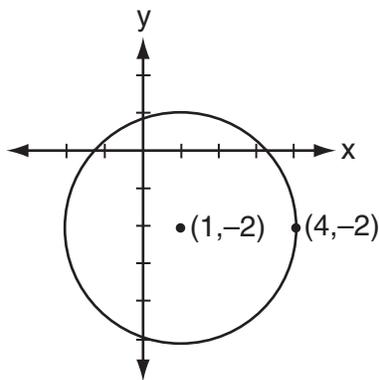
15 What is the amplitude of the function shown in the accompanying graph?



- (1) 1.5
- (2) 2

- (3) 6
- (4) 12

16 Which equation represents the circle shown in the accompanying graph?



- (1)  $(x - 1)^2 - (y + 2)^2 = 9$
- (2)  $(x - 1)^2 + (y + 2)^2 = 9$
- (3)  $(x + 1)^2 - (y - 2)^2 = 9$
- (4)  $(x + 1)^2 + (y - 2)^2 = 9$

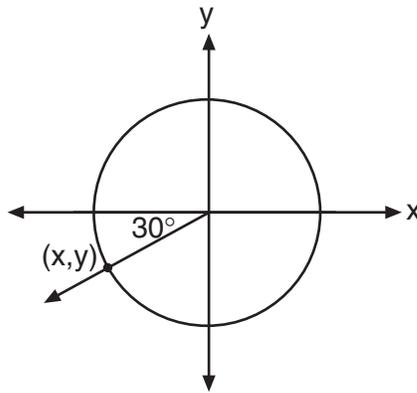
Use this space for  
computations.

- 17 A black hole is a region in space where objects seem to disappear. A formula used in the study of black holes is the Schwarzschild formula,

$$R = \frac{2GM}{c^2}.$$

Based on the laws of logarithms,  $\log R$  can be represented by

- (1)  $2 \log G + \log M - \log 2c$
  - (2)  $\log 2G + \log M - \log 2c$
  - (3)  $\log 2 + \log G + \log M - 2 \log c$
  - (4)  $2 \log GM - 2 \log c$
- 18 In the unit circle shown in the accompanying diagram, what are the coordinates of  $(x,y)$ ?



- (1)  $\left(-\frac{\sqrt{3}}{2}, -0.5\right)$
- (2)  $\left(-0.5, -\frac{\sqrt{3}}{2}\right)$
- (3)  $(-30, -210)$
- (4)  $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$

**Use this space for  
computations.**

**19** Which transformation represents a dilation?

- (1)  $(8,4) \rightarrow (11,7)$       (3)  $(8,4) \rightarrow (-4,-8)$   
(2)  $(8,4) \rightarrow (-8,4)$       (4)  $(8,4) \rightarrow (4,2)$

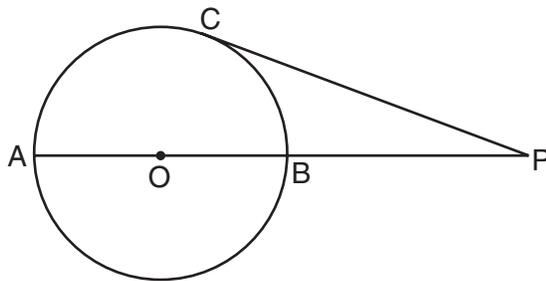
**20** In  $\triangle ABC$ ,  $m\angle A = 30$ ,  $a = 14$ , and  $b = 20$ . Which type of angle is  $\angle B$ ?

- (1) It must be an acute angle.  
(2) It must be a right angle.  
(3) It must be an obtuse angle.  
(4) It may be either an acute angle or an obtuse angle.
-

Part II

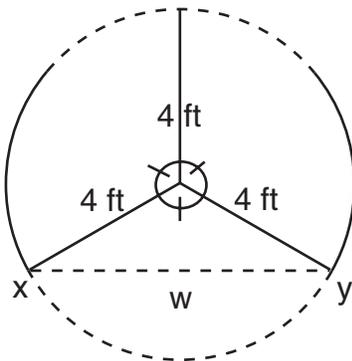
Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

- 21 In the accompanying diagram of circle  $O$ , diameter  $\overline{AOB}$  is extended through  $B$  to external point  $P$ , tangent  $\overline{PC}$  is drawn to point  $C$  on the circle, and  $m\widehat{AC} : m\widehat{BC} = 7:2$ . Find  $m\angle CPA$ .



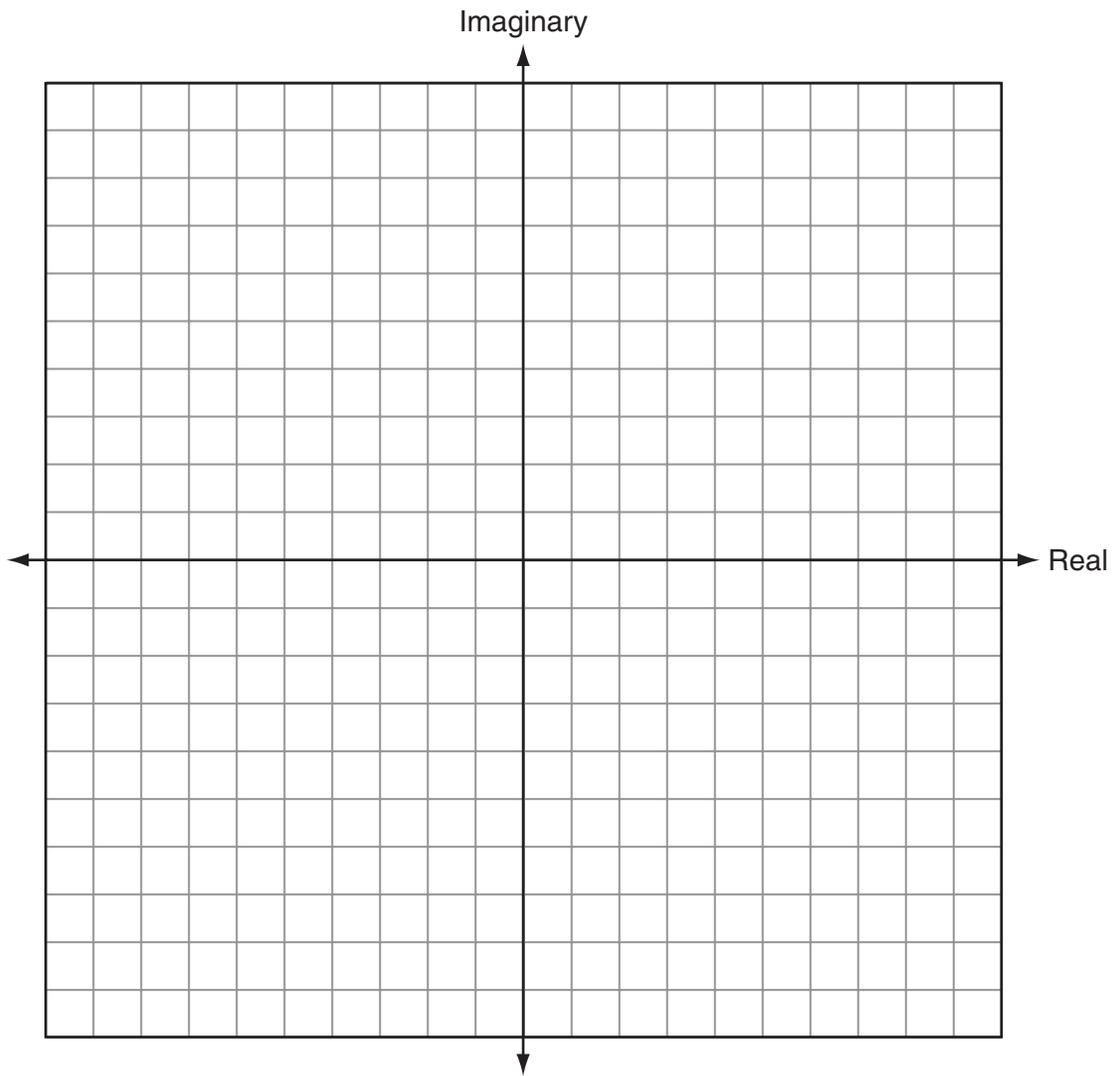
(Not drawn to scale)

- 22 The accompanying diagram shows a revolving door with three panels, each of which is 4 feet long. What is the width,  $w$ , of the opening between  $x$  and  $y$ , to the *nearest tenth of a foot*?

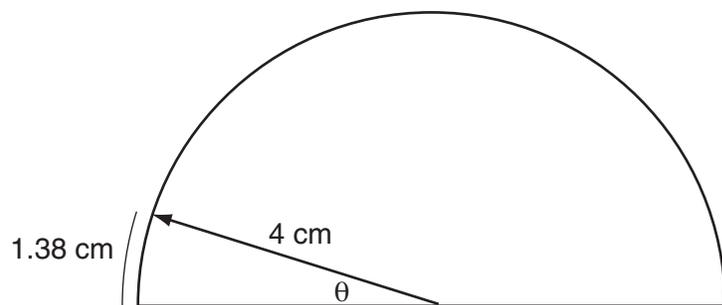


- 23 In  $\triangle ABC$ ,  $AC = 18$ ,  $BC = 10$ , and  $\cos C = \frac{1}{2}$ . Find the area of  $\triangle ABC$  to the *nearest tenth of a square unit*.

24 On the accompanying set of axes, graphically represent the sum of  $3 + 4i$  and  $-1 + 2i$ .



- 25** As shown in the accompanying diagram, a dial in the shape of a semicircle has a radius of 4 centimeters. Find the measure of  $\theta$ , in radians, when the pointer rotates to form an arc whose length is 1.38 centimeters.



- 26** What is the fourth term in the expansion of  $(2x - y)^5$ ?

### 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]

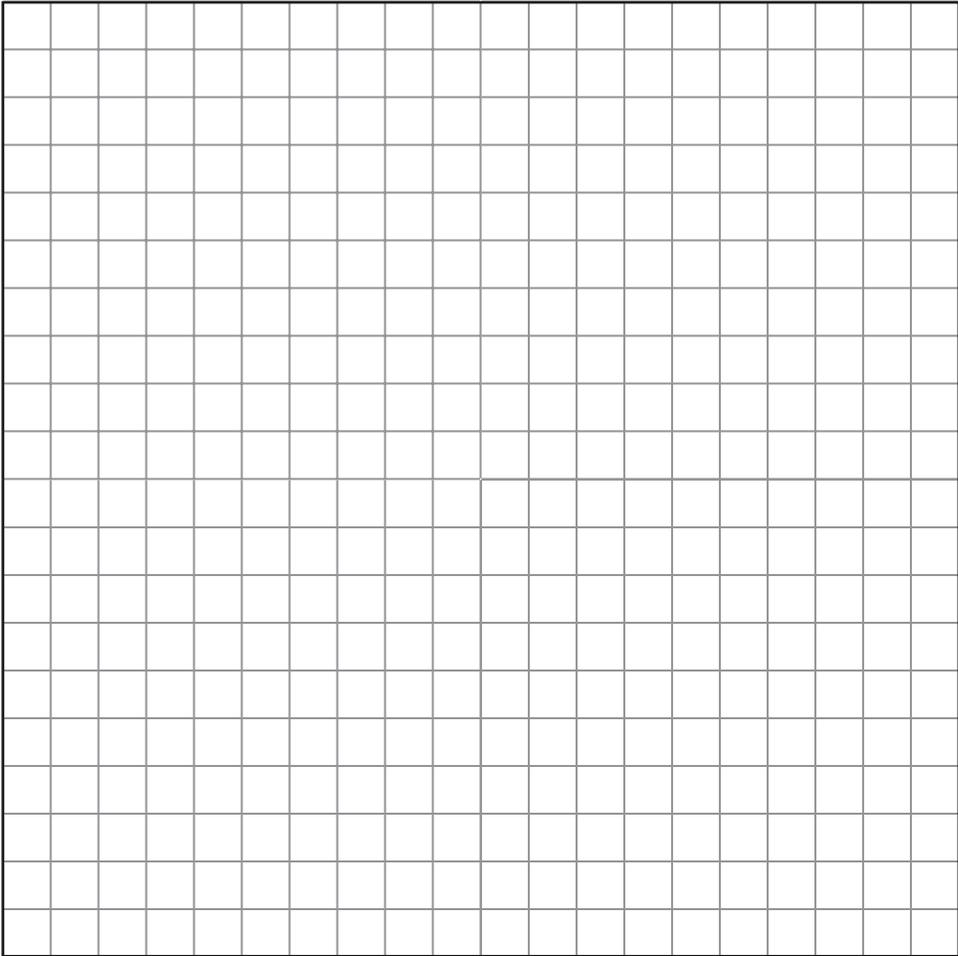
27 Find, to the *nearest degree*, all values of  $\theta$  in the interval  $0^\circ \leq \theta \leq 180^\circ$  that satisfy the equation  $8 \cos^2 \theta - 2 \cos \theta - 1 = 0$ .

**28** Since January 1980, the population of the city of Brownville has grown according to the mathematical model  $y = 720,500(1.022)^x$ , where  $x$  is the number of years since January 1980.

Explain what the numbers 720,500 and 1.022 represent in this model.

If this trend continues, use this model to predict the year during which the population of Brownville will reach 1,548,800. [The use of the grid on the next page is optional.]

**Question 28 continued**



**29** Matt's rectangular patio measures 9 feet by 12 feet. He wants to increase the patio's dimensions so its area will be twice the area it is now. He plans to increase both the length and the width by the same amount,  $x$ . Find  $x$ , to the *nearest hundredth of a foot*.

**30** The accompanying table shows the number of new cases reported by the Nassau and Suffolk County Police Crime Stoppers program for the years 2000 through 2002.

<b>Year (<math>x</math>)</b>	<b>New Cases (<math>y</math>)</b>
2000	457
2001	369
2002	353

If  $x = 1$  represents the year 2000, and  $y$  represents the number of new cases, find the equation of best fit using a power regression, rounding all values to the *nearest thousandth*.

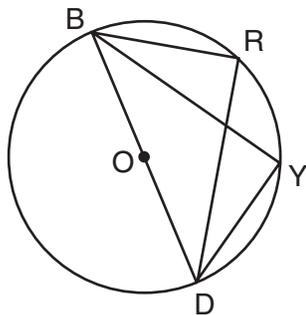
Using this equation, find the estimated number of new cases, to the *nearest whole number*, for the year 2007.

**31** Dr. Glendon, the school physician in charge of giving sports physicals, has compiled his information and has determined that the probability a student will be on a team is 0.39. Yesterday, Dr. Glendon examined five students chosen at random.

Find, to the *nearest hundredth*, the probability that *at least* four of the five students will be on a team.

Find, to the *nearest hundredth*, the probability that *exactly* one of the five students will *not* be on a team.

- 32 In the accompanying diagram,  $m\widehat{BR} = 70$ ,  $m\widehat{YD} = 70$ , and  $\overline{BOD}$  is the diameter of circle  $O$ . Write an explanation or a proof that shows  $\triangle RBD$  and  $\triangle YDB$  are congruent.



### 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 Perform the indicated operations and simplify completely:

$$\frac{x^2 - 9}{x^2 - 5x} \cdot \frac{5x - x^2}{x^2 - x - 12} \div \frac{x - 4}{x^2 - 8x + 16}$$

**34** Two forces of 40 pounds and 20 pounds, respectively, act simultaneously on an object. The angle between the two forces is  $40^\circ$ .

Find the magnitude of the resultant, to the *nearest tenth of a pound*.

Find the measure of the angle, to the *nearest degree*, between the resultant and the larger force.

# 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

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

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

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

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

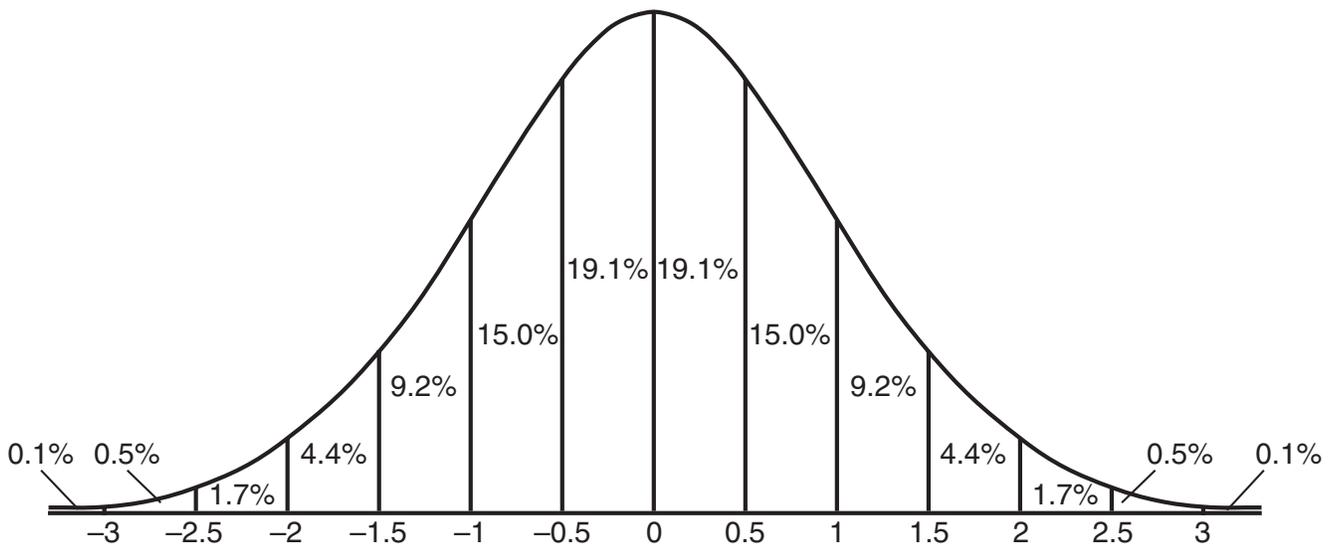
## Functions of the Half Angle

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

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

## Normal Curve

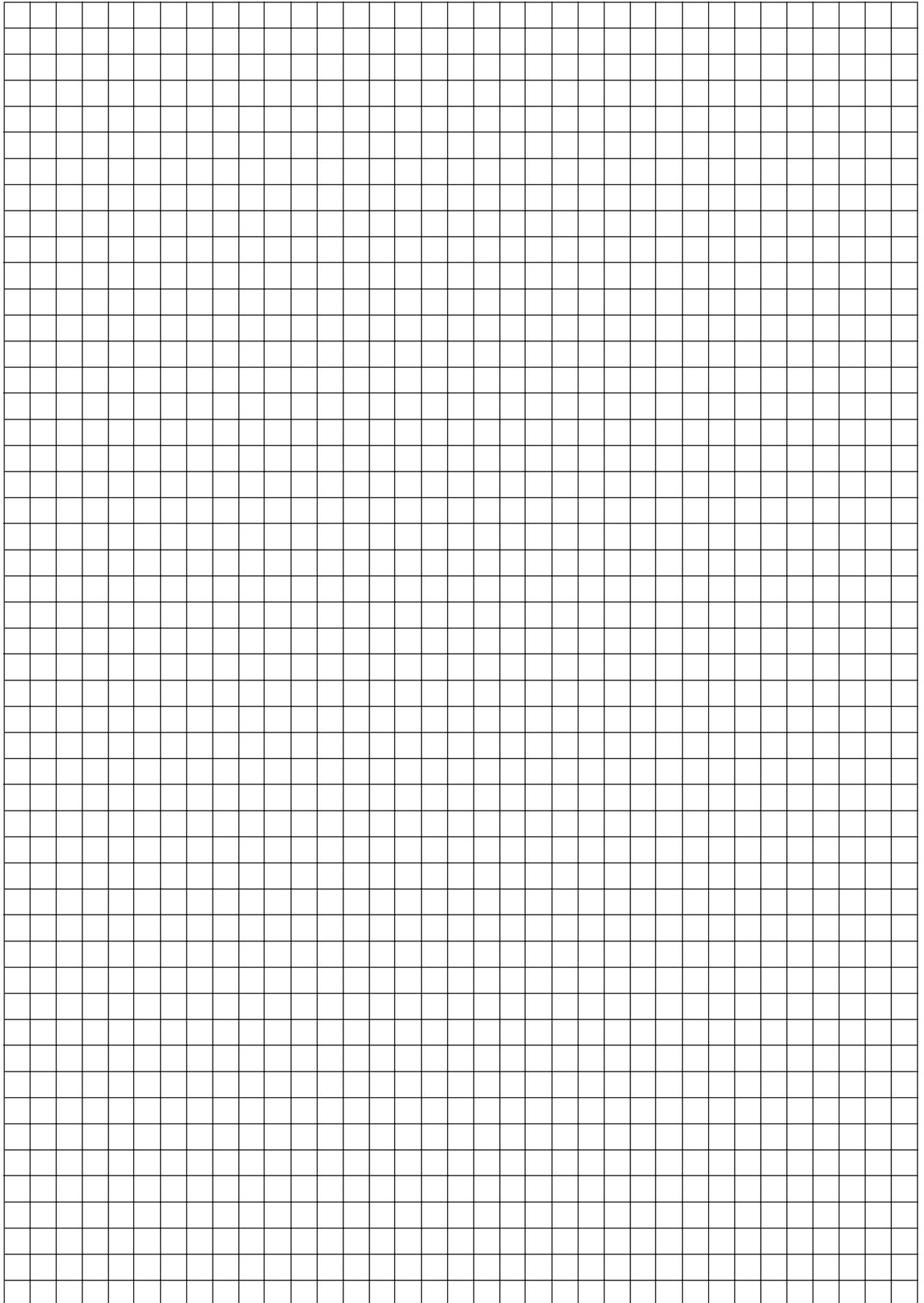
### Standard Deviation



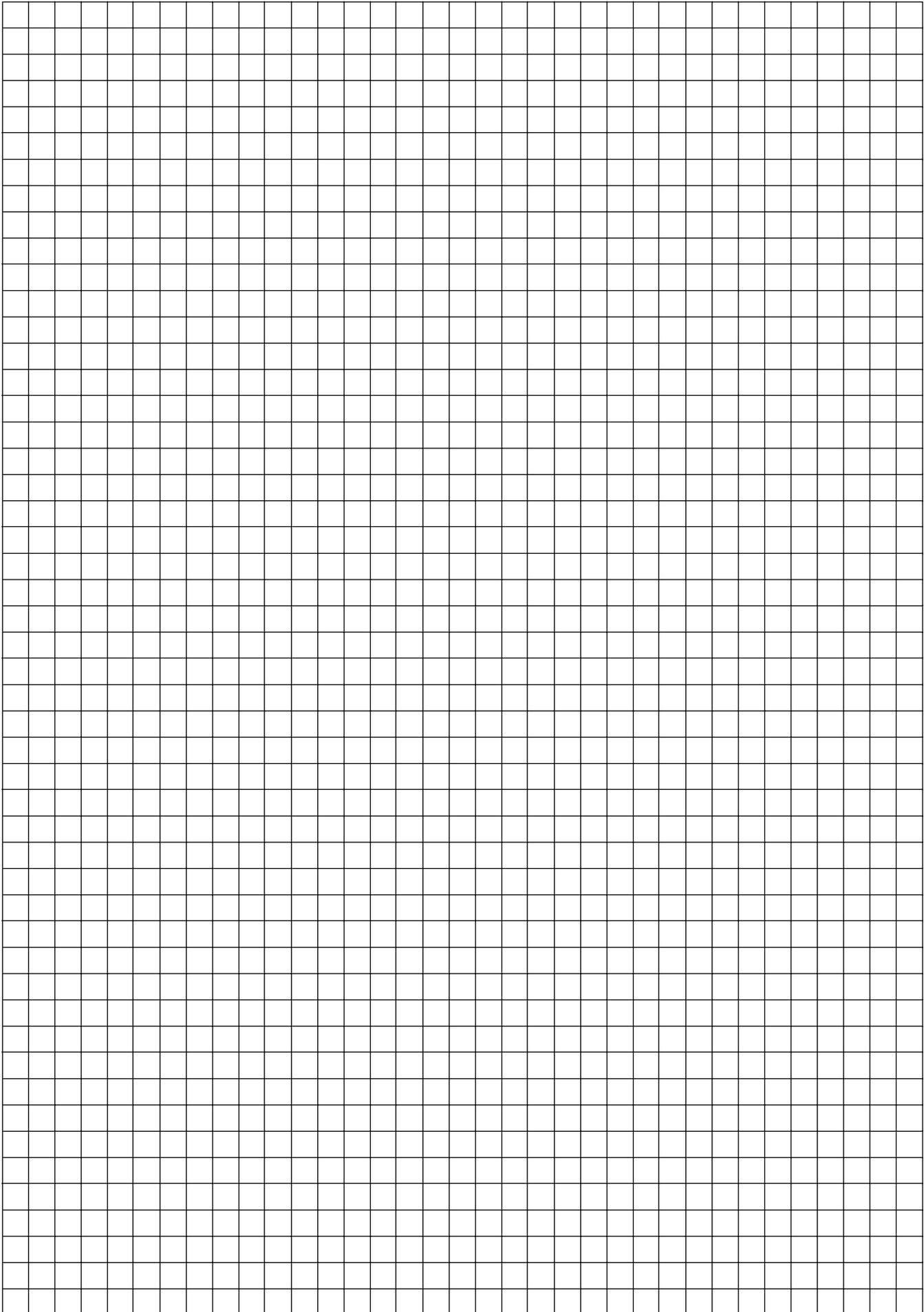
Scrap Graph Paper — This sheet will *not* be scored.

Tear Here

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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

Friday, January 26, 2007 — 9:15 a.m. to 12:15 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

Tear Here



# FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

## MATHEMATICS B

Friday, January 26, 2007 — 9:15 a.m. to 12:15 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 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 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 Friday, January 26, 2007. 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) 1	(11) 1	(16) 2
(2) 2	(7) 1	(12) 3	(17) 3
(3) 2	(8) 1	(13) 4	(18) 1
(4) 1	(9) 3	(14) 3	(19) 4
(5) 3	(10) 1	(15) 2	(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] 50, and appropriate work is shown, such as  $m\widehat{AC} = 140$ ,  $m\widehat{BC} = 40$ , and  $m\angle CPA = \frac{1}{2}(140 - 40)$ .

[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]  $m\widehat{AC}$  and  $m\widehat{BC}$  are found correctly, but no further correct work is shown.

*or*

[1] 50, 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] 6.9, and appropriate work is shown, such as using special right triangles, the Law of Cosines, or the Law of Sines.

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

*or*

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

*or*

[1] 6.9, but no work is shown.

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

MATHEMATICS B – *continued*

- (23) [2] 77.9, and appropriate work is shown, such as evaluating  $\frac{1}{2}ab \sin C$ .
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [1] Appropriate work is shown, but one conceptual error is made, such as writing  $\cos C$ .
- or**
- [1] 77.9, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- (24) [2] A correct graph is drawn to represent  $2 + 6i$ .
- [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.
- or**
- [1] The sum  $2 + 6i$  is written, but no graph is drawn.
- [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] 0.345, and appropriate work is shown, such as solving the equation  $\theta = \frac{1.38}{4}$ .
- [1] Appropriate work is shown, but one computational error is made.
- or**
- [1] Appropriate work is shown, but one conceptual error is made.
- or**
- [1] 0.345, 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*

(26) [2]  $-40x^2y^3$ , 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]  $-40x^2y^3$ , 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.

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**Part III**

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

(27) [4] 60 and 104, and appropriate work is shown either algebraically or graphically.

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

***or***

[3] Appropriate work is shown, but only one correct angle is found.

***or***

[3] 60 and 104, and appropriate work is shown, but additional angles outside the interval are found.

[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]  $\cos \theta = -\frac{1}{4}$  and  $\cos \theta = -\frac{1}{2}$ , 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] 60 and 104, but no work is shown.

[0] 60 or 104, 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.

MATHEMATICS B – *continued*

- (28) [4] 720,500 is the population in 1980, 1.022 represents a growth rate of 2.2% added to the current population, and the population will reach the given number in 2015, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational error is made.
- or***
- [3] 720,500 and 1.022 are explained correctly, and 2015 is found as the year, but no work is shown to indicate how the year was obtained.
- or***
- [3] Either 720,500 or 1.022 is explained correctly, and 2015 is found as the year, and appropriate work is shown.
- or***
- [3] 720,500 and 1.022 are explained correctly, but 35.167 years is found as an answer, but appropriate work is shown.
- [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] 720,500 and 1.022 are not explained or are explained incorrectly, but 2015 is found as the year, and appropriate work is shown.
- or***
- [2] 720,500 and 1.022 are explained 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] Either 720,500 or 1.022 is explained correctly, but no further correct work is shown.
- or***
- [1] 35.167 or 35 years, and appropriate work is shown, but the year is not found, and no explanations or incorrect explanations are given.
- or***
- [1] 2015, 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] 4.27, and appropriate work is shown, such as solving the equation  $(9 + x)(12 + x) = 216$ .
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or*
- [3] Appropriate work is shown, but the negative root is not rejected.
- [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] A correct equation is written in standard form, but no further correct work is shown.
- or*
- [2] An incorrect quadratic equation of equal difficulty is solved appropriately.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or*
- [1] An incorrect quadratic equation of a lesser degree of difficulty is solved appropriately.
- or*
- [1] 4.27, 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.

MATHEMATICS B – *continued*

- (30) [4]  $y = 451.431x^{-0.243}$  and 272, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [3]  $y = 451.431x^{-0.243}$ , but 7, instead of 8, is substituted for  $x$  to find the number of new cases.
- or**
- [3]  $y = 451.431x^{-0.243}$  and 272, but no work is shown to find the number of cases.
- or**
- [3] The expression  $451.431x^{-0.243}$  is written, and appropriate work is shown to find 272, but no equation is 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 correct regression equation is written, but no further correct work is shown.
- or**
- [2] An incorrect regression equation of equal difficulty is solved appropriately for the number of new cases, and appropriate work is shown.
- [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 solved appropriately for the number of new cases, and appropriate work is shown.
- or**
- [1] The expression  $451.431x^{-0.243}$  is written, but no further correct work is shown.
- or**
- [1] 272, 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] .08 and .07, and appropriate work is shown.

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

*or*

[3] The probability that at least four students will be on a team is found correctly, and appropriate work is shown, but the probability that exactly one student will not be on a team is not found or is found incorrectly.

[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 that at most four or exactly four students will be on the team.

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

*or*

[1] The probability that at least one student will not be on a team is found correctly, and appropriate work is shown, but the probability that at least four students will be on a team is not found.

*or*

[1] .08 and .07, but no work is shown.

[0] .08 or .07, 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.

MATHEMATICS B – *continued*

- (32) [4] Appropriate work is shown to explain why or prove the triangles are congruent.
- [3] An explanation 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.
- [2] An explanation is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
- [1] Some correct relevant statements about the method of proof are made, but two or three statements or reasons are missing or are incorrect.
- [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]  $-(x - 3)$ ,  $-x + 3$ , or  $3 - x$ , and appropriate work is shown.
- [5] Appropriate work is shown, but one computational, factoring, or simplification error is made.
- [4] Appropriate work is shown, but two computational, factoring, or simplification errors are made.
- or*
- [4]  $x - 3$ , and appropriate work is shown.
- [3] Appropriate work is shown, but three or more computational, factoring, or simplification errors are made.
- or*
- [3] Appropriate work is shown, but one conceptual error is made, such as not multiplying by the multiplicative inverse.
- [2] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.
- [1]  $-(x - 3)$ ,  $-x + 3$ , or  $3 - x$ , 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*

(34) [6] 56.8 and 13, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.

[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] The Law of Cosines is used correctly to determine the magnitude of the resultant, but no further correct work is shown.

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

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

***or***

[2] 56.8 and 13, but no work is shown.

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

***or***

[1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.

***or***

[1] 56.8, 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.

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**Map to Learning Standards**

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

**Regents Examination in Mathematics B**

**January 2007**

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

**The *Chart for Determining the Final Examination Score for the January 2007 Regents Examination in Mathematics B* will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Friday, January 26, 2007. 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 January 2007

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

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.