

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

# MATHEMATICS B

Thursday, August 13, 2009 — 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 19. 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.

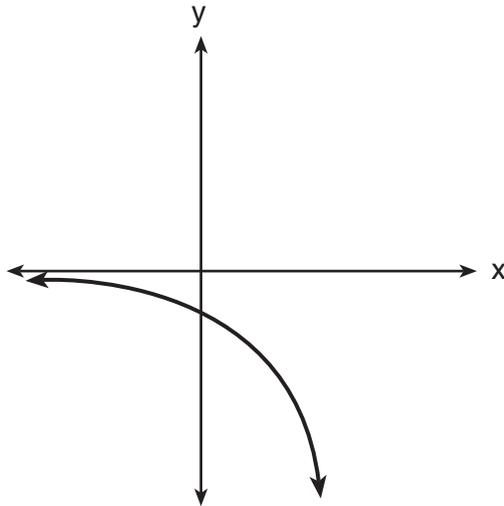
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

### 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 is represented by the accompanying graph?



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

2 What are the coordinates of the turning point of the parabola whose equation is  $y = -x^2 + 4x + 1$ ?

- (1) (-2, -11)                      (3) (2, 5)  
(2) (-2, -3)                      (4) (2, 13)

3 The graph of the equation  $y = |\sin x|$  will contain *no* points in Quadrants

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

Use this space for  
computations.

4 What is the value of  $\sum_{k=0}^2 3(2)^k$ ?

- (1) 15 (3) 21  
(2) 19 (4) 43

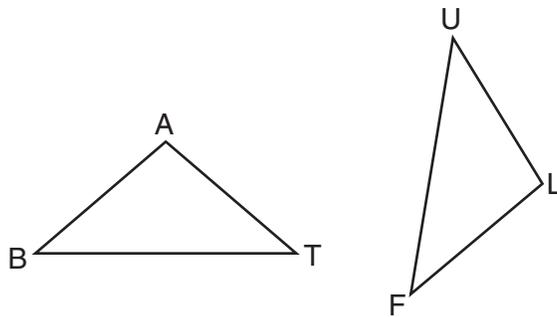
5 Expressed in simplest form,  $\frac{\sqrt{-20}}{\sqrt{5}}$  is equivalent to

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

6 On a graph, if point  $A$  represents  $2 - 3i$  and point  $B$  represents  $-2 - 5i$ , which quadrant contains  $3A - 2B$ ?

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

7 In the accompanying diagram of triangles  $BAT$  and  $FLU$ ,  $\angle B \cong \angle F$  and  $\overline{BA} \cong \overline{FL}$ .



Which statement is needed to prove  $\triangle BAT \cong \triangle FLU$ ?

- (1)  $\angle A \cong \angle L$  (3)  $\angle A \cong \angle U$   
(2)  $\overline{AT} \cong \overline{LU}$  (4)  $\overline{BA} \parallel \overline{FL}$

**Use this space for  
computations.**

**8** Which type of transformation is  $(x,y) \rightarrow (x + 2,y - 2)$ ?

- (1) dilation                      (3) rotation  
(2) reflection                    (4) translation

**9** Which functions are positive for angles terminating in Quadrant II?

- (1) sine and cosine              (3) sine and tangent  
(2) sine and secant              (4) sine and cosecant

**10** What is  $\sqrt{\frac{4}{3}} - \sqrt{\frac{3}{4}}$  expressed in simplest form?

- (1) 1                                  (3)  $\frac{\sqrt{3}}{6}$   
(2) 0                                  (4)  $2\sqrt{3}$

**11** Banks use the formula  $A = P(1 + r)^x$  when they compound interest annually. If  $P$  represents the amount of money invested and  $r$  represents the rate of interest, which expression represents  $\log A$ , where  $A$  represents the amount of money in the account after  $x$  years?

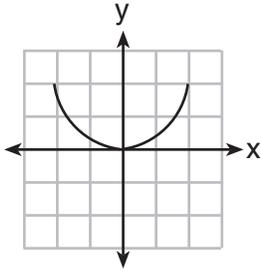
- (1)  $x \log P + \log (1 + r)$   
(2)  $\log P + x \log (1 + r)$   
(3)  $\log P + x \log 1 + r$   
(4)  $\log P + \log x + \log (1 + r)$

**12** If the equation of the axis of symmetry of a parabola is  $x = 2$ , at which pair of points could the parabola intersect the  $x$ -axis?

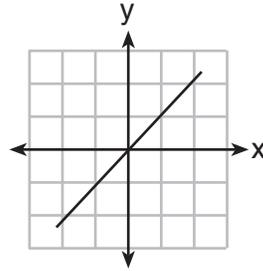
- (1) (3,0) and (5,0)              (3) (3,0) and (1,0)  
(2) (3,0) and (2,0)              (4) (-3,0) and (-1,0)

Use this space for  
computations.

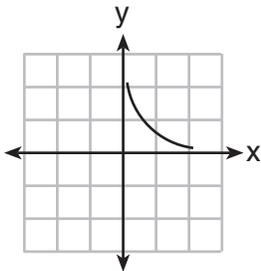
- 13 Jack is driving from New York to Florida. The number of hours that he drives and the speed at which he drives are inversely proportional. Which graph could be used to describe this situation if one axis represents speed and the other represents hours?



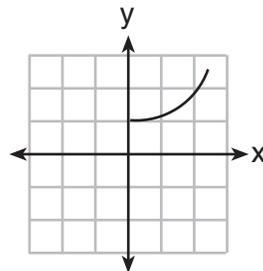
(1)



(3)



(2)



(4)

- 14 What is the length of the altitude of an equilateral triangle whose side has a length of 8?

- (1) 32                                      (3)  $4\sqrt{3}$   
(2)  $4\sqrt{2}$                                       (4) 4

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

- (1)  $1,080x^2$                                       (3)  $540x^3$   
(2)  $270x^3$                                       (4)  $1,080x^3$

**Use this space for  
computations.**

**16** If the dilation  $D_k$  is an isometry, what must be the value of  $k$ ?

- (1) 1  
(2) 2

- (3) -2  
(4) 0

**17** If  $f(x) = x^2$  and  $g(x) = 2x + 1$ , which expression is equivalent to  $(f \circ g)(x)$ ?

- (1)  $2x^2 + 1$   
(2)  $2(x + 1)^2$

- (3)  $4x^2 + 1$   
(4)  $4x^2 + 4x + 1$

**18** What is the inverse of the function  $y = 2x - 3$ ?

(1)  $y = \frac{x + 3}{2}$

(3)  $y = -2x + 3$

(2)  $y = \frac{x}{2} + 3$

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

**19** If  $a > 0$ , which function represents the reflection of  $y = a^x$  in the  $y$ -axis?

(1)  $y = -a^x$

(3)  $y = \left(\frac{1}{a}\right)^{-x}$

(2)  $y = \left(\frac{1}{a}\right)^x$

(4)  $x = a^y$

**20** The graph of the equation  $2x^2 - 3y^2 = 4$  forms

(1) a circle

(3) a hyperbola

(2) an ellipse

(4) a parabola

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## 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]

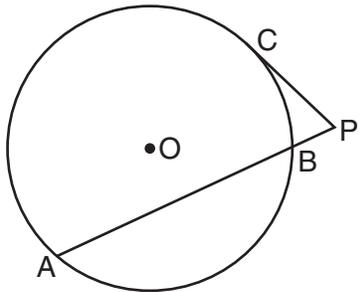
21 Evaluate the expression  $(x + 3)^{\frac{1}{2}} + (x - 3)^0 + (x + 2)^{-\frac{2}{3}}$  when  $x = 6$ .

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

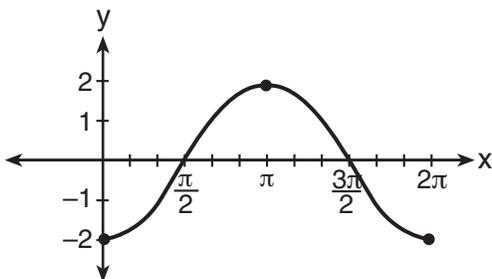
**23** Solve for the negative value of  $x$ :  $|2x + 5| + 1 = 13$

**24** In physics class, Esther learned that force due to gravity can be determined by using the formula  $F = \frac{Gm_1m_2}{r^2}$ . Solve for  $r$  in terms of  $F$ ,  $G$ ,  $m_1$ , and  $m_2$ .

- 25 In the accompanying diagram of circle  $O$ ,  $\overline{PC}$  is a tangent,  $\overline{PBA}$  is a secant,  $m\widehat{AB} = 132$ , and  $m\widehat{CB} = 46$ . Find  $m\angle P$ .



- 26 The accompanying graph shows a trigonometric function. State an equation of this function.



### Part III

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

**27** Kathy swims laps at the local fitness club. As she times her laps, she finds that each succeeding lap takes a little longer as she gets tired. If the first lap takes her 33 seconds, the second lap takes 38 seconds, the third takes 42 seconds, the fifth takes 50 seconds, and the seventh lap takes 54 seconds, state the power regression equation for this set of data, rounding all coefficients to the *nearest hundredth*.

Using your written regression equation, estimate the number of seconds that it would take Kathy to complete her tenth lap, to the *nearest tenth of a second*.

**28** Dave is the manager of a construction supply warehouse and notes that 60% of the items purchased are heating items, 25% are electrical items, and 15% are plumbing items. Find the probability that *at least* three out of the next five items purchased are heating items.

**29** The heights of a sample of female students at Oriskany High School are normally distributed with a mean height of 65 inches and a standard deviation of 0.6 inch.

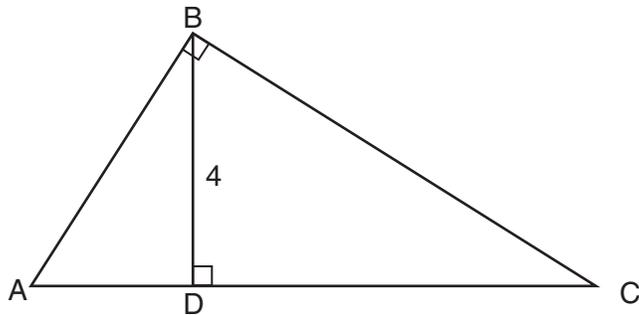
What percent of this sample is between 63.8 inches and 66.2 inches?

Above what height, in inches, would the top 2.3% of this sample population be found?

30 Express in simplest form:  $\frac{\frac{5}{a+b} - \frac{5}{a-b}}{\frac{10}{a^2 - b^2}}$

**31** Solve the equation  $3x^2 + 5 = 4x$  and express the roots in simplest  $a + bi$  form.

**32** The drawing for a right triangular roof truss, represented by  $\triangle ABC$ , is shown in the accompanying diagram. If  $\angle ABC$  is a right angle, altitude  $BD = 4$  meters, and  $\overline{DC}$  is 6 meters longer than  $\overline{AD}$ , find the length of base  $\overline{AC}$ , in meters.



### 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]

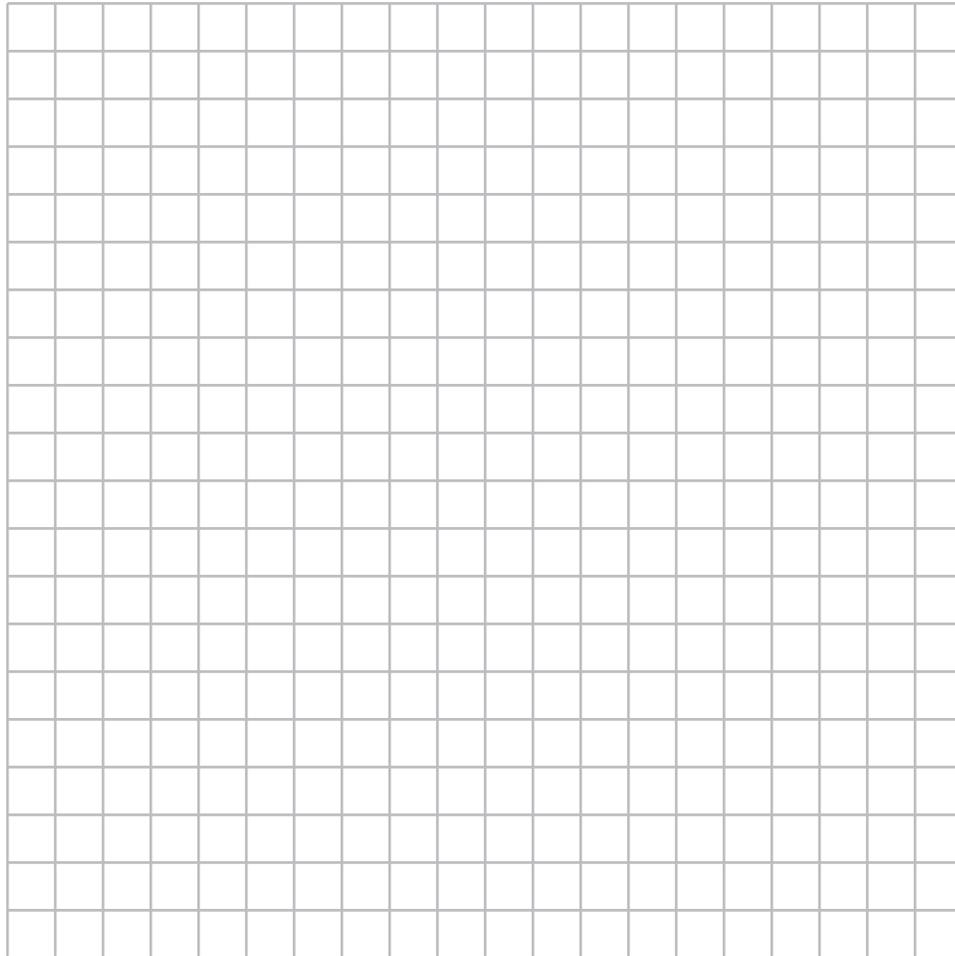
33 Given:  $T(-1,1)$ ,  $R(3,4)$ ,  $A(7,2)$ , and  $P(-1,-4)$

Prove:  $TRAP$  is a trapezoid.

$TRAP$  is *not* an isosceles trapezoid.

[The use of the grid on the next page is optional.]

**Question 33 continued**



**34** Firefighters dug three trenches in the shape of a triangle to prevent a fire from completely destroying a forest. The lengths of the trenches were 250 feet, 312 feet, and 490 feet.

Find, to the *nearest degree*, the *smallest* angle formed by the trenches.

Find the area of the plot of land within the trenches, to the *nearest square foot*.

# 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

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

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

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

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

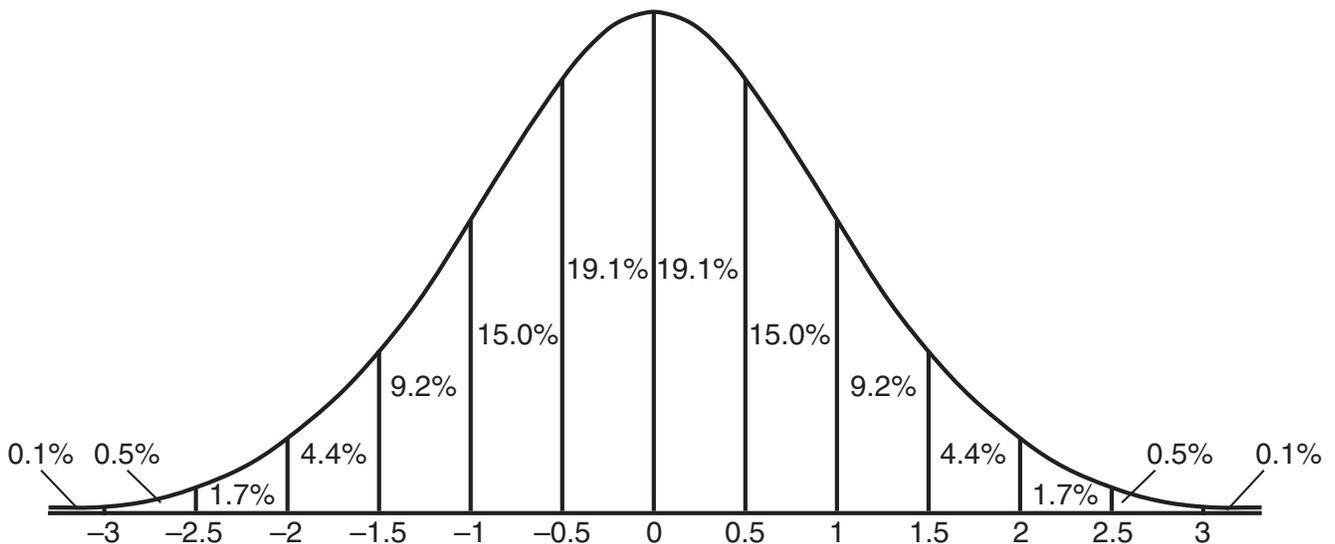
## Functions of the Half Angle

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

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

## Normal Curve

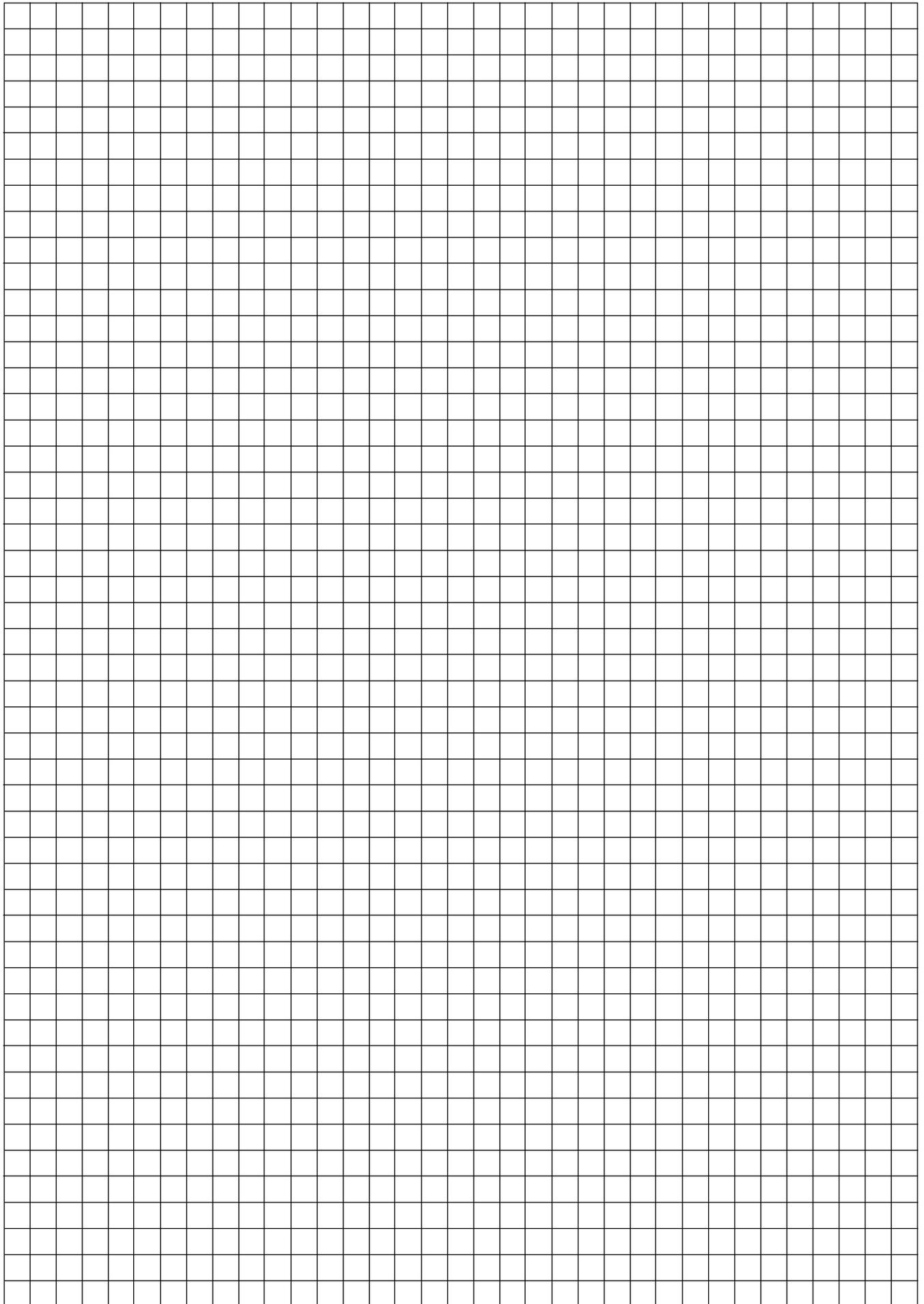
### Standard Deviation



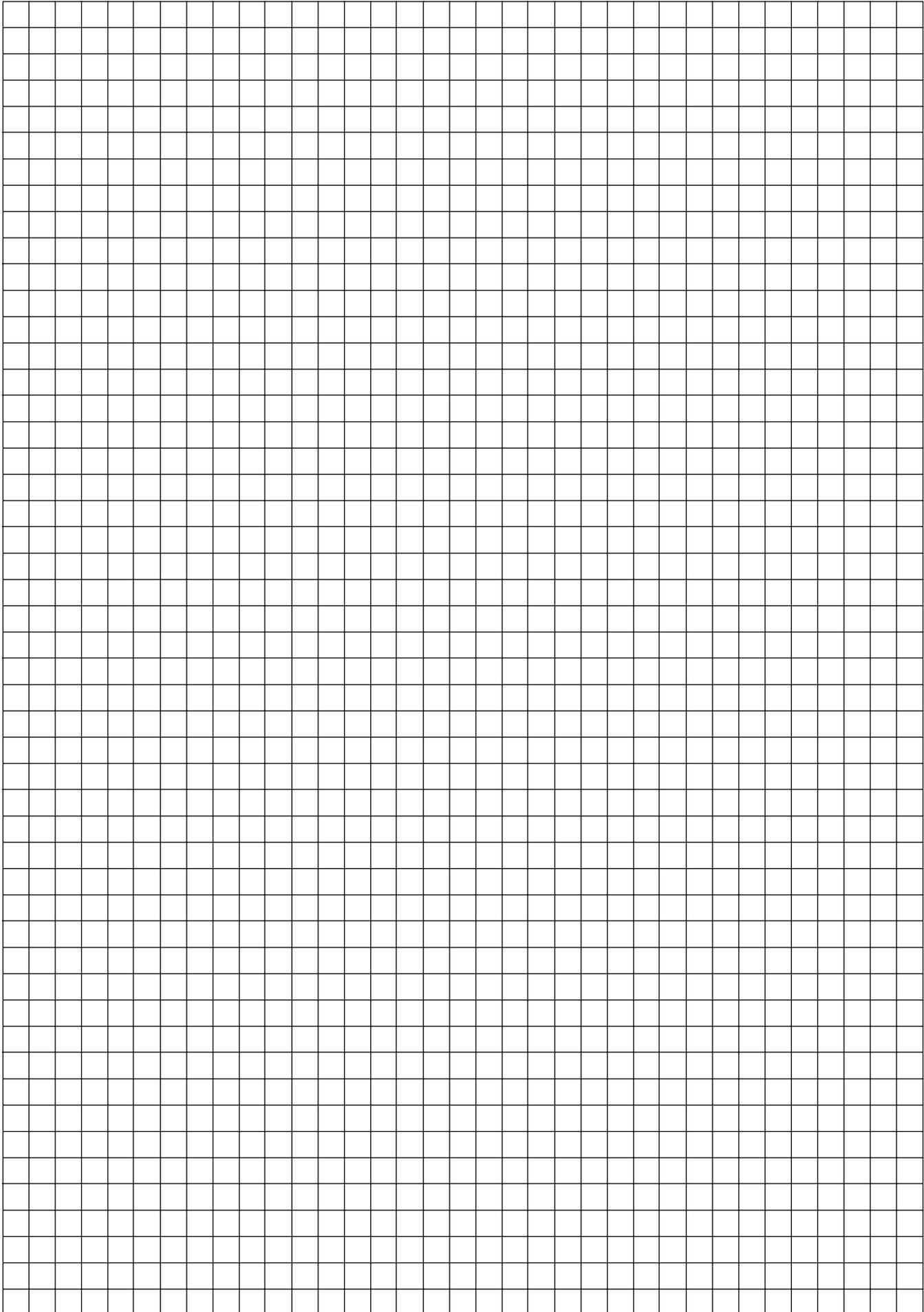
**Scrap Graph Paper — This sheet will *not* be scored.**

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

Thursday, August 13, 2009 — 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

Thursday, August 13, 2009 — 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 Examination in Mathematics B*.

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* attempt to correct the student's work by making insertions or changes of any kind. Use check marks to indicate student errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Each student's answer paper is to be scored by a minimum of three mathematics teachers. On the back of the student's detachable answer sheet, raters must enter their initials in the boxes next to the questions they have scored and also write their name in the box under the heading "Rater's/Scorer's Name."

Raters should record the student's scores for all questions and the total raw score on the student's detachable answer sheet. Then the student's total raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Thursday, August 13, 2009. The student's scaled score should be entered in the box provided on the student's detachable answer sheet. The scaled score is the student's final examination score.

#### Part I

Allow a total of 40 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 2	(6) 1	(11) 2	(16) 1
(2) 3	(7) 1	(12) 3	(17) 4
(3) 3	(8) 4	(13) 2	(18) 1
(4) 3	(9) 4	(14) 3	(19) 2
(5) 2	(10) 3	(15) 4	(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. Check this web site <http://www.emsc.nysed.gov/osa/> and select the link “Examination Scoring Information” for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

### General Rules for Applying Mathematics Rubrics

#### I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Mathematics B are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher’s professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examination in Mathematics B*, use their own professional judgment, confer with other mathematics teachers, and/or contact the consultants at the State Education Department for guidance. During each Regents examination administration period, rating questions may be referred directly to the Education Department. The contact numbers are sent to all schools before each administration period.

#### II. Full-Credit Responses

A full-credit response provides a complete and correct answer to all parts of the question. Sufficient work is shown to enable the rater to determine how the student arrived at the correct answer.

When the rubric for the full-credit response includes one or more examples of an acceptable method for solving the question (usually introduced by the phrase “such as”), it does **not** mean that there are no additional acceptable methods of arriving at the correct answer. Unless otherwise specified, mathematically correct alternative solutions should be awarded credit. The only exceptions are those questions that specify the type of solution that must be used; e.g., an algebraic solution or a graphic solution. A correct solution using a method other than the one specified is awarded half the credit of a correct solution using the specified method.

#### III. Appropriate Work

*Full-Credit Responses:* The directions in the examination booklet for all the constructed-response questions state: “Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, charts, etc.” The student has the responsibility of providing the correct answer **and** showing how that answer was obtained. The student must “construct” the response; the teacher should not have to search through a group of seemingly random calculations scribbled on the student paper to ascertain what method the student may have used.

*Responses With Errors:* Rubrics that state “Appropriate work is shown, but ...” are intended to be used with solutions that show an essentially complete response to the question but contain certain types of errors, whether computational, rounding, graphing, or conceptual. If the response is incomplete, i.e., an equation is written but not solved or an equation is solved but not all of the parts of the question are answered, appropriate work has **not** been shown. Other rubrics address incomplete responses.

#### IV. Multiple Errors

*Computational Errors, Graphing Errors, and Rounding Errors:* Each of these types of errors results in a 1-credit deduction. Any combination of two of these types of errors results in a 2-credit deduction. No more than 2 credits should be deducted for such mechanical errors in any response. The teacher must carefully review the student’s work to determine what errors were made and what type of errors they were.

*Conceptual Errors:* A conceptual error involves a more serious lack of knowledge or procedure. Examples of conceptual errors include using the incorrect formula for the area of a figure, choosing the incorrect trigonometric function, or multiplying the exponents instead of adding them when multiplying terms with exponents. A response with one conceptual error can receive no more than half credit.

If a response shows repeated occurrences of the same conceptual error, the student should not be penalized twice. If the same conceptual error is repeated in responses to other questions, credit should be deducted in each response.

If a response shows two (or more) different major conceptual errors, it should be considered completely incorrect and receive no credit.

If a response shows one conceptual error and one computational, graphing, or rounding error, the teacher must award credit that takes into account both errors: i.e., awarding half credit for the conceptual error and deducting 1 credit for each mechanical error (maximum of two deductions for mechanical errors).

**Part II**

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

(21) [2]  $4\frac{1}{4}$  or 4.25, 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]  $4\frac{1}{4}$  or 4.25, 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] 4, and appropriate algebraic work is shown.

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

*or*

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

*or*

[1]  $3^{3x} = 3^{2(x+4)}$  is written, but no further correct work is shown.

*or*

[1] 4, but a method other than algebraic is used.

*or*

[1] 4, 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]  $-\frac{17}{2}$  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] Appropriate work is shown, but only the positive value is found.

**or**

[1]  $-\frac{17}{2}$  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.

(24) [2]  $r = \sqrt{\frac{Gm_1m_2}{F}}$  or  $r = \pm \sqrt{\frac{Gm_1m_2}{F}}$ , and appropriate work is shown.

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

**or**

[1] Appropriate work is shown, but one conceptual error is made, such as solving for  $r^2$ .

**or**

[1]  $r = \sqrt{\frac{Gm_1m_2}{F}}$  or  $r = \pm \sqrt{\frac{Gm_1m_2}{F}}$ , 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] 68, 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] 68, 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]  $y = -2 \cos x$  or an equivalent equation is written.

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

*or*

[1] Amplitude = 2 and frequency = 1, but no further correct work is shown.

*or*

[1] The expression  $-2 \cos x$  is written.

[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]  $y = 32.35x^{0.26}$  and 58.9, and appropriate substitution is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or*
- [3] A correct regression equation is written and 58.9, but no substitution is shown.
- or*
- [3] The expression  $32.35x^{0.26}$  is written, and appropriate work is shown to find 58.9.
- [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 regression equation is solved appropriately.
- or*
- [2]  $y = 32.35x^{0.26}$ , 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] 58.9, 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*

- (28) [4] .68256 or  $\frac{2133}{3125}$  and appropriate work is shown, such as  
 ${}_5C_3(0.6)^3(0.4)^2 + {}_5C_4(0.6)^4(0.4)^1 + {}_5C_5(0.6)^5(0.4)^0$ .

[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” or “more than three.”

*or*

[2]  ${}_5C_3(0.6)^3(0.4)^2 + {}_5C_4(0.6)^4(0.4)^1 + {}_5C_5(0.6)^5(0.4)^0$ , but no further correct work is shown.

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

*or*

[1] Appropriate work is shown to find the probability for “exactly three out of five items.”

*or*

[1] .68256 or  $\frac{2133}{3125}$ , 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] 95.4 and 66.2, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational error is made.
- [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] 95.4 or 66.2, and appropriate work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or***
- [1] 95.4 and 66.2, but no work is shown.
- [0] 95.4 or 66.2, 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*

- (30) [4]  $-b$ , and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or simplification error is made.
- [2] Appropriate work is shown, but two or more computational or simplification errors are made.
- or***
- [2] Appropriate work is shown, but one conceptual error is made.
- or***
- [2]  $\frac{5(a - b) - 5(a + b)}{10}$  is written, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.
- or***
- [1]  $-b$ , but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(31) [4]  $\frac{2}{3} \pm \frac{i\sqrt{11}}{3}$ , and appropriate work is shown.

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

**or**

[3] Appropriate work is shown to obtain  $\frac{4 \pm 2i\sqrt{11}}{6}$ , but no further correct 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, such as the incorrect use of the quadratic formula.

**or**

[2] Appropriate work is shown to obtain  $\frac{4 \pm \sqrt{-44}}{6}$ , but no further correct work is shown.

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

**or**

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

**or**

[1]  $\frac{2}{3} \pm \frac{i\sqrt{11}}{3}$ , 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.

MATHEMATICS B – *continued*

- (32) [4] 10, and appropriate work is shown, such as solving  $\frac{x}{4} = \frac{4}{x+6}$ .
- [3] Appropriate work is shown, but one computational or factoring error is made.
- or**
- [3] Appropriate work is shown to find  $x = 2$ , but no further correct work is shown.
- [2] Appropriate work is shown, but two or more computational or factoring errors are made.
- or**
- [2] Appropriate work is shown, but one conceptual error is made.
- or**
- [2] Appropriate work is shown to find 2 and  $-8$ , but the negative value is not rejected, and no further correct work is shown.
- or**
- [2] A correct right triangle proportion is written, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.
- or**
- [1] 10, 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] A complete and correct proof with an appropriate concluding statement is written.

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

*or*

[5] Appropriate work is shown to prove  $TRAP$  is a trapezoid and the lengths of the sides are found, but no concluding statement is made regarding it not being isosceles.

*or*

[5] All calculations necessary to prove  $TRAP$  is a trapezoid but not isosceles are made, but one statement or reason is missing or is incorrect.

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

*or*

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

*or*

[4] Appropriate work is shown to prove  $TRAP$  is a trapezoid with an appropriate concluding statement, but no further correct work is shown.

[3] Appropriate work is shown to find  $TP$ ,  $RA$ , and the slopes of all four sides, but no conclusions are written.

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

*or*

[2] Appropriate work is shown to prove  $\overline{TR} \parallel \overline{PA}$  with appropriate justification, but no further correct work is shown.

*or*

[2] Appropriate work is shown to find the slopes of all four sides and either  $TP$  or  $RA$ , but no conclusions are written.

MATHEMATICS B – *continued*

[1] Appropriate work is shown to find the slopes of all four sides, but no further correct work is shown.

*or*

[1] Appropriate work is shown to find  $TP$  and  $RA$ , 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] 26 and 33,443, and appropriate work is shown, such as using the Law of Cosines and finding the area of the triangle. [Allow full credit if the student uses 26 and finds  $A = 33,509$ .]

[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 to find 26, but no further correct work is shown.

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

***or***

[3] The area is found using Hero(n)'s formula, but no further correct work is shown.

[2] Appropriate work is shown, but two conceptual errors are made.

***or***

[2] 26 and either 33,509 or 33,443, but no work is shown.

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

***or***

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

***or***

[1] 26 or 33,509 or 33,443, 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**

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

**Regents Examination in Mathematics B**

**August 2009**

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

***The Chart for Determining the Final Examination Score for the August 2009 Regents Examination in Mathematics B will be posted on the Department’s web site <http://www.emsc.nysed.gov/osa/> on Thursday, August 13, 2009. Conversion charts provided for the previous administrations of the Regents Examination in Mathematics B must NOT be used to determine students’ final scores for this administration.***

**Online Submission of Teacher Evaluations of the Test to the Department**

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to <http://www.emsc.nysed.gov/osa/exameval>.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

**As a reminder . . .**

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



## Regents Examination in Mathematics B August 2009

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

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

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

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

Because scale scores corresponding to raw scores in the conversion chart change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score. The chart above is usable only for this administration of the Regents Examination in Mathematics B.