

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

# MATHEMATICS B

Thursday, January 29, 2004 — 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. Any work done on this sheet of scrap graph paper will *not* be scored. Write all your work in pen, except graphs and drawings, which should be done in pencil.

This examination has four parts, with a total of 34 questions. You must answer all questions in this examination. Write your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. The formulas that you may need to answer some questions in this examination are found on page 19.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice . . .

A graphing calculator, a straightedge (ruler), and a compass must be available for your use while taking this examination.

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

## Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [40]

1 The expression  $\cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ$  is equivalent to

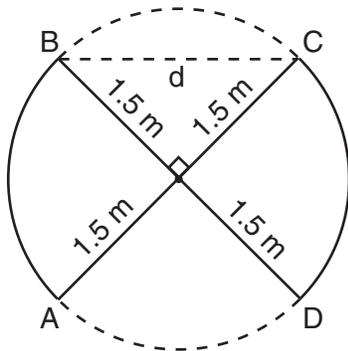
- (1)  $\cos 30^\circ$                       (3)  $\sin 30^\circ$   
(2)  $\cos 50^\circ$                       (4)  $\sin 50^\circ$

Use this space for  
computations.

2 The expression  $\frac{\sec \theta}{\csc \theta}$  is equivalent to

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

3 An overhead view of a revolving door is shown in the accompanying diagram. Each panel is 1.5 meters wide.



What is the approximate width of  $d$ , the opening from  $B$  to  $C$ ?

- (1) 1.50 m                      (3) 3.00 m  
(2) 1.73 m                      (4) 2.12 m

4 What is a positive value of  $x$  for which  $9^{-\cos x} = \frac{1}{3}$ ?

- (1)  $30^\circ$                       (3)  $60^\circ$   
(2)  $45^\circ$                       (4)  $90^\circ$

Use this space for  
computations.

5 The expression  $\frac{7}{2-\sqrt{3}}$  is equivalent to

(1)  $14 - 7\sqrt{3}$

(3)  $\frac{2 + \sqrt{3}}{7}$

(2)  $14 + 7\sqrt{3}$

(4)  $\frac{14 + \sqrt{3}}{7}$

6 Jean's scores on five mathematics tests were 98, 97, 99, 98, and 96. Her scores on five English tests were 78, 84, 95, 72, and 79. Which statement is true about the standard deviations for the scores?

- (1) The standard deviation for the English scores is greater than the standard deviation for the math scores.
- (2) The standard deviation for the math scores is greater than the standard deviation for the English scores.
- (3) The standard deviations for both sets of scores are equal.
- (4) More information is needed to determine the relationship between the standard deviations.

7 In  $\triangle ABC$ ,  $a = 19$ ,  $c = 10$ , and  $m\angle A = 111$ . Which statement can be used to find the value of  $\angle C$ ?

(1)  $\sin C = \frac{10}{19}$

(3)  $\sin C = \frac{10 \sin 21^\circ}{19}$

(2)  $\sin C = \frac{19 \sin 69^\circ}{10}$

(4)  $\sin C = \frac{10 \sin 69^\circ}{19}$

8 If  $f(x) = \frac{2}{x+3}$  and  $g(x) = \frac{1}{x}$ , then  $(g \circ f)(x)$  is equal to

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

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

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

(4)  $\frac{x+3}{2x}$

Use this space for computations.

9 If  $\log x = a$ ,  $\log y = b$ , and  $\log z = c$ , then  $\log \frac{x^2y}{\sqrt{z}}$  is equivalent to

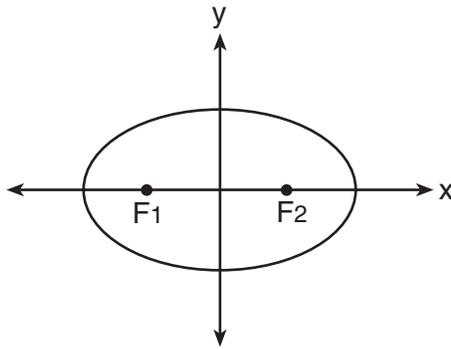
(1)  $42a + b + \frac{1}{2}c$

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

(2)  $2ab - \frac{1}{2}c$

(4)  $2a + b - \frac{1}{2}c$

10 The accompanying diagram shows the elliptical orbit of a planet. The foci of the elliptical orbit are  $F_1$  and  $F_2$ .



If  $a$ ,  $b$ , and  $c$  are all positive and  $a \neq b \neq c$ , which equation could represent the path of the planet?

(1)  $ax^2 - by^2 = c^2$

(3)  $y = ax^2 + c^2$

(2)  $ax^2 + by^2 = c^2$

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

11 Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. Approximately what percent of batteries have lifetimes *longer than* 561 days?

(1) 16%

(3) 68%

(2) 34%

(4) 84%

12 The expression  $\log_3(8 - x)$  is defined for all values of  $x$  such that

(1)  $x > 8$

(3)  $x < 8$

(2)  $x \geq 8$

(4)  $x \leq 8$

13 The expression  $b^{-\frac{3}{2}}$ ,  $b > 0$ , is equivalent to

(1)  $\frac{1}{(\sqrt[3]{b})^2}$

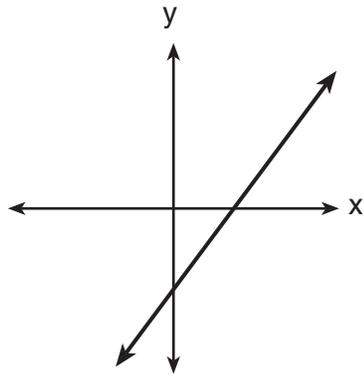
(3)  $-(\sqrt{b})^3$

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

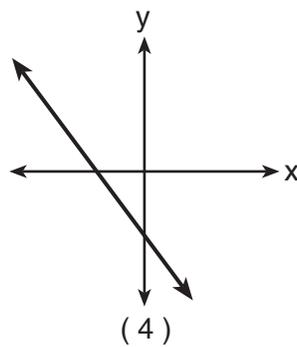
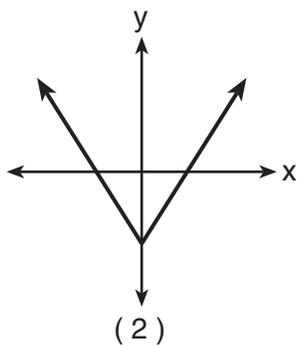
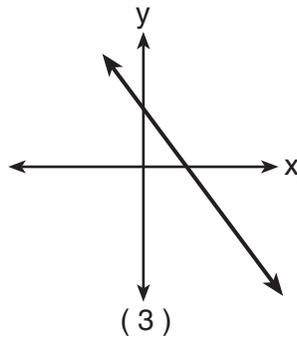
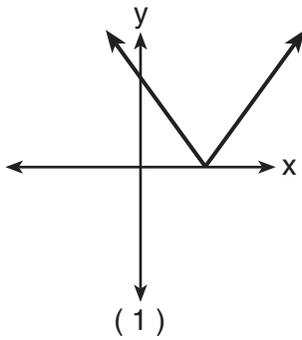
(4)  $(\sqrt[3]{b})^2$

Use this space for computations.

14 The graph below represents  $f(x)$ .



Which graph best represents  $|f(x)|$ ?



**Use this space for  
computations.**

**15** If  $f(x) = x^3 - 2x^2$ , then  $f(i)$  is equivalent to

(1)  $-2 + i$

(3)  $2 + i$

(2)  $-2 - i$

(4)  $2 - i$

**16** Which statement must be true if a parabola represented by the equation  $y = ax^2 + bx + c$  does *not* intersect the  $x$ -axis?

(1)  $b^2 - 4ac = 0$

(2)  $b^2 - 4ac < 0$

(3)  $b^2 - 4ac > 0$ , and  $b^2 - 4ac$  is a perfect square.

(4)  $b^2 - 4ac > 0$ , and  $b^2 - 4ac$  is not a perfect square.

**17** A garden in the shape of an equilateral triangle has sides whose lengths are 10 meters. What is the area of the garden?

(1)  $25 \text{ m}^2$

(3)  $50 \text{ m}^2$

(2)  $25\sqrt{3} \text{ m}^2$

(4)  $50\sqrt{3} \text{ m}^2$

**18** If  $x$  is an acute angle and  $\sin x = \frac{12}{13}$ , then  $\cos 2x$  equals

(1)  $\frac{25}{169}$

(3)  $-\frac{25}{169}$

(2)  $\frac{119}{169}$

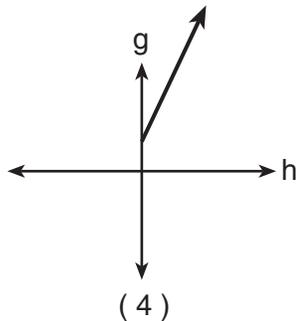
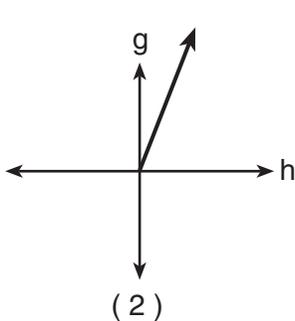
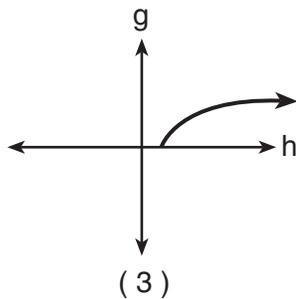
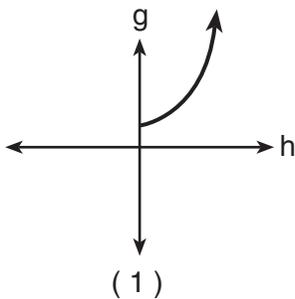
(4)  $-\frac{119}{169}$

19 What is the axis of symmetry of the graph of the equation  $x = y^2$ ?

- (1)  $x$ -axis
- (2)  $y$ -axis
- (3) line  $y = x$
- (4) line  $y = -x$

Use this space for computations.

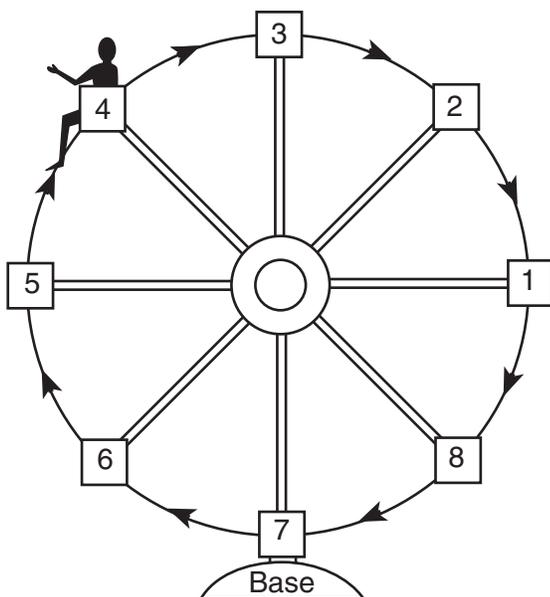
20 The cells of a particular organism increase logarithmically. If  $g$  represents cell growth and  $h$  represents time, in hours, which graph best represents the growth pattern of the cells of this organism?



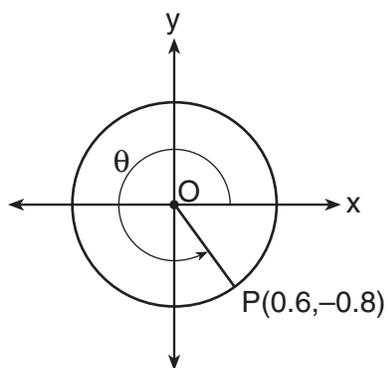
## Part II

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 Kristine is riding in car 4 of the Ferris wheel represented in the accompanying diagram. The Ferris wheel is rotating in the direction indicated by the arrows. The eight cars are equally spaced around the circular wheel. Express, in radians, the measure of the *smallest* angle through which she will travel to reach the bottom of the Ferris wheel.



- 22** In the accompanying diagram, point  $P(0.6, -0.8)$  is on unit circle  $O$ .  
What is the value of  $\theta$ , to the *nearest degree*?



- 23** A pulley that has a diameter of 8 inches is belted to a pulley that has a diameter of 12 inches. The 8-inch-diameter pulley is running at 1,548 revolutions per minute. If the speeds of the pulleys vary inversely to their diameters, how many revolutions per minute does the larger pulley make?

**24** When a current,  $I$ , flows through a given electrical circuit, the power,  $W$ , of the circuit can be determined by the formula  $W = 120I - 12I^2$ . What amount of current,  $I$ , supplies the maximum power,  $W$ ?

**25** The brightness of the star MIRA over time is given by the equation  $y = 2 \sin \frac{\pi}{4}x + 6$ , where  $x$  represents time and  $y$  represents brightness. What is the period of this function, in radian measure?

**26** A landscape designer is designing a triangular garden with two sides that are 4 feet and 6 feet, respectively. The angle opposite the 4-foot side is  $30^\circ$ . How many distinct triangular gardens can the designer make using these measurements?

### 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 Solve algebraically:  $\sqrt{x + 5} + 1 = x$

28 A board game has a spinner on a circle that has five equal sectors, numbered 1, 2, 3, 4, and 5, respectively. If a player has four spins, find the probability that the player spins an even number *no more than* two times on those four spins.

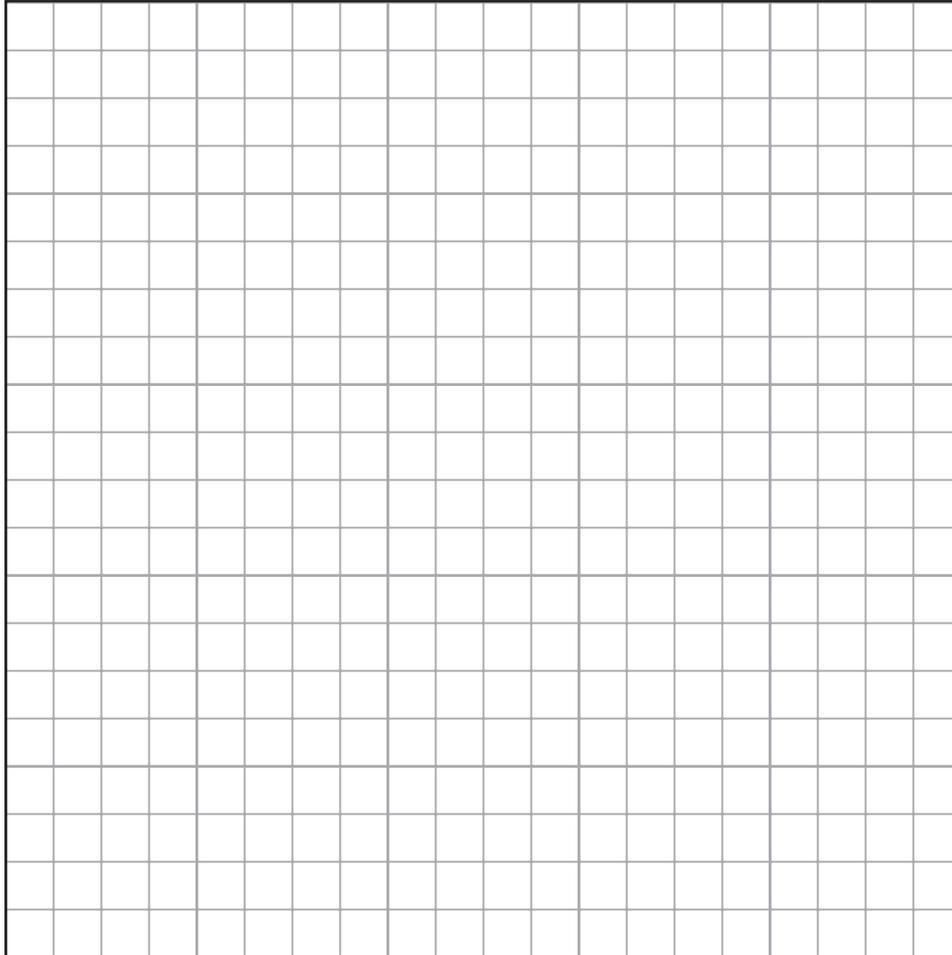
**29** The equation for radioactive decay is  $p = (0.5)^{\frac{t}{H}}$ , where  $p$  is the part of a substance with half-life  $H$  remaining radioactive after a period of time,  $t$ .

A given substance has a half-life of 6,000 years. After  $t$  years, one-fifth of the original sample remains radioactive. Find  $t$ , to the *nearest thousand years*.

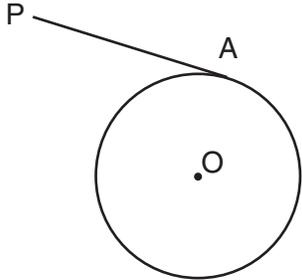
**30** One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the *nearest degree*, the angle between the two original forces.

**31** An acorn falls from the branch of a tree to the ground 25 feet below. The distance,  $S$ , the acorn is from the ground as it falls is represented by the equation  $S(t) = -16t^2 + 25$ , where  $t$  represents time, in seconds. Sketch a graph of this situation on the accompanying grid.

Calculate, to the *nearest hundredth of a second*, the time the acorn will take to reach the ground.



**32** In the accompanying diagram of circle  $O$ ,  $\overline{PA}$  is drawn tangent to the circle at  $A$ . Place  $B$  on  $\overline{PA}$  anywhere between  $P$  and  $A$  and draw  $\overline{OA}$ ,  $\overline{OP}$ , and  $\overline{OB}$ . Prove that  $\overline{OB}$  is *not* perpendicular to  $\overline{PA}$ .



## Part IV

Answer all questions in this part. Each correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

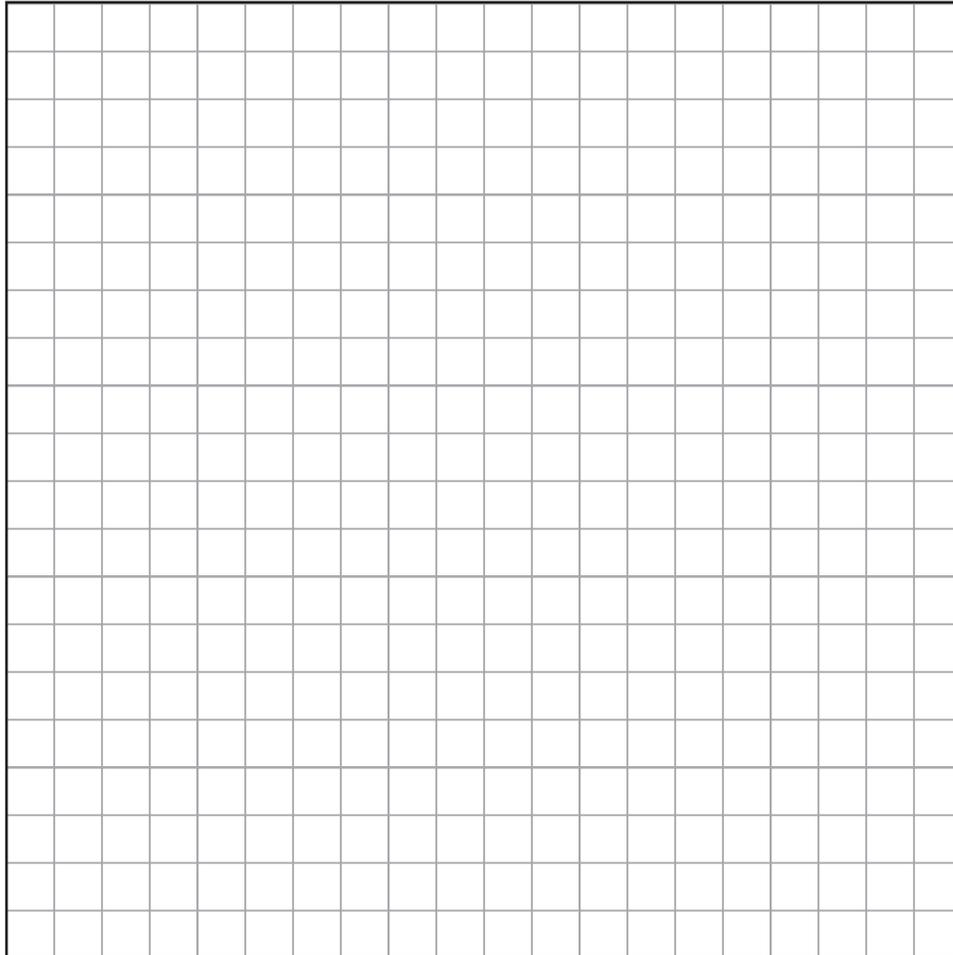
- 33 The accompanying table shows the average salary of baseball players since 1984. Using the data in the table, create a scatter plot on the grid on the next page and state the exponential regression equation with the coefficient and base rounded to the *nearest hundredth*.

Using your written regression equation, estimate the salary of a baseball player in the year 2005, to the *nearest thousand dollars*.

**Baseball Players' Salaries**

<b>Numbers of Years Since 1984</b>	<b>Average Salary (thousands of dollars)</b>
0	290
1	320
2	400
3	495
4	600
5	700
6	820
7	1,000
8	1,250
9	1,580

**Question 33 continued**



34 Express in simplest form:  $\frac{4x + 8}{x + 1} \cdot \frac{2 - x}{3x - 15} \div \frac{x^2 - 4}{2x^2 - 8x - 10}$

# Formulas

## Area of Triangle

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

## Law of Cosines

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

## Functions of the Sum of Two Angles

$$\begin{aligned} \sin(A + B) &= \sin A \cos B + \cos A \sin B \\ \cos(A + B) &= \cos A \cos B - \sin A \sin B \end{aligned}$$

## Functions of the Double Angle

$$\begin{aligned} \sin 2A &= 2 \sin A \cos A \\ \cos 2A &= \cos^2 A - \sin^2 A \\ \cos 2A &= 2 \cos^2 A - 1 \\ \cos 2A &= 1 - 2 \sin^2 A \end{aligned}$$

## Functions of the Difference of Two Angles

$$\begin{aligned} \sin(A - B) &= \sin A \cos B - \cos A \sin B \\ \cos(A - B) &= \cos A \cos B + \sin A \sin B \end{aligned}$$

## Functions of the Half Angle

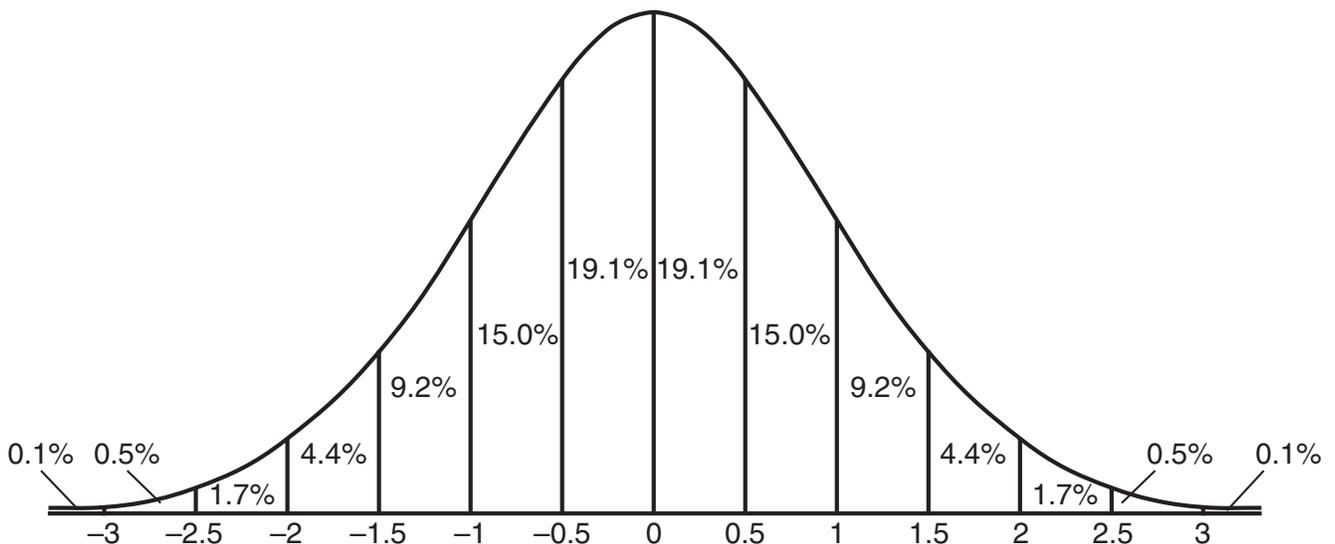
$$\begin{aligned} \sin \frac{1}{2} A &= \pm \sqrt{\frac{1 - \cos A}{2}} \\ \cos \frac{1}{2} A &= \pm \sqrt{\frac{1 + \cos A}{2}} \end{aligned}$$

## Law of Sines

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

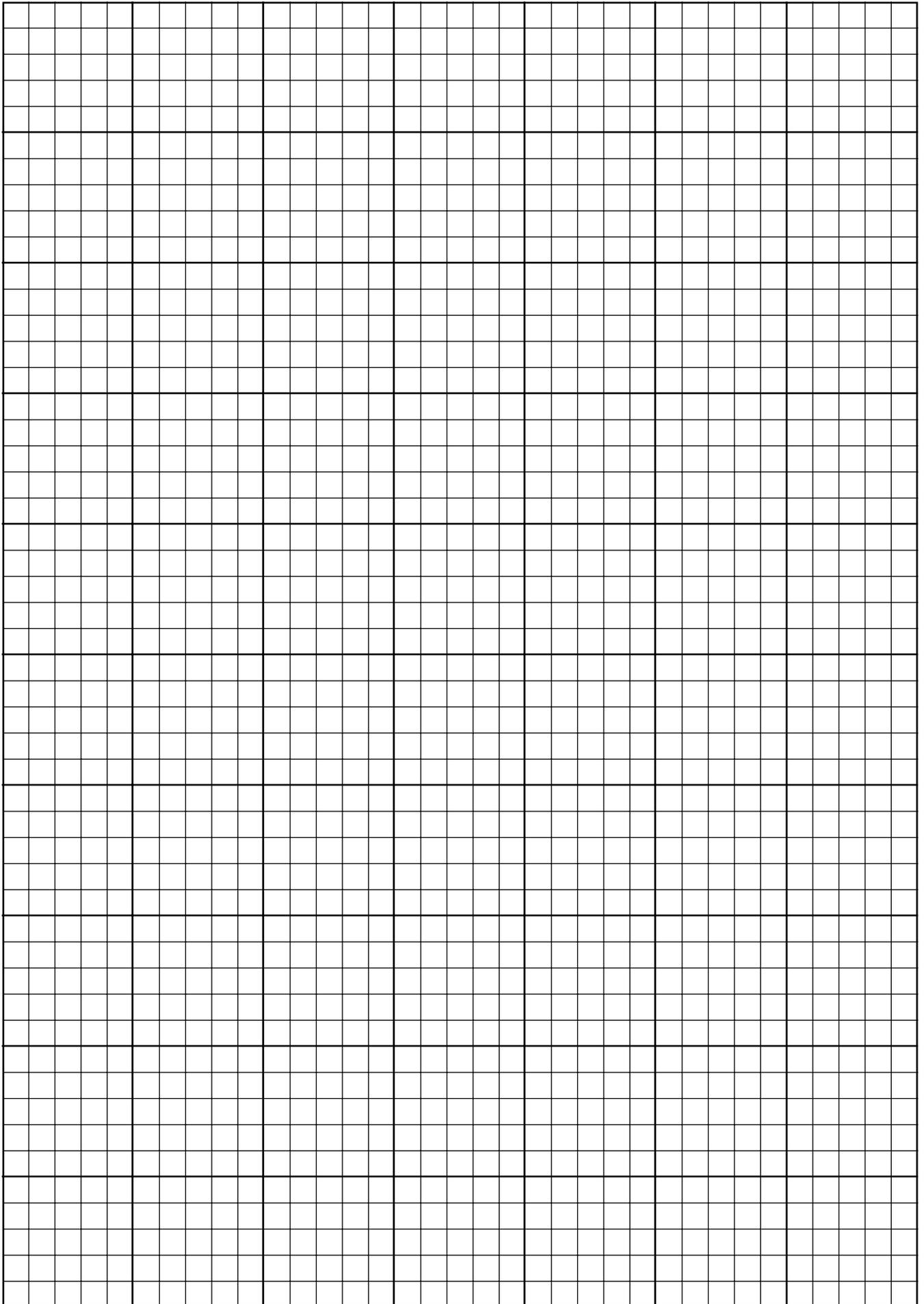
## Normal Curve

### Standard Deviation



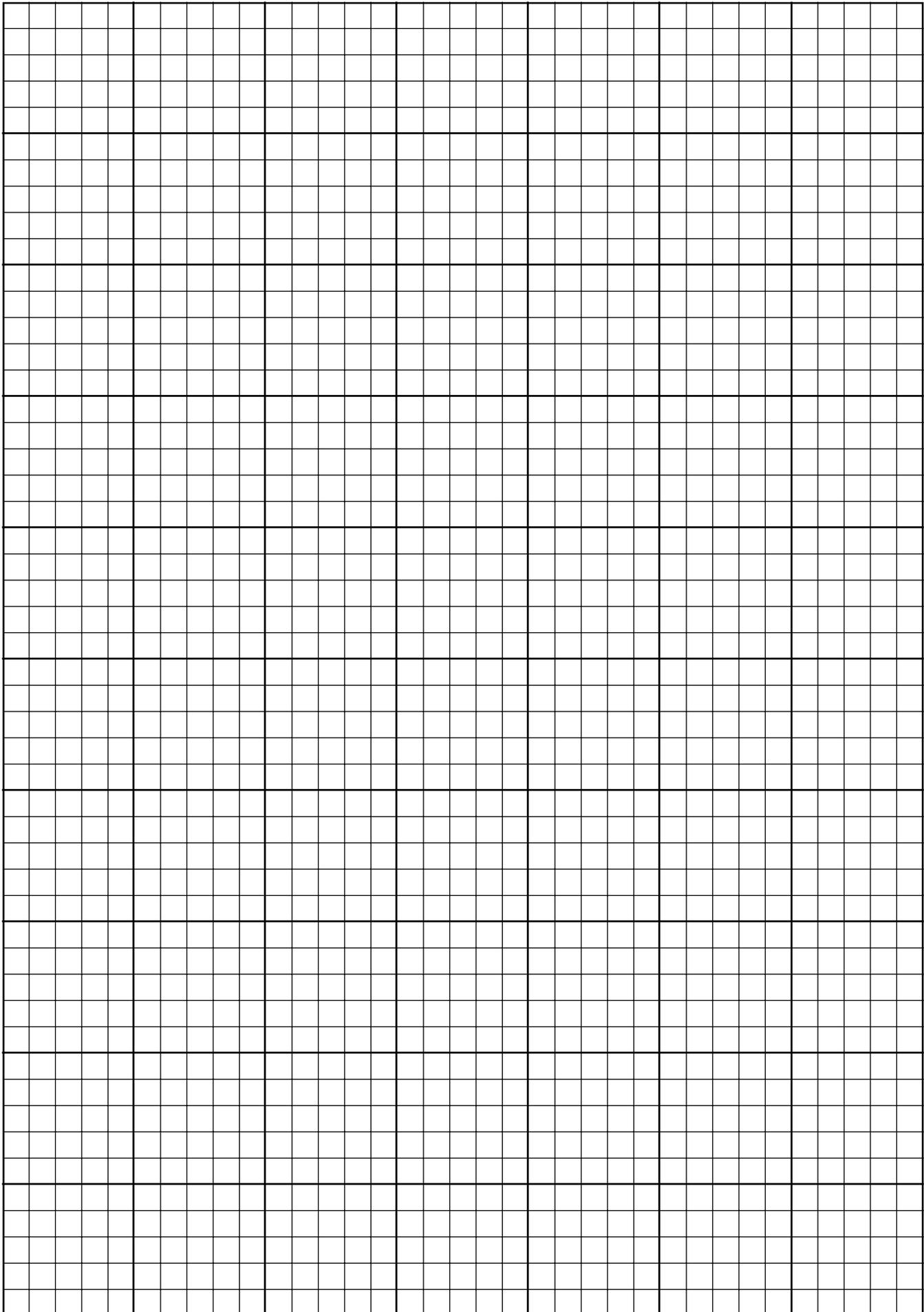
Scrap Graph Paper — This sheet will *not* be scored.

Tear Here



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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Thursday, January 29, 2004 — 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

Thursday, January 29, 2004 — 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 Administering and Scoring the Regents Examinations in Mathematics A and Mathematics B*.

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's detachable answer sheet. Then the student's total raw score should be converted to a scaled score by using the conversion chart printed at the end of this key. The student's scaled score should be entered in the box provided on the student's detachable answer sheet. The scaled score is the student's final examination score.

#### Part I

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

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

**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]  $\frac{5\pi}{4}$  or an equivalent answer in radian measure, 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] 225 or 225°, but appropriate work is shown.

**or**

[1] The measure of the angle in a counterclockwise rotation is found, resulting in an answer of  $\frac{3\pi}{4}$ .

**or**

[1]  $\frac{5\pi}{4}$  or an equivalent answer in radian measure, 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] 307, 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 to find the value of the reference angle, but no further correct work is shown.

**or**

[1] 307, 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] 1,032, 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] 1,032, but no work is shown.

[0] Direct variation is used instead of inverse variation.

*or*

[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] 5, and appropriate work is shown.

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

*or*

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

*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.

(25) [2] 8, and appropriate work is shown.

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

*or*

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

*or*

[1] 8, 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] Two, and appropriate work is shown or an appropriate diagram is drawn.

[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 one correct solution is found.

*or*

[1] Two, 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] 4, and appropriate work is shown.

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

*or*

[3] Appropriate work is shown, but  $x = -1$  is not rejected.

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

*or*

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

*or*

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

*or*

[2] A quadratic equation of equal difficulty is solved appropriately.

[1] Both sides of the equation are squared correctly, but no further correct work is shown.

*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*

- (28) [4]  $\frac{513}{625}$  or 0.821 or an equivalent answer, and appropriate work is shown, such as
- $${}_4C_2\left(\frac{2}{5}\right)^2\left(\frac{3}{5}\right)^2 + {}_4C_1\left(\frac{2}{5}\right)^1\left(\frac{3}{5}\right)^3 + {}_4C_0\left(\frac{2}{5}\right)^0\left(\frac{3}{5}\right)^4.$$

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

**or**

[3] Appropriate work is shown, but a value for *at least* two,  $\frac{328}{625}$ , is found.

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

**or**

[2] An appropriate answer is found, but one conceptual error is made, such as multiplying the probabilities or using five as the number of spins.

**or**

[2] Appropriate work is shown, but a value for *less than* two,  $\frac{297}{625}$ , is found.

[1] Appropriate work is shown, but a value for *exactly* two,  $\frac{216}{625}$ , is found.

**or**

[1]  $\frac{513}{625}$  or 0.821 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*

- (29) [4] 14,000, 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.
- or**
- [2] A correct equation such as  $\log \frac{1}{5} = \left(\frac{t}{6,000}\right) \log 0.5$  is written, but no further correct work is shown.
- [1] The correct substitutions are made, but no further correct work is shown.
- or**
- [1] 14,000, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (30) [4] 116, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [3] Appropriate work is shown, but the supplement of the correct answer, 64, is 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.
- [1] The correct substitutions are made into the Law of Cosines, but no further correct work is shown.
- or**
- [1] 116, 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] A correct graph is sketched and 1.25, and appropriate work is shown.
- [3] A correct graph is sketched, but one computational or rounding error is made in determining the time.
- or*
- [3] Appropriate work is shown, but one error is made in sketching the graph, such as the axes are not labeled or are labeled incorrectly, but the time is determined correctly.
- or*
- [3] A correct graph is sketched and appropriate work is shown to calculate the time, but the negative root is not rejected.
- [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 graph is sketched, but no further correct work is shown.
- or*
- [2] Appropriate work is shown to calculate the time, but no graph or an incorrect graph is sketched.
- [1] Appropriate work is shown to calculate the time, but one computational or rounding error is made, and no graph or an incorrect graph is sketched.
- or*
- [1] Appropriate work is shown to calculate the time, but the negative root is not rejected, and no graph or an incorrect graph is sketched.
- or*
- [1] 1.25, but no graph or an incorrect graph is sketched, and 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] An appropriate diagram is drawn, and a correct proof is written in statement-reason or paragraph form, such as stating that  $\triangle AOB$  cannot have two right angles or that two perpendiculars cannot be drawn to  $\overline{PA}$  from point  $O$ .

[3] An appropriate diagram is drawn and an appropriate reason is written to show  $\overline{OA} \perp \overline{PA}$ , but one statement or one reason is incomplete or is incorrect, but an appropriate conclusion is drawn.

***or***

[3] The diagram is not drawn, but a complete and correct proof is written.

[2] An appropriate diagram is drawn, and an appropriate reason is written to show  $\overline{OA} \perp \overline{PA}$ , but one statement and one reason are incomplete or are incorrect, but an appropriate conclusion is drawn.

[1] An appropriate diagram is drawn, but the proof contains circular reasoning.

[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 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] An appropriate scatter plot is drawn, and either  $y = 276.67(1.21)^x$  and \$15,151,000 or  $y = 276673.91(1.21)^x$  and \$15,152,000.

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

**or**

[5] Appropriate work is shown, but one error is made in rounding the coefficients or by substituting an incorrect value of  $x$  for the year 2005.

**or**

[5] Appropriate work is shown, but an incorrect nonlinear function for the regression equation is written, but an appropriate salary is found.

**or**

[5] No scatter plot or an incorrect scatter plot is drawn, but the correct regression equation is written, and the correct salary is found.

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

**or**

[4] No scatter plot or an incorrect scatter plot is drawn, and one rounding error is made, but the correct regression equation is written, and an appropriate salary is found.

[3] Appropriate work is shown, but a linear function for the regression equation is written, but an appropriate salary is found.

**or**

[3] An appropriate scatter plot is drawn, and the correct regression equation is written, but no further correct work is shown.

[2] An appropriate scatter plot is drawn, and the correct salary is found, but no work or regression equation is shown.

**or**

[2] An appropriate scatter plot is drawn, but an incorrect regression equation is written, but an appropriate salary is found.

[1] No scatter plot or an incorrect scatter plot is drawn, and an incorrect regression equation is written, but an appropriate salary is found.

**or**

MATHEMATICS B – *concluded*

- [1] An appropriate scatter plot is drawn, 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]  $-\frac{8}{3}$ , and appropriate work is shown.
- [5] Appropriate work is shown, but one computational error is made.
- [4] Appropriate work is shown, but two or more computational errors are made.
- [3] Appropriate work is shown, but one conceptual error is made, such as not factoring out  $-1$  when canceling out  $2 - x$ .
- [2] Appropriate work is shown, but one conceptual error and one computational error are made.
- [1]  $-\frac{8}{3}$ , 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.
- 

**Map to Learning Standards**

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

## Regents Examination in Mathematics B

January 2004

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

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

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

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key 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.