

FOR TEACHERS ONLY

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

MATHEMATICS B

Thursday, January 30, 2003 — 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) 2	(6) 2	(11) 2	(16) 2
(2) 1	(7) 1	(12) 3	(17) 3
(3) 3	(8) 1	(13) 4	(18) 2
(4) 4	(9) 4	(14) 4	(19) 4
(5) 3	(10) 3	(15) 2	(20) 1 or 3

Part II

For each question, use the specific criteria to award a maximum of two credits.

- (21) [2] An appropriate explanation is given, such as:

One very high or very low score in either class would have a great effect on the range for that class, but might not affect the median at all. The range is the difference between the two most extreme values, the lowest and the highest. The median, being the middle value, is not very sensitive to outliers or to extreme values.

or

- [2] Specific examples are shown to illustrate the situation.

[1] An understanding of median and range is demonstrated, but the specific situation is not explained.

[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] Maximum, and an appropriate reason is given, such as the value of a is negative (less than 0) or the graph opens downward.

[1] Minimum, but an appropriate reason is given, based on an incorrect equation, such as an error in finding the axis of symmetry.

[0] Maximum or minimum, but no reason or an inappropriate reason is given.

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*

- (23) [2] 65,797.36, and appropriate work is shown.
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or***
- [1] An incorrect derivation of the equation is solved appropriately.
- or***
- [1] 65,797.36, 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] 1,584.89, and appropriate work is shown.
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or***
- [1] 1,584.89, 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] $-7 + i$, and appropriate work is shown, such as $(-2 + i)(3 + i)$.
- [1] Appropriate work is shown, but one computational error is made.
- or***
- [1] $-7 + i$, but no work is shown.
- [0] $(-2 + i)(3 + i)$ is shown but not multiplied, or the values are added instead of multiplied.
- 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*

(26) [2] $-4 \leq C \leq 36$, and appropriate work is shown.

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

or

[1] Appropriate work is shown, but only one extreme value is found.

or

[1] $-4 \leq C \leq 36$, but no work is shown.

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

Part III

For each question, use the specific criteria to award a maximum of four credits.

- (27) [4] $\frac{1}{2}$ or 50%, $\frac{15.9}{100}$ or 0.159, and $\frac{0.159}{0.977}$ or an equivalent answer, and appropriate work is shown.

[3] Correct answers are found for either part *a* or part *b* and for part *c*.

[2] Correct answers are found for part *a* and part *b*, but the answer for part *c* is missing or is incorrect.

or

[2] Only the correct answer for part *b* is found, and one computational or substitution error is made in determining the answer to part *c*.

[1] Only the correct answer for either part *a* or part *b* is found.

or

[1] $\frac{1}{2}$ or 50%, $\frac{15.9}{100}$ or 0.159, and $\frac{0.159}{0.977}$ 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*

- (28) [4] *a* $y = 0.8344648562x + 14.64960064$ or an equivalent answer expressed to three significant digits

and

b 80, and appropriate work is shown.

- [3] One computational error is made or one rounding error is made with one of the numbers in the equation, such as truncating or not giving at least three significant digits.

- [2] Only the correct answer for either part *a* or part *b* is found.

or

- [2] Appropriate work is shown, but more than one computational or rounding error is made.

- [1] 78 is substituted into an incorrect linear equation, but it is evaluated appropriately.

or

- [1] $y = 0.8344648562x + 14.64960064$ and 80, but no work is shown.

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

- (29) [4] 4.1 and the equation $T = 8 \cos t + 78$ is graphed correctly and appropriate work is shown to determine the amount of time, such as using the table function of the graphing calculator or estimating (3.9–4.3 hours) based on the graph.

- [3] The equation $T = 8 \cos t + 78$ is graphed correctly and the correct intervals are stated, but the number of hours is not found or is incorrect.

- [2] The equation $T = 8 \cos t + 78$ is graphed correctly, but no further correct work is shown.

or

- [2] The equation $T = 8 \cos t + 78$ is graphed incorrectly, but an appropriate number of hours is found, based on the incorrect graph.

- [1] 4.1, 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] The side equals 2.3 and the area equals 25.5, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- [2] Appropriate work is shown, but one incorrect formula is used, such as using an incorrect trigonometric function, but appropriate answers are found.
- or**
- [2] Appropriate work is shown to find the correct side, but no further correct work is shown.
- [1] The radius equals 3 and the central angle equals 45° , but no further correct work is shown.
- or**
- [1] The side equals 2.3 and the area equals 25.5, 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.
- (31) [4] $(f \circ g)(x) = 4x^{-\frac{1}{3}}$ or $\left(8x^{-\frac{1}{2}}\right)^{\frac{2}{3}}$ or an equivalent answer and $(f \circ g)(27) = \frac{4}{3}$ or an equivalent answer, and appropriate work is shown.
- [3] Simplification is shown to at least $4x^{-\frac{1}{3}}$, but one computational error or an error in the Law of Exponents is made when finding $(f \circ g)(27)$.
- [2] $(f \circ g)(x)$ is determined correctly, but $(f \circ g)(27)$ is not found or is found incorrectly.
- or**
- [2] $\frac{4}{3}$ or an equivalent answer, and appropriate work is shown, but an expression for $(f \circ g)(x)$ is not found or is found incorrectly.
- [1] $4x^{-\frac{1}{3}}$ and $\frac{4}{3}$ or equivalent answers, 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) *a* [2] Appropriate sketches of the functions are shown, and the horizontal line tests are used to explain why the statement is true.

or

- [2] An explanation is given that the inverse of g is a function and the inverse of f is not a function, which includes a definition of the relationship between a function and its inverse or the vertical line test.

or

- [2] Appropriate sketches of the inverses are shown that use the vertical line test to explain why the statement is true.

or

- [2] The correct inverses are found algebraically, and appropriate explanations are given.

- [1] An explanation is given that indicates only that g is a 1:1 function or that g passes the horizontal line test.

or

- [1] An explanation is given that indicates only that f is not a 1:1 function or that f does not pass the horizontal line test.

- b* [2] 3.2, and appropriate work is shown.

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

or

- [1] 3.2, but no work is shown.

a and b

- [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.

(33) a and b

[6] $\overline{KA} \parallel \overline{ET}$, $\overline{AT} \not\parallel \overline{KE}$, and $\overline{KE} \neq \overline{AT}$, and appropriate work is shown.

[5] Appropriate work is shown, but one computational error leads to incorrect conclusions that are appropriate, based on that error.

[4] Appropriate work is shown to find $\overline{KA} \parallel \overline{ET}$ or $\overline{AT} \not\parallel \overline{KE}$ and $\overline{KE} \neq \overline{AT}$, but no further correct work is shown.

[3] Appropriate work is shown to find $\overline{KE} \neq \overline{AT}$, and at least three of the four slopes are found correctly, but no statement regarding parallelism is made.

or

[3] Appropriate work is shown to find the four slopes, and correct statements of parallelism are made, but no further correct work is shown.

[2] Appropriate work is shown to find unequal sides, but no further correct work is shown.

or

[2] Appropriate work is shown to find the four slopes, but no conclusion is drawn.

or

[2] The four slopes are correct, but no work is shown, but appropriate opposite sides are stated to be parallel and nonparallel.

or

[2] The slope and distance formulas are used, but more than one computational error is made, but one accurate conclusion is drawn.

[1] Only two correct slopes or distances are found.

[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 – *concluded*

(34) [6] 330, and appropriate work is shown, such as solving $\frac{\sin 13}{250} = \frac{\sin 37}{y}$ and calculating $\cos 50 = \frac{x}{668.8288536}$ and subtracting 100.

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

or

[5] Appropriate work is shown, but 100 is not subtracted from the answer.

or

[5] An incorrect trigonometric function is used, but the rest of the work is appropriate.

[4] The Law of Sines is used incorrectly, such as using the wrong angle measure, but an appropriate distance from the rocks is found.

[3] The Law of Sines is used correctly, but no answer or an incorrect answer is found.

[2] The Law of Sines is used without finding the angles correctly, and no answer or an incorrect answer is found.

[1] Only a correct diagram is drawn.

or

[1] 330, 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

Map to Learning Standards

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

Regents Examination in Mathematics B

January 2003

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

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.