

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.

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.

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.
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Map to Learning Standards

Key Ideas	Item Numbers
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.