FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS B

Friday, January 25, 2002 — 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) 3	(6) 2	(11) 3	(16) 4
(2) 1	(7) 3	(12) 2	(17) 2
(3) 4	(8) 1	(13) 3	(18) 2
(4) 1	(9) 3	(14) 1	(19) 4
(5) 2	(10) 4	(15) 2	(20) 3

Part II

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

(21) **[2]** An explanation is given that indicates that a set of data can represent inverse variation if the product of two variables is constant, and a correct table of values is shown.

[1] The rule for direct rather than inverse variation is stated, but an appropriate equation and table of values are shown.

or

[1] An example of inverse variation is shown, but no explanation of why it is an inverse variation is given.

or

[1] An explanation is given that indicates that a set of data can represent inverse variation, but no table of values 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]** $-4 \pm 3i$, and appropriate work is shown.

[1] The quadratic formula is used correctly, but one computational error is made.

or

[1] $\frac{-8 \pm 6i}{2}$, but appropriate work is shown.

or

[1] $-4 \pm 3i$, 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.

(23) **[2]** 9.42, and appropriate work is shown, such as changing the angle to radians and finding s.

[1] The formula $s = \theta r$ is stated, but 54° is not converted to radian measure.

or

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

or

[1] 9.42, 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 and 2, $1 < x < 2$, or $1 < 1.854 < 2$, and appropriate work is shown.

[1] $\frac{3}{h} = \frac{h}{3-h}$ is shown, but one computational error is made.

or

[1] The positive root, 1.854, is obtained from the quadratic, but the two correct consecutive integers are not stated.

or

[1] 1 and 2, 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]** 164.2, and appropriate work is shown.

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

or

[1] 164.2, 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]** 0.624 or 62.4%, and appropriate work is shown.

[1] The correct standard deviations of –1.5 and +0.5 are found, but an incorrect probability is calculated.

or

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

or

[1] 0.624 or 62.4%, 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.

Part III

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

(27) **[4]** 3.8, and the Law of Cosines is used.

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

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

or

[2] The Law of Cosines is shown, but sine is used instead of cosine, such as $x^2 = 3.2^2 + 5.6^2 - 2(3.2)(5.6)(\sin 40)$, but an appropriate answer is determined, based on that error.

[1] Substitution into the Law of Cosines is used, but no further work is shown.

or

[1] 3.8, 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.

(28) **[4]** \$6.15, and appropriate work is shown, such as solving simultaneous equations or using a trial-and-error method.

[3] \$2.95 (movie) and \$3.20 (game) are found, but they are not added.

or

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

[2] The system of equations is set up correctly, but one conceptual error leads to an appropriate solution.

or

[2] \$2.95 (movie) or \$3.20 (game), and appropriate work is shown.

[1] \$6.15, 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]** $\frac{51}{243}$, and appropriate work is shown.

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

[2] Appropriate work is shown, but the probabilities for the teams are switched.

or

[2] Correct substitution is made, but no further work is shown.

or

[2] Correct substitution is made, but an incorrect mathematical operation is used, such as multiplication instead of addition.

or

[2] The probability for "at most three" or "more than 3" is found, but appropriate work is shown.

[1] $\frac{40}{243}$, and exactly three games are shown.

or

[1] $\frac{51}{243}$, 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]** 4.5, and appropriate work is shown, such as using logs to solve the equation $0.2 = 0.7^t$.

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

[2] Substitution with $r = 30$ is shown and the log of both sides is determined, but the domain error is not recognized, such as $\log 0.2 = t \log (-29)$.

or

[2] The order of operations is used incorrectly and an exponential function is maintained, but t is solved for appropriately, using logs.

[1] Substitution with $r = 0.3$ is shown, resulting in $0.2 = 0.7^t$, but no further work is shown.

or

[1] 4.5, 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]** $1 \le t \le 3$, and appropriate work is shown, such as $-16t^2 + 64t + 4 \ge 52$.

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

or

[3] An incorrect inequality is written, but the resulting quadratic inequality is solved appropriately.

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

or

[2] The quadratic equation $-16t^2 + 64t + 4 = 52$ is solved appropriately, and both solutions are found.

[1] An incorrect quadratic equation of equal difficulty is solved appropriately, but one computational error is made.

or

[1] $1 \le t \le 3$, 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.

(32) *a* **[2]** The equation $2y = 2x^2 - 4$ is graphed correctly over the required interval and labeled.

[1] An appropriate graph is shown, but less than the required interval is drawn.

or

[1] An appropriate graph is shown, but one coordinate is calculated incorrectly.

b **[2]** A correct composition of transformations of the graph drawn in part *a* is sketched and labeled.

[1] Only one of the transformations is correct.

or

[1] The composition of transformations is correct, but done in reverse order.

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.

Part IV

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

(33) **[6]** Either a correct Euclidean proof is written, with a concluding statement that the diagonals bisect each other, or a correct analytic proof using coordinate geometry is written, with a concluding statement that the diagonals bisect each other.

[5] One reason is omitted or incorrect.

or

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

[4] The appropriate triangles are proven to be congruent, but the corresponding parts and a final statement that indicates why the diagonals are bisected are omitted.

or

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

or

[4] A correct analytic proof using coordinate geometry is written, but no concluding statement is made.

[3] An appropriate conclusion is drawn, including a statement that indicates why the diagonals are bisected; but only a partial proof is written, with two steps missing, and errors in the statements or reasons are made.

or

[3] An analytic proof using coordinate geometry with more than two errors is written, but an appropriate concluding statement is made.

or

[3] The diagram in an analytic proof is labeled incorrectly or numerically, but the rest of the proof is correct.

[2] Statements for the Euclidean proof are written, but no valid reasons are given.

or

[2] A congruence proof is written with some valid statements and reasons, but a concluding statement that the diagonals bisect each other is not made.

[1] A correctly labeled diagram for a Euclidean proof is shown, but no proof is written.

or

[1] An analytic proof using coordinate geometry with more than two errors is written, but no concluding statement is made.

[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]** A correct scatter plot, $y = 0.62x + 29.18$, $r = 0.92$, and 83; and appropriate work is shown.

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

or

[5] A correct scatter plot, equation, and score are shown, but no *r*-value is found.

[4] A correct scatter plot and equation are shown, but the *r*-value and score are missing or incorrect.

or

[4] An incorrect equation is shown, but all further work is appropriate.

or

[4] The scatter plot is missing or incorrect, but all further work is appropriate.

[3] The scatter plot is incorrect, but a correct equation and either a correct *r*-value or score are found.

or

[3] The scatter plot is correct, but an incorrect equation and either an appropriate *r*-value or score based on the incorrect equation are found.

[2] Only a correct scatter plot is shown, and all further work is missing or incorrect.

or

[2] Only a correct equation is shown, and all further work is missing or incorrect.

[1] An incorrect equation is shown, but an appropriate score is found.

[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

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

Regents Examination in Mathematics B

January 2002

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

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.