FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Tuesday, January 22, 2002 — 1:15 to 4:15 p.m., only

SCORING KEY

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Mathematics A 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) 3	(11) 4	(16) 4
(2) 4	(7) 4	(12) 2	(17) 1
(3) 3	(8) 1	(13) 3	(18) 1
(4) 2	(9) 2	(14) 1	(19) 3
(5) 1	(10) 2	(15) 3	(20) 1

Part II

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

(21) **[2]** 23, and appropriate work is shown.

[1] Appropriate work is shown, but no answer or an incorrect answer is found.

or

[1] 23, 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]** 15, and any equivalent proportion, equation, or fraction conversion is shown, such as $\frac{12}{16} = \frac{x}{20}$.

[1] An appropriate proportion, equation, or fraction conversion is shown, but one computational or conceptual error is made.

or

[1] An incorrect proportion, equation, or fraction conversion is shown, but an appropriate answer is found for the incorrect proportion.

or

[1] 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.

(23) **[2]** 32, and appropriate work is shown, such as a diagram or "let" statements and an appropriate equation, such as $5x + 20 = 180$.

or

[2] 32, and an appropriate trial-and-error method with at least two trials and appropriate checks are shown.

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

or

[1] An incorrect equation set equal to 180° is shown, but it is solved appropriately, such as $4x + 20 = 180$; or an incorrect equation set equal to 360° is shown, such as $5x + 20 = 360$.

or

[1] 32, and an appropriate trial-and-error method with less than two trials and appropriate checks are shown.

or

[1] 32, 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]** $7x - 2$ or $x + 3x + 3x - 2$, and appropriate work is shown, such as $x + 3x + 3x - 2$ when chips = x, pretzels = $3x$, and nachos = $3x - 2$.

[1] The expressions for snacks are represented correctly, but one computational error is made in adding the expressions.

or

[1] The expressions for snacks are represented incorrectly, but the expressions are added appropriately.

or

[1] $7x - 2$, 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]** A correct triangle with the longest side on $\overline{PQ}$ and a vertex at P is drawn, and three appropriate arcs are shown.

[1] A correct triangle is constructed on $\overline{PQ}$, but P is not a vertex.

or

[1] A correct triangle is constructed with no sides on $\overline{PQ}$.

[0] A triangle that is not congruent to the correct solution or a triangle with less than three arcs 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.

Part III

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

(26) **[3]** Jerry, and appropriate work is shown, such as the following explanation: Jerry traveled 7 miles at a rate of 5 miles per hour and his time was $1\frac{2}{5}$ hours; Jean traveled 5 miles at a rate of 3 miles per hour for a time of $1\frac{2}{3}$ hours.

[2] The time for each jogger is calculated appropriately, but an error is made in determining one of the distances, but an appropriate answer is found.

or

[2] The time for each jogger is calculated correctly, but the question of which person reached *C* first is not answered.

or

[2] Both distances are calculated correctly, but an error is made in determining times, but an appropriate answer is found.

[1] Only the distances are calculated correctly. No answer to the question is found or an answer is found based on distance only.

or

[1] The time for only one jogger is calculated correctly, and the question of which person reached *C* first is not answered.

or

[1] The time for both joggers is calculated appropriately, but multiple computational errors are made.

or

[1] Jerry and $1\frac{2}{5}$ hours and $1\frac{2}{3}$ hours, but no work is shown.

[0] Jerry, 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.

(27) **[3]** 47, and appropriate work is shown.

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

or

[2] The correct numerical value of the volume of the cup (20π or its equivalent) and the volume of the tank (3,000) are shown, but the solution is not completed.

[1] The correct volume of only the cup or only the tub is shown.

or

[1] 47, 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) **[3]** \$16,400, and appropriate work is shown, such as

$$\begin{array}{lrl} 200 \text{ tickets sold at the door} & \times \$32 = & \$\ 6{,}400 \\ 400 \text{ tickets sold in advance} & \times \$25 = & \underline{\$10{,}000} \\ & & \$16{,}400 \end{array}$$

[2] The correct number of tickets is shown, but one computational error is made in computing the total amount of money collected.

or

[2] \$6,400 and \$10,000 are calculated correctly, but they are not added to obtain the total.

[1] The numbers of tickets, 200 and 400, are calculated correctly.

or

[1] An appropriate solution is found, but it is based on incorrect numbers of tickets.

or

[1] \$16,400, 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) **[3]** 80, and appropriate work is shown.

[2] $x = 30$ is shown, but the student fails to substitute to find m$\angle AEC$.

or

[2] $x = 30$ is shown, but the student states that the answer is 100°, by finding the supplement of $\angle AEC$.

or

[2] The student makes one computational error in the solution of the correct equation $4x - 40 = x + 50$ but appropriately substitutes the incorrect value to solve for m$\angle AEC$.

[1] The student makes one computational error in the solution of the correct equation $4x - 40 = x + 50$ and fails to substitute to find m$\angle AEC$.

or

[1] The student makes more than one computational error in the solution of the correct equation $4x - 40 = x + 50$, but appropriately substitutes the incorrect value to solve for m$\angle AEC$.

or

[1] 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.

(30) **[3]** 59 or 59°, and appropriate work is shown, such as $63 = \frac{256 + x}{5}$ or $56 + 72 + 67 + 61 = 256$, $63 \times 5 = 315$, and $315 - 256 = 59$.

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

or

[2] A value is chosen for Friday's temperature that rounds to 63, such as 57 or 61, but whose mean is not exactly 63, and appropriate work is shown.

[1] A limited understanding of the concept of the mean is shown, such as the sum of the temperatures must be 315, but the given temperatures are not subtracted.

or

[1] The correct mean of the four given temperatures is calculated.

or

[1] 59 or 59°, 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 four credits.

(31) **[4]** $\frac{8}{36}$ or $\frac{2}{9}$ or 2:9, and all three lines are graphed correctly and the triangle's area is shown to be 8 and the square's area is shown to be 36.

[3] The three lines are graphed correctly, but one area is incorrect, but the probability is appropriate, based on this error.

or

[3] The graphs and areas are correct, but the probability is incorrect, based on one computational error.

or

[3] The three lines are graphed correctly and both areas are calculated correctly, but the probability is not found.

or

[3] One equation is graphed incorrectly, but the area is appropriate, based on the graph, and the probability is appropriate, based on the areas.

[2] The three lines are graphed correctly, but the area of the smaller triangle is used, but the probability is appropriate, such as $\frac{2}{36}$.

or

[2] Two or three lines are graphed incorrectly, but the areas and the probability are appropriate.

or

[2] The lines are graphed correctly, but the areas are incorrect, but the probability is appropriate, based on the errors.

[1] All graphs and the areas are incorrect, but the probability is appropriate.

or

[1] $\frac{8}{36}$ or $\frac{2}{9}$ or 2:9, 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.

(32) **[4]** Milk Chocolate bar = \$0.75 and Creamy Nougat bar = \$0.50, and appropriate work is shown, such as equations, a trial-and-error method with at least two trials and appropriate checks, or an algebraic or graphic solution.

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

[2] The cost of one candy bar is determined correctly with appropriate work shown, but no attempt is made to find the cost of the other candy bar.

or

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

[1] Appropriate work is shown, but no answer is found.

or

[1] Milk Chocolate bar = \$0.75 and Creamy Nougat bar = \$0.50, 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.

(33) **[4]** $x(x + 10) = 144$ or an equivalent equation and 8 = width and 18 = length, and appropriate work is shown.

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

or

[3] A correct equation is used and a correct solution is found, but only one dimension is identified.

[2] An appropriate solution is found to an incorrect equation of equal difficulty.

or

[2] A correct equation set equal to zero is shown, with no further work or incorrect work.

[1] A conceptual error is made, such as writing the equation $2x + 2(x + 10) = 144$, but the dimensions are found appropriately.

or

[1] $x(x + 10) = 144$ and 8 = width and 18 = length, 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.

(34) **[4]** The inequalities $x \leq 10$, $y \leq 12$, and $x + y \leq 16$ are graphed and shaded correctly on the given set of axes.

[3] All inequalities are graphed and shaded correctly, but one incorrect type of line (dashed or broken) is used.

or

[3] All three inequalities are graphed correctly, but one inequality is not shaded or is shaded incorrectly.

or

[3] The inequality $x + y \leq 16$ is graphed correctly, but an error is made in graphing either the horizontal or vertical line, but they are shaded appropriately.

or

[3] Only two of the three inequalities are graphed correctly, but all three are shaded appropriately.

[2] All three inequalities are graphed correctly, but two are shaded incorrectly.

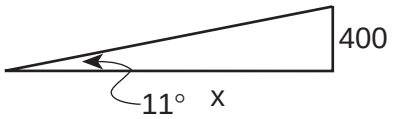
or

[2] Only two of the three inequalities are graphed and shaded correctly.

[1] Only one of the three inequalities is graphed and shaded correctly.

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

(35) **[4]** 2,058, and appropriate work is shown, such as the accompanying diagram and equation.



$\tan 11° = \frac{400}{x}$

[3] Appropriate work is shown, including a correct diagram and the use of the tangent function, but one computational error is made.

or

[3] Appropriate work is shown, including a correct diagram and the use of the tangent function, but the answer is not rounded or is rounded incorrectly.

[2] A correct diagram is drawn, but an incorrect trigonometric function is selected, but it is solved and rounded appropriately.

or

[2] A correct diagram is drawn and the tangent function is selected, but no further work is shown.

or

[2] An incorrect diagram is drawn, but the appropriate trigonometric function, based on the drawing, is selected, solved, and rounded appropriately.

[1] An incorrect diagram is drawn and an incorrect trigonometric function is selected, but it is solved and rounded appropriately.

or

[1] Only a correct diagram is drawn.

or

[1] 2,058, 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

Key Ideas	Item Numbers
Mathematical Reasoning	14, 20, 21
Number and Numeration	17, 19
Operations	1, 5, 6, 7, 11, 12, 24
Modeling/Multiple Representation	8, 13, 16, 23, 25, 29, 34
Measurement	2, 10, 22, 26, 27, 30, 33
Uncertainty	9, 18, 31
Patterns/Functions	3, 4, 15, 28, 32, 35

Regents Examination in Mathematics A

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

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 A examination.