

An Analysis of NYS Regents Physics Exam Issues

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Presentation Overview

- Issues from the field
- Exam findings
- Issues and events
- Future directions...

Issues From the Field

What are issue(s) are uppermost in your mind at this time?

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Exam Findings

- Call for student papers, STANYS, NYS Section AAPT
- >2000 student papers were submitted
- Results from across NYS

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Initial Distribution of Papers

NYC (& Manhattan)	0
Catskill-Leatherstocking	5
Central-Western	74
Eastern	74
Mohawk Valley	80
Nassau	324
North Central	17
Northeastern	24
Northwestern	114
Southeastern	126
Southern	71
Southwestern	271
Suffolk	18
Westchester	21
Western	473

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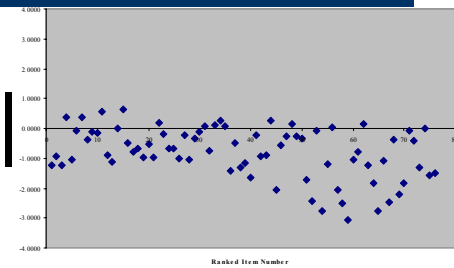
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Rasch Analysis

- Parts A and B-1; B-2 and C presented together
- Concepts
 - Difficulty – how well did the students do?
 - Discrimination – how well did an item distinguish between high and low performing students?
 - Rasch transformation – log transformation

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Item Difficulty Range



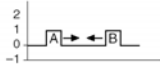
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“Easy” Items – A, B-1

Item	Key	R1	R2	R3	R4	%C	N	DE
Q45	3	57	26	860	15	89.8	958	-2.17
Q40	3	40	3	807	106	84.2	956	-1.69
Q36	2	122	777	38	21	81.1	958	-1.46
Q38	3	12	54	759	131	79.2	956	-1.35
Q3	2	129	749	38	42	78.2	958	-1.28

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45 The diagram below shows two pulses, A and B, approaching each other in a uniform medium.



Which diagram best represents the superposition of the two pulses?



(1)



(3)



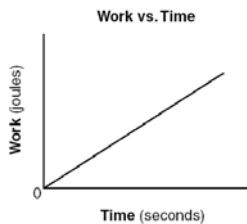
(2)



(4)

10

40 The graph below shows the relationship between the work done by a student and the time of ascent as the student runs up a flight of stairs.

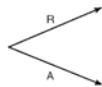


The slope of the graph would have units of

- (1) joules
- (2) seconds
- (3) watts
- (4) newtons

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36 Forces A and B have a resultant R. Force A and resultant R are represented in the diagram below.



Which vector best represents force B?



(1)



(3)



(2)



(4)

12

38 What is the approximate width of a person's little finger?

- (1) 1 m
- (2) 0.1 m
- (3) 0.01 m
- (4) 0.001 m

3 A car initially traveling at a speed of 16 meters per second accelerates uniformly to a speed of 20. meters per second over a distance of 36 meters. What is the magnitude of the car's acceleration?

- (1) 0.11 m/s^2
- (2) 2.0 m/s^2
- (3) 0.22 m/s^2
- (4) 9.0 m/s^2

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"Difficult" Items – A, B-1

Item	Key	R1	R2	R3	R4	%C	N	DE
Q15	1	324	13	42	576	33.8	955	0.67
Q11	3	69	76	352	458	36.7	955	0.54
Q4	4	313	20	237	387	40.4	957	0.39
Q7	2	95	394	320	148	41.1	957	0.36
Q34	4	122	371	46	418	43.6	957	0.25

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15 Which person has the greatest inertia?

- (1) a 110-kg wrestler resting on a mat
- (2) a 90-kg man walking at 2 m/s
- (3) a 70-kg long-distance runner traveling at 5 m/s
- (4) a 50-kg girl sprinting at 10 m/s

11 When a 12-newton horizontal force is applied to a box on a horizontal tabletop, the box remains at rest. The force of static friction acting on the box is

- (1) 0 N
- (2) between 0 N and 12 N
- (3) 12 N
- (4) greater than 12 N

15

16

4 A ball is thrown at an angle of 38° to the horizontal. What happens to the magnitude of the ball's vertical acceleration during the total time interval that the ball is in the air?

- (1) It decreases, then increases.
- (2) It decreases, then remains the same.
- (3) It increases, then decreases.
- (4) It remains the same.

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Base your answers to questions 6 and 7 on the information below.

Projectile *A* is launched horizontally at a speed of 20. meters per second from the top of a cliff and strikes a level surface below, 3.0 seconds later. Projectile *B* is launched horizontally from the same location at a speed of 30. meters per second.

6 The time it takes projectile *B* to reach the level surface is

- (1) 4.5 s
- (2) 2.0 s
- (3) 3.0 s
- (4) 10. s

7 Approximately how high is the cliff?

- (1) 29 m
- (2) 44 m
- (3) 60. m
- (4) 104 m

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34 The strong force is the force of

- (1) repulsion between protons
- (2) attraction between protons and electrons
- (3) repulsion between nucleons
- (4) attraction between nucleons

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“Easy Items” B-2, C

Item	Key	R0	R1	R2	%C	N	DE
Q59	1	16	458	--	96.6	474	-3.35
Q54	2	27	51	398	89.0	476	-2.84
Q65	1	27	447	--	94.3	474	-2.81
Q58	1	34	440	--	92.8	474	-2.56
Q69	2	23	60	391	91.0	474	-2.32

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59 Draw the best-fit straight line. [1]

54 A light bulb attached to a 120.-volt source of potential difference draws a current of 1.25 amperes for 35.0 seconds. Calculate how much electrical energy is used by the bulb. [Show all work, including the equation and substitution with units.] [2]

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Base your answers to questions 64 through 68 on the information and data table below:

Three lamps were connected in a circuit with a battery of constant potential. The current, potential difference, and resistance for each lamp are listed in the data table below. [There is negligible resistance in the wires and the battery.]

	Current (A)	Potential Difference (V)	Resistance (Ω)
lamp 1	0.45	40.1	89
lamp 2	0.11	40.1	365
lamp 3	0.28	40.1	143

64 Using the circuit symbols found in the *Reference Tables for Physical Setting/Physics*, draw a circuit showing how the lamps and battery are connected. [2]

65 What is the potential difference supplied by the battery? [1]

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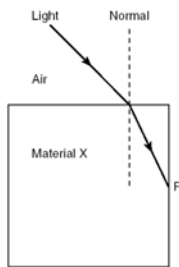
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58 Plot the data points for the square of period versus length. [1]

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A ray of light passes from air into a block of transparent material X as shown in the diagram below.



69 Measure the angles of incidence and refraction to the nearest degree for this light ray at the air into material X boundary and write your answers in the appropriate spaces in *your answer booklet*. [2]

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“Difficult” Items B-2, C

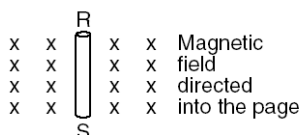
Item	Key	R0	R1	R2	%C	N	DE
Q62	1	266	207	--	43.8	473	0.25
Q48	1	253	223	--	46.8	476	0.13
Q53	1	246	230	--	48.3	476	0.07
Q74	1	243	231	--	48.7	474	0.05
Q56	1	242	233	--	49.1	475	0.04

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62 A student is given two pieces of iron and told to determine if one or both of the pieces are magnets. First, the student touches an end of one piece to one end of the other. The two pieces of iron attract. Next, the student reverses one of the pieces and again touches the ends together. The two pieces attract again. What does the student definitely know about the initial magnetic properties of the two pieces of iron? [1]

25

48 The diagram below represents a wire conductor, *RS*, positioned perpendicular to a uniform magnetic field directed into the page.



Describe the direction in which the wire could be moved to produce the maximum potential difference across its ends, *R* and *S*. [1]

26

53 What is the magnitude of the charge, in coulombs, of a lithium nucleus containing three protons and four neutrons? [1]

74 After a short time, the moving sled with the child aboard reaches a rough level surface that exerts a constant frictional force of 54 newtons on the sled. How much work must be done by friction to bring the sled with the child to a stop? [1]

56 Two monochromatic, coherent light beams of the same wavelength converge on a screen. The point at which the beams converge appears dark. Which wave phenomenon best explains this effect? [1]

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Reading Level

- McLaughlin-SMOG
- Additional Analysis Pending

Initial Analysis, Reading Levels

Exam Administration	Grade Equivalent
June 2000	8 th
June 2001	10 th (Low)
June 2002	10 th (High)
June 2003	11 th

Conceptual Level

- Modification of Bloom
 - Knowing
 - Using 1
 - Using 2
 - Integrating

Exam Conceptual Level

Exam Administration	Conceptual Level
June 2000	1.61
June 2001	1.59
June 2002	1.89
June 2003	1.74

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Exam Format

Exam Administration	MC	W	P
June 2000	75	11	3
January 2001	75	10	3
June 2001	75	11	4
January 2002	75	11	3
June 2002	45	24	12
August 2002	47	21	8
January 2003	50	27	10
June 2003	47	29	16

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AP Correlation

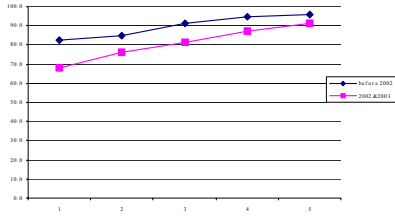
- Approximately 0.69
- Precise value varied from year to year

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NYS Physics/AP B



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Listserv Comments

- Latency -- Incomplete/unfinished tests
- Power Tests -- assessments where time does not play a significant role in the score

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Issues

Impact of Scaled Scoring on student scores in the standards-based exams

Direction of future exams

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Sessions

- NYSUT Session with Commissioner Mills
- Science Education Consortium – August
- Regents Session – September
- Senate Hearings
- NYS AAPT Meeting (SUNY Binghamton)
- Physics Summit (Albany Area)

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Additional Directions?

Where do we go from here?

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