

SCHOOL REPORT

JUNE 2011

Case Study #7

Table 1
Physics 30
Percentage of Students Who Achieved Standards on Their Final Course Mark

Standard	Final Course Mark Representing Standard (%)	Percentage of Students Who Achieved Standard
Acceptable Standard	50	91.4
Standard of Excellence	80	33.2
Number of Students Included in Report	6314	66

Table 2
Physics 30
Percentage Distribution of A, B, C, and F, Averages, and Standard Deviations of Scores

Scores	School-Awarded Mark	Diploma Examination Mark	Final Course Mark
A (80 - 100%)	46.4	66.7	51.5
B (65 - 79%)	33.5	19.7	28.8
C (50 - 64%)	16.3	10.6	15.2
F (0 - 49%)	3.8	3.0	4.5
Average Percent Score	75.4	79.8	76.6
Standard Deviation	13.7	13.8	15.2

Please refer to "Guidelines for Interpreting the Diploma Examination Detailed Reports" for suggestions about how to use this report.

$$Z = \frac{79.8 - 75.4}{13.8} = +0.32$$

$$Z = \frac{73.1 - 65.7}{17.8} = +0.36$$

$$Z = \frac{76.6 - 70.5}{15.1} = +0.37$$

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Table 3
Physics 30
Percentage of Students Who Achieved Standards on Their Final Course Mark, by Gender

Gender	Students		Students Who Achieved the Acceptable Standard		Students Who Achieved the Standard of Excellence	
	Number	Percent of Total	Number	Percent of Gender	Number	Percent of Gender
Province						
Male	3960	62.7	3588	90.6	1337	33.8
Female	2354	37.3	2184	92.8	761	32.3
School						
Male	46	69.7	45	97.8	25	54.3
Female	20	30.3	18	90.0	9	45.0

Table 4
Physics 30
Percentage Distribution of A, B, C, and F, Averages, and Standard Deviations of Scores, by Gender

Scores	School-Awarded Mark		Diploma Examination Mark		Final Course Mark			
	Province Male	Province Female	School Male	School Female	Province Male	Province Female	School Male	School Female
A (80 - 100%)	44.8	48.9	67.4	65.0	31.2	27.3	52.2	45.0
B (65 - 79%)	32.7	34.9	19.6	20.0	23.4	26.4	21.7	20.0
C (50 - 64%)	17.8	13.8	10.9	10.0	23.6	25.1	15.2	20.0
F (0 - 49%)	4.7	2.4	2.2	5.0	21.8	21.2	10.9	15.0
Average Percent	74.7	76.6	79.8	80.1	66.0	65.2	74.5	69.8
Standard Deviation	14.3	12.6	13.2	15.6	19.6	18.8	16.2	21.1

$$Z = +0.36$$

$$Z = +0.28$$

$$Z = +0.43$$

$$Z = +0.24$$

$$Z = +0.42$$

$$Z = +0.27$$

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Table 5
Physics 30
Average Raw Scores and Standard Deviations, by Item Format

Item Format	Total Marks Possible	Average Raw Score	Prov. School	Standard Deviation	Prov. School
Multiple Choice	36	24.9	26.9	6.8	6.1
Numerical Response	14	8.1	9.7	3.3	3.2

$$\frac{26.9 - 24.9}{6.8} = +0.29$$

$$z = \frac{9.7 - 8.1}{3.3} = 0.48$$

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Table 6
Physics 30
Raw Score Results, by Reporting Category

Reporting Category	Total Marks		Average Raw Score		Standard Deviation	
	Possible	Prov.	School	Prov.	School	
Momentum and Impulse (A1)	6	4.4	4.6	1.4	1.1	
Forces and Fields (B1/B2/B3)	19	11.6	13.1	3.8	3.6	
Electromagnetic Radiation (C1/C2)	14	9.5	10.6	3.1	3.1	
Atomic Physics (D1/D2/D3/D4)	11	7.6	8.2	2.6	2.3	

$$Z = \frac{4.6 - 4.4}{1.4} = +0.14$$

$$Z = +0.39$$

$$Z = +0.35$$

$$Z = +0.23$$

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Table 7 - 1
Physics 30
Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
1	85.1 89.4	A1.1k			Identify the list that contains physics quantities that are only of a specified type
NR1	73.3 89.4	A1.1k	A1.3s		Calculate the horizontal component of a momentum given the mass and the velocity
3	87.1 90.9	A1.2k	A1.3s		Calculate the impulse given a graph of force as a function of time
2	50.8 37.9	A1.3k			Identify the physics concept that can be validly applied to a system given a description of the system
NR3	84.6 83.3	A1.4k			Calculate the maximum final speed given three masses, their initial speeds, and a sequence of linear collisions
NR5	55.4 71.2	A1.4k			Calculate the average force given type of particle, the time interval, and initial and final speeds
4	78.6 84.8	B1.3k			Determine the nature of the charge and the method of charge transfer given a list of procedural steps. Also B1.2k
5	66.6 69.7		B1.3s		Calculate the magnitude of the electrostatic force on a suspended charge given the angle of deflection from the vertical and the magnitude of the gravitational force
NR4	63.8 75.8		B1.3s		Match the direction of the force with the type of force acting on a suspended charged object
7	62.2 77.3	B1.5k			Analyze the function of one element of an experimental apparatus

Note: The reporting categories **Knowledge (k)**; **Skills (s)**; and **Science, technology and society (sts)** refer to curricular outcomes only. Items in each reporting category cover a range of cognitive levels.

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Table 7 - 2
Physics 30
Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
6	84.2 90.9	B1.6k			Calculate the new electrostatic force given the original electrostatic force, the new charges and location. Also B1.1k
8	74.1 84.8	B1.7k	B1.3s		Determine the magnitude of the net electrostatic force on one of three co-planar charges given the nature and charge on each charge and the distances between them
9	68.4 75.8	B2.5k	B2.3s		Determine the magnitude of the electric potential difference between two points in a uniform electric field. Also B2.4k
10	78.6 78.8	B2.6k	B2.3s		Determine the magnitude of the electric field at a point collinear with two charges, given the nature and charge on each of the charges and the distances between the point and each charge
NR2	79.1 83.3	B2.6k	B2.3s		Calculate the electric field strength given a graph of force as a function of time and the type of particle
NR13	15.1 27.3	B2.8k	B2.3s		Calculate the initial speed of a charged particle given its two-dimensional trajectory, the length of the plates, their separation, and the electric potential difference between the plates
NR14	31.4 48.5	B2.8k	B2.3s		Match two physics principles to the order they must be used to solve a given problem
11	74.1 75.8	B2.9k			Calculate the accelerating electric potential difference given the type of particle, the time interval, and the initial and final speeds
16	57.2 45.5	B2.10k		STS	Identify the most significant result from the analysis of a named experiment (NS1)
13	43.7 43.9	B3.5k	B3.2s		Identify the directions of the electric and magnetic fields given that the path followed by an identified charged particle is undeflected

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Table 7 - 3
Physics 30

Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
17	81.7 93.9	B3.5k	B3.3s		Calculate the mass given the charge, the speed, the magnetic field strength, the radius of curvature and that the velocity is perpendicular to the magnetic field
32	55.5 62.1	B3.5k	B3.2s		Analyze a diagram showing deflected paths in an external magnetic field to determine the magnetic field direction and the types of decay particles that follow particular paths
14	80.1 87.9	B3.6k	B3.3s		Calculate the magnetic field strength given the type of charged particle, its speed, the magnitude of the electric field and that the path is undeflected
15	57.5 69.7	B3.8k	B3.2s		Use a hand rule to determine the polarity of a U-shaped magnet given the direction of the electron flow in a current-carrying conductor and the direction of the magnetic force
NR6	11.9 30.3	B3.8k	B3.3s		Draw a line of best fit for scattered data, read a point on the line, and use the mathematical model of $y=mx+b$ to determine the physics significance of the slope
18	67.9 72.7	C1.1k			Identify situations in which electromagnetic radiation is produced
NR7	56.5 71.2	C1.5k		STS	Calculate an experimental value for the speed of light for a Michelson-type situation given the number of sides on the rotating mirror, a one-way distance and the frequency of rotation (ST4)
NR8	75.7 87.9	C1.6k			Identify significant angles for the optical phenomena of refraction and reflection
20	66.6 81.8	C1.7k	C1.3s		Determine the nature and location of the image given the type of lens, the location of the object, and the focal length of the lens
21	51.5 69.7	C1.8k			Compare the wavelengths and the angles of diffraction of two different types of EMR. Also C1.2k

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Table 7 - 4
Physics 30

Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
NR9	68.4 84.8	C1.10k			Calculate the wavelength of light given the distance between lines of a diffraction grating, the angle of diffraction, and the order number of the image
12	69.0 78.8	C2.1k			Calculate the frequency of EMR given the type of accelerating charge and its initial and final speeds
19	65.4 83.3	C2.1k			Calculate the frequency of EMR and classify given photon energy. Also C1.2k
23	69.6 71.2	C2.1k		STS	In an STS context, analyze a model of the photoelectric effect to determine the significance of one of the features of the model (NS6)
26	66.6 66.7	C2.1k		STS	In an STS context, analyze a model of the photoelectric effect to predict a change in procedure that would produce a given result (NS6)
24	75.9 77.3	C2.3k		STS	In an STS context, analyze a model of the photoelectric effect to determine the significance of changing one of the conditions (NS6)
27	66.8 66.7	C2.3k		STS	In an STS context, analyze a model of the photoelectric effect to determine which aspect of the theoretical explanation of the photoelectric effect is absent in the model (NS6)
25	63.0 62.1	C2.4k		STS	In an STS context, analyze a model of the photoelectric effect to identify a property of the model that is inconsistent with the theoretical explanation of the photoelectric effect (NS6)
NR10	84.2 89.4	C2.6k			Calculate the momentum of a photon given its wavelength
28	74.8 77.3	D1.4k		STS	Assesses STS outcome. Identify the experiment that provided support for a given model of the atom (D1.1sts)

Note: The reporting categories **Knowledge (k)**; **Skills (s)**; and **Science, technology and society (sts)** refer to curricular outcomes only. Items in each reporting category cover a range of cognitive levels.

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Table 7 - 5
Physics 30
Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
29	68.0 59.1	D2.1k		STS	Assesses STS outcome. Identify how a given theory results in the weakening of the validity of one model of the atom (D2.1sts)
30	61.7 66.7	D2.3k	D2.1s		Match types of spectra with their methods of production
22	75.3 84.8	D2.5k	D2.3s		Calculate the wavelength of an emitted photon given an energy level diagram in electron volts and several possible transitions
31	80.7 87.9	D2.6k		STS	Identify the hypothesis supported by given experimental observations (D2.1sts)
33	85.7 90.9	D3.1k			Identify the types of radiation affected by a given field
36	68.3 77.3	D3.2k	D3.3s		Determine the final nucleus given the initial nucleus and a three-step decay chain
NR12	66.3 66.7	D3.3k			Calculate the percentage remaining of a sample given the half-life and the elapsed time
34	70.7 77.3	D3.5k	D3.3s		Determine the energy per nucleon released in given fission and fusion reactions
NR11	46.8 57.6	D3.6k			Calculate the mass equivalence of a change in energy given the mass, initial and final speeds
35	58.7 75.8	D4.3k			Select the quark model explanation for a given type of nuclear decay

Note: The reporting categories **Knowledge (k)**, **Skills (s)**, and **Science, technology and society (sts)** refer to curricular outcomes only. Items in each reporting category cover a range of cognitive levels.