

SCIENCE 30
DIPLOMA EXAMINATION
SCHOOL REPORT
JUNE 2011

Case Study #9

Table 1
Science 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	92.4
Standard of Excellence	80	21.3
Number of Students Included in Report	2847	53

Table 2
Science 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	
	Prov.	School	Prov.	School	Prov.	School
A (80 - 100%)	28.0	34.0	20.2	9.4	21.3	9.4
B (65 - 79%)	36.7	39.6	33.0	45.3	37.4	56.6
C (50 - 64%)	29.2	22.6	25.7	28.3	33.6	26.4
F (0 - 49%)	6.0	3.8	21.1	17.0	7.6	7.5
Average Percent Score	69.5	70.0	64.8	63.4	67.5	67.0
Standard Deviation	13.5	11.2	16.0	13.4	13.6	11.2

$$Z = \frac{67.0 - 67.5}{13.6} = -0.04$$

$$Z = \frac{70.0 - 69.5}{11.2} = +0.04$$

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

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Table 3
Science 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	1424	50.0	1313	92.2	272	19.1
Female	1423	50.0	1317	92.6	335	23.5
School						
Male	28	52.8	26	92.9	1	3.6
Female	25	47.2	23	92.0	4	16.0

Table 4
Science 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	Male	Province	Female	School
A (80 - 100%)	22.7	33.4	28.6	40.0	20.4	20.0	7.1	12.0
B (65 - 79%)	37.9	35.6	42.9	36.0	32.7	33.2	46.4	44.0
C (50 - 64%)	31.8	26.6	21.4	24.0	27.2	24.3	28.6	28.0
F (0 - 49%)	7.7	4.4	7.1	0.0	19.7	22.5	17.9	16.0
Average Percent	67.6	71.4	68.4	71.9	65.0	64.6	62.3	64.6
Standard Deviation	13.4	13.4	11.6	10.6	15.7	16.4	12.4	14.5

$$z=0.06$$

$$z=0.01$$

$$z=-0.17$$

$$z=0.00$$

$$z=-0.06$$

$$z=+0.01$$

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

Item Format	Total Marks Possible	Average Raw Score	Standard Deviation
Multiple Choice	39	25.0	6.0
Numerical Response	16	9.8	3.3

$$Z = \frac{25.3 - 25.0}{6.0} = +0.05$$

$$Z = \frac{8.6 - 9.8}{3.3} = -0.36$$

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Table 6
Science 30
Raw Score Results, by Reporting Category

Reporting Category	Total Marks Possible	Average Raw Score Prov.	School	Standard Deviation Prov.	School
Circulatory and Immune Systems (A1/A2)	8	5.4	5.2	1.7	1.6
Genetics (A3)	8	5.9	5.7	1.7	1.6
Environmental Chemistry (B1/B2/B3)	14	7.7	7.2	2.7	2.7
Field Theory and Electrical Energy (C1)	8	5.4	5.6	1.8	1.8
Electromagnetic Spectrum (C2)	5	2.4	2.5	1.3	1.2
Energy and the Environment (D1/D2)	12	8.0	7.6	2.2	2.0

$$z = \frac{5.2 - 5.4}{1.7} = -0.12$$

$$z = -0.12$$

$$z = -0.19$$

$$z = +0.11$$

$$z = +0.08$$

$$z = -0.18$$

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

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
1	44.9 35.8	A1.1k			Identify the function of a blood vessel in the heart.
2	60.9 56.6	A1.2k			Identify a consequence and health issue resulting from a particular heart defect.
3	80.9 75.5	A1.3k			Compare the structure and relative blood pressure of selected types of blood vessels.
4	61.0 52.8		A1.2s		Identify the circulatory system structures and events involved in measuring blood pressure.
5	79.9 90.6	A1.4k			Identify the effect a particular genetic disease has on blood cell function.
NR1	86.4 84.9		A1.2s		Identify the manipulated, responding, and controlled variables in an experiment.
NR2	58.8 50.9	A2.3k			Match components of the immune system with their functions.
6	66.5 73.6	A2.3k			Identify the function of a particular type of immune cell.
7	70.8 71.7	A3.8k			Identify the effects of a mutation.
8	58.2 66.0	A3.2k	A3.3s		Determine the probability that offspring from a particular cross will possess a certain phenotype.

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
Science 30
Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
NR3	62.0 47.2	A3.5k			Sequence the steps of DNA replication.
9	80.1 75.5	A3.4k			Identify components of a DNA strand from a diagram.
10	76.8 81.1	A3.8k			Identify the term used to describe a change in a DNA strand.
11	87.3 77.4	A3.6k			Compare the amino acids produced before and after a change in DNA code.
NR4	72.0 64.2	A3.7k			Match a protein function with given protein types.
12	84.2 88.7	A3.10k		STS	Identify the process of development of antibiotic resistance in bacteria in the context of A3.2sts.
13	44.0 39.6	B1.1k			Identify the proton donors and proton acceptors in a particular chemical reaction.
NR5	40.8 26.4		B1.3s		Read and record the volume of liquid contained in a burette from a photograph.
NR6	38.5 24.5	B1.1k	B1.3s		Calculate the concentration of an acid from titration data.
14	63.8 62.3	B1.2k			Identify a strong acid and identify its effect on the pH of a solution.

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 - 3
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Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
15	84.6 73.6		B1.2s		Verify which indicator would be best to use to determine if a solution has a specific pH.
16	58.8 54.7	B2.1k	B3.1s	STS	Identify the solution that could be used to neutralize a chemical spill in the context of B1.1sts.
17	72.3 66.0	B1.4k		STS	Identify the effect of a buffer in the context of B1.1sts.
NR7	55.9 39.6	B1.3k	B1.3s		Calculate the hydronium ion concentration of a solution given pH.
18	56.1 62.3	B1.8k		STS	Identify the environmental issue associated with a particular chemical reaction; assessing B1.2sts.
19	73.5 67.9	B2.1k			Classify a chemical compound from its structural formula and identify its properties.
20	32.9 62.3	B2.2k		STS	Identify the effect of a particular class of organic compound in the context of B2.1sts.
NR8	57.3 58.5	B3.1k			Match an environmental problem with its cause and possible solution.
21	63.8 54.7	B2.6k		STS	Identify a factor that affects biomagnification and identify the group of organisms most affected by biomagnification in the context of B2.1sts.
22	27.5 28.3	B3.2k		STS	Identify the effect of particular pollution reduction practices in the context of B1.2sts.

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 - 4
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Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
23	64.7 64.2	C1.1k			Compare the characteristic forces of magnetic, electric, and gravitational fields.
24	67.0 58.5	C1.4k			Given the mass and radius of a particular planet compare and calculate the gravitational field strength of that planet.
25	65.4 75.5	C1.5k		STS	Identify a technology that uses induction to produce an electrical current in the context of C1.1sts.
NR9	59.6 66.0		C1.2s		Match electrical terms with their descriptions.
NR10	82.8 79.2	C1.6k	C1.3s		Calculate the current given power and voltage.
26	52.0 62.3	C1.6k		STS	Identify a parallel circuit from a description of its properties in the context of C1.3sts.
27	63.6 62.3	C1.7k	C1.3s		Calculate power given energy and time.
28	82.9 90.6		C1.3s	STS	Calculate the turns on the secondary coil of a transformer given the change in voltage and the turns on the primary coil in the context of C1.1sts.
29	57.9 56.6	C2.3k		STS	Interpret a graph to determine the effect of the atmosphere on various types of EMR; assessing C2.2sts.
NR11	67.4 64.2	C2.4k			Match descriptions of light interacting with objects to the terms that describe those interactions.

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
Science 30
Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
30	44.2 47.2	C2.5k			Compare the wavelength and frequency of different components of the visible light spectrum.
NR12	54.6 50.9	C2.6k	C2.1s	STS	Calculate the wavelength of a radio wave given its frequency in the context of C2.1sts.
31	21.1 34.0	C2.11k			Identify the final stage in the evolution of a particular type of star.
32	51.4 52.8	D1.5k		STS	Identify a possible advantage of using biomass fuels in the context of D2.1sts.
33	72.2 71.7	D1.5k		STS	Identify the cause of a particular environmental problem in the context of D1.1sts.
NR13	35.0 28.3	D1.5k		STS	Identify the advantages of a particular electricity-producing technology from a list in the context of D1.1sts.
NR14	89.1 92.5	D1.3k		STS	Match the reason for using a particular technology with its corresponding perspective; assessing D2.1sts.
34	57.8 52.8	D2.4k	D1.3s	STS	Identify the renewable energy source with the lowest estimated future production cost from a graph in the context of D2.1sts.
35	71.3 75.5		D2.3s		Calculate the percent efficiency of an energy conversion device.
36	78.0 81.1	D2.4k		STS	Identify an advantage and a disadvantage of a particular electricity-producing technology in the context of D2.1sts.

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 - 6
Science 30

Results, Blueprint Classifications, and Item Descriptions, by Item

Item #	% Correct Prov. Sch.	Knowledge	Skills	STS	Item Description
NR15	44.2 26.4	D2.5k			Balance a nuclear reaction equation.
37	56.4 54.7	D2.9k		STS	Compare types of electricity-producing technologies in the context of D2.1sts.
NR16	78.5 56.6	D2.11k			Match energy reaction equations with their descriptions.
38	75.9 81.1	D2.11k			Compare types of reactions with the energy they produce.
39	87.5 90.6	D2.12k			Identify the cause of tides.

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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INDIVIDUAL STUDENT SCORES

Case Study #9

Maximum Score		Reporting Category:		Maximum Score	
MC: Multiple-Choice Score	39	A1/A2	- Circulatory and Immune Systems	8	
NR: Numerical-Response Score	16	A3	- Genetics	8	
		B1/B2/B3	- Environmental Chemistry	14	
		C1	- Field Theory and Electrical Energy	8	
		C2	- Electromagnetic Spectrum	5	
		D1/D2	- Energy and the Environment	12	

Student Name	Exam Total (%)	MC Total (39)	NR Total (16)	Reporting Category					
				A1/A2 (8)	A3 (8)	B1/B2/B3 (14)	C-1 (8)	C2 (5)	D1/D2 (12)
	71	27	11	7	5	11	7	2	6
	38	14	6	7	5	1	2	2	3
	53	22	6	3	4	7	1	3	10
	78	31	11	6	8	8	7	3	10
	45	18	6	5	4	4	3	0	8
	49	20	7	5	4	6	5	1	6
	60	24	8	3	5	7	7	2	8
	65	27	8	4	7	6	7	1	10
	75	26	14	7	6	9	6	3	9
	69	29	8	6	5	12	7	1	6
	75	29	11	6	6	9	6	3	10
	76	30	11	7	8	9	7	2	8
	65	28	7	5	7	6	7	2	8
	73	31	8	5	7	7	8	2	10
	44	18	5	4	2	4	5	2	6
	53	22	6	5	6	4	6	2	5
	65	27	8	7	6	8	5	2	7
	91	34	15	7	8	12	8	5	9

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Maximum Score
MC: Multiple-Choice Score 39
NR: Numerical-Response Score 16

Reporting Category: Maximum Score
A1/A2 - Circulatory and Immune Systems 8
A3 - Genetics 8
B1/B2/B3 - Environmental Chemistry 14
C1 - Field Theory and Electrical Energy 8
C2 - Electromagnetic Spectrum 5
D1/D2 - Energy and the Environment 12

Student Name	Exam Total (%)	MC Total (39)	NR Total (16)	Reporting Category					
				A1/A2 (8)	A3 (8)	B1/B2/B3 (14)	C1 (8)	C2 (5)	D1/D2 (12)
	47	20	6	3	6	4	4	1	8
	64	27	7	5	6	6	5	3	9
	44	17	6	3	3	5	6	2	4
	65	28	7	7	7	4	5	1	11
	84	31	14	8	8	9	7	3	10
	75	30	10	6	4	12	6	4	8
	53	22	6	5	5	7	3	1	7
	69	28	9	5	6	8	7	4	7
	69	28	9	7	7	5	8	1	9
	82	31	13	6	7	11	7	4	9
	82	34	10	6	7	11	8	3	9
	64	24	10	5	5	8	6	3	7
	55	19	10	2	5	6	4	4	8
	60	23	9	6	6	6	5	3	6
	60	26	6	2	7	9	4	3	7
	78	31	11	5	6	11	7	2	11
	44	15	8	5	3	5	2	3	5
	58	23	8	5	5	7	4	3	7