

**Science 10 Physical Sciences
Item-level Response Report - Multiple Choice (Provincial Level)**

British Columbia All Schools June /2005

Provincial Science 10 Item-Level Response Reports include data for all BC students who wrote the exam in June 2005. Both public and independent schools are included. The Science 10 June 2005 (Physical Sciences) provincial Item-Level Response Report displays the proportion of students who made errors on each test item and a description of the misconception.

Form	Item #	Question type	Number of Students who Responded to the Item	Percentage of Students who Answered Incorrectly	Specific Curricular Aspect that Needs Attention [>20% selected incorrect response]
A	31	MC	10125	42	*
A	32	MC	10136	18	N/A
A	33	MC	10129	22	*
A	34	MC	10119	38	<ul style="list-style-type: none"> Students understood that atomic number and number of electrons both determine an element's place on the periodic table, but incorrectly answered that the number of isotopes is also a factor, and number of electrons in the outermost shell was not.
A	35	TF	10128	21	<ul style="list-style-type: none"> Students mistook atomic mass for the number of neutrons.
A	36	MT	10130	32	*
A	37	MT	10110	34	*
A	38	MT	10116	33	*
A	39	MC	10096	51	<ul style="list-style-type: none"> Students answered correctly that the elements will lose electrons when they form compounds, but incorrectly answered that Xg loses fewer electrons than Xn.
A	40	TF	10136	51	<ul style="list-style-type: none"> Students did not understand that atoms of the same element can have different mass

					numbers; did not understand the term "isotope."
A	41	MC	10136	50	<ul style="list-style-type: none"> Students understood the term "ion" but chose the answer opposite to explain how the ion is formed.
A	42	MC	10107	64	<ul style="list-style-type: none"> Students likely misread the question and answered how many electrons the halogen atom needs to gain to be complete, not how many electrons the outer shell contains.
A	43	TF	10128	51	<ul style="list-style-type: none"> Students did not understand the term "ionic compound."
A	44	TF	10134	23	<ul style="list-style-type: none"> Students did not understand the term "diatomic molecule."
A	45	MC	10095	13	N/A
A	46	MC	10134	23	*
A	47	MC	10128	43	<ul style="list-style-type: none"> Students named the compound correctly, but incorrectly used a coefficient for the metal.
A	48	MC	10123	31	*
A	49	TF	10124	30	<ul style="list-style-type: none"> Students used the correct naming rules for a covalent compound, but incorrectly reduced the formula before naming it.
A	50	MT	10093	41	*
A	51	MT	10129	28	*
A	52	MC	10127	26	*
A	53	MC	10118	25	*
A	54	TF	10132	27	<ul style="list-style-type: none"> Students did not understand how electric charges interact.
A	55	MC	10122	15	N/A
A	56	MC	10137	3	N/A
A	57	TF	10137	10	N/A
A	58	TF	10135	21	<ul style="list-style-type: none"> Students confused the term "insulator" with

					"conductor."
A	59	MC	10127	68	<ul style="list-style-type: none"> Students answered correctly that a salt water solution will conduct electricity, but incorrectly answered that pure water will also conduct electricity. Students incorrectly answered that pure water will conduct electricity.
A	60	TF	10136	48	<ul style="list-style-type: none"> Students did not understand the shape of the magnetic field around a magnet.
A	61	MC	10131	57	<ul style="list-style-type: none"> Students chose the answer opposite to the direction of the magnetic field around a coil; used the wrong hand when using the right-hand rule, or placed their fingers in the opposite direction of the current.
A	62	MC	10104	52	<ul style="list-style-type: none"> Students understood that an increase in current will increase an electromagnet's strength, but incorrectly answered to increase the current through the nail, not the solenoid.
A	63	TF	10129	11	N/A
A	64	TF	10126	10	N/A
A	65	MC	10115	40	<ul style="list-style-type: none"> Students did not understand that voltage changes when cells are connected in series or parallel.
A	66	MC	10130	24	*
A	67	MC	10124	55	<ul style="list-style-type: none"> Students likely answered the question for the current, not the power rating of R1. Students likely incorrectly multiplied the current by the resistance, not the current by the voltage, to calculate the power rating of R1.

A	68	MC	10096	71	<ul style="list-style-type: none"> • Students incorrectly added the total resistance and the total voltage, instead of dividing the total voltage by the total resistance. • Students used the correct formula to calculate the total current, but incorrectly calculated the total resistance for a series connection of resistors, not a parallel connection.
A	69	MC	10113	15	N/A
A	70	MC	10100	15	N/A
A	71	TF	10128	15	N/A
A	72	TF	10125	19	N/A
A	73	MT	10116	9	N/A
A	74	MT	10112	23	*
A	75	MT	10101	24	*
A	76	MT	10119	56	<ul style="list-style-type: none"> • Students incorrectly calculated the total voltage for a series circuit, instead of a parallel circuit.
A	77	MT	10115	47	<ul style="list-style-type: none"> • Students likely did not refer to the data booklet; multiplied voltage and resistance to calculate power, instead of voltage and current.
A	78	TF	10119	15	N/A
A	79	MC	10083	56	<ul style="list-style-type: none"> • Students did not understand how to calculate the energy used (in kW·h) by an appliance over a month given current and time.
A	80	MC	10111	68	<ul style="list-style-type: none"> • Students used the correct formula to calculate energy, but incorrectly answered using time in hours instead of seconds.
A	81	TF	10125	8	N/A
A	82	MC	10088	56	<ul style="list-style-type: none"> • Students did not understand how to calculate energy used by a motor when given voltage, current, and time.
A	83	MC	10110	39	<ul style="list-style-type: none"> • Students did not understand why a fluorescent

					bulb costs less to operate than an equally bright filament bulb.
A	84	TF	10129	9	N/A
A	85	TF	10112	31	<ul style="list-style-type: none"> Students did not understand the penetrating ability of alpha particles through a human body.
A	86	TF	10128	16	N/A
A	87	MC	10111	54	<ul style="list-style-type: none"> Students mistook an isotope of hydrogen for a beta particle.
A	88	MC	10090	60	<ul style="list-style-type: none"> Students calculated the atomic mass correctly but miscalculated the atomic number.
A	89	MC	10104	8	N/A
A	90	TF	10111	16	N/A
B	31	TF	10251	6	N/A
B	32	MC	10248	54	<ul style="list-style-type: none"> Students chose the correct mass number and atomic number but incorrectly switched them on the symbol.
B	33	MC	10244	26	*
B	34	MC	10232	38	*
B	35	MC	10228	45	<ul style="list-style-type: none"> Students chose the correct element, but mistook the atomic mass for the number of neutrons.
B	36	MC	10248	62	<ul style="list-style-type: none"> Students did not understand the connection between a compound's formula and the combining capacity for the elements that make up the compound.
B	37	MC	10227	55	<ul style="list-style-type: none"> Students did not understand that alkali metals do not combine with other positive ions. Students did not understand that the noble gases do not combine with other elements to form compounds.

B	38	TF	10243	23	<ul style="list-style-type: none"> Students did not know the term "ionic compound."
B	39	MC	10246	37	<ul style="list-style-type: none"> Students incorrectly named the compound using the rules for ionic compounds instead of covalent compounds.
B	40	MC	10220	29	*
B	41	MC	10254	39	<ul style="list-style-type: none"> Students likely answered the question for the total number of oxygen atoms in the entire reaction, not only for the reactants.
B	42	MC	10247	30	*
B	43	MC	10245	14	N/A
B	44	MC	10238	45	*
B	45	TF	10226	45	<ul style="list-style-type: none"> Students confused the term "ionic compound" with "ion."
B	46	MT	10237	37	*
B	47	MT	10248	15	N/A
B	48	TF	10246	34	<ul style="list-style-type: none"> Students did not know how to recognize an acid by its formula.
B	49	TF	10247	17	N/A
B	50	MT	10189	19	N/A
B	51	MT	10228	51	<ul style="list-style-type: none"> Students understood the term "single replacement reaction", but chose the incorrect chemical formula for one of the products.
B	52	MT	10224	20	*
B	53	MC	10242	44	<ul style="list-style-type: none"> Students understood that electrons are transferred, but chose the answer of the opposite charge.
B	54	MC	10250	11	N/A
B	55	MC	10219	71	<ul style="list-style-type: none"> Students correctly understood that the rod was neutral, but misunderstood the charge on a

					<p>proton and the location of protons in an atom.</p> <ul style="list-style-type: none"> Students understood that electrons move when creating a charge by friction, but did not make the connection that the rod being used was a conductor.
B	56	TF	10249	18	N/A
B	57	TF	10241	35	<ul style="list-style-type: none"> Students did not understand the electrical nature of solutions made with ionic compounds.
B	58	TF	10253	7	N/A
B	59	TF	10249	17	N/A
B	60	MC	10251	57	<ul style="list-style-type: none"> Students chose the answer opposite to the direction of the magnetic field.
B	61	MC	10251	26	*
B	62	TF	10251	29	<ul style="list-style-type: none"> Students did not understand how to apply the right hand rule to find the direction of current in a circuit.
B	63	TF	10252	28	<ul style="list-style-type: none"> Students did not understand how current decreases when lamps are added in series in a circuit.
B	64	TF	10254	8	N/A
B	65	MC	10247	27	*
B	66	MC	10243	60	<ul style="list-style-type: none"> Students did not understand that resistance and energy use can vary in different series circuits. Students did not understand that voltage across each resistor can vary in different series circuits.
B	67	MC	10247	18	N/A
B	68	MC	10250	67	<ul style="list-style-type: none"> Students calculated the total voltage for a series connection instead of series-parallel connection of cells.

B	69	TF	10245	11	N/A
B	70	TF	10231	10	N/A
B	71	MT	10220	38	<ul style="list-style-type: none"> Students did not understand that a voltmeter should not be connected in series.
B	72	MT	10231	16	N/A
B	73	MT	10233	60	<ul style="list-style-type: none"> Students did not understand that an ammeter is not connected in parallel.
B	74	MT	10231	31	*
B	75	MT	10232	16	N/A
B	76	MC	10244	60	<ul style="list-style-type: none"> Students did not understand the relationship of voltage, current, and resistance; did not know how to read a graph showing the relationship between voltage and current.
B	77	MC	10223	70	<ul style="list-style-type: none"> Students used the correct formula to calculate electrical energy, but did not convert time from hours into seconds.
B	78	MC	10250	19	N/A
B	79	TF	10242	47	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; mistook resistance for current when calculating power.
B	80	MC	10244	24	*
B	81	MC	10234	58	<ul style="list-style-type: none"> Students used the correct formula to calculate electrical energy, but did not convert the units from watts to kilowatts.
B	82	MC	10242	86	<ul style="list-style-type: none"> Students incorrectly answered that high voltage would overload a circuit, instead of low resistance.
B	83	MC	10244	33	<ul style="list-style-type: none"> Students chose the answer opposite to what happens to frequency as wavelength increases.
B	84	TF	10247	8	N/A

B	85	MC	10213	38	<ul style="list-style-type: none"> Students correctly answered that radioactivity results from an unstable isotope, but incorrectly answered that the outermost electrons of an atom cause radioactivity, instead of the nucleus.
B	86	TF	10252	5	N/A
B	87	TF	10247	46	<ul style="list-style-type: none"> Students did not understand the penetration ability of a beta particle.
B	88	TF	10251	43	<ul style="list-style-type: none"> Students did not understand the decay products of beta decay.
B	89	TF	10243	47	<ul style="list-style-type: none"> Students confused the term "nuclear fission" with "nuclear fusion"; did not know how to recognize the chemical equation of nuclear fusion.
B	90	MC	10234	38	<ul style="list-style-type: none"> Students answered the question to explain the result of the difference between the two wheat crops, instead of the cause of the results.
C	31	MC	10140	55	<ul style="list-style-type: none"> Students chose the correct mass number and atomic number but incorrectly switched them on the symbol.
C	32	MC	10132	21	*
C	33	MC	10138	38	<ul style="list-style-type: none"> Students understood that atomic number and number of electrons both determine an element's place on the periodic table, but incorrectly answered that the number of isotopes is also a factor, and number of electrons in the outermost shell was not.
C	34	MC	10105	26	*
C	35	TF	10128	20	*
C	36	MT	10130	37	*
C	37	MT	10123	38	*
C	38	MT	10125	32	*

C	39	MC	10086	54	<ul style="list-style-type: none"> Students answered correctly that elements would lose electrons when forming compounds, but incorrectly answered that one element would lose fewer electrons than another when given an equation.
C	40	MC	10137	56	<ul style="list-style-type: none"> Students answered correctly that electrons must be lost to become an ion, but confused the term "atom" with "ion."
C	41	TF	10144	50	<ul style="list-style-type: none"> Students did not understand that different atoms of nitrogen can have different mass numbers.
C	42	TF	10140	40	<ul style="list-style-type: none"> Students did not understand that different isotopes of an element have the same number of protons.
C	43	TF	10139	56	<ul style="list-style-type: none"> Students mistook a covalent compound for an ionic compound.
C	44	TF	10131	42	<ul style="list-style-type: none"> Students mistook a covalent compound for a polyatomic ion; did not understand that a polyatomic ion is made up of two or more elements combined with an overall charge.
C	45	MC	10117	38	<ul style="list-style-type: none"> Students incorrectly named the compound using the rules for ionic compounds instead of covalent compounds.
C	46	MC	10110	30	*
C	47	MC	10144	24	*
C	48	MC	10126	28	*
C	49	MC	10115	34	*
C	50	TF	10119	25	<ul style="list-style-type: none"> Students did not understand how to name an ionic compound.
C	51	MT	10136	42	*

C	52	MT	10127	32	*
C	53	MC	10120	27	*
C	54	MC	10128	30	*
C	55	TF	10103	27	<ul style="list-style-type: none"> Students did not understand how electric charges interact.
C	56	MC	10135	71	<ul style="list-style-type: none"> Students correctly understood that, in an experiment of creating a charge by friction, the rod was neutral, but misunderstood the charge on a proton and the location of protons in an atom. Students understood that electrons move when creating a charge by friction, but did not make the connection that the rod being used was a conductor.
C	57	MC	10143	3	N/A
C	58	TF	10140	27	<ul style="list-style-type: none"> Students confused the term "series circuit" with a "parallel circuit."
C	59	MC	10127	72	<ul style="list-style-type: none"> Students answered correctly that a salt water solution will conduct electricity, but incorrectly answered that pure water will also conduct electricity. Students incorrectly answered that pure water will conduct electricity.
C	60	TF	10142	8	N/A
C	61	MC	10130	24	*
C	62	TF	10133	30	<ul style="list-style-type: none"> Students did not understand the direction of the magnetic lines of force outside a permanent magnet.
C	63	TF	10139	32	<ul style="list-style-type: none"> Students did not understand that current is the same at any point in a series connection of

					lamps.
C	64	TF	10135	10	N/A
C	65	MC	10124	46	<ul style="list-style-type: none"> Students did not understand that voltage changes when cells are connected in series or parallel.
C	66	MC	10134	40	*
C	67	MC	10115	60	<ul style="list-style-type: none"> Students did not understand that resistance and energy use can vary in different series circuits. Students did not understand that voltage across each resistor can vary in different series circuits.
C	68	MC	10134	45	<ul style="list-style-type: none"> Students incorrectly placed the ammeter in parallel to read the current passing through R3, not in series.
C	69	MC	10126	20	*
C	70	MC	10120	16	N/A
C	71	MC	10138	67	<ul style="list-style-type: none"> Students calculated the total voltage for a series connection instead of series-parallel connection of cells.
C	72	MC	10122	34	<ul style="list-style-type: none"> Students incorrectly calculated the resistance of each resistor using Ohm's law.
C	73	TF	10139	17	N/A
C	74	TF	10135	40	<ul style="list-style-type: none"> Students incorrectly answered that an ammeter is connected in parallel in a circuit, not in series.
C	75	MT	10068	20	*
C	76	MT	10133	17	N/A
C	77	MT	10045	50	<ul style="list-style-type: none"> Students understood the symbol for a resistor, but confused the term "parallel" with "series."
C	78	MT	10086	17	N/A
C	79	MT	10127	15	N/A

C	80	MC	10121	63	<ul style="list-style-type: none"> Students did not understand the relationship of voltage, current, and resistance; did not know how to read a graph showing the relationship between voltage and current.
C	81	MC	10124	69	<ul style="list-style-type: none"> Students used the correct formula to calculate electrical energy, but did not convert time from hours into seconds.
C	82	TF	10136	13	N/A
C	84	MC	10126	42	<ul style="list-style-type: none"> Students did not understand why a fluorescent bulb costs less to operate than an equally bright filament bulb.
C	85	MC	10103	35	<ul style="list-style-type: none"> Students correctly answered that radioactivity results from an unstable isotope, but incorrectly answered that the outermost electrons of an atom cause radioactivity, instead of the nucleus.
C	86	TF	10135	44	<ul style="list-style-type: none"> Students incorrectly answered that standing near a lone tree during a lightning storm was safer than being in a building.
C	87	TF	10135	65	<ul style="list-style-type: none"> Students incorrectly identified the products of gamma decay.
C	88	MC	10131	58	<ul style="list-style-type: none"> Students mistook an isotope of hydrogen for a beta particle.
C	89	MC	10115	59	<ul style="list-style-type: none"> Students did not understand the properties of an alpha particle and how alpha decay changes the parent nucleus. Students did not understand the properties of an alpha particle and how alpha decay changes the parent nucleus; correctly answered that two protons and two neutrons are involved in alpha decay (an alpha particle), but incorrectly

					answered that the parent
C	90	TF	10106	43	<ul style="list-style-type: none"> Students confused the term “nuclear fission” with “nuclear fusion”; did not know how to recognize the chemical equation of nuclear fusion.

Note: ‘N/A’ represents that there were fewer than 20% of the students who incorrectly answered the item; ‘*’ represents that there was no specific curricular aspect that needed attention since each of the incorrect answers has been chosen by less than 20% of the students.