

Science 10 Physical Science Item-level Response Report (Provincial Level)

British Columbia All Schools June /2007

Provincial Science 10 Item-Level Response Reports include data for all BC students who wrote the exam in June 2007 (about 34,300 students). Both public and independent schools are included. The Science 10 June 2007 (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	30	TF	9372	19	N/A
A	31	MC	9392	28	*
A	32	MC	9391	16	N/A
A	33	MC	9384	43	<ul style="list-style-type: none"> Students did not understand the term "covalent bond"; interpreted a diagram showing the Bohr models of elements before and after bonding, and answered that the diagram neither supported nor refuted the statement that only one covalent bond has formed in the molecule, instead of refuting the statement. Students did not understand the term "covalent bond"; interpreted a diagram showing the Bohr models of elements before and after bonding, and answered that the diagram supported the statement that only one covalent bond has formed in the molecule, instead of refuting the statement.
A	34	MC	9377	41	<ul style="list-style-type: none"> Students did not understand the term "isotope"; interpreted a diagram showing the Bohr models of elements before and after bonding, and answered

					that the diagram neither supported nor refuted the statement that all of the atoms of hydrogen are the same isotope, instead of supporting the statement.
A	35	MC	9362	46	<ul style="list-style-type: none"> Students correctly answered that neon-20 and argon-40 are Noble Gases, but did not consider that their atoms contain 8 electrons in the outermost shell.
A	36	MT	9347	61	*
A	37	MT	9330	69	<ul style="list-style-type: none"> Students did not understand the term "covalent compound(s)"; correctly identified a covalent compound but incorrectly included a diatomic molecule and two polyatomic ions.
A	38	MT	9319	53	*
A	39	MT	9323	55	*
A	40	MT	9336	74	<ul style="list-style-type: none"> Students did not understand how elements combine to form compounds; incorrectly answered that an oxygen molecule will form a compound when combined with one potassium ion.
A	41	TF	9385	37	<ul style="list-style-type: none"> Students did not understand the term "ion"; incorrectly answered that an ion of sulphur has only two electrons.
A	42	TF	9388	27	<ul style="list-style-type: none"> Students mistook an element's atomic mass for its atomic number when trying to identify the element; incorrectly identified an element when given the element's atomic mass and atomic number.
A	43	MC	9380	49	<ul style="list-style-type: none"> Students did not understand the characteristics of a covalent bond; incorrectly answered that when oxygen forms a compound with chlorine, chlorine gains electrons, oxygen loses them, instead of sharing electrons.

A	44	TF	9377	46	<ul style="list-style-type: none"> Students incorrectly answered that metal atoms gain electrons when they form compounds.
A	45	MC	9376	26	*
A	46	MC	9387	39	<ul style="list-style-type: none"> Students did not understand how to name an ionic compound when given the chemical formula; used the correct names for the ions, but incorrectly used a prefix when naming the second ion, when none was needed; possibly confused the naming rules for covalent compounds with the naming rules for ionic compounds.
A	47	MC	9376	63	<ul style="list-style-type: none"> Students were unable to identify and compare the ion charges of a metal when given different chemical formulae. Students were unable to identify and compare the ion charges of a metal when given different chemical formulae; incorrectly chose the compound where plutonium had the lowest ion charge, not the highest.
A	48	TF	9383	21	<ul style="list-style-type: none"> Students did not understand the term "diatomic molecule"; incorrectly answered that a Bohr model of a compound was not a diatomic molecule.
A	49	MC	9374	37	<ul style="list-style-type: none"> Students did not understand the term "products"; confused the products of a neutralization reaction with the reactants.
A	50	MC	9380	48	<ul style="list-style-type: none"> Students were unable to classify a chemical reaction when given the reactants in a word equation; mistook a neutralization reaction for a single replacement reaction.
A	51	MC	9385	24	*
A	52	MC	9360	32	*

A	53	TF	9393	24	<ul style="list-style-type: none"> Students did not understand the term “mass number”; incorrectly answered that the mass number of an atom is not the number of protons plus neutrons.
A	54	TF	9381	42	<ul style="list-style-type: none"> Students did not understand the terms “alpha decay” and “daughter isotope”; were unable to determine the daughter isotope produced when an element undergoes alpha decay.
A	55	MC	9374	20	*
A	56	MC	9389	48	*
A	57	MC	9369	74	<ul style="list-style-type: none"> Students were unable to identify an isotope product to complete a nuclear equation; chose the correct element, but incorrectly calculated the atomic mass by using the mass of only one of the decay products; did not include the mass of the three neutrons that were also produced.
A	58	TF	9384	26	<ul style="list-style-type: none"> Students were unable to make the connection that a decaying radioactive isotope with a shorter half-life will kill cancer cells more rapidly than one with a longer half life.
A	59	TF	9384	36	<ul style="list-style-type: none"> Students did not understand the rules of attraction and repulsion of static electricity; incorrectly answered that neutral lunar dust would not be attracted to a charged balloon.
A	60	MC	9387	30	*
A	61	MC	9386	38	*
A	62	TF	9388	53	<ul style="list-style-type: none"> Students did not understand that metals are conductors, not insulators; incorrectly answered that a gold layer on the surface of a sphere is an insulator.
A	63	MC	9366	41	<ul style="list-style-type: none"> Students likely did not refer to the data booklet;

					incorrectly calculated the energy by multiplying voltage by current, instead of multiplying voltage by current by time.
A	64	TF	9385	18	N/A
A	65	TF	9381	56	<ul style="list-style-type: none"> Students incorrectly answered that protons move when grounding strips are used in helicopters, not electrons; did not understand that static charge is created due to the build up of electrons, not protons.
A	67	TF	9388	48	<ul style="list-style-type: none"> Student did not understand how to apply the right-hand rule to determine the direction of the compass needle around a current-carrying wire
A	69	MC	9375	74	<ul style="list-style-type: none"> Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through a loop of wire. Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through the loop of wire; possibly misread the question and used the direction of the electron flow, instead of the direction of the current, when applying the right-hand rule, resulting in the students choosing the opposite direction of the magnetic field.
A	70	MC	9363	26	*
A	71	MC	9382	37	*
A	72	MC	9375	59	<ul style="list-style-type: none"> Students did not understand the relationship between current and resistance; incorrectly answered that the current in a branch of a parallel circuit with a lower resistance would have the lowest current reading, instead of choosing one of the branches with the

					highest resistance.
A	73	MC	9379	23	*
A	74	MC	9365	79	<ul style="list-style-type: none"> Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a parallel connection diagram with only one switch and three resistors can have different power ratings depending on which switches were opened or closed. Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a series connection diagram with three switches and three resistors can have different power ratings depending on which switches were opened or closed.
A	76	MC	9380	44	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand how to calculate current when given power and voltage; incorrectly calculated current in a circuit by dividing voltage by power, instead of dividing power by voltage.
A	77	MC	9375	61	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between power, voltage and current when given resistance and voltage; likely solved the question correctly but incorrectly switched the answers for the two resistors, or did not understand that as resistance increases, the power converted by the resistor decreases.
A	78	MC	9374	58	<ul style="list-style-type: none"> Students did not understand the function of a generator; read an article and confused the function of a solar panel with that of a generator.
A	79	MC	9363	68	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between energy,

					<p>voltage, current and time; likely correctly calculated the energy produced but did not convert the units into kW?h.</p> <ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between energy, voltage, current and time; likely incorrectly calculated energy by multiplying voltage by current, instead of voltage by current by time, and did not convert the units into kW?h.
A	80	MC	9373	28	*
A	81	MC	9371	43	<ul style="list-style-type: none"> Students did not understand the function of a transformer; incorrectly answered that a transformer would be required to limit current flow to 20 A inside a household circuit, instead of to change a 120 V outlet voltage to 12 V inside a power adapter; confused the function of a circuit breaker with a transformer.
A	82	MC	9368	66	<ul style="list-style-type: none"> Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but did not convert time from hours into units of seconds. Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but incorrectly converted time from hours into units of minutes, instead of seconds.
A	83	MT	9375	10	N/A
A	84	MT	9365	20	*
A	85	MT	9363	8	N/A
A	86	MT	9347	50	<ul style="list-style-type: none"> Students did not understand how to calculate the amount of electricity in kW?h a stereo uses per year

					when given the power of the stereo and the amount of time it was used.
A	87	MT	9342	65	*
B	30	MC	7645	39	*
B	31	MT	7678	21	*
B	32	MT	7683	11	N/A
B	33	MT	7684	4	N/A
B	34	MT	7677	28	<ul style="list-style-type: none"> Students did not understand how ions form; incorrectly answered that a metal will tend to gain three electrons, not lose three electrons.
B	35	MT	7676	12	N/A
B	36	TF	7690	21	<ul style="list-style-type: none"> Students answered incorrectly that metals do not form ions with a positive charge.
B	37	MC	7643	40	<ul style="list-style-type: none"> Students did not understand how to count and/or compare the number of protons in an element and a molecule; incorrectly answered that nitrogen has the same number of protons as a molecule of carbon dioxide; possibly mistook an atom's atomic mass for its atomic number.
B	38	TF	7687	19	N/A
B	39	MC	7686	22	*
B	40	TF	7683	29	<ul style="list-style-type: none"> Students were unable to correctly identify an element when given an atomic model of the element.
B	41	TF	7686	37	<ul style="list-style-type: none"> Students did not understand that the number of electrons in a neutral atom of an unknown element can be used to identify the element.
B	42	MC	7667	51	<ul style="list-style-type: none"> Students did not understand the term "isotope"; correctly answered that one of the isotopes of an element was more common than the other, but incorrectly answered that the isotope differed from

					the other isotope by having fewer protons, not fewer neutrons.
B	43	TF	7677	17	N/A
B	44	MC	7667	21	*
B	45	MC	7662	63	<ul style="list-style-type: none"> Students did not understand the term "reactant"; correctly answered that HCl could be a reactant in a decomposition and single replacement reaction, but did not consider that it could also be a reactant in a neutralization reaction. Students did not understand the term "reactant"; correctly answered that HCl could be a reactant in a neutralization and single replacement reaction, but did not consider that it could also be a reactant in a decomposition reaction.
B	46	TF	7688	37	<ul style="list-style-type: none"> Students did not understand the term "neutralization reaction"; mistook a synthesis reaction for a neutralization reaction.
B	47	MC	7683	39	*
B	48	MC	7680	28	*
B	49	MC	7670	28	*
B	50	MC	7665	46	<ul style="list-style-type: none"> Students read an article and did not understand how to write a chemical formula when given the chemical name; mistook the "chlorite" ion for the "chlorate" ion.
B	51	MC	7683	43	*
B	52	TF	7688	6	N/A
B	53	MC	7682	48	<ul style="list-style-type: none"> Students did not understand the term "fission"; mistook the results of fission for gamma decay.
B	54	MC	7662	47	<ul style="list-style-type: none"> Students did not understand the term "half-life"; did not understand how to calculate the amount of a

					sample that remains after a specified length of time when given the sample's half-life.
B	55	MC	7667	38	*
B	56	MC	7679	64	<ul style="list-style-type: none"> Students were unable to determine one of the reactants in a nuclear reaction, when given the other reactant and the products in a nuclear equation; chose the correct element, but incorrectly calculated the element's atomic mass.
B	57	MC	7683	45	<ul style="list-style-type: none"> Students read an article and did not understand the penetrating ability of different forms of radiation; incorrectly answered that beta radiation would be easily stopped by the skin, instead of alpha radiation.
B	58	TF	7685	38	<ul style="list-style-type: none"> Students answered incorrectly, from reading a short article, that particles of sugar increase the half-life of a sample of americium-241.
B	59	TF	7685	34	<ul style="list-style-type: none"> Students did not understand the rules of attraction and repulsion of static electricity; incorrectly answered that neutral lunar dust would not be attracted to a charged balloon.
B	60	MC	7688	31	*
B	61	MC	7687	38	*
B	62	TF	7688	55	<ul style="list-style-type: none"> Students did not understand that metals are conductors, not insulators; incorrectly answered that a gold layer on the surface of a sphere is an insulator.
B	63	MC	7670	40	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; incorrectly calculated the energy by multiplying voltage by current, instead of multiplying voltage by current by time.
B	64	TF	7684	18	N/A

B	65	TF	7678	56	<ul style="list-style-type: none"> Students incorrectly answered that protons move when grounding strips are used in helicopters, not electrons; did not understand that static charge is created due to the build up of electrons, not protons.
B	67	TF	7685	46	<ul style="list-style-type: none"> Student did not understand how to apply the right-hand rule to determine the direction of the compass needle around a current-carrying wire
B	69	MC	7670	75	<ul style="list-style-type: none"> Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through a loop of wire. Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through the loop of wire; possibly misread the question and used the direction of the electron flow, instead of the direction of the current, when applying the right-hand rule, resulting in the students choosing the opposite direction of the magnetic field.
B	70	MC	7661	25	*
B	71	MC	7680	40	<ul style="list-style-type: none"> Students did not understand how to calculate the total voltage of four cells connected in series; incorrectly analyzed a diagram showing four cells in series and answered that the total voltage was 0 V, instead of 6 V.
B	72	MC	7677	60	<ul style="list-style-type: none"> Students did not understand the relationship between current and resistance; incorrectly answered that the current in a branch of a parallel circuit with a lower resistance would have the lowest current reading, instead of choosing one of the branches with the

					highest resistance.
B	73	MC	7676	24	*
B	74	MC	7675	79	<ul style="list-style-type: none"> Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a parallel connection diagram with only one switch and three resistors can have different power ratings depending on which switches were opened or closed. Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a series connection diagram with three switches and three resistors can have different power ratings depending on which switches were opened or closed.
B	75	TF	7648	28	<ul style="list-style-type: none"> Students did not understand the term "power".
B	76	MC	7681	45	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand how to calculate current when given power and voltage; incorrectly calculated current in a circuit by dividing voltage by power, instead of dividing power by voltage.
B	77	MC	7675	60	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between power, voltage and current when given resistance and voltage; likely solved the question correctly but incorrectly switched the answers for the two resistors, or did not understand that as resistance increases, the power converted by the resistor decreases.
B	78	MC	7678	58	<ul style="list-style-type: none"> Students did not understand the function of a generator; read an article and confused the function of a solar panel with that of a generator.

B	79	MC	7673	69	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between energy, voltage, current and time; likely correctly calculated the energy produced but did not convert the units into kW?h. Students likely did not refer to the data booklet; did not understand the relationship between energy, voltage, current and time; likely incorrectly calculated energy by multiplying voltage by current, instead of voltage by current by time, and did not convert the units into kW?h.
B	80	MC	7679	31	*
B	81	MC	7679	41	<ul style="list-style-type: none"> Students did not understand the function of a transformer; incorrectly answered that a transformer would be required to limit current flow to 20 A inside a household circuit, instead of to change a 120 V outlet voltage to 12 V inside a power adapter; confused the function of a circuit breaker with a transformer.
B	82	MC	7678	68	<ul style="list-style-type: none"> Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but did not convert time from hours into units of seconds. Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but incorrectly converted time from hours into units of minutes, instead of seconds.
B	83	MT	7675	9	N/A
B	84	MT	7659	18	N/A
B	85	MT	7664	7	N/A

B	86	MT	7651	51	<ul style="list-style-type: none"> Students did not understand how to calculate the amount of electricity in kW?h a stereo uses per year when given the power of the stereo and the amount of time it was used.
B	87	MT	7652	64	*
C	30	TF	8349	17	N/A
C	31	MT	8353	16	N/A
C	32	MT	8357	20	*
C	33	MT	8343	29	*
C	34	MT	8341	54	*
C	35	MT	8337	55	<ul style="list-style-type: none"> Students did not understand how to determine the number of electrons in the most common ion of an element when given the elements name and mass number; confused the number of electrons in the most common ion with the number of electrons in an atom of an element.
C	36	MC	8359	42	*
C	37	MC	8346	48	<ul style="list-style-type: none"> Students were correctly able to determine that a metal has at least two ion charges, when given three different chemical formulae, but incorrectly answered that the metal gains electrons when forming compounds, instead of loses, and did not consider that the metal forms ionic compounds.
C	38	MC	8366	58	<ul style="list-style-type: none"> Students incorrectly switched the atomic mass and the atomic number when writing the symbol for an element.
C	39	MC	8348	57	<ul style="list-style-type: none"> Students did not understand the term "isotope"; correctly answered that an isotope had two more sub-atomic particles but incorrectly answered that there were two more electrons, not neutrons.
C	40	MC	8354	53	<ul style="list-style-type: none"> Students correctly answered that isotopes, ions and

					atoms of the same element have the same atomic number and number of protons, but incorrectly answered that they also have the same number of neutrons.
C	41	MC	8341	60	<ul style="list-style-type: none"> Students correctly answered that a covalent compound and a polyatomic ion both have the potential to react with another element and that the atoms of each are held together by covalent bonds, but they incorrectly answered that they are both polyatomic ions.
C	42	TF	8362	26	<ul style="list-style-type: none"> Students did not understand the term "diatomic molecule"; did not understand how to recognize a diatomic molecule from its formula.
C	43	TF	8368	11	N/A
C	44	MC	8365	28	*
C	45	MC	8350	20	*
C	46	MC	8363	19	N/A
C	47	MC	8352	58	<ul style="list-style-type: none"> Students correctly classified a neutralization reaction, and identified that the products of the reaction were salt and water, when given a chemical equation, but incorrectly identified the formula of the acid and the base.
C	48	MC	8349	63	<ul style="list-style-type: none"> Students confused the "chromate" ion with the "dichromate" ion when writing the chemical formula for a compound. Students did not understand the rules for writing formulae for ionic compounds; used the correct symbols and subscripts but incorrectly switched the subscripts below the wrong elements when writing the chemical formula for an ionic compound.

C	49	TF	8356	22	<ul style="list-style-type: none"> Students did not understand how to name an ionic compound when given the compound's chemical formula.
C	50	MC	8324	43	<ul style="list-style-type: none"> Students did not understand how to recognize a single replacement reaction when given a chemical equation; mistook a synthesis reaction for a single replacement reaction.
C	51	TF	8368	12	N/A
C	52	TF	8365	32	<ul style="list-style-type: none"> Students did not understand beta decay; incorrectly answered that in beta decay, a proton becomes a neutron and an electron.
C	53	TF	8369	32	<ul style="list-style-type: none"> Students did not understand the penetrating abilities of alpha particles; incorrectly answered that alpha particles can penetrate 6 cm of lead.
C	54	MC	8331	50	<ul style="list-style-type: none"> Students did not understand how an atom is changed during gamma decay; incorrectly answered that the mass number decreases by one, instead of staying the same.
C	55	MC	8337	63	<ul style="list-style-type: none"> Students incorrectly answered that fission occurs in a star to produce carbon from helium, not fusion. Students incorrectly answered that gamma decay occurs in a star to produce carbon from helium, not fusion.
C	56	MC	8362	44	<ul style="list-style-type: none"> Students did not understand the applications of electromagnetic radiation; incorrectly answered that television screens are not an application of electromagnetic radiation.
C	57	MC	8363	11	N/A

C	58	TF	8368	6	N/A
C	59	TF	8361	36	<ul style="list-style-type: none"> Students did not understand the rules of attraction and repulsion of static electricity; incorrectly answered that neutral lunar dust would not be attracted to a charged balloon.
C	60	MC	8361	32	*
C	61	MC	8357	40	*
C	62	TF	8359	53	<ul style="list-style-type: none"> Students did not understand that metals are conductors, not insulators; incorrectly answered that a gold layer on the surface of a sphere is an insulator.
C	63	MC	8332	43	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; incorrectly calculated the energy by multiplying voltage by current, instead of multiplying voltage by current by time.
C	64	TF	8356	17	N/A
C	65	TF	8352	57	<ul style="list-style-type: none"> Students incorrectly answered that protons move when grounding strips are used in helicopters, not electrons; did not understand that static charge is created due to the build up of electrons, not protons.
C	67	TF	8358	48	<ul style="list-style-type: none"> Student did not understand how to apply the right-hand rule to determine the direction of the compass needle around a current-carrying wire
C	69	MC	8356	76	<ul style="list-style-type: none"> Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through a loop of wire. Students did not understand how to use the right-hand rule to determine the direction of the magnetic field at the center of a loop, when given the direction of the electron flow through the loop of wire; possibly

					misread the question and used the direction of the electron flow, instead of the direction of the current, when applying the right-hand rule, resulting in the students choosing the opposite direction of the magnetic field.
C	70	MC	8343	25	*
C	71	MC	8356	37	*
C	72	MC	8354	76	<ul style="list-style-type: none"> Students did not understand the relationship between current and resistance; incorrectly answered that the current in a branch of a parallel circuit with a lower resistance would have the lowest current reading, instead of choosing one of the branches with the highest resistance. Students did not understand the relationship between current and resistance; incorrectly answered that the total current in a parallel circuit would have the lowest current reading, instead of choosing one of the branches.
C	73	MC	8356	25	*
C	74	MC	8346	80	<ul style="list-style-type: none"> Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a parallel connection diagram with only one switch and three resistors can have different power ratings depending on which switches were opened or closed. Students did not understand how to interpret diagrams showing series and parallel connections; incorrectly answered that a series connection diagram with three switches and three resistors can have different power ratings depending on which switches were opened or closed.
C	76	MC	8352	47	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did

					not understand how to calculate current when given power and voltage; incorrectly calculated current in a circuit by dividing voltage by power, instead of dividing power by voltage.
C	77	MC	8345	69	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between power, voltage and current when given resistance and voltage; likely solved the question correctly but incorrectly switched the answers for the two resistors, or did not understand that as resistance increases, the power converted by the resistor decreases.
C	78	MC	8343	59	<ul style="list-style-type: none"> Students did not understand the function of a generator; read an article and confused the function of a solar panel with that of a generator.
C	79	MC	8332	71	<ul style="list-style-type: none"> Students likely did not refer to the data booklet; did not understand the relationship between energy, voltage, current and time; likely correctly calculated the energy produced but did not convert the units into kW?h. Students likely did not refer to the data booklet; did not understand the relationship between energy, voltage, current and time; likely incorrectly calculated energy by multiplying voltage by current, instead of voltage by current by time, and did not convert the units into kW?h.
C	80	MC	8349	29	*
C	81	MC	8346	43	<ul style="list-style-type: none"> Students did not understand the function of a transformer; incorrectly answered that a transformer would be required to limit current flow to 20 A inside a household circuit, instead of to change a 120 V outlet voltage to 12 V inside a power adapter; confused the function of a circuit breaker with a

					transformer.
C	82	MC	8353	68	<ul style="list-style-type: none"> Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but did not convert time from hours into units of seconds. Students did not understand how to calculate energy when given power and time; likely did not refer to the data booklet; likely correctly calculated energy when given power and time, but incorrectly converted time from hours into units of minutes, instead of seconds.
C	83	MT	8348	8	N/A
C	84	MT	8323	20	*
C	85	MT	8336	7	N/A
C	86	MT	8329	53	<ul style="list-style-type: none"> Students did not understand how to calculate the amount of electricity in kW?h a stereo uses per year when given the power of the stereo and the amount of time it was used.
C	87	MT	8323	68	<ul style="list-style-type: none"> Students did not understand how to calculate the amount of electricity in kW?h a vacuum cleaner uses per year when given the power of the vacuum cleaner and the amount of time it was used.
D	30	MC	8677	40	*
D	31	MT	8755	23	*
D	32	MT	8755	12	N/A
D	33	MT	8769	4	N/A
D	34	MT	8758	30	<ul style="list-style-type: none"> Students did not understand how ions form; incorrectly answered that a metal will tend to gain three electrons, not lose three electrons.
D	35	MT	8764	11	N/A

D	36	TF	8779	21	<ul style="list-style-type: none"> Students answered incorrectly that metals do not form ions with a positive charge.
D	37	MC	8738	41	<ul style="list-style-type: none"> Students did not understand how to count and/or compare the number of protons in an element and a molecule; incorrectly answered that nitrogen has the same number of protons as a molecule of carbon dioxide; possibly mistook an atom's atomic mass for its atomic number.
D	38	TF	8778	18	N/A
D	39	MC	8776	23	*
D	40	TF	8771	29	<ul style="list-style-type: none"> Students were unable to correctly identify an element when given an atomic model of the element.
D	41	TF	8782	37	<ul style="list-style-type: none"> Students did not understand that the number of electrons in a neutral atom of an unknown element can be used to identify the element.
D	42	MC	8757	50	<ul style="list-style-type: none"> Students did not understand the term "isotope"; correctly answered that one of the isotopes of an element was more common than the other, but incorrectly answered that the isotope differed from the other isotope by having fewer protons, not fewer neutrons.
D	43	TF	8768	19	N/A
D	44	MC	8765	21	*
D	45	MC	8755	67	<ul style="list-style-type: none"> Students did not understand the term "reactant"; correctly answered that HCl could be a reactant in a decomposition and single replacement reaction, but did not consider that it could also be a reactant in a neutralization reaction. Students did not understand the term "reactant"; correctly answered that HCl could be a reactant in a

					<p>neutralization and decomposition reaction, but did not consider that it could also be a reactant in a single replacement reaction.</p> <ul style="list-style-type: none"> Students did not understand the term "reactant"; correctly answered that HCl could be a reactant in a neutralization and single replacement reaction, but did not consider that it could also be a reactant in a decomposition reaction.
D	46	TF	8775	38	<ul style="list-style-type: none"> Students did not understand the term "neutralization reaction"; mistook a synthesis reaction for a neutralization reaction.
D	47	MC	8772	41	*
D	48	MC	8771	26	*
D	49	MC	8758	29	*
D	50	MC	8756	46	<ul style="list-style-type: none"> Students read an article and did not understand how to write a chemical formula when given the chemical name; mistook the "chlorite" ion for the "chlorate" ion.
D	51	MC	8771	43	*
D	52	TF	8776	6	N/A
D	53	MC	8764	50	<ul style="list-style-type: none"> Students did not understand the term "fission"; mistook the results of fission for gamma decay.
D	54	MC	8745	47	<ul style="list-style-type: none"> Students did not understand the term "half-life"; did not understand how to calculate the amount of a sample that remains after a specified length of time when given the sample's half-life.
D	55	MC	8752	39	*
D	56	MC	8764	62	<ul style="list-style-type: none"> Students were unable to determine one of the reactants in a nuclear reaction, when given the other reactant and the products in a nuclear equation;

					chose the correct element, but incorrectly calculated the element's atomic mass.
D	57	MC	8768	49	<ul style="list-style-type: none"> Students read an article and did not understand the penetrating ability of different forms of radiation; incorrectly answered that beta radiation would be easily stopped by the skin, instead of alpha radiation.
D	58	TF	8770	41	<ul style="list-style-type: none"> Students answered incorrectly, from reading a short article, that particles of sugar increase the half-life of a sample of americium-241.
D	59	TF	8781	26	<ul style="list-style-type: none"> Students did not understand the rules of attraction and repulsion of static electricity; incorrectly answered that a negative charge will repel a positive charge, instead of attract; did not understand how to interpret an object's charge when it has an excess of electrons or an excess of protons.
D	60	MC	8780	20	*
D	61	MC	8772	19	N/A
D	63	MC	8770	29	*
D	64	TF	8771	18	N/A
D	65	TF	8763	15	N/A
D	66	MC	8766	53	<ul style="list-style-type: none"> Students were unable to apply the right-hand rule to determine the compass direction when given the direction of current flowing in a wire.
D	67	MC	8764	67	<ul style="list-style-type: none"> Students were unable to apply the right-hand rule to determine the direction of the magnetic field inside a current-carrying wire loop.
D	68	TF	8767	53	<ul style="list-style-type: none"> Students did not understand the function of a voltmeter; confused the function of a voltmeter with the function of an ammeter.

D	69	MC	8755	62	<ul style="list-style-type: none"> Students did not understand that the total voltage is equal to the voltage in each branch in a parallel circuit.
D	70	MC	8754	17	N/A
D	71	MC	8769	67	<ul style="list-style-type: none"> Students correctly calculated resistance when given current and voltage, but incorrectly used the voltage of one cell, not four cells in series.
D	72	MC	8764	23	*
D	73	MC	8763	67	<ul style="list-style-type: none"> Students incorrectly calculated current through a resistor in a series circuit by using the resistance of the resistor, not the total resistance of the circuit; did not understand that in a series circuit, the current remains the same at any point in the circuit.
D	74	TF	8770	17	N/A
D	75	TF	8749	43	<ul style="list-style-type: none"> Students did not understand how to calculate energy used in a circuit when given power and time; likely did not refer to the data booklet.
D	76	MC	8760	40	*
D	77	MT	8749	23	*
D	78	MT	8738	25	*
D	79	MT	8735	29	*
D	80	MT	8742	33	*
D	81	MT	8748	56	<ul style="list-style-type: none"> Students likely did not refer to the formula in the data booklet; did not understand how to calculate energy when given voltage, time and power; answered incorrectly in units of kW?h, instead of joules.
D	82	TF	8768	34	<ul style="list-style-type: none"> Students did not understand the function of a fuse in terms of the safety it provides in an electrical circuit; incorrectly answered that a fuse that burns out should be replaced with another fuse with a higher current

					rating.
D	83	MC	8758	34	*
D	84	MC	8755	33	*
D	85	MC	8724	55	*
D	86	MC	8759	37	*
D	87	MC	8754	53	<ul style="list-style-type: none"> • Students read an article and incorrectly answered that a statement was neither supported nor refuted by the article, instead of the article being refuted. • Students read an article and incorrectly answered that a statement was supported by the article, instead of refuted.

Note:

'*' indicates that there were fewer than 20% of the students who selected any of the possible incorrect answers to the item, hence, no curricular note is reported;

'N/A' indicates that there were fewer than 20% of the students who incorrectly answered the item, hence, no curricular note is reported.