

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

**British Columbia      All Schools      June /2006**

Provincial Science 10 Item-Level Response Reports include data for all BC students who wrote the exam in June 2006 (about 32,300 students). Both public and independent schools are included. The Science 10 June 2006 (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	5461	20	*
A	31	TF	5478	49	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the number of protons, neutrons and electrons for an ion.</li> </ul>
A	32	TF	5480	19	N/A
A	33	TF	5470	34	<ul style="list-style-type: none"> <li>Students did not understand the term "isotope"; did not understand that different isotopes of the same element have different numbers of neutrons.</li> </ul>
A	34	MT	5449	21	*
A	35	MT	5439	55	<ul style="list-style-type: none"> <li>Students did not understand the term "polyatomic ion"; confused the term "polyatomic ion" with a compound.</li> </ul>
A	36	MT	5443	52	<ul style="list-style-type: none"> <li>Students did not understand the term "diatomic element"; confused a diatomic element with a compound.</li> </ul>
A	37	MT	5465	49	<ul style="list-style-type: none"> <li>Students correctly understood that the</li> </ul>

					charge on an atom that loses two electrons should be two, but chose the wrong charge.
A	38	MT	5471	49	<ul style="list-style-type: none"> <li>Students correctly understood that the charge on an atom that gains two electrons should be two, but chose the wrong charge.</li> </ul>
A	39	TF	5472	36	<ul style="list-style-type: none"> <li>Students did not understand the naming rules for covalent compounds.</li> </ul>
A	40	MC	5476	65	<ul style="list-style-type: none"> <li>Students did not understand the term "ionic compound"; mistook the chemical formula for a covalent compound for an ionic compound.</li> </ul>
A	41	TF	5480	37	<ul style="list-style-type: none"> <li>Students did not understand how to count the total number of atoms of an element on the products side of a balanced chemical equation.</li> </ul>
A	42	TF	5472	32	<ul style="list-style-type: none"> <li>Students did not understand how to find the combining capacity of an element when given a compound's chemical formula.</li> </ul>
A	43	TF	5474	26	<ul style="list-style-type: none"> <li>Students did not understand how to write a formula from an ionic compound's name.</li> </ul>
A	44	MC	5475	36	*
A	45	MC	5457	54	<ul style="list-style-type: none"> <li>Students were unable to identify and compare the ion charges of a metal when given different chemical formulae; likely incorrectly determined the ion charge of a metal by looking at the subscript below the non-metal in the compound's formula.</li> </ul>
A	46	MC	5467	58	<ul style="list-style-type: none"> <li>Students did not understand the term</li> </ul>

					"covalent compound"; mistook an ionic compound for a covalent compound.
A	47	MC	5479	49	<ul style="list-style-type: none"> <li>Students did not understand how to identify a base from observing its chemical formula; mistook a base for an acid.</li> </ul>
A	48	MC	5476	68	<ul style="list-style-type: none"> <li>Students were unable to predict the products of a neutralization reaction when given the reactants; were correctly able to identify a salt as a product but incorrectly answered that hydrogen gas was also a product.</li> <li>Students were unable to predict the products of a neutralization reaction when given the reactants; were correctly able to identify water and a salt as the products but incorrectly answered that hydrogen gas was also a product.</li> </ul>
A	49	MC	5467	42	<ul style="list-style-type: none"> <li>Students correctly balanced a chemical equation when given a word equation, but incorrectly switched the products with the reactants.</li> </ul>
A	50	MC	5471	30	*
A	51	MC	5478	25	*
A	52	MC	5462	85	<ul style="list-style-type: none"> <li>Students were unable to write a chemical equation from a word equation, and/or were unable to balance the equation; did not understand the term "coefficient".</li> </ul>
A	53	MC	5475	33	*
A	54	MC	5460	62	<ul style="list-style-type: none"> <li>Students did not understand the process of beta decay; confused the process of</li> </ul>

					gamma decay with beta decay.
A	55	MC	5441	67	<ul style="list-style-type: none"> <li>Students chose the correct element and atomic number for one of the decay products from a nuclear reaction, but miscalculated the element's atomic mass.</li> </ul>
A	56	MC	5471	66	<ul style="list-style-type: none"> <li>Students did not recognize the process of nuclear decay when given a nuclear equation; confused beta decay with nuclear fission.</li> <li>Students did not recognize the process of nuclear decay when given a nuclear equation; confused nuclear fusion with nuclear fission.</li> </ul>
A	57	MC	5474	24	*
A	58	TF	5480	9	N/A
A	59	TF	5476	33	<ul style="list-style-type: none"> <li>Students did not understand that static electricity is a result of unequal positive and negative charges within an object.</li> </ul>
A	60	TF	5478	26	<ul style="list-style-type: none"> <li>Students did not understand that neutral objects will attract both positive and negative charges.</li> </ul>
A	61	MC	5478	22	*
A	62	MC	5473	34	*
A	63	MC	5476	19	N/A
A	64	TF	5474	49	<ul style="list-style-type: none"> <li>Students mistook current electricity for static electricity; did not understand the term "static electricity".</li> </ul>
A	65	TF	5475	21	<ul style="list-style-type: none"> <li>Students did not understand the advantages of an electromagnet; answered</li> </ul>

					incorrectly that it was not an advantage to be able to turn electromagnets on and off.
A	66	MC	5480	16	N/A
A	67	MC	5475	72	<ul style="list-style-type: none"> <li>Students did not understand how to use the right-hand rule to determine the direction of the magnetic field within a solenoid.</li> <li>Students did not understand how to use the right-hand rule to determine the direction of the magnetic field within a solenoid; incorrectly answered opposite to the direction the compass needle will point inside a solenoid.</li> </ul>
A	68	MC	5479	15	N/A
A	69	TF	5474	50	<ul style="list-style-type: none"> <li>Students did not understand that current remains the same at any point in a series circuit.</li> </ul>
A	70	MC	5470	32	*
A	71	MC	5475	50	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the voltage drop across three identical resistors in series, when given the total voltage of a circuit.</li> </ul>
A	72	MC	5469	43	*
A	73	MT	5427	66	*
A	74	MT	5446	55	*
A	75	MT	5429	79	<ul style="list-style-type: none"> <li>Students did not understand the relationship between resistance, current, and voltage in a circuit; did not understand how to apply Ohm's law to a parallel circuit to calculate total current.</li> </ul>
A	76	MT	5442	61	*

A	77	MT	5446	81	<ul style="list-style-type: none"> <li>• Students correctly calculated the voltage drop across one resistor for a series circuit, but incorrectly answered with the units for current, instead of voltage.</li> <li>• Students did not understand the relationship between resistance, current, and voltage in a circuit; did not understand how to apply Ohm's law to a series circuit to calculate the voltage drop across one resistor.</li> <li>• Students did not understand the relationship between resistance, current, and voltage in a circuit; did not understand how to apply Ohm's law to a series circuit to calculate the voltage drop across one resistor; incorrectly answered with the units for current, instead of voltage.</li> </ul>
A	78	MC	5472	34	*
A	79	TF	5469	38	<ul style="list-style-type: none"> <li>• Students did not understand how to calculate power when given the amount of energy used per minute; did not understand the relationship between power and energy; likely did not refer to the data booklet.</li> </ul>
A	80	TF	5467	28	<ul style="list-style-type: none"> <li>• Students did not understand the term "power"; did not understand the relationship between power and energy; likely did not refer to the data booklet for the formula relating power and energy.</li> </ul>
A	81	MC	5469	82	<ul style="list-style-type: none"> <li>• Students correctly calculated energy when given voltage, current and time, but incorrectly calculated with the time in</li> </ul>

					<p>minutes, instead of seconds.</p> <ul style="list-style-type: none"> <li>• Students correctly calculated energy when given voltage, current and time, but likely miscalculated the total voltage using only one cell instead of two, and also incorrectly calculated with the time in minutes, instead of seconds.</li> <li>• Students correctly calculated energy when given voltage, current and time, but likely miscalculated the total voltage using only one cell instead of two.</li> </ul>
A	82	MC	5457	82	<ul style="list-style-type: none"> <li>• Students did not understand how to calculate the average power rating of a device from the amount of kilowatt-hours used in a day.</li> <li>• Students incorrectly answered the question for the number of kilowatt hours used in one day, instead of calculating the average power rating of the electrical devices, and answered incorrectly in kilowatts instead of watts.</li> </ul>
A	83	TF	5471	18	N/A
A	84	MC	5456	42	<ul style="list-style-type: none"> <li>• Students did not understand the function of a circuit breaker; did not understand how to calculate current when given power and voltage; incorrectly chose a circuit breaker that was too low to allow a device to operate safely.</li> </ul>
A	85	MC	5460	40	<ul style="list-style-type: none"> <li>• Students did not understand the function of a resistor; incorrectly answered that a resistor can be used to increase voltage,</li> </ul>

					instead of a transformer.
A	86	MC	5461	56	<ul style="list-style-type: none"> <li>Students incorrectly calculated energy using the power of a device in standby mode, instead of calculating the difference in power of the device when being used and when in standby mode, and students also did not convert the units into kilowatts.</li> </ul>
A	87	MC	5470	34	<ul style="list-style-type: none"> <li>Students read an article and incorrectly answered that a technology's benefit was that it was an efficient energy source, not a portable energy source.</li> </ul>
B	30	TF	4727	37	<ul style="list-style-type: none"> <li>Students likely incorrectly answered the question for how many electrons are needed to be gained in the outer shells of a fluoride ion and a chloride ion to be full, not for how many electrons are found in their outer shells.</li> </ul>
B	31	MT	4758	27	*
B	32	MT	4754	31	*
B	33	MT	4761	27	*
B	34	MT	4756	29	*
B	35	MT	4756	31	<ul style="list-style-type: none"> <li>Students did not understand how to identify an atom of an element when given its Bohr model; students incorrectly answered that a Bohr model of a sodium atom was a sodium ion.</li> </ul>
B	36	TF	4770	29	<ul style="list-style-type: none"> <li>Students incorrectly answered that two isotopes of an element had a different number of protons.</li> </ul>
B	37	TF	4767	35	<ul style="list-style-type: none"> <li>Students did not understand that the</li> </ul>

					atomic mass represents the total number of protons and neutrons in an isotope or mistook the atomic mass for the atomic number from the element's symbol.
B	38	TF	4763	62	<ul style="list-style-type: none"> <li>Students mistook a polyatomic ion for a covalent compound; did not understand that a covalent compound does not have an overall charge.</li> </ul>
B	39	MC	4763	25	*
B	40	MC	4770	38	*
B	41	TF	4772	31	<ul style="list-style-type: none"> <li>Students did not understand how to recognize an acid when given its chemical formula.</li> </ul>
B	42	MC	4767	56	<ul style="list-style-type: none"> <li>Students correctly named an ionic compound, and correctly answered how many electrons were lost by the metal, but answered incorrectly the number of electrons gained by the non-metal to form the compound.</li> </ul>
B	43	MC	4760	32	*
B	44	MC	4769	39	<ul style="list-style-type: none"> <li>Students likely misread the question and wrote the name of the product that was given to them in the question, instead of figuring out the other product in the chemical reaction.</li> </ul>
B	45	MC	4763	38	*
B	46	MC	4769	13	N/A
B	47	MC	4758	53	<ul style="list-style-type: none"> <li>Students were able to correctly identify two out of three compounds that had the same ion charge for the metal, but incorrectly included a third compound that had a</li> </ul>

					different ion charge.
B	48	MC	4767	28	*
B	49	MC	4752	55	<ul style="list-style-type: none"> <li>Students did not understand the general formula for a neutralization reaction; correctly identified one acid (when given its chemical formula) to react with a base to produce a salt and water, but incorrectly answered that a base could also be a reactant.</li> </ul>
B	50	MC	4751	53	*
B	51	TF	4771	37	<ul style="list-style-type: none"> <li>Students did not understand the rules for naming ionic compounds; incorrectly named an ionic compound containing a negative polyatomic ion.</li> </ul>
B	52	MC	4764	46	<ul style="list-style-type: none"> <li>Students used the correct symbols and charges for the elements, but did not use brackets when writing the combining capacity as a subscript for the polyatomic ion, when writing the chemical formula for an ionic compound.</li> </ul>
B	53	MC	4764	31	*
B	54	MC	4759	41	<ul style="list-style-type: none"> <li>Students did not recognize an example of alpha decay from a chemical equation and incorrectly answered that a beta particle was one of the decay particles, not an alpha particle.</li> </ul>
B	55	MC	4744	64	<ul style="list-style-type: none"> <li>Students correctly understood that beta decay changes the number of protons in the parent nucleus, but incorrectly answered that it decreases the number of protons by one, not increases; also incorrectly wrote the element's name with</li> </ul>

					<p>its atomic number (thallium-81), not its atomic mass (thallium-204).</p> <ul style="list-style-type: none"> <li>Students correctly understood that beta decay increases the number of protons by one, and chose the correct decay product, but incorrectly wrote the element's name with its atomic number (bismuth-83), not its atomic mass (bismuth-211).</li> </ul>
B	56	MC	4765	47	<ul style="list-style-type: none"> <li>Students incorrectly answered that a neutron is more stable than a proton.</li> </ul>
B	57	TF	4762	25	<ul style="list-style-type: none"> <li>Students did not understand that different isotopes of the same element have different half lives.</li> </ul>
B	58	TF	4768	11	N/A
B	59	TF	4767	26	<ul style="list-style-type: none"> <li>Students did not understand that static electricity is produced from an imbalance of charges on an object.</li> </ul>
B	60	MC	4765	55	<ul style="list-style-type: none"> <li>Students incorrectly answered that when a car is grounded during electrostatic painting, the grounding reduces the risk of electric shock.</li> </ul>
B	61	MC	4769	33	*
B	62	TF	4769	28	<ul style="list-style-type: none"> <li>Students did not understand that when a charge develops on a material after being rubbed, the opposite charge develops on the object that was being rubbed with the material.</li> </ul>
B	63	MC	4768	40	*
B	64	MC	4765	42	<ul style="list-style-type: none"> <li>Students read an article and incorrectly</li> </ul>

					answered that a new technology operates from charge generated when electrons are transferred from an object when it is rubbed.
B	65	TF	4760	37	<ul style="list-style-type: none"> <li>Students interpreted an article and incorrectly answered that a computer mouse operated by power generated from static electricity, not magnetism.</li> </ul>
B	66	TF	4768	32	<ul style="list-style-type: none"> <li>Students did not understand the term "solenoid".</li> </ul>
B	67	TF	4766	7	N/A
B	68	MC	4766	80	<ul style="list-style-type: none"> <li>Students did not understand how to use the right-hand rule to determine the direction a compass needle will point when placed next to a current carrying wire.</li> </ul>
B	69	MC	4768	14	N/A
B	70	TF	4752	20	*
B	71	MC	4765	80	<ul style="list-style-type: none"> <li>Students likely incorrectly calculated the current going through only one of the resistors, instead of the total current through the entire parallel circuit.</li> <li>Students used the correct formula to calculate current, but likely incorrectly calculated the total resistance in series, not in parallel.</li> </ul>
B	72	MC	4765	22	*
B	73	MC	4758	74	<ul style="list-style-type: none"> <li>Students did not understand that voltage drops over each resistor in a series connection; did not understand the relationship between voltage, current and</li> </ul>

					<p>resistance in a circuit.</p> <ul style="list-style-type: none"> <li>Students did not understand that voltage drops over each resistor in a series connection; likely misread the question and incorrectly answered the question for the voltage drop over the second resistor, not the current through the second resistor.</li> </ul>
B	74	MC	4758	77	<ul style="list-style-type: none"> <li>Students did not understand the relationship between voltage, current and resistance in a circuit; did not understand how to calculate the voltage drop over one resistor in series.</li> </ul>
B	75	MC	4745	54	*
B	76	TF	4766	44	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand that one watt is equal to one Joule per second.</li> </ul>
B	77	MC	4763	34	*
B	78	MT	4756	24	*
B	79	MT	4740	64	*
B	80	MT	4752	32	*
B	81	MT	4757	51	*
B	82	MT	4746	49	*
B	83	TF	4760	31	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to calculate current when given power and voltage; did not understand the function of a GFCI outlet.</li> </ul>
B	84	MC	4753	45	*
B	85	MC	4754	33	<ul style="list-style-type: none"> <li>Students did not understand the function of a circuit breaker; did not understand how to calculate current when given power and</li> </ul>

					voltage; incorrectly chose a circuit breaker that was too low to allow a device to operate safely.
B	86	MC	4765	13	N/A
B	87	MC	4740	47	<ul style="list-style-type: none"> <li>Students correctly understood how to calculate energy when given power and time, but incorrectly calculated the energy used by one appliance, instead of the difference in energy used between two appliances.</li> </ul>
C	30	TF	5444	9	N/A
C	31	MC	5462	43	<ul style="list-style-type: none"> <li>Students were unable to determine the reactivity of elements according to their position on the periodic table; incorrectly answered that krypton was the most reactive element, not fluorine.</li> </ul>
C	32	MC	5458	77	<ul style="list-style-type: none"> <li>Students did not understand how to compare an atom and an ion of the same element; correctly answered that an atom and an ion of aluminum contained the same number of protons and neutrons, but did not understand that an aluminum atom has more electrons than an aluminum ion.</li> <li>Students did not understand how to compare an atom and an ion of the same element; correctly answered that an atom and an ion of aluminum contained the same number of protons and that an aluminum atom has more electrons than an aluminum ion, but did not understand that they also have the same number of neutrons.</li> </ul>
C	33	TF	5462	35	<ul style="list-style-type: none"> <li>Students did not understand how to</li> </ul>

					calculate how many electrons an atom will gain or lose to form an ion.
C	34	MT	5423	46	*
C	35	MT	5444	52	<ul style="list-style-type: none"> <li>Students did not understand the description "has lost one electron"; mistook a chlorine ion for an atom that has lost one electron.</li> </ul>
C	36	MT	5444	53	<ul style="list-style-type: none"> <li>Students did not understand the term "diatomic element"; mistook an ionic compound for a diatomic element.</li> </ul>
C	37	MT	5456	51	<ul style="list-style-type: none"> <li>Students did not understand the description "has gained one electron"; mistook a hydrogen ion for an atom that has gained one electron.</li> </ul>
C	38	MT	5449	59	*
C	39	MC	5441	67	<ul style="list-style-type: none"> <li>Students understood that a metal loses electrons when forming compounds, but incorrectly answered that the element was capable of forming covalent compounds, and did not consider that the element forms ions with two different charges.</li> <li>Students were correctly able to determine the two ion charges of a metal when given three different chemical formulas, and correctly answered that a metal loses electrons when forming compounds, but incorrectly answered that the metal was an alkaline earth metal and incorrectly answered that the element was capable of forming covalent compounds.</li> </ul>
C	40	TF	5458	41	<ul style="list-style-type: none"> <li>Students did not understand how to identify a covalent compound when given the</li> </ul>

					chemical formula.
C	41	TF	5467	42	<ul style="list-style-type: none"> <li>Students did not understand how to determine and compare the ion charges of a metal when given several compounds' chemical formulae.</li> </ul>
C	42	TF	5465	57	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the total number of atoms of an element in a compound when given the chemical name, or did not understand how to write a chemical formula for an ionic compound when given the name.</li> </ul>
C	43	MC	5456	39	*
C	44	MC	5465	60	<ul style="list-style-type: none"> <li>Students did not understand how to name an ionic compound when given the chemical formula; correctly named the compound, and understood that a Roman numeral was needed, but calculated the wrong Roman numeral.</li> <li>Students incorrectly named an ionic compound using the rules for naming a covalent compound.</li> </ul>
C	45	MC	5456	42	*
C	46	MC	5455	54	<ul style="list-style-type: none"> <li>Students were unable to identify an acid from its chemical formula; confused the formula of an acid with a base.</li> </ul>
C	47	MC	5450	45	*
C	48	MC	5462	35	*
C	49	MC	5455	32	*
C	50	MC	5442	24	*
C	51	MC	5461	41	<ul style="list-style-type: none"> <li>Students were unable to determine which</li> </ul>

					chemical equation was not balanced, when given four chemical equations; incorrectly identified an equation as being not balanced, when it was balanced.
C	52	TF	5463	15	N/A
C	53	MC	5458	20	*
C	54	MC	5449	45	<ul style="list-style-type: none"> <li>Students were unable to determine one of the products in a nuclear reaction; did not recognize gamma decay when given a nuclear equation; confused gamma decay with beta decay.</li> </ul>
C	55	MC	5451	35	*
C	56	MC	5455	60	<ul style="list-style-type: none"> <li>Students did not understand how an atom's atomic number is affected by alpha and beta decay; did not understand the processes of alpha and beta decay.</li> <li>Students did not understand how an atom's atomic number is affected by alpha and beta decay; did not understand the processes of alpha, beta or gamma decay.</li> </ul>
C	57	TF	5465	21	<ul style="list-style-type: none"> <li>Students did not understand the connection between an atom's unstable nucleus and its radioactivity.</li> </ul>
C	58	TF	5466	12	N/A
C	59	TF	5463	25	<ul style="list-style-type: none"> <li>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</li> </ul>

					electrons or an excess of protons.
C	60	MC	5463	20	*
C	61	MC	5464	19	N/A
C	62	TF	5459	37	<ul style="list-style-type: none"> <li>Students did not understand the term "current electricity"; confused an example of current electricity with static electricity.</li> </ul>
C	63	MC	5459	28	*
C	64	TF	5460	17	N/A
C	65	TF	5460	17	N/A
C	66	MC	5455	57	<ul style="list-style-type: none"> <li>Students were unable to apply the right-hand rule to determine the compass direction when given the direction of current flowing in a wire.</li> </ul>
C	67	MC	5458	73	<ul style="list-style-type: none"> <li>Students were unable to apply the right-hand rule to determine the direction of the magnetic field inside a current-carrying wire loop.</li> </ul>
C	68	TF	5460	57	<ul style="list-style-type: none"> <li>Students did not understand the function of a voltmeter; confused the function of a voltmeter with the function of an ammeter.</li> </ul>
C	69	MC	5454	70	<ul style="list-style-type: none"> <li>Students did not understand that the total voltage is equal to the voltage in each branch in a parallel circuit.</li> </ul>
C	70	MC	5450	20	*
C	71	MC	5462	71	<ul style="list-style-type: none"> <li>Students correctly calculated resistance when given current and voltage, but incorrectly used the voltage of one cell, not four cells in series.</li> </ul>
C	72	MC	5458	26	*

C	73	MC	5451	73	<ul style="list-style-type: none"> <li>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.</li> </ul>
C	74	TF	5458	18	N/A
C	75	TF	5449	45	<ul style="list-style-type: none"> <li>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.</li> </ul>
C	76	MC	5457	43	*
C	77	MT	5455	24	*
C	78	MT	5454	27	*
C	79	MT	5440	33	*
C	80	MT	5452	78	<ul style="list-style-type: none"> <li>Students likely did not refer to the formula in the data booklet; did not understand how to calculate energy in units of kW?h when given voltage, time and power.</li> </ul>
C	81	MT	5451	38	*
C	82	TF	5462	32	<ul style="list-style-type: none"> <li>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.</li> </ul>
C	83	MC	5453	31	*
C	84	MC	5450	35	*
C	85	MC	5426	54	<ul style="list-style-type: none"> <li>Students correctly understood how to calculate the energy difference between two appliances when given power and time, but incorrectly calculated the energy used</li> </ul>

					for only one twelve-hour day, instead of for thirty twelve-hour days.
C	86	MC	5457	41	<ul style="list-style-type: none"> <li>Students read an article and incorrectly answered that a statement concerning a new technology that was capable of producing more than 50 000 W was neither supported nor refuted by the article, when the article supported the statement.</li> </ul>
C	87	MC	5456	54	<ul style="list-style-type: none"> <li>Students read an article and incorrectly answered that a statement was neither supported nor refuted by the article, instead of the article being refuted.</li> </ul>
D	30	MC	5120	77	<ul style="list-style-type: none"> <li>Students correctly answered that neon has 2 electrons in the first shell and 8 electrons in the second shell, but did not include a fluoride ion or a sodium ion.</li> </ul>
D	31	TF	5135	54	<ul style="list-style-type: none"> <li>Students mistook a Bohr model of an ion with a Bohr model of an atom; did not understand the difference between an atom and an ion of the same element.</li> </ul>
D	32	MT	5110	77	<ul style="list-style-type: none"> <li>Students did not understand the term "negative ion"; mistook chlorine gas for a negative ion.</li> </ul>
D	33	MT	5111	51	*
D	34	MT	5108	59	<ul style="list-style-type: none"> <li>Students did not understand the term "neutral atom"; mistook a chlorine atom that has gained one electron for a neutral atom.</li> </ul>
D	35	MT	5103	63	<ul style="list-style-type: none"> <li>Students did not understand the term "ionic"</li> </ul>

					compound"; mistook a group of covalently bonded atoms with an overall charge for an ionic compound.
D	36	MT	5120	63	<ul style="list-style-type: none"> <li>Students did not understand the term "neutral atom"; mistook a Bohr model of a sodium ion for a neutral atom.</li> </ul>
D	37	TF	5126	31	<ul style="list-style-type: none"> <li>Students likely did not refer to the periodic table; incorrectly answered that an element with atomic number 85 forms an ion with a 1+ charge, not 1-.</li> </ul>
D	38	MC	5130	63	<ul style="list-style-type: none"> <li>Students did not understand how different isotopes of the same element differ from each other; incorrectly answered that potassium-40 has one more electron than potassium-39, instead of one more neutron.</li> <li>Students did not understand how different isotopes of the same element differ from each other; incorrectly answered that potassium-40 has one more proton than potassium-39, instead of one more neutron.</li> </ul>
D	39	TF	5122	62	<ul style="list-style-type: none"> <li>Students incorrectly answered that a bromide ion, a krypton atom and a rubidium ion all have different numbers of electrons, not the same number; did not understand how to calculate the number of electrons in an atom or an ion.</li> </ul>
D	40	TF	5133	23	<ul style="list-style-type: none"> <li>Students did not understand the rules for naming covalent compounds.</li> </ul>

D	41	TF	5135	59	<ul style="list-style-type: none"> <li>Students did not understand how to write the formula for an ionic compound, and/or did not understand how to write the ratio of positive ions to negative ions from a chemical formula when given the chemical name.</li> </ul>
D	42	TF	5137	17	N/A
D	43	MC	5133	42	<ul style="list-style-type: none"> <li>Students did not understand how to count the number of atoms of an element in a molecule when given the chemical formula; likely incorrectly counted the number of atoms of an element by using the subscripts of other elements within the molecule.</li> </ul>
D	44	MC	5136	44	*
D	45	MC	5116	68	<ul style="list-style-type: none"> <li>Students did not understand when to use brackets for writing the formulae for compounds when given the chemical names; correctly chose one compound out of two that would require brackets, but incorrectly chose two compounds whose formulae would not require brackets.</li> <li>Students did not understand when to use brackets for writing the formulae for compounds when given the chemical names; correctly chose the two compounds that would require brackets, but incorrectly chose one compound whose formula would not require brackets.</li> </ul>
D	46	MC	5137	43	<ul style="list-style-type: none"> <li>Students were unable to identify a base when given its chemical name; mistook the name of a base for an acid.</li> </ul>

D	47	MC	5135	43	*
D	48	MC	5134	34	*
D	49	MC	5127	53	<ul style="list-style-type: none"> <li>Students correctly identified the reactants from a word equation and understood that nitrogen trihydride was the product of the reaction, but did not understand that nitrogen and hydrogen are both diatomic gases and that nitrogen trihydride is held together by covalent bonds.</li> </ul>
D	50	MC	5119	29	*
D	51	MC	5128	55	<ul style="list-style-type: none"> <li>Students were unable to correctly balance a chemical equation.</li> </ul>
D	52	MC	5113	51	<ul style="list-style-type: none"> <li>Students were unable to correctly balance a chemical equation, when given a word equation.</li> </ul>
D	53	MC	5127	29	*
D	54	TF	5131	14	N/A
D	55	MC	5118	70	<ul style="list-style-type: none"> <li>Students were unable to identify an isotope reactant to complete a nuclear equation; chose the correct symbol and atomic number; incorrectly calculated the atomic mass by adding up the mass of two of the decay products, but did not include the mass of the neutrons.</li> <li>Students were unable to identify an isotope reactant to complete a nuclear equation; chose the correct symbol and atomic number; incorrectly calculated the atomic mass.</li> </ul>
D	56	MC	5137	41	<ul style="list-style-type: none"> <li>Students did not understand the similarities between nuclear fission and nuclear fusion; correctly answered that they both are</li> </ul>

					nuclear reactions, but did not include that they release energy.
D	57	TF	5133	36	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the decay product produced from alpha decay when given the radioactive isotope's name and atomic mass.</li> </ul>
D	58	MC	5137	55	<ul style="list-style-type: none"> <li>Students did not understand the processes that use radioactive isotopes; correctly answered that geology and medicine use radioactive isotopes, but did not include industry.</li> </ul>
D	59	TF	5130	27	<ul style="list-style-type: none"> <li>Students did not understand the function of an electroscope.</li> </ul>
D	60	MC	5138	47	<ul style="list-style-type: none"> <li>Students answered incorrectly that when electrons are transferred from a glass rod to a silk cloth, the cloth is now positively charged, not negatively charged.</li> </ul>
D	61	MC	5133	63	<ul style="list-style-type: none"> <li>Students incorrectly answered that a cat's fur stands on end when it walks across a thick carpet because charges in the carpet repel the cat's fur, instead of the charges in the cat's fur producing repulsive forces.</li> </ul>
D	62	MC	5131	62	<ul style="list-style-type: none"> <li>Students did not understand the term "current".</li> <li>Students did not understand the term "current"; mistook the definition of resistance for current.</li> </ul>
D	63	MC	5124	57	<ul style="list-style-type: none"> <li>Students incorrectly answered that a salt</li> </ul>

					<p>solution conducts electricity because atoms move in the solution, not ions.</p> <ul style="list-style-type: none"> <li>Students incorrectly answered that a salt solution conducts electricity because protons move in the solution, not ions.</li> </ul>
D	64	MC	5126	31	*
D	65	TF	5130	34	<ul style="list-style-type: none"> <li>Students answered incorrectly that an electromagnet can not be turned on and off.</li> </ul>
D	66	TF	5132	25	<ul style="list-style-type: none"> <li>Students did not understand how magnetic fields are produced from electricity.</li> </ul>
D	67	TF	5133	11	N/A
D	68	MC	5128	47	<ul style="list-style-type: none"> <li>Students did not understand how to use the right-hand rule; answered incorrectly that the thumb points in the direction of the electron flow, not current.</li> </ul>
D	69	TF	5132	43	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the total voltage of three cells connected in parallel; confused how to calculate total voltage of cells in a parallel connection with a series connection.</li> </ul>
D	70	TF	5132	47	<ul style="list-style-type: none"> <li>Students did not understand how to connect an ammeter in a circuit to measure current through a light bulb; incorrectly answered that an ammeter should be connected in parallel, not series.</li> </ul>
D	71	TF	5134	25	<ul style="list-style-type: none"> <li>Students did not understand the relationship between resistance and current; incorrectly answered that when the</li> </ul>

					total resistance in a series circuit is increased, the current will not decrease.
D	72	TF	5134	49	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the voltage drop across a resistor in a series connection; confused the rules for calculating voltage in a parallel connection with the rules for a series connection; answered incorrectly that the voltage across two resistors in series is equal to the total voltage.</li> </ul>
D	73	MT	5107	61	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the current through a resistor in series; did not understand that the current is the same at any point in a series circuit.</li> </ul>
D	74	MT	5100	44	*
D	75	MT	5094	49	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the voltage drop across a resistor in series; did not understand that voltage decreases over each resistor in series depending upon the resistance of the resistor.</li> </ul>
D	76	MT	5114	40	*
D	77	MT	5110	42	*
D	78	MC	5127	45	<ul style="list-style-type: none"> <li>Students likely did not refer to the formulae in the data booklet; did not understand how to calculate energy in a circuit when given voltage, current and time.</li> </ul>
D	79	MC	5125	41	<ul style="list-style-type: none"> <li>Students did not understand the advantages of connecting cells in parallel; incorrectly answered that a parallel connection increases the voltage, instead of</li> </ul>

					the battery lasting longer.
D	80	MC	5113	50	<ul style="list-style-type: none"> <li>Students did not understand that in a parallel circuit, the total current is additive, splitting into each branch of the circuit; likely did not refer to the data booklet; did not understand how to calculate current when given power and voltage.</li> </ul>
D	81	MC	5133	12	N/A
D	82	MC	5124	71	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the current going through one branch of a parallel connection of lights when given the total voltage in the circuit, the total current and current through the other light bulb; incorrectly answered that the current going through a light bulb was equal to the current going through a second light bulb in a parallel connection.</li> <li>Students did not understand how to calculate the current going through one branch of a parallel connection of lights when given the total voltage in the circuit, the total current and current through the other light bulb; incorrectly answered that the current going through a light bulb was equal to the total current in a circuit.</li> </ul>
D	83	MC	5128	39	*
D	84	MC	5117	52	<ul style="list-style-type: none"> <li>Students likely did not refer to the formulae in the data booklet; did not understand how to calculate energy when given voltage, current and time; incorrectly multiplied voltage by current, instead of voltage by current by time.</li> </ul>

D	85	MC	5108	18	N/A
D	86	MC	5130	29	*
D	87	MC	5125	59	<ul style="list-style-type: none"> <li>Students likely did not refer to the formulae in the data booklet; did not understand how to calculate voltage when given power and current; did not understand that large appliances run on 240V, not small appliances like a television.</li> </ul>
E	30	TF	5686	7	N/A
E	31	MC	5699	50	<ul style="list-style-type: none"> <li>Students chose the correct mass number and atomic number but incorrectly switched them on the symbol.</li> </ul>
E	32	MC	5698	23	*
E	33	MC	5693	38	*
E	34	MC	5694	42	*
E	35	MC	5684	57	<ul style="list-style-type: none"> <li>Students did not understand the connection between a compound's formula and the combining capacity for the elements that make up the compound; did not understand the charge of the ions formed in the alkaline earth metal family.</li> </ul>
E	36	MC	5691	48	*
E	37	TF	5696	21	<ul style="list-style-type: none"> <li>Students did not understand how to identify an ionic compound when given the chemical formula.</li> </ul>
E	38	MC	5692	34	*
E	39	MC	5678	26	*
E	40	MC	5699	37	<ul style="list-style-type: none"> <li>Students likely answered the question for the total number of oxygen atoms in the entire reaction, not only for the reactants.</li> </ul>
E	41	MC	5698	36	<ul style="list-style-type: none"> <li>Students did not understand that the</li> </ul>

					chemical equation does not give information showing the production of heat.
E	42	MC	5698	12	N/A
E	43	MC	5693	37	*
E	44	TF	5692	35	<ul style="list-style-type: none"> <li>Students confused the term "ionic compound" with "ion."</li> </ul>
E	45	MT	5677	31	*
E	46	MT	5694	14	N/A
E	47	MC	5680	55	<ul style="list-style-type: none"> <li>Students did not understand how to recognize an acid from its chemical formula; mistook an acid for a base.</li> </ul>
E	48	TF	5691	17	N/A
E	49	MT	5683	18	N/A
E	50	MT	5683	45	<ul style="list-style-type: none"> <li>Students understood the term "single replacement reaction", but chose the incorrect chemical formula for one of the products.</li> </ul>
E	51	MT	5686	18	N/A
E	52	MC	5689	29	<ul style="list-style-type: none"> <li>Students chose the answer opposite to what happens to frequency as wavelength increases.</li> </ul>
E	53	MC	5684	41	<ul style="list-style-type: none"> <li>Students incorrectly answered that radioactivity can be explained by the outermost electron shell of an isotope that is unstable, instead of the nucleus.</li> </ul>
E	54	TF	5698	5	N/A
E	55	TF	5683	34	<ul style="list-style-type: none"> <li>Students answered incorrectly that alpha particles can easily pass through a human body.</li> </ul>

E	56	TF	5694	40	<ul style="list-style-type: none"> <li>Students did not understand the process of beta decay.</li> </ul>
E	57	TF	5694	44	<ul style="list-style-type: none"> <li>Students confused the term "nuclear fission" with "nuclear fusion"; did not know how to recognize a chemical equation of nuclear fusion.</li> </ul>
E	58	MC	5698	42	<ul style="list-style-type: none"> <li>Students answered the question to explain the result of the difference between the two wheat crops, instead of the cause of the results.</li> </ul>
E	59	TF	5695	34	<ul style="list-style-type: none"> <li>Students did not understand the term "static charge"; incorrectly answered that when there are equal numbers of positive and negative charges within a metal object there is an overall static charge.</li> </ul>
E	60	TF	5697	33	<ul style="list-style-type: none"> <li>Students did not understand the rules of attraction and repulsion with static electricity; incorrectly answered that for charged particles to be attracted toward an object, the object must also be charged.</li> </ul>
E	61	TF	5695	26	<ul style="list-style-type: none"> <li>Students identified the Bohr diagrams of two ions and incorrectly answered that they would be attracted toward each other, instead of repelled; students did not understand the rules of attraction and repulsion with static electricity, and/or students did not understand how to recognize the charge on an ion when given the Bohr model of the ion.</li> </ul>
E	62	TF	5698	36	<ul style="list-style-type: none"> <li>Students mistook a definition of current</li> </ul>

					with voltage.
E	63	TF	5696	28	<ul style="list-style-type: none"> <li>Students answered incorrectly that when one object is rubbed with another object, the same charges will develop on the two objects, instead of the opposite charge.</li> </ul>
E	64	MC	5685	55	<ul style="list-style-type: none"> <li>Students answered incorrectly that sulphur will produce the brightest light in a solution, instead of salt.</li> </ul>
E	65	MC	5686	61	<ul style="list-style-type: none"> <li>Students answered incorrectly that a glass rod, when rubbed with wax, will repel electrons, instead of protons; did not understand the rules of attraction and repulsion in static electricity.</li> </ul>
E	66	TF	5697	16	N/A
E	67	MC	5696	34	*
E	68	MC	5697	75	<ul style="list-style-type: none"> <li>Students did not understand how to use the right-hand rule to identify the direction a compass needle would point when placed beneath a current-carrying wire.</li> </ul>
E	69	MC	5678	67	<ul style="list-style-type: none"> <li>Students did not understand the right-hand rule; did not understand that changing the direction of the current in a current-carrying wire causes the magnetic field to also change direction.</li> </ul>
E	70	TF	5679	30	<ul style="list-style-type: none"> <li>Students did not understand the term "series circuit"; did not understand that the current in a series circuit is the same at all locations.</li> </ul>
E	71	MC	5695	25	*

E	72	MC	5685	67	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the resistance in one branch of a parallel circuit, when given total current and total voltage.</li> </ul>
E	73	MT	5687	36	*
E	74	MT	5673	76	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the voltage drop over one resistor in a series circuit when given a diagram showing total voltage and resistance; likely did not refer to the formulae in the data booklet; incorrectly answered that the voltage drop over one resistor in series was equal to the total voltage.</li> </ul>
E	75	MT	5661	73	<ul style="list-style-type: none"> <li>Students did not understand how to calculate the voltage drop over one resistor in a series circuit when given a diagram showing total voltage and resistance; incorrectly answered in units for current, not voltage; did not understand that voltage is measured in parallel in a circuit, not current; possibly mistook the units of volts for current when choosing their response.</li> <li>Students did not understand how to calculate the voltage drop over one resistor in a series circuit when given a diagram showing total voltage and resistance; possibly mistook the total voltage of the circuit for the voltage drop.</li> </ul>
E	76	MT	5686	57	<ul style="list-style-type: none"> <li>Students did not understand how to calculate total current in a series circuit when given a diagram showing voltage and resistance; likely did not refer to the</li> </ul>

					formulae in the data booklet.
E	77	MT	5673	55	*
E	78	MC	5694	20	*
E	79	MC	5691	42	*
E	80	MC	5690	25	*
E	81	MC	5695	18	N/A
E	82	TF	5689	58	<ul style="list-style-type: none"> <li>Students did not understand how to convert the units of kW?h into Joules.</li> </ul>
E	83	MC	5689	21	*
E	84	MC	5684	67	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to calculate current when given power and voltage, and/or did not understand the function of a fuse; chose a fuse value that would not allow enough current to operate an electrical device.</li> </ul>
E	85	MC	5687	24	*
E	86	MC	5695	13	N/A
E	87	MC	5684	59	<ul style="list-style-type: none"> <li>Students correctly calculated the energy production of a technology, but incorrectly used the time for 30 days, not 30 days of continuous 24-hour operation.</li> </ul>
F	30	TF	5500	44	<ul style="list-style-type: none"> <li>Students likely incorrectly answered the question for how many electrons are needed to be gained in the outer shells of a fluoride ion and a chloride ion to be full, not for how many electrons are found in their outer shells.</li> </ul>
F	31	MT	5534	32	*
F	32	MT	5527	37	<ul style="list-style-type: none"> <li>Students did not understand the term "ion"; correctly understood that the number</li> </ul>

					of protons in an element represents the element's atomic number but confused a magnesium ion with a magnesium atom.
F	33	MT	5530	33	*
F	34	MT	5517	34	<ul style="list-style-type: none"> <li>Students did not understand how to identify an atom of an element when given its Bohr model; students incorrectly answered that a Bohr model of an aluminum atom was an aluminum ion.</li> </ul>
F	35	MT	5523	37	<ul style="list-style-type: none"> <li>Students did not understand how to identify an atom of an element when given its Bohr model; students incorrectly answered that a Bohr model of a sodium atom was a sodium ion.</li> </ul>
F	36	TF	5538	34	<ul style="list-style-type: none"> <li>Students incorrectly answered that two isotopes of an element had a different number of protons.</li> </ul>
F	37	TF	5542	37	<ul style="list-style-type: none"> <li>Students did not understand that the atomic mass represents the total number of protons and neutrons in an isotope or mistook the atomic mass for the atomic number from the element's symbol.</li> </ul>
F	38	TF	5536	64	<ul style="list-style-type: none"> <li>Students mistook a polyatomic ion for a covalent compound; did not understand that a covalent compound does not have an overall charge.</li> </ul>
F	39	MC	5533	28	*
F	40	MC	5540	42	<ul style="list-style-type: none"> <li>Students correctly named an ionic compound, but incorrectly used a Roman numeral after the metal when one was not</li> </ul>

					needed.
F	41	TF	5542	32	<ul style="list-style-type: none"> <li>Students did not understand how to recognize an acid when given its chemical formula.</li> </ul>
F	42	MC	5533	63	<ul style="list-style-type: none"> <li>Students correctly answered the number of electrons lost by the metal and gained by the non-metal, but incorrectly found the metal's charge and incorrectly named an ionic compound.</li> <li>Students correctly named an ionic compound, and correctly answered how many electrons were lost by the metal, but answered incorrectly the number of electrons gained by the non-metal to form the compound.</li> </ul>
F	43	MC	5535	37	*
F	44	MC	5531	44	<ul style="list-style-type: none"> <li>Students likely misread the question and wrote the name of the product that was given to them in the question, instead of figuring out the other product in the chemical reaction.</li> </ul>
F	45	MC	5530	44	<ul style="list-style-type: none"> <li>Students did not understand how to recognize a double replacement reaction when given a word equation; mistook a single replacement reaction for a double replacement reaction.</li> </ul>
F	46	MC	5542	16	N/A
F	47	MC	5517	59	<ul style="list-style-type: none"> <li>Students were able to correctly identify two out of three compounds that had the same ion charge for the metal, but incorrectly included a third compound that had a</li> </ul>

					different ion charge.
F	48	MC	5535	35	*
F	49	MC	5513	61	<ul style="list-style-type: none"> <li>Students did not understand the general formula for a neutralization reaction; correctly identified one acid (when given its chemical formula) to react with a base to produce a salt and water, but incorrectly answered that a base could also be a reactant.</li> <li>Students did not understand the general formula for a neutralization reaction; correctly identified one acid (when given its chemical formula) to react with a base to produce a salt and water, but incorrectly answered that a salt could also be a reactant.</li> </ul>
F	50	MC	5516	58	<ul style="list-style-type: none"> <li>Students did not understand the term "ionic compound"; mistook an ionic compound for a diatomic molecule.</li> </ul>
F	51	TF	5543	41	<ul style="list-style-type: none"> <li>Students did not understand the rules for naming ionic compounds; incorrectly named an ionic compound containing a negative polyatomic ion.</li> </ul>
F	52	MC	5533	52	<ul style="list-style-type: none"> <li>Students used the correct symbols and charges for the elements, but did not use brackets when writing the combining capacity as a subscript for the polyatomic ion, when writing the chemical formula for an ionic compound.</li> </ul>
F	53	MC	5537	35	*
F	54	MC	5524	51	<ul style="list-style-type: none"> <li>Students did not recognize an example of</li> </ul>

					alpha decay from a chemical equation and incorrectly answered that a beta particle was one of the decay particles, not an alpha particle.
F	55	MC	5502	69	<ul style="list-style-type: none"> <li>Students correctly understood that beta decay changes the number of protons in the parent nucleus, but incorrectly answered that it decreases the number of protons by one, not increases; also incorrectly wrote the element's name with its atomic number (thallium-81), not its atomic mass (thallium-204).</li> <li>Students correctly understood that beta decay increases the number of protons by one, and chose the correct decay product, but incorrectly wrote the element's name with its atomic number (bismuth-83), not its atomic mass (bismuth-211).</li> </ul>
F	56	MC	5534	48	<ul style="list-style-type: none"> <li>Students incorrectly answered that a neutron is more stable than a proton.</li> </ul>
F	57	TF	5538	27	<ul style="list-style-type: none"> <li>Students did not understand that different isotopes of the same element have different half lives.</li> </ul>
F	58	TF	5539	11	N/A
F	59	TF	5540	23	<ul style="list-style-type: none"> <li>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.</li> </ul>

F	60	MC	5535	19	N/A
F	61	MC	5533	17	N/A
F	62	TF	5532	41	<ul style="list-style-type: none"> <li>Students did not understand the term "current electricity"; confused an example of current electricity with static electricity.</li> </ul>
F	63	MC	5528	30	*
F	64	TF	5531	17	N/A
F	65	TF	5531	17	N/A
F	66	MC	5530	58	<ul style="list-style-type: none"> <li>Students were unable to apply the right-hand rule to determine the compass direction when given the direction of current flowing in a wire.</li> </ul>
F	67	MC	5527	71	<ul style="list-style-type: none"> <li>Students were unable to apply the right-hand rule to determine the direction of the magnetic field inside a current-carrying wire loop.</li> </ul>
F	68	TF	5529	55	<ul style="list-style-type: none"> <li>Students did not understand the function of a voltmeter; confused the function of a voltmeter with the function of an ammeter.</li> </ul>
F	69	MC	5530	69	<ul style="list-style-type: none"> <li>Students did not understand that the total voltage is equal to the voltage in each branch in a parallel circuit.</li> </ul>
F	70	MC	5525	21	*
F	71	MC	5526	70	<ul style="list-style-type: none"> <li>Students correctly calculated resistance when given current and voltage, but incorrectly used the voltage of one cell, not four cells in series.</li> </ul>
F	72	MC	5529	27	*
F	73	MC	5521	71	<ul style="list-style-type: none"> <li>Students incorrectly calculated current through a resistor in a series circuit by</li> </ul>

					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.
F	74	TF	5526	21	*
F	75	TF	5507	46	<ul style="list-style-type: none"> <li>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.</li> </ul>
F	76	MC	5519	43	*
F	77	MT	5513	25	*
F	78	MT	5510	26	*
F	79	MT	5496	32	*
F	80	MT	5506	76	<ul style="list-style-type: none"> <li>Students likely did not refer to the formula in the data booklet; did not understand how to calculate energy in units of kW?h when given voltage, time and power.</li> </ul>
F	81	MT	5512	39	*
F	82	TF	5528	31	<ul style="list-style-type: none"> <li>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.</li> </ul>
F	83	MC	5522	32	*
F	84	MC	5518	36	*
F	85	MC	5486	54	<ul style="list-style-type: none"> <li>Students correctly understood how to calculate the energy difference between two appliances when given power and time, but incorrectly calculated the energy used for only one twelve-hour day, instead of for</li> </ul>

					thirty twelve-hour days.
F	86	MC	5523	40	<ul style="list-style-type: none"> <li>Students read an article and incorrectly answered that a statement concerning a new technology that was capable of producing more than 50 000 W was neither supported nor refuted by the article, when the article supported the statement.</li> </ul>
F	87	MC	5520	57	<ul style="list-style-type: none"> <li>Students read an article and incorrectly answered that a statement was neither supported nor refuted by the article, instead of the article being refuted.</li> </ul>

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.