

**Science 10 Earth and Space 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 (Earth and Space Science) 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	88	MC	9382	52	<ul style="list-style-type: none"> <li>Students likely did not refer to the Geological Time Scale in the data booklet; incorrectly answered that a dinosaur fossil was from the Mesozoic era, instead of the Paleozoic era.</li> </ul>
A	89	TF	9381	28	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to interpret from the Geological Time Scale that all amphibians did not become extinct at the end of the Permian Period.</li> </ul>
A	90	MC	9363	23	*
A	91	MC	9372	42	*
A	92	MT	9343	32	*
A	93	MT	9374	10	N/A
A	94	MT	9371	51	<ul style="list-style-type: none"> <li>Students did not understand the term “youngest rock”; did not understand the Cross-cutting Rule; incorrectly answered that the top layer of a rock layer was younger than the dyke that cut through it.</li> </ul>
A	95	MT	9356	35	<ul style="list-style-type: none"> <li>Students did not understand the term “erosion surface”; confused an erosion surface with the oldest</li> </ul>

					rock layer in a diagram of a geological cross-section.
A	96	MT	9370	36	*
A	97	TF	9371	29	<ul style="list-style-type: none"> <li>Students did not understand the term “absolute age dating”; confused absolute age dating with relative age dating.</li> </ul>
A	98	TF	9375	40	<ul style="list-style-type: none"> <li>Students did not understand the Law of Superposition; incorrectly answered that rock formations found above rock layers were older, not younger than the rock layers.</li> </ul>
A	99	MC	9352	69	<ul style="list-style-type: none"> <li>Students did not understand the Crosscutting Rule; confused the Crosscutting Rule with the Law of Superposition; incorrectly answered that the Law of Superposition could be used to compare the relative age of a volcanic neck and dike to the surrounding rock, instead of using the Crosscutting Rule.</li> </ul>
A	100	MC	9355	26	*
A	101	TF	9376	23	<ul style="list-style-type: none"> <li>Students did not understand the term “half-life”; incorrectly answered that an isotope’s half-life increases over time, not remains constant.</li> </ul>
A	102	TF	9375	26	<ul style="list-style-type: none"> <li>Students did not understand the term “convergent plate boundaries”; answered incorrectly that convergent plate boundaries cannot occur in areas where there are no ocean trenches.</li> </ul>
A	103	MC	9367	51	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; analyzed a map showing the sea floor along the Pacific Coast of North America and incorrectly identified a divergent plate boundary as an ocean trench.</li> </ul>
A	104	MC	9361	44	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; analyzed a map showing the sea floor along the</li> </ul>

					Pacific Coast of North America and incorrectly identified some transform faults as divergent plate boundaries.
A	105	MC	9354	73	<ul style="list-style-type: none"> <li>Students were unable to identify a transform plate boundary from a map showing seafloor spreading rate; confused a divergent plate boundary with a transform plate boundary.</li> </ul>
A	106	MC	9372	32	*
A	107	MC	9355	70	<ul style="list-style-type: none"> <li>Students correctly answered that new ocean crust forming at different rates in different locations is caused by variation in the rate of spreading at divergent plate boundaries, but incorrectly answered that rapid spreading resulting in deeper earthquakes is also caused by the variation and did not include the fact that transform faults are formed as a result of uneven seafloor spreading.</li> <li>Students correctly answered that new ocean crust forms at different rates in different locations, and transform faults are formed as a result of uneven seafloor spreading are caused by variation in the rate of spreading at divergent plate boundaries, but incorrectly answered that rapid spreading resulting in deeper earthquakes is also caused by the variation.</li> </ul>
A	108	MC	9365	35	*
A	109	TF	9369	37	<ul style="list-style-type: none"> <li>Students likely did not refer to the Geological Time Scale in the data booklet; incorrectly answered that Pangea was forming during the Cretaceous Period, not the Permian Period.</li> </ul>
A	110	MC	9330	41	*
A	111	MC	9370	51	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; incorrectly answered that an abundance of divergent plate boundaries best explains the volcanic activity in</li> </ul>

					<p>the Ring of Fire, instead of an abundance of subduction zones.</p> <ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; incorrectly answered that an abundance of hot spots best explains the volcanic activity in the Ring of Fire, instead of an abundance of subduction zones.</li> </ul>
A	112	MC	9355	57	<ul style="list-style-type: none"> <li>Students correctly answered that earthquake epicenters are often associated with divergent and convergent plate boundaries, but did not include hot spots and transform faults.</li> </ul>
A	113	MC	9359	49	<ul style="list-style-type: none"> <li>Students did not understand the term "seismology"; incorrectly answered that remote sensing, not seismology, was used in obtaining data for a map of earthquake epicenters.</li> </ul>
A	114	MC	9365	36	*
A	115	TF	9364	13	N/A
A	116	TF	9367	6	N/A
B	88	TF	7680	31	<ul style="list-style-type: none"> <li>Students did not understand the term "remote sensing"; incorrectly answered that remote sensing data is collected by drilling deep into the Earth's crust.</li> </ul>
B	89	TF	7681	21	<ul style="list-style-type: none"> <li>Students answered incorrectly that the Continental Drift Theory was not developed using evidence gathered from geological field work.</li> </ul>
B	90	MC	7672	40	<ul style="list-style-type: none"> <li>Students incorrectly answered that the Earth's mantle has the greatest density, instead of the core.</li> </ul>
B	91	MC	7672	60	<ul style="list-style-type: none"> <li>Students did not understand how P-waves and S-waves travel through different rock layers; interpreted a graph and chose a cross-section that incorrectly answered that S-waves travel through a</li> </ul>

					<p>liquid mantle and are stopped by a solid core of Planet X, instead of traveling through solid rock and being stopped by a liquid core.</p> <ul style="list-style-type: none"> <li>Students did not understand how P-waves and S-waves travel through different rock layers; interpreted a graph and chose a cross-section that incorrectly answered that both S-waves and P-waves travel through both solid and liquid rock layers of a Planet X.</li> </ul>
B	93	TF	7670	55	<ul style="list-style-type: none"> <li>Students incorrectly answered that major extinctions are identified by the disappearance of all life forms in the fossil record at a particular time.</li> </ul>
B	94	MC	7673	27	*
B	95	MC	7650	47	<ul style="list-style-type: none"> <li>Students likely did not refer to the Geological Time Scale in the data booklet; interpreted a passage and incorrectly answered that a fossil formed before the Cambrian Explosion was formed during the Paleozoic era, instead of the Precambrian era.</li> </ul>
B	96	TF	7679	10	N/A
B	97	TF	7682	10	N/A
B	98	MC	7675	72	<ul style="list-style-type: none"> <li>Students did not understand the terms "sill" or "folded"; incorrectly interpreted a picture and answered that the structure shown was sediment layers that have folded, instead of an erosion surface.</li> </ul>
B	99	MC	7666	60	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to determine the age of a rock sample when given the percent remaining of the original sample and the parent isotope's half-life.</li> <li>Students likely did not refer to the data booklet; did not understand how to determine the age of a rock sample when given the percent remaining of the</li> </ul>

					original sample and the parent isotope's half-life; incorrectly calculated the age of the rock sample using only one half-life instead of two.
B	100	MC	7670	67	<ul style="list-style-type: none"> <li>• Students likely did not refer to the data booklet; correctly answered that fossils that can be age dated using the carbon-14 isotope are from the Quaternary period, but incorrectly answered that they can also be from the Tertiary and Cretaceous period.</li> <li>• Students likely did not refer to the data booklet; correctly answered that fossils that can be age dated using the carbon-14 isotope are from the Quaternary period, but incorrectly answered that they can also be from the Tertiary period.</li> </ul>
B	101	MC	7678	86	<ul style="list-style-type: none"> <li>• Students did not understand the terms "crust" and "asthenosphere"; incorrectly answered that the tectonic plates move on the crust, not the asthenosphere.</li> <li>• Students did not understand the terms "lithosphere" and "asthenosphere"; incorrectly answered that the tectonic plates move on the lithosphere, not the asthenosphere.</li> <li>• Students did not understand the terms "mantle" and "asthenosphere"; incorrectly answered that the tectonic plates move on the mantle, not the asthenosphere.</li> </ul>
B	102	MC	7676	76	<ul style="list-style-type: none"> <li>• Students correctly identified one type of plate boundary from a diagram, but did not consider that there were two types of plate boundaries present.</li> <li>• Students incorrectly identified three types of plate boundaries from a diagram when there were only two</li> </ul>

					types present.
B	103	MC	7663	59	<ul style="list-style-type: none"> <li>Students did not understand the term "hot spot"; incorrectly answered that if the Pacific Plate did not move over the Hawaiian hot spot, there would be no volcanic island formed, instead of there being only one extremely large volcanic island.</li> </ul>
B	104	MC	7667	67	<ul style="list-style-type: none"> <li>Students correctly answered that mantle magma rises at hot spots, but incorrectly answered that it also rises at subduction zones, and did not consider that it rises at divergent plate boundaries.</li> </ul>
B	105	MC	7648	43	*
B	106	MT	7666	67	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; were unable to correctly identify the Mid-Atlantic ridge from a map of Iceland and the surrounding sea floor.</li> <li>Students likely did not refer to the data booklet; were unable to correctly identify the Mid-Atlantic ridge from a map of Iceland and the surrounding sea floor; confused a transform plate boundary with the Mid-Atlantic Ridge.</li> </ul>
B	107	MT	7654	60	<ul style="list-style-type: none"> <li>Students were unable to identify the oldest sea floor rock when given a map of Iceland and the surrounding sea floor; incorrectly answered that an island was the oldest sea floor rock, instead of identifying the ocean floor.</li> </ul>
B	108	MT	7634	77	<ul style="list-style-type: none"> <li>Students did not understand the term "magnetic reversal pattern"; were unable to identify a magnetic reversal pattern from a diagram; mistook Iceland for a magnetic reversal pattern.</li> <li>Students did not understand the term "magnetic reversal pattern"; were unable to identify a magnetic</li> </ul>

					reversal pattern from a diagram; mistook a transform plate boundary for a magnetic reversal pattern.
B	109	MT	7654	40	*
B	110	MT	7657	41	*
B	112	MC	7664	48	<ul style="list-style-type: none"> <li>Students incorrectly answered that fossil evidence from North America and the Arctic provided evidence for Continental Drift Theory.</li> <li>Students incorrectly answered that mapping of the mid-ocean ridge in the Atlantic and Pacific oceans provided evidence for Continental Drift Theory.</li> </ul>
B	113	MC	7667	62	<ul style="list-style-type: none"> <li>Students incorrectly answered that rising convection currents are not a source of magma.</li> </ul>
B	114	MC	7661	53	<ul style="list-style-type: none"> <li>Students incorrectly answered that ocean trenches on a map identify divergent plate boundaries, not subduction zones.</li> </ul>
B	115	TF	7663	15	N/A
B	116	MC	7667	28	<ul style="list-style-type: none"> <li>Students analyzed a map and incorrectly answered that seismic waves in the Hawaiian Islands would be triggered by an earthquake in Alaska 6.5 hours earlier, not tsunamis.</li> </ul>
C	88	TF	8358	32	<ul style="list-style-type: none"> <li>Students did not understand the function of a seismometer; confused a seismometer with the study of magnetic reversals on the sea floor.</li> </ul>
C	89	TF	8359	29	<ul style="list-style-type: none"> <li>Students did not understand the function of remote sensing, and its application of collecting data for moons and planets beyond Earth.</li> </ul>
C	90	MC	8333	45	<ul style="list-style-type: none"> <li>Students were unable to identify a seismogram that would be used to determine the distance to the</li> </ul>

					epicenter of an earthquake; correctly understood that L (surface)-waves arrive last, but incorrectly answered that S-waves arrive before P-waves.
C	91	MC	8348	63	<ul style="list-style-type: none"> <li>Students did not understand the process that led to the identification of Earth's outer core; incorrectly answered that the pattern of volcanic eruption around the world, not the measurement of the maximum depth of secondary seismic waves, led to the identification of Earth's outer core.</li> <li>Students did not understand the process that led to the identification of Earth's outer core; incorrectly answered that the refraction of secondary seismic waves, not the measurement of the maximum depth of secondary seismic waves, led to the identification of Earth's outer core.</li> </ul>
C	92	TF	8350	23	<ul style="list-style-type: none"> <li>Students likely did not refer to the geological time scale in the data booklet; answered incorrectly that trilobite fossils are not formed in marine sedimentary rock.</li> </ul>
C	93	TF	8355	32	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to interpret from the Geological Time Scale that a Paleocene sedimentary rock can not contain fossils of both dinosaurs and mammals.</li> </ul>
C	94	MC	8351	33	*
C	95	MC	8258	64	<ul style="list-style-type: none"> <li>Students likely did not refer to the geological time scale in the data booklet; did not understand how to calculate the relative time taken to reach the Cambrian Explosion with the geological time scale compressed into twelve hours.</li> <li>Students likely did not refer to the geological time scale in the data booklet; likely misread the question</li> </ul>

					and answered for how many hours would remain after the Cambrian Explosion on a compressed time scale, instead of how many hours would pass before the Cambrian Explosion would occur.
C	96	TF	8355	29	<ul style="list-style-type: none"> <li>Students did not understand the process of radioactive decay; did not understand the relationship between the decreasing amount of the parent isotope and increasing amounts of the decay product as time goes on.</li> </ul>
C	97	TF	8354	56	<ul style="list-style-type: none"> <li>Students did not understand the process of radioactive decay; did not understand how to calculate the ratio of parent isotope to daughter isotopes after three half-lives.</li> </ul>
C	98	MC	8347	66	<ul style="list-style-type: none"> <li>Students incorrectly answered that potassium-40 isotope age dating requires careful collection of rock samples because potassium-40 decays at an extremely rapid rate, instead of argon-40 being a gas that is easily lost to the environment.</li> </ul>
C	99	MC	8356	18	N/A
C	100	MC	8355	39	<ul style="list-style-type: none"> <li>Students analyzed a diagram and incorrectly used the law of superposition or the cross-cutting rule to incorrectly answer that a statement about a rock layer being younger than another was refuted, when this was neither supported nor refuted by the diagram.</li> </ul>
C	101	MC	8359	28	<ul style="list-style-type: none"> <li>Students analyzed a diagram and used the law of superposition to incorrectly answer that a rock layer was younger than another, instead of older.</li> </ul>
C	102	MT	8349	7	N/A
C	103	MT	8336	39	<ul style="list-style-type: none"> <li>Students did not understand the term "transform fault" mistook a transform fault with a diagram of a</li> </ul>

					divergent plate boundary.
C	104	MT	8346	33	<ul style="list-style-type: none"> <li>Students did not understand the term "lithosphere" mistook the lithosphere with a diagram of the asthenosphere.</li> </ul>
C	105	MT	8344	34	<ul style="list-style-type: none"> <li>Students did not understand the term "asthenosphere" mistook the asthenosphere with a diagram of the lithosphere.</li> </ul>
C	106	MT	8346	39	<ul style="list-style-type: none"> <li>Students did not understand the term "divergent plate boundary" mistook a divergent plate boundary with a diagram of a transform fault.</li> </ul>
C	107	MF	8356	51	<ul style="list-style-type: none"> <li>Students did not understand the term "transform fault plate boundary" did not understand the type of movement that occurs at a transform fault plate boundary.</li> </ul>
C	108	MF	8356	48	<ul style="list-style-type: none"> <li>Students did not understand the cause of deep earthquakes within the mantle; incorrectly answered that magma rising within the mantle causes deep earthquakes within the mantle.</li> </ul>
C	109	MC	8348	43	*
C	110	MC	8312	68	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; incorrectly answered that oceanic-continental plate boundaries occur at ocean trenches, instead of subduction zones.</li> <li>Students likely did not refer to the data booklet; incorrectly answered that oceanic-oceanic plate boundaries occur at ocean trenches, instead of subduction zones.</li> </ul>
C	111	MC	8356	59	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; answered incorrectly that the San Andreas Fault is a</li> </ul>

					<p>divergent plate boundary, instead of a transform plate boundary.</p> <ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; answered incorrectly that the San Andreas Fault is an oceanic-continental convergent plate boundary, instead of a transform plate boundary.</li> </ul>
C	112	MC	8343	48	*
C	113	MC	8347	39	<ul style="list-style-type: none"> <li>Students incorrectly answered that Plate Tectonic Theory was the first concept presented to the scientific community, not the Continental Drift Theory.</li> </ul>
C	114	MC	8351	60	<ul style="list-style-type: none"> <li>Students correctly answered that seafloor spreading and the location of volcanoes and earthquakes support the Theory of Plate Tectonics, but did not include matching fossil evidence and matching ancient rocks on adjacent continents.</li> </ul>
C	115	MC	8345	32	<ul style="list-style-type: none"> <li>Students analyzed a graph and correctly understood that the location should be underground, but incorrectly answered that the percent area of the Earth's crust was large to represent an ocean trench, not small.</li> </ul>
C	116	MC	8347	40	<ul style="list-style-type: none"> <li>Students incorrectly answered that an earthquake is most likely to give warning signs before occurring, allowing people to be safely evacuated, instead of a volcanic eruption.</li> </ul>
D	88	TF	8770	34	<ul style="list-style-type: none"> <li>Students did not understand the term "remote sensing"; incorrectly answered that remote sensing data is collected by drilling deep into the Earth's crust.</li> </ul>
D	89	TF	8768	20	*

D	90	MC	8764	44	<ul style="list-style-type: none"> <li>Students incorrectly answered that the Earth's mantle has the greatest density, instead of the core.</li> </ul>
D	91	MC	8756	66	<ul style="list-style-type: none"> <li>Students did not understand how P-waves and S-waves travel through different rock layers; interpreted a graph and chose a cross-section that incorrectly answered that S-waves travel through a liquid mantle and are stopped by a solid core of Planet X, instead of traveling through solid rock and being stopped by a liquid core.</li> <li>Students did not understand how P-waves and S-waves travel through different rock layers; interpreted a graph and chose a cross-section that incorrectly answered that both S-waves and P-waves travel through both solid and liquid rock layers of a Planet X.</li> </ul>
D	93	TF	8759	54	<ul style="list-style-type: none"> <li>Students incorrectly answered that major extinctions are identified by the disappearance of all life forms in the fossil record at a particular time.</li> </ul>
D	94	MC	8760	27	*
D	95	MC	8734	52	<ul style="list-style-type: none"> <li>Students likely did not refer to the Geological Time Scale in the data booklet; interpreted a passage and incorrectly answered that a fossil formed before the Cambrian Explosion was formed during the Paleozoic era, instead of the Precambrian era.</li> </ul>
D	96	TF	8767	11	N/A
D	97	TF	8770	10	N/A
D	98	MC	8763	73	<ul style="list-style-type: none"> <li>Students did not understand the terms "sill" or "folded"; incorrectly interpreted a picture and answered that the structure shown was sediment layers that have folded, instead of an erosion surface.</li> </ul>
D	99	MC	8743	60	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did</li> </ul>

					<p>not understand how to determine the age of a rock sample when given the percent remaining of the original sample and the parent isotope's half-life.</p> <ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; did not understand how to determine the age of a rock sample when given the percent remaining of the original sample and the parent isotope's half-life; incorrectly calculated the age of the rock sample using only one half-life instead of two.</li> </ul>
D	100	MC	8755	66	<ul style="list-style-type: none"> <li>Students likely did not refer to the data booklet; correctly answered that fossils that can be age dated using the carbon-14 isotope are from the Quaternary period, but incorrectly answered that they can also be from the Tertiary and Cretaceous period.</li> <li>Students likely did not refer to the data booklet; correctly answered that fossils that can be age dated using the carbon-14 isotope are from the Quaternary period, but incorrectly answered that they can also be from the Tertiary period.</li> </ul>
D	101	MC	8766	86	<ul style="list-style-type: none"> <li>Students did not understand the terms "crust" and "asthenosphere"; incorrectly answered that the tectonic plates move on the crust, not the asthenosphere.</li> <li>Students did not understand the terms "lithosphere" and "asthenosphere"; incorrectly answered that the tectonic plates move on the lithosphere, not the asthenosphere.</li> <li>Students did not understand the terms "mantle" and "asthenosphere"; incorrectly answered that the tectonic plates move on the mantle, not the asthenosphere.</li> </ul>

D	102	MC	8766	76	<ul style="list-style-type: none"> <li>• Students correctly identified one type of plate boundary from a diagram, but did not consider that there were two types of plate boundaries present.</li> <li>• Students incorrectly identified three types of plate boundaries from a diagram when there were only two types present.</li> </ul>
D	103	MC	8759	58	<ul style="list-style-type: none"> <li>• Students did not understand the term “hot spot”; incorrectly answered that if the Pacific Plate did not move over the Hawaiian hot spot, there would be no volcanic island formed, instead of there being only one extremely large volcanic island.</li> </ul>
D	104	MC	8754	68	<ul style="list-style-type: none"> <li>• Students correctly answered that mantle magma rises at hot spots, but incorrectly answered that it also rises at subduction zones, and did not consider that it rises at divergent plate boundaries.</li> </ul>
D	105	MC	8722	43	*
D	106	MT	8758	67	<ul style="list-style-type: none"> <li>• Students likely did not refer to the data booklet; were unable to correctly identify the Mid-Atlantic ridge from a map of Iceland and the surrounding sea floor.</li> </ul>
D	107	MT	8739	62	<ul style="list-style-type: none"> <li>• Students were unable to identify the oldest sea floor rock when given a map of Iceland and the surrounding sea floor; incorrectly answered that an island was the oldest sea floor rock, instead of identifying the ocean floor.</li> </ul>
D	108	MT	8708	76	<ul style="list-style-type: none"> <li>• Students did not understand the term “magnetic reversal pattern”; were unable to identify a magnetic reversal pattern from a diagram; mistook Iceland for a magnetic reversal pattern.</li> </ul>
D	109	MT	8740	43	*
D	110	MT	8749	45	*

D	112	MC	8752	48	<ul style="list-style-type: none"> <li>Students incorrectly answered that fossil evidence from North America and the Arctic provided evidence for Continental Drift Theory.</li> <li>Students incorrectly answered that mapping of the mid-ocean ridge in the Atlantic and Pacific oceans provided evidence for Continental Drift Theory.</li> </ul>
D	113	MC	8758	63	<ul style="list-style-type: none"> <li>Students incorrectly answered that rising convection currents are not a source of magma.</li> </ul>
D	114	MC	8751	55	<ul style="list-style-type: none"> <li>Students incorrectly answered that ocean trenches on a map identify divergent plate boundaries, not subduction zones.</li> </ul>
D	115	TF	8751	17	N/A
D	116	MC	8758	32	<ul style="list-style-type: none"> <li>Students analyzed a map and incorrectly answered that seismic waves in the Hawaiian Islands would be triggered by an earthquake in Alaska 6.5 hours earlier, not tsunamis.</li> </ul>

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.