

Appendix B: Complete rubric for assessing student work for data skills within Ocean Tracks-College Edition

All skill levels can be assumed to begin with the phrase “Based upon what is asked for in the question”

Indicator	4 Exceeds Expectations	3 Meets Expectations	2 Needs Improvement	1 Inadequate
Decoding Data (BDS1): Ability to read data or measurements from a representation or table	<i>Not applicable for this indicator</i>	- Data table is completely filled in with completely correct values and units. - In a non-table answer, student correctly located and reported specific numeric value(s).	- At least half of the data table is filled in with correct values and units. Other entries may be blank or incorrect. - In a non-table answer, student refers to data with a value, but it is incorrect	- Less than half of the data table is filled in with correct values and units. - In a non-table answer, student does not use any specific numeric values.
Describing Data (BDS2): Ability to say what patterns or relationships are seen between data points	Meets Expectations is satisfied AND one or more of the following: - Comparison references specific data values beyond the scope of what is asked (e.g., makes magnitude and/or statistical comparisons) - Creatively presents data visualization or uses more advanced tools to show a relationship between data points. - Appropriately uses scientific vocabulary	- Description of the data pattern is accurate. - Makes quantitative comparison that includes reference to specific data values. - Makes a comparison or describes a data pattern that is relevant to the scientific question - Data visualization (including screenshot) are properly annotated with descriptions and/or comparisons, per instructions. <i>The only time a qualitative-only comparison can be scored a three is if the scoring</i>	- Description of the data pattern is attempted, but inaccurate. (e.g., reports an increase when the data showed a decrease) - Makes no quantitative comparison or reference to data values. - Makes a qualitative comparison of a pattern that is relevant to the scientific question - Data visualization (including screenshot) is minimally annotated OR includes annotations that are incomplete or incorrect.	- Provides little or no description of data patterns at all. - Makes a qualitative comparison, but it is irrelevant to the scientific question. - Provides a description that is a summary of background information without any evident use of OT data. - Does not include a data visualization OR a visualization with no annotation at all.

	to describe data patterns.	<i>guide explicitly notes that it is not possible to make a quantitative description.</i>		
Interpreting Meaning in Data / Drawing Conclusions (IDS1): Ability to explain what data patterns mean or why they are important	Meets Expectations is satisfied AND one or more of the following: - Chooses examples of evidence that are expertly matched to the claim, interpretation, or conclusion - Reasoning for why evidence supports a claim is deeply explained (e.g., digs deeper into a dataset, demonstrating a higher level of sophistication than expected) - Provides information or evidence from primary sources - Considers the sample size and takes measurements from multiple tracks to increase confidence in the patterns identified	- References multiple appropriate sources of evidence for the claim, conclusion, or interpretation made. - At least two sources of evidence from within OT are used. - Evidence used is relevant to the claim, conclusion, or interpretation that has been made. - Evidence is presented with specificity, not generalities. - Clearly articulates why the evidence provided supports a claim. Evidence may include: qualitative patterns or observations from OT data, quantitative measurements or patterns from OT data, background information from OT library, and/or other background information or knowledge	- References at least one appropriate source of evidence for the claim, conclusion, or interpretation made. - Uses one source of evidence from within OT; if other evidence is used, it draws on background information. - Evidence is relevant to the claim, conclusion, or interpretation. - Evidence is presented more generally, without specificity. OR - Presents robust evidence, but does not clearly articulate how the evidence supports the claim, conclusion, or interpretation made.	- Does not concrete reference any evidence at all. OR - Does not reference any OT data. OR - Evidence provided is irrelevant to the claim, conclusion, or interpretation. <i>This includes “floating interpretations” that score well as a plausible claim being made, but that do not articulate support for the argument.</i>
Making Hypothesis Statements and	Meets Expectations is satisfied; AND additional	Poses a hypothesis or research question that: Is specific.	Poses a hypothesis or research question that: Is specific.	Poses a hypothesis or research question that: Is vague or unclear.

Research Questions (IDS3): Ability to articulate a question or hypothesis that would generate new information or insight	mastery, including one or more of the following: • Writes a statement that, as described, is a clearly testable approach to answering a question or exploring a phenomenon • Questions or hypotheses show insight and high degree of understanding • Presents novel hypotheses or questions that show original thought beyond the direction of the prompts • Poses highly insightful questions about relationships that are not or are under-explored within the bounds of the curriculum • Strong use of appropriate scientific language (e.g., dependent and independent variable)	• Involves at least one dependent and one independent variable (even if this terminology is not used) • Is bounded within the scope of either observed data within OT, theoretically observable data, and/or scientific concepts or principles <i>Note: a hypothesis or question that is strong in these characteristics, but does not use highly scientific language, should still be scored a 3.</i>	• Has either a clear dependent or independent variable, but the other is missing or unclear. • May be fanciful or seem disconnected from scientific concepts or principles, including OT data.	• Has no clear inclusion of dependent or independent variables.
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Critical Thinking about Data (CT1): Ability to critically examine data sources and interpretations, including: data limitations, alternative interpretations, additional data needs, evaluating strength of a claim	Meets Expectations is satisfied AND one or more of the following: • Separates factual information from inferences • Identifies MULTIPLE plausible alternative explanations or interpretations of data • Shows proficiency in such thinking in questions where it is not specifically asked for. • Adds more specificity to the type of data or measurement that would be needed to address other points of view	<i>Note: rarely will more than one of these be asked for in a given question.</i> • States a factual limitation of why a particular data source or data point may be invalid, unreliable, or should be questioned in some way; i.e., limitation comes from background information in OT or scientific knowledge / principles about the nature of that data OR Separates relevant from irrelevant data (e.g., identifies meaningful data vs. outliers or sampling artifacts; takes into account single track vs. larger dataset) • Identifies at least one plausible alternative explanation or interpretation for data or observations; explanation is fully explained and specific. • Clearly names or describes at least one other type of data or information –	• States a plausible, but unsupported, reason why a particular data source or data point may be invalid, unreliable, or should be questioned in some way; i.e., indicates some assumption that may be unfounded • Attempts to provide an alternative explanation or interpretation, but explanation is not plausible or only vaguely explained • Names or suggests at least one other type of data or information to be used; but the suggestion is not relevant to the question, claim, or hypothesis that is being addressed • When evaluating strength of a claim or hypothesis, student uses minimal critical thinking indicators; OR only minimally uses OT data	Does not demonstrate core skills of thinking critically about data when asked for: • Does not provide any plausible reasoning for why one might question a data source or data point OR Does not question (and may base interpretation on) a data point that is invalid or unreliable in some way • Does not attempt or is not able to provide any alternative explanation or interpretation; OR repeats / rephrases the existing interpretation. • Cannot or does not name other data sources that could be used; OR names sources that would
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		whether available within OT or not – that would further strengthen a conclusion, support a hypothesis, or refute a conclusion - When evaluating the strength of a claim or hypothesis, student uses critical thinking indicators OR strong use of OT data evidence to support their evaluation of strength, for instance: - Look at data limitations - Look at outliers - Look at sampling	evidence to support their evaluation of strength	not qualify as valid data When evaluating strength of a claim or hypothesis, student uses no critical thinking indicators; does not use any OT data evidence to support their evaluation
Communicating Ideas Effectively (CT2): Ability to clearly articulate thinking and ideas about data in writing	Meets expectations + demonstrates additional mastery. For example: - Uses consistent, high-level, sophisticated language and communication techniques - Uses advanced graphics or visualizations	- Clearly articulates thoughts and ideas in response, so that meaning can be easily understood by an outside reader. - Uses complete, coherent sentences or paragraphs, punctuation, and appropriate citations. - Uses appropriate data visualization to support written communication of information, including graphs, tables, and annotated screenshots.	- Articulates thoughts and ideas in response, but has some difficulty with clarity, making it more difficult for a reader to understand - Does not use complete, coherent sentences or paragraphs, punctuation, and appropriate citations. - Attempts to use data visualization to support communication, but may not be fully clear	- Clarity of presentation of thoughts and ideas makes it very difficult, or impossible, for a reader to understand. - Does not use complete, coherent sentences or paragraphs, punctuation, and appropriate citations. - Does not use data visualization

		• Uses appropriate scientific vocabulary • Adheres to provided guidelines in the question, if provided (e.g., format, word count, etc.)	• Does not use appropriate scientific vocabulary consistently in response; OR uses scientific language inappropriately (distracting from clarity) • Adheres to some, but not all, of provided guidelines in the question, if provided (e.g., format, word count, etc.)	• Does not use appropriate scientific vocabulary at all. • Does not adhere to any provided guidelines in the question (e.g., format, word count, etc.)
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