

Specific Rubrics for Sufficiency of Evidence

****Notes:**

1. *Must have a claim that evidence is supporting.*
 - a. *If only a claim, then there is no evidence and sufficiency is not measured*
 - i. *C1S2: "What causes more destructive power is the hardness of the ground and the amount of time it shakes."*
2. *The claim does not have to be relevant or accurate (e.g. Earthquakes are more destructive when they occur closer to the Earth's surface).*
3. *There can be more evidence than is stated in the claim (e.g. the claim only discusses hardness of the ground material, but the evidence includes soft ground result in more destructive earthquakes as well as earthquakes that shake longer result in more destructive earthquakes.)*
4. *Evidence can be citations of the data as well as trends, inferences, or patterns from the data table.*
5. *Sufficiency is a measure of how many RELEVANT variables the student uses as evidence (all, some, or none).*
6. *Not enough to identify relevant variables (e.g. the hardness of ground material impacts the strength of the earthquake); the relationship between variables must be stated (e.g. soft ground results in more destructive earthquakes).*
7. *Do not obsess over unit*
 - a. *S7: "the depth was shallow 26-30 in deep". Should have been km, not in.*
8. *Deadlier is an acceptable proxy for destructive power*
 - a. *S13: "(I has to do with the ground.) Softer the ground, the deadlier the earthquake gets."*

Sufficiency of Evidence-Joe

Depth and Rock Type

Score	Description	Sample Student Response
2	Student provides empirical evidence (observations or measurements that support the claim) for ALL the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Both depth and rock type:</p> <ul style="list-style-type: none"> D2 T2 V3 S18: "How close the earth's surface earthquake started and what type of rock it travels through. This is true because the data table shows the higher the MMI the closer the surface is and the softer the rock type. Whether it happens on an island dose not matter because it only matters how close to the surface it is." D9 T9 V2 S04: "the depth of the epicenter,and the type of rock it passes through on the way to the surface. The quakes closet to the surface were stronger than the ones deeper down,and the quakes that past through soft rock were stronger than the quakes that passed through harder types of rock. The tempreture doesnt matter because an earthquake occured at an level of 8 at 14 degrees while the strongest was at 22 degrees.Also it doesnt matter if its on an island or not it doesnt affect the strength of the quake."
1	Student provides empirical evidence (observations or measurements that support the claim) for SOME of the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Rock type:</p> <ul style="list-style-type: none"> D6 T6 V1 S08: "The type of rock they travel through. This is true because if the ground is very hard there would not be a lot of damage but if the ground is soft there going to be a lot of damage. The other are wrong because it does matter where it happen." D9 T9 V2 S22: "the type of rock they traveled through. If the rock was hard the earthquake is not as strong. It does not matter where the earthquake is it still does not affect the earthquake." <p>Depth:</p> <ul style="list-style-type: none"> D9 V9 V2 S18: "How close they are to the surface of the Earth. Because on the chart earthquake A was only 20 kilometers away from the surface of the so it got a 12 on the MMI Scale. Earthquake B got a 10 on the MMI Scale because it was 115 Kilometers deep into Earth's surface. The air temperature claim is wrong because the air temperature for earthquake B is warmer than the temperature for eathquake C and was more powerful but the air temperature for earthquake A was colder than for Earthquake B and was more powerful." D9 T9 V3 S02: "HOW CLOSE THEY ARE TO THE EARTH'S SURFACE. THE CLOSER IT IS THE STRONGER IT IS. IT DOES NOT MATTER WHAT ROCK IT IS OR AIR TEMPUTURE IT IS AND IT NOT ALWAYS ON ISLANDS."

0	Student does NOT provide any RELEVANT empirical evidence (observations or measurements that support the claim).	Neither depth nor rock type: <ul style="list-style-type: none"><li data-bbox="808 207 1902 267">• D6T6V1S03: "How close they are to earth. The closer it is to the city the stronger it is. The weather dose not matter when a earth quake is."<li data-bbox="808 305 1902 389">• D6 T6 V1 S12: "How a tornado forms. This is true because sometimes it depends on the weather and a tornado gets some of its energy from the ground up. That earthquakes start at higher depth."
----------	---	---

Sufficiency of Evidence-Nan

Energy and Time

Score	Description	Sample Student Response
2	Student provides empirical evidence (observations or measurements that support the claim) for ALL the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Both energy and time:</p> <ul style="list-style-type: none"> D6 T6 V2 S09: "How long they last and how much energy they release. It is true because the more energy it releases the stronger. It is also, how long they last because the longer the more destruction. It is wrong because not all cities have earthquakes." D3 T3 V3 S11: "How long they last and how much energy they release. The amount of energy released was larger the hugher the strength of the earthquake. Time of shaking was longer as the earthquake got more powerful. Wether they happen in cities may effect the damage, but not how powerful the quake is. The type of fault where they begin isn't important isn't important either because a stronger quake had the reverses fault, and so did a weak one."
1	Student provides empirical evidence (observations or measurements that support the claim) for SOME of the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Energy:</p> <ul style="list-style-type: none"> d10 t10 v1 s10: "the amount of energy it relese. because the chart says the more stronger it the more energy that is released. they could be wrong because the chart says so i dont know if the chart is right or not but im trusting it so its just a 50 50 for both." d6t6v1s24: "the amount of energy released. If the earthquake wasn't strong than it wouldn't have much energy. Another claim that would be wrong is if someone said that the strength of earthquakes were related weather they happened in cities, that is wrong because earthquakes can happen anywhere." <p>Time:</p> <ul style="list-style-type: none"> D2 T2 V3 S26: "How long they last. The longer they last the more energy they will release. Weather this happens in cities wont matter on how much energy their is." D4T4V2S10: "How long an earthquake lasts. This is true because the data above shows that longest earthquake was the strongest and the shortest earthquake was the least powerful. Another claim is wrong because the data above does not prove anything else."
0	Student does NOT provide any RELEVANT empirical evidence (observations or measurements that support the claim).	<p>Neither energy nor time:</p> <ul style="list-style-type: none"> D10 T10 V1 S12: "The earth culapsing in the ocean. Becuase earthquaks happen all over the earth. Becuase well i dont no." D10 T10 V1 S21: "The pushing of plates. Because that is how they are created. Because nothing else relates."

Sufficiency of Evidence-Aisha

Magma thickness and Gas bubbles affects explosive power

Score	Description	Sample Student Response
2	Student provides empirical evidence (observations or measurements that support the claim) for ALL the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Both magma thickness and number of gas bubbles:</p> <ul style="list-style-type: none"> D4T4V2S04: "The number of gas bubbles in the magma. The thickness of the magma. It is true because the volcano with the most power has many gas bubbles and when the thickness of the magma is sticky that's the one with more power. It doesn't show us the size of the volcano and the Earth's average surface temperature at the site of the eruption was different. Different by, power of the volcano 6 had 6 degrees c. But the one with the power of the volcano was 2 it was 31 degrees c." D4T4V2S07: "The number of gas bubbles in the magma and the thickness of the magma because they had the same thickness of magma and they both had many gas bubbles. This is true because A, B, and C were all related when you look at the graph you can see that out of all the volcanoes on there they had the highest power of eruption they also all had many gas bubbles and a sticky thickness of magma, you can mostly tell because there is a pattern to tell how the facts are related. Another claim would be wrong because they would have no facts to back it up and they could not explain why, for example if they were to say the power of a volcano's eruption is related to the temperature, when you look at the graph there is no pattern or relationship with the temperature so it would be wrong."
1	Student provides empirical evidence (observations or measurements that support the claim) for SOME of the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Magma thickness:</p> <ul style="list-style-type: none"> D4T4V2S15: "It is related to the thickness of the magma, and the number of gas bubbles in the magma, and the amount of pressure buildup of magma. Because the pressure in the magma causes the volcano to erupt, the more pressure in the magma, the bigger the eruption. <u>If the magma is sticky, the power of the eruption is increased.</u> Some people might think the outside temperature will make a bigger eruption, but it will decrease the power in the eruption if it is hot outside the volcano." D4T4V4S02: "the thickness of the magma. if you have a runny magma it will not be as powerful as if you have a thicker magma then it will be powerful. if the volcano size is too big then it might blow a hole in its self." <p>Number of gas bubbles:</p> <ul style="list-style-type: none"> D4T4V1S04: "The number of gas bubbles in the magma. This is true because the more gas bubbles in the magma, the more powerful the eruption of the volcano will be. Another claim is wrong because on the chart there is no space for the size of the volcano, so you cannot compare the size with anything else on the chart." D7T7V4S04: "the number of gas bubbles in the Magma. because the more gas bubbles there are the stronger the volcano will be as on the chart when the volcano was really strong there were a lot of gas bubbles and when the volcano was not really strong there were not as many gas bubbles. another claim that is wrong is that the thing that is related to the power of the volcano's eruption is what the earth's average surface temperature at the site of eruption. It is wrong because if you look at the chart you can see that the temperature varies whether it is hot or cold or the volcano is strong or mild."

<p>0</p>	<p>Student does NOT provide any RELEVANT empirical evidence (observations or measurements that support the claim).</p>	<p>Neither magma thickness nor number of gas bubbles:</p> <ul style="list-style-type: none"> • 11900723: "Tornado is related. It is strong like a volcano and fast. A earthquake is just shaking and it is no throwing fireballs," • D2 T2 V4 S37: "The size of the volcano. This is true because the bigger the volcano the more magma it can hold which in turn causes a bigger eruption with more lava. The surface temperature wont affect it because the magma is inside and is not getting effected by the surface.: • d6 t6 v2 s21: "Size of the volcano. The smaller the volcano is and the more magma it will erupt. It might be right"
-----------------	--	--

Sufficiency of Evidence-Veronica

Temperature and magma thickness affect eruption power

Score	Description	Sample Student Response
2	Student provides empirical evidence (observations or measurements that support the claim) for ALL the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>The thickness and temperature of the magma:</p> <ul style="list-style-type: none"> D4T4V3S15: "The thickness and the temputure of the magma/lava. If the magma was very sticky and cool, then the volcano will expolode more violently. if the magma is hot and runny it would build up less pressure. The amount of rain fall and/or if it was on a island would have nothing to do with the eruption of a volcano because it depends on the magma and pressure that is built up." D7T7V6S13: "The depth and rock type where the earthquake started. This is true because the earthquakes with the least depth, and the earthquakes with the softest rock, had a higher strength than the any of the others. Another claim is wrong because the air temperature when the earthquake started is mixed. There is no structured pattern that relates to the strength of the earthquake."
1	Student provides empirical evidence (observations or measurements that support the claim) for SOME of the RELEVANT variables provided that could be used to explain the multivariate phenomena in question.	<p>Thickness of magma:</p> <ul style="list-style-type: none"> D10T10V2S18: The thickness of the magma. Because acording to the chart if the magma is sticky (thick) the eruption has more power. The amount of rain where the volcano is located and the temperature of the magma or whether they happen on island are wrong because acording the the chart everything is mixed but one thing that is the thickness of the magma." d3 t3 v3 s03: " the thickness of the magma. the most powerful eruptions had sticky magma so that expresses thickness. the temperature because the hottest eruptions had the least thickness." <p>Temperature of magma:</p> <ul style="list-style-type: none"> D3 T3 V3 S02: " The temperature of the magma. In the chart, the eruptions from the volcanoes with the highest power had the lowest temperature of the magma. The power is not related to if they happen on islands or not because the chart does not even include whether the eruptions happened on islands or not." D7 T7 V6 S05: " How thick the magma is, and the magma's temperature. The hotter and more liquid the magma, the smaller the eruption. The rain isn't a proper example of evidence because it isn't related to the volcano."
0	Student does NOT provide any RELEVANT empirical evidence (observations or measurements that	<p>Neither the thickness of the magma nor the temperature of the magma:</p> <ul style="list-style-type: none"> D4T4V1S03: "The power of the magma underground. Because if the magma flies higher the lava is sticky. Because if it rains alot that doesn't mean a volcano is going to erupt." D10T10V12S21: "The thickness of the magma the temperature of the magma the power of a volcano's eruption. That the thickness of the magma the temperature of the magma the power of a volcano's eruption. Because the thare lj sdjf."

	support the claim).	<ul style="list-style-type: none">• D3T3V2S17: "Thickness of the magma. Because the data shows it. Because the data shows that that the others are unrelated."
--	---------------------	--