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# 3

91429



914290



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## Level 3 Geography 2022

### 91429 Demonstrate understanding of a given environment(s) through selection and application of geographic concepts and skills

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of a given environment(s) through selection and application of geographic concepts and skills.	Demonstrate in-depth understanding of a given environment(s) through selection and application of geographic concepts and skills.	Demonstrate comprehensive understanding of a given environment(s) through selection and application of geographic concepts and skills.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

**You should attempt ALL parts of the question in this booklet.**

Pull out Resource Booklet 91429R from the centre of this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (✂). This area may be cut off when the booklet is marked.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

**Merit**

**TOTAL**

**05**

ASSESSOR'S USE ONLY

## INSTRUCTIONS

Read the resource booklet about lithium extraction in Bolivia. Integrate supporting evidence from a variety of resource materials into your answers.

Your answers should demonstrate your understanding of a range of geographic skills, conventions, and concepts. A list of geographic concepts is provided on page 2 of the resource booklet.

## QUESTION

- (a) Describe the geography (location, size, and extent) of the Salar de Uyuni (Uyuni salt flat).

Use specific geographic information from the resources, with precision, to support your answer.

The Uyuni salt flat is located in the Southern Western Hemisphere at coordinates  $22^{\circ}\text{S}$ ,  $67^{\circ}\text{W}$ . This is in the country Bolivia located in the continent South America. Uyuni Salt flat is the largest salt flat globally with an area of  $10000\text{ km}^2$ . It is located to the East of the Andes Mountain Range and West of the town Uyuni in South Western Bolivia. The salt flats are so large they can be seen with satellite imaging which shows the extent at which the flats span across the environment. Bolivian government claims it holds ~70% of the world's extractable Lithium.



- (b) How and why is the natural and/or cultural environment of this area suitable for lithium extraction?

The Natural Environment of Uyuni Salt flats has Particular Characteristics which Contribute to the suitability of Lithium extraction. The Salt flats were formed as a result of the ~~slaying~~ drying of Minchin Lake causing a change in the environment to form Salt flats with lithium brine as a further result of hot, dry Conditions and poor drainage of the Lake. The Process of Weathering of older rocks in the surrounding Mountains (andes) is one of the lithium sources for Uyuni's lithium brine. This factor along with other lithium rich sources such as debris from Volcanoes, lithium rich magma fluid and Convecting basal brine (resource E) interact with the weather conditions (hot/dry) to create evaporation, forming a layer of exploitable lithium to be extracted.

The Weather Conditions which allow for these Processes occur as the Climate classification of Southern Western Bolivia (Where Uyuni) is located is Arid desert ~~which~~ (Resource F fig 1).

The ~~Salt~~ Uyuni town rainfall ~~is~~ is seasonal which ~~is~~ with very low rainfall between April and November with months like June receiving 0 days of Rainfall. These conditions are perfect during April-November as



Extra space if required.  
Write the question number(s) if applicable.

QUESTION  
NUMBER

Q, b) evaporation Requires ~~that~~ dry conditions  
which both Arid desert and low rainfall  
Provides.



- (c) Lithium demand is predicted to grow as people embrace 'green' (environmentally friendly) technologies that require lithium-ion (Li-ion) batteries. For example, by 2030, electric vehicles are expected to account for 75% of total lithium demand.

Considering the statement above, and the resource material, how sustainable is lithium mining in Bolivia likely to be in future?

Sustainability is the adoption of behaviors and thinking which allows ~~future~~ individuals, groups, and societies to meet their needs without ~~have~~ preventing future generations from doing the same.

Lithium mining will have major cultural impacts and benefits affecting people and societies. One positive outcome of lithium mining in Salar de Uyuni is that it provides employment opportunity. Tourism in Bolivia creates 200,000 jobs directly ~~with 132,000 of these~~ compared to the 132,000 jobs created by mining. These jobs indirectly impact 800,000 people (Resource H). This source of income will allow future generations with the resources to meet their aspirations.

However, a negative ~~and~~ effect on the cultural environment includes quinoa producers. With Bolivia being second largest producer of quinoa behind Peru. Due to the large water needs of lithium extraction



With the evaporation process, large quantities of water is needed to be extracted from the environment. The two major rivers, Rio Colorado and Rio grande de Lipez flow into the Uyuni Salt flat. This is Worrying for Quinoa Producers as experts ~~believe~~ are Skeptical ~~the~~ of the claim by Bolivian Government that 90% of water used by the mines will be Salt Water. As demand for Lithium is Predicted to meet supply in 2023 (resource D) this will create a greater need for water <sup>(2,273,000 L/Tonne Lithium)</sup> to evaporate and extract greater quantities of lithium. A future impact on the Quinoa growers is that water ~~Advancing~~ from Rio Colorado and Rio grande<sup>m</sup> de Lipez may become ~~stagnant~~ ~~affecting~~ ~~Quinoa~~ ~~crops~~ ~~and~~ contaminated. due to leaching of toxic chemicals from evaporation Pools. ~~for water~~ ~~so~~ As this water is relied upon for Production of food ~~and~~, livestock and humans, future generations may not be able to use it as a resource therefore not allowing them to reach their aspirations, not Sustainable. As Quinoa is a major income Provider for these People, they will suffer economically as their source of income will decrease.



The perspective that electric vehicles are green comes from data that shows electric vehicles produce ~60% less carbon ~~emissions~~ pollution than traditional internal combustion. This perspective explains the decisions to increase demand for battery power and that perhaps the rest of the world's viewpoints are ignorant to the costs of lithium mining on people and the local environment of those countries who extract it.

The entire globe is impacted by the effects hydrocarbon has with global warming ~~more~~ which affects a greater population. Global warming will affect future generations and their ability to meet their future aspirations including those in lithium mining countries such as Bolivia. Whereas issues that arise from lithium mining are local and only affect those in the surrounding area to reach their future aspirations. Final call: Mining in Bolivia is unsustainable due to the large ~~over~~ environmental impacts such as water use and pollution which I believe overrules the positive impacts gained such as 800,000 people indirectly benefitted from the 332,000 ~~over~~ combined jobs from tourism and mining. Not sustainable.

## Merit Exemplar 2022

Subject	Level 3 Geography		Standard	91429	Total score	05
Q	Grade score	Annotation				
1	M5	A good use of the geographic skills in part (a) to show understanding of the specific location and size of the Salar. Part (b) is weaker with more required about how the environment, which is well explained, makes the location suitable for lithium extraction. More information about the ease of extraction given the flat nature of the salt plains or the location of the lithium being only a metre below the surface was needed, and not just an explanation of why the lithium is there. Part (c) has a range of aspects of sustainability and considers how it could be more economically than environmentally sustainable as well as considering the different impacts globally and locally.				