



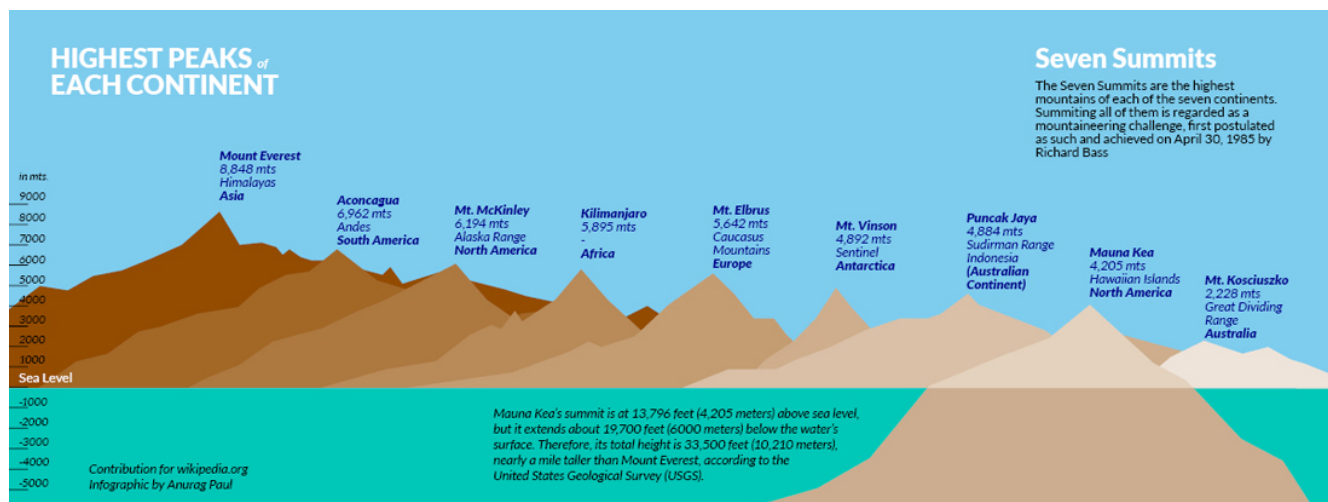
**AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES
SCHOOLS ENRICHMENT CENTRE
TEACHER NETWORK**

Title: EXTREMES (Grades 6 to 9)

We need to use negative numbers for sub zero temperatures and for distances between the highest peaks on earth and the deepest points in the oceans and deep mines.

Mauna Kea's summit is 4205 metres above sea level but it extends below the sea surface to a depth of -6000 metres. This makes Mauna Kea taller than Mount Everest. Why is it taller and by how much?

We shall ask some questions relating to the facts and figures given below and learners can find answers to their own questions.



What is the difference in the heights of the highest peak on earth and the deepest point on the ocean floor?

A drone is flying at the same height as the top of Mount Kilimanjaro but directly above the Mponeng Mine. Some men are working at the lowest point in the mine. How far are the men below the drone?

Highest Mountains	Height	Deepest Oceans	Depth	Deepest Mines	Depth	Location	Mineral
Everest, Asia	8848 m	Pacific Ocean	10924 m	Mponeng	4.0 km	S. Africa	Gold
Aconcagua, S America	6962 m	Atlantic Ocean	9219 m	Tau Tona	3.9 km	S. Africa	Gold
McKinley, N. America	6194 m	Indian Ocean	7455 m	Savuka	3.7 km	S. Africa	Gold
Kilimanjaro, Africa	5895 m	Southern Ocean	7236 m	Driefontein	3.4 km	S. Africa	Gold
Elbrus, Europe	5642 m	Caribbean Sea	6946 m	Kusasaletu	3.27 km	S. Africa	Gold
Vinson, Antarctica	4892 m	Arctic Ocean	5625 m	Kidd	2.92 km	Canada	Copper/Zinc
Puncak Jaya, Australia	4884 m	South China Sea	5016 m	Creighton	2.5 km	Canada	Nickel

What is the difference between the highest and lowest temperatures recorded at the South Pole?

How much hotter was the hottest day compared to the coldest day ever recorded in South Africa?

How much colder was the coldest day recorded at the South Pole compared to the hottest day recorded in Death Valley?

What is the range of temperature between the highest and lowest temperatures recorded in Greece and Italy?

Country /Region	Record High Temp	Place	Date	Country /Region	Record Low Temp	Place	Date
USA	56.7°C	Death Valley	1913	Antartica	-82.8°C	South Pole	1882
Israel	54.0°C	Tirat Zvi	1942	Russia	-67.8°C	Oymyakon	1933
South Africa	50.0°C	Dunbrody	1918	Greenland	-66.1°C	North Ice	1954
Argentina	48.9°C	Rivadavia	1905	Mongolia	-55.3°C	Zuungovi	1976
Greece	48.0°C	Athens	1977	Italy	-49.6°C	Busa Fradusta	2013
Antartica	-12.3°C	South Pole	2011	South Africa	-20.1°C	Buffelsfontein	2013

References: https://en.wikipedia.org/wiki/List_of_weather_records
https://en.wikipedia.org/wiki/Seven_Summits
<http://www.sciencekids.co.nz/sciencefacts/earth/highestmountainsbycontinent.html>
<http://www.worldatlas.com/aatlas/infopage/deepest.htm>
https://en.wikipedia.org/wiki/List_of_deepest_mines



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Solution

Mauna Kea's summit is 4205 metres above sea level but it extends below the sea surface to a depth of -6000 metres. This makes Mauna Kea taller than Mount Everest. Why is it taller and by how much?

Mauna Kea is altogether 10 205 metres tall from its lowest point on the ocean floor to its highest point so it is taller than Mount Everest 8850 metres by a difference of $10205 - 8848 = 1357$ metres.

What is the difference in the heights of the highest peak on earth and the deepest point on the ocean floor?

The difference is $8848 - (-10924) = 19772$ metres. We add the distances because one is above sea level and the other is below sea level.

A drone is flying at the same height as the top of Mount Kilimanjaro but directly above the Mponeng Mine. Some men are working at the lowest point in the mine. How far are the men below the drone?

The men are $5895 - (-4000) = 9896$ metres. We add the distances because one is above sea level and the other is below sea level.

What is the difference between the highest and lowest temperatures recorded at the South Pole?

The difference is $-12.3^\circ - (-82.8^\circ) = 70.7^\circ\text{C}$

How much hotter was the hottest day compared to the coldest day ever recorded in South Africa?

The difference in temperature was $50.0 - (-20.1^\circ) = 70.1^\circ\text{C}$

How much colder was the coldest day recorded at the South Pole compared to the hottest day recorded in Death Valley?

This difference in temperature was $56.7^\circ - (-82.8^\circ) = 139.5^\circ\text{C}$

What is the range of temperature between the highest and lowest temperatures recorded in Greece and Italy?

The range is $48.0 - (-49.6) = 97.6^\circ\text{C}$.

Why do this activity?

This activity gives some real world examples of the use of negative numbers in a cross curricular context involving geography and science. It motivates the rule about subtracting negative numbers in a context where adding the values can be visualised as the natural way to find total distances or differences in temperature. It gives learners practice in reading numerical data from tables and interpreting the data. It also invites many more questions and extension for example to finding out about differences in pressure at high altitudes and under the sea and the effects on the human body.

Possible approach

Print the question as on page 1 with all the information. Ask the learners to work in pairs or small groups to find the answers to the questions. Have a class discussion where the learners share the answers they have found and check each others' working.

Then ask each group to pose another question. Write the questions on the board. Ask all the learners to find the answers. End the lesson by discussing the answers and the implications of these facts and figures.

Possible extension

Find out about differences in pressure at high altitudes and under the sea and the effects on the human body.

Possible support

When working in groups tell the learners that it is the group's responsibility to help each other and to ensure that everyone understands the question and will be able to answer similar questions.