

TEMPERATURE & HEAT

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Austin Texas & New York Times MARCH 16,2018

Burning Coal for Survival in the World's Coldest Capital

Photographs and Text by BRYAN DENTON MARCH 15, 2018



The smoke-filled streets of Dari Ekh, an unplanned ger district in Ulan Bator, Mongolia as homes burned coal on a February evening.



QUESTION: Using algebra show 40 degrees F is the same as 40 Degrees C ? Show calculations.

HINTS: $C = 5/9 (F - 32)$, let $C = F$, solve for when this happens.

BELOW GOOD EXTRA CREDIT PREP FOR FINAL EXAM IF NEEDED

EXTRA CREDIT QUESTION: Note in second picture below the ice archers Are shooting arrows at 45 degrees. If arrows are shot at 200 ft./s, find distance horizontal arrows would go at: (a) 30 degrees to horizontal (b) 60 degrees to horizontal, (c) 45 degrees to horizontal?

HINTS: Break solution into two parts: Horizontal and vertical motion.

ANSWERS TO EXTRA CREDIT: (a) $x = \sim 1082.5$ ft., (b) same as (a) (c) $x = \sim 1249.6$ ft.

ULAN BATOR, Mongolia — Mongolians have long relied on folklore to explain how miserably cold their winters are. During the first of nine phases of winter — each composed of nine days, starting on Dec. 22 — it is said that vodka made from milk freezes. During the third set of nine days, **when temperatures can hit minus 40 degrees in both Fahrenheit and Celsius**, the tail of a 3-year-old ox is said to fall off. Around the sixth set of nine days, which falls in the middle of February, roads are expected to re-emerge from underneath the ice and snow.

But for the nearly 1.5 million residents of the capital, Ulan Bator, the misery of winter is now defined almost singularly by the smoke rising out of the city's chimneys. Since 2016, in addition to being the world's **coldest capital city**, **it has also had the distinction of being the one with the highest recorded levels of air pollution, surpassing notoriously polluted megacities like Beijing and New Delhi.**

According to local government figures, around 80 percent of Ulan Bator's air pollution is produced by just over half the population, living in the so-called ger districts in the north of the city, named for the traditional nomadic dwelling central to Mongolians' herding lifestyle.



Preparing for an ice archery competition on the frozen Tuul River, which runs through Ulan Bator.



Residents walking through a northern Ulan Bator district on a polluted February morning.