

Quiz 5

Name _____

The gargantuan grasshopper (*Aeropedulus imaginus*) requires ~2000 growing degree days (GDD) above 0°C to complete its development from egg to adult. The adults lay eggs, which can overwinter. The adult, however, die if they freeze.

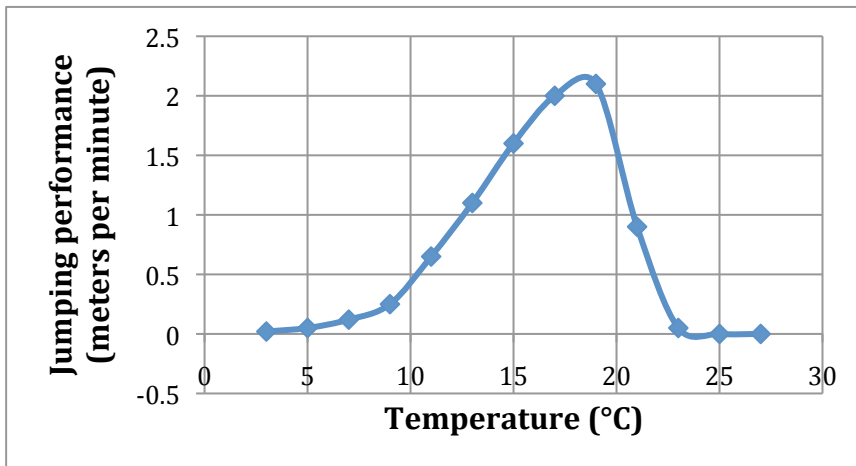
Using this table showing the average temperature in °C at a site near Pullman and assuming that each month has 30 days (and that all days in the month are the same temperature), answer the following questions.

	Ave temp. in 1970		Ave temp in 2010		Ave temp. in 2040	
April	2	60	4	120	7	210
May	7	210	10	300	13	390
June	10	300	14	420	16	480
July	14	420	17	510	19	570
August	16	480	20	600	21	630
September	14	420	15	450	16	
October	3	90	6		10	
November	-4	dies	-2		1	

1) In which time period(s) can *A. imaginus* complete it's life cycle?___2010 & 2040

2) What happens to the phenology of the adults over these 60 years? (Be specific)

Adults emerge earlier from September in 2010 to August in 2040



3) If this graph showing the jumping performance of the grasshoppers is representative of other fitness metrics of the adults, in which time period would the population have the highest growth rate?

2010 (get's too hot when adults emerge in 2040)

4) The table above shows average temperatures. Provide *one* brief, clear explanation for why variability in temperature might be even more important than averages.

Variability, especially around the high end, can lead to zero or near zero fitness (e.g., a mean of 21 with a heat wave of a few degrees higher could be lethal).

Alternatively, if there were enough variability in Oct of 1970's, a grasshopper might just make the 2000 GDD to develop (but this requires assuming a particular distribution of variability and some squinting, so half points)

____/10pts