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- Distributing and/or posting our content online (for example, on social media or a blog.

Thank you for supporting us. And, we look forward to helping you with your teaching practice. Please feel free to reach out to us if you have any questions or suggestions.

Sincerely,

Kent
REAL Science Challenge Founder
Science Department Head (Burnaby South Secondary)

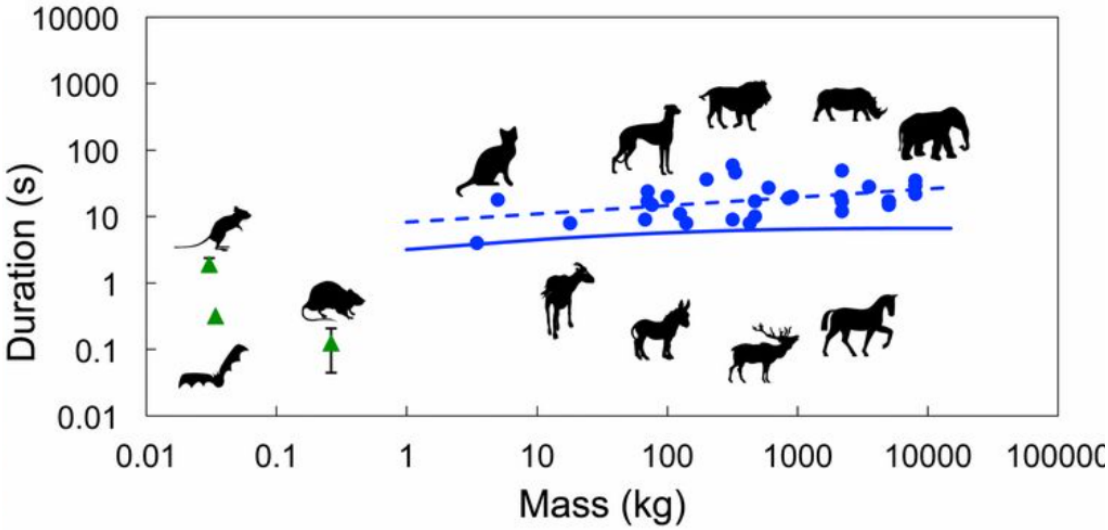
Contact Kent at realsciencechallenge@gmail.com

Intro CER Example - Ig Nobel Prize

Question: Does an animal's body size affect the duration of urination?

Claim: All mammals above 3 kg in weight empty their bladders over nearly constant duration of 21 ± 13 s

Evidence: Scientists filmed the urination of 16 animals and obtained 28 videos of urination from YouTube.



Reasoning:

- Bigger animals have bigger bladders, which exert a greater amount of pressure on the urine stored inside, which causes urine to exit more quickly.
- Bigger animals have larger openings (ie. a larger urethra) that allows more urine to exit at one time.
- Both large and small animals need to finish peeing quickly in order to escape being vulnerable to attack by predators.

2015 Ig Nobel Prize Winners

"Duration of Urination Does Not Change With Body Size," Patricia J. Yang, Jonathan Pham, Jerome Choo, and David L. Hu, *Proceedings of the National Academy of Sciences*, vol. 111 no. 33, August 19, 2014, pp. 11932–11937

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More Ig Nobel Prize Examples

2015 Physiology Winner - Bee Sting Pain Index

This study rated the painfulness of honey bee stings over 25 body locations in one subject (the author). Pain was rated on a 1–10 scale, relative to an internal standard, the forearm. In the single subject, pain ratings were consistent over three repetitions. Sting location was a significant predictor of the pain rating in a linear model ($p < 0.0001$, $DF = 25, 94$, $F = 27.4$). The three least painful locations were the skull, middle toe tip, and upper arm (all scoring a 2.3). The three most painful locations were the nostril, upper lip, and penis shaft (9.0, 8.7, and 7.3, respectively). This study provides an index of how the painfulness of a honey bee sting varies depending on body location.

Ref: "Honey Bee Sting Pain Index by Body Location," Michael L. Smith, PeerJ, 2014, 2:e338.

2008 Biology Winner - Dog Fleas jump farther than Cat Fleas

Jump performances of Ctenocephalides canis and Ctenocephalides felis have been measured and compared on unfed young imagos. The mean length of the C. felis jump was 19.9+/-9.1cm; minimum jump was 2cm, and the maximum was one 48cm. The C. canis jump was significantly longer (30.4+/-9.1cm; from 3 to 50cm). For height jump evaluation, grey plastic cylindric tubes measuring 9cm in diameter were used. Their height was increasing from 1 to 30cm by 1cm. Groups of 10 fleas of the same species were deposited on the base of the tube. The number of fleas which succeeded in jumping above the tube was recorded. The mean height jump carried out by 50% of fleas was calculated after linearisation of the curves: it was 15.5 and 13.2cm for C. canis and C. felis, respectively. The highest jump was 25 for C. canis and 17cm for C. felis.

Ref: "A Comparison of Jump Performances of the Dog Flea, Ctenocephalides canis (Curtis, 1826) and the Cat Flea, Ctenocephalides felis felis (Bouche, 1835)," M.C. Cadiergues, C. Joubert, and M. Franc, Veterinary Parasitology, vol. 92, no. 3, October 1, 2000, pp. 239-41.

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Sample: Graphing & CER Assignment

Graph the following data using the format (ie. line graph or bar graph) that is the most appropriate. Be sure to label and title your graph, use pencil and ruler to draw, and provide a consistent scale on both the x- and y-axis.

Month	Number of NHL Players with Birthdays
January	874
February	813
March	824
April	789
May	773
June	690
July	694
August	600
September	632
October	616
November	554
December	549

Reflection

What is the relationship between NHL players and the month in which they were born? Explain using the CER (Claim, Evidence, Reasoning) framework. Write your response in your notebooks.

For example,
Claim - More players in the NHL are born <earlier/later> in the year." or "There is no relationship between NHL players and their birth month."

Evidence - "According to the data…"

Reasoning - "More NHL players are born <earlier/later> in the year because…"

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Sample: Graphing & CER Assignment

Part 1
Graph the following data using the format (ie. line graph or bar graph) that is the most appropriate. Be sure to label and title your graph, use pencil and ruler to draw, and provide a consistent scale on both the x- and y-axis. Make sure both sets of data appear on the same graph, and find a way to distinguish the different data sets on the graph.

Monthly Temperatures (Average Daily High)	
Month	**Temp**
Jan	7
Feb	8
Mar	10
Apr	13
May	17
Jun	20
Jul	22
Aug	22
Sept	19
Oct	14
Nov	9
Dec	7

Table 1

Monthly Temperatures (Average Daily High)	
Month	**Temp**
Jan	26
Feb	27
Mar	24
Apr	21
May	17
Jun	15
Jul	14
Aug	16
Sept	18
Oct	20
Nov	22
Dec	24

Table 2

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Part 2
Using the map below, answer the question below

A - Vancouver, BC
B - Los Angeles, California
C - Cancun, Mexico
D - Lima, Peru
E - Melbourne, Australia

Question: Which of the five cities on the map above do the monthly temperatures on Tables 1 and 2 correspond to? Explain using the CER (Claim, Evidence, Reasoning) framework.

Note:

Claim - “Table 1 corresponds to <city 1> while Table 2 corresponds to <city 2>”

Evidence - “According to Table 1…. . According to Table 2…”

Reasoning - “The temperatures in Table 1 correspond to <city 1> because…. The temperatures in Table 2 correspond to <city 2> because…”

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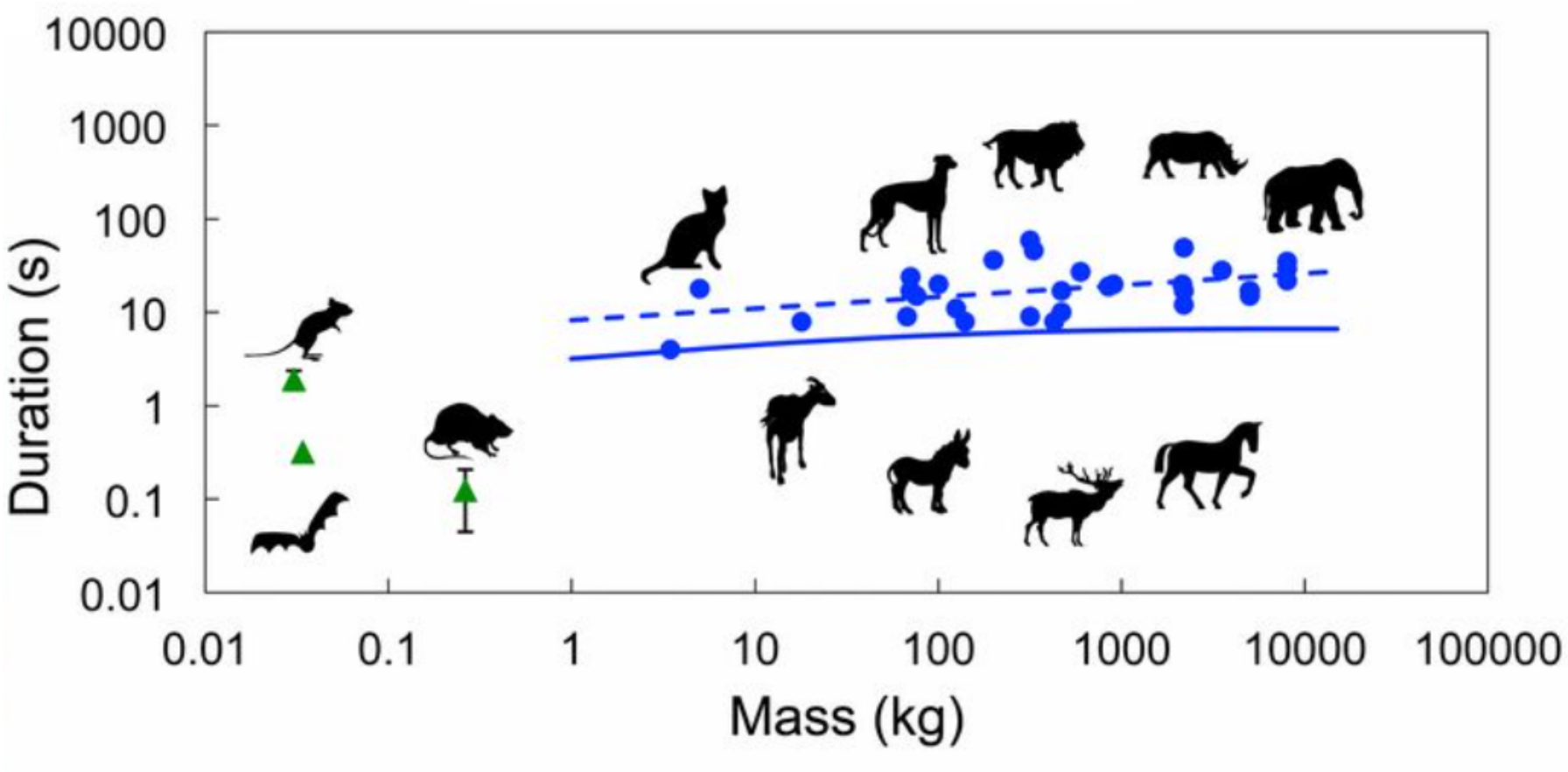

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