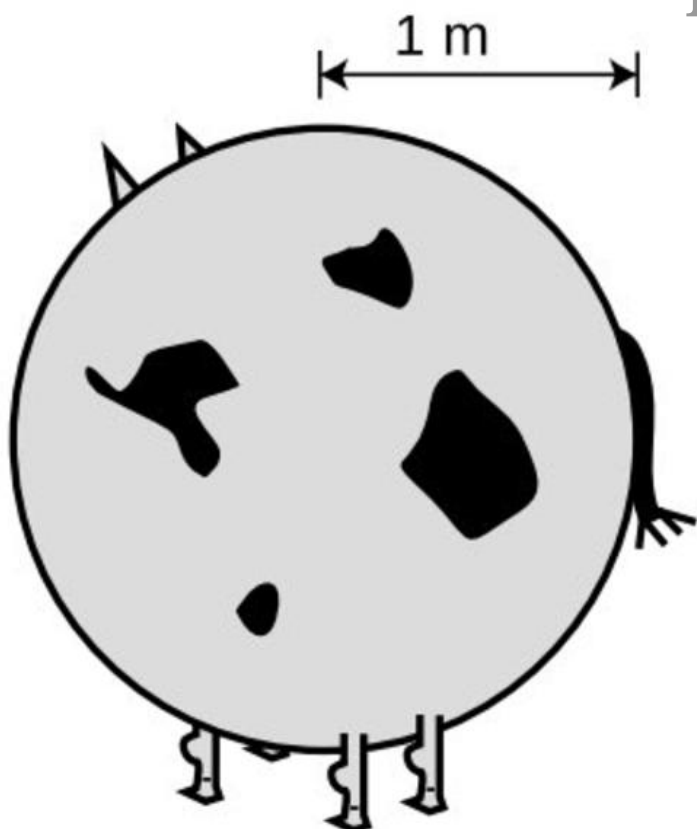


# Applied Mathematics

## *Examples*

Dr. Sam Macharia



s / Consider a spherical cow.

# Table of Contents

Introduction..... 1

    Cow’s weight, hide, and its limits..... 1

    How quickly does a candle burn? ..... 2

References ..... 3

# Introduction

*The spherical cow* [Lawrence-M-Krauss]

A physicist, an engineer, and a psychologist are called in as consultants to a dairy farm whose production has been below par. Each is given time to inspect the details of the operation before making a report.



The size of the stalls for the cattle should be decreased. Efficiency could be improved if the cows were more closely packed, with a net allotment of 275 cubic feet per cow. Also, the diameter of the milking tubes should be increased by 4 percent to allow for a greater average flow rate during the milking periods.

— The engineer

The inside of the barn should be painted green. This is a more mellow color than brown and should help induce greater milk flow. Also, more trees should be planted in the fields to add diversity to the scenery for the cattle during grazing, to reduce boredom.

— The psychologist

Assume the cow is a sphere ...

— The physicist

*Before doing anything else, abstract out all irrelevant details!* <sup>[1]</sup>

## Cow's weight, hide, and its limits

- Given that the weight of a normal cow is  $x$ , what is the weight of a super-cow thrice as big?
- If I wanted to make leather shoes out of the super-cow's hide, how much more hide would it yield more than the normal cow?
- In comparison to the normal cow, how much pressure is the supercow's skin experiencing?



Figure 1. From: the brutal realities of leather.

Let the weight of the normal cow  $x = W_{(nc)} = mg$

$$W_{(nc)} = mg$$
$$m = \rho \times v$$

- A cow has an irregular shape that would be complicated to calculate its volume. For simplicity, let's approximate that shape into a sphere.

$$\text{sqrt}(4) = 2$$

Water ( $H_2O$ ) is a critical component.

A matrix can be written as  $[[a,b],[c,d]](n,k)$ .

$$\text{sqrt}(4) = 2$$

## How quickly does a candle burn?

- Formulate a mathematical equations to predict how long it takes for a candle to burn out.

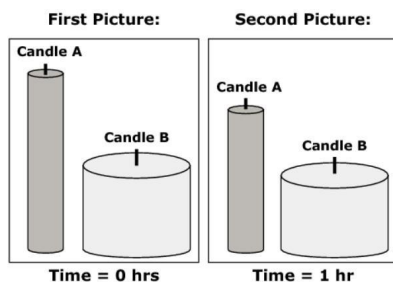


Figure 2. From: which candle will burn out first?

[1] You may read more from the reference [\[Lawrence-M-Krauss\]](#), *The Fear of Physics*.

# References

- [\[Lawrence-M-Krauss\]](#) Lawrence M. Krauss. *Fear of Physics: A Guide for the Perplexed*. Basic Books. 2007. ISBN 9780465007134 [books.google](#)