

What's all this Math Doing in a Video Game?

The screenshot below is from the flight-deck of Mr. Ford's exploration vessel, the *Akili Meator* from the game *Elite Dangerous™* on *PS4™*. Notice from left to right sections are labeled with letters; the following describes the values in that section. Next are sample calculations that could be made from the data in each section.

- A. **Location Designation:** An alpha-numeric (letters and numbers) designation of either the system in which you're traveling, or the system to which you are headed. Notice there is no decimal in the system designation. This system is LZ-N d7-2963; B3 is the 3rd planet in the in the B system of planets.
- B. **Heat Capacity:** The percent of the total heat the ship can withstand before taking damage that the ship is exposed to. Different ships have different capacities.
- C. **Distance to Destination:** This is given in either Light-seconds or Light years. a Light-Second is the distance it takes light to travel in one second: $3.8 \cdot 10^8 m$. A Light Year is the distance light travels in one year: $9.5 \cdot 10^{15} m$. In this photo, the *Meator* is 117ls from planet B3, so the total distance would be $117 \cdot ls = 117(3.8 \cdot 10^8 m)$
- D. **Velocity:** typically shown as a multiple of the speed of light. In the photo, the *Meator* is traveling at 17.6 times the speed of light, 'c'. The speed of light is $3.8 \cdot 10^8 \frac{m}{s}$, so the *Meator's* current speed is $17.6 \left(3.8 \cdot 10^8 \frac{m}{s} \right)$
- E. **Hull Integrity:** This is a percent of the hull's ability to take take damage. The current hull capacity of the *Meator* is 945. I once landed too hard on a high gravity planet (doh!) and my hull capacity dropped to 81%, which would be $0.81(945)$
- F. **Shields:** The rings represent the *Meator's* shield strength. You can have between 0 and 3 rings. The current *total* shield strength is 177 mega-joules (MJ). Lose a ring, shield strength drops a third.
- G. **Power Distribution:** Each ship gets six (6) 'pips' that you can distribute among Systems, Engines, or Weapons. In the photo, I have 2 pips to Systems and 4 pips to Shields, with 0 pips to Weapons.
- H. **Fuel Consumption:** How many tons of fuel per hour I would consume at my current speed traveling in super cruise.

Sample Calculations

How long (time) will it take me to reach planet B3 at my current speed?

$d = rt$, so:

$$d = 117(ls) = 117(3.8 \cdot 10^8 m) = 4.446 \cdot 10^{10} m$$

$$r = 17.6 \left(3.8 \cdot 10^8 \frac{m}{s} \right) = 6.688 \cdot 10^9 \frac{m}{s}$$

$d = rt$,

$$\text{thus } t = \frac{4.446 \cdot 10^{10} m}{6.688 \cdot 10^9 \frac{m}{s}} = 0.665 \cdot 10^1 = 6.65 \cdot 10^{-1} = 6.65 \cdot 10^0 = 6.65 s =$$

$$t = \frac{d}{r}$$

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Tasks:

1) Identify who has assumed each role in the Investigation:

- a) Question Responses b) Calculations c) Write and submit report

2) For each lettered item, which Number System *best* describes the value in that item? Justify your argument with evidence; maybe some math, but no longer than 2 sentences! This should have eight (8) parts:

- A) Location
- B) Heat Capacity
- C) Distance
- D) Velocity
- E) Hull Integrity (recall the *Meator's* current hull strength of 945)
- F) Shields
- G) Power Distribution
- H) Fuel Consumption

3) From the Distance to Destination (C) and the Velocity (E), determine the time required to reach the destination. State your result in hours and days, in standard form and scientific notation, rounded to the nearest 10th.

4) The rings represent shield capacity. Recall each ring represents a third of the total shield capacity. If I lose 2 rings, and my total shield strength before losing the rings was 178 MJ, What number system *best* describes my remaining shield capacity? Justify with evidence; a little math but not more than one sentence!

5) The Distant Worlds 2 expedition has travelled about 25,000 Ly.

a) What number system *best* describes this distance in *meters* written in scientific notation?

b) What number system *best* describes this distance in *meters* in standard form?

Justify your arguments with evidence; a little math, not more than one sentence! (each).