

How many Calories are needed when running in Old School RuneScape?

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Abstract

This paper aims to calculate the energy needed in the form of Calories when running in the game of Old School RuneScape. A value of 27 Calories was calculated to be needed if the in-game character were to run from 100% run energy to 0% run energy. This was under the assumption the in-game character had a mass of 83.6 kg and that act of running for a male of this mass requires 17 Calories per minute. Then the energy needed to run without stopping from the beginner town to various cities was calculated and summarised in table 1. A key result found that 32.3 Calories are needed to run from Lumbridge to the Grand Exchange.

Introduction

Old School RuneScape is a Massive Multiplayer Online Role-Playing Game which was released in 2013 [1]. In Old School RuneScape players control an in-game character and the main method of travel is walking or running [2]. The player's in-game character has a metric relating to how long they can run for [2]. This metric is referred to as 'run energy' (*RE*) and has a maximum value of 100% and drains to a minimum value of 0% when the character is running [2]. At a *RE* value of 0% the player's character can no longer run and only can walk until they passively wait for it to recharge or can actively increase it using in-game items [2].

Aims

The aims of this paper are to calculate the energy in the form of Calories that would be required to sustain running in the time it takes for the *RE* to drain from 100% to 0%. Another aim is to calculate the number of Calories required to perform a sustained run between popular locations in Old School RuneScape.

Results

The rate at which *RE* drains depends on the mass in kilograms (kg) the character is carrying in-game [3].

The drain rate can be calculated using the following equation:

$$RE \text{ drain rate} = \frac{Mass (kg)}{100} + 0.64. \quad (1)$$

The *RE* drain rate equation of equation 1 outputs a value in terms of a percentage decrease of *RE* per the metric of in-game time. The in-game time is measured using the unit of a game tick which is equivalent to 0.6 s [4].

To reduce the *RE* drain rate the mass that the player carries should be reduced as much as possible. This leads to an increase in the length of time that the player can run before their *RE* drains to 0%. The character can have a carried mass of 0 kg. When this is substituted into equation 1 a *RE* drain rate of 0.64% per game tick is calculated.

Therefore, it would take approximately 156 game ticks for *RE* to drain to 0%, which is the equivalent of roughly 94 s. This was experimentally confirmed in-game using a series of carried masses, with the lowest mass of 0 kg resulting in the longest time the character could run before depleting their *RE*.

In order to calculate the number of Calories required when running for 94 s various assumptions need to be made. Such as the average mass of the character, which will be assumed to be the average of a male in the United Kingdom of 83.6 kg [5]. The number of Calories a 180-pound (81.65 kg) male uses per minute

while running was found to be 17 and will be assumed to be a constant [6].

This finding allows for equation 2 to be formed, which relates the time spent running to the total Calories needed. Where the time running in seconds is converted into minutes then multiplied by the Calories used in one minute:

$$\text{Calories} = \frac{\text{Time running}}{60} \times 17. \quad (2)$$

Using equation 2, roughly 27 Calories are required to run the full 94 s.

However, in Old School RuneScape various in-game items can restore and recover *RE*. Taking this into consideration the required Calories needed when performing a sustained run from popular locations within the game will be calculated. The time taken to run between various locations was measured with repeat readings and an average value was noted. The starting point of these runs was the beginner town of Lumbridge, specifically in the courtyard of the castle.

Location	Average time taken (s)	Calories required using equation 2
Varrock centre	90	25.5
Grand Exchange	114	32.3
Draynor Village	45	12.8
Falador centre	114	32.3

Table 1 – A table of results showing the average time taken for a character to run to various locations within Old School RuneScape from the starting town of Lumbridge. These times are then used with equation 2 to generate a required Calorie to run to these various locations [2].

Analysis

The total Calories required for a player's in-game character to fully deplete their *RE* was calculated using equations 1 and 2 under the assumptions stated in the results section to be roughly 27 Calories.

Then from Table 1 the Calories required to run from the beginner town of Lumbridge to popular locations within the game is calculated. With a key result being that it takes an average of 114 s to reach the Grand Exchange (the main trading location of items) which would require 32.3 Calories.

One item that can be consumed to restore energy is the 'Energy potion' and it can be filled to a maximum of four doses. Each dose restores the *RE* by 10% [2]. An 'Energy potion' is required for the character to run without stopping to the Grand Exchange. The equivalent Calorie content of the 'Energy potion' can be calculated to be roughly 11 Calories.

Conclusion

To conclude the number of Calories needed when running from 100% to 0% run energy was calculated to be roughly 27 Calories. This was under various assumptions such as an average character mass of 83.6 kg and that act of running for a male of this mass requires 17 Calories per minute. Then the energy needed to run without stopping from the beginner town to various cities was calculated and summarised in Table 1. A key result being that 32.3 Calories are needed to run from Lumbridge to the Grand Exchange.

References

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