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## P6\_8 Agni: The God Among Us

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### Abstract

This paper investigates the effect of a God's ability within the game Smite, in which the God in question sends down a meteor which impacts the Earth and damages an opponent. Through calculations, the diameter of the resultant crater, if it were to occur in reality, was found and compared to the suggested area of effect of the ability. It was found that the suggested area of effect is less than the value of 28.707ft for the crater diameter.

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### Introduction

The game Smite allows players to play as Gods from various pantheons including characters such as Zeus, Vamana, or Anubis and to combat other teams using four various abilities. In this particular circumstance, the Hindu god of fire, Agni, has the in game ability to send down three volcanic rock meteors upon an opponent[1]. When using this ability, the player is able to see the 'blast radius' of the meteor, in which any enemies within this area will suffer damage. This paper conducts the analysis of the blast radius and crater which would be produced from such impact using variables such as the initial radius of effect, impact velocity and meteor radius. From this a conclusion can be made regarding the accuracy of the destruction caused by Agni's ability.

### Theory

From studying a frame of a demonstration video, an estimation of the width of the lane can be made. This was done through observing the characters stance and then extrapolating this width to approximate the full lane width. This was found to be roughly 25ft. In addition



Figure 1: A studied clip of Agni using his ability to bring down the meteor, as seen in the centre of the image. The radius of impacted implied is shown by the orange ring on the ground [2].

to this, the target radius, that is shown before the ability is used, was found from estimating the fraction of lane width coverage in which the orange shadow covers (see figure 1). The ratio of lane width to diameter of the blast was found to be 5:3, therefore by using the initial deduction of lane width (25ft), the blast's diameter was found to be 15ft.

To calculate the crater diameter, multiple variables need to be obtained. Firstly, using a guard tower's approximate height of 20ft as 'height ref-

erence frame'. Once the reference frame was set, a timer was used to measure the time taken from entering the screens view to the point of ground impact. This value was measured to be 0.25s. This meant a velocity of the meteor impact itself can be calculated. All values of height and width were converted from feet to metres before inserting into equations:

$$v = \frac{s}{t} \quad (1)$$

Where  $v$  is impact velocity,  $s$  is the displacement and  $t$  is time taken for this observation:

$$v = \frac{6.096}{0.250} = 24.384 \quad (2)$$

This velocity can be used in the following equation [3] to calculate a value for the crater diameter:

$$D = 1.161 \left( \frac{\rho_p}{\rho_t} \right) L^{0.78} v_i^{0.44} g^{-0.22} \sin^{1/3}(\theta) \quad (3)$$

Where  $\rho_p$  is the projectile density of the meteor. It was found that the rock composition is likely to be a Chondrite- assuming the meteor was pulled from the asteroid belt- which is the largest and closest asteroid belt. This value was  $3440 \text{ kg/m}^3$  [4].

$\rho_t$  is the density of the target- in this scenario it is Earth and therefore the density of the crust was found to be  $2700 \text{ kg/m}^3$  [5].

$L$  is the diameter of the meteor which through observation was estimated to be 7ft.

$v_i$  is the impact velocity which was calculated above to be 24.384 m/s.

$g$  is the acceleration due to gravity of the meteor. As this event is occurring on Earth the value of  $g$  is 9.8m/s [6].

Finally,  $\theta$  is the angle at which the meteor impacts the surface which is 90 degrees.

Once all values are input into equation 3, this gives a crater diameter of 8.75 metres (28.707ft). This value was converted back to feet in order to compare to the original area of effect diameter, which was 25ft.

## Conclusion

Through calculations, it is found that this hypothetical meteor impact would exceed the suggested area seen within the game. The resultant crater would, in reality, be larger than the perceived width of the entire lane, thus showing that the realistic effect of his ability has been scaled down for the purpose of the gaming experience. It is understood that the assumptions used within the calculations do carry some underlying errors, which could account for discrepancies in the results of the area of effect.

## References

- [1] <https://smite.fandom.com/wiki/Agni#Abilities> [Accessed 30/11/2021]
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- [4] <https://sites.wustl.edu/meteoritesite/items/density-specific-gravity> [Accessed 30/11/2021]
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