**Game 2005 – Assignment 2**

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**Problem:** *Consider a metal loot crate, at the top of a frictionless ramp. If the mass of the loot crate is 12.8kg and the ramp has a rise of 3m and a run of 4m, then compute the following*.

1. *Free body diagram at time 0*

**B)**Diagram

Description automatically generated

Graphical user interface, text, application

Description automatically generatedFirst, I calculated the qualities of the ramp and angle of force.

d, the distance the box travels on the ramp,

θ, the angle of the ramp and net force

Because the crate is moving down the ramp, we know the net force

must be the component of Fg that is parallel with the ramp

With the net force and mass of the box provided, we can calculate acceleration

with Newton’s second law

**A picture containing text, clock

Description automatically generatedC)** *Free body diagram at bottom of ramp*

Text, letter

Description automatically generated

Simple calculation of Fk using the provided values, this is also

the net force acting on the object

Calculating acceleration again using Newton’s second law

**D)** *Slight format change because there’s lots of equations ahead*

Utilizing the hypotenuse of the slope, d, we can determine the time it takes for the box to reach the ground. This will be necessary for determining the velocity.

The final velocity of the crate at the end of the ramp is the same as the initial velocity when it reaches the ground, we use this to find the time it takes for the crate to stop.

Finally, we have all the values necessary to determine the distance the crate travels.

m

The final distance travelled is 7.146 meters after 1.863 seconds.