**Unit 3 Factors Affecting Acceleration Due to Gravity**

**Data Collection**

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| [**https://www.thephysicsaviary.com/Physics/Programs/Labs/PVCFreefallLab/index.html**](https://www.thephysicsaviary.com/Physics/Programs/Labs/PVCFreefallLab/index.html) |

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| **Part A: Effect of Object Mass (Material Type) on Acceleration Due to Gravity**  **(adjust “Cylinder Composition”)** |
| **Table 1 – Effect of Object Mass (Material Type) on Acceleration Due to Gravity**  **Constant *\_Conducted on (Planet)\_\_* = \_\_\_\_\_\_\_\_\_\_\_\_; Constant \_*Nail Placement (Height)*\_\_ = \_\_\_\_\_\_**  **Constant *Cylinder length* = 5.0 cm = 0.050 m; Constant *Displacement (Nails x 0.05 m) = \_\_\_\_\_***  **Constant *Initial Velocity* = 0.0 m/s;**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Cylinder Composition** | **Object Mass**  ***m***  **(g)** | **Gate 1 Blocked**  ***t1***  **(s)** | **Gate 1 Unblocked**  ***t2***  **(s)** | **Time Interval**  ***Δt***  **(s)** | **Final Average Velocity vf**  **(m/s)** | **Accel. Due to Gravity *g***  **(m/s2)** | | **1** | **1** | **copper** | **140** |  |  |  |  |  | | **2** | **1** | **aluminum** | **43** |  |  |  |  |  | | **3** | **1** | **plastic** | **17** |  |  |  |  |  | | **4** | **1** | **gold** | **303** |  |  |  |  |  | | **5** | **1** | **wood** | **12** |  |  |  |  |  | |

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| **Part B: Effect of Height on Acceleration Due to Gravity**  **(adjust “Nail Placement” from 4-9)** |
| **Table 2 – Effect of Height on Acceleration Due to Gravity**  **Constant *\_Conducted on (Planet)\_\_* = \_\_\_\_\_\_\_\_\_\_\_\_; Constant \_(*Cylinder Composition)*\_\_ = \_\_\_\_\_\_\_\_**  **Constant *Cylinder length* = 5.0 cm = 0.050 m; Variable *Displacement=Height (Nails x 0.05 m)***  **Constant *Initial Velocity* = 0.0 m/s;**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Nail Placement** | **Height**  ***m***  **(g)** | **Gate 1 Blocked**  ***t1***  **(s)** | **Gate 1 Unblocked**  ***t2***  **(s)** | **Time Interval**  ***Δt***  **(s)** | **Final Average Velocity vf**  **(m/s)** | **Accel. Due to Gravity *g***  **(m/s2)** | | **1** | **1** |  |  |  |  |  |  |  | | **2** | **1** |  |  |  |  |  |  |  | | **3** | **1** |  |  |  |  |  |  |  | | **4** | **1** |  |  |  |  |  |  |  | | **5** | **1** |  |  |  |  |  |  |  | | **6** | **1** |  |  |  |  |  |  |  | |

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| **Part C: Effect of Planet on Acceleration Due to Gravity**  **(adjust “Conducted On”)** |
| **Table 3 – Effect of Planet Mass/Radius Squared Ratio (Planet) on Acceleration Due to Gravity**  **Constant \_(*Cylinder Composition)*\_\_ = \_\_\_\_\_\_\_; Constant \_*Nail Placement (Height)*\_\_ = \_\_\_\_\_\_**  **Constant *Cylinder length* = 5.0 cm = 0.050 m; Constant *Displacement=Height (Nails x 0.05 m)=*0.35 m**  **Constant *Initial Velocity* = 0.0 m/s;**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Planet** | **Planet Mass/Radius Squared**  **Ratio**  **(kg/m2)** | **Gate 1 Blocked**  ***t1***  **(s)** | **Gate 1 Unblocked**  ***t2***  **(s)** | **Time Interval**  ***Δt***  **(s)** | **Final Average Velocity vf**  **(m/s)** | **Accel. Due to Gravity *g***  **(m/s2)** | | **1** | **1** |  |  |  |  |  |  |  | | **2** | **1** |  |  |  |  |  |  |  | | **3** | **1** |  |  |  |  |  |  |  | | **4** | **1** |  |  |  |  |  |  |  | | **5** | **1** |  |  |  |  |  |  |  | | **6** | **1** |  |  |  |  |  |  |  | |