**Unit 4 Factors Affecting Magnitude of Force of Kinetic Friction**

**Data Collection**

**Free Body Diagram of boxes pulled by constant velocity cart.**

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| **Part A: Effect of Surface Area on Magnitude of Force of Kinetic Friction** |
| **Table 1 – Effect of Surface Area on Magnitude of Force of Kinetic Friction**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Length**  ***L***  **(cm)** | **Width**  ***w***  **(cm)** | **Surface Area**  ***SA***  **(cm2)** | **Magnitude of Force of Cart on Boxes**  ***FConB***  **(N)** | **Magnitude of Force of Kinetic Friction on Boxes**  ***Ffk***  **(N)** | | **1** | **1** |  |  |  |  |  | | **1** | **2** |  |  |  |  |  | | **1** | **3** |  |  |  |  |  | | **1** | **Avg.** |  |  |  |  |  | | **2** | **1** |  |  |  |  |  | | **2** | **2** |  |  |  |  |  | | **2** | **3** |  |  |  |  |  | | **2** | **Avg.** |  |  |  |  |  | | **3** | **1** |  |  |  |  |  | | **3** | **2** |  |  |  |  |  | | **3** | **3** |  |  |  |  |  | | **3** | **Avg.** |  |  |  |  |  | |

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| **Part B: Effect of Magnitude of Normal Force (Mass) on Magnitude of Force of Kinetic Friction** |
| **Table 2 – Effect of Magnitude of Normal Force (Mass) on Magnitude of Force of Kinetic Friction**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Mass of Box(es)**  ***m***  **(kg)** | **Magnitude of Force of Earth on Boxes**  ***FEonB (Fg )***  **(N)** | **Magnitude of Normal Force on Boxes**  ***FN***  **(N)** | **Magnitude of Force of Cart on Boxes**  ***FConB***  **(N)** | **Magnitude of Force of Kinetic Friction on Boxes**  ***Ffk***  **(N)** | | **1** | **1** |  |  |  |  |  | | **1** | **2** |  |  |  |  |  | | **1** | **3** |  |  |  |  |  | | **1** | **Avg.** |  |  |  |  |  | | **2** | **1** |  |  |  |  |  | | **2** | **2** |  |  |  |  |  | | **2** | **3** |  |  |  |  |  | | **2** | **Avg.** |  |  |  |  |  | | **3** | **1** |  |  |  |  |  | | **3** | **2** |  |  |  |  |  | | **3** | **3** |  |  |  |  |  | | **3** | **Avg.** |  |  |  |  |  | |

**Calculation for Magnitude of Normal Force on Boxes**

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| **Part C: Effect of Coefficient of Kinetic Friction (surface types) on Magnitude of Force of Kinetic Friction** |
| **Table 3 – Effect of Coefficient of Kinetic Friction (surface types) on Magnitude of Force of Kinetic Friction**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**  **Constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Trial** | **Rep.** | **Mass of Box(es)**  ***m***  **(kg)** | **Magnitude of Force of Earth on Boxes**  ***FEonB (Fg )***  **(N)** | **Magnitude of Normal Force on Boxes**  ***FN***  **(N)** | **Magnitude of Force of Cart on Boxes**  ***FConB***  **(N)** | **Magnitude of Force of Kinetic Friction on Boxes**  ***Ffk***  **(N)** | **Coefficient of Kinetic Friction µk**  **(dimen-sionless)** | | **1** | **1** |  |  |  |  |  |  | | **1** | **2** |  |  |  |  |  |  | | **1** | **3** |  |  |  |  |  |  | | **1** | **Avg.** |  |  |  |  |  |  | | **2** | **1** |  |  |  |  |  |  | | **2** | **2** |  |  |  |  |  |  | | **2** | **3** |  |  |  |  |  |  | | **2** | **Avg.** |  |  |  |  |  |  | | **3** | **1** |  |  |  |  |  |  | | **3** | **2** |  |  |  |  |  |  | | **3** | **3** |  |  |  |  |  |  | | **3** | **Avg.** |  |  |  |  |  |  | |

**Calculation for Coefficient of Kinetic Friction**