**3. Practice**

**3.1 Study of distance variations as a function of time**

B.O.2

B.O.1

m1



Set up the experimental setup for Figure 2:

* m1: trolley with overload.
* m2: weights.
* B.O.1: Optical barrier.
* B.O.2: Optical barrier.
* Weigh the mass of trolley m1 and then add a 100g mass.
* Place a 55g mass on the mass port such that m2 = 60g.
* Place the small rod on the trolley and measure its width.
* Initially position the optical barrier at a specific location.
* Start the air blower.
* Set the stopwatch to zero and release the motion.
* Take two measurements.
* Choose a new step distance of 10 cm and repeat the previous steps.

Table 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 30 | 40 | 50 | 60 | 70 |
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**Questions**

1. Fill in Table 1.
2. Plot the curve (figure below). Then deduce the value of .………………………………………………………………………………………………………………………………………………………………………………………………………………
3. Deduce from the table the value of g for the city of M'sila and express it as .……………………………………………………………………………………………………………………………………………………………………………………………………………….
4. What short or long distances do you use to obtain the best value of ? ………………………………………………………………………………………………………………………………………………………....................................................................................

**3.2 Relationship between acceleration and force**

We study the relationship between the acceleration of the system and the accelerating force (F), while keeping the total mass m1 + m2 of the system constant. We take the acceleration due to gravity from the first part.

* To vary F, we remove mass from one side and add it to the other.
* Fix the optical barriers at long distances.
* Record in Table 2 the respective values of the passage times «  » for the rod of width. Repeat the operation a second time.
* Return the trolley to the initial position and set the stopwatch so that it indicates the time t it takes to pass through each optical barrier. Repeat the operation a second time.

**Questions**

1. Fill in Table 2.
2. What do you observe about the ratio?

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1. Plot the variation of « F » with «  » (figure below).
2. What does the slope represent? Compare it to the ratio «  »?

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Table 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| m2(g) | 5 | 10 | 20 | 30 | 40 |
| m1 |  |  |  |  |  |
| [m1+m2](g) | 305 | 305 | 305 | 305 | 305 |
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**Conclusion**

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