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PHYS 2125.103

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Vectors

**Analysis Questions**

**Q6.0.3.1**

As the mass of M1 increases, the elevation and incline angles both increase. This is due to the fact that as the mass of M1 increases, the disparity in masses between M1 and M2 increases. This in turn, forces the incline to increase in order for the system to reach equilibrium.

**Q6.0.4.7**

The component addition gave a lower percent error.

**Q6.0.4.8**

You can improve upon the sources of error in the graphical method by being more accurate. For example when drawing the initial vectors make sure the measurements are as accurate as possible. In addition the more precise the ruler can be, the more accurate the measurements could be. Also make sure the pencil is sharp so as to not add unnecessary length to the vectors. Basically, make sure all the utensils you use are precise and make accurate drawings.

**Q6.0.4.9**

Two sources of error for the force table could be the fact that the angles and forces may not be completely accurate because we ignores the masses of the string and the fact that there is friction from the string on the table.

**Q6.0.5.1**

Two examples of scalar quantities speed and temperature. Two examples of vectors are velocity and acceleration.

**Data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trial | Mass on Hanger 1 (kg) | m1 (kg) | Mass on Hanger 2 (kg) | m2 (kg) | Elevation (m) | Incline Angle (°) |
| 1 | 0.01 | 0.0313 | 0.01 | 0.0311 | 0 | 0 |
| 2 | 0.015 | 0.0363 | 0.01 | 0.0311 | 0.009 | 0.515 |
| 3 | 0.02 | 0.0413 | 0.01 | 0.0311 | 0.027 | 1.547 |
| 4 | 0.025 | 0.0463 | 0.01 | 0.0311 | 0.036 | 2.063 |
| 5 | 0.03 | 0.0513 | 0.01 | 0.0311 | 0.045 | 2.579 |
| 6 | 0.035 | 0.0563 | 0.01 | 0.0311 | 0.063 | 3.612 |

|  |  |  |
| --- | --- | --- |
| **Name** | **Data** | **Uncertainty** |
| Distance between feet (m) | 1 | 0.0005 |
| Mass of Glider + 200g (kg) | 0.3875 | 0.0005 |
| Mass of Air Hanger 1 (kg) | 0.0213 | 0.0005 |
| Mass of Air Hanger 2 (kg) | 0.0211 | 0.0005 |
| Mass of Force Table (kg) | 0.0200 | 0.0005 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Trial** | **x component - f1 (N)** | **x component - fe (N)** | **x component - f2 (N)** | **y component -f1 (N)** | **y component -f2 (N)** | **y component -fe (N)** | **resultant - experimental (N)** | **resultant - graphical (N)** | **resultant - component (N)** | **percent error - graphical** | **percent error - component** |
| 1 | 0.686 | 0.490 | 1.176 | 0.000 | 0.000 | 0.000 | 0.490 | 0.583 | 0.490 | 15.95% | 0.00% |
| 2 | 0.490 | 0.472 | 0.000 | 0.000 | 0.588 | 0.563 | 0.735 | 0.791 | 0.765 | 7.08% | 3.97% |
| 3 | 0.686 | 0.094 | 0.588 | 0.000 | 1.018 | 1.074 | 1.078 | 1.000 | 1.023 | -7.80% | -5.41% |
| 4 | 0.424 | 0.450 | 0.000 | 0.245 | 0.686 | 0.450 | 0.637 | 0.625 | 0.611 | -1.92% | -4.26% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trial | X Component of Glider (N) | Y Component of Glider (N) | Net Resultant Force FR (N) | Percent Difference |
| 1 | 0.00 | 3.80 | 0.002 | 100.00% |
| 2 | 0.03 | 3.80 | 0.051 | 33.02% |
| 3 | 0.10 | 3.80 | 0.100 | -2.56% |
| 4 | 0.14 | 3.80 | 0.149 | 8.23% |
| 5 | 0.17 | 3.79 | 0.198 | 13.68% |
| 6 | 0.24 | 3.79 | 0.247 | 3.13% |