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| **Worksheet for Lab on Rotational Equilibrium** | **Name** |  |
|  |  |  |
|  | **Date** |  |

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|  | **Partner #1** |  |
|  |  |  |
|  | **Partner #2** |  |

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| **1. Masses on the x axis only** |
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| --- | --- | --- | --- | --- | --- |
| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
| 150 |  | +0.100 | 0 | 0 |  |
|  |  | -0.150 | 0 | 0 |  |
|  |  |  | **Total** | **0** |  |

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|  |
| **2. Masses on the y axis only** |
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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
|  |  | 0 | +0.075 |  | 0 |
| 90 |  | 0 | -0.250 |  | 0 |
|  |  |  | **Total** |  | **0** |

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| **3. Two on x axis, two on y axis** |
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| --- | --- | --- | --- | --- | --- |
| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
| 150 |  | +0.150 | 0 | 0 |  |
| 120 |  | 0 | +0.075 |  | 0 |
|  |  | -0.750 | 0 | 0 |  |
|  |  | 0 | -0.150 |  | 0 |
|  |  |  | **Total** |  |  |

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| **4. Three masses** |
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| --- | --- | --- | --- | --- | --- |
| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
| 100 |  | +0.150 | +0.150 |  |  |
|  |  | -0.050 | 0 | 0 |  |
|  |  | 0 | -0.050 |  | 0 |
|  |  |  | **Total** |  |  |

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| **5.Another three masses** |
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| --- | --- | --- | --- | --- | --- |
| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
| 300 |  | +0.150 | +0.150 |  |  |
|  |  | -0.100 | +0.050 |  |  |
|  |  | 0 | -0.125 |  | 0 |
| Note: balance torque about y first | **Total** |  |  |

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| **6. Four masses** |
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| **Mass (g)** | **Force (N)** | $$x \left(m\right)$$ | $$y \left(m\right)$$ | $$τ\_{x}\left(N m\right)$$ | $$τ\_{y}\left(N m\right)$$ |
| 100 |  | +0.150 | 0 | 0 |  |
| 125 |  | -0.200 | 0 | 0 |  |
|  |  | 0 | +0.200 |  | 0 |
|  |  | +0.075 | -0.150 |  |  |
|  |  |  | **Total** |  |  |

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| **7. Finding the center of mass of an irregularly-shaped object** |
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| **Mass M (g)** |  |  |  | **include correct units** |
|  |  |  |  |  |  |
| **Mass** | $$x\_{1}\left(m\right)$$ | $$y\_{2}\left(m\right)$$ |  | $$X\_{CM}$$ | $$Y\_{CM}$$ |
| $$m\_{1}=200 g$$ |  | **----** |  |  |  |
| $$m\_{2}=100 g$$ | **----** |  |  |  |  |

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| **8. Center of mass II** |
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| Note: Fill in the units with the numbers |
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| --- | --- | --- |
| $x\_{3}=$ | $x\_{cm}=$ | $x\_{t}=$ |
| $y\_{3}=$ | $y\_{cm}=$ | $y\_{t}=$ |
| $θ\_{3}=$ | $θ\_{cm}=$ | $θ\_{t}=$ |
| $R\_{3}=$ | $R\_{cm}=$ | $R\_{t}=$ |

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