| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Your name | | Date | | | | | | | | | |
| 2 | Partner's name | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | **Phys 1101/1120 - Surrey campus** | | | | | **DISCLAIMER: These example data are purposefully** | | | | | | |
| 5 | **Expt. 6: Collisions** | | | | | **inaccurate. You may test your spreadsheet equations** | | | | | | |
| 6 | | | | | | **for correctness using these values, but your real** | | | | | | |
| 7 | **DATA - Elastic Collision:** | | | | | **experimental values will be very different.** | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | **Flag Width:** | | | | **Flag Width:** | | | | | | | |
| 10 | **dgold (cm)** | **δdgold (cm)** | **(δd/d)_gold** | | **dred (cm)** | **δdred (cm)** | **(δd/d)_red** | | | | | |
| 11 | **6** | **0.1** | 1.67% | | **6** | **0.1** | 1.67% | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | **Flag Times** | | | | | | | |
| 14 | **Glider masses:** | | | | **Before Collision:** | | | | **After Collision:** | | | |
| 15 | **mgold (g)** | **dmgold (g)** | **(dm/m)_gold** | | **tgold_i (s)** | **dtgold_i (s)** | **(dt/t)_gold_i** | | **tgold_f (s)** | **dtgold_f (s)** | **(dt/t)_gold_f** | |
| 16 | **400** | **0.05** | 0.01% | | **2.1** | 0.021 | 1.00% | | **6.29** | 0.0629 | 1.00% | |
| 17 | | | | | | | | | | | | |
| 18 | **mred (g)** | **dmred (g)** | **(dm/m)_red** | | | | | | **tred_f (s)** | **dtred_f (s)** | **(dt/t)_red_f** | |
| 19 | **800** | **0.05** | 0.01% | | | | | | **3.16** | 0.0316 | 1.00% | |
| 20 | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | |
| 22 | **CALCULATIONS - Elastic Collision:** | | | | | | | | | | | |
| 23 | | | | | | | | | | | | |
| 24 | **Flag Width:** | | | | **Flag Width:** | | | | | | | |
| 25 | **dgold (m)** | **δdgold (m)** | **(δd/d)_gold** | | **dred (m)** | **δdred (m)** | **(δd/d)_red** | | | | | |
| 26 | 0.06 | 0.001 | 1.67% | | 0.06 | 0.001 | 1.67% | | | | | |
| 27 | | | | | | | | | | | | |
| 28 | | | | | **Momentum uncertainties based on p = m * d / t** | | | | | | | |
| 29 | **Glider masses:** | | | | **MOMENTUM** | | | | | | | |
| 30 | **mgold (kg)** | **dmgold (kg)** | **(dm/m)_gold** | | **Before Collision:** | | | | **After Collision:** | | | |
| 31 | 0.4 | 0.00005 | 0.01% | | **pgold_i (kgm/s)** | **dpgold_i (kgm/s)** | **(dp/p)_gold_i** | | **pgold_f (kgm/s)** | **dpgold_f (kgm/s)** | **(dp/p)_gold_f** | |
| 32 | | | | | 0.011428571 | 0.000222136 | 1.94% | | -0.00381558 | 7.41631E-05 | -1.94% | |
| 33 | **mred (kg)** | **dmred (kg)** | **(dm/m)_red** | | | | | | | | | |
| 34 | 0.8 | 0.00005 | 0.01% | | | | | | **pred_f (kgm/s)** | **dpred_f (kgm/s)** | **(dp/p)_red_f** | |
| 35 | | | | | | | | | 0.015189873 | 0.00029524 | 1.94% | |
| 36 | | | | | | | | | | | | |
| 37 | | | | | **Total p Before Collision:** | | | | **Total p After Collision:** | | | |
| 38 | | | | | **p_tot_i (kgm/s)** | **dp_tot_i (kgm/s)** | **(dp/p)_tot_i** | | **p_tot_f (kgm/s)** | **dp_tot_f (kgm/s)** | **(dp/p)_tot_f** | |
| 39 | | | | | 0.011428571 | 0.000222136 | 1.94% | | 0.011374293 | 0.000304412 | 2.68% | |
| 40 | | | | | | | | | | | | |
| 41 | | | | | **Kinetic energy uncertainties based on KE = 0.5 * m * d^2 / t^2** | | | | | | | |
| 42 | | | | | **KINETIC ENERGY** | | | | | | | |
| 43 | | | | | **Before Collision:** | | | | **After Collision:** | | | |
| 44 | | | | | **KEgold_i (J)** | **dKEgold_i (J)** | **(dKE/KE)_gold_i** | | **KEgold_f (J)** | **dKEgold_f (J)** | **(dKE/KE)_gold_f** | |
| 45 | | | | | 0.000163265 | 6.34665E-06 | 3.89% | | 1.81983E-05 | 7.07427E-07 | 3.89% | |
| 46 | | | | | | | | | | | | |
| 47 | | | | | **KEred_i (J)** | **dKEred_i (J)** | **(dKE/KE)_red_i** | | **KEred_f (J)** | **dKEred_f (J)** | **(dKE/KE)_red_f** | |
| 48 | | | | | 0 | 0 | 0.00% | | 0.000144208 | 5.60579E-06 | 3.89% | |
| 49 | | | | | | | | | | | | |
| 50 | | | | | **Total KE Before Collision:** | | | | **Total KE After Collision:** | | | |
| 51 | | | | | **KE_tot_i (J)** | **dKE_tot_i (J)** | **(dKE/KE)_tot_i** | | **KE_tot_f (J)** | **dKE_tot_f (J)** | **(dKE/KE)_tot_f** | |
| 52 | | | | | 0.000163265 | 6.34665E-06 | 3.89% | | 0.000162406 | 5.65025E-06 | 3.48% | |

| | M | N | O | P | Q | R | S | T | U | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | **DATA - Inelastic Collision:** | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | **Flag Width:** | | | | | | | | | | |
| 10 | **d (cm)** | **δd (cm)** | **(δd/d)** | | | | | | | | |
| 11 | **6** | **0.1** | 1.67% | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | **Flag Times** | | | | | | |
| 14 | **Glider masses:** | | | | **Before Collision:** | | | | **After Collision:** | | |
| 15 | **mred (g)** | **dmred (g)** | **(dm/m)_red** | | **t_i (s)** | **dt_i (s)** | **(dt/t)_i** | | **t_f (s)** | **dt_f (s)** | **(dt/t)_f** |
| 16 | **800** | **0.05** | 0.01% | | **2.1** | 0.021 | 1.00% | | **3.09** | 0.0309 | 1.00% |
| 17 | | | | | | | | | | | |
| 18 | **mgold (g)** | **dmgold (g)** | **(dm/m)_gold** | | | | | | | | |
| 19 | **400** | **0.05** | 0.01% | | | | | | | | |
| 20 | | | | | | | | | | | |
| 21 | | | | | | | | | | | |
| 22 | **CALCULATIONS - Inelastic Collision:** | | | | | | | | | | |
| 23 | | | | | **Momentum uncertainties based on p = m * d / t** | | | | | | |
| 24 | **Flag Width:** | | | | **MOMENTUM** | | | | | | |
| 25 | **d (m)** | **δd (m)** | **(δd/d)** | | **Before Collision:** | | | | **After Collision:** | | |
| 26 | 0.06 | 0.001 | 1.67% | | **p_i (kgm/s)** | **dp_i (kgm/s)** | **(dp/p)_i** | | **p_f (kgm/s)** | **dp_f (kgm/s)** | **(dp/p)_f** |
| 27 | | | | | 0.022857143 | 0.00044427 | 1.94% | | 0.023300971 | 0.00045289 | 1.94% |
| 28 | | | | | | | | | | | |
| 29 | **Glider masses:** | | | | **Kinetic energy uncertainties based on KE = 0.5 * m * d^2 / t^2** | | | | | | |
| 30 | **mred (kg)** | **dmred (kg)** | **(dm/m)_red** | | **KINETIC ENERGY** | | | | | | |
| 31 | 0.8 | 0.00005 | 0.01% | | **Before Collision:** | | | | **After Collision:** | | |
| 32 | | | | | **KE_i (J)** | **dKE_i (J)** | **(dKE/KE)_i** | | **KE_f (J)** | **dKE_f (J)** | **(dKE/KE)_f** |
| 33 | **mgold (kg)** | **dmgold (kg)** | **(dm/m)_gold** | | 0.000326531 | 1.2693E-05 | 3.89% | | 0.000226223 | 8.794E-06 | 3.89% |
| 34 | 0.4 | 0.00005 | 0.01% | | | | | | | | |
| 35 | | | | | | | | | **Sub-calculations for momentum and** | | |
| 36 | | | | | | | | | **KE uncertainties:** | | |
| 37 | | | | | | | | | **dm(red+gold)** | 7.0711E-05 | |
| 38 | | | | | | | | | **(dm/m)_(r+g)** | 5.8926E-05 | |
| 39 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 41 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 43 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
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| 46 | | | | | | | | | | | |
| 47 | | | | | | | | | | | |
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| 51 | | | | | | | | | | | |
| 52 | | | | | | | | | | | |