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| **QUESTION 1** | | |
| **Code** | **Points to score** | **Marks** |
| A1  A2  A3  A4  A5  A6  A7  A8  A9  A10 | For a =0.800 m, time for 20 oscillations recorded to 2 decimal places and is  34.50 – 36.50 s ½ + ½  T correctly calculated to 3 decimal places ½ + ½  β correctly calculated to 3 sf if the substitution is correct and is 9.5 – 10.2 ms-2 ½ + ½  For a =0.600 m, time for 20 oscillations recorded to 2 decimal places and is  30.00 – 32.00 s ½ + ½  T correctly calculated to 3 decimal places ½ + ½  β correctly calculated to 3 sf if the substitution is correct and is 9.5 – 10.2 ms-2 ½ + ½  For a =0.400 m, time for 20 oscillations recorded to 2 decimal places and is  24.00 – 26.00 s ½ + ½  T correctly calculated to 3 decimal places ½ + ½  β correctly calculated to 3 sf if the substitution is correct and is 9.5 – 10.2 ms-2 ½ + ½  σ correctly calculated to 3 sf and is 9.5 – 10.2 ms-2 1 + ½ | 1  1  1  1  1  1  1  1  1  1 |
|  |  | **10½** |
| B1  B2  B3  B4  B5  B6  B7  B8 | Initial position of the pointer recorded to 1 dp in cm  Columnar table of: m, new position of pointer, e, time for 20 oscil, T and T2 @¼  Correct units for columns: kg, cm, m, s, s and s2 @¼  New position of pointer recorded to 1 dp in cm (or 3 dp in m), difference between consecutive value (3.0 – 5.0) cm or (0.030 – 0.050) m @½  e correctly calculated to 3 dp @¼  Time for 20 oscillations increasing (7.50 – 22.00)s & recorded to 2 dp, diff between consecutive values 1.00 – 3.00 s @ ½  T correctly calculated to 3 or 4 dp consistently @¼  T2 correctly calculated to 3 or 4 dp consistently @¼ | ½  1½  1½  3  1½  3  1½  1½ |
|  |  | **14** |
| C1  C2  C3  C4  C5  C6  C7  C8 | Title of the graph: *A graph of T2 against e*  Axes: Each drawn with an arrow in the increasing direction, each labeled with quantity and unit ……….. ½ + ½    Scales: Uniform, each spanning at least ½ pg, demarcations marked, starting values  indicated ………... ½ + ½  Points correctly plotted: no shading ……….@½  Best fit : awarded if at least 4 points were correctly plotted  Indication of triangle or equivalent for calculating s1, covering all points  s correctly calculated if the coordinates were correctly read and  3.8 ≤ s ≤ 4.3 s2 m-1 recorded to 1 or 2 decimal places …….. 1 + ½  σ correctly calculated if correct substitution is available and 9.5 ≤ σ ≤ 10.2 m s-2 -1 , recorded to 0 or 1 decimal place ………….. 1 + ½ | ½  1  1  3  ½  ½  1½  1 |
|  |  | **9½** |
| ***Total = 34*** | | |

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|  | **QUESTION 2** |  |
| **Code** | **Points to score** | **Marks** |
| A1  A2 | Aim of the experiment as given  t recorded to 2 dp in cm and is 6.00 – 6.30 cm | ½  1½ |
|  |  | **2** |
| B1  B2  B3  B4  B5  B6  B7  B8  B9  B10 | Columnar table of α, θ, β, d, φ, φ - β, cosβ, sin(φ - β) and dcosβ @¼  Correct units for the columns: (o), (o), (o), (o), \_, (o), \_, \_, cm @¼  Values of θ increasing: (19 - 21), (24 - 26), (29 - 31), (33 - 38), (38 - 42), (48 – 52) recorded to 0dp, no repeated values @½  Values of β increasing: (12 - 14), (15 - 18), (18 - 21), (21 - 24), (24 - 27), (29 - 33) recorded to 0dp, no repeated values @½  Values of d: (0.6 - 0.9), (0.7 - 1.2), (1.0 - 1.4), (1.3 - 1.6), (1.6 - 1.9), (2.4 - 2.6)  recorded to 0 dp in cm @1  φ correctly calculated to 0 dp @¼  Values of φ - β correctly calculated to 0 dp @¼  Values of sin(φ - β) correctly read to 3 dp @¼  Values of cosβ correctly read to 3 dp @¼  Values of dcosβ calculated to 1 dp (or 2 dp accordingly) @¼ | 2  2  3  3    6  1½  1½  1½  1½  1½ |
|  |  | **23½** |
| C1  C2  C3  C4  C5  C6  C7 | Title of the graph: *A graph of dcosβ against sin(φ - β)*  Axes: Each drawn with an arrow in the increasing direction, each labeled with quantity and unit ……….. ½ + ½    Scales: Uniform, each spanning at least ½ pg, demarcations marked, starting values  indicated ………... ½ + ½  Points correctly plotted: no shading ……….@½  Best fit : awarded if at least 4 points were correctly plotted  Indication of triangle or equivalent for calculating, ***x***, covering all points  ***x*** correctly calculated if the coordinates were correctly read and is 5.7 – 6.7 cm  recorded to 1dp …….. 1 + ½ | ½  1  1  3  ½  ½  1½ |
|  |  | **8** |
| ***Total = 33*** | | |