PHYSICS LAB - ANSWER KEY
Circular Motion - Computer Simulation

Data Tables

Partner 1 _____Student 1____

Partner 2 _____Student 2____

Partner 3 _____Student 2_____

Partner 4 _____Student 1_____

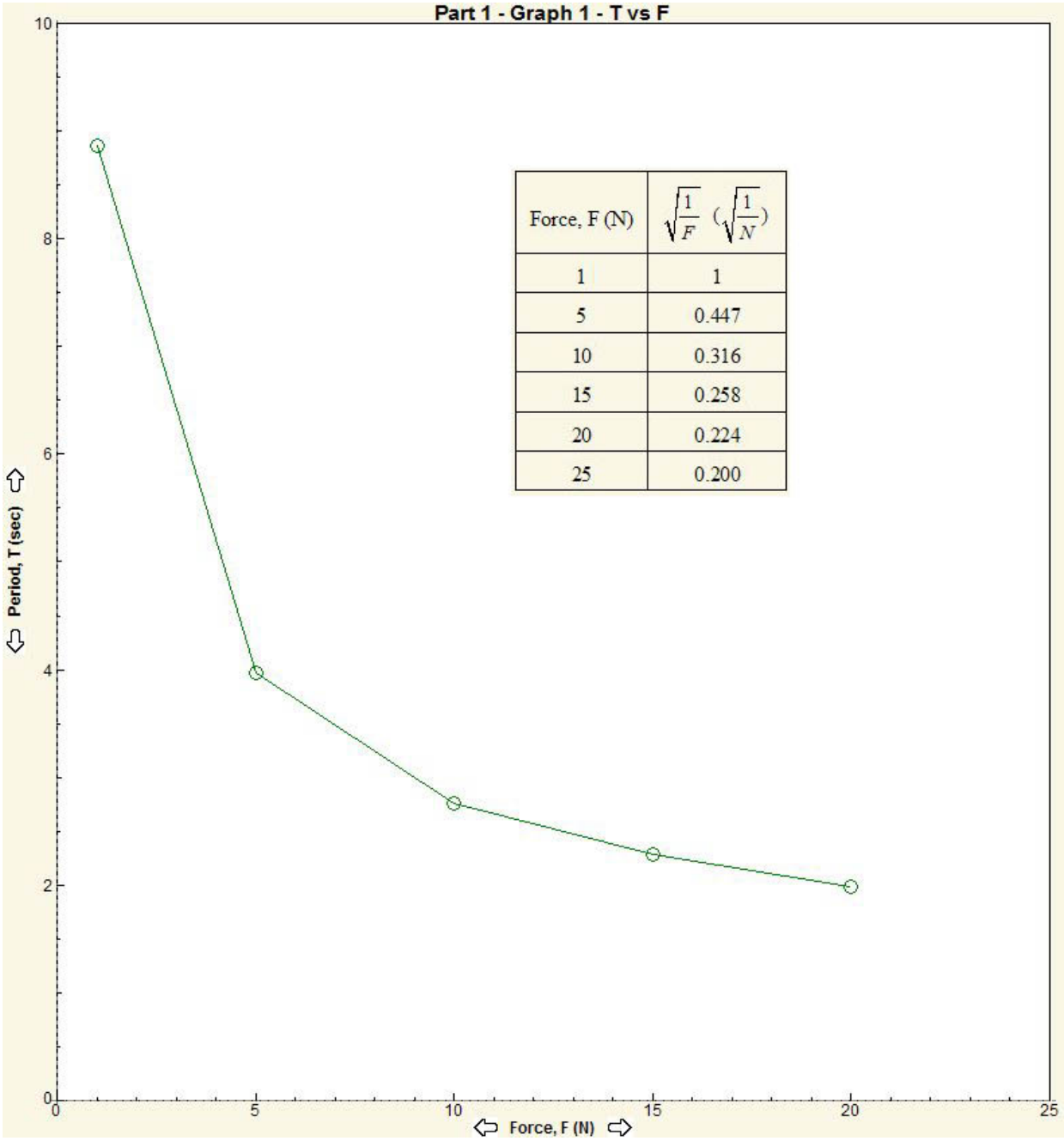
Data Table 1 - T versus F Constant: R = 1m, m = 2 kg					
Period, T (sec) x 10	88.69	39.66	27.63	22.743	19.891
Period, T (sec)	8.87	3.97	2.76	2.28	1.99
Force, F (washers)	1	5	10	15	20

Data Table 2 - T versus m Constant: R = 1 m, F = 20 N					
Period, T (sec) x 10	19.937	27.625	34.234	39.703	44.437
Period, T (sec)	1.99	2.76	3.42	3.97	4.44
mass, m (stoppers)	2	4	6	8	10

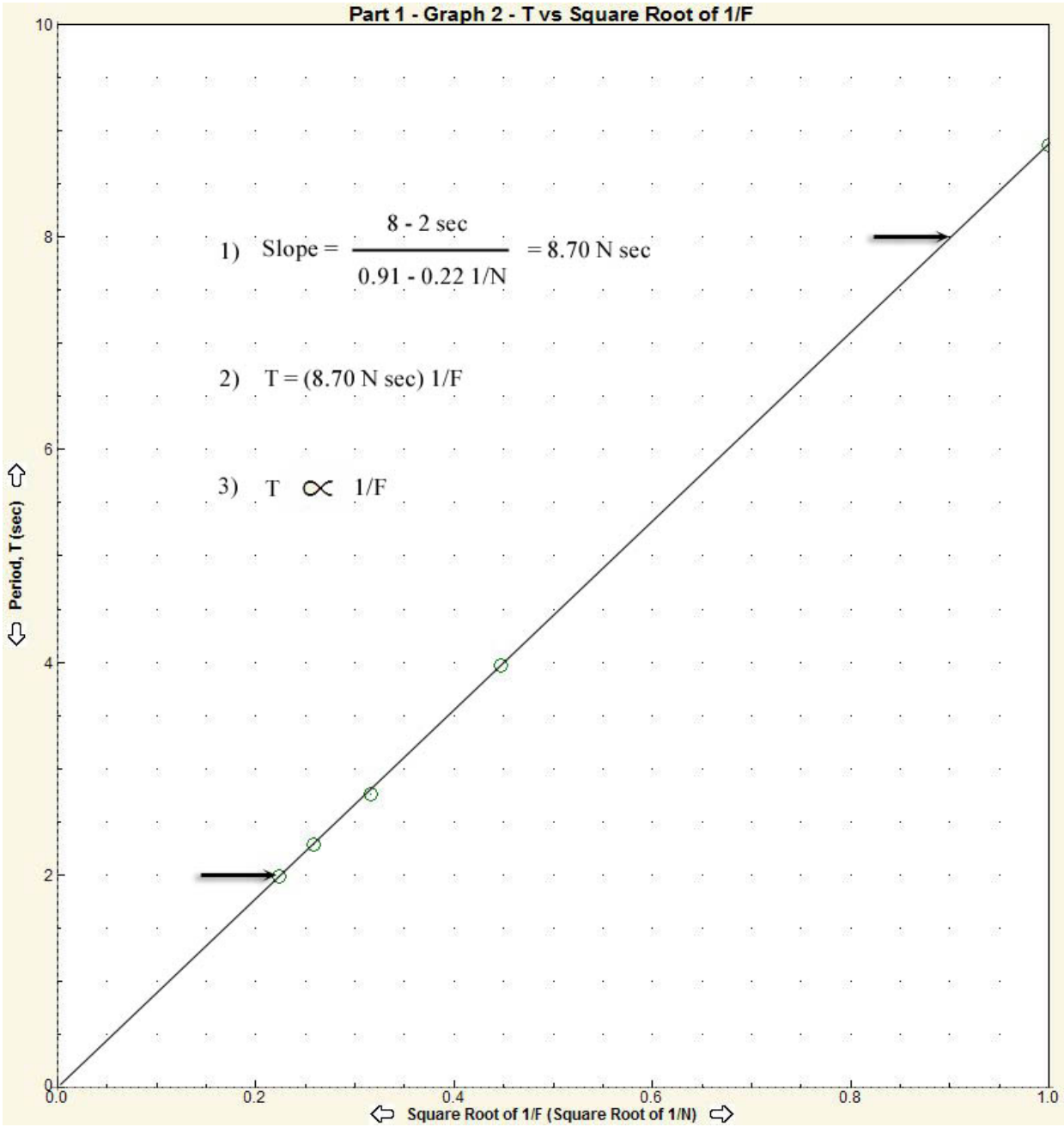
Data Table 3 - T versus R Constant: F = 10 N, m = 6 kg					
Period, T (sec) x 10	13.172	16.328	18.062	20.547	22.922
Period, T (sec)	1.32	1.63	1.81	2.06	2.29
Radius, R (m)	0.2	0.4	0.6	0.8	1.0

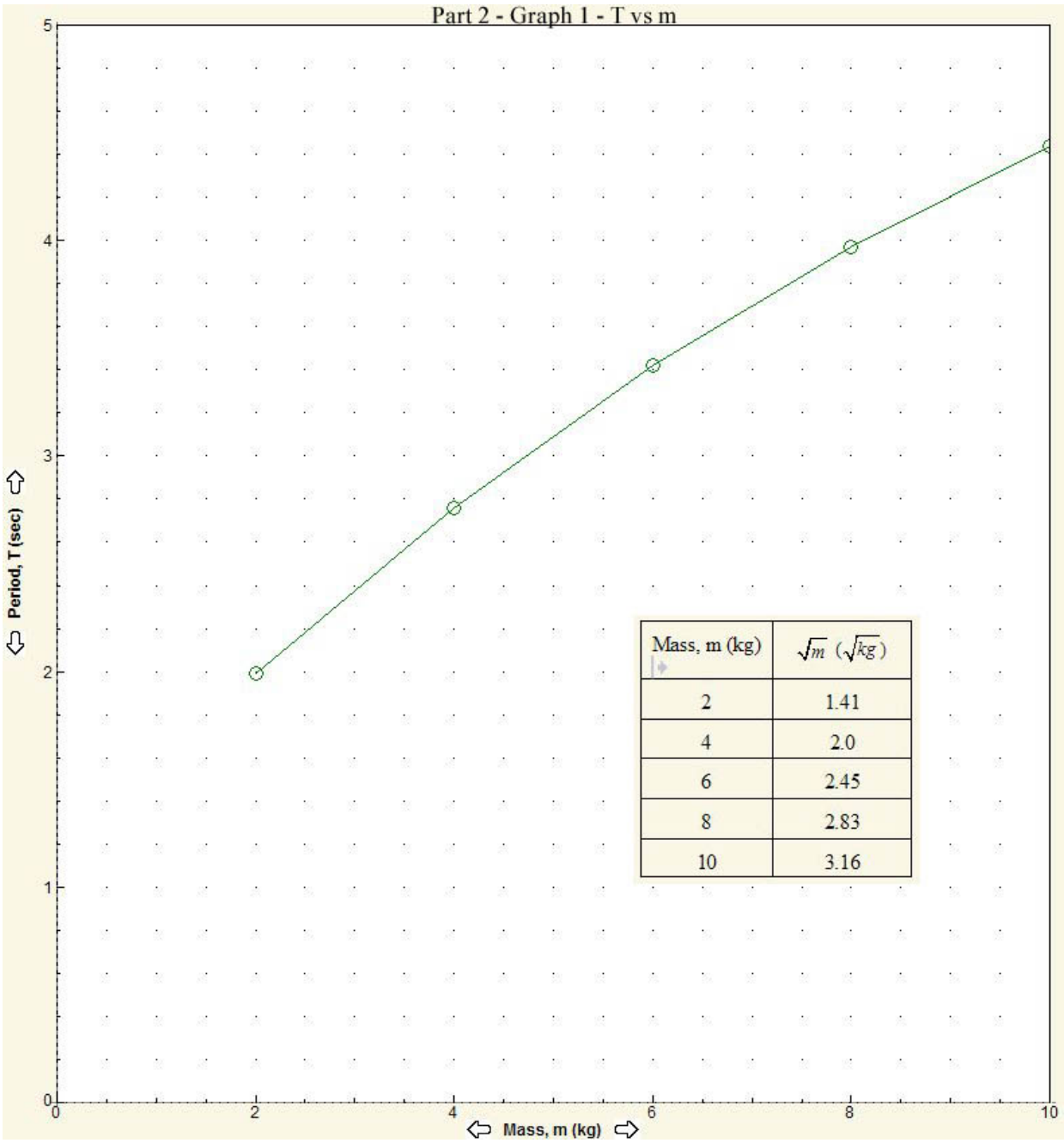
© 2003 Multimedia Science

Data Table 4 - T vs f(F, m, R)	
Period, T (sec)	$\sqrt{\frac{mR}{F}}$ $(\sqrt{\frac{kg \bullet m}{N}})$
8.87	1.41
3.97	0.632
2.76	0.447
2.28	0.365
1.99	0.316
1.99	0.316
2.76	0.447
3.42	0.548
3.97	0.632
2.18	0.346
3.06	0.490
3.73	0.6
4.34	0.693
4.85	0.775

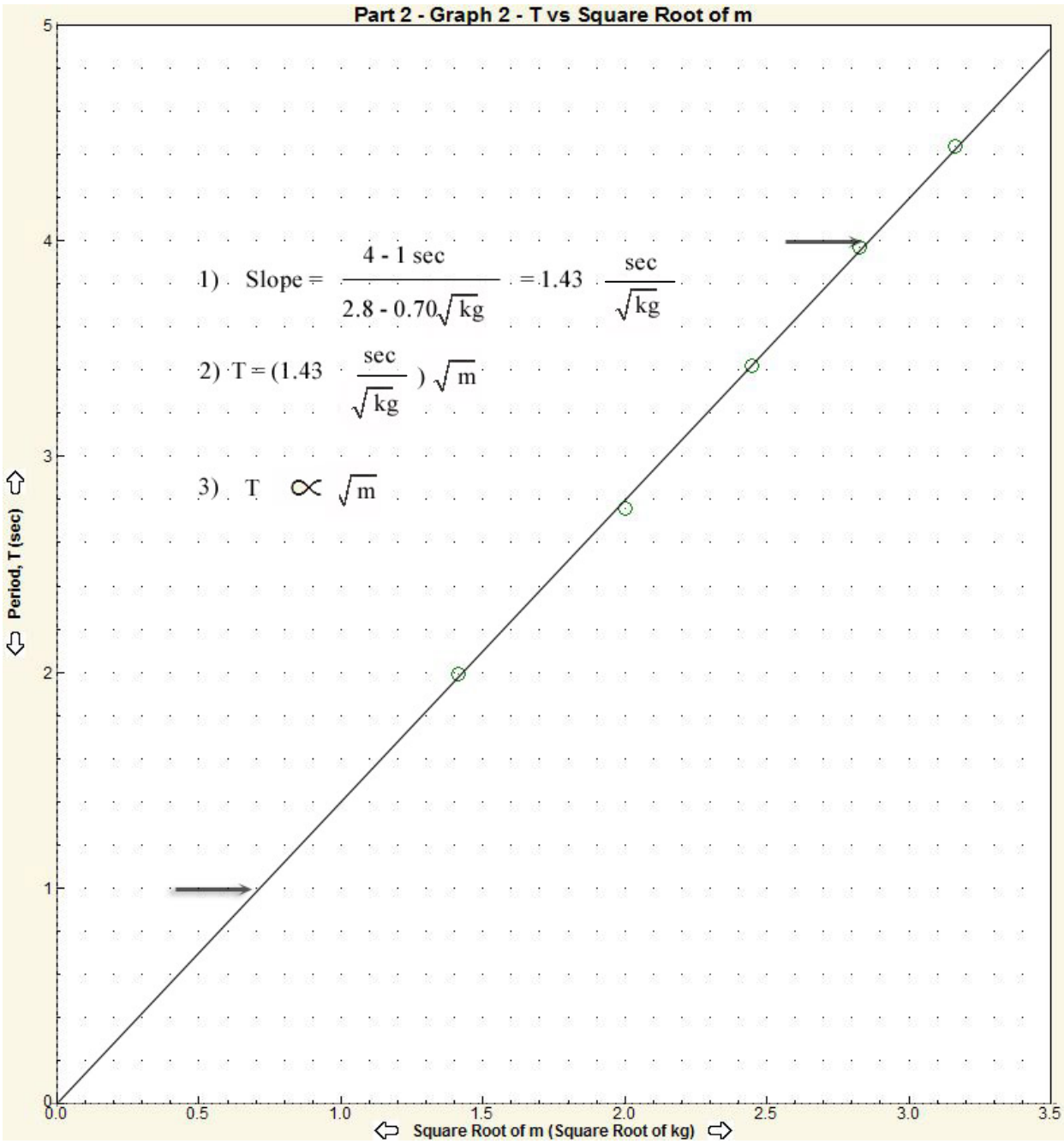


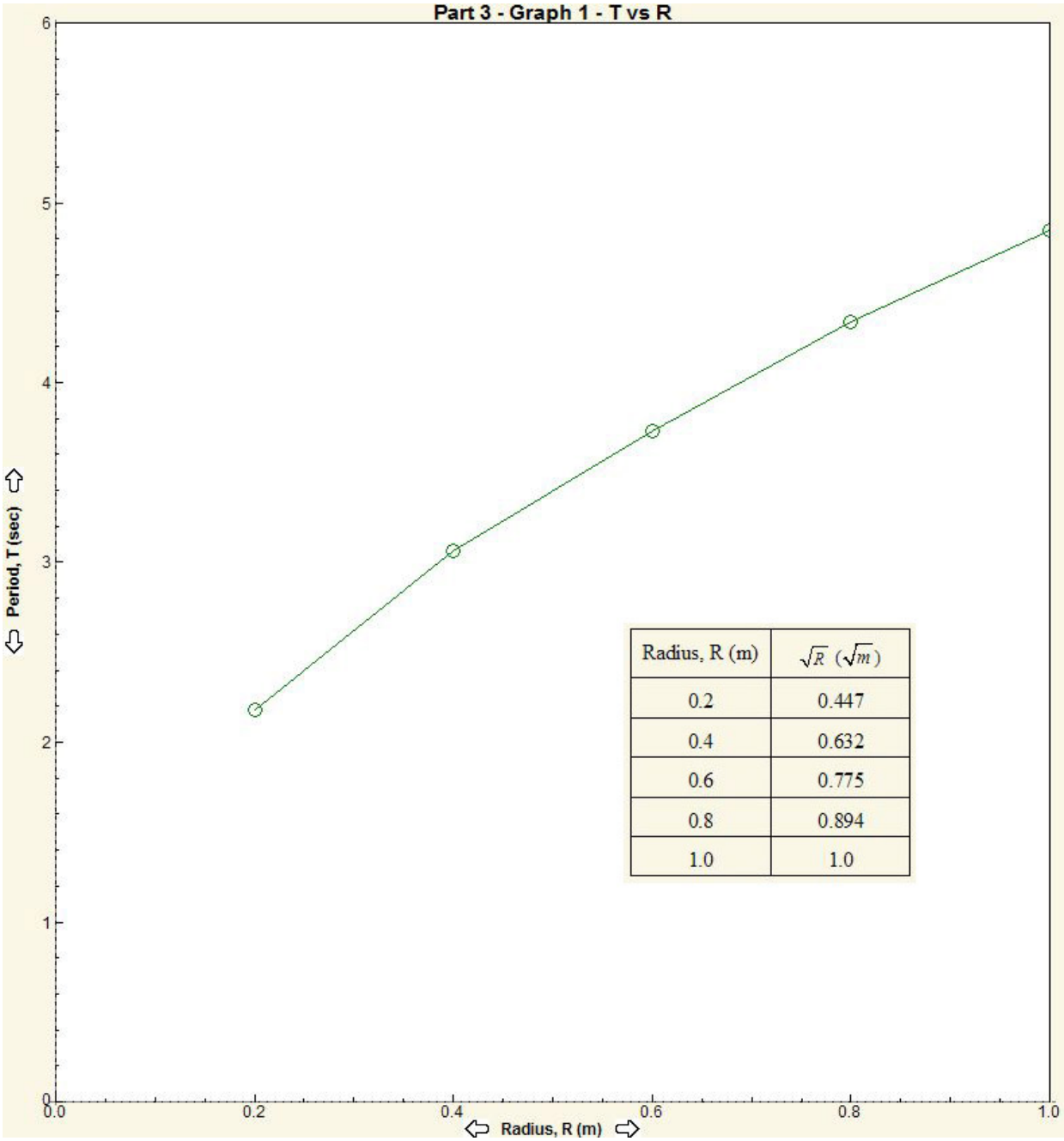
Force, F (N)	$\sqrt{\frac{1}{F}}$ $(\sqrt{\frac{1}{N}})$
1	1
5	0.447
10	0.316
15	0.258
20	0.224
25	0.200


Part 1 - Graph 2 - T vs Square Root of 1/F
1) Slope = (8 - 2 sec) / (0.91 - 0.22 1/N) = 8.70 N sec
2) T = (8.70 N sec) 1/F
3) T ∝ 1/F
Period, T (sec)
Square Root of 1/F (Square Root of 1/N)
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0

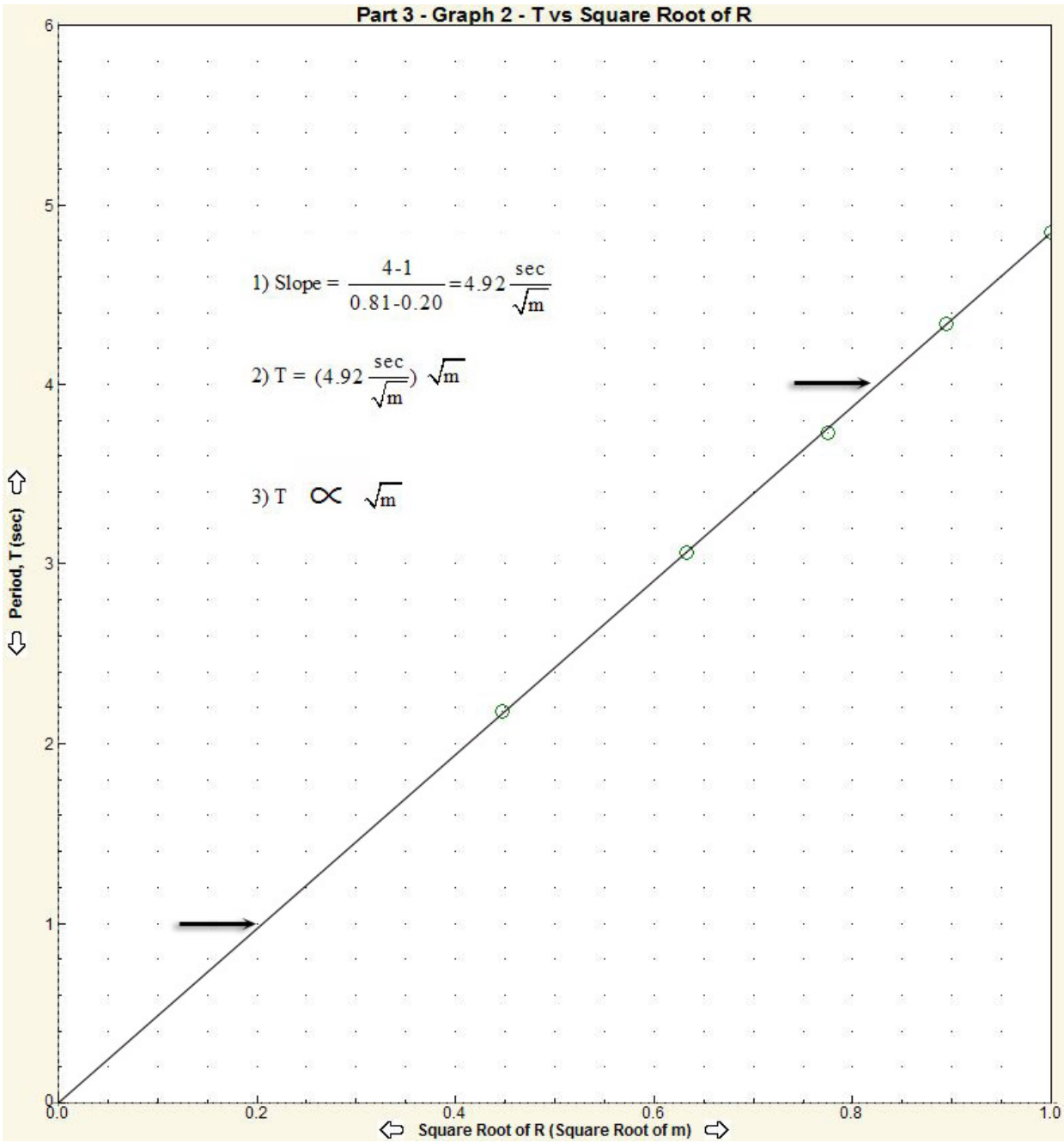


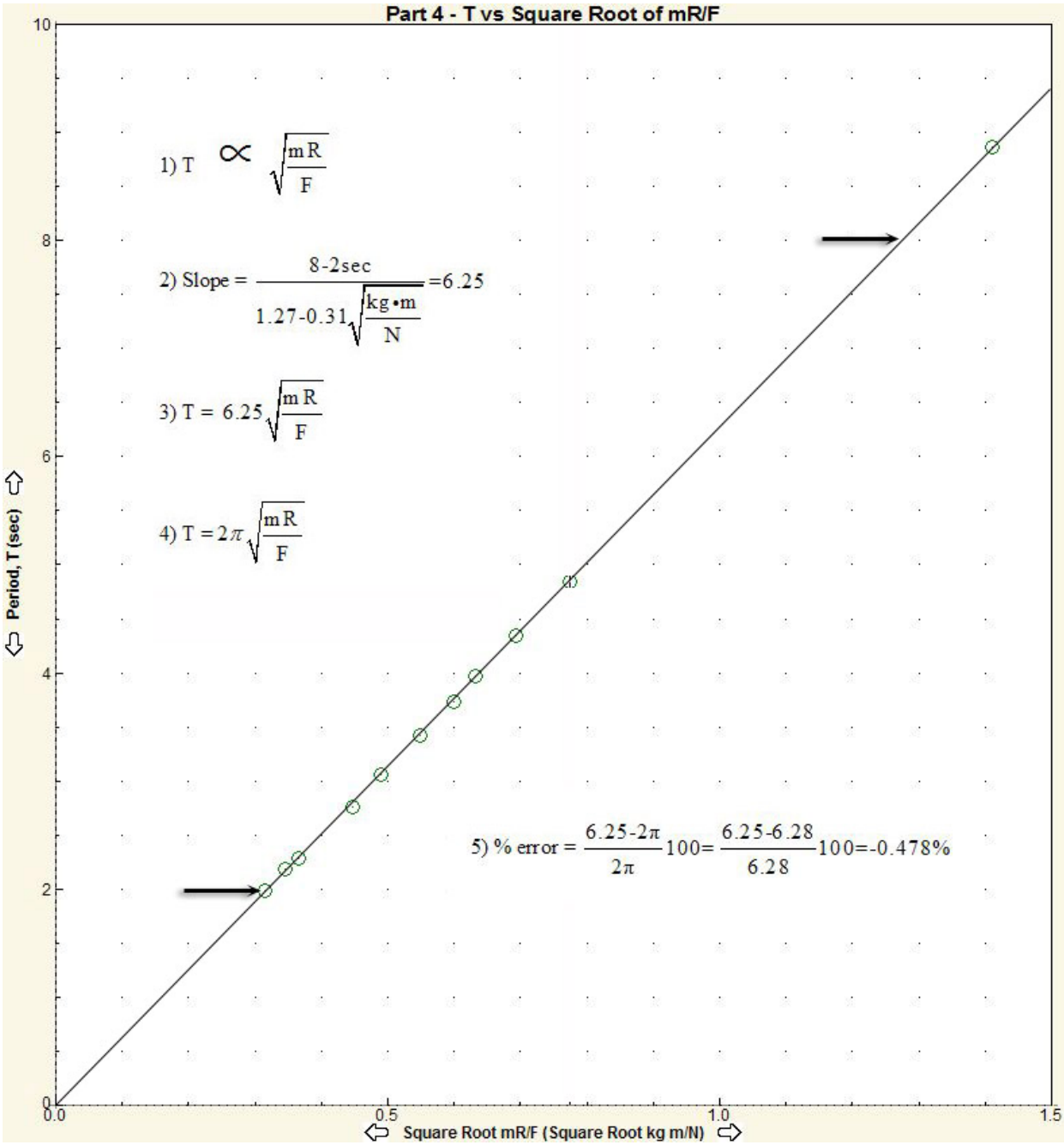
Mass, m (kg)	$\sqrt{m}$ ($\sqrt{kg}$)
2	1.41
4	2.0
6	2.45
8	2.83
10	3.16


Part 2 - Graph 2 - T vs Square Root of m
1) Slope = (4 - 1 sec) / (2.8 - 0.70√kg) = 1.43 sec/√kg
2) T = (1.43 sec/√kg) √m
3) T ∝ √m
Period, T (sec)
Square Root of m (Square Root of kg)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
1
2
3
4
5



Radius, R (m)	$\sqrt{R}$ ($\sqrt{m}$)
0.2	0.447
0.4	0.632
0.6	0.775
0.8	0.894
1.0	1.0


Part 3 - Graph 2 - T vs Square Root of R
1) Slope = $\frac{4-1}{0.81-0.20} = 4.92 \frac{sec}{\sqrt{m}}$
2) $T = (4.92 \frac{sec}{\sqrt{m}}) \sqrt{m}$
3) $T \propto \sqrt{m}$
Period, T (sec)
Square Root of R (Square Root of m)
0
1
2
3
4
5
6
0.0
0.2
0.4
0.6
0.8
1.0


Part 4 - T vs Square Root of mR/F
Period, T (sec)
Square Root mR/F (Square Root kg m/N)
0
2
4
6
8
10
0.0
0.5
1.0
1.5
1) $T \propto \sqrt{\frac{mR}{F}}$
2) Slope = $\frac{8\text{-}2\text{sec}}{1.27\text{-}0.31\sqrt{\frac{kg \bullet m}{N}}} = 6.25$
3) $T = 6.25\sqrt{\frac{mR}{F}}$
4) $T = 2\pi\sqrt{\frac{mR}{F}}$
5) % error = $\frac{6.25\text{-}2\pi}{2\pi}100 = \frac{6.25\text{-}6.28}{6.28}100 = -0.478\%$