PC1221: Circular Motion

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DATA ANALYSIS

Part A: Vary Radius

Data Table 1

	y_i Radius r (m)	t (s)	Period T (s)	x_i T^2 (s^2)	y_{best}
#1	0.120	32.10	1.605	2.576025	0.13375803
#2	0.140	36.12	1.806	3.261636	0.13901974
#3	0.160	43.90	2.195	4.818025	0.15096424
#4	0.180	53.42	2.671	7.134241	0.16874001
#5	0.200	69.82	3.491	12.187081	0.20751798

LINEST()

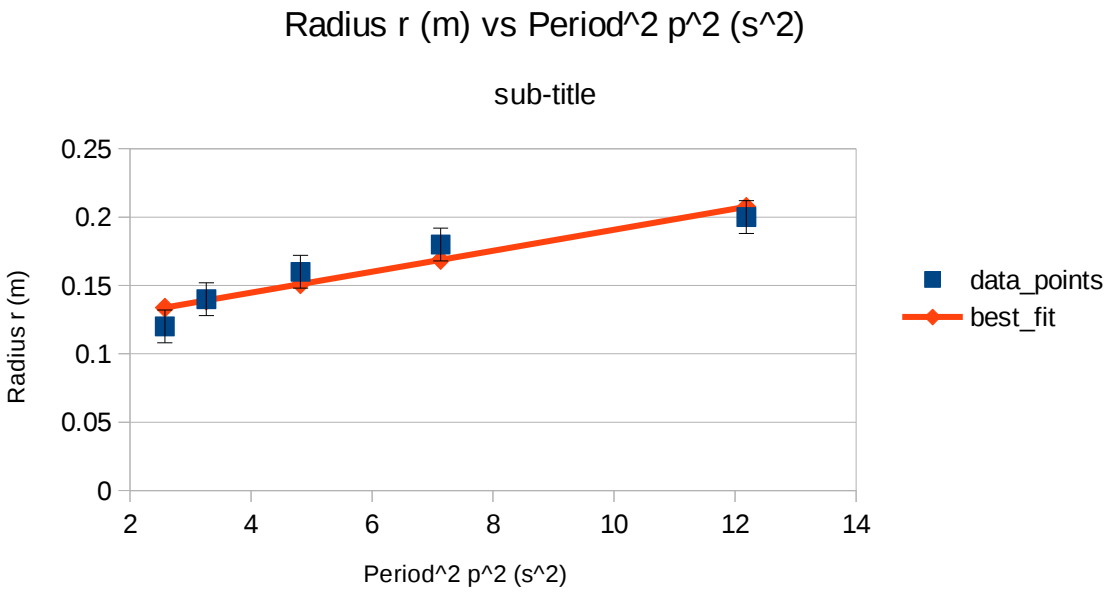
m	0.00767449	0.11398835	c
σ_m	0.00158779	0.01099845	σ_c
r^2	0.88620083	0.01231796	σ_y

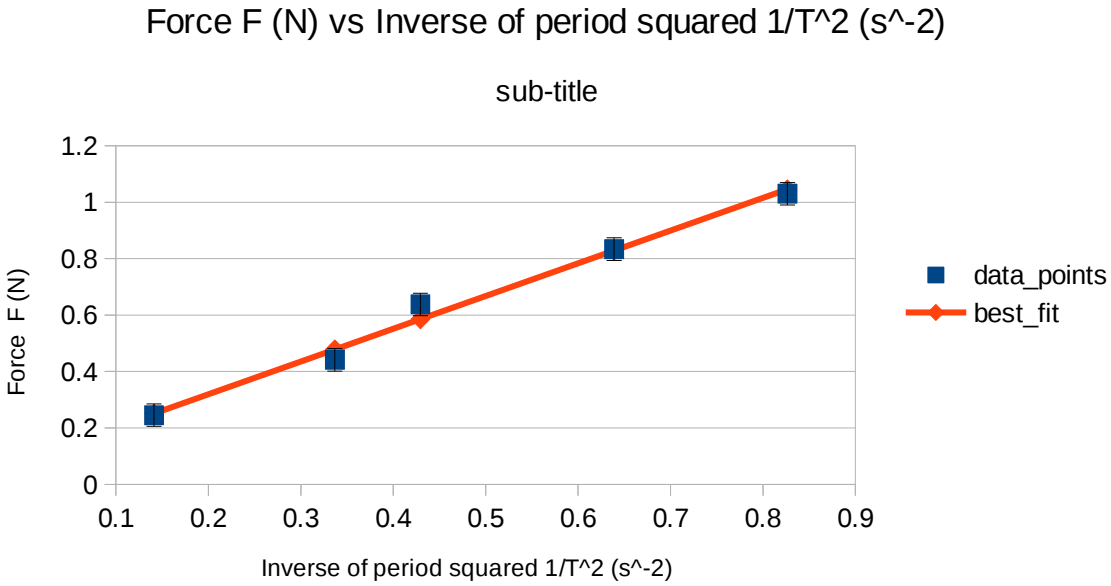
Part B: Vary Force

Data Table 2										
	Mass M (kg)	y_i F (N)	t (s)	Period T (s)	x_i T^{-2} (s^{-2})	y_{best}				
#1	0.02500	0.24525	53.22	2.661	0.14122457	0.25105641	LINEST()			
#2	0.04500	0.44145	34.46	1.723	0.33684449	0.47791472				
#3	0.06500	0.63765	30.52	1.526	0.42942857	0.58528347	m	1.15968917	0.08727981	c
#4	0.08500	0.83385	25.02	1.251	0.63897723	0.82829478	σ_m	0.07184167	0.0381387	σ_c
#5	0.10500	1.03005	22.00	1.100	0.82644628	1.04570062	r^2	0.98861798	0.03821625	σ_y

Part C: Vary Mass

Data Table 2					
Mass hanging over the pulley M:	0.02497	kg			
Radius of the circular motion r:	0.180	m			
Theoretical centripetal force F:	0.2449557	N			
	Mass m (kg)	t (s)	Period T (s)	Centripetal Force F (N)	
				Exp. Value	% disc.
#1	0.10685	31.71	1.5855	0.30204683	23.3067144
#2	0.15767	44.88	2.244	0.22250286	9.16608049
#3	0.20843	51.24	2.562	0.22564942	7.88153983
#4	0.25928	52.21	2.6105	0.27036711	10.3738814


Radius r (m) vs Period^2 p^2 (s^2)
sub-title
Radius r (m)
0.25
0.2
0.15
0.1
0.05
0
2
4
6
8
10
12
14
Period^2 p^2 (s^2)
data_points
best_fit


Force F (N) vs Inverse of period squared 1/T^2 (s^-2)
sub-title
Force F (N)
1.2
1
0.8
0.6
0.4
0.2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Inverse of period squared 1/T^2 (s^-2)
data_points
best_fit