

Measuring g by Freefall

Resolutions: Ruler $\pm 0.001\text{m}$ (uncertainty $s = 0.004\text{m}$)
 Timer $\pm 0.00001\text{s}$

s/cm	t_1/s	t_2/s	t_3/s	t_{av}/s	$\Delta t/\text{s}$	ϵ_s	ϵ_t
40.0	0.18034	0.17867	0.18040	0.179803	0.00087	1.0%	0.48%
35.0	0.16412	0.16402	0.16358	0.163907	0.00027	1.1%	0.16%
30.0	0.14691	0.14900	0.14635	0.147420	0.00132	1.3%	0.90%
25.0	0.12714	0.12748	0.12797	0.127530	0.00041	1.6%	0.33%
20.0	0.10711	0.10726	0.10744	0.107270	0.00016	2.0%	0.15%
15.0	0.08515	0.08617	0.08644	0.085920	0.00065	2.7%	0.75%

$$s = ut + \frac{1}{2}at^2$$

$$\frac{s}{t} = u + \frac{1}{2}at$$

$$\frac{s}{t} = \frac{1}{2}a \cdot t + u$$

$$\underbrace{\quad}_y = \underbrace{\quad}_{\text{grad}} \times \underbrace{\quad}_{\text{int}} + \underbrace{\quad}_{\text{int}}$$

Accepted value of $g = 9.8\text{ms}^{-2}$

According to Garrett E, Rooney F et al (2016), CAP.

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$(\frac{s}{t})/\text{ms}^{-1}$	t/s	$\Delta(\frac{s}{t})/\text{ms}^{-1}$	$\Delta t/\text{s}$
2.2247	0.179803	0.033	0.00087
2.1354	0.163907	0.028	0.00027
2.0350	0.147420	0.045	0.00132
1.9603	0.127530	0.038	0.00041
1.8645	0.107270	0.040	0.00016
1.7458	0.085920	0.060	0.00065

x-axis 0.002s per small sq

y-axis 0.005ms⁻¹ per small sq

Measured $g = (10.4 \pm 2.4)\text{ms}^{-2}$

Accepted $g = 9.8\text{ms}^{-2}$

