

Acceleration of a Free-Falling Object

Aim: investigate the motion of everyday objects, such as toy cars and tennis balls, and use the results to calculate the gravitational field strength.

Apparatus — tick each item as you add it to your diagram

draw your set-up here

Use these to draw your set-up:

☐ tennis ball

☐ tape measure

☐ stop clock

Method — fill in the gaps

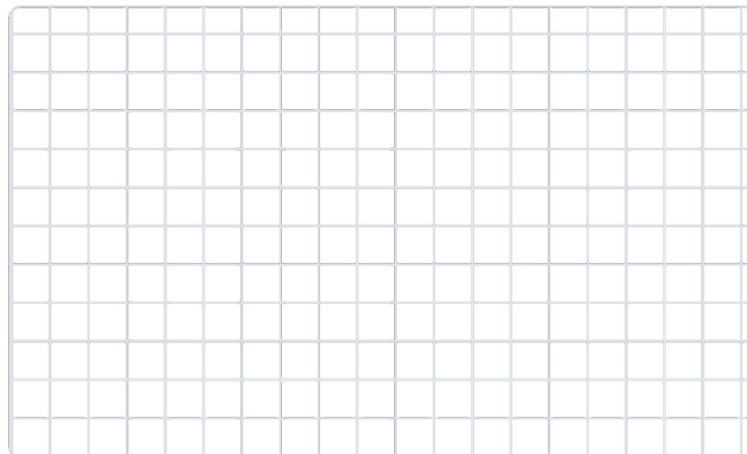
1. Measure the _____ from the ground to the _____ of the ball, using a height of 2 m.
2. Drop the ball from rest, making sure it is not pushed.
3. Measure the _____ between the ball being released and it hitting the ground, using a stop clock.
4. Calculate the acceleration using $v^2 = u^2 + 2as$, rearranged to make _____ the subject.
5. Repeat steps 1–4, releasing the ball from a height of 1.8 m, 1.6 m, 1.4 m and 1.2 m.
6. Calculate the _____ for each height.

Results

Height / m	Time to reach ground / s	Acceleration / m/s ²
2.0		
1.8		
1.6		
1.4		
1.2		

Graph

_____ (y) against _____ (x)



Conclusion

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The acceleration is _____ for each height, with a value of approximately _____ m/s², which is the gravitational field strength.

Evaluation

Do not _____ the ball, so it is initially _____. [2]

Use a _____ ball, so there is less _____ acting on it [2]