

What We Know

- Two masses attract each other.

The force is: Directly proportional to the product of their masses.

Inversely proportional to the square of the distance between them.

Derivation

Let's say we have:

- Masses: m_1 and m_2
- Distance between them: r
- Gravitational force: F

So, based on proportionality:

$$F \propto \frac{m_1 m_2}{r^2}$$

To turn this proportionality into an equation, we introduce the gravitational constant G :

$$F = G \cdot \frac{m_1 m_2}{r^2}$$

Where:

- F : Force of gravity (in newtons)
- G : Gravitational constant $= 6.674 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
- m_1, m_2 : Masses in kg
- r : Distance between the centers of the masses in meters

Why Inverse Square?

The inverse square nature ($\frac{1}{r^2}$) arises from geometry:

- Think of a point mass radiating "influence" (like gravity or light) equally in all directions.
- The surface area of a sphere grows as $4\pi r^2$, so the "influence" per unit area drops with $\frac{1}{r^2}$.

This makes gravitational force weaker with distance — but never zero.

Final Formula

$$F = G \cdot \frac{m_1 m_2}{r^2}$$

This is Newton's Universal Law of Gravitation — clean, simple, and still used in modern astrophysics and orbital mechanics.

below is the first image

Cedric himself knew nothing whatever about it. It had never been even mentioned to him. He knew that his papa had been an Englishman, because his mamma had told him so; but then his papa had died when he was so little a boy that he could not remember very much about him, except that he was big, and had blue eyes and a long mustache, and that it was a splendid thing to be carried around the room on his shoulder.

below is the second image

This is a lot of 12 point text to test the ocr code and see if it works on all types of file format.

The quick brown dog jumped over the lazy fox. The quick brown dog jumped over the lazy fox. The quick brown dog jumped over the lazy fox. The quick brown dog jumped over the lazy fox.

below is the last image

This is a handwritten
example

Write as good as you can.