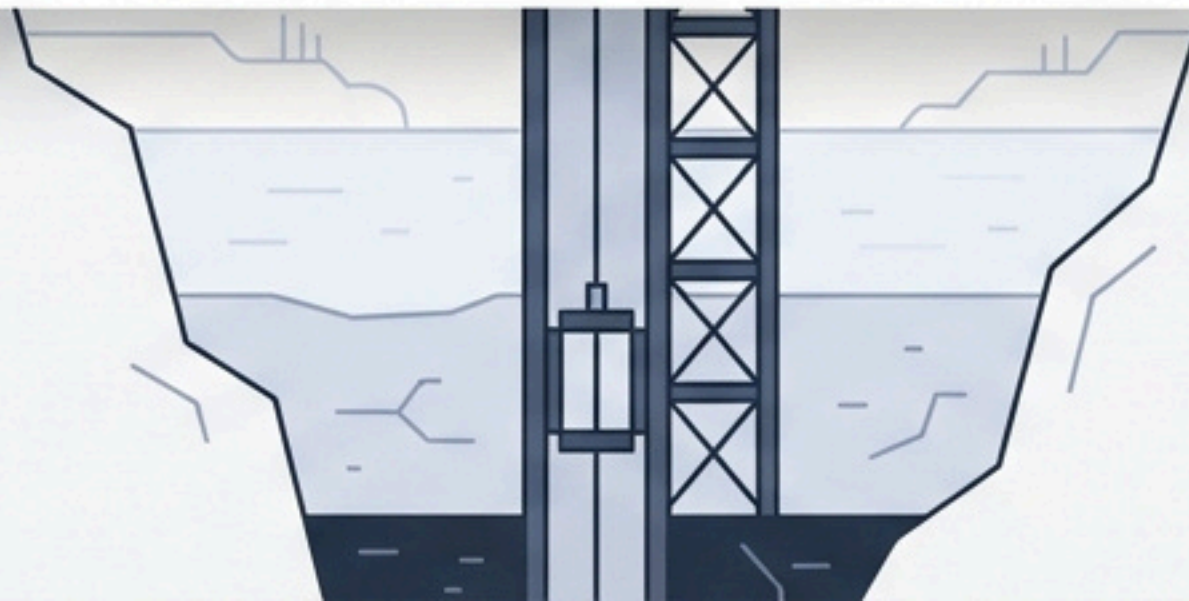




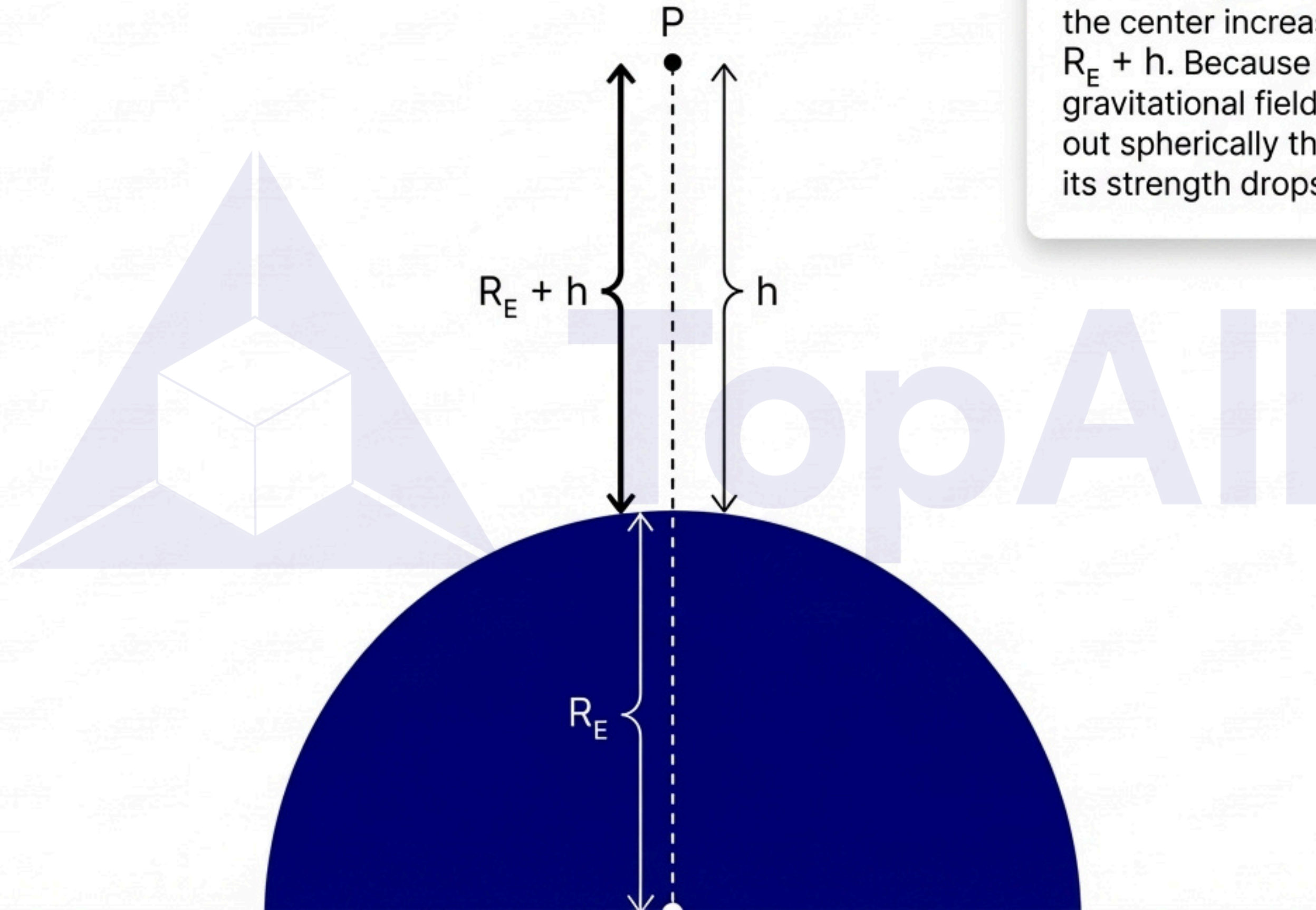
How g Changes with Height and Depth

Gravity is strongest precisely where we live: Earth's surface. Going up or down makes you lighter.



Leaving the Surface: The Inverse-Square Law

As an object moves away from Earth, its distance from the center increases to $R_E + h$. Because the gravitational field spreads out spherically through space, its strength drops rapidly.



Exact Formula (For any altitude)

$$g(h) = \frac{GM_E}{(R_E + h)^2}$$

Gravity decreases as the inverse-square of the total distance from the center.

Binomial Approximation

$$g(h) \approx g \left(1 - \frac{2h}{R_E} \right)$$

① Valid ONLY when $h \ll R_E$ (e.g., airplanes, low-earth satellites). Do not use for deep space.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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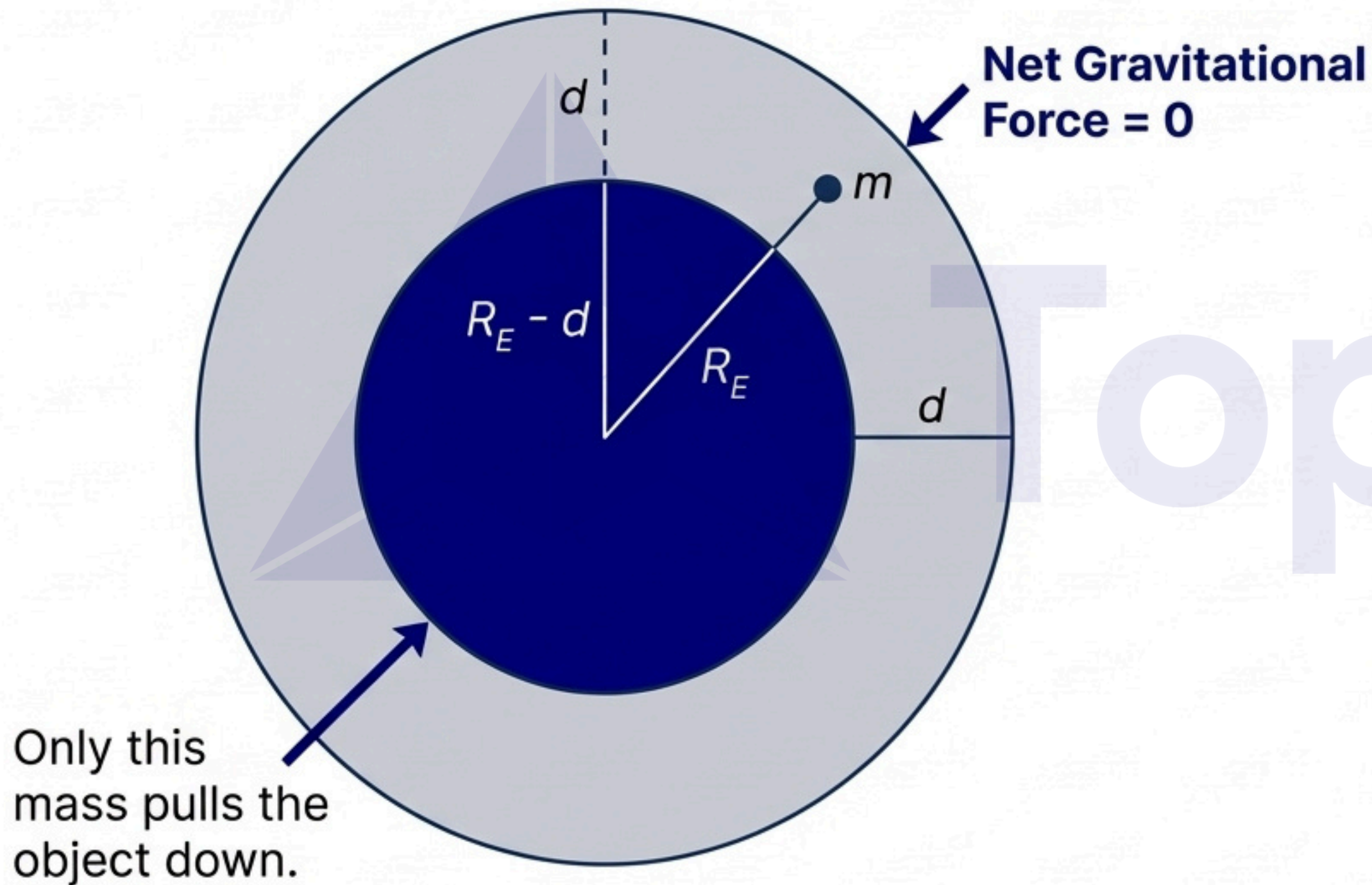
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- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



Digging Deep: The Inner Sphere Effect



The mass of the Earth *above* you cancels itself out perfectly.

Only the sphere of mass directly *beneath* you contributes to downward acceleration.

Distance decreases $\rightarrow$ Gravity should get stronger ($1/r^2$)

Available mass decreases $\rightarrow$ Gravity gets weaker (r^3)

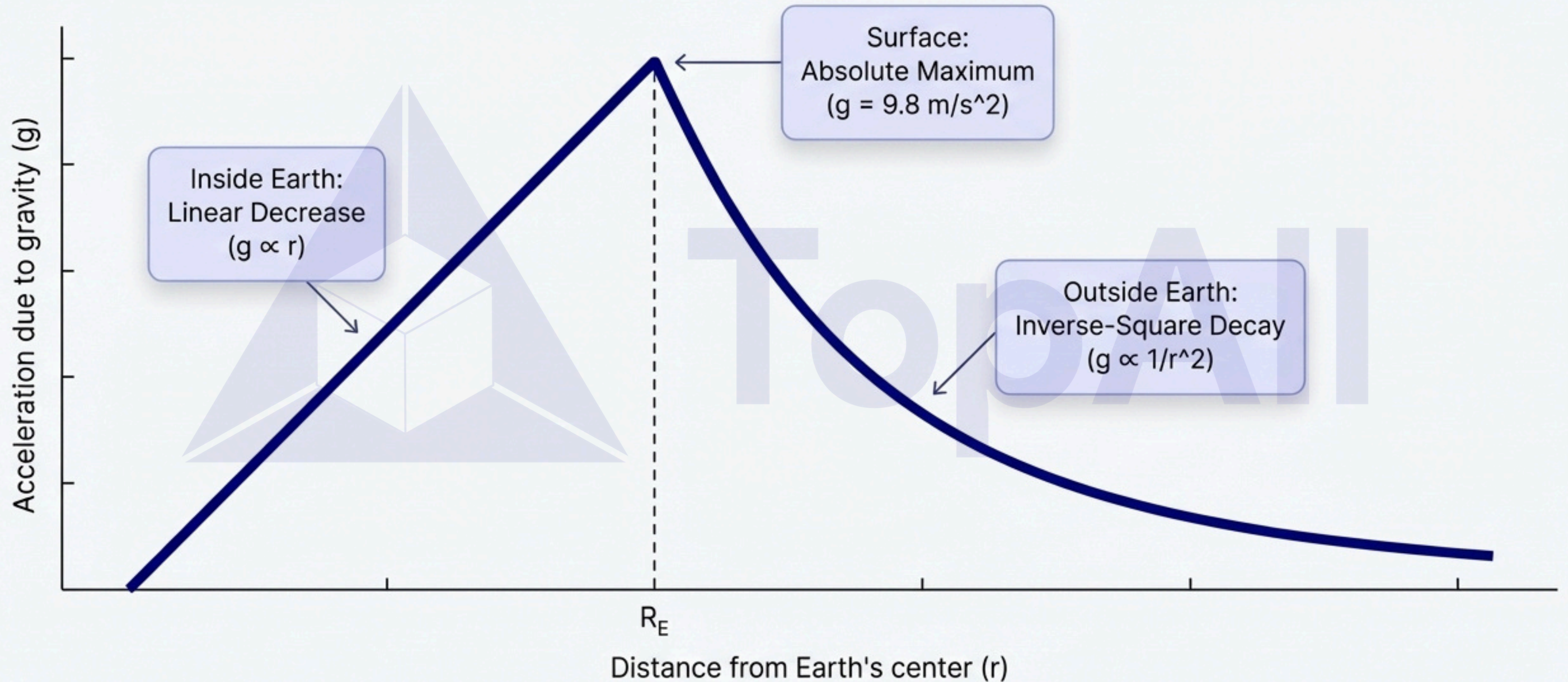
The mass drop outpaces the distance drop. The net result is a linear decrease.

Formula for Gravity at Depth

$$g(d) = g \left(1 - \frac{d}{R_E} \right)$$

Gravity drops steadily in a straight line until it reaches exactly zero at Earth's core.

The Radial Journey: Mapping Earth's Gravity



Three Absolute Truths of Earth's Gravity



Maximum Gravity

g is at its absolute peak (9.8 m/s^2) directly on the surface.
Distance $r = R_E$.



Inverse-Square Decay

Going up makes you lighter.
Drops rapidly. Uses approximation $1 - 2h/R_E$ for low heights.



Linear Decrease

Going down makes you lighter.
Drops steadily. Uses $1 - d/R_E$.
Zero at the core.

You are now ready to solve variable gravity problems.



You've Learned the Theory.

Now Let's Test It.

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