AQA A-Level Physics
7.2 Gravitational Fields
Flashcards

What is gravity?

What is gravity?

Gravity is the universal attractive force which acts between all matter.

What is *G*?

What is G?

The universal gravitational constant.

Approx. 6.67×10^{-11} m³kg⁻¹s⁻²

What can field lines tell you about a field?

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The direction of the field and the strength of the field depending on the density of the field lines.

What is g?

What is *g*?

g is the force per unit area in a uniform field

In a radial field the magnitude of *g* is the the proportionality constant at that point between force and mass.

let *g* = GM/r²

What is gravitational potential?

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The potential energy per kilogram, at any point in the field. 0 potential is defined at infinity, hence at a point close to a mass the potential of an object would be negative.

What is the work done by moving a mass in a field?

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Mass x change in potential

What is the gravitational potential difference?

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Gravitational potential difference is the difference in the gravitational potentials of two points in a gravitational field.

What is an equipotential surface?

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A surface in which every point on the surface has the same potential.

How much work is done when you move 1km in any direction on an equipotential?

How much work is done when you move 1km in any direction on an equipotential surface?

No work is done when moving across equipotentials, as the potential at each point is the same.

Why is gravitational potential a negative value?

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Work needs to be done to move an object from the inside the field to outside the field. Since outside the field's potential is defined as 0 then the potential inside the field must be negative.

How is the orbital period related to the radius of a circular orbit?

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$$T^2 \propto R^3$$

What equations could one use to find the speed of an orbiting satellite?

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The orbiting object (mass m) is in circular motion, so we would use F = ma with F = GMm / r^2 rearranged to a = v^2 / r = ω^2 x r. This can be sold to find the speed (v), angular speed (ω), the radius of the orbit or using T = 2π / ω its period.

Compare the PE and KE of a lower orbit to a higher one.

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A lower orbit (smaller m) has less potential energy and more kinetic energy than a higher orbit (bigger r).

What is the period of a geosynchronous orbit?

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Geosynchronous orbits have a period of one day.