

CIE A-Level Physics

8 - Gravitational Fields

Flashcards

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What is gravity?



What is gravity?

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



What is G ?



What is G?

The universal gravitational constant.

$$\text{Approx. } 6.67 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$$



What can field lines tell you about a field?



What can field lines tell you about a field?

- The direction of the field.
- The strength of the field, which depends on the density of the field lines.



What is g ?



What is g ?

g is the force per unit area in a uniform gravitational field. (acceleration due to gravity)

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

$$\text{i.e. } g = GM/r^2$$



Derive the equation for the gravitational field strength of a radial field.



Derive the equation for the gravitational field strength of a radial field.

Starting with $g = F/m$ and sub in
 $F = GMm/r^2$ to get $g = GMm/r^2m$

$$g = GM/r^2$$



What is Newton's law of Gravitation?



What is Newton's law of Gravitation?

Newton's law of gravitation states that two point masses attract each other with a force that is directly proportional to the product of their masses, and inversely proportional to the square of the distance between them.



What are satellites? What are they used for?



What are satellites? What are they used for?

- Satellites are objects that orbit other, larger objects - they include natural satellites like the moon, as well as artificial satellites that humans have sent into space.
- Uses include communications, scientific research, and Global Positioning Systems (GPS).



What are geostationary satellites? What are they used for?



What are geostationary satellites? What are they used for?

- Geostationary satellites have an orbital period that is exactly a day, so that they appear stationary above the Earth.
 - They orbit 36,000km above the equator.
- They are useful for communications and surveying since they can provide continuous coverage.



What is gravitational potential?



What is gravitational potential?

The potential energy per kilogram, at any point in the field.

0 potential is defined at infinity, so at a point close to a mass, the potential of an object would be negative.



What is gravitational potential difference?



What is gravitational potential difference?

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



What is gravitational potential energy at a point in the field?



What is gravitational potential energy at a point in the field?

The work done per unit mass in moving an object from infinity to that point in the field.

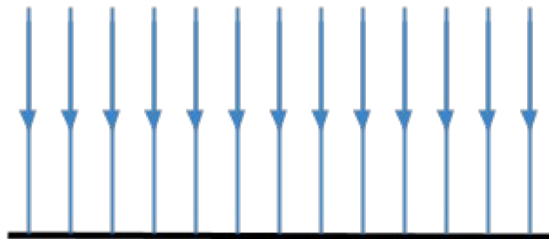


True or false? At the Earth's surface the value of g is approximately constant.



True or false? At the Earth's surface the value of g is approximately constant.

True, at the Earth's surface the field is uniform and g is constant.



Uniform field

