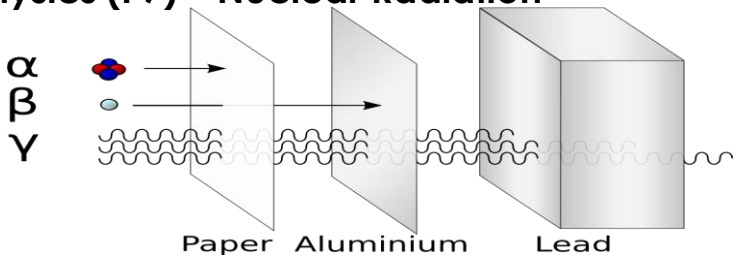
Ormiston Victory Academy

Subject: Physics HT1 P7 and P8

Victory Vitals

Physics (P7) – Nuclear Radiation



Alpha radiation is a helium nucleus (no electrons so a positive charge). In half life equations Alpha decay (two **protons** and two **neutrons**) changes the **mass number** of the element by -4 and the **atomic number** by -2

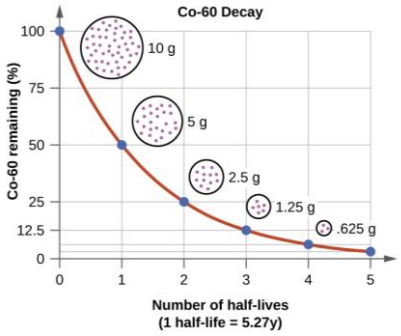
$$^{219}_{86}\mathrm{Rn} \rightarrow ^{215}_{84}\mathrm{Po} + ^{4}_{2}\mathrm{He}$$

Beta radiation is an electron (so a negative charge). In half life equations Beta decay changes the atomic number by +1 (the nucleus gains a proton) but the mass number remains unchanged

$$^{14}_{6}\mathrm{C} \rightarrow ^{14}_{7}\mathrm{N} + ^{0}_{-1}\mathrm{e}$$

Gamma radiation is electromagnetic waves so no charge. In half life equations **Gamma** is pure energy and will not change the structure of the nucleus in any way.

Nuclear half-life shows us how long it takes for half a mass of a radioactive isotope to decay.

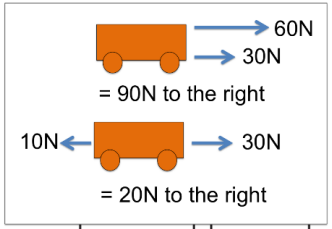


Physics (P8) - Forces

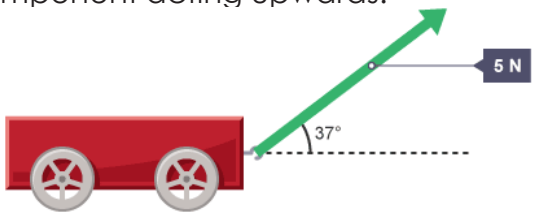
A physical quantity is something that can be measured. Scalar quantities only have a **magnitude** or size. Vector quantities have both **magnitude** and an associated direction. This makes them different from scalar quantities, which just have magnitude.

Contact forces are **forces** that act between two objects that are physically touching each other. Examples of this include: tension, friction, and air resistance.
Non-contact forces are **forces** that act between two objects that are not physically touching each other. Examples of non-contact forces include: magnetic force, electrostatic force, and gravitational force.

When two forces acting on an object are not equal in size, we say that they are unbalanced forces. The overall force acting on the object is called the **resultant force**



Vector diagrams can be used to resolve the pulling force into a horizontal component acting to the right, and a vertical component acting upwards.



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Key Vocabulary:

Nucleus: The central part of an atom. It contains protons and neutrons, and has most of the mass of the atom. The plural of nucleus is nuclei.

Nuclear fission: The splitting of a large nucleus to produce two smaller ones. Two or three neutrons are also released in the process.

Nuclear fusion: The joining together of two smaller atomic nuclei to produce a larger nucleus.

Alpha particle: Subatomic particle comprising two protons and two neutrons (the same as a helium nucleus).

Beta radiation: Radiation caused by beta particles (high-energy electrons). A beta particle is an electron ejected from a nucleus when a neutron becomes a proton.

Gamma radiation: A type of ionising radiation that is also part of the EM spectrum. It has no mass.

Nuclear half life: The time it takes for the number of nuclei of a radioactive isotope in a sample to halve

Displacement: Quantity describing the distance from the start of the journey to the end in a straight line with a described direction

Vectors: Vector quantities have both magnitude and an associated direction.

Scalars: A physical quantity is something that can be measured. Scalar quantities only have a magnitude or size.

Magnitude: The size of a physical quantity.

Force: A push or a pull. The unit of force is the newton (N).

Friction: A force that opposes or prevents movement and converts kinetic energy into heat.

Resultant force: The single force that could replace all the forces acting on an object, found by adding these together. If all the forces are balanced, the resultant force is zero.

Videos




Quizzes