Question 5 – Maximum Mark 3

5. Alpha, beta and gamma are types of nuclear radiation, which have a range of properties and effects.

   Using your knowledge of physics, comment on the similarities and/or differences between these types of nuclear radiation. **3**

Response 1

Alpha particles are the most ionising type of radiation as it has the strongest charge of 2+. Alpha is made up of 2 protons and 2 neutrons. Alpha is weakly penetrating as it stopped by air or a sheet of paper.

Beta radiation is a fast moving electron with a charge of 1-. Beta is more ionising than gamma but not more than Alpha. Beta can be blocked using a few mm of aluminium.

All these radiations ionise and are used in society. Alpha is used in smoke detectors and gamma is used to treat diseases such as cancer. These can all kill living cells.

Response 2

- gamma radiation is a wave and Alpha, beta aren't
- gamma can be stopped by thick lead.
- beta is the slowest and gamma is the fastest.

Response 3

- Some can cause more damage if exposed to one.
- Some are more explosive and powerful
- Some can kill if taken in the body.

Response 4

Alpha and beta ~~don't~~ have a bigger wave length than gamma so they aren't as strong. on one thing.
They can all cause a chain reaction.
Gamma ~~&~~ causes chain reactions faster.

Response 5

Alpha radiation is the most harmful but it can be stopped by just a sheet of paper. Gamma is the least harmful however it needs meters of lead-lined concrete to reduce it. Gamma radition is the only one in the E.M spectrum therefore it doesn't have a mass and alpha particles are the largest

Response 6

- Gamma radiation has no charge, Beta radiation is negatively charged and Alpha radiation is positively charged.

- Gamma radiation is on the electromagnetic spectrum
- Alpha radiation is made up of 2 neutrons and two protons, Beta is made up of 1 neutron and 1 proton and Gamma has no charge
- Gamma radiation is the most powerful and you need lead to stop it Beta radiation needs aluminium to stop it and Alpha can be stopped by paper.

Response 7

Alpha, Beta. and gamma all have different penitrative power alpha has the liest and can be absorbed by human skin or a sheet of paper beta is in the midde and can be absorbed by a sheet of Aluminium and gamma has the most it can be absorbed by a few cm of lead of a concrete wall. Alpha carries the most energy followed by beta then gamma. Gamma has no mass and is a wave on the elecero magnetic spectrum, Beta has a tiny small mass and is a fast moving electron, Alpha has the largest mass and is a helium nucleus

Response 8

Alpha radiation has a helium nucleus – $^{4}_{2}He$

Beta radiation is a fast moving electron- $^{0}_{-1}e$

Gamma radiation is a wave on the electromagnetic spectrum.

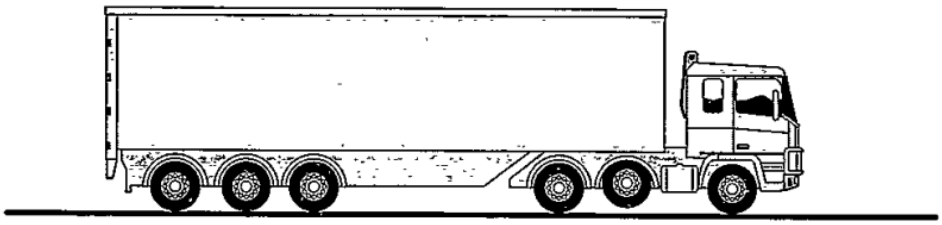
Alpha radiation is positively charged, Beta radiation is negatively charged and gamma radiation has no charge.

Alpha radiation can be stopped by a sheet of paper. Beta radiation is stopped by a few cms of aluminium whereas gamma rays are only stopped by about 2 inches of lead or more. Alpha radiation is the most dangerous as it can ionise easily, then Beta is next and gamma radiation is not very ionising. All radiations can be used in industries for different uses. *

* Gamma radiation can be used in medicine to target tumours. Beta radiation can be used to check the thicknesses of materials in industry as it can pass through paper. Alpha radiation could possibly be used in some smoke alarms.

Question 10 - Maximum Mark 3

10. An articulated lorry has six pairs of wheels.
One pair of wheels can be raised off the ground.



Using your knowledge of physics, comment on situations in which the wheels may be raised or lowered. 3

Response 1

- Bumpy Mountain roads
- Icy roads
- Sharp turns

Response 2

when going round corners the wheels may be raised so the truck has more moveability to turn and they might be lowered when on a straight road so there is more friction for stopping.

Response 3

- raising the wheels would result in a ~~greater~~ friction this could be used lasser

  When accelerating

- lowering the wheels would result in a greater friction this could be used trying to decelerate.

- In icy conditions all wheels would be lowered as friction prevents skidding.

- A greater Area Results in a lesser force and Pressure $P=\frac{F}{A}$ this may be used When Crossing a bridge.

Response 4

one ~~reason~~ situation in which the wheels may be ~~raised or~~ lowed is when ~~is to~~ ~~create~~ creating more friction with the road so the lorry can slow down. A situation to raise the wheels of the grounded would be to increase its velocity as the wheels while not be causing a friction force with road which would slow the lorry down.

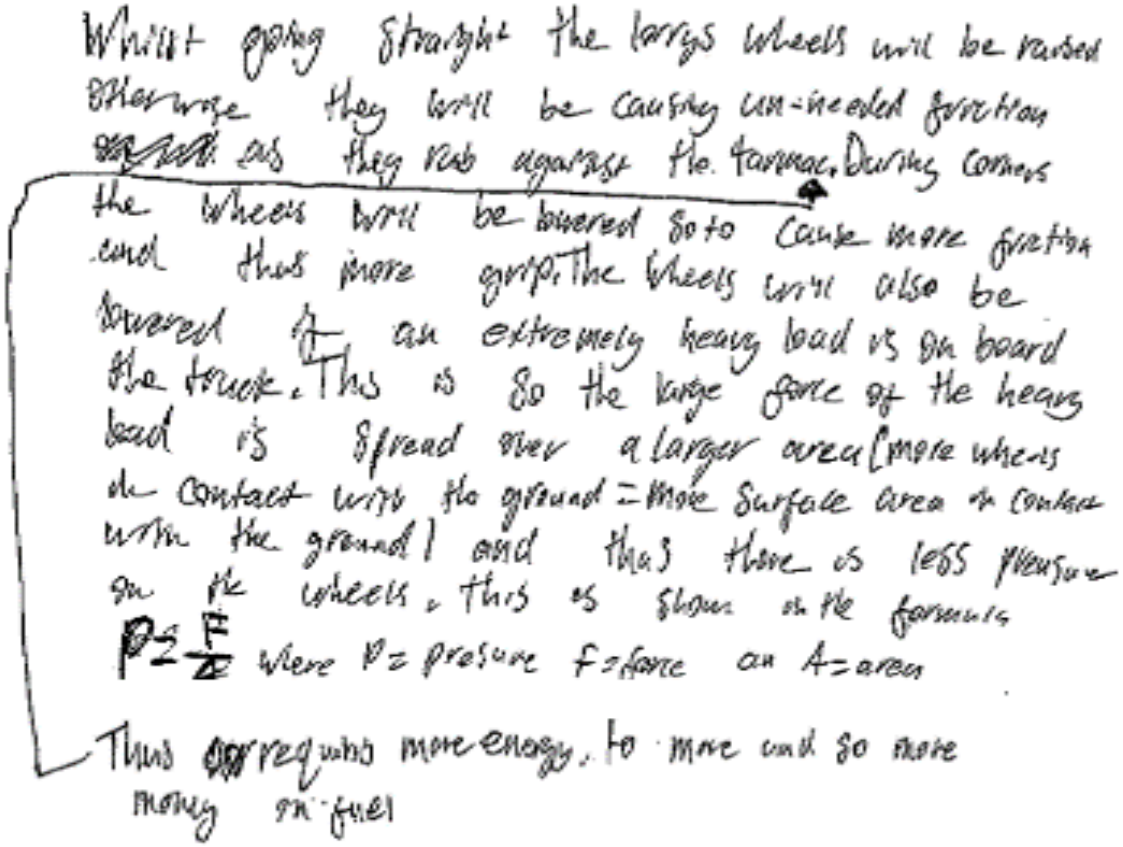
Response 5

the more wheels in contact with the ground means there will be a greater friction. if the road surface is wet or slippery the wheels may be lower to give better grip of if the road is dry and the driver wants to save fuel he may raise them because the less friction there is the less the engine will have to work to keep the lorrie moving at the same speed

Response 6

The wheels may be lifted when a lighter object is in the lorry when the object is heavy the lorry must balance the force and put the same force on the earth as the cargo puts on it

Response 7



Response 8