RADIOACTIVE

DART ACTIVITY

Complete the following tasks

1. Fill in the blank keywords - if you are not sure, there are clues on the next page.
2. Circle sections in **red** that describe **uses** of radioactivity
3. Circle sections in **green** that describe **dangers** of radioactivity
4. Circle sections in **blue** that describe **how** unstable nuclei decay
5. Circle sections in **black** that describe **why** unstable nuclei decay

Verse 1:
In the middle of every atom you'll find a 1._____ which will be made,
Of protons and neutrons that strongly bind, and most nuclei never will change.
But large nuclei that are bigger than 2._____ can't hold all their protons in place,
And some rare 3._____ have too many neutrons, or not enough, for them to be stable,
They may decay, and radiate particles or high energy 4._____,
As their nucleus changes, they change their name as their 5._____ does not stay the same.

Chorus:
Unstable nuclei randomly 6._____,
Spit out an alpha or a beta then emit a 7._____,
They may be dangerous, (watch out!) but we use them every day, yeah.
Radioactive r-radioactive.

Verse 2:
Alpha's a 8._____ nucleus, with a charge of plus 2, and it's slow,
It won't 9._____ paper or skin but that makes emitters more dangerous if they are swallowed.
Betas are just fast electrons emitted when 10._____ decay so beware,
They can get through your skin, ionise you within, but aluminium can 11._____ you if you're prepared.
Gamma rays may not be so 12._____, but they go through most things in their way,
You'll need about one inch of lead to protect all your cells from the rays that may go astray.

Bridge 1
Ooooh, small amounts can be found almost everywhere,
13._____ can come from food, rocks or space, from nuclear waste and breathed in from the air,
Ooooh, this is normal but too much exposure can leave you unwell,
If 14._____ you'll be 15._____ from within causing cancer or killing your cells,

Verse 3:
Alpha 16._____ are in smoke detectors and saving lives all of the time,
Beta emitters will measure the thickness of paper or foil in a factory line,
Doctors, inject you with gamma emitters, to track stuff that's flowing inside,
If you have a tumour, they may kill it with gamma rays, so that they don't have to cut you with knives.

Bridge 2:
Oooh 17._____ or decays every second, are 18._____,
It decreases with time, as fewer unstable nuclei are left to decay 19._____,
Ooh 20._____ is the time for it to go down by half naturally,
For some isotopes this will be seconds or millions of years if they have more stability.

Each of these words is used once.

nucleus radiation contaminated gamma ray helium

penetrate isotopes bequerels neutrons emitters

atomic number half-life irradiated lead activity

ionising randomly shield EM waves decay

Definitions

1. The part at the centre of an atom containing protons and neutrons.
2. The heaviest element with stable isotopes.
3. Types of an element with the same number of protons but a different number of neutrons to other atoms of the same element.
4. A wave that can travel through a vacuum at the speed of light.
5. Equal to the number of protons in the nucleus of an atom.
6. Fall apart.
7. An EM wave with a very high frequency.
8. The second element on the periodic table.
9. To go through something.
10. A particle with no charge, found in the nucleus of an atom.
11. When a substance absorbs radiation so that it cannot penetrate further.
12. Able to knock electrons out of atoms, causing them to become charged.
13. Waves or particles that spread out from something.
14. When someone has radioactive material inside them.
15. Bombarded by radiation.
16. A radioactive element that gives out a type of radiation.
17. A unit of measurement for radioactivity.
18. The number decays given off by a sample per second.
19. Unpredictably, without a pattern.
20. The time taken for the activity of a sample to decrease by half.