Acute Exposure	Exposure to a large, single dose of radiation, or a series of moderate doses received during a short period of time. Large acute doses can result from accidental or emergency exposures, or from specific medical procedures (radiation therapy).
Alpha Particle	A positively charged particle made up of two neutrons and two protons emitted by certain radioactive nuclei. Alpha particles cannot penetrate most matter. A piece of paper or the dead outer layers of skin is sufficient to stop alpha particles. Radioactive material that emits alpha particles (alpha emitters) can be very harmful when inhaled, swallowed, or absorbed into the blood stream.
Americium	A man-made element; a silvery metal. Trace quantities of americium are widely used in smoke detectors and as neutron sources in neutron moisture gauges
Atom	Extremely small particles of which we, and everything around us, are made. Atoms consist of a nucleus, containing protons and neutrons, surrounded by electrons.
Beta Particle	An electron or positron emitted by certain radioactive nuclei. Beta particles can be stopped by a layer or two of clothing or by a few millimeters of a substance such as aluminum. They are capable of penetrating the skin and causing radiation damage, such as skin burns. As with alpha emitters, beta emitters are most hazardous when they are inhaled or ingested.

Chain Reaction	A reaction that initiates its own repetition. In a fission chain reaction, a fissionable nucleus absorbs a neutron and fissions (splits) spontaneously, releasing additional neutrons. These, in turn, can be absorbed by other fissionable nuclei, releasing still more neutrons. A fission chain reaction is self-sustaining when the number of neutrons released in a given time equals or exceeds the number of neutrons lost by absorption in non-fissionable material or by escape from the system.
Chronic Exposure	Continuous or intermittent exposure to low doses of radiation over a long period of time. There is a delay between the exposure and the observed health effect.
Cosmic Radiation	Radiation from space, like a steady drizzle of rain. This shower of cosmic radiation is created by charged "sub-atomic particles" (parts of atoms) that originate in our galaxy and the sun. The particles interact with Earth's atmosphere and magnetic field to create cosmic radiation.
DNA **(deoxyribonucleic acid)**	The "blueprints" that carry our genetic information. DNA ensures that a perfect copy of the original cell is created when our body repairs or replaces cells.
Decay Chain	The series of decays or steps that certain unstable (radioactive) atoms go through before reaching a stable form. For example, the decay chain that begins with uranium– 238 culminates in lead–206, after forming uranium–234, thorium–230, radium–226 and radon– 222.

Direct Exposure	Exposure to radioactive material from a source outside of your body
Dose	The quantity of energy absorbed by a person exposed to radiation.
Dosimeter	A small portable instrument (e.g., a film badge, thermoluminescent dosimeter or pocket dosimeter) used for measuring and recording the total accumulated personal dose of ionizing radiation.
Dosimetry	The monitoring of individuals to accurately determine their radiation dose equivalent.
Electromagnetic Spectrum	Energy that travels in the form of waves or high-speed particles. The electromagnetic spectrum extends from low to high frequencies of energy including radio waves, microwaves, infrared light, visible light, ultraviolet light, x-rays and gamma rays. The electromagnetic spectrum is divided into two major categories: ionizing radiation and non-ionizing radiation

Electron	Particles that orbit the nucleus as a cloud. They are negatively charged and balance the positive electrical charge of the protons in the nucleus. Interactions with electrons in the outer orbits affect an atom's chemical properties.
Exposure Pathways	The way in which people are exposed to radiation or other contaminants. The three basic pathways are inhalation (contaminants are taken into the lungs), ingestion (contaminants are swallowed) and direct (external) exposure (contaminants cause damage from outside the body).
Fission	The splitting of a nucleus into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.
Fusion	The union of atomic nuclei to form heavier nuclei resulting in the release of enormous quantities of energy when certain light elements unite.
Gamma Rays	High-energy electromagnetic radiation emitted by certain radioactive elements when their nuclei transition from a higher to a lower energy state. These rays have high energy and a short wavelength. Gamma rays are very penetrating. Several feet of concrete or a few inches of lead may be required to stop gamma rays. While gamma rays can easily pass completely through the human body, a fraction of the energy will always be absorbed by tissue.

Geiger Counter	A radiation detection and measuring instrument. It consists of a gas-filled tube containing electrodes, between which there is an electrical voltage, but no current flowing. When ionizing radiation passes through the tube, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulses per second measures the intensity of the radiation field. It is the most commonly used portable radiation detection instrument.
Half-life	The amount of time it takes for half of the radioactive atoms in a sample to decay into a more stable form. Every radioactive atom has a different half-life. Half-lives vary from billionths of a billionth of a second to billions of years.
Health Physics	A scientific field that focuses on radiation protection of humans and the environment. Health physics uses physics, biology, chemistry, statistics and electronic instrumentation to help protect individuals from any damaging effects of radiation.
Ingestion	Eating or drinking. When used with these materials it refers to eating or drinking radioactive material.
Inhalation	Breathing in. When used with these materials it refers to breathing in radioactive material.

Ion	An atom that has too many or too few electrons, causing it to have an electrical charge, and therefore, be chemically active.
Ionizing Radiation	Energy given off as either particles or rays from the unstable nucleus of an atom. The most energetic form of radiation; capable of removing electrons from atoms and damaging living cells and the DNA of those cells. Ionizing radiation includes x-rays, gamma rays and alpha and beta particles.
Isotope	A form of an element that has the same atomic number (same number of protons), but a different atomic mass due to the presence of a different number of neutrons.
Man-made Radiation	Radiation that is produced for medical, manufacturing and consumer purposes.
Meson	A subatomic particle that holds nucleons together in the atomic nucleus.

Monitoring	The use of sampling and detection equipment to determine the levels of radiation or other toxic materials in land, air or water.
Natural (Background) Radiation	The radiation present in the natural environment; includes cosmic, terrestrial and internal radiation .
Neutron	A small particle, with no electrical charge, typically found within an atom's nucleus. A neutron has about the same mass as a proton.
Non-ionizing Radiation	Radiation that has lower energy levels and longer wavelengths than ionizing radiation. It has enough energy to move atoms, but not enough to alter them chemically. It can be strong enough to heat tissue and cause harmful biological effects. Examples include radio waves, microwaves, visible light and infrared from a heat lamp.
Nucleus	The heat energy produced by the process of nuclear reaction (fission or fusion) within a nuclear reactor or by radioactive decay.

Nuclear Fallout	The slow descent of minute particles of radioactive debris in the atmosphere following a nuclear explosion.
Nucleus	The central part of an atom that contains protons and neutrons. The nucleus is the heaviest part of the atom.
Photon	A "packet" of electromagnetic energy. Photons have no mass and travel at the speed of light. Gamma and X-rays are photons.
Proton	A small particle, typically found within an atom's nucleus, that possesses a positive electrical charge. The number of protons is unique for each chemical element.
Radiation	Radiation is energy that travels in the form of waves and makes up the electromagnetic spectrum. The electromagnetic spectrum is divided into two major categories: ionizing radiation and non-ionizing radiation.

Radiation Exposure	Exposure occurs when a person is near a radiation source. Receiving an x-ray is an example of exposure. Though the radiation penetrates the body, it does not remain on the skin or in the body.
Radiation Exposure Pathways	The way in which people are exposed to radiation or other contaminants. The three basic pathways are inhalation (contaminants are taken into the lungs), ingestion (contaminants are swallowed) and direct (external) exposure (contaminants cause damage from outside the body).
Radiation Protection	Radiation is energy that travels in the form of waves and makes up the electromagnetic spectrum. The electromagnetic spectrum is divided into two major categories: ionizing radiation and non-ionizing radiation.
Radioactive Atom	An atom with an unstable nucleus that emits ionizing radiation (alpha particles, beta particles or gamma rays) as it decays and attempts to become stable.
Radioactive Contamination	A deposit of radioactive material on the surfaces of structures, areas, objects or people. It may also be airborne, external or internal (inside components or people).

Radioactive Decay	The process in which an unstable (radioactive) nucleus emits radiation and changes to a more stable isotope or element. A number of different particles can be emitted by decay. The most typical are alpha or beta particles, often accompanied by gamma radiation.
Radioactive Materials	Materials that emit ionizing radiation (alpha particles, beta particles, and gamma rays).
Radioactivity	The property of some atoms that causes them to spontaneously give off energy as particles or ray. Radioactive atoms emit ionizing when they decay and transform into a new element.
Radium	A naturally occurring radioactive (unstable) element that forms when uranium and thorium decay. Elevated levels of radium can contaminate water supplies. Radium also poses a risk when it decays to form radon, a radioactive gas.
Radon	A naturally occurring (colorless and odorless) radioactive gas found in soils, rock and water throughout the United States. Radon causes lung cancer and is a threat to health because it tends to collect in homes, sometimes in very high concentrations. As a result, radon is the largest source of exposure to naturally occurring radiation.

Rem	Doses are most commonly reported in millirem (mrem). A millirem is one thousandth of a rem (1000 mrem = 1 rem). Countries that use the metric system measure radiation dose in units of sieverts (Sv). A millisievert is one thousandth of a sievert (1000 mSv = 1 Sv). Converting sieverts to rems is easy. One sievert equals 100 rem (1 Sv = 100 rem). One millisievert equals one hundred millirems (1 mSv = 100 millirems).
Strong Nuclear Force	A powerful force between nucleons: proton-to-proton, neutron-neutron, and proton-neutron. It extends only a very short distance, about the diameter of a proton or neutron.
Shelter-in-place	Selecting a small, interior room, with no or few windows, and taking refuge there.
Terrestrial Radiation	Radiation that is emitted by naturally occurring radioactive materials in the earth.
Tritium	Tritium (chemical symbol H–3) is a radioactive isotope of the element hydrogen (chemical symbol H).

Unstable Nucleus	An atom is unstable (radioactive) if the forces among the particles that make up the nucleus are unbalanced (has an excess of internal energy).
Uranium	A radioactive (unstable) element generally found in the environment. As uranium (U; atomic number 92) decays, it releases radiation and forms other elements (like radium and radon) until it becomes a stable element (lead).
X-rays	X-rays and gamma rays differ in origin, but have essentially the same properties. All x-rays are less energetic than the most energetic gamma rays. Most diagnostic medical x-rays are stopped by a few millimeters of lead.

Directions:

- Print these cards, single sided, for each student.
- Allow students to familiarize themselves with the terms and definitions. Go over any questions together as a class.
- Have students cut along the solid black lines, and review each word with its definition visible. Once students have reviewed the vocabulary a couple of times, fold along the middle dotted line to create a flashcard.
- Students can use double sided flashcards to test their knowledge of Radiation Vocabulary.