NUCLEAR SCIENCE MERIT BADGE — PRE-WORK VIDEO CHECK

Scouting America • Complete Before Merit Badge Day & Bring to Class

Scout Name:	**Troop #:**	**Class Session:**

Instructions: Watch all 16 short videos on the assigned YouTube playlist before Merit Badge Day and answer the questions below. Bring this completed sheet to class so we can jump straight into our Geiger counter lab and mousetrap reactor!

1. Ionizing vs. Non-Ionizing Radiation:
What is the main difference between ionizing radiation (like X-rays or gamma rays) and non-ionizing radiation (like radio waves or visible light)?

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2. The ALARA Principle:
What do the letters **ALARA** stand for, and what are the **three main ways** we protect ourselves from radiation?

A_____ **L**_____ **A**_____ **R**_____ **A**_____

3 Safety Methods: 1) _____ 2) _____ 3) _____

3. Alpha, Beta, and Gamma Shielding:
What material stops each type of radiation? *(Hint: Paper, Aluminum, or Lead)*

Alpha Particle → _____ | **Beta Particle →** _____ | **Gamma Ray →** _____

POP CULTURE CHECK #1 **Who is the big green guy from Marvel who got his powers from a massive dose of gamma rays (and definitely didn't follow ALARA)?**
Answer: _____ *(Hint: Don't make him angry!)*

4. Everyday NORM (Naturally Occurring Radioactive Material):
Name **two** everyday NORM items found in a normal house or grocery store:

1) _____ 2) _____

5. Exposure vs. Contamination:
Which one means radioactive dust or liquid has actually gotten *on* your skin or clothes (and can be washed off)?
Circle one: EXPOSURE / CONTAMINATION

6. Atoms, Isotopes & Quarks:
• Two isotopes of the same element (like Carbon-12 and Carbon-14) always have the same number of **protons**, but a different number of _____.
• How many **quarks** are inside a single proton or neutron? **Circle one: 2 / 3 / 4**

7. Nuclear Reactor Safety (SCRAM):
What happens inside a nuclear reactor during a **SCRAM** (emergency shutdown), and what part drops into the core to stop the chain reaction?

POP CULTURE CHECK #2 **Who is the nuclear-powered superhero on *The Simpsons* that Bart always reads about in comic books?**
Hero: _____ | Bonus — Sidekick: _____

8. Careers in Nuclear Science:
List **three** nuclear science jobs that require a college degree, and **three** that do **not** require a 4-year engineering degree:

Degree Required:	1) _____	2) _____	3) _____
No Degree Required:	1) _____	2) _____	3) _____

POP CULTURE CHECK #3 **In *Back to the Future*, Doc Brown used plutonium to generate 1.21 Gigawatts for his time machine. Name one real-world helpful way nuclear science is used outside of power plants (medicine, space, or industry):**

_____

TOP SECRET: NUCLEAR RADIATION DECODER PUZZLE

Crack the Code Before Merit Badge Day for Bonus Extra Credit!

Mission Briefing: Match each nuclear science symbol below to its letter in the Decoder Key to reveal a hidden message from your Merit Badge Counselor!

A	B	C	D	E	F	G	H	I	J	K	L	M
☢	⚛	⚡	☣	γ	α	β	λ	Ω	Δ	⏻	⚙	☀

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
∿	◎	⬡	⊕	ϟ	≋	⏚	⊗	⏚	ψ	✕	⍂	★

WORD 1

γ	✕	⏚	ϟ	☢

WORD 2

⚡	ϟ	γ	☣	Ω	⏚

WORD 3

Ω	α

WORD 4

⍂	◎	⊗

WORD 5

ψ	γ	☢	ϟ

WORD 6

λ	⊗	⚙	⏻

WORD 7

λ	☢	∿	☣	≋

WORD 8

◎	ϟ

WORD 9

☢

WORD 10

λ	⊗	⚙	⏻

WORD 11

≋	λ	Ω	ϟ	⏚

WORD 12

⏚	◎

WORD 13

⚡	⚙	☢	≋	≋

Don't forget! Bring both pages of this completed packet with you to Merit Badge Day along with a pen/pencil and your signed Blue Card!