

# NUCLEAR SCIENCE MERIT BADGE



Boy Scout Troop 806  
Houston, Texas

NAME \_\_\_\_\_

REQUIREMENT 1a.) Describe the biological effects and hazards of radiation to:

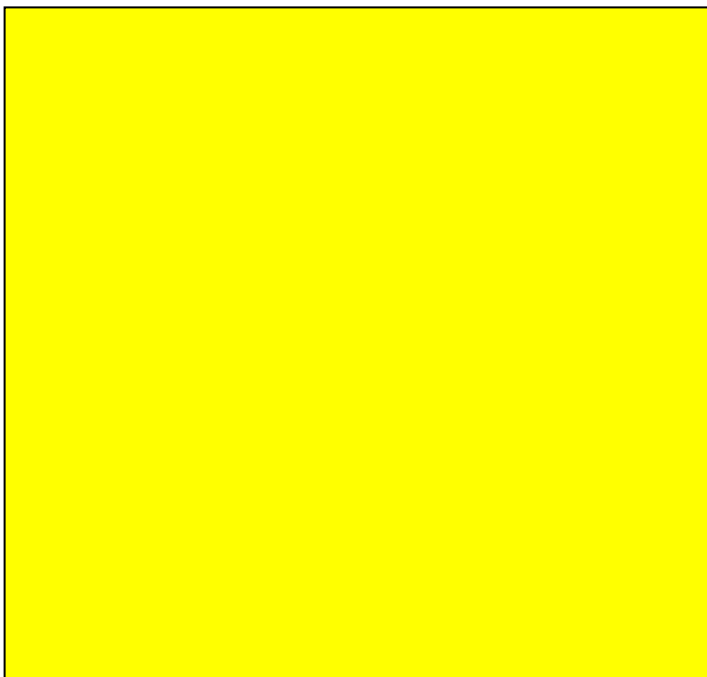
- ◆ humankind \_\_\_\_\_  
\_\_\_\_\_
- ◆ the environment \_\_\_\_\_  
\_\_\_\_\_
- ◆ wildlife \_\_\_\_\_  
\_\_\_\_\_

Explain the difference between deterministic and stochastic effects.

\_\_\_\_\_  
\_\_\_\_\_

	Nature of the risk	Magnitude of the risk	Measures required by law to minimize
nuclear power			
medical radiation			
background radiation			

REQUIREMENT 1b.) Draw and color the radiation hazard symbol.



USE IT: \_\_\_\_\_

DON'T USE IT: \_\_\_\_\_

Why should people use radioactive materials safely?

\_\_\_\_\_

How should people use radioactive materials safely?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

REQUIREMENT 2. Complete the open-book test on these terms. Numbers in parentheses are page numbers in the Nuclear Science merit badge book.

ALARA (78)	isotope (14)
alpha particle (31)	neutron (16)
atom (11)	nuclear energy (57)
background radiation (74)	nuclear reactor (55)
beta particle (31)	particle accelerator (24)
contamination (74)	rad and gray (69)
curie and becquerel (32)	radiation (27)
gamma ray (31)	radioactivity (28)
half-life (37)	radon (75)
ionization (14)	rem and sievert (69)
quark (19)	X-ray (27)

REQUIREMENT 3. Complete the open-book test on these famous scientists. Numbers in parentheses are page numbers in the Nuclear Science merit badge book.

Henri Becquerel (33)	Ernest Lawrence (53)
Niels Bohr (15)	Lise Meitner (53)
Marie Curie (32)	David Politzer (20)
Albert Einstein (49)	William Roentgen (27)
Enrico Fermi (51)	Sir Ernest Rutherford (14)
David Gross (20)	Glenn Seaborg (53)
Otto Hahn (53)	Rosalyn Yalow (41)
	Frank Wilczek (20)

REQUIREMENT 4: Choose an element from the periodic table. Construct 3-D models for the atoms and 3 isotopes of this element. Show protons, neutrons and electrons.

Explain the difference between atomic number and mass number

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REQUIREMENT 4a. Make a drawing showing how nuclear fission happens. Label all details.

Draw a second picture showing how a chain reaction could be started and stopped. Show what is meant by "critical mass".

REQUIREMENT 4b. Explain what is meant by "critical mass."

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REQUIREMENT 5c. Using a radiation survey meter and a radioactive source, show how the measurements per minute change as the source gets closer to or farther from the radiation detector. Place three different kinds of materials between the source and the detector.

Explain any differences in the measurements per minute.

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Explain how time, distance, and shielding can reduce the radiation dose.

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REQUIREMENT 5e:

Describe how radon is detected in homes.

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Discuss the steps taken for the long-term and short-term test methods

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Why is radon gas a health concern?

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What steps can be taken to reduce radon in buildings?

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REQUIREMENT 5f: Visit a place where X ray is used. Draw a floor plan of the room in which it is used. Show where the unit, the person who runs it, and the patient would be when it is used.

Radiation dangers from X rays:

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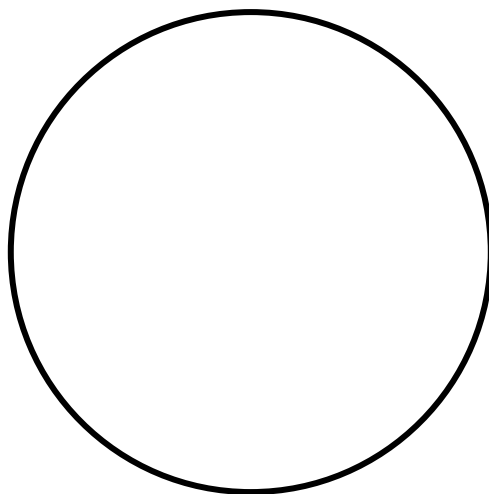
REQUIREMENT 6:

How many nuclear power plants exist in the United States? \_\_\_\_\_

Locate the one nearest your home: \_\_\_\_\_

What percentage of electrical power is generated by:

nuclear power    coal    oil    gas    hydroelectric    other



REQUIREMENT 7: List 3 career opportunities in Nuclear Science.

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For one of these \_\_\_\_\_, give:

- ◆ Education required \_\_\_\_\_
- ◆ Training required \_\_\_\_\_
- ◆ Experience required \_\_\_\_\_