

Name: _____

Period: _____

Seat#: _____

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website...and the entire internet! See me if you need help finding practice on a topic you are struggling with.

Article about Wild Boar in Germany Being Radioactive:

<https://tinyurl.com/mwv2f3yu>



Write nuclear symbols for the following isotopes:

1) lead-208	2) helium-5	3) potassium-40	4) What is the nuclear symbol for an isotope of rubidium with 50 neutrons?
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Complete the following nuclear equations:

5) ${}^7_3\text{Li} + {}^1_1\text{H} \rightarrow ?$	6) ${}^3_1\text{H} + {}^2_1\text{H} \rightarrow ? + {}^1_0\text{n}$	7) ${}^{26}_{12}\text{Mg} + {}^1_0\text{n} \rightarrow ? + {}^0_{+1}\beta$
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Write nuclear equations for the following processes:

8) Ra-226 decays by α -emission	9) The result of the β -decay of an isotope is Mg-22
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Write nuclear equations for the following isotopes undergoing alpha decay:

10) ${}^{227}_{91}\text{Pa}$	11) ${}^{231}_{91}\text{Pa}$	12) ${}^{233}_{92}\text{U}$	13) ${}^{237}_{93}\text{Np}$	14) ${}^{239}_{94}\text{Pu}$
15) ${}^{241}_{95}\text{Am}$	16) ${}^{240}_{96}\text{Cm}$	17) ${}^{247}_{97}\text{Bk}$	18) ${}^{251}_{98}\text{Cf}$	19) ${}^{252}_{99}\text{Es}$
20) ${}^{257}_{100}\text{Fm}$	21) ${}^{255}_{101}\text{Md}$	22) ${}^{255}_{102}\text{No}$	23) ${}^{256}_{103}\text{Lr}$	

Write nuclear equations for the following isotopes undergoing beta decay:

24) ${}^{16}_7\text{N}$	25) ${}^{19}_8\text{O}$	26) ${}^{20}_9\text{F}$	27) ${}^{24}_{10}\text{Na}$	28) ${}^{32}_{15}\text{P}$
29) ${}^{35}_{14}\text{S}$	30) ${}^{42}_{19}\text{K}$	31) ${}^{52}_{26}\text{Fe}$	32) ${}^{60}_{27}\text{Co}$	33) ${}^{82}_{35}\text{Br}$
34) ${}^{90}_{38}\text{Sr}$	35) ${}^{99}_{43}\text{Tc}$	36) ${}^{131}_{53}\text{I}$	37) ${}^{137}_{55}\text{Cs}$	38) ${}^{192}_{77}\text{Ir}$

Write nuclear equations for the following isotopes undergoing positron decay:

39) ${}^{23}_{12}\text{Mg}$	40) ${}^{25}_{13}\text{Al}$	41) ${}^{27}_{14}\text{Si}$	42) ${}^{30}_{15}\text{P}$	43) ${}^{30}_{16}\text{S}$
44) ${}^{37}_{19}\text{K}$	45) ${}^{39}_{20}\text{Ca}$	46) ${}^{42}_{21}\text{Sc}$	47) ${}^{45}_{22}\text{Ti}$	48) ${}^{54}_{27}\text{Co}$
49) ${}^{60}_{29}\text{Cu}$	50) ${}^{81}_{30}\text{Zn}$	51) ${}^{83}_{38}\text{Sr}$	52) ${}^{68}_{31}\text{Ga}$	

Multiple Choice Practice

- 53) Gamma rays are emanations that have
 a) mass but no charge
 b) charge but no mass
 c) neither mass nor charge
 d) both mass and charge
- 54) If 3.0 grams of ^{90}Sr in a rock sample remained in 1989, approximately how many grams of ^{90}Sr were present in the original rock sample in 1933? Half life of Sr is 28.8 yrs
 a) 9.0 g
 b) 6.0 g
 c) 3.0 g
 d) 12 g
- 55) Which of the following particles has the greatest mass?
 a) an alpha particle
 b) a beta particle
 c) a proton
 d) an electron
- 56) After 30 days, 5.0 grams of a radioactive isotope remains from an original 40. gram sample. What is the half life of this element?
 a) 5 days
 b) 10 days
 c) 15 days
 d) 20 days
- 57) A mixture of emanations from radioactive atoms is passed through electrically charged plates. Emanation #1 is attracted to the negative plate, #2 is attracted to the positive plate, and #3 goes straight through undeflected. The nuclear emanations 1,2, and 3 are called, respectively,
 a) alpha, beta, and gamma
 b) beta, gamma, and alpha
 c) gamma, alpha, and beta
 d) gamma, beta, and alpha
- 58) In the reaction $^{75}_{33}\text{As} + X \rightarrow ^{78}_{35}\text{Br} + ^1_0n$, X represents
 a) an alpha particle
 b) a beta particle
 c) a proton
 d) a triton
- 59) To determine the age of organic material, which ratio needs to be determined?
 a) ^{14}C to ^{12}C
 b) ^{14}N to ^{13}N
 c) ^2H to ^1H
 d) ^{238}U to ^{235}U
- 60) Given the reaction: $^{24}_{11}\text{Na} \rightarrow ^{24}_{12}\text{Mg} + ^0_{-1}e$ This reaction is best described as
 a) alpha decay
 b) beta decay
 c) fission
 d) fusion
- 61) In a nuclear reactor, the speed of neutrons is reduced by use of
 a) control rods
 b) an accelerator
 c) a moderator
 d) a detector
- 62) $^{234}_{90}\text{Th} \rightarrow ^{234}_{91}\text{Pa} + X$, which particle is presented by X?
 a) $^0_{-1}e$ c) ^1_1H
 b) ^4_2He d) $^0_{+1}e$
- 63) A sample of ^{134}I decays to 1.0 gram in 40. days. What was the mass of the original sample? Half life is 8.02 days
 a) 8.0 g
 b) 16 g
 c) 32 g
 d) 4.0 g
- 64) The half life of a radioactive isotope is 20.0 minutes. What is the total amount of a 1.00-gram sample of this isotope remaining after 1.00 hour?
 a) 0.500 g
 b) 0.333 g
 c) 0.250 g
 d) 0.125 g
- 65) $^9_4\text{Be} + ^1_1\text{H} \rightarrow ^4_2\text{He} + X$ Which species is by X?
 a) ^8_3Li c) ^8_5B
 b) ^6_3Li d) $^{10}_5\text{B}$
- 66) Which statement best describes a primary occurrence in an uncontrolled fission reaction?
 a) Mass is created and energy is released.
 b) Mass is created and energy is stored.
 c) Mass is converted to energy, which is released.
 d) Mass is converted to energy, which is stored.
- 67) Which nuclear equation represents a fusion reaction?
 a) $^{238}_{92}\text{U} + ^1_0n \rightarrow ^{239}_{93}\text{Np} + ^0_{-1}e$
 b) $^{235}_{92}\text{U} + ^1_0n \rightarrow ^{92}_{36}\text{Kr} + ^{141}_{56}\text{Ba} + ^1_0n$
 c) $^{14}_6\text{C} \rightarrow ^{14}_7\text{N} + ^0_{-1}e$
 d) $^1_1\text{H} + ^2_1\text{H} \rightarrow ^3_2\text{He}$
- 68) Which nuclear equation in question #67 represents a fission reaction?