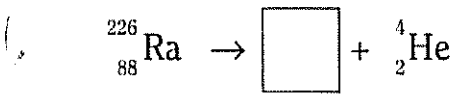
Name: _____

Class/Lab Period: _____

Nuclear Equations Worksheet

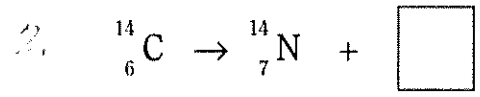
Identify the missing atomic nuclei or radiation particles in the following nuclear equations:

1. Alpha decay of radium-226, the most abundant isotope of radium



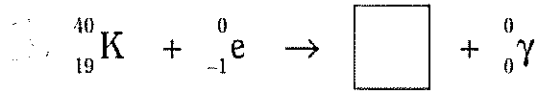
$$^{226}_{88}\mathrm{Ra} \rightarrow \square + {}^{4}_{2}\mathrm{He}$$

2. Radioactive decay of carbon-14, which is used in radiocarbon dating



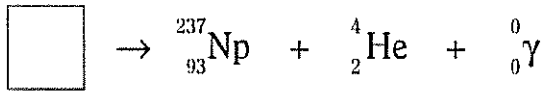
$$^{14}_{6}\mathrm{C} \rightarrow {}^{14}_{7}\mathrm{N} + \square$$

3. "Electron capture" by potassium-40, a natural source of radiation in the human body



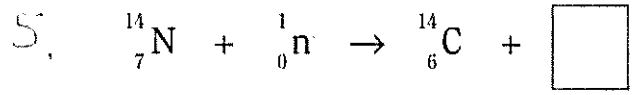
$$^{40}_{19}\mathrm{K} + {}^{0}_{-1}\mathrm{e} \rightarrow \square + {}^{0}_{0}\gamma$$

4. Alpha decay of the artificially produced radioisotope that is used in smoke detectors



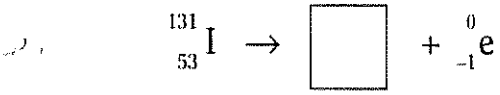
$$\square \rightarrow {}^{237}_{93}\mathrm{Np} + {}^{4}_{2}\mathrm{He} + {}^{0}_{0}\gamma$$

5. Formation of radioactive carbon-14 in the upper atmosphere by reaction with cosmic rays



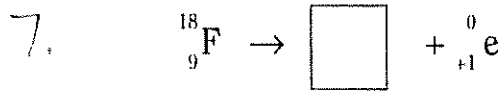
$$^{14}_{7}\mathrm{N} + {}^{1}_{0}\mathrm{n} \rightarrow {}^{14}_{6}\mathrm{C} + \square$$

6. Beta decay of iodine-131, which is used to treat thyroid cancer



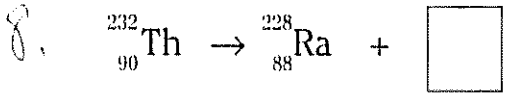
$$^{131}_{53}\mathrm{I} \rightarrow \square + {}^{0}_{-1}\mathrm{e}$$

7. "Positron" emission by fluorine-18, which is used in PET scans to study brain function



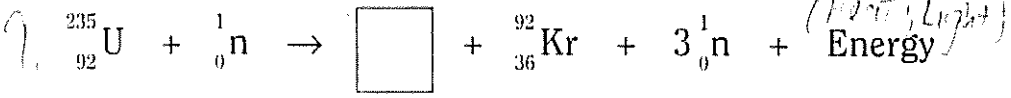
$$^{18}_{9}\mathrm{F} \rightarrow \square + {}^{0}_{+1}\mathrm{e}$$

8. Radioactive decay of thorium-232 used in incandescent gas "lantern mantles"



$$^{232}_{90}\mathrm{Th} \rightarrow {}^{228}_{88}\mathrm{Ra} + \square$$

9. "Fission reaction" of uranium-235 in a nuclear reactor



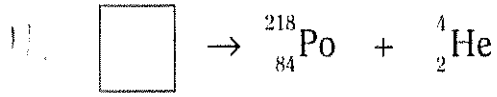
$$^{235}_{92}\mathrm{U} + {}^{1}_{0}\mathrm{n} \rightarrow \square + {}^{92}_{36}\mathrm{Kr} + 3\,{}^{1}_{0}\mathrm{n} + \text{Energy}$$

(Heat, Light)

10. "Fusion reaction" of hydrogen isotopes—the principal source of energy production in the Sun

$$^{3}_{1}\mathrm{H} + {}^{2}_{1}\mathrm{H} \rightarrow \square + {}^{1}_{0}\mathrm{n} + \text{Energy}$$

11. Alpha decay of the most abundant source of natural background radiation



$$\square \rightarrow {}^{218}_{84}\mathrm{Po} + {}^{4}_{2}\mathrm{He}$$