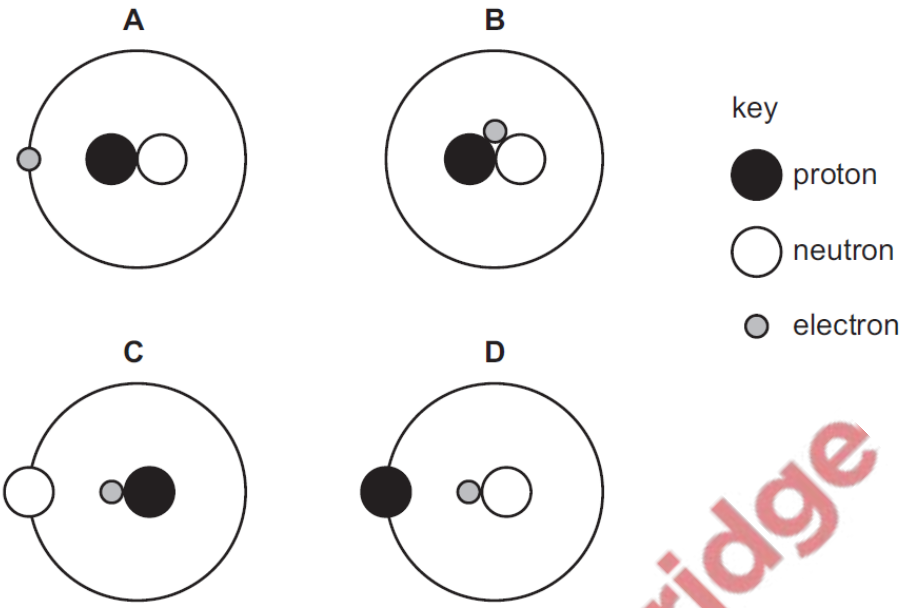
Radioactivity – 2019 Nov

1. 0625/11,21/O/N/19/No.37

Which diagram shows a possible structure of a neutral atom?



2. 0625/11/O/N/19/No.38

A nuclide of cobalt contains 27 protons and 32 neutrons.

Which symbol represents this nuclide?

A $^{27}_{59}Co$ **B** $^{32}_{27}Co$ **C** $^{32}_{59}Co$ **D** $^{59}_{27}Co$

3. 0625/11/O/N/19/No.39

An isotope of radon is radioactive. It decays by emitting an α-particle.

What happens to the nucleus of a radon atom during the emission of the α-particle?

A It becomes the nucleus of a different isotope of radon with fewer neutrons.

B It becomes the nucleus of a different isotope of radon with more neutrons.

C It becomes the nucleus of an element with a higher proton number.

D It becomes the nucleus of an element with a lower proton number.

4. 0625/11/O/N/19/No.40

Why are some radioactive sources stored in boxes made from lead?

A Lead absorbs emissions from the radioactive sources.

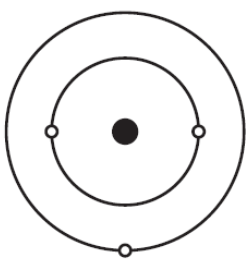
B Lead decreases the half-life of radioactive sources.

C Lead increases the half-life of radioactive sources.

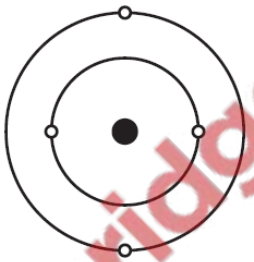
D Lead repels emissions from the radioactive sources.

5. 0625/12,22/O/N/19/No.37

The diagrams show the simple atomic structure for two neutral atoms X and Y of different elements.



X



Y

Which row is correct?

	atom with more electrons	atom with a more positively charged nucleus
A	X	X
B	X	Y
C	Y	X
D	Y	Y

6. 0625/12/O/N/19/No.38

A nuclide of chlorine has the symbol shown.

$$^{35}_{17}Cl$$

What is the nucleon number of this nuclide of chlorine?

A 17 **B** 18 **C** 35 **D** 52

7. 0625/12/O/N/19/No.39

Which type of radiation can be stopped by a sheet of paper?

A α-particles

B β-particles

C γ-rays

D X-rays

8. 0625/12/O/N/19/No.40

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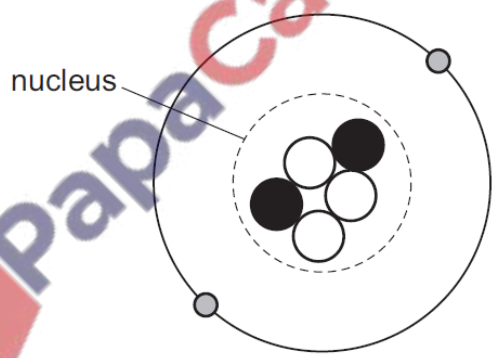
9. 0625/13,23/O/N/19/No.37,38

The diagram represents a neutral atom.



Which row identifies each type of particle in the diagram?

	●	○	●
A	electron	neutron	proton
B	electron	proton	neutron
C	neutron	electron	proton
D	proton	electron	neutron

10. 0625/13/O/N/19/No.38

An iron nuclide is represented by the symbol shown.

$$^{56}_{26}Fe$$

Which statements about a nucleus of this iron nuclide are correct?

1 The nucleus contains 56 neutrons.

2 The nucleon number is 30.

3 The proton number is 26.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 3 only

11. 0625/13/O/N/19/No.39

Three types of radiation that can cause ionisation are α-, β- and γ-radiation.

Which row identifies the least and the most ionising of these radiations?

	least ionising	most ionising
A	α	β
B	α	γ
C	γ	β
D	γ	α

12. 0625/13,23/O/N/19/No.40,38

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13. 0625/21/O/N/19/No.38

The scattering of particles by a thin gold foil provided scientists with evidence for the nuclear atom.

Which particles were scattered by the gold nuclei in the thin foil?

A α-particles

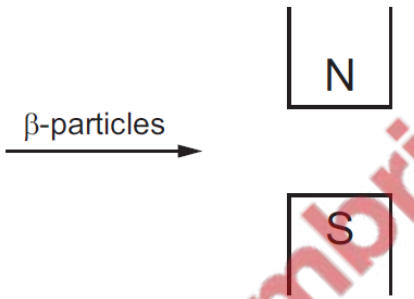
B β-particles

C neutrons

D protons

14. 0625/21/O/N/19/No.39

The diagram shows β-particles being directed between the poles of a magnet.



In which direction will the particles be deflected?

A into the page

B out of the page

C towards the bottom of the page

D towards the top of the page

15. 0625/21/O/N/19/No.40

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16. 0625/22/O/N/19/No.38

Plutonium-238 decays by the emission of an α-particle.

Which equation represents the decay of a plutonium-238 nucleus?

A $^{238}_{94}Pu \rightarrow {}^{238}_{95}U + {}^{0}_{-1}\alpha$

B $^{238}_{94}Pu \rightarrow {}^{234}_{92}U + {}^{4}_{2}\alpha$

C $^{238}_{94}Pu \rightarrow {}^{234}_{92}U + {}^{2}_{4}\alpha$

D $^{238}_{94}Pu \rightarrow {}^{242}_{96}U + {}^{4}_{2}\alpha$

17. 0625/22/O/N/19/No.39

A radioactive isotope has a half-life of 8 days.

A detector close to a sample of this isotope gives a count rate of 200 counts per minute. Without the source, the background count is 20 counts per minute.

What is the count rate due to the source after 8 days?

A 80 counts per minute

B 90 counts per minute

C 100 counts per minute

D 110 counts per minute

18. 0625/22/O/N/19/No.40

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19. 0625/23/O/N/19/No.39

A thin metal foil is placed in a vacuum. α-particles are fired at the foil and most go straight through. A very small proportion of the α-particles are deflected through large angles.

What does this provide evidence for?

A α-particles are very small.

B There are negative electrons in each atom.

C There is a tiny nucleus in each atom.

D There are neutrons in each atom.

20. 0625/23/O/N/19/No.40

The background count rate measured by a radiation counter is 40 counts per minute.

With the counter close to a radioactive source, the counter reading is 960 counts per minute.

The half-life of the source is 20 minutes.

What is the counter reading one hour later?

A 115 counts per minute

B 120 counts per minute

C 155 counts per minute

D 160 counts per minute