Year 9 Science: Mass number, electron shells and valence electrons

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Aluminium-27 has atomic number 13. How many protons, neutrons and electrons does a neutral atom have?

2. Write the electron arrangement for sulfur, atomic number 16.

3. Potassium has atomic number 19. How many valence electrons does it have, and in which shell?

4. Fluorine is 2,7. Will it tend to lose or gain electrons, and how many?

5. Why is it harder to recycle helium than to recycle copper?

Fix the mistake

6. Correct this statement: "The mass number of chlorine-35 means it has 35 neutrons."

7. Correct this statement: "Potassium is 2,8,9, because the third shell can take more electrons."

8. Correct this statement: "Chlorine is in group 17, so it has 7 electrons."

9. Correct this statement: "Sodium loses an electron, so it becomes a negative ion."

Answer key (for parents and tutors)

1. Aluminium-27 has atomic number 13. How many protons, neutrons and electrons does a neutral atom have?
   13 protons, 14 neutrons (27 − 13), 13 electrons.
2. Write the electron arrangement for sulfur, atomic number 16.
   2,8,6.
3. Potassium has atomic number 19. How many valence electrons does it have, and in which shell?
   One valence electron in the fourth shell, because the arrangement is 2,8,8,1.
4. Fluorine is 2,7. Will it tend to lose or gain electrons, and how many?
   Gain 1, since one more electron fills its outer shell, while losing 7 would take far more energy.
5. Why is it harder to recycle helium than to recycle copper?
   Copper stays in the wire or pipe and can be collected and melted down, but released helium escapes into the air and then into space.
6. Correct this statement: "The mass number of chlorine-35 means it has 35 neutrons."
   The mass number counts protons and neutrons together, so neutrons = 35 − 17 = 18.
7. Correct this statement: "Potassium is 2,8,9, because the third shell can take more electrons."
   For the first 20 elements the third shell holds 8 before the fourth starts, so potassium is 2,8,8,1.
8. Correct this statement: "Chlorine is in group 17, so it has 7 electrons."
   Chlorine has 17 electrons, arranged 2,8,7; the 7 is only the number in its outer, valence shell.
9. Correct this statement: "Sodium loses an electron, so it becomes a negative ion."
   Losing a negative electron leaves 11 protons and 10 electrons, so sodium becomes a positive ion, Na^+.