# Worksheet 1.2: Solutions
# Revisiting atomic structure

| No. | Answer |
|---|---|
| **1** | 33 protons, 38 neutrons, 30 electrons |
| **2** | $Na^+$ or $Na^+$ |
| **3** | 34 protons, 44 neutrons, 36 electrons |
| **4** | 6 + (3 × 8) = 30 protons, 32 electrons |
| **5** | **A** and **D** |
| **6** | **a** 2, 8, 8, 2<br>**b** 2, 8, 8<br>**c** 2, 8<br>**d** This ion has no electrons. |
| **7** | $F^-$, $O^{2-}$, $N^{3-}$ |
| **8** | Period 3, group 13 |
| **9** | Each of these elements has 4 electrons in its outermost shell (i.e. 4 valance electrons) |
| **10** | **a** Lower<br>**b** Higher<br>**c** Lower |
| **11** | 5 valence electrons (a much larger amount of energy is required to remove the sixth electron compared to the fifth electron) |
| **12** | The magnesium atom has 12 protons and a configuration of 2, 8, 2.<br>The sulfur atom has 16 protons and a configuration of 2, 8, 6.<br>The outermost electrons are in the same third shell for both atoms; however, these electrons are attracted to the nucleus by a larger positive charge in the sulfur atom than in the magnesium ion. The sulfur atom will therefore have a smaller radius than the magnesium atom. |

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| **13** | The oxygen atom has 8 protons and a configuration of 2, 6.<br>The sulfur atom has 16 protons and a configuration of 2, 8, 6.<br>The outermost electrons are in the second shell for oxygen and in the third shell for sulfur. On average, the electrons in the third shell are further from the nucleus than electrons in the second shell. Sulfur will therefore be a larger atom. (The core charge is the same, +6, for both atoms.) |
| **14** | The magnesium atom has 12 protons and a configuration of 2, 8, 2.<br>The magnesium ion has 12 protons and a configuration of 2, 8.<br>For the magnesium atom, the outermost electrons are in the third shell but for the ion, its outermost electrons are only in the second shell. The positive ion will therefore be smaller than the neutral atom. |