| Day 139 | S Tier 10-a-day |
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| **1** Each interior angle of a regular polygon is 165°.<br>Work out the number of sides of the polygon. | |
| **2** 100 deer in a forest are caught, marked and put back.<br>Later, a second sample of 20 deer is caught. 5 of these are marked.<br>(a) Work out an estimate for the number of deer in a forest.<br>(b) State one assumption you have made. | |
| **3** Zip Taxis has a fixed charge of £3.50 plus £5.50 per mile.<br>Go Cabs has a fixed charge of £35 plus £1 per mile.<br>(a) Work out the number of miles for which the two costs are the same.<br>(b) Which is cheaper for 14 miles, and by how much? | |
| **4** Expand and simplify $(5 + \sqrt{5})(4 + 2\sqrt{5})$<br>Give your answer in the form $p + q\sqrt{5}$ | |
| **5** 24 machines can make a batch of bolts in 24 hours.<br>After 4 hours, 8 of the machines leave. The rest carry on working at the same rate.<br>How many more hours does it take to finish? | |

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| **6** The radius of a sphere is increased by 10%.<br>Work out the percentage change in the volume of the sphere. | |
| **7** An alloy contains 316 g of iron and 108 g of aluminium.<br>The density of iron is 7.9 g/cm$^3$. The density of aluminium is 2.7 g/cm$^3$.<br>Work out the density of the alloy. | |
| **8** Show that the equation $x^2 + 2kx - 5 = 0$ has two distinct real solutions for all values of k. | |
| **9** Solve $2 \sin x = \sqrt{3}$ for $0° \leq x \leq 360°$.<br>Do not use a calculator. | |
| **10** In one country, income tax is worked out like this:<br>The first £15,000 of income is not taxed.<br>The next £20,000 is taxed at 20%.<br>All income above that is taxed at 40%.<br>Nia pays £18,600 in income tax in a year.<br>Work out Nia's income for the year. | |