| Day 62 | A Level Maths: B Tier 10-a-day |
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| **1** The continuous random variable X has pdf f(x) $= \frac{3x^2}{8}$ for $0 \leq x \leq 2$, and 0 otherwise.<br>(a) Find P(X > 1).<br>(b) Find the median of X, to 3 significant figures. | |
| **2** A van of mass 2000 kg moves along a straight horizontal road. The engine produces a driving force of 2400 N and the resistance to motion is 600 N.<br>Find the acceleration of the van. | |
| **3** y = f(x) has a maximum point at (6, −4).<br>Find the turning point on the curve:<br>(a) y = f(3x) (b) y = f(x) − 3<br>(c) y = f(−x) | |
| **4** Customers arrive at a shop at random at an average rate of 2.5 per hour.<br>Find the probability that in 45 minutes there are exactly 3 (3 s.f.). | |
| **5** Expand and simplify $(2 + 3\sqrt{2})(-1 + 4\sqrt{2})$, giving your answer in the form $a + b\sqrt{2}$. | |

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| **6** Solve $\ln(5x + 2) = 2$, giving your answer to 3 s.f. | |
| **7** A new car costs £20000. Its value falls by 15% each year.<br>(a) Find its value after 3 years (nearest £).<br>(b) In which year does it first fall below £8000? | |
| **8** Particles A (2 kg) and B (6 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 5 m above the ground, then released.<br>Take $g = 9.8$ m $s^{-2}$.<br>Find the speed with which B hits the ground. | |
| **9** The variables x and y satisfy $y = Ae^{kx}$. A graph of ln y against x is a straight line through (0, 1.5) and (4, 3.1).<br>Find A to 3 s.f. and k. | |
| **10** The function $f(x) = x^3 - 1x - 8$.<br>Show that $f(x) = 0$ has a root between $x = 2$ and $x = 2.5$. | |